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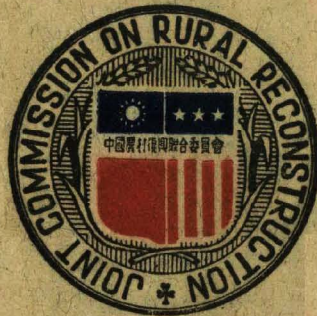
**A PRELIMINARY STUDY OF FARM
IMPLEMENTS USED IN TAIWAN PROVINCE**

By

Fengchow C. Ma

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TAIPEI, TAIWAN, CHINA

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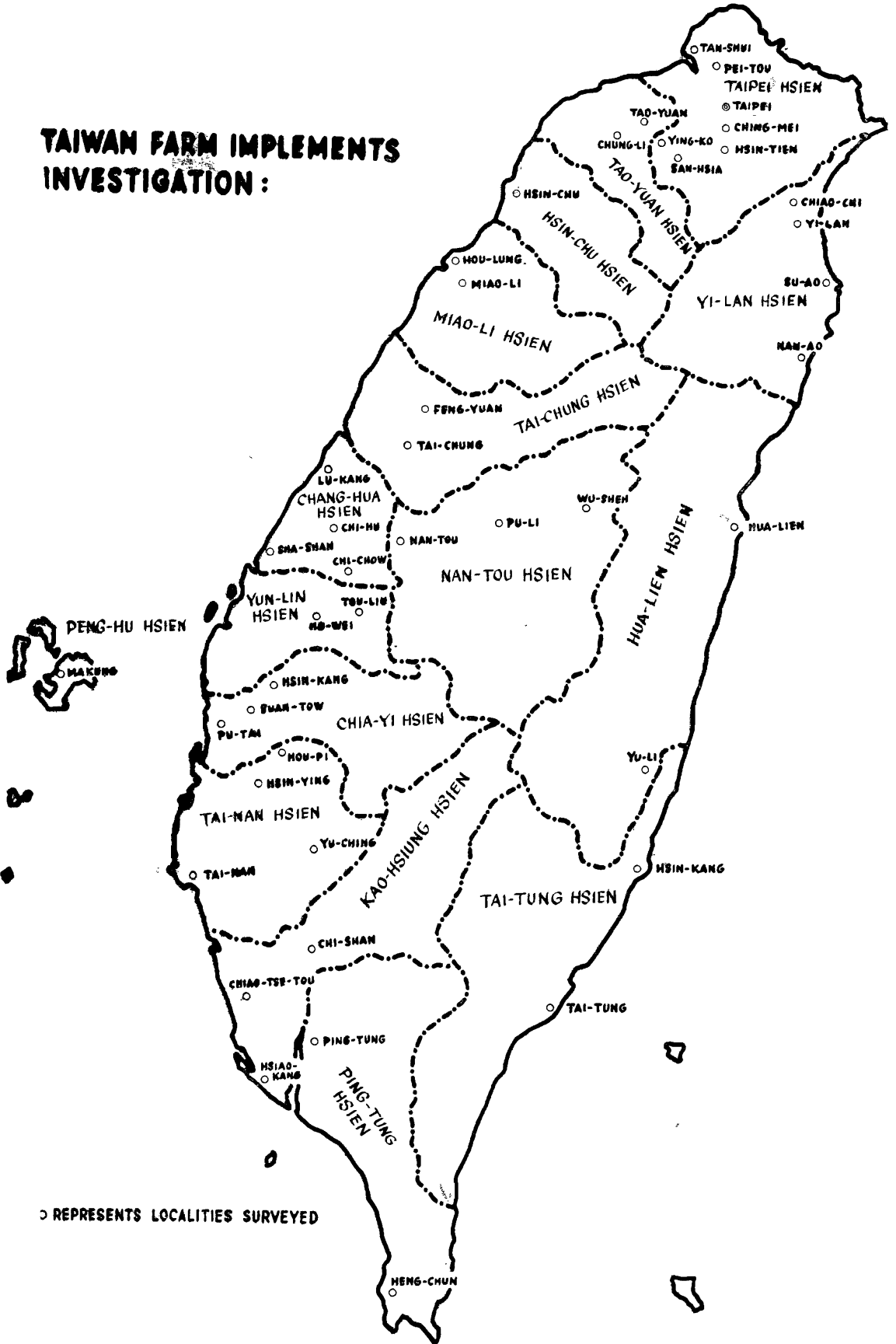
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TAIWAN FARM IMPLEMENTS INVESTIGATION:



○ REPRESENTS LOCALITIES SURVEYED

Notes to the Readers

1. This is the report of a project, "Investigation of Farm Implements in Taiwan" initiated and financed by the Joint Commission on Rural Reconstruction (JCRR) in 1952 (JCRR project code number: TW-A-235) and carried out during 1952 and 1953. The field-survey was carried out by members of the Department of Agricultural Engineering, National Taiwan University. The local farmers' associations, and sugarcane plantations operated by Taiwan Sugar Corporation and other interested individuals all contributed much to the success of this survey.
2. All the farm implements mentioned in this report have a history of usage of over ten years in Taiwan. However, those recently introduced large and powered farm machineries, being profitably employed in agricultural enterprises, are also included herein.
3. Many farm implements can be used for multiple purposes. In this report farm implements are grouped together according to their principal usage. For example, local plows are being used to plough crop fields, open new ground, make planting furrows, dig sweet potatoes, build ridges, etc. Hoes are employed in nearly every farm operation, but are classified as land-preparation implement.
4. The names of farm implements vary with different localities. In all cases, the most commonly used name is adopted; it is translated into English.
5. The price, weight, and seasonal usage of those farm implements investigated differ in different localities. Only their mode is taken as representative.
6. The design and specification of one particular kind of farm implement might differ with localities, manufactures, or habitual uses of individual farmers. Only the most common ones are included. Blue-prints and photographs are sometimes employed for purpose of clarification.
7. The length of service life of a farm implement depends largely upon the extent of care and maintenance given by its user, as well as frequency of use, etc. The efficiency of a farm implement also depends upon the nature of soil cultivated, the type of work done and the diligence of men or animals used; their value cannot be arbitrarily gauged.
8. Evaluation of a given farm implement, showing its merits and demerits, is given in this report.

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PART ONE
STUDY OF TAIWAN FARM IMPLEMENTS

Introduction

As agricultural conditions change with the passage of time, it seems that a timely improvement of farm implements to meet the current need is imperative. Nevertheless, farm implements used today in China are still very primitive. Much resemblance is found between farm implements in current use and those recorded in our ancient history. In the chapter of "On the Grains" (乃粒) written by Soong Ying Hsing (宋應星) in his book entitled "The Lord Creates Everything" (天工開物), a description of farm implements used at the end of Ming Dynasty indicates that many farm implements in use today are almost the exact replica of those of old times. It is safe to say that farm implements in China have not changed much in the past 400 years. This does not imply, however, that our farm implements are so perfect that no further improvements are necessary.

1. Shortcomings of Conventional Chinese Farm Implements.

LAND-PREPARATION IMPLEMENTS

There are two successive operations for completing the process of land preparation, namely first, to plow and turn over the soil; and second, to pulverize the soil and prepare seed-bed for planting. Plows and harrows are the two types of implements used.

The plowshare of a Chinese plow is triangular in shape and looks like a sharp tongue; it cuts a plow furrow deeper in the center and raised on the sides. Crop roots would not develop evenly in a seed-bed so prepared. To correct this situation by overlapping plow furrows would involve a considerable waste of power and time. Chinese plows also do not have parts corresponding to the landside of the Western plows; therefore, it cannot resist side pressure imposed upon moldboard from turning of furrow slices, thus making plowing a cumbersome job to farmers. The moldboard is only a cast iron disk, sometimes an oval board, so it is not efficient in turning soil and gives almost no pulverizing effect at all.

The harrows customarily used in China are serviceable. However, their teeth are too short; spaces between teeth are too wide; shape of teeth are not uniform; and arrangement of teeth is not so dovetailed in the direction of travel. Although the above points cannot be considered as serious defects, their effects on working efficiency are within our expectations.

INTERTILLING IMPLEMENTS

There is a great shortage of intertilling tools in Chinese farm implements. Although the main source of power for farming in China comes from draft animal, yet very few animal-drawn intertilling implements, up to now, are available. Hoes alone are used for intertilling on the uplands. On paddy fields, farmers have even less suitable implements to operate. For instance, in Fukien and Taiwan Provinces, farmers kneel in the fields and weed with bare hands. A more thorough job of weeding and earthing could thus be accomplished, but the efficiency is low and farmers get exhausted easily.

FERTILIZER APPLICATION IMPLEMENTS

Fertilizer application in China is mostly carried out by human labor. Implements such as spades, forks and carrying pans are used to distribute compost manure. Bucket, ladles, and others are used for applying liquid night soil. They are low in working efficiency. Fertilizer thus applied is scattered all over the surface of the field and is much wasted.

IRRIGATION IMPLEMENTS

Farmers everywhere in China use well-water lifting bucket (pillar-balance type), dragon pumps, windlass pump or water wheels to irrigate fields. Their speed is slow and efficiency is low. In time of drought, farmers have to work very hard in order to get a scanty supply of water.

HARVESTING IMPLEMENTS

Besides hand-pulling and hand-picking, Chinese farmers use sickles or scythes to gather crops above ground. The work is hard and efficiency is low. When a large area of crops ripens, many temporary helpers have to be hired and very often there is a shortage of labor force. Such is the condition prevailing in north China when wheat ripens and in south China when paddy rice is harvested. Hoes are generally used for harvesting root or tuber crops. Some use plow to open the ridges first and pick the tubers or roots successively; this, of course, is more efficient than digging with hoes, but it involves a great drain on human labor.

The points mentioned above represent only few salient features of the problem we are facing; they serve to illustrate the many defects of our farm implements. By and large, the defects are low efficiency and poor construction. If an increase in farm production is projected, the improvement of farm implements should invite immediate attention.

2. Survey of Taiwan Farm Implements

From the discussions above, the justification of and urgency in improving farm implements used in China today should be clearly recognized. There are two ways whereby our farm implements can be improved: one is by improving the local farm implements, and the other is by introducing new farm machineries developed abroad. Whatever may be the measure taken, a thorough understanding of the existing farm implements is deemed necessary. Farm implements in Taiwan Province were brought in by people from either Fukien Province or Kwangtung Province, with some changes made through recent influence of Japanese farm implements. Since we have no complete record on farm implements commonly used in these mainland provinces, an investigation on farm implements used in Taiwan Province will not only be helpful in the improvement of Taiwan farm implements, but will also provide a good reference for improving farm implements in the mainland provinces in the future.

In the early part of 1951, Mr. T. H. Chien, Commissioner of JCRR, was approached by Dr. R. W. Phillips and again by Dr. A. B. Lewis, both of FAO, for cooperation in supplying information about small farm implements and small farm machines particularly useful in China, to be used for comparative study in other member countries of FAO. Later in December, 1951, Mr. W. H. Fippin, Commissioner of JCRR, received a letter from Mr. Harold E. Schwartz, Agricultural Officer of U.S. Special Technical and Economic Mission to Cambodia, Laos and Vietnam, in which he expressed the importance of having more adequate farm equipment to increase the food production in Southeast Asia and suggested that all the interested parties in different missions should exchange sketches, photographs, descriptions, etc. of the farm implements used locally. He believed that there are improved tools in every area which would be helpful to other areas if they were made known. It is obvious, therefore, that a comprehensive survey on farm implements on Taiwan will not only collect the information we need, but will also be useful to those peace-loving countries that wish to ameliorate people's livelihood through agricultural improvement.

In April, 1952, JCRR commissioned the Agricultural Engineering Department of the College of Agriculture, National Taiwan University, to undertake a survey of Taiwan farm implements under the direction of Professor T. Takasaka. The important nature of this survey is to conduct a qualitative investigation of Taiwan farm implements current in use, but no attempt was made to include a quantitative study. In 1921 a similar investigation was undertaken and the results were presented in Japanese in a book on titled "Taiwan Farm Implements" (澁谷紀三郎: 台灣之農具). If the results of these two surveys were to be compared,

the conservatism of our agricultural population could soon be visualized. Local farm implements are primitive in construction but they have long dependable service record. Therefore, it would not be easy to replace them with new farm implements.

However, there were many improvements in the recent 30-odd years. For instance, the Taichung Regional Agricultural Improvement Station, in cooperation with the Isono Plow Factory of Japan, had developed the Isono type improved plow which has extensively used in Taiwan today. Takechi Manufactory of Kaohsiung developed Taiwan type improved plow and also the animal drawn subsoiling plow. Again Kido of Tainan invented the pedal-operating sweet potato slicer and the castor seed shelling machine. Chang Yu Pei devised the spike tooth cultivator; Lee Li created the disc-type Check-row closer spacing marker; and Wu Hsin and Wu Chi Chuan brothers invented the comb-shape rice borer catcher. These achievements are the landmarks in the progress of Taiwan farm implements and greatly inspire our farm implement improvement work.

Japanese farm implements had been imported to Taiwan in large quantity. Some of them such as the pedal operating rice thresher did exert remarkable influence. The thresher is now manufactured and sold everywhere in Taiwan but has to undergo many changes prior to its full acceptance by the Taiwan farmers. Japanese paddy field cultivators were also introduced into Taiwan, but did not gain much confidence from the farmers. The popular Taiwan improved plow has the general skeleton of a Japanese plow, but its detail specification has been changed to meet Taiwan farming requirements. This plow, although slightly poorer in performance ability, is easier in handling.

Since 1948, there has been a strong urge for improving farm implements to increase agricultural production in Taiwan. Manufacturers are eager to produce the implements to meet farmers' need in quality and in quantity, as evidenced by the supply of the pedal rice threshers and hand-operating sprayers and dusters. Joint effort is being made by the privately-owned enterprises, government agencies and JCRR to accelerate the program.

Farm Implements of Taiwan

1. Absence of Standard Nomenclature for Taiwan Farm Implements

Confusion arises when attempt was made to record the names of farm implements. Names may be handed down by mouth from father to son and farmers generally have no knowledge as to how to put them in written characters. There is much dispute on the proper characters for each implement. Often a farm implement is called by a name that has no connection whatsoever with the written characters. Sometimes, one name may be applied to several implements. On the other hand, one implement may have different names in variance with the passage of time, geographical localities, customs or recorder's interpretations.

Because of the absence of standard nomenclature, attempt is made in the following table to set up standard names for Taiwan farm implements both in English and Chinese (for Taiwan Province).

Table 1. Standard Nomenclature For Farm Implements

Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
1. Shovel	砂銚	鐵鍬，尖銚，土鏟，鏟仔
2. Post digger	鎗仔	土鎗仔，老鎗
3. Round shoulder spade	銅	舌削鏟
4. Tilling hoe	鋤頭公	鋤頭姑
5. Taiwan pick-axe	尖錐	錐嘴，鍬仔，半撒仔，尖嘴仔
6. Raking hoe	鐵托	鐵搭，四齒鎬，鐵耙，四齒，四齒耙仔
7. Hoe	鋤頭	鑿，大鎬，鋏
8. Heart-shaped hoe	砂爬	蒜鉤，猪屎，爬仔
9. Six-toothed rake	六齒耙仔	六齒爬仔，耙仔，鐵耙
10. Stubble trampler	草踏	
11. Paddy seed-bed trawel	鏟刀	秧仔，抹刀
12. Seedling spade	秧銚	秧刀
13. Seedling sickle	秧刈	
14. Seedling stool	秧頓仔	秧樸仔
15. Seedling board	秧砧仔	
16. Seedling basket	秧披	

	Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
17.	Seedling basket carrier	秧擔	
18.	Seedling tub	秧船	
19.	Seedling holder	秧枷	
20.	Check-row closer spacing marker (disc-type)	正條密植器 (車輪式)	播田輪仔
21.	Check-row closer spacing marker (rod-type)	正條密植器 (竹竿式)	播田格仔, 棚仔, 植田 竹竿
22.	Transplanting snapper	播田管仔	植田管
23.	Seeding pipe	胡麻管	麻管, 烏麻筒
24.	Cane seedling saw	側芽鋸	
25.	Cane planting hoe	插甘蔗掘仔	
26.	Planting trowel	銚仔	鏟仔, 花掙仔
27.	Short handle 3-tooth weeding rake	三爪	三爪耙, 三齒鏟
28.	Three-prong weeding hook	三齒	
29.	Two-prong weeding hook	二齒	二齒鏟
30.	Intertilling hoe	中耕鋤頭	
31.	Aborigines weed shaver	(Aborigines implement, no Chinese name)	
32.	Weed shaver	草爬仔	
33.	Point-head hoe (short handle)	尖頭掘仔	尖嘴掙仔
34.	Short handle hoe	手掘仔	小鋤
35.	Small hoe	爬仔	小鋤
36.	Weed shaving knife	除草刀	
37.	Weeding matchets	草掙	
38.	Weed chopper	手掙	草掙, 掙仔
39.	Ridge cutting knife	岸刀	田刀, 畔刀, 斬刀
40.	Weed smother	田草鏟	
41.	Rotary paddy cultivator	水田中耕除草器	豐年車, 田打車, 搜草 輪仔
42.	Plow share hoe	犁頭爬	
43.	Tea pruning shears	剪刀	加剪
44.	Paddy pusher	稻押仔	
45.	Banana chisel	芭蕉鑿仔	
46.	Banana knife	芭蕉刀	
47.	Water scoop	屎掬	擲斗
48.	Well water lifting bucket (Pillar blance type)	桔槔	
49.	Watering spray-bucket	撒桶	掙桶

Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
50. Watering spray pot	花撒	噴壺，如露，花掟，撒管
51. Dragon pump	龍骨水車	翻車，水車
52. Manure sieve	糞篩	
53. Manure fork	鐵叉	叉，虎骨，糞叉，草叉
54. Fertilizer chisel	施肥鐵鑽	
55. Night-soil barrel	肥桶	
56. Night-soil funnel	肥漏仔	
57. Night-soil ladle	尿撒	尿甌
58. Water carrying bamboo tube	竹水桶	
59. Calcium cyanamide applicator	石灰氮施用器	
60. Worm scoop	蟲撒	背尿龜仔撒，尿龜仔甌，竹撒，龜仔撒
61. Worm catcher	鐵釘仔排	青蟲除蟲器
62. Worm comb	蟲爪仔	蟲撒，蟲梳
63. Disinfection tub	消毒用桶	
64. Disinfection basket	消毒用籃	
65. Sprayer	噴霧器	噴霧機
66. Duster	噴粉器	撒粉器
67. Rice sickle	鐮厝仔	刈稻鐮刀，鐮仔
68. Rice threshing tub	撕桶	削桶，棘桶
69. Pedal rice thresher	脫穀機	機器桶，腳踏式迴轉脫穀機
70. Digging hoe	鏟仔	菜頭鏟，半斨仔，大鏟
71. Sugarcane hack-knife	甘蔗刀	蔗尾刀，甘蔗鏟仔
72. Harvesting hatchet	大搞	
73. Jute harvesting digger	黃麻鑿仔	黃麻鏟
74. Sweet-potato digging shovel	蕃薯掙	
75. Sweet-potato pick-axe	擡搭鏟	
76. Peanut harvesting knife	土豆揸	
77. Peanut basket	土豆籃	土豆披仔
78. Peanut sieve	土豆篩	
79. Tea-leaf basket	茶箕	
80. Grass sickle	鐮仔	刈草鐮，草搨
81. Hand rake	鐵耙	
82. Orange scissors	柑仔剪	柑剪
83. Bamboo shoot knife	筍刀	
84. Chaff sieve	穀篩	篩穀篩
85. Grain handling rake	穀爪仔	大把，木耙
86. Grain sweeper	穀杓	杓，木杓

Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
87. Grain sweeping board	大拖	刮板
88. Winnower (fanmill)	風鼓	颶扇，扇車
89. Rice huller	土礮	礮
90. Rice sieving screen	米漏	斜篩，萬石篩
91. Mortar and pestle	精白及杵	搗杵，精白槌
92. Tread mortar	脚踏精白	坭碓，鳥啄
93. Flail	連枷	工枷，枷仔，豆枷
94. Jute stripper	黃麻刀	麻鉋，麻刀
95. Rope twister	絞車	紡索仔台，索仔絞
96. Ramie decorticating knife	苧麻刀	
97. Sweet-potato slicer	番薯簽擦	菜擦，地瓜擦刀
98. Sweet-potato slicing machine	番薯簽機	番薯簽製造機，機器擦
99. Castor seed hulling machine	蓖麻脫壳機	
100. Tobacco air curing mat	菸簞	煙簞
101. Straw sandal looming stool	草鞋爬	
102. Straw-rope machine	製繩機	草索仔車
103. Bin	大桶	
114. Back carryiny hook frame	笨仔	粟笨
105. Grain-storing bamboo bin	茄籐	加榭，茄籐
106. Bawl-type storage hut	鼓亭笨	葫蘆笨，箐桶笨
107. Rice sweeper	扒不仔	爬不仔
108. Crop-drying mat	籐籬	古達
109. Mat tray	簸壺	拉壺
110. Grain basket	米籃	
111. Carrying pan	箕	颶箕，簸箕，車箕，粟箕，糞箕
112. Vegetable basket	菜籃	
113. Should carrying fork frame	柴馬仔	
114. Back carrying hock frame	柴措仔	
115. Back carrying board	背架	
116. Back carrying sack	背袋	
117. Back carrying basket	籐籠	
118. Rear cart	手拉車	
119. Rain shield	龜殼	龜背，覆殼
120. Coir rain coat	棕蓑	蓑
121. Conventional plow	在來犁	犁，臺灣犁，本島犁，和尚犁，允龜犁
122. Improved plow	改良犁	日本犁，深耕犁
123. Lister	培土用兩面犁	犂溝犁，雙犂犁
124. Subsoil plow	底軟犁	

	Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
125.	Plow cleaning scrapper (accessory for plow)	犁突	
126.	Comb harrow	手耙	抄，鐵耙
127.	Bamboo row-opening attach- ment (to be mounted on comb harrow)	竹管	
128.	Leveling pole (to be mounted on comb-harrow)	埤管	蓋筒，埤筒
129.	Knife tooth harrow	割耙	方耙，刈耙
130.	Bend frame knife tooth harrow	彎割耙仔	曲割耙仔，彎刈耙仔
131.	Flexible knife tooth harrow	軟骨割耙	貓鷄割耙
132.	Rectangular frame spike harrow	方形釘耙	合爪，方形耙磅
133.	Triangular frame spike harrow	三角釘耙	
134.	Paddy field pulverizing roller	礮礮	磅礮，碌礮，六毒，轆 軸，礮礮，礮礮，南部 稱草斬
135.	Pulverizing roller hook (acces- sory for pulverizing roller)	礮礮鉤	
136.	Bamboo harrow	竹叩齒	竹簧齒
137.	Stone roller	石輪	輓輪，礮礮
138.	Flexible bamboo plank	踏合仔	踏覆仔
139.	Soil scoop	土拖	
140.	Furrow cultivator	耙仔	犁耙仔，手耙仔，爪乞 犁，耙仔犁
141.	Prong cultivator	鐵拐耙	鐵拐犁，鐵杈犁
142.	Cultivator	蜈蚣犁	中耕器，鬆土器
143.	Between row knife tooth harrow	割耙仔	小刈耙
144.	Hoe plow	鋤頭犁	
145.	Ox-cart	牛車	
146.	Sled carrier	木馬	橇
147.	Yoke	牛擔	
148.	Evener	牛後蹠	耕架，牛後蹠，後蹠仔 ，後轆曳木
149.	Ox muzzle	牛嘴籠	
150.	Ox nose ring	牛鼻環	牛鼻串，牛鼻，牛鼻圈
151.	Whip	鞭仔	牛摔仔，迷仔
152.	Water wheel	筒車	水螞蟻，螞蟻車，筒水 車

	Standard English Name	Standard Chinese Name (for Taiwan Province)	Other Common Names
153.	Wind mill	風車	
154.	Water powered pestle	水碓	
155.	Steam plow	蒸汽犁	機器犁
156.	Centrifugal pump	抽水機	
157.	Power sprayer	動力噴霧器	
158.	Ramie decorticating machine	苧麻剝皮機	
159.	Casava mill	樹薯絞	
160.	Tractor (with all farming attachments)	曳引機	火犁

2. Classification of Taiwan Farm Implements.

Farm implements used in Taiwan can be classified by its usage as follows:

Table 2. **Kinds of Farm Implements Classified by Usage**

	Usage	implements Kinds of Farm	Percentage
1.	Land-preparation	31	19.4%
2.	Planting	16	10.0%
3.	Intertillage	21	13.1%
4.	Irrigation	8	5.0%
5.	Fertilizer application	8	5.0%
6.	Plant protection	8	5.0%
7.	Harvesting	18	11.3%
8.	Processing, grading and storage of products	29	18.1%
9.	Transportation	11	6.9%
10.	Outfit for draft animals	5	3.1%
11.	Miscellaneous usage	5	3.1%
	Total	160	100.0%

The above table shows that there is a great variety in land preparation implements. Intertillage implements rank second in variety; this is because Taiwan farm lands vary in topography, and particular intertillage implement is used on particular land. It is extremely rare to use several kinds of intertillage implements in area where the type of soil and crop grown are same. Harvesting implements rank third in the number of varieties. At the harvest time farmers have to reap harvest,

process crop product and prepare land at the same time. Consequently, more kinds of implements are employed to save labor. Although manure application is a year-round activity, yet the varieties of implements used, are very few. Most of the farmers use their bare hands to spread manure, or employ whatever implement is convenient at hand. This non-specific usage of farm implements is a notable feature in Taiwan, because the farm size is small and to procure a larger variety of implements is not economical.

The following table shows another method of classifying farm implements according to the objects they deal with.

Table 3. **Classification of Farm Implements According to the Object Dealt With**

Object dealt with	Kinds of Farm implements	Percentage
1. Soil	62	38.7%
A. Plows	6	
B. Harrows	11	
(1) Knife-tooth Harrow	5	
(2) Spike-tooth Harrow	6	
C. Rollers	3	
D. Levellers	5	
E. Spades and shovels	8	
(1) Large	4	
(2) Small	4	
F. Hoes	11	
(1) Large	6	
(2) Small	5	
G. Rakes	6	
H. Knives	5	
I. Other soil-managing implements	7	
2. Crops	45	28.1%
A. Sickle	4	
B. Knives	3	
C. Scissors	3	
D. Threshers	3	
E. Hulling and Polishing equipment	6	
F. Grading & cleaning equipment	6	
G. Potato processing equipment	3	

Object dealt with	Kinds of Farm implements	Percentage
H. Drying equipment	3	
I. Storage equipment	4	
J. Fibre processing equipment	6	
K. Miscellaneous	5	
3. Agricultural products (for moving and transportation)	22	13.8%
A. Basket etc. for carrying products while harvesting in the field	5	
B. Sweeper etc. for moving grain	3	
C. Equipment carried on back	5	
D. Baskets etc., using carrying pole for transportation	6	
E. Cart etc., transportation equipment	3	
4. Water (for irrigation)	8	5.0%
5. Fertilizers and manures (for distribution)	8	5.0%
6. Pest (for plant protection)	8	5.0%
7. Draft animal (for handling draft animal)	5	3.1%
8. Farmers (for protecting body against rain while working in the field)	2	1.3%
Total	160	100.0%

The above table shows that implements working on soil have the greatest variety; those working on crops rank second; and these two groups make up about two-thirds of all the varieties of farm implements in Taiwan. Items 4-8 occupy the other one third of the total.

One of the means to increase agricultural production is to employ more kinds of labor-saving implements. Since Items 4-8 contain only a few kinds, it signifies that more implements of these categories, such as pest control implements, fertilizer distributing implements, etc. should be introduced for trial purposes in Taiwan.

3. Origin of Taiwan Farm Implements.

The different kinds of farm implements are tabulated as follows according to its origin.

Table 4. **Kinds of Taiwan Farm Implements and Its Origin**

Usage	Conven- tionally Chinese	Tradi- tionally aboriginal	Introduced from Japan	Introduced from Western Countries	Originated in Taiwan	Origin unknown	Modelled from non- agri. tools	Total
Land-preparation	22	—	3	2	2	1	1	31
Planting	11	—	—	—	2	3	—	16
Intertillage	14	1	1	—	3	2	—	21
Irrigation	6	—	—	2	—	—	—	8
Plant protection	2	—	—	3	1	—	2	8
Fertilizer applica- tion	2	1	—	1	2	—	2	8
Harvesting	15	—	1	—	—	2	—	18
Processing grading and storage of products	24	—	1	1	2	1	—	29
Transportation	5	4	1	—	—	—	1	11
Outfit for draft animals	5	—	—	—	—	—	—	5
Miscellaneous	5	—	—	—	—	—	—	5
Total	111	6	7	9	12	10	6	160
Percentage	69.3	3.7	4.3	5.6	7.5	6.2	3.7	100.00

69.3% of Taiwan farm implements are exactly the same types used on the China Mainland. They are the heritages from the Chinese people who brought the implements along when they came to Taiwan centuries ago. The Aborigines have, however, a greater variety of transportation equipments. This is due to the fact that the Aborigines were originally hunters and lived a nomadic life. They did not have many farm implements of their own to cultivate land and what few crude implements they had were soon replaced by more efficient and suitable ones introduced by people from China Mainland. Nevertheless, the transportation equipments were adopted for extensive use as they were excellent for carrying loads on the rugged mountain paths.

Though many conventional farm implements used now in Japan were introduced from China long ago, yet, during recent years, Japanese farm-implement industry had made a rapid progress. Consequently, many of their new developments are being introduced into Taiwan. However, these new developments must be remodelled and adjusted to suit the requirements and habits of the farmers of this Province. Implements such as the improved plow and pedal threshing machine are examples of such modification.

Some machines now in use such as the steam plow and the ramie

decorticating machine were introduced from Western countries. Taiwan farmers also adopted a few Western hand-implements such as the shovels and manure forks. Small machineries and animal-drawn implements introduced usually could not gain a firm foot-hold in Taiwan, as the conventional types have adapted well to local conditions. On the other hand, large-powered machineries, performing work that cannot be accomplished by man or draft animal, are acceptable in Taiwan.

With the increase in population and in demand for greater food production, people are developing a keener interest in improving farm implements. Many implements such as the check-row closer spacing markers, sweet-potato slicing machines, animal drawn subsoilers, cultivators, and worm catcher are designed and manufactured in Taiwan.

The paddy seed-bed trowel is actually modelled after the trowel used by masons in plastering. Others like the night-soil funnels and disinfection tubs and transporting sleds are all copied from implements customarily used in professions other than agriculture.

4. Operating Power of Taiwan Farm Implements.

The operating power of Taiwan farm implements is indicated in Table 5.

Table 5. **Implements and Sources of Power**

Group of Implements	Man-powered implements	Animal drawn implements	Mechanical powered implements	Water and wind powered implements	Total
Land-preparation implements	12	17	2	—	31
Planting implements	16	—	—	—	16
Intertillage implements	17	4	—	—	21
Irrigation implements	5	—	1	2	8
Fertilizer application implements	8	—	—	—	8
Plant protection implements	7	—	1	—	8
Harvesting implements	17	1	—	—	18
Implements for processing and storage of products	26	—	2	1	29
Transportation implements	9	2	—	—	11
Outfit for draft animal	1	4	—	—	5
Miscellaneous implements	5	—	—	—	5
Total	123	28	6	3	160
Percentage	76.9	17.5	3.8	1.8	100

The above table shows that man-power is the prime source of power for Taiwan farm implements; animal-power ranks second. Man-power is equivalent to 0.07—0.1 horse-power and the power exerted by each buffalo or yellow ox is comparable to about 0.5 horse-power. Taiwan farm implements are in small-scales.

60.7% of animal power is used for land preparation, 14.3% for intertillage, and 7.1% for transportation. This is because land preparation itself is the most power-consuming work. Farmers are in need of help aside from their own bare hands. The animal-drawn intertillage implements are limited to upland crops only. Though there exist more paddy fields and more water buffaloes in Taiwan, yet there are no animal-drawn paddy field intertillage implements available until today. There are more ox-carts in the southern part of Taiwan, as there are more dryland down in the south, and the paddy-field paths are not suitable for ox-cart to pass.

These animal-drawn farm implements are designed to travel in straight line and none of them draws in circles. According to the book "Taiwan Farm Implements" published thirty-three years ago, Taiwan once had plate type rice huller and oxen-drawn windlass pump which were animal-drawn farm implements travelling in circles. With the introduction of various kinds of mechanical or electrical-powered machineries such as the modern rice huller and polisher and the centrifugal pump, the above-mentioned animal-drawn implements have been replaced.

5. Body Weight of Taiwan Farm Implements.

The body weight of one particular kind of farm implement might be different with each locality, each manufacturer, & each material available for construction, etc. Table 6 shows the average weight of different kinds of farm implements taken from samples available, the kinds of implements are grouped together according to the sources of power indicated in the table.

Table 6. Body Weight of Farm Implements

Group of Implements	Kinds of farm implements								Total
	Belew 0.4 kg.	0.5-0.9 kg.	1.0-3.9 kg.	4.0-10 kg.	11-25 kg.	26-50 kg.	51-100 kg.	over 100 kg.	
Manpower- operated farm implements & equipment	20	11							31
One-handed implements									
Two-handed implements	5	26	2						33
Stationary equipment	2	3		1	3	3	7		22
Portable equipment	3	2	20	5	2	1	1	2	36
Operator rid- ing implements				4	2	2			8
Operator walk- ing implements					9	1	2	2	14
Accessories & attachments to implements, and outfits for draft animals	2	1	2	1	1				7
Total	27	19	51	12	15	7	6	5	151
Percentage	17.9	12.6	33.8	7.9	10.0	4.6	3.9	3.3	6.0

(The weights of mechanical- powered and water or wind-powered farm machineries are not included in this table, because inadequate amount of material has been collected by this survey to substantiate any adequate discussion on these machineries.)

The above table shows that the average weight for one-handed farm implements such as sickle, weeding knife, etc. is below 0.99 kilogram. Two-thirds of them weigh less than 0.49 kilogram. This is because the force exerted from one hand is rather limited and cannot handle implements which are too heavy.

Most of the two-handed implements weigh between 1 to 3.99 kilograms, e.g., hoes, rakes, shovels, etc. They are many times heavier than the one-handed implements. Two hands, of course, can lift more weight; and oftentimes, the effective weight of an implement is also measured by its potential energy and momentum while in operation; the latter factors will help to determine the proper weight of each implement. The heaviest implements are the banana chisel which weighs about 4.8 kilograms and the pestle which weighs about 5 kilograms.

Manpower-operated farm equipment can be divided into two groups according to its movability: the stationary equipment and the portable equipment. Portable equipment such as the seedling carriers, seedling pans, grain basket, carrying pan, etc. usually weigh between 1 to 3.9 kilograms. Stationary equipment such as the bowl-type storage hut, treadle mortars, and ramie decorticating machines weigh much more heavier; sometimes its weight is rather uncertain and no average can be taken.

Most of the animal-drawn farm implements such as plows, comb-harrows and the knife-tooth harrows weigh from 10 to 25 kilograms. They are not too difficult for one man to carry. Since paddy field paths are sometimes under 20 centimeters in width, it is quite natural that lifting and carrying of these implements become one man's assignment. It is, therefore, necessary to adjust the weight of these implements to the carrying capacity of one man.

There is another point worth mentioning in connection with the weight of implements. In Taiwan the prices of farm implements are determined by weight. Therefore farmers like to buy implements as light as possible. Sometimes, in order to accomplish certain farming operations, heavy implement is needed for better performance. To meet the required basic weight and also to sell it at cheap price by using less material, some farm implements in Taiwan are designed for men to ride on them. The body weight of the operator is added to the weight of the farm implement to make the operation possible. Eventually, the weight of that implement would be so light that one man can easily carry it around. Examples of such implements are knife-tooth harrows, paddy field pulverizing rollers, bamboo harrows, flexible bamboo plank etc. Generally speaking, operator-riding-type animal drawn farm implements are lighter than those operator-walking-type.

The Outfits for draft animals are always very light, so that more power can be obtained from the animal. Examples of this group are the yoke, ox muzzle, etc. The same is true with the accessories and attachments for other farm implements such as row-opening bamboo tube attachment, leveling bamboo pole etc.

Since 65% of Taiwan farm implements weighs less than 4 kilograms, lightness is therefore a factor that determines the acceptability or non-acceptability of the farm implements by farmers.

In Taiwan, farmers usually buy or order implements according to their own experiences. They have no standard to go by as to the proper weight needed for an implement. If the implement is too heavy, the farmer would procure a lighter one. Thus, the weight of plow was found different in different localities, as shown by the following table:

Table 7. **Weight of Plows**

Region	Localities	Improved Plow	Conventional Plow
North Taiwan	Ling-kou	14.4 kg	14.0 kg
	Ching-mei	11.5	10.8
	Wu-lai	15.0	—
	Miao-li	13.8	—
Central Taiwan	Taichung	14.1	—
	Pu-li	14.4	15.5
	Nan-tou	18.0	14.1
South Taiwan	Pu-tai	15.5	19.5
	Ping-tung	16.2	—
	Hsiao-kang	15.4, 25.8	—
	Heng-chun	14.3	—
East Taiwan	Tai-tung	15.6	14.4
	Hua-lien	12.6	—
	Lo-tung	—	18.0
Pescadores	Ma-kung	—	14.9

The plows used on upland-field are generally heavier than those used on paddy-field. This is due to the fact that soil on upland-field is more compact and require heavier and sturdier implements to break it up.

6. Variations in Structure of Taiwan Farm Implements.

There are vast difference in size and shape among each particular kind of farm implement. The following table illustrate the width of two farm implements.

Table 8. **Width of Paddy Field Pulverizing Roller and Knife Tooth Harrow (in meter)**

Region	North Taiwan		East Taiwan	
Locality	Tan-shui	Linko	Yilan	Lotung
Pulverizing roller	1.40	1.80	2.50	2.00
Knife tooth harrow	1.25	1.53	1.63	1.63

There is a direct relationship between the width of an implement and the size of the field. As presented in Table 8, the average size of paddy fields in Yilan and Lotung is larger, so the implements adopted are also wider. On the other hand, in Tan-shui where most of the farming land is terraced, implements narrower in width have to be employed.

Aside from the width of implement, there are many other points that also vary with different localities. Table 9 gives an example on several structural variation of knife-tooth harrows used in different localities.

The material for making knife blades are closely related to the types of soil cultivated. Cast iron knife blades are usually used on hard and compact soil; wrought iron teeth, on gravel soil; bamboo teeth, on sandy soil. Wrought iron teeth are the most expensive one, but do not break as easily as the cast iron teeth. Bamboo teeth are the cheapest ones to manufacture and lightest ones to manipulate, but they are among the easiest to get damaged. However, there are exceptional cases. For instance, in the northern part of Taichung Hsien, almost no one uses bamboo teeth for harrows although the soil is sandy and loose; farmers there are probably not accustomed to using bamboo teeth harrows.

Hoe is another popular farm implement in rural Taiwan. Wide variation, of course, is found everywhere as shown in table 10.:

Table 9. Variation on Shape, Measurement, and Other Specifications of Knife-tooth Harrow in Different Localities on Taiwan













Region	North Taiwan			Central Taiwan				South Taiwan		East Taiwan		
	Lingko	Miaoli	Fengyuan	Lukong	Shashan	Nantou	Shuishieh	Touliu	Hengchun	Hsinkong	Chochi	Juihui
Locality												
Overall Width(cm)	153	156	143	157	125	165	133 157	140	144	86	112	159
Overall Length(cm)	60	76	60	58	58	63	62 55	65	65	52	58	60
Material of Teeth	Cast iron	Cast iron	Cast iron	Bamboo	Scrap iron rods	Wrought iron	Oak or Bamboo	Wrought iron	Wrought iron	Wrought iron	Wrought iron	Cast iron
Front row	7	8	8	9	13	9	7,8	6	7	7	6	8
Back row	8	9	9	10	13	10	7,9	7	8	8	7	9
Shape of Tooth blades												
Methods of affixing teeth to frame members	Driven from lower side of frame	Driven from lower side of frame	Driven from top of wedge ¹ tight	Driven from top of frame	Driven from lower side of frame; affixed through eye	Driven from top; wedged tight	Driven from top; wedged tight	Driven from lower side of frame	Driven from lower side of frame	Driven from lower side of frame; the upper end of the shank flattened for fixing	Driven from lower side of frame; the upper end of the shank flattened for fixing	Fastened with screws

Table 10. Hoes and Their Variations in Structure

Region	Central Taiwan				South Taiwan				East Taiwan			
	Hou-lung	Puli	Chi-hu		Yu-ching		Chiao tze-tou		Jui-hui			
Locality			Earth opening	Weed- ing	Earth opening	Hill- ing	Weed- ing	Earth opening	Hill- ing	Weed- ing	Earth opening	Weed- ing
Usage	For All purposes											
Width of blade(cm)	16	12.8	36	19	12	20	18	18.5	20.8	11.5	12.3	15
Length of blade(cm)	23.5	23	30	21.5	27	24	20	19.5	18.5	18.5	19	12
Thickness of blade(cm)	0.5	0.7	0.4	0.4	1.6	0.6	0.5	0.5	0.25	0.3	0.8	0.2
Length of handle(cm)	137	84.5	110	115	125	120	128	146	136	108	140	125
Cross Section of handle	Elliptical	Round	Round	Round	Round	Round	Round	Round	Round	Round	Round	Round
Total weight (kg)	2.48	2.55	3.15	2.93	3.6	2.4	2.1	3.0	2.3	1.4	2.7	0.75
Angle between hoe blade & handle	65°	54°	53°	50°	68°	65°	60°	62°	57°	64°	65°	60°

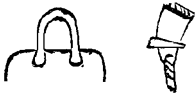


The width of the hoes are also related to the type of soil worked on. On loose soil, the hoes are wider; and on compact soil, narrow. However, there are exceptions; e.g., soils of Hou-lung are sandy but the hoes are not wide. This is because the farmers there have only one kind of hoe used for many operations including opening earth, intertilling and weeding. For intertilling, the blade cannot be too wide.




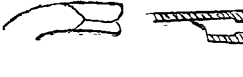

The thickness of the hoe blades are related to their weight and usage. Because earth opening is more strenuous than weeding or cultivating and needs more potential energy or momentum, the blades used should be heavier; they need to be sturdier and therefore are thicker.

The hoe handles of Pu-li are short and the angle between hoe blade and handle is small. The use of this kind of hoes is very much localized. This conforms with the general rule that handles of implements in cooler region may be short but in the tropical area they must be long. Hoes with short handles are more efficient, but farmers have to bend down while they work. Obviously it is too cumbersome for the tropical farmers to work in this way. Hoes with long handles are not so efficient, but to the tropical farmers it is more comfortable to operate and would not get tired easily. Since Pu-li basin is of high elevation and its average temperature is low, farmers are getting used to short-handle hoes.

There is a big variation in the connecting devices between working parts of hoe, shovel, sickle, etc. and their handles. The following table gives a brief description of this variation.

Table 11. **Connecting Devices of Working Parts & Handles of Farm Implements**

Sketch	Name	Description
	D-shaped eye-hole of hoe blade	Traditionally farmers put leather and wood wedge between handle and eyehold; and the angle between blade and handle can thus be adjusted.
	Round eye-hole catches of hoe blade	Cut a piece of iron plate and fold backward to form a tube forge it on the blade. Easy to manufacture, but eyeholes are not sturdy. The eyehole is not adjustable.
	Square eye-hole of hoe blade	Introduced from Japan. The angles are set and cannot be adjusted.

Sketch	Name	Description
	Ferrule with a goose neck to connect the blade	This connecting device does not require wedges. There is a tang inside the ferrule which can hold handle securely in place.
	Ferrule that folds backward	These three ferrules all have tangs in sections. No nails are used to secure handle. Drive handle into ferrule; the elasticity of wooden handle will help to secure holding. Ferrules are welded together.
	Ferrule that folds in front	
	Ferrule that fold on the side	
	Chung-li Sickle and handle connecting method.	At the hind end of the sickle blade, there is an extended hook. Insert this hook into the groove of the handle. Drive the hook down into the wood with a hammer to secure hold; then wind steel wire around handle.

More variation is found with more complicated implement. For example, the rice pedal threshers which generally have three models: the northern, the central, and the southern models. Although their difference may be caused by topography and size of the land, perhaps the main contributing factor is the manufacturers' retail policy. In order to maintain a constant demand of its own products from farmers, the manufacturers deliberately differ in their specifications of accessories produced from the others.

Farm implement structure varies with climate; topography; types of soil; kinds of crop; planting methods; farming system; construction material available; manufacturers' technique; physical build-up, skill and habits of the people; farmers' mechanical knowledge; industrial standard of the society; and history of the implements and other factors.

Although the size of farm implements may vary in many ways, the variation must come within a certain range. Too large or too small an implement cannot accomplish the desired purposes.

7. Unit Price of Taiwan Farm Implements.

The unit price of any particular kind of farm implement varies with different localities, manufacturers or dealers, material for construction, season of use, buyer's ability in selection, etc. The following table is compiled by taking the mode of the unit price of various implements grouped together according to the sources of power.

Table 12. Unit Price of Taiwan Farm Implements (in NT\$)

Group of Implements	Kinds of farm implements											Total
	Under NT\$4.-	\$5-14	\$15-24	\$25-34	\$35-74	\$75-129	\$130-200	\$201-300	\$301-500	Over \$500	Not known	
Man-power operated farm implements and equipment:												
One-handed farm implement:	18	13	0	0	0	0	0	0	0	0	0	31
Two-handed farm implement:	6	12	9	3	3	0	0	0	0	0	0	33
Stationary equipment:	1	2	2	1	0	6	4	1	1	3	1	22
Portable equipment:	9	10	2	3	5	1	2	2	0	2	0	36
Animal-drawn farm implements:	1	0	0	1	8	6	3	2	0	1	0	22
Accessories & attachments to other implements & outfits for draft-animals:	3	3	0	1	0	0	0	0	0	0	0	7
Mechanical-powered farm implements:	0	0	0	0	0	0	0	0	0	6	0	6
Water and wind-powered farm equipment:	0	0	0	0	0	1	0	1	0	1	0	3
Total	38	40	13	9	16	14	9	6	1	13	1	160
Percentage	23.8	25.0	8.1	5.6	10.0	8.8	5.6	3.8	0.6	8.1	0.6	100

Table 12 shows that there is a direct correlation between weight and price of each implement. Therefore prices of one-handle farm implements (which are lighter) are all below NT\$14 per piece. Many of the two-handed farm implements which are heavier than one-handed

implement are priced from NT\$5 to NT\$24 per piece, and some even reach \$74 per piece. Portable equipments such as the seedling sickle, seedling board and the carrying pan (classified under man-power operated equipment) are priced around NT\$14; others like the pull cart and pedal rice threshers are priced at about NT\$500. Stationary equipment is more expensive because its volume is large and its construction is complicated. Most of the animal-drawn implements are priced from NT\$35 to NT\$130; they are larger and heavier than the man-power operated implements and therefore are more expensive. Mechanical powered and water-powered farm implements are complicated in structure, so their prices are much higher. On the whole, 48.8% of the farm implements in Taiwan are priced less than NT\$14.

Farm implements in Taiwan are comparatively cheap and this is due to the farmers' low purchasing power. Manufacturers often have to sacrifice quality in order to maintain a low price. If sturdy and highly efficient farm implements were to be made, their prices will have to be raised; farmers, because of their financial stringency, will not be able to buy these implements even if they are aware of their good performance. In other words, the farmers in Taiwan should be temporarily satisfied with the minimum serviceability of implements available.

Table. 13. **Unit Price of Farm Implements Classified According to the Source of Manufacturer (in NT\$)**

Source of manufacturer	Kinds of farm implements											Total
	NT\$4 under	\$5 -14	\$15 -24	\$25 -34	\$35 -74	\$75 -129	\$130 -200	\$201 -300	\$301 -500	over \$500	uncertain	
Implements made in the blacksmith shops	7	18	8	2	2	0	1	0	0	0	0	39
Implements made by the plow carpenters	3	3	2	3	8	7	2	2	1	0	0	31
Implements made by the bamboo workers	11	7	2	2	1	3	0	0	0	1	0	27
Implements made in farm machinery factories	0	0	0	1	1	1	0	2	0	4	0	9
Implements made by specialized manufacturers	2	3	0	0	1	2	2	1	0	0	1	12

Source of manufacturer	Kinds of farm implements											Total
	under NT\$4	\$5-14	\$15-24	\$25-34	\$35-74	\$75-129	\$130-200	\$201-300	\$301-500	over \$500	uncertain	
Home made implements	12	4	1	0	1	0	0	0	0	0	0	18
Implements made in general carpentry	0	1	0	0	1	0	3	1	0	0	0	6
Others (including those imported)	3	3	0	1	1	1	1	0	0	8	0	18
Total	38	40	13	9	16	14	9	6	1	13	1	160
Percentage	23.8	25.0	8.1	5.6	10.0	8.8	5.6	3.8	0.6	8.1	0.6	100

Table 13 shows that implements made in the blacksmith shops are priced mostly around NT\$5 to NT\$24 a piece. The prices of farm implements made by the plow carpenters are evenly distributed; the most expensive one being the winnower (fanmill) priced in the class of NT\$240—NT\$450. Bamboo implements are cheaper; a large number of them are sold under NT\$4 per piece except the bowl-type storage hut which costs more due to its large size. Implements manufactured by machine works are more complicated and therefore, the unit price are again higher. Home made farm implements are usually very small in size; simple to make, and made from materials at hand, naturally their costs are the lowest among all other manufacturing sources. The item "Others" includes implements or machineries made in the tin-smith shops, stone shops, sickle shops and cart shops and imported from abroad. Those priced over NT\$500 are the ox cart, rear cart, ramie decorticating machine, tractor, steam plow, etc.

In conclusion, the unit price of farm implements is determined by the material used and its size, weight and service life. Since the implement produced by the same type of manufacturers, are all made from same kind of material, processed by same kind of technique; theoretically their service life should be about the same. But the quantity of material used in making these implements often varies, the weight of the implement becomes the major determining factor in pricing all farm implements, In fact, practically all types of implements are sold by weight.

8. Season in Use of Taiwan Farm Implements.

"Before planting, get sowing implements ready; before reaping,

get harvesting implements ready." This is an adage of rural Taiwan. It implies that each farm implement has its busy season and also slack season. Larger quantities of implements are sold in their respective busy months. The following table indicates the distribution of busy months of a few farm implements manufactories:

Table 14. **Busy Months of Farm Implement Manufactories**

Manufactories	Busy months
Pedal rice threshing machine factories	Before harvesting of paddy crops (May—June, September—October)
Sickle shops	Before harvesting of paddy crops (May—June, September—October)
Rope-making machine factories	After harvesting of second paddy crops (November—December)
Plow shops	Winter plowing season (November—March)
Blacksmith shops in the southern part of Taiwan	Before sugarcane harvesting (November—March)
Ox-carts shops in the southern part of Taiwan	Before sugarcane harvesting (November—March)
Bamboo shops	Before paddy crops harvesting (June and October)

In Taiwan, farmers often buy rice thresher before the harvesting of the first paddy rice crop and repair them before the harvesting of the second crop. This is because with the first rice crop, the fields are usually not well drained and wet and give more deteriorating effect to the thresher.

Reaping sickles are easy to get deteriorated so they have to be replaced every season.

Straw-rope making machines are usually bought during the slack season, when, after harvest, farmers are at leisure and have more money to expend. This season covers the months after the harvest of the second rice crop and before the transplanting of the seedlings of the first rice crop.

Plows are often bought and/or repaired during November through March. Fields after the harvest of the first rice crop are soggy and plows used in preparing such lands could not be easily damaged. However, after the harvest of the second rice crop or sugarcane the

fields become dry and plows working on such fields are often damaged and need to be replaced.

In the south, the busy season for blacksmith shops and ox-cart shops falls within the months before sugarcane harvesting. At this time, the blacksmiths will keep themselves fully occupied in manufacturing cane digging hoes and cane-backing knives. Ox-carts are used for conveying harvested canes to the mill or cane collecting railway terminal. This makes ox-cart shops busier than ever at this season.

Bamboo shops, at a time prior to the harvesting of paddy rice, are heavily loaded with manufacturing of rice baskets, chaff sieves, grain storing bins, bamboo brooms and other related farm implements used in harvesting.

This distribution in the manufacture of implements according to its seasonal usage is a conspicuous feature in rural Taiwan. Unless there is a shortage of raw material, supply and demand would usually balance.

9. Service Life of Taiwan Farm Implements.

The service life of farm implement depends upon the care taken in its operation, maintenance, and storing by the user, type of soil it works on, weather condition, frequency of its being used, etc. The following table presents the service life of farm implements indicated:

Table 15. **Service Life of farm implements (in year)**

Group of implement	Kind of Farm Implements							Total
	Under 1.5 years	1.6-3.5 years	3.6-6.5 years	6.6-10 years	11-17 years	18-27 years	Over 28 years	
Farm implements that directly work on soils	4	18	11	16	7	3	3	62
Farm implements that work on crops	2	10	6	10	4	7	6	45
Products moving and transporting equipment	3	6	4	6	2	1	0	22
Irrigation Equipment	0	1	2	1	3	0	1	8
Pest control implements	2	0	1	3	2	0	0	8
Fertilizer and manure distributing equipment	3	2	2	1	0	0	0	8
Other outfits for farmers and draft animals	1	1	2	2	1	0	0	7
Total	15	38	28	39	19	11	10	160
Percentage	9.4	23.8	17.5	24.3	11.9	6.9	6.2	100

Three-fourths of the Taiwan farm implements have a service life ranging from less than 1½ years to 10 years. The reaping sickle and the plow share are the easiest to be damaged; they must be replaced even within one season of use. On the other hand there are winnower (fanmill), stone roller, and banana chisel, which can last a good many years.

Implements that work on soil and equipment for transportation have a comparatively shorter service life than those that work on crop. But implements that work on soil have a longer life than those of the irrigation equipment with the exception of the windmill and centrifugal pump. Frequent change from wet to dry surroundings lowers the durability of irrigation equipment that is made of wood and bamboo. Implements distributing fertilizers and insecticides, and those outfits protecting human body while working in the field have a shorter service life because they are being used too frequently and are getting worn-out soon.

Another factor that affects service life of farm implements is the place where they are manufactured. The following table presents the data collected:

Table 16. **Service Life of Farm Implements Made in Different Manufactories (in years)**

Group of implements	Kind of Farm Implements							Total
	Under 1.5 years	1.6-3.5 years	3.6-6.5 years	6.6-10 years	11-17 years	18-27 years	Over 28 years	
Implements made in blacksmith shops	2	19	10	4	2	1	1	39
Implements made by plow carpenters	0	1	2	13	8	5	2	31
Implements made by bamboo workers	5	10	8	2	1	0	1	27
Home made implements	3	2	3	8	1	1	0	18
Implements made by specialized manufacturers	1	3	3	2	2	1	0	12
Implements made in general carpenters	0	1	0	3	2	0	0	6
Implements made in farm machinery factories	1	1	1	2	2	2	0	9

Group of implements	Kind of Farm Implements							Total
	Under 1.6- 1.5 years	3.6- 3.5 years	6.6- 6.5 years	11- 10 years	18- 17 years	Over 27 years	28 years	
Implements made in tin-smith shops	2	1	1	0	0	0	0	4
Others (including those imported from abroad)	1	0	0	5	1	1	6	14
Total	15	38	28	39	19	11	10	160

The above table shows that implements made in the blacksmith shops have a shorter life than those made by plow carpenters because the Taiwan blacksmith shops use very primitive techniques in their heat treatment. Using better material and improving heat treatment technique are indeed two most urgent steps which should be taken when improving our farm implement industry. Many of the home made farm implements last from 6½ years to 10 years because they are very simple in structure and could be easily repaired if damaged. Implements made from bamboo and sheet metal have also a shorter service life because the materials themselves are not durable. The item "Others" includes farm implements manufactured in cart shops, stone shops, sickle shops and those imported from abroad.

10. Changes in Farm Implements of Taiwan.

Comparing the findings between farm implements survey made in 1921 and in 1952, we have noted that there are 40 new farm implements being accepted in a lapse of 30-odd years. The possible reasons accounted for the acceptance of these new implements are tabulated as follows:

Table 17. **Advantages of Newly Accepted Farm Implements**

Advantages	Example	Total kinds	Percentage
Doing works that have never been done before	Check-row closer spacing maker, sprayer, etc.	12	30.0%
Working efficiency higher than before	Sweet-potato slicing machine, manure fork, etc.	13	32.5%
Performance better than before	Improved plow, flexible knife-tooth harrow, etc.	6	15.0%
Work done better and faster than before	Tractor and its attached implecents, animal drawn lister, etc.	6	15.0%
Old corresponding implements unknown but satisfactory service being given by the new one	Pruning shears, duster etc.	3	7.5%
Total		40	100 %

Though the working rate of the new sweet-potato slicing machine is ten times greater than that of the old one, and though the improved plow can plow a depth of 18 cm. while the conventional one only about 10 cm., yet many farmers today are still using the old type plow, the Check-row closer spacing marker, etc.

1. Some of the new farm implements might not be suitable for a specific type of soil or a typical farming method, e.g., the improved plow, the check-row closer spacing marker, etc.

2. Farmers might not be informed of the existence of the new farm implement which is being used in area not yet visited by them.

3. Farmers will not buy any implement beyond their purchasing power which is low. Even if they could, they will have to wait so long as the old one is still serviceable.

4. Farmers' land holding may be too small to justify the best utilization of new implements, such as the tractor and its attached equipment.

5. The farmers' farming knowledge has not been mature for adopting the new implement yet, such being the case as with power sprayer and windmill.

Regarding the reason mentioned in point 3, the price of farm im-

plements might have been over-emphasized by technical person as well as layman. A comparison between the prices of 25 kinds of new implements and their corresponding old ones reveals the fact that "low price" is not an absolute necessity in introducing new farm implement, as shown in the following table:

Table 18. **Cost of New and Old Farm Implements**

	Total Kinds	Percentage
New implements that are cheaper than their corresponding old implements	5	20%
New implements that are more expensive than their corresponding old implements	20	80%
TOTAL	25	100%

Studies have again been made about the operating power of these 40 new implements and their results are compiled in table 19.

Table 19. **Power of New and Old Farm Implements**

Operating Power	New implements		Corresponding old implements	
	Total kinds	Percentage	Total kinds	Percentage
Man powered	26	65.0%	16	64.0%
Animal drawn	10	25.0%	9	36.0%
Mechanical powered	4	10.0%	0	0%
TOTAL	40	100.0%	25	100.0%

Table 19 indicates that powered machineries will get into use in Taiwan farming gradually.

There is the tendency that small farm implements with power unit will soon be getting popular with Taiwan farmers. Of the power implements, the stationary ones shall gain footing easier than portable ones; especially those for processing, even though they are in larger size.

S. Torii, in his article "Review on Mechanized Farming in Taiwan" published in the "Journal of Japanese Agricultural Machinery Society" (Vol. III, P251, 1939), stated that Taiwan began using tractors in 1916. Of the very first ones introduced, some used gasoline and

some used kerosene as fuel. Because the tractors then introduced had less horse power than anticipated and no skillful operators were available for operating and maintaining these tractors, the result accomplished was not favorable. Later, diesel-powered crawler tractors of about 100 HP each and steam plow driven by stationary steam engine were also procured. Diesel tractors were found easier to operate and also able to do more work than the steam plows. On the other hand, the maintenance of steam engine was simple and easy. In 1921, the Taiwan Machine Work of Kaohsiung manufactured four sets of steam plow, indicating that the steam plow had been used to advantage. During World War II, spare parts for those aged gasoline and kerosene tractors became unavailable, and the diesel crawler tractors were commandeered and sent to Southern Sea Islands by the Japanese military authorities, so both of them vanished from Taiwan. After the restoration of Taiwan only few old steam plows were still in operation on the sugarcane field.

The Agricultural Machinery Operation and Management Office, formerly jointly operated by the Ministry of Agriculture and Forestry and Chinese National Relief and Rehabilitation Administration, and at present under the Taiwan Sugar Corporation, has imported since 1947 many new tractors to Taiwan, about 350 in number up to 1952. Most of them are now used on the sugarcane plantations in the south. Some are kept by the agricultural improvement stations, agricultural schools, and also a few are in the hands of farmers. Favorable results in using these tractors have been reported. With progress made in petroleum industry, machinery industry and automobile repair service in Taiwan and with more efficient tractors available in the market, we are confident that tractors will soon become rooted in the Taiwan soil for operation on large plantations.

The current situation towards displacement of conventional farm implements by new ones can be summarized as follows:

1. New farm implements doing new type of work can gain acceptance in Taiwan.

2. In the light of crop-production, new farm implements, having greater efficiency and doing better work, can gain acceptance in Taiwan and can also displace the conventional farm implements comparable to them.

3. Man-powered and animal-drawn farm implements are easier to gain adoption in Taiwan.

4. Modern farm machineries that can be repaired and/or manufactured by the present machinery industries in Taiwan can also be adopted in Taiwan.

5. The new farm implements, though higher than the conventional ones in cost, can also gain acceptance in Taiwan, if it pays to use them because of their higher efficiency.

6. Conventional farm implements will not completely disappear in the future.

7. New farm implements, suitable only for specific environment or specific area of Taiwan, cannot gain wide acceptance in Taiwan.

Farm Implement Manufactories in Taiwan

1. Blacksmith Shops.

There is blacksmith shop everywhere, in cities, townships or villages. Ordinarily the owner, who himself is a smith, works together with his apprentices. His shop is usually small, occupying an area of about 30 square meters. The forge is usually made of bricks with a hand pulled double action bellow and is about 80 cm in length. There may be one or two anvils, the height of which is about 70 cm and the working surface is about 7.5 to 9.5 cm in each side. This is a rather small anvil but it serves the purpose very well because the blanks to be forged are usually small. A large anvil will absorb too much heat. The anvil is used for hammering and stretching iron structures. Other equipment in the shop include quenching tank, chisels, tongs, etc. It is indeed a simple set-up.

Blacksmith shops usually manufacture implements only after being ordered and also repair them. Their products are hoes, hand rakes, grass sickles, knives and other forged implements. They do not sell wooden handles in ordinary practice. Farmers have to either purchase from other sources or to make the handles themselves.

The forge furnace uses coke as fuel. Coke is sieved and selected to a uniform size of about 2 cm in diameter. Intense heat produced by the furnace gives the iron surface a reducing layer, which is the first requirement for welding wrought iron parts while they are in a plastic state. To obtain this proper heat, coke is piled on the furnace to a thickness of about 20 cm, and the hand-pulled double action bellow of small diameter but of good length will give enough air of high pressure. The rotary-type blower, however, cannot serve the purpose. By this method forge-welding can be successfully accomplished without borax or other purifiers as flux.

There are two methods to reinforce the cutting edge of a hoe blade. First, heat the blank and hammer on the edge end till it is thin enough and expanding like an ear on each side. Bend the so called ears upward and place a small steel plate upon the blade and between the two ears, then fold the iron ear expansions. Apply heat until the steel is welded in the blade and shape it into a hoe. This finished hoe blade has steel on cutting edge and wrought iron on upper part of body and shoulder. The hoeing operation will gradually grind the cutting edge and produce an automatic sharpening effect. Another method is to bend the cutting edge end of the blade slightly upward to about 5 cm and place white cast iron particles on it. (These white cast iron particles

are made by heating cast iron to proper temperature and cooling rapidly through quenching, rendering it brittle. Then hammer and break it into fine particles.) Apply heat to blade till white cast iron particles begin to melt; then withdraw it from the fire quickly and hammer the cutting edge end of the blade. This will mix the high carbon content of the cast iron particles and increase the carbon content of the wrought iron. Forge a few more times and the blade will be hardened.

No cold process is employed to cut iron and drill holes, so tools like hack saws and drill are not used at all. Instead, hot process is adopted; hammer with chisel to do the cutting or with punch to make a hole while the blanks are still red hot. No grinder is found either. Generally speaking the blacksmithing techniques and equipment remain to be primitive and coarse. They are gradually being replaced by new ones introduced in recent years.

The prices of implements made in the blacksmith shops are usually determined by its weight. If the hoe blade weighs 1 catty, then the implement will sell at NT\$9. This shows that materials are more valued than human skill. A given kind of farm implements made in the same shop have always the same weight and shape, unless specially ordered.

The following is a performance record of one skilled smith and one apprentice in manufacturing farm implements per day:

Medium size hoe	10 pieces;
Medium size rake,	12 pieces;
Grass Sickle	16 pieces; or
Comb harrow,	1 piece.

2. Plow Shops.

The plow shop in Taiwan may be better named as farm implement carpentry, as not only the wooden part of plow but also wooden part of implements such as paddy field pulverizing roller, knife tooth harrow, dragon pumps, grain sweepers, etc. are all made there. The grain sweepers have bamboo handles; such handles are to be matched by farmer himself. Other implements like the winnower (fanmill) and rice sieving screen are made by other workmen proficient in that artifice. The tools of the plow carpenters, however, are similar to those of ordinary carpenters. All works are done by hand.

To meet the need of farmers in the village, the plow carpenters procure in advance a proper amount of wood needed for making farm implements. Very few finished farm implements can be found in any plow shop; they are usually made before the season of use or after order is being received. The wood used differs from place to place; e.g., the plow beams in north Taiwan are made of Taiwan *Engelhardtia* (Engel-

hardtia Formosana Hay); in the central, Acacia (*Acacia confusa* Merr.), in the east, Formosa Michelia (*Michelia Compressa* Max. Var. *Formosana* Kanehira) and in the south, Taiwan oak (*Quercus gilva* Blume; *Q. glauca* Thunb) and Acacia. The general practice is to select the cheapest and also the most durable wood in that area. Take for instance the manufacture of paddy field pulverizing roller. In the north, it is easier to get Taiwan Engelhardtia in large diameter, so the roller can be made of a complete piece of log. In the central and southern part of the Island such large timbers are not accessible; therefore roller blades are made from timber of smaller size and then assembled together into a roller. Skillful carpenters, before making implements, always take into consideration the amount of shrinkage accounted for the wood to be used and shape structures with necessary allowance.

Plow workmen have their own sphere of influence and their steady customers. Farmers like to use implements they are accustomed to and made by workmen whom they are familiar with. For instance, the Isonotype improved plow, though higher in efficiency and better in performance, has had a hard time and would require strenuous efforts to gain recognition in the rural area before it could displace the conventional plows. But once after it gained acceptance from farmers, its place is firmly established. This illustrates the conservatism of Chinese farmers.

Plow shops manufacture only the wooden parts of a plow; forged parts are done by the blacksmith shops; and casted parts by the foundry shops or plow share jobbers.

Besides the plow shop, there are plow workmen that go to work on farms whenever and wherever hired. While employed manufacturing materials, wages and food are all supplied by farmers.

Following is the work-rate of a skilled plow workman:

One plow	0.5 man-day
One knife harrow	0.5 man-day
One paddy field pulverizing roller	2.5 man-days

3. Bamboo Shops.

Farmers often use bamboo to construct houses, grain-storing bins, rod-type check-row closer spacing marker, pig fences, etc. The tools used are very simple, consisting of few knives, a chisel or two awls; but the bamboo workmen can skillfully make all kinds of bamboo implements. Not only this they can make chairs, tables, beds, even walls and roofs of houses. No iron nails but bamboo wedges are used. Waste bamboo fragments and saw dusts are burned as fuel to heat bamboo whenever bending or discoloring is desired.

Besides bamboo shops, there are skilled workmen being hired by farmers to make bowl-type storage huts or to build bamboo houses,

While employed, the materials used, wages and daily repast are all supplied by farmers.

Ordinarily to make one grain storing bin requires 1 man-day, and to make a bowl-type storage hut for storing 1200 kilograms of grain requires 4 man-days of bamboo worker, 1 man-day of carpenter and 1 man-day of roof-covering mason.

Baskets, carrying pans and sieves are all made of bamboo splints. These small bamboo articles are often carried around for sale; they may also be distributed by shopkeepers or other distributors. These products are all hand-made and require even less tools; only few kinds of knives are necessary for splitting bamboo into splints or threads.

In the eastern part of Taiwan, manure-carrying pan, disk-type baskets and ox-muzzles are often made of rattan. This is because much rattan is produced there and it is more durable than bamboo.

4. Farm Implement Factories.

Before the restoration of Taiwan, the main source of supply for modern farm implements was Japan. At present, except the power units, most of the locally used implements can be made in Taiwan.

Farm implement factories are usually equipped with power unit, lathe, drill, grinder and forge equipment. Some of them have also planer, acetylene welder and foundry equipment. Modern mechanical processing techniques are used in these factories but the heat-treatment equipment and techniques are as backward as the blacksmith shops. They manufacture pedal rice threshing machine, rotary paddy cultivator, straw rope-making machine, sweet-potato slicing machine, cultivator, etc. The items manufactured differ from factory to factory. The Pei-tou Farm Implement Work sponsored by the Provincial Department of Agriculture and Forestry is considered one of the large-scale farm implement factories. There are about forty wood working and metal-working machines in this factory, manufacturing pedal rice threshing machine, hand operating semi-automatic sprayer, disc-type check-row closer spacing marker, etc. Farmers' associations assist in distributing these commodities throughout the province. Other manufactories are all privately owned. The Lee Brothers Factory in Taoyuan is the largest. It can fabricate 10,000 pedal rice threshing machines in one year although the demand is only around 4,000. There are other manufactories that specialize in making water pumps for farm uses and mining industries as well as for household purposes.

Besides those factories that take farm implements as their major or sole business, there are some very reputable machine works now taking in farm implement as one of their major lines. The Aurora Machine

Works Co. has long experience in manufacturing fire-extinguishing equipment and pumps, and is engaging now also in manufacturing sprayer and duster. This will help to stimulate our farm-implement manufacturing industry to enter a modern stage.

Village plow shops and bicycle shops often act as agents in distributing accessories or repair parts. Implements made by various factories do not have the same specification; therefore, farmers often encounter great difficulties in finding the proper replacing parts.

There are Farm Implement Manufacturer's Association in Taichung City, Taichung Hsien and Kaohsiung Hsien but not in other places.

5. Ox-cart Shops.

The ox-cart shop is a combination of carpenter shop and blacksmith shop. There are tools for metal work and for carpentry. Their forge furnaces are about 1 square meter in surface area, larger than the usual blacksmith's; besides installing hand-pulled bellows, small electric blowers are also utilized. The anvils may be square-shaped and small but there are also western styled anvils in use. Outside the ox-cart shop is a water tank of about 2 meters in diameter and 1 meter in height used for quenching.

Most of the ox-cart wheels consist of wooden-spokes with iron tires. These iron tires are made of $3/8$ " to $1/2$ " thick iron plates. The manufacturing processes are: (1) Hammer the iron plate till it becomes a circle. (2) Heat it and weld the two ends of the plate together. (3) Pile 10 or more iron tires in the yard and burn wood to heat them. Some build earthen walls around the pile to a height of 70 centimeters and a circumference of 2 meters for saving fuel. Heat till the iron tires turn to a light yellow color. (4) Take them out of flame and frame around the grooved wooden-wheel rim lying nearby. (5) One man stands on the wooden hub to make the wheel unmovable. (6) 3 or 4 workers are to hammer on the hot iron tire to tighten it around the wooden-wheel along the groove. By this time, the wooden-wheel rim will be in flame. (7) As soon as the tire becomes well-fitted on the groove, soak the wheel in the water tank immediately. Then the iron tire will shrink and will grip tightly around the wooden wheel rim. Unless thinned or stretched by wear, the tires will never come off.

In cities, today, ox-cart wheels are using rubber tires, but the hubs are still made of wood with soft steel shafts and cast iron plain bearings.

The shaft of two-wheeled ox-cart is about 5 meters long with cross section size of 10 cm x 10 cm. This is the part that bears most stress and needs to be made of one piece of strong wood. Oak (*Quercus* Spp.)

is usually used. The quality of wood used for shaft and the thickness of the iron tires determine the service-life of an ox-cart. It also affects the prices to a large extent.

Following is the manufacturing rate of an ox-cart:

4-wheeled ox-cart	12 man-days
2-wheeled ox-cart	7 man-days

6. Plow Share Jobbers and Foundry Shops.

Plow share, moldboard, cast iron piece for plow sleds and harrow knife blades are largely manufactured by village plow share jobbers. This kind of work is mostly done by the people of Ying-ko Township of Taipei Hsien; they are farmers cultivating a small piece of land but serving as a foundry jobber in part time. During slack season, they gather together in a crew of 7 to 9 farmers who are trained in foundry work, and proceed to fetch works in the neighbouring villages. They are equipped with hand bellow and a blast furnace of a diameter of about 30 cm and a height of 60 cm; they also carry with them various moulds, ladles for melting cast iron, cokes, other small tools and casting materials.

On the farms, it is customary to trade two old plow shares, or exchange one old plow share plus NT\$1.2 (equal to 0.5 kilograms of white rice), for a new one. This enables the jobbers to travel around without having to carry excessive casting materials.

Ordinarily the jobbers bring several casting moulds of different lengths; the curvatures of the plow share and moldboard are usually the same. When plow shares are red hot, they are taken out of moulds and the forward ends are bended according to the wishes of the farmers. Thus, various curvatures of plow shares and moldboards can be adjusted without a great many varieties of moulds. And the few moulds brought along by them will be enough for using in many places to serve the purposes.

White cast iron is the material used in great extent. To increase flexibility, grey cast iron or sometimes a little wrought iron is added to the plow share and moldboard. Very rarely are brass used to make moldboard or plow shares, such plows are only used in heavy clayey soils.

These jobbers are acquainted with the fact that adding manganese and silicon to the iron will improve the physical property of the casting parts. Nevertheless, the quantity added is not standardized and varies according to the experience of the workers.

Besides plow share jobbers, there are some plow foundries. They use small cupola, say about 1/4—1/2 ton capacity, with electric blower,

In this kinds of shop, about 200 to 300 plow shares and over 100 moldboards can be casted every day. These are sold in quantity to and retailed by the plow shops throughout the villages. They also cast other articles and household utensils. Such foundries exist in Ying-ko, Taoyuan, Chia-yi, Kaohsiung, Pingtung and other places.

7. Rice Sickle Shops.

In Taiwan, most of the sickles for harvesting rice are manufactured in Chung-li Township of Taoyuan Hsien; there are 30-odd such rice sickle shops along the highway of Chungli. It is a sort of home industry; members of the family all help to do the work. They have the same tools as the blacksmith, except the forge furnace. Their forge furnace is also made of bricks, square-shaped and having the same measurement as the blacksmith's, but there are walls around three sides of the furnace with cover on the top. A chimney stands up in the middle of the cover.

The sickle blade weighs about 15 grams. They are made of spikes, old bolts, rail steels or other scraps. Roughly, one large spike can make 8 sickle blades. First hammer these scrap iron into long strips grooved in the middle; then place a steal wire made of scrap files in the groove and hammer it into the shape of a sickle. Heat the sickle so that the iron and steel will weld into one with steel at the edge of the blade and iron at all other sides. Next hammer to smooth, grind to sharpen blade with teeth cutting on the edge, to be followed by heating and quenching, in order to complete a sickle. Teeth-cutting, heating and quenching are highly technical jobs and require an experienced hand. The quenching material differs from person to person, and they usually keep it as a professional secret. Judging from the finished product, we can say that it probably is composed of water with some kind of mineral and oil mixed in it.

To cut teeth on sickle requires a two-man team; one man is to hold two sickles firmly on the anvil (a small anvil which is square in shape with a height of 40 cm and a surface area of 8 cm x 8 cm) while another man cuts teeth on the sickle with a chisel and a short-handle hammer. The distance between each tooth is 1 mm. They can hammer three teeth every second. This work is very skillful, tedious and exacting.

Quenching and tempering are usually done at noon time. For quenching, place over 20 sickle blades on the forge and heat with blast, and the sickle should be so placed that its back will be lying on the burning coke and the cutting edge upward. The coke used in the furnace are all sieved beforehand to an even size of 1 cm in diameter. Skilled sickle smiths are able to observe the color of the sickle keenly while

pulling the bellows to adjust the heat. When it reaches the stage that the thick back part of the blade is redder and the thin edge part darker, the thinner blade edge will have a lower temperature and the thicker blade back a higher one. The smith will immediately take it off from the furnace and dip into their proper quenching liquid, in order to assume that the hardness of various parts of the sickle will be homogenous. Experience will make experts out of the workers.

One man can make 25 sickles per day; a team of three men can make 75 sickles per day and a team of 4 men can make 100 sickles per day. Formerly there was a cooperative among these sickle shops, shipping and selling sickles produced by them in group. After the restoration of Taiwan, this organization has been disassociated. The products are sold in ordinary hardware stores. Sometimes handles are not sold together with sickles; in this case, farmers have to provide their own.

Three models of sickles are manufactured, the northern, the central and southern models; but they are indiscriminately used everywhere. Besides making sickles, these sickle smiths also manufacture kitchen knives, pocket knives, etc.

8. Other Farm Implements Manufactories:

Besides the above mentioned manufactories, there are carpentry shop that make seedling pan, wooden irrigation bucket, night soil barrel, etc. Irrigation spraying pot, night-soil ladle and night-soil funnel are made of sheet metals in the tin smith shops. Stone roller, stone pestle and motar are all made in the stone shops. Water wheel, rice huller and water-powered pestle are made by special workmen employed by the farmers. Others like the coir rain coats and rain shields are made by special-makers and are sold in the grocery stores or peddled around by the makers themselves.

If farmers need farm implements that are odd-sized, they can go to the above manufactories, carpenters, or blacksmiths to specify measurements and have implements made to order.

9. Production Capacity of Farm Implement Manufactories in Taiwan.

The Taiwan Provincial Department of Agriculture and Forestry has made a thorough survey on farm implement manufactories in Taiwan during the winter of 1952. The result shows that there are 874 farm implement manufactories. Of this number, 75 manufactories are specialized in a certain type of farm implements and 41 take farm implement repair as their sole business. Total investment of the 874

manufactories was NT\$4,167,960.00. They have a total labor force of 2,703 workers (casual labor not counted), and 218 motors, totalling 451 horse-power, and 7 diesel engines, totaling 26 horse-power. They were equipped with the following tools and machineries:

A. Wood work.

(1) Hand tools: 377 sets.

Each set consisting, in average, of 5 saws, 7 chisels, 3 planners, 2 axes, 1 drill and 2 hammers.

(2) Powered machineries:

27 wood lathe, 64 planners, 12 saws (both disk and band type), 40 drills and 4 broaching machines.

B. Iron work.

(1) Hand tools: 541 sets.

Each set consisting, in average, of 2 anvils, 3 hammers, 2 pliers, 2 long-handle tongs, 1 furnace, 1 bellow, 1 cutting shear, and 1 vise.

(2) Powered machineries.

218 lathes, 153 drills, 74 grinders, 46 thread cutting machines, 15 planners, 28 presses, 19 shapers, 6 gear hobbing machines, 3 turret lathes, 8 boring machines, 3 hammer machines, 5 shearing machines and 204 electrical blowers.

(3) Other equipment.

68 gas welders, 20 arc welders and 96 cupolas.

Locational distribution of farm implements manufactories is shown in Table 20.

Table 20. Locational Distribution of Farm Implement Manufactories

Location	No. of Manufac- tories	Total Capital (NT\$)	Floor space (Tsubo)	Total labor	Total Power (H.P.)	Wood work tools (Sets)	Wood work mach- ine (Unit)	Iron work tools (Sets)	Iron work mach- ine & equipment (Unit)	Distribution of products
Taipei area	76	138,260	3,000	171	25	14	21	58	34	Province-wide
Taoyuan	48	993,000	—	234	40	—	—	—	—	Province-wide
Hsinchu	16	262,500	—	201	51	—	—	—	—	Province-wide
Yilan	44	66,900	—	96	8	14	—	30	48	Ilan Hsien
Miaoli	19	235,000	—	93	44	8	—	9	100	Miaoli & Hsinchu Hsien
Taichung	144	484,550	—	435	68	—	—	—	—	Province-wide
Yunlin	17	72,200	—	59	5½	—	—	—	—	Yunlin Hsien
Nantou	75	79,400	—	155	0	40	—	54	—	Nantou Hsien
Changhwa	81	316,500	3,240	261	44½	—	—	—	—	Changhwa Hsien
Chiayi	47	409,400	—	150	44	22	—	22	43	Central & Southern Taiwan
Tainan	108	232,450	4,300	302	48	61	—	45	81	Central & Southern Taiwan
Kaohsiung	77	325,300	3,000	201	21	35	—	44	61	Kaohsiung & Eastern Taiwan
Pingtung	38	373,300	2,000	151	34	32	—	22	46	Pingtung & Eastern Taiwan
Taitung	33	88,500	1,000	62	6	—	—	—	—	Taitung Hsien
Hwalien	28	63,000	900	68	6	—	—	—	—	Hwalien Hsien
Pescadore	23	27,700	—	64	32	—	—	—	—	Penghu Hsien
Total	874	4,167,960	—	2,703	477	377	147	541	966	

The figures in Table 20 serve only for reference, as, in certain respects, they do not represent true facts. For example, (1) the manufactories surveyed are limited to those registered with the local governments; and (2) the capital investment is based upon the figure reported at the registration of those manufactories, some of which has been established more than 60 years. The currency has been changed several times, and the increased value of assets and depreciation of machine tools are not counted.

The past peak productivity and 1952 production as surveyed by PDAF are shown in Table 21.

Table 21. **Farm Implement Production in Taiwan**

Implements	1952 production	Past peak production
Plows	12,514 units	17,104 units
Knife-tooth harrow	5,092	6,604
Comb-harrow	3,742	4,624
Raking-hoe	3,600	3,953
Heart shaped hoe	1,861	2,110
Grain handling rake	150	150
Tilling hoe	151,814	168,640
Shovel	320	350
Taiwan pick-axe	4,480	4,765
Post digger	300	200
Digging hoe	5,232	6,780
Pulverizing roller	657	1,409
Short handle hoe	3,365	3,118
Animal drawn subsoiling plow	100	300
Check-row closer spacing marker (disk type)	1,020	315
Rice drill	30	3,000
Rotary paddy field cultivator	4,090	4,870
Intertilling hoe	792	1,124
Animal drawn cultivator	3,680	4,375
Lister	210	290
Prong type cultivator	700	1,000
Furrow cultivator	360	260
Short hoe	2,462	3,110
Weed smoother	100	300
Weed shaver	845	1,160
Weed shaving knife	7,045	8,466
Ridge cutting knife	680	795
Centrifugal pump	211	66

Implements	1952 production	Past peak production
Piston pump	1,200	1,200
Water wheel	348	1,603
Watering spray pot	30	70
Night soil barrel	12	22
Water basket	1,020	1,620
Sprayer	850	1,800
Rice sickle	369,280	556,950
Grass sickle	94,517	106,018
Sugarcane hack knife	5,305	6,310
Banana knife	6,700	7,200
Rattan knife	40	20
Fuel wood knife	17,124	19,026
Pedal rice thresher	11,691	35,626
Threshing tub	18	50
Hand rake	719	827
Sweet potato slicing machine	673	1,681
Sweet potato hand slicer	68,000	68,000
Straw rope machine	3,410	19,500
Rope twister	3	3
Rice husker	200	200
Winnower (fanning mill)	829	2,121
Ox-carts	1,838	2,819
Yoke	110	145
Ox nose ring	70,000	70,000

These figure, same as those shown in the foregoing table, may serve only as relative reference. But compared with the potential expressed by the number of equipment available as shown in table 20, its indeed low. It so happens because the machineries used are mostly of old type, of low efficiency and of small capacity. Most significant of all, these manufactories are not scientifically managed to attain full productivity.

Letters and questionnaires were sent to 354 farmers' associations in Taiwan. As a result, 228 answers were received. The information collected is compiled in the following table, which gives different result from the PDAF survey but is reported here for reference.

Table 22. **Number of Manufactories of Farm Implements in 212 Townships and Cities (Not including aboriginal area)**

Type of manufactories	Total number as answered from 228 townships	Average number per township	Estimated total for all 354 Townships and cities in Taiwan
Black smith shops	747	3.52	1,246
Plows shops	358	1.59	562
Ox-cart shops	294	1.39	492
Farm implement factories	176	0.83	176

There are plow shops almost everywhere and twice as many blacksmith shops can be found. Ox-cart shops are very rare north of Hsin-chu Hsien, but south of Chang-hua Hsien there are more. This is because, in the south, there are more dry-land farming and consequently more ox-carts are needed. Farm implement factories exist only in larger towns and supply the neighbouring villages with threshing machines, etc.

It can at least be disclosed from the above table that the majority of farm implement manufactories existing are of a small-scale, scattering across a large agricultural area and that repair houses, too, are located in every corner.

Of the 16 aboriginal townships, 12 answered that they have no manufactory whatsoever. Four answered that they have blacksmith shops,. It is believed that they may consider any fire place that process and temper tools are blacksmith shop. Indeed the aborigines buy whatever metal implements necessary from outside; their metal processing techniques leave much room for improvement.

10. Types of Farm Implements Produced by Specialized Manufactories.

Table 23 indicates the kind of farm implements manufactured in different types of manufactories. In many cases, one kind of farm implement has its parts made by more than one manufactory before it is assembled. Blacksmith shops manufacture only the iron working parts, and the handles have to be made by carpenter shops. Plow carpenters manufacture only the wooden parts of a plow and the frame of harrow, but the plow shares and the knife blades of harrows have to be casted in foundries or by plow share jobbers. The manufactories mention in Table 23 are those where the principal parts of an implement are made.

Table 23. **Implements Made From Various Manufactories**

Types of manufactories	Kinds of Implements	Percentage	Examples
1. Blacksmith shops	40	25.0	Hoes
2. Plow shops	33	20.6	Plows
3. Bamboo shops	28	17.5	Grain storing bamboo bin
4. Farm implements factories	9	5.6	Pedal rice thresher
5. Rice sickle shops	2	1.25	Rice sickle
6. General carpentry	6	3.75	Seedling pan
7. Tin-smith shop	4	2.50	Watering spray pot
8. Ox-cart shops	2	1.25	Ox-cart
9. Stone shops	2	1.25	Motar
10. Other special manufacturers (includes those imported)	12	7.5	Water wheel and Rice huller
11. Plow share jobbers and foundry shops			Plow moldboard
Total	160	100	

The above table shows that the blacksmith shops manufacture most of the implements, about $\frac{1}{4}$ of the total; plow carpenters rank second; bamboo workers rank third. These three make up a total of 63.1%.

11. Materials Used for Manufacturing Farm Implements.

The following table is a rough classification of materials used in each kind of 160 farm implements surveyed.

Table 24. **Materials Used for Making Farm Implement**

Materials Used	Kind of farm implement	Percentage
Soft steel and wood	61	38.10
Bamboo	15	9.40
Bamboo, wood and iron	14	8.70
Bamboo and wood	10	6.30
Wood	9	5.66
Soft steel, cast iron and wood	8	5.04
Bamboo and rattan	8	5.04
Steel and cast iron	6	3.75

Copper, rubber, iron	4	2.50
Coir, bamboo, hemp, etc.	4	2.50
Soft steel and bamboo	3	1.87
Sheet metals and bamboo	3	1.87
Stone, wood, bamboo	3	1.87
Bamboo, earth, etc.	3	1.87
Cast iron and wood	2	1.25
Stone, wood and soft steel	2	1.25
Sheet metals	2	1.25
Sheet metal, wood	2	1.25
Iron, brick, cement	1	0.63
Total	160	100.00

It shows that soft steel and wood together are used most frequently in manufacturing implements. Next is bamboo. Rarely an implement is made entirely of metal. The conventional farm implements are made of materials native in that area, such as wood, bamboo, rattan, stone, coir, etc. Metal is not as widely used as in other countries and the reasons accounted for are as follows:

1. Metallurgical processes are not well developed.
2. Metal is heavy and the implements made from metal might be too heavy for human or even for draft animal.
3. Metal is more expensive.

Wood is traditionally used in making implements and is pliable and easy to work with. Farmers are more familiar with woodworking than metalworking. They have very few woodworking tools and still less any metalworking tools. Should any damage, large or small, be inflicted on these metal implements, the farmers themselves will not be able to repair these implements and the work itself must be interrupted. The blacksmiths and the manufacturers will be called upon for such repair. For example, a screw is the most basic accessory in a modern farm implement; but in the villages, if a screw is lost, finding a replacement is almost an impossibility. However, conditions like these are being remedied and improved gradually with the progress being made in transportation and mechanical industry.

Today, many of the modern farm implements are constructed with metal, e.g., the sweet-potato slicer, pedal rice thresher, ramie discorticating machine, sprayer, duster, etc.

JCRR had suggested to the steel works of Taiwan the production of high standard steel suitable for manufacturing farm implements, thus

to improve Taiwan farm implements through the use of better material. The steel works acted upon the suggestion and produced three kinds of standard steel:

- A. SAE 1020 steel—a mild carbon steel for making handles, frame and cross member of rakes, harrows, threshing machine parts, etc.
- B. SAE 1060 steel—for making sharp-edged tools such as sickles, hatchets, axes, spades, shovels, tines of forks, etc.
- C. SAE 1085 steel—a high carbon steel for making hammers, chisels, knives, etc.

Steel bars and rods were painted in red on one end for SAE 1020, in yellow on SAE 1960 and in blue on SAE 1085, for easy identification by rural blacksmiths. These standard steels were distributed to blacksmiths for their trial use and comment. One of the recipient shops, the farm implement shop of the San-chia Farmers' Association, reported that from the material received they had made many kinds of farm tools in large quantity for sale. Favorable comments had been received from end-users except that the price of these standard steel was too high.

Although standard steels are not widely adopted for use, it is firmly believed that to use better material in manufacturing hand-operating or animal-drawn implement is one of the most important means to improve their efficiency. An analytical study on the iron and steels used in making farm implements today is indeed a felt-need. The information thus collected will probably help more in finding the right kind of steel and iron which should not be too expensive from the viewpoint of farmers' purchasing power and therefore could be recommended for use in improving the quality of farm implements.

Summary

1. Attempt is made in assigning one standard name for each kind of farm implement both in Chinese and English.
2. Land-preparation implements have the greatest variety; processing implements the second; harvesting implements the third; but fertilizer application implements have fewer varieties.
3. 38.7% of the Taiwan farm implements are being used for work directly on soils; 28.1% on crops.
4. 69.3% of the Taiwan farm implements are modeled after those used in the mainland provinces.
5. 76.9% of the Taiwan farm implements are man-powered; and 17.5% are animal-drawn ones.
6. Taiwan farm implements are light. 82.2% of them weigh under 25 kilograms, while 17.9% of them weigh under 4 kilograms.
7. Taiwan farm implements are cheap. 48.8% of them are priced under NT\$14.00.
8. 75% of the Taiwan farm implements have a service-life under 10 years; therefore, farm implements have to be replaced often.
9. Over one third of Taiwan farm implements are used on rice crop. Those for sugarcane rank the second, and for peanuts, the third.
10. Material used for construction of Taiwan farm implements are mostly a combination of wood and soft steel, and bamboo next.
11. Taiwan farm implements are mostly made in the blacksmith shops; those in the plow carpenters rank next and those in bamboo shops rank third. These three places manufacture 63.1% of the total farm implements in Taiwan.
12. There are a large number of small-scale farm implement manufactories and repair shops scattered all over the farming regions.
13. Each kind of farm implements has its seasonal use. Manufactories are ready to supply farmers with all the conventional farm implements ahead of these seasons.
14. The specifications of Taiwan farm implements are not standardized; great variation of sizes and shapes from place to place exists.
15. New farm implements are gradually gaining footing in rural Taiwan under the following circumstances
 - A. New farm implements that can do work which have never been accomplished before can gain acceptance in Taiwan.

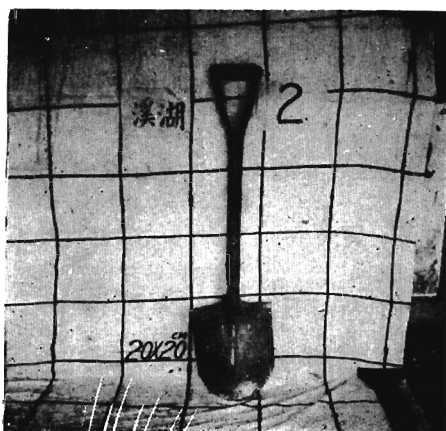
- B. New farm implements that are more efficient and do a better job than the conventional farm implements can gain acceptance in Taiwan and gradually replace its corresponding conventional ones.
 - C. Man-powered and animal-drawn new farm implements are easier to gain acceptance in Taiwan.
 - D. New farm implements that can be manufactured and repaired by local machinery industries can be rooted in Taiwan.
 - E. Price of farm implement is not the sole determining factor in gaining acceptance.
 - F. Conventional farm implements may become decreasing in quantity but will not be replaced completely.
16. Changes in Taiwan farm implements are of the following tendencies :
- A. Greater varieties will rapidly appear as interest in farm implements increases.
 - B. Farm implements of a specific function and of higher efficiency will replace implements serving multiple purposes but of lower efficiency.
 - C. Stationary farm implements are more easy to be mechanized than the moving implements.
 - D. Crop-products processing operations can be easily mechanized and are becoming independent industries separate from farm.
 - E. Taiwan farm implements are gradually using more iron and steel as construction materials.
 - F. More machines are being employed in farming work.

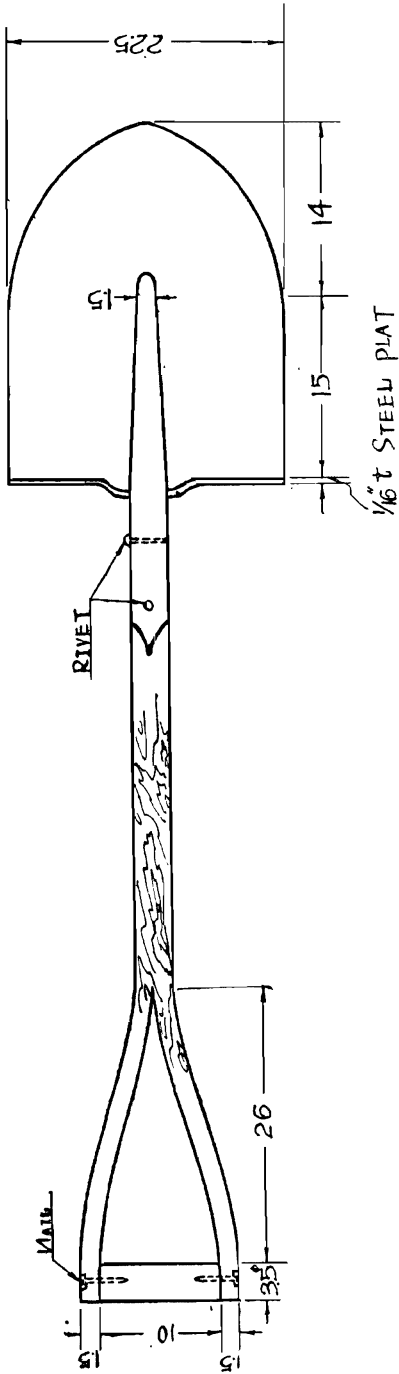
PART TWO
DESCRIPTION OF TAIWAN FARM
IMPLEMENTS

I. Man-powered Farm Implements

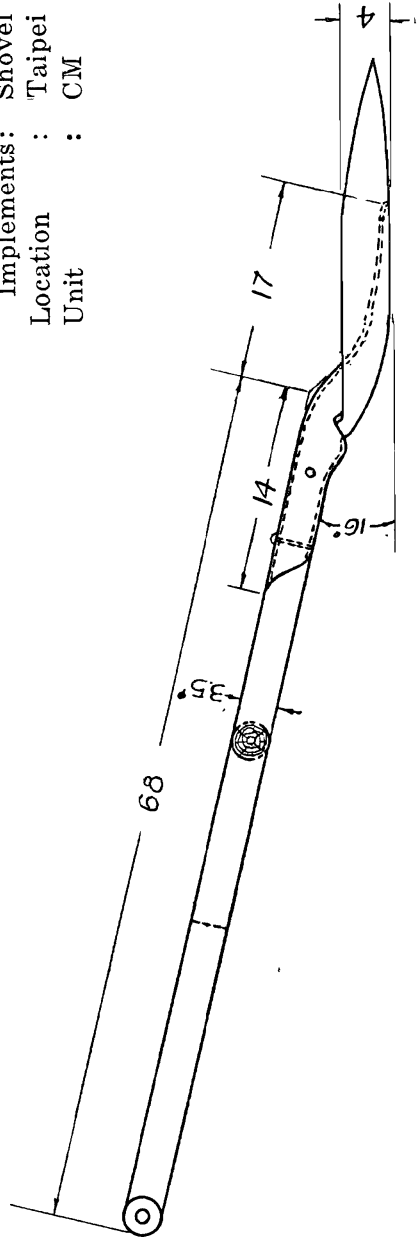
Classification : Land Preparation Implements
Name : Shovel 砂鉢
Cost : NT\$13—15
Weight : Approx. 1.8 kg.
Usage : To dig ditches
 To move earth
Operating Power : 1 man
Material Used : Shovel—Soft steel
 Handle—Wood
Season of Use: Year round
Service Life : Approx. 10 years
Application : Both hands hold handle; one foot press on shoulder of the shovel and shove into soil.
Work Rate : Move soil approx. 15 m³/day
Origin : Introduced from western countries.
Remarks :

1. Press with foot and utilize body weight for digginv.
2. The curvature of the shovel helps to hold and move pebbles, loose soil or other materials.
3. Connecting socket folds backwards.

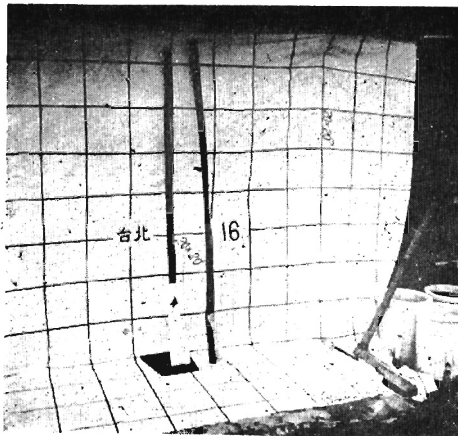




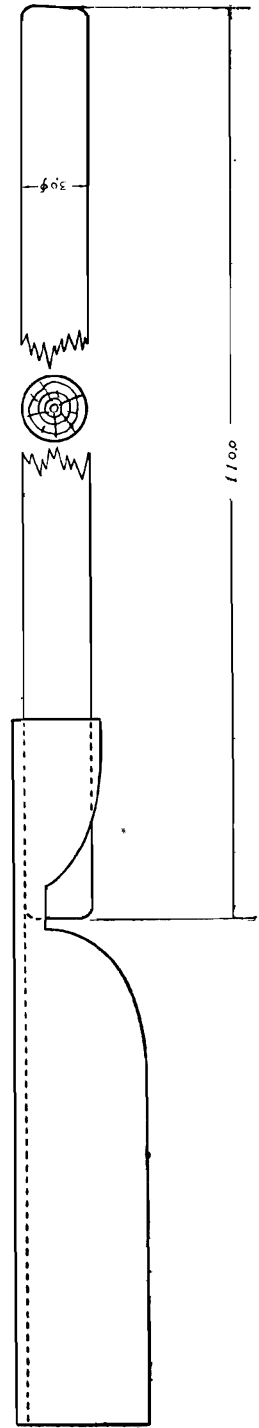
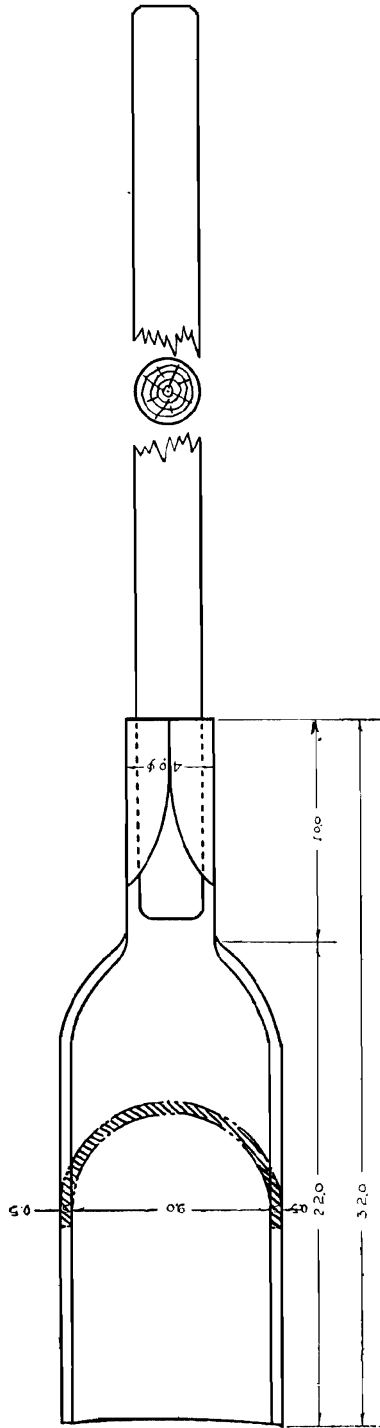
Name of Farm :
 Implements : Shovel
 Location : Taipei
 Unit : CM



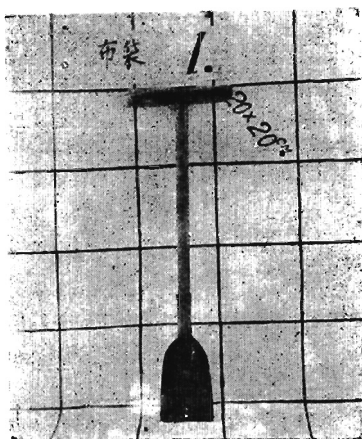
- Classification : Land Preparation Implements
- Name : Post digger 槍仔
- Cost : NT\$13—15
- Weight : 1.2—1.6 kg.
- Usage : To dig pits and holes.
- Operating Power : 1 man
- Material Used : Digger—Soft steel
Handle—Wood
- Season of Use: Year round
- Service Life : 4—6 years
- Method of Application : Hold digger handle in an upright position; strike downward into the soil and dig up the soil.
- Work Rate : Uncertain
- Origin : Traditional Chinese.
- Remarks : 1. Standing upright, the worker can easily strike vertically downward.
2. The blade curves into a C shape; suitable for digging round holes and scoop up soil.
3. Connecting socket folds up in front.

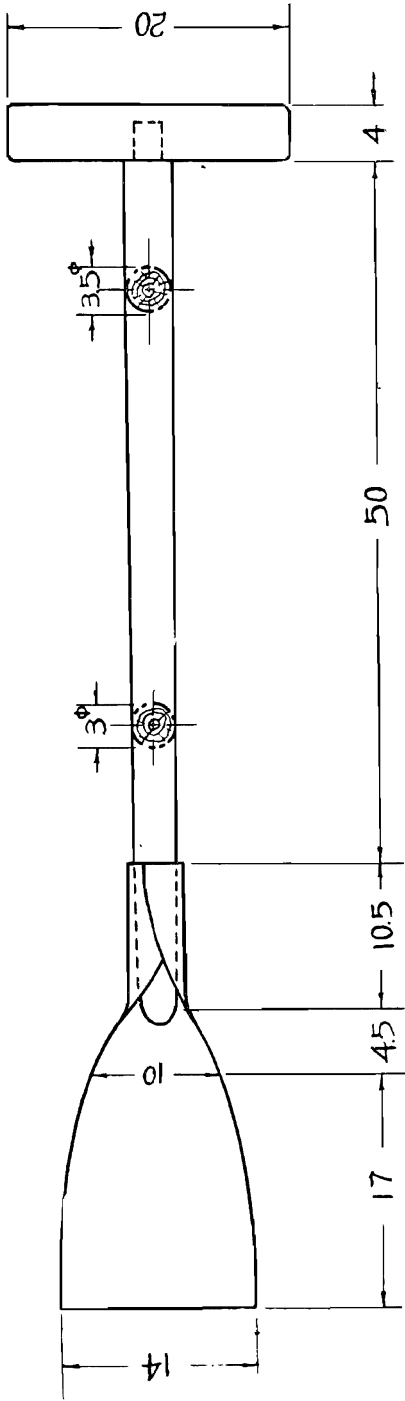


Name of Farm
Implements: Post digger
Location : Hsin-tien
Unit : CM

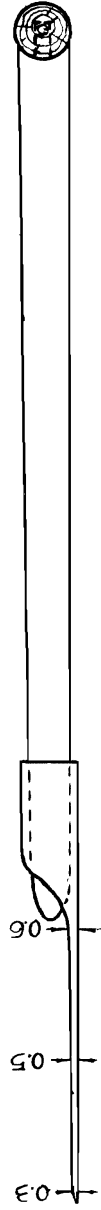


Classification : Land Preparation Implements
Name : Round shoulder spade 鈎
Cost : Approx. NT\$20
Weight : Approx. 2.1 kg.
Usage : To dig ditches.
 To build dikes and ponds.
Operating Power : 1 man
Material Used : Blade—Soft steel
 Handle—Wood
Season of Use: No specific season of use
Service Life : About 3 years
Method of Application : Two hands hold handle; stand on a high place; dig into earth and make a square block. Another man is to lift block away.
Work Rate : 25—40 m³/Day
Origin : Traditional Chinese.
Remarks : 1. Blade surface is flat and is thick.
 2. Suitable for digging clayey soils.
 3. Cannot scoop up earth needs twoman teamwork.

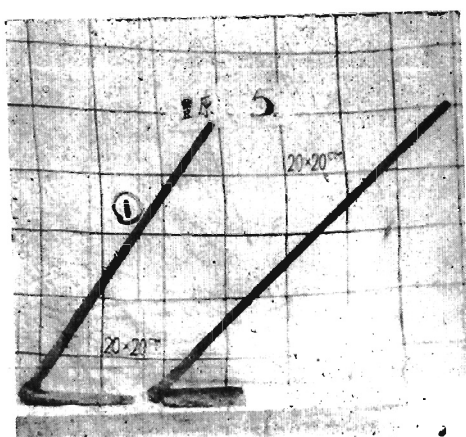




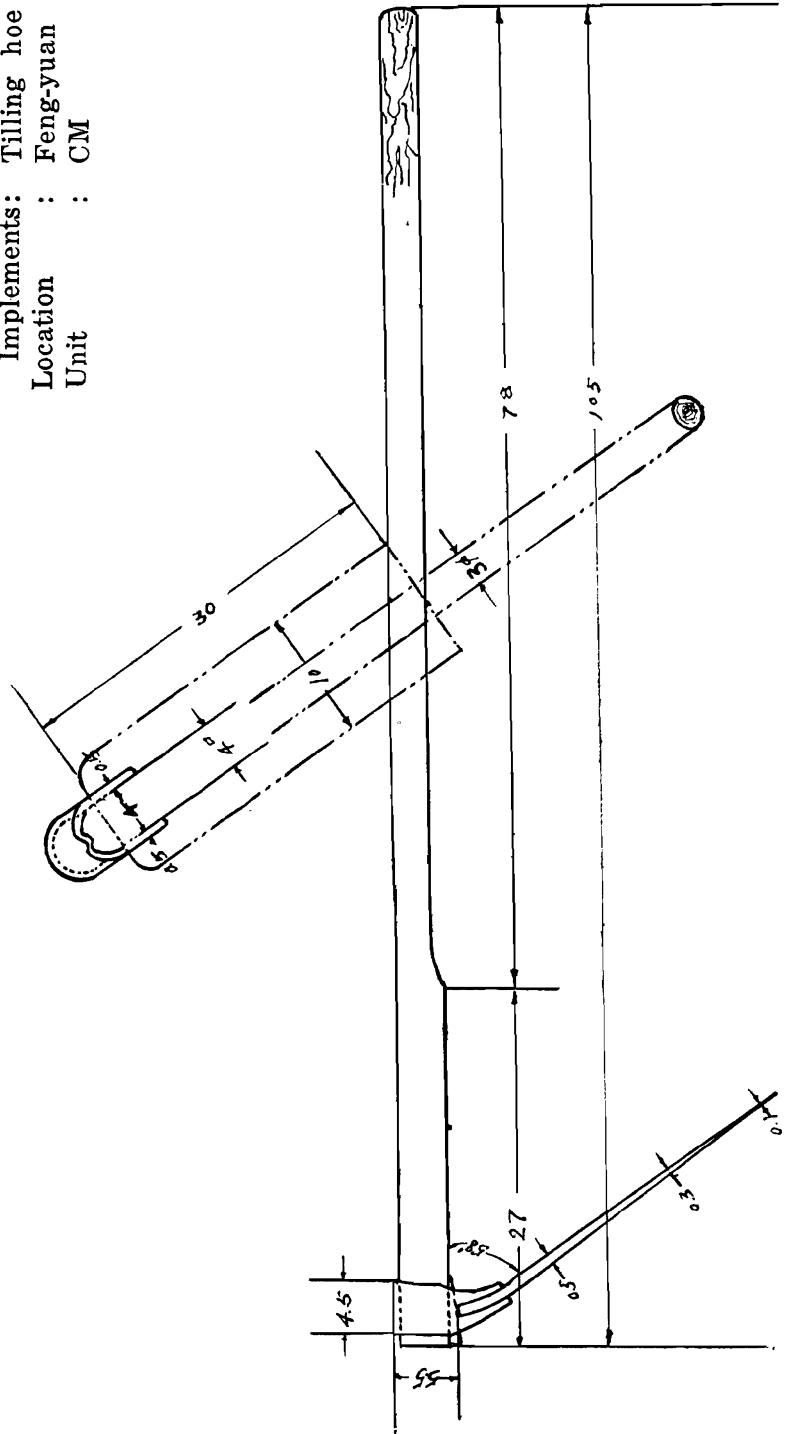
Name of Farm : Round shoulder
Implements : spade
Location : Pu-tai
Unit : CM



Classification	: Land Preparation Implements
Name	: Tilling hoe 鋤頭公
Cost	: NT\$20—25
Weight	: 1.8—3.2 kg.
Usage	: Opening and loosening earth
Operating Power	: 1 man
Material Used	: Blade—Soft steel Handle—Wood
Season of Use	: Year round
Service Life	: About 10 years
Method of Application	: Both hands hold handle; lift it high and strike into soil, lift up to loose soil.
Work Rate	: 0.005—0.02 ha./Day
Origin	: Traditional Chinese.
Remarks	: 1. Blade is narrow; suitable for digging. 2. Strong and sturdy. 3. Socket is very thick. Angle between blade and handle is larger; can dig deeper into earth. 4. Socket is D-shaped.



Name of Farm :
Implements : Tilling hoe
Location : Feng-yuan
Unit : CM



Classification : Land Preparation Implements

Name : Taiwan pick-axe 尖錐

Cost : Approx. NT\$20

Weight : Approx. 3.9 kg.

Usage : To loosen gravel earth

Operating Power : 1 man

Material Used : Blade—Soft steel
Handle—Wood

Season of Use: No specific season of use

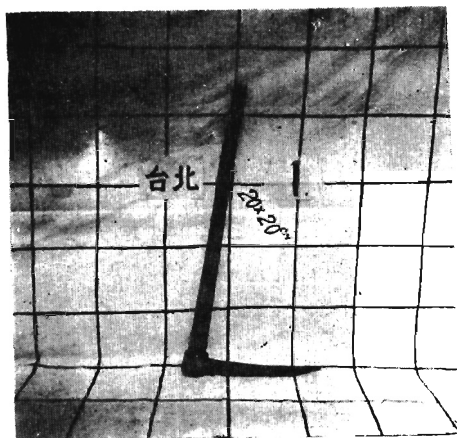
Service Life : 3—5 years

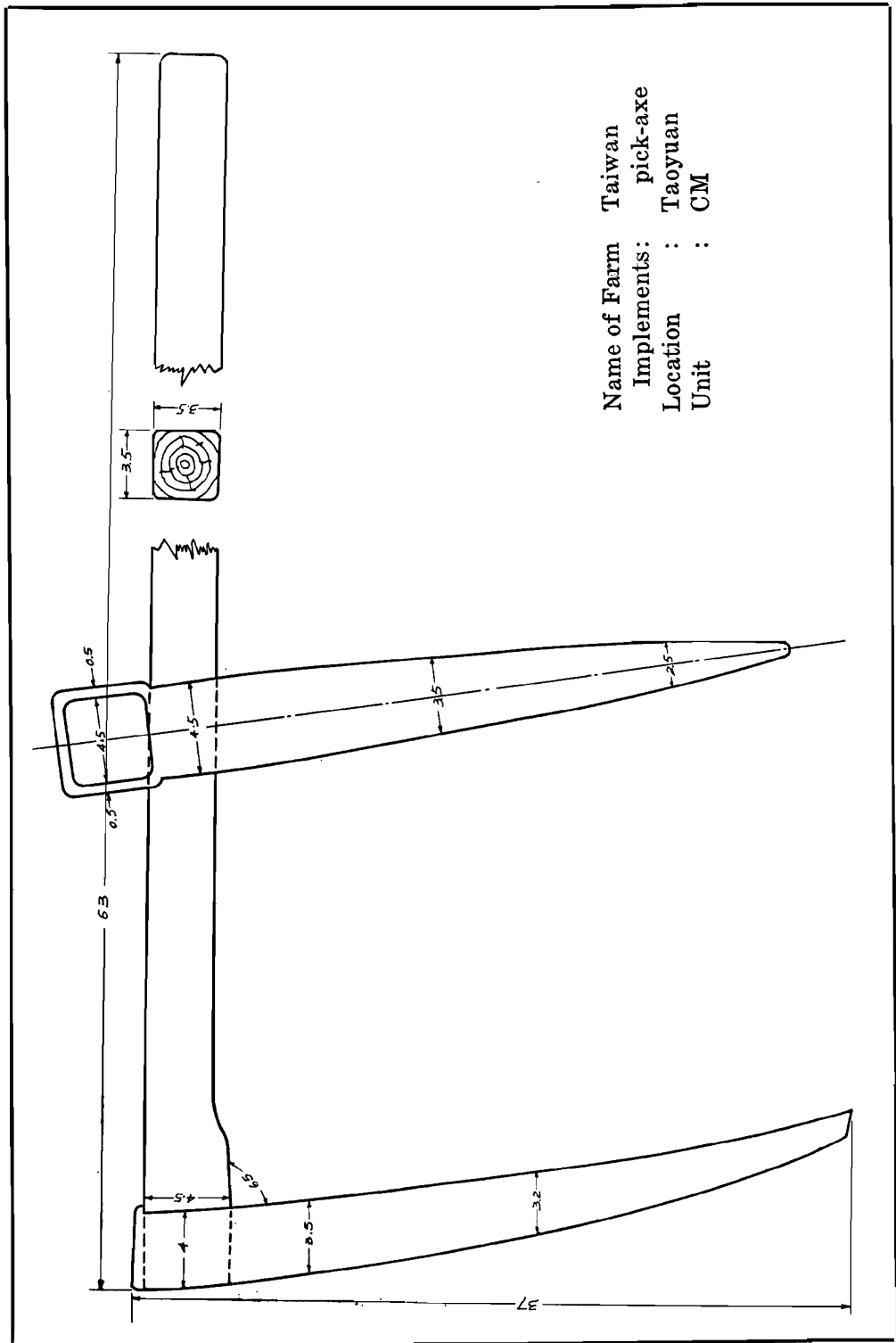
Method of Application : Hold handle with two hands; strike into earth; to loosen and turn soils.

Work Rate : Approx. 0.005 ha./day

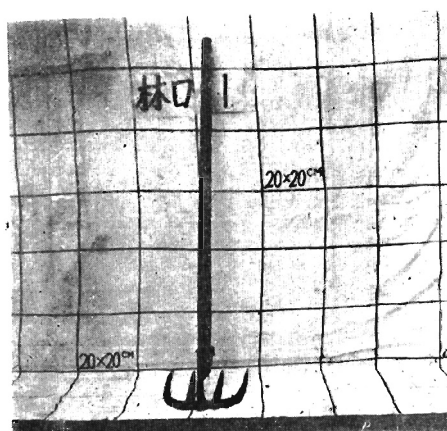
Origin : Traditional Chinese.

Remarks : The pointed axe end is suitable for digging.

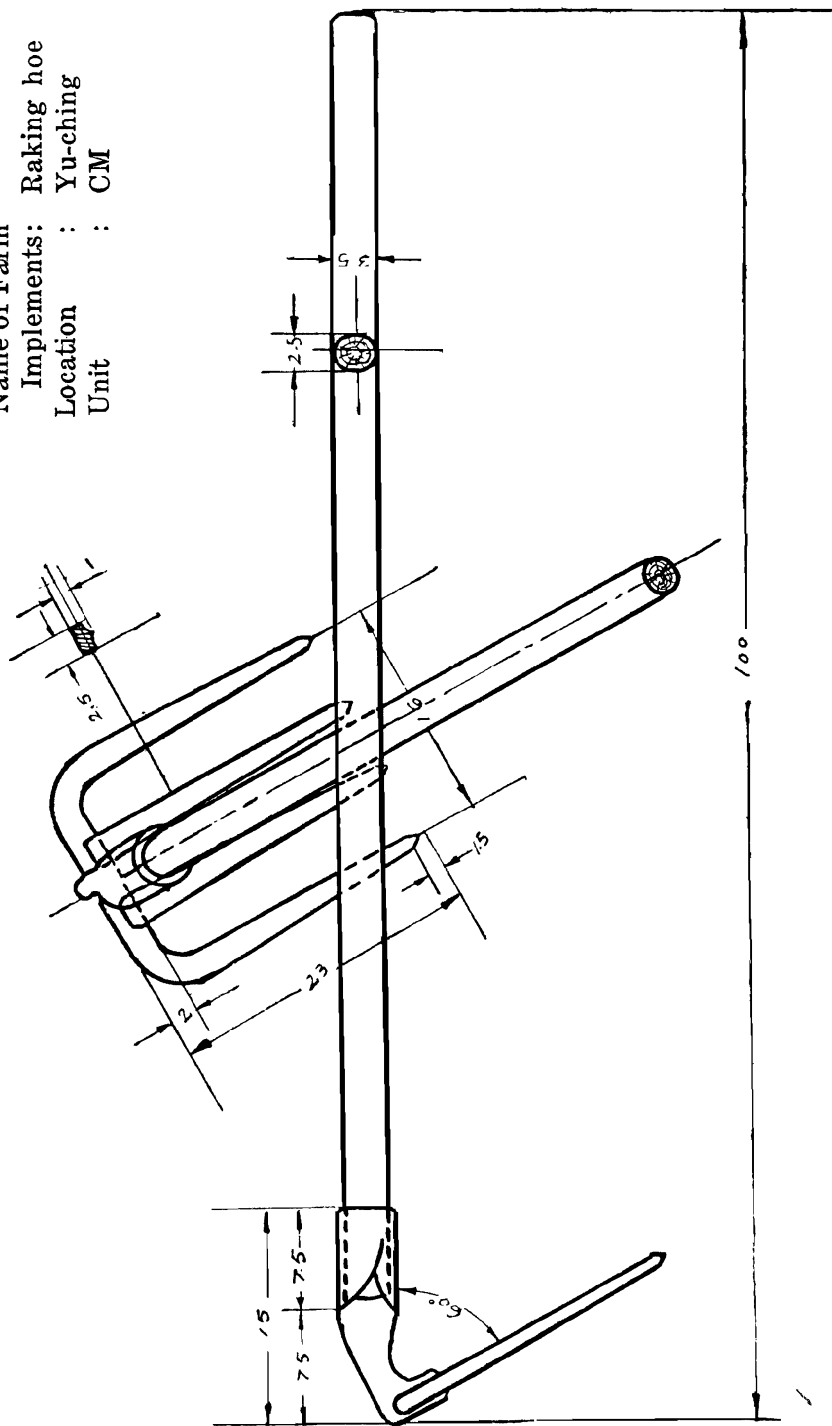




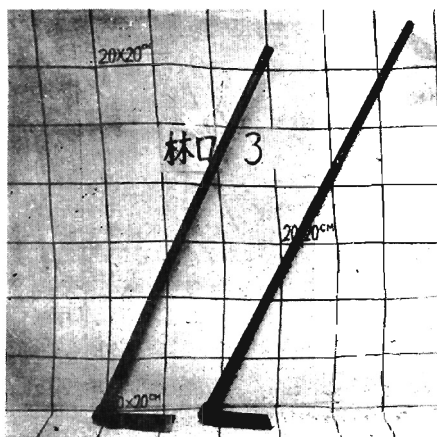
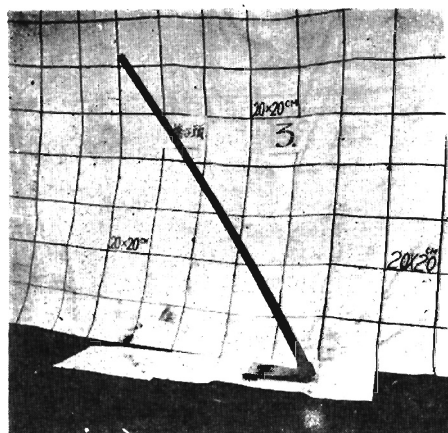
Classification	:	Land Preparation Implements
Name	:	Raking hoe 鐵托
Cost	:	NT\$20—35
Weight	:	1.2—3.5 kg.
Usage	:	1. To loosen earth. 2. To mix compost. 3. To dig planting holes.
Operating Power	:	1 man
Material Used	:	Prongs—Soft steel Handle—Wood
Season of Use	:	Year round
Service Life	:	3—6 years
Method of Application	:	Hold handle with two hands; strike into earth; to loosen and dig up earth or break up compost piles.
Work Rate	:	1. Approx. 0.01 ha./day for opening earth. 2. 0.2-0.3 ha./day for dig planting holes.
Origin	:	Traditional Chinese.
Remarks	:	1. Prongs dig easily into compost, or compact earth. 2. Not very sturdy; prongs forged together, easily break 3. Cannot heap compost into a mound. 4. Connecting socket folds on the right side.



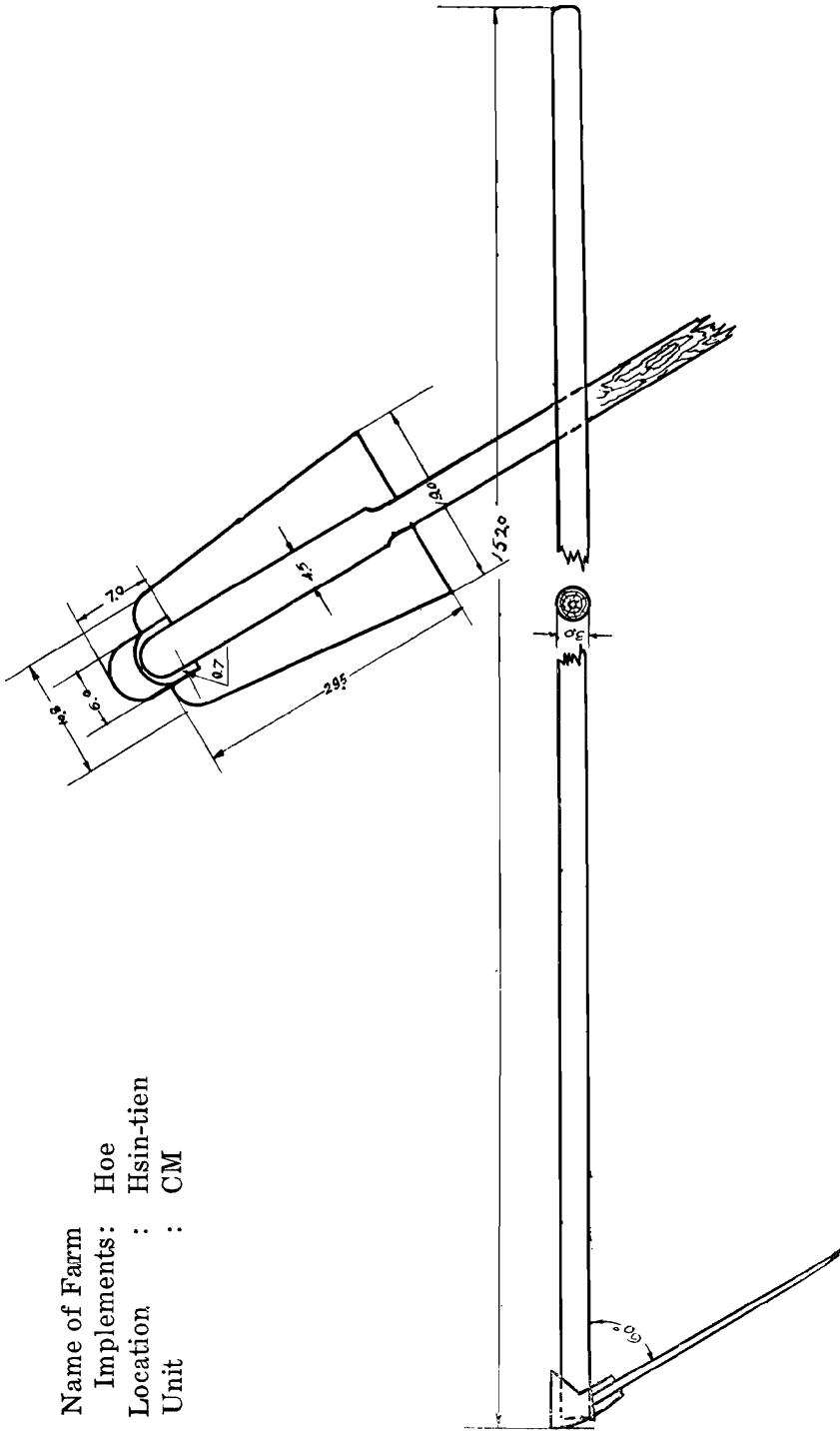
Name of Farm Implements: Raking hoe
 Location : Yu-ching
 Unit : CM



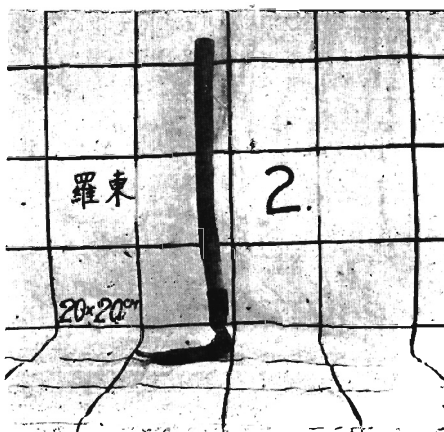
- Classification : Land Preparation Implements
- Name : Hoe 鋤頭
- Cost : NT\$15—25
- Weight : 1.4—3.7 kg.
- Usage : To harvest crops, dig pits, make mounds, plow earth, overlay earth, build dikes, weed grass, pulverize earth, intertillage and cultivate soil.
- Operating Power : 1 man
- Material Used : Blade—Soft steel
Handle—Wood
- Season of Use: Year round
- Service Life : 2—5 years
- Method of Application : Hold handle with both hands, strike into earth; move around to loosen earth and plough.
- Work Rate : To open land 0.02—0.03 ha/day
Weeding 0.05 ha/day, hilling 0.1 ha/day.
- Origin : Traditional Chinese.
- Remarks : 1. Serves all purpose for the farmer.
2. The material used, the design and the weight, all vary according to location and kinds of soil.
3. The socket eye is D shaped.
4. The hang of the hoe can be adjusted by inserting wedges in eye.
5. Long handle is easier on farmer's back but is less efficient.
6. Some places have one kind, some 3-4 kinds.
7. Blade needs reforging yearly.



Name of Farm
Implements: Hoe
Location : Hsin-tien
Unit : CM

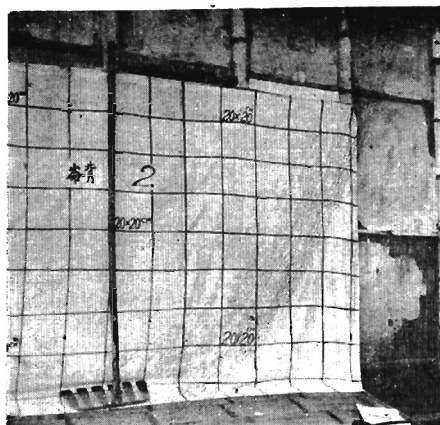


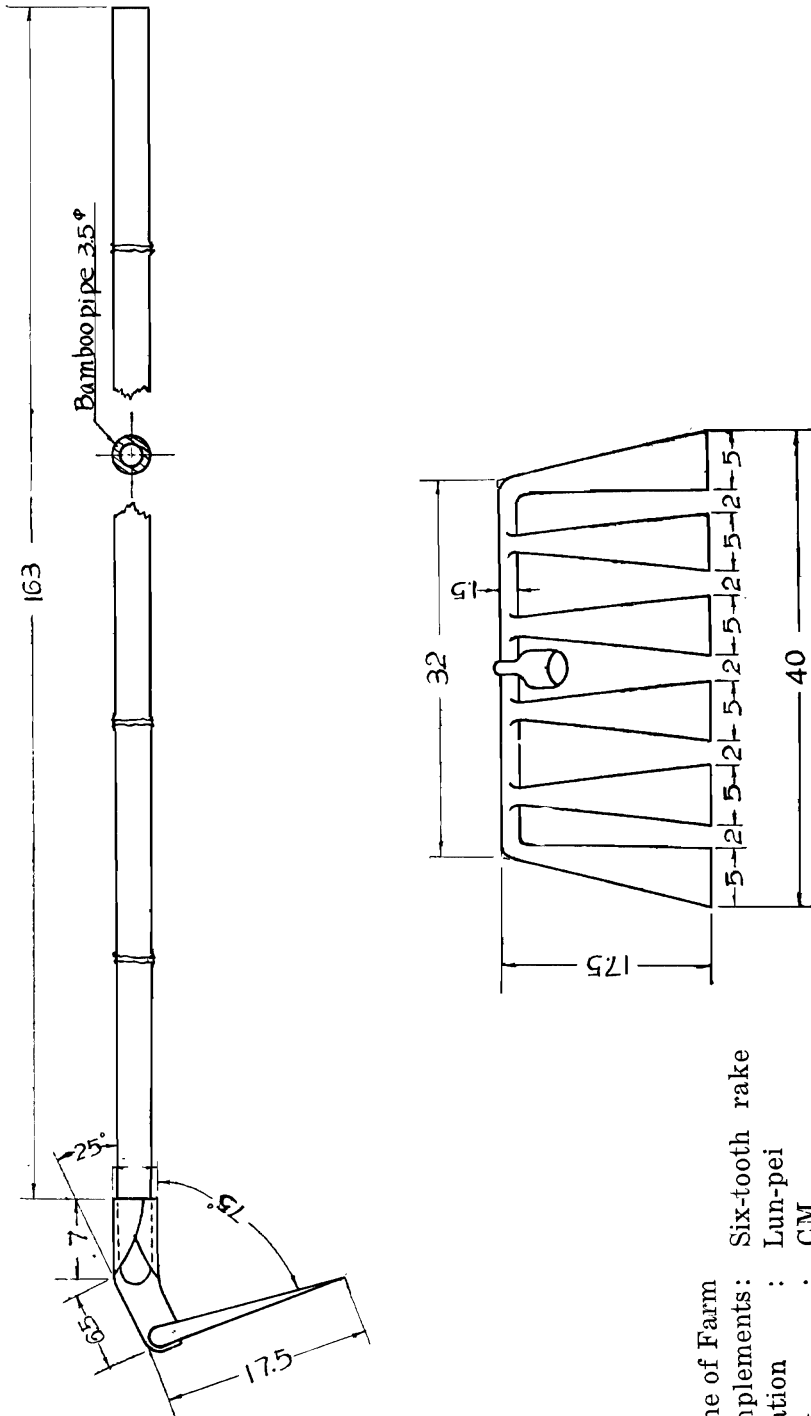
- Classification : Land Preparation Implements
- Name : Heart-shape hoe 砂爬
- Cost : Approx. NT\$15
- Weight : 1.5—2.0 kg.
- Usage : For digging and opening new gravel land.
For digging and picking up gravels.
- Operating Power : 1 man
- Material Used : Blade—Soft steel
Handle—Wood
- Season of Use: Year round
- Service Life : 1—2 years
- Method of Application : Hold handle with both hands, strike into earth to loosen dirt.
- Work Rate : Approx 0.01 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. The pointed head is suitable for digging gravel soils.
2. The connecting socket is western-styled and there is slight elasticity in the gooseneek part.
3. Used extensively in the eastern parts.



Classification : Land Preparation Implements
Name : Six-tooth rake 六齒耙仔
Cost : Approx. NT\$18
Weight : Approx. 2.2 kg.
Usage : Ridging and hilling.
Operating Power : 1 man
Material Used : Blade—Soft steel
 Handle—Wood
Season of Use: August and September
Service Life : 7—8 years
Method of Application : Stand aside the ridge; hold handle with both hands; rake up the earth from the furrow and furrow and hilling up the ridges.
Work Rate : 2—3 ha./Day
Origin : Traditional Chinese.
Remarks :

1. This implement is light.
2. Blade is wide, can hilling up large quantities of earth.
3. Can dig into sandy loams, whereas other implements of the same width cannot.
4. The connecting socket folds on one side.
5. Used mostly in Changhua Hsien and Yunlin Hsien.



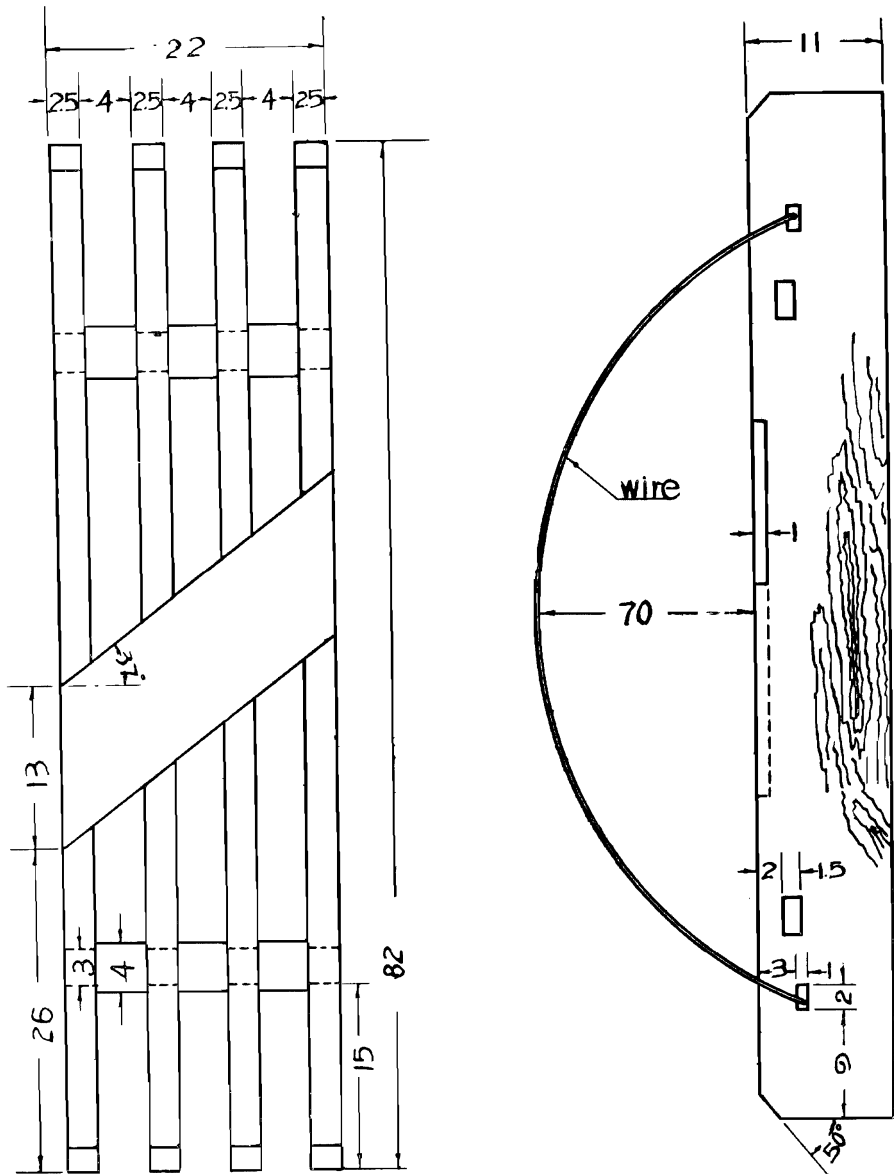


Name of Farm :
 Implements : Six-tooth rake
 Location : Lun-pei
 Unit : CM

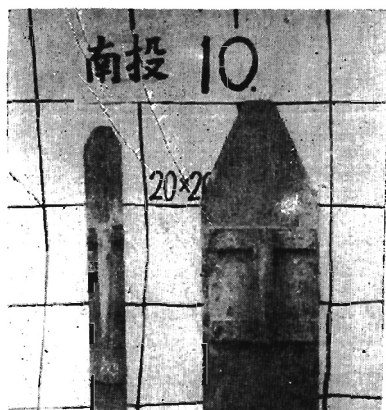
Classification : Land Preparation Implements
Name : Stubble trampler 草踏
Cost : Approx. NT\$30
Weight :
Usage : To trample and mix paddy stalks into the soils.
Operating Power : 1 man
Material Used : Handle—Steel
 Suspenders—Wires
 Tramplers—Wood
Season of Use: June and July
Service Life : Approx. 15 years
Method of Application : Place two feet on the separate tramplers; hold in each hand the suspenders attached to the tramplers. Tramp on the stalks and force them into the soil.
Work Rate : Approx. 2 ha./day
Origin : Traditional Chinese.
Remarks : 1. Applicable on heavy clayey soils which are too soggy to sustain the weight of buffaloes.
 2. Work done is extensive.
 3. Specially adapted to th the clayey fields of Tan-shui.

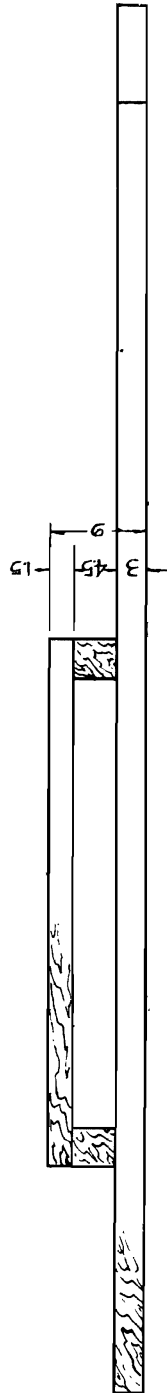
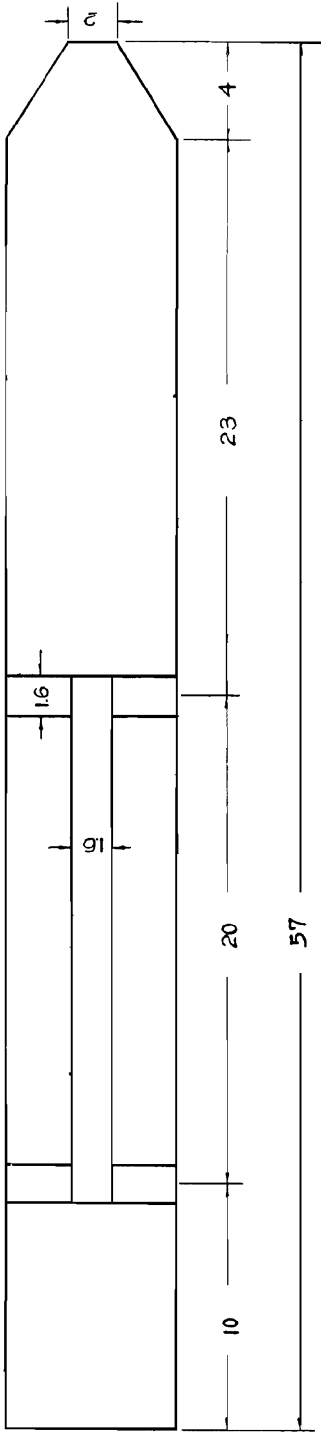


Name of Farm Stubble
 Implements: trampler
 Location : Tan-shui
 Unit : CM



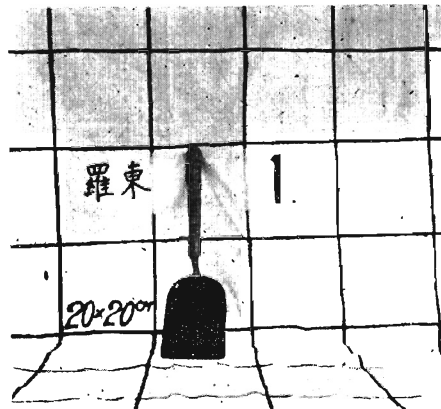
Classification : Land Preparation Implements
Name : Paddy seed-bed trowel 鋤刀
Cost : NT\$3—5
Weight : 0.4—1.0kg.
Usage : To smooth paddy seed-beds.
Operating Power : 1 man
Material Used : Wood
Season of Use: Before grain is sown onto seed bed.
Service Life : 10—20 years
Method of Application : Hold handle with one hand; level seed-beds to a smooth surface.
Work Rate : Approx. 0.01 ha./hour
Origin : Take shape from mason's trowel about 15 years ago.
Remarks : 1. Excellent for smoothing seed-bed for paddy rice.
 2. Light and convenient.

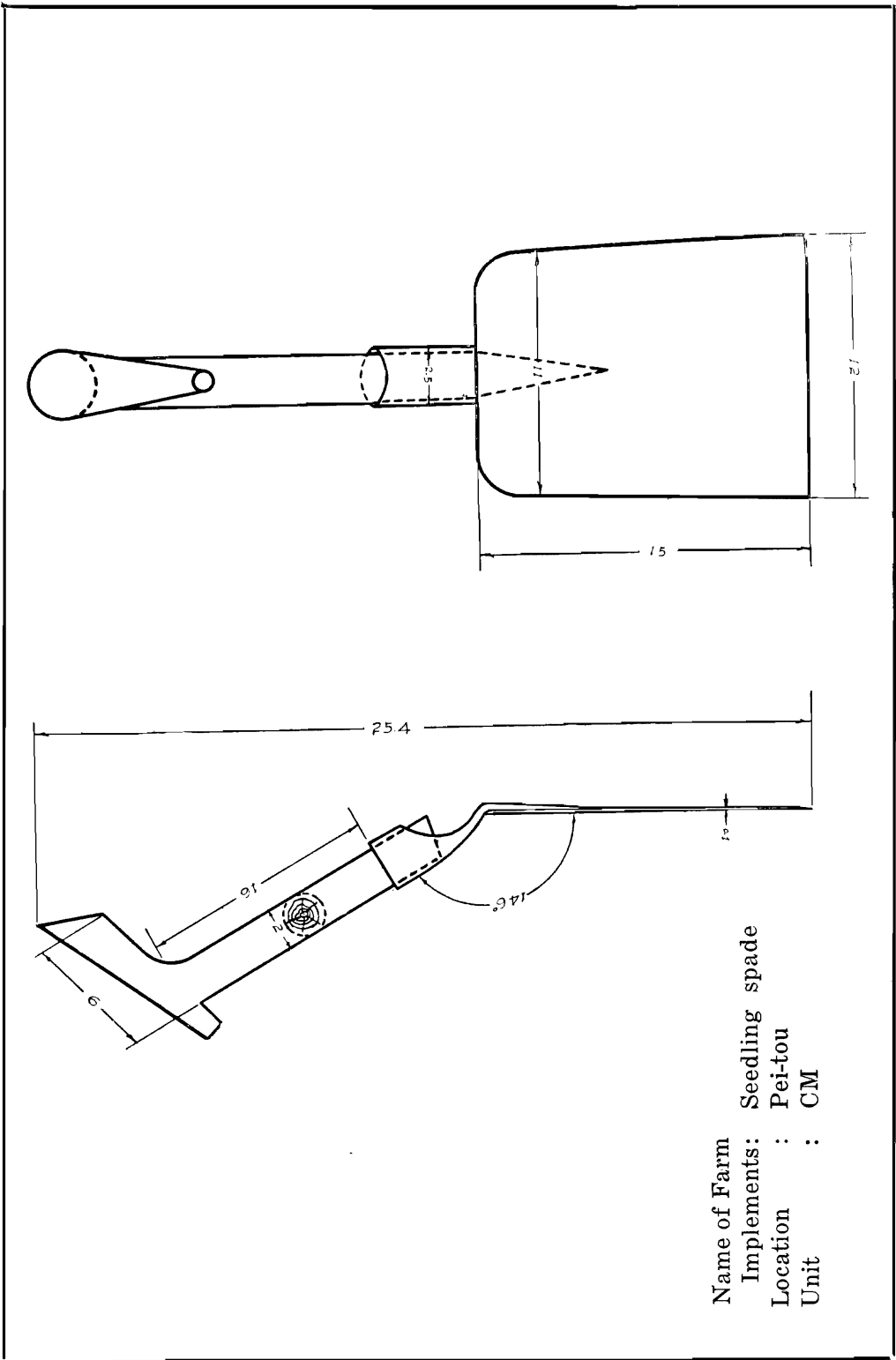




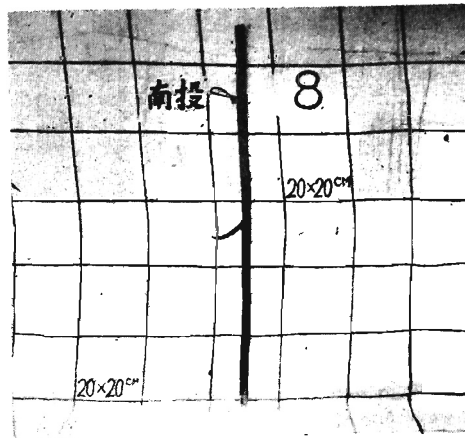
Name of Farm Paddy seed-bed
 Implements: trowel
 Location : Nan-ton
 Unit : CM

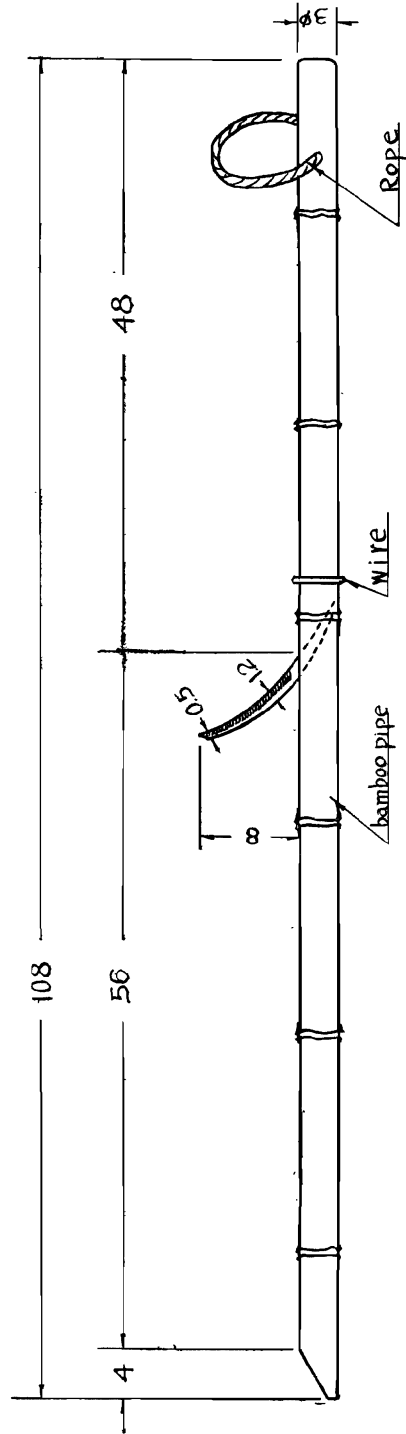
- Classification : Planting Implements
- Name : Seedling spade 秧鋤
- Cost : NT\$10—15
- Weight : 0.45—0.6 kg.
- Usage : To spade up rice seedlings from seed bed.
- Operating Power : 1 man
- Material Used : Blade—Soft steel
Handle—Wood or Bamboo
- Season of Use: Before rice seedlings are transplanted.
- Service Life : About 5 years
- Method of Application : Hold handle with both hands; dig 2 cm. around growing seedlings covered with water, then scoop up both soil and seedlings.
- Work Rate : Approx. 0.02 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Can scoop up seedlings with soil on them.
2. Can sever seedling roots at definite length.
3. The center of the blade back is slightly raised allowing excess water to run off.





Classification : Planting Implements
 Name : Seedling sickle 秧刈
 Cost : Approx. NT\$2
 Weight : Approx. 0.3 kg.
 Usage : To shorten rice seedling leaves in order to minimize leaves evaporation.
 Operating Power : 1 man
 Material Used : Knife—Sickle blade
 Handle—Bambo
 Season of Use: Before Transplanting of second crop of rice.
 Service Life : 5—10 years
 Method of Application : Stick the bamboo pole into the earth and press it against the farmer's breast; hold the seedling leaves with both hands and push toward sickle to cut leaves.
 Work Rate : Approx. 1,200 handfals/hour
 Origin : Traditional Chinese.
 Remarks : 1. Can work fast and cut accurately.
 2. Design is simple.
 3. Specifically for planting native rice seedling.





Name of Farm :
 Implements : Seedling sickle
 Location : Nan-tou
 Unit : CM

Classification : Planting Implements

Name : Seedling stool 秧頓仔

Cost : NT\$3—5

Weight : Approx. 0.9 kg.

Usage : To arrange rice seedling in order.

Operating Power : 1 man

Material Used : Seat—Wood
Supporting leg—Wood

Season of Use: When rice seedlings are being digged up.

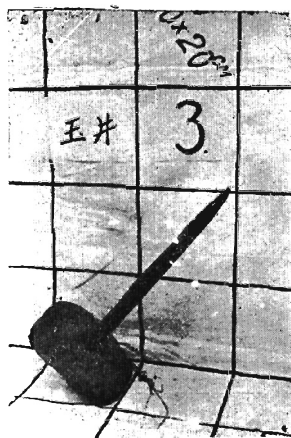
Service Life : Approx. 15 years

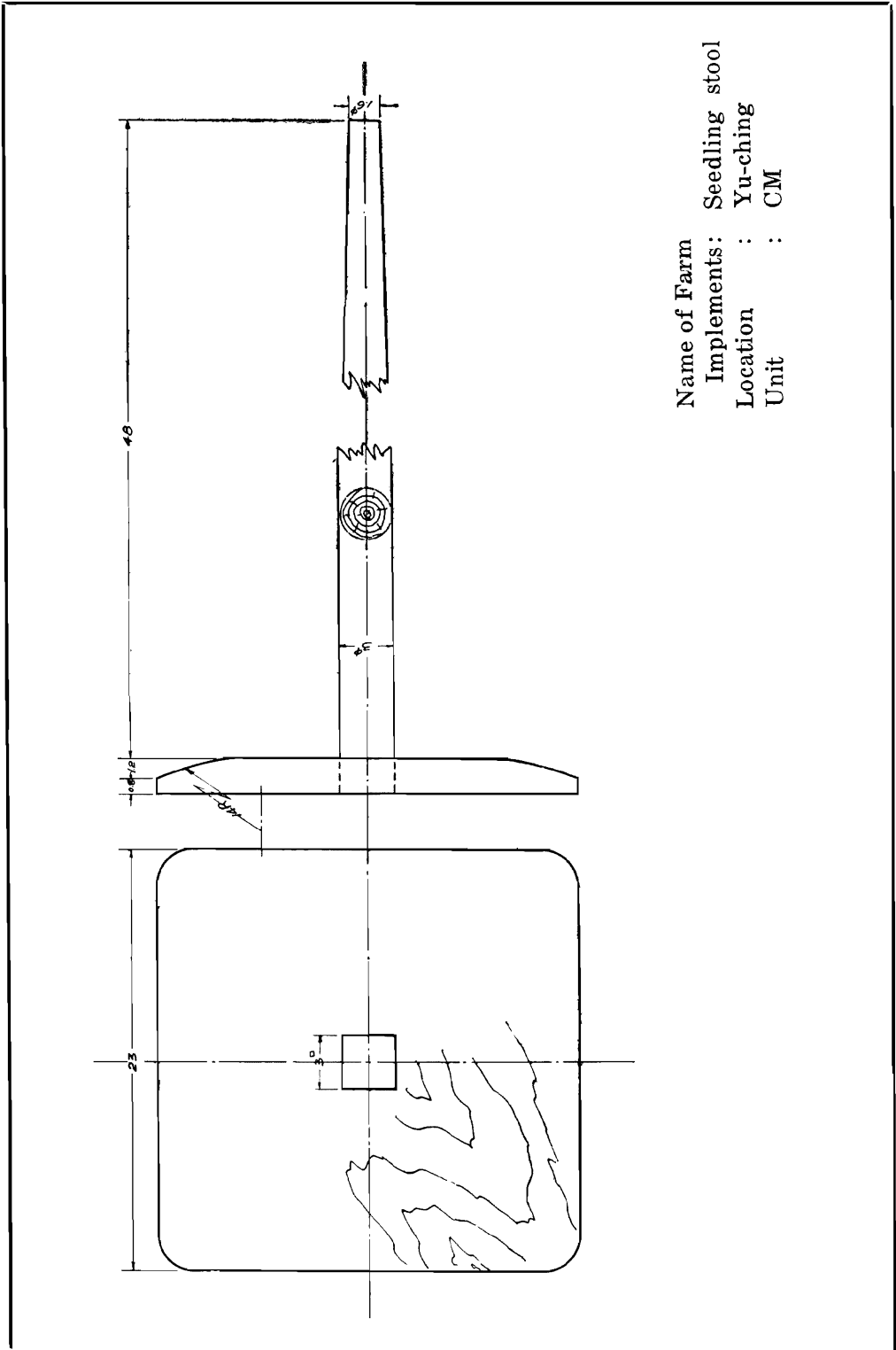
Method of Application : Stick leg into mud; the top is used as a table to place the seedlings for tying them up together.

Work Rate :

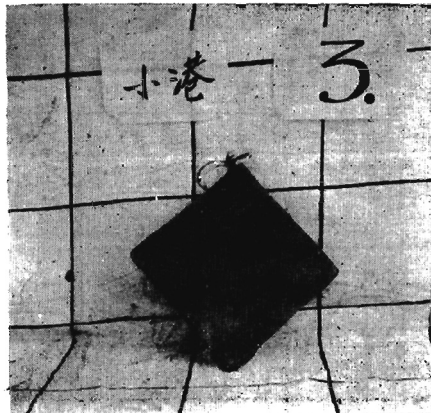
Origin : Traditional Chinese.

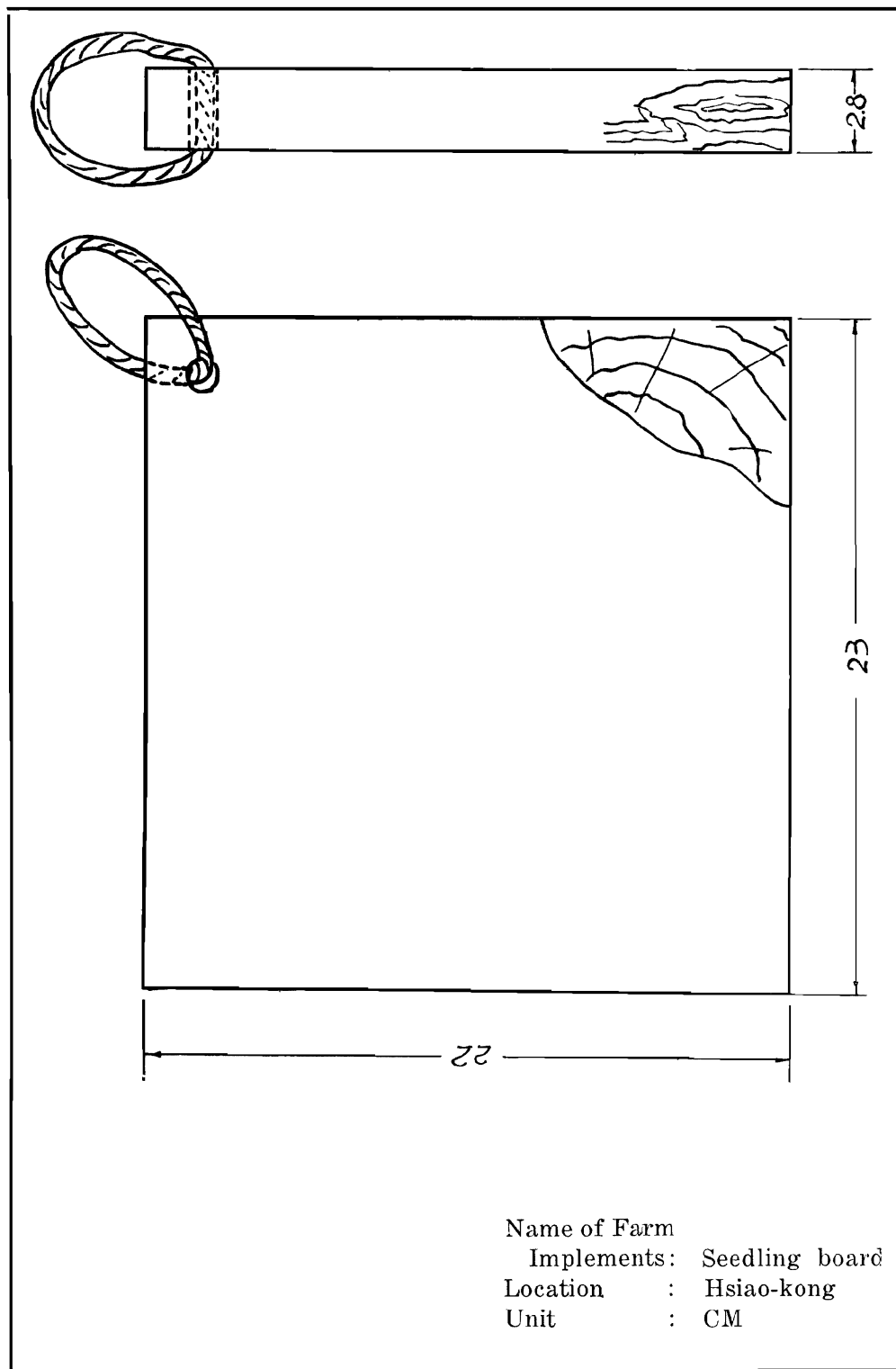
Remarks : 1. Convenient to carry and to use.
2. A special implement of Tainan area.





Classification : Planting Implement
 Name : Seedling board 秧砧仔
 Cost : Approx. NT\$0.5
 Weight : Approx. 0.7 kg.
 Usage : To shake off soil attached to the roots.
 To arrange seedlings in order.
 Operating Power : 1 man
 Material Used : Wood
 Season of Use: The season for transplanting rice.
 Service Life : 20—30 years
 Method of Application : Lefthand—hold a bundle of rice seedling. Righthand—hold this board. Beat the seedling roots gently against the board to remove soil. Lay board on ground; place seedlings in order.
 Work Rate : Approx. 70 handfuls/hour
 Origin : Traditional Chinese.
 Remarks : 1. Used when rice seedlings are pulled by hand.
 2. Special implement of Kaohsiung Hsien





Name of Farm
Implements: Seedling board
Location : Hsiao-kong
Unit : CM

Classification : Planting Implements

Name : Seedling basket 秧披

Cost : Approx. NT\$0.5

Weight : Approx. 0.3 kg.

Usage : To transport rice seedlings.

Operating Power : 1 man

Material Used : Bamboo

Season of Use: Before transplanting rice seedlings.

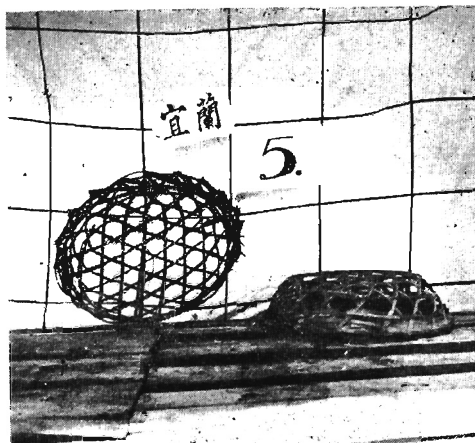
Service Life : 1—2 years

Method of Application : When loaded with seedlings, the basket is put on the bottom frame of the seedling basket carrier, and transported to the seedling tub and put onto it for further transporting.

Work Rate : Seedlings from 0.5 m² of seedbed basket

Origin : Traditional Chinese.

Remarks : This implement is useful for protecting the young seedlings from injury, and keep soils on the roots.



Classification : Planting Implements

Name : Seedling basket carrier 秧担

Cost : Approx. NT\$7

Weight : Approx. 3 kg.

Usage : To transport rice seedling in the seedling basket.

Operating Power : 1 man

Material Used : Suspenders—Steel wire or bamboo strips
Carrier—Bamboo frame

Season of Use: While transplanting rice

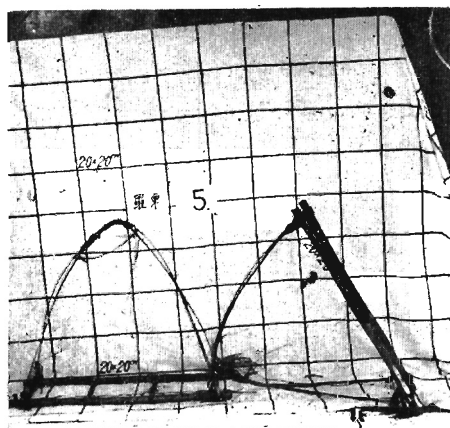
Service Life : 2—3 years

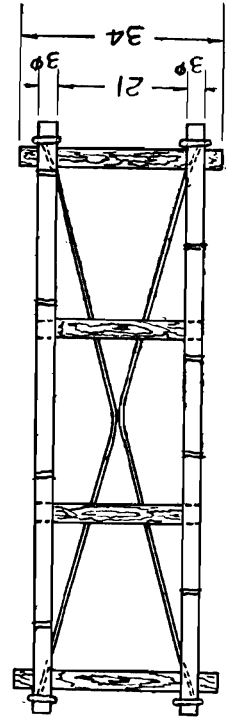
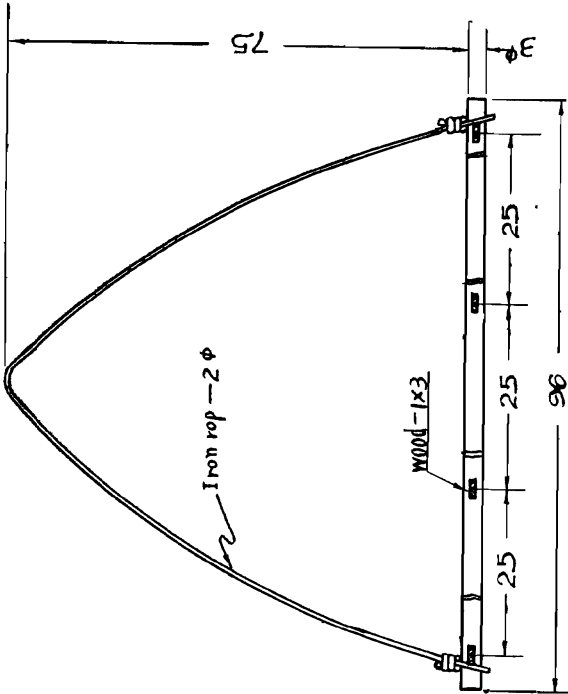
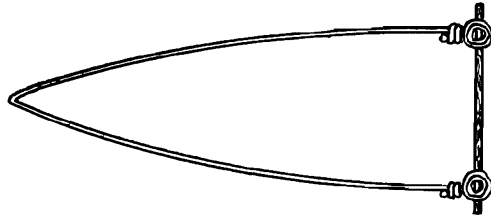
Method of Application : Place the seedling baskets loaded with seedlings in this implement to be transported from seed-beds directly to paddy fields or first to seedling tubs.

Work Rate : Approx. 60 kg./load

Origin : Traditional Chinese.

Remarks : 1. Simple, light and convenient.
2. Has no raised edge, suitable for transporting seedling baskets.





Name of Farm :
 Implements :
 Location :
 Unit :

Seedling basket
 carrier
 Lo-tung
 CM

Classification : Planting Implements

Name : Seedling tub 秧船

Cost : Approx. NT\$12

Weight : Approx. 1.8 kg.

Usage : For holding and transporting rice seedlings.

Operating Power : 1 man

Material Used : Tub hoop—Steel wire or bamboo strips
Tub—Wood

Season of Use: While transplanting rice.

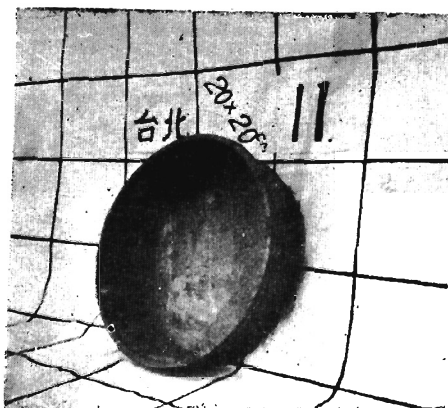
Service Life : 5—10 years

Method of Application : Place seedling basket loaded with seedlings in this tub, float it along the right side of farmer. As the farmer progresses, the tub is pushed ahead of him.

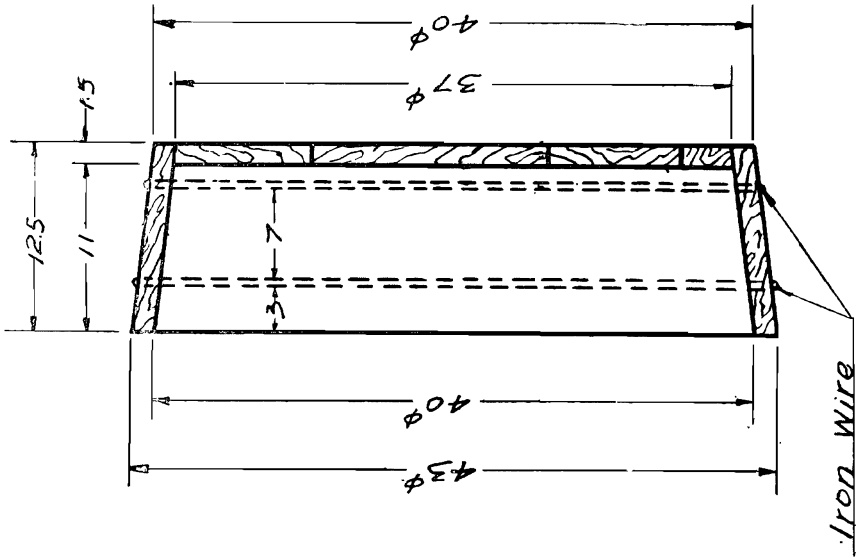
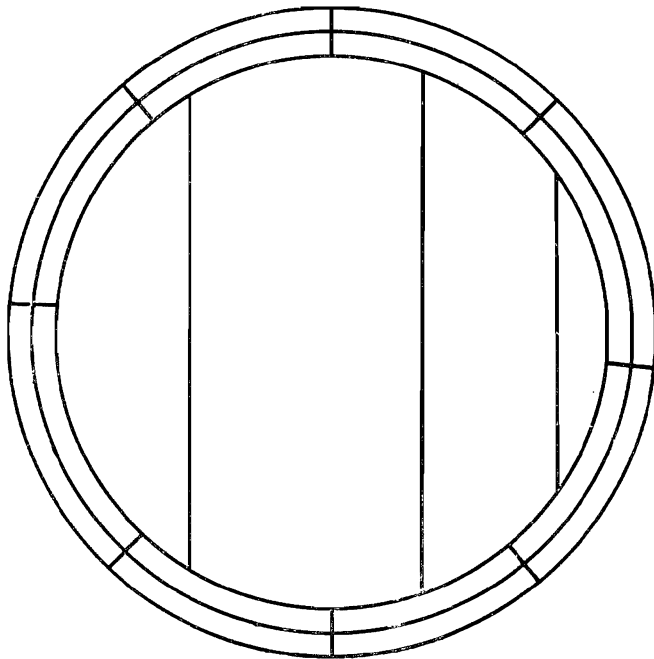
Work Rate : 1—2 Seedling baskets tub

Origin : Traditional Chinese.

Remarks : 1. Flat bottom, glides smoothly over flooded fields without scralching the surface of the fields.
2. Can protect seedlings from injury.
3. Can also be used as household utilities.



Name of Farm
Implements: Seedling tub
Location : Taipei
Unit : CM



Classification : Planting Implements

Name : Seedling holder 秧枷

Cost : NT\$2—3

Weight : Approx. 0.38 kg.

Usage : To transport rice seedlings.

Operating Power : 1 man

Material Used : Holder—Wood
Connecting device—Steel wire

Season of Use: While transplanting rice bshrdcmfwccf cmfcm

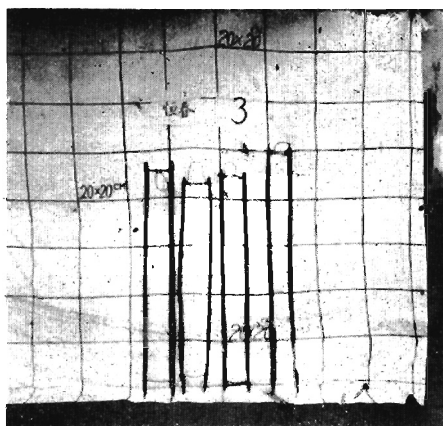
Service Life : Approx. 10 years

Method of Application : Stick the sharp ends into the field, fill seedlings snugly to the top of the holder and then transport it by pole.

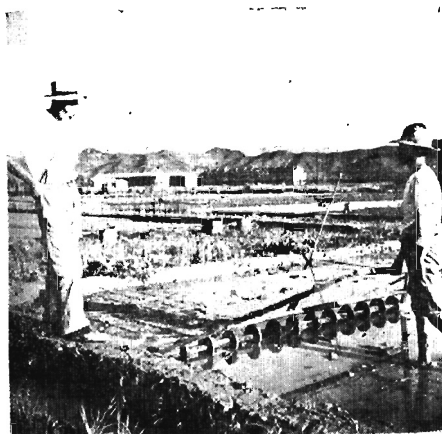
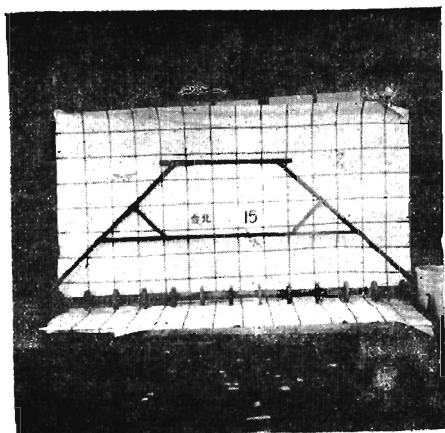
Work Rate : 120—130 handful of seedlings / Holder

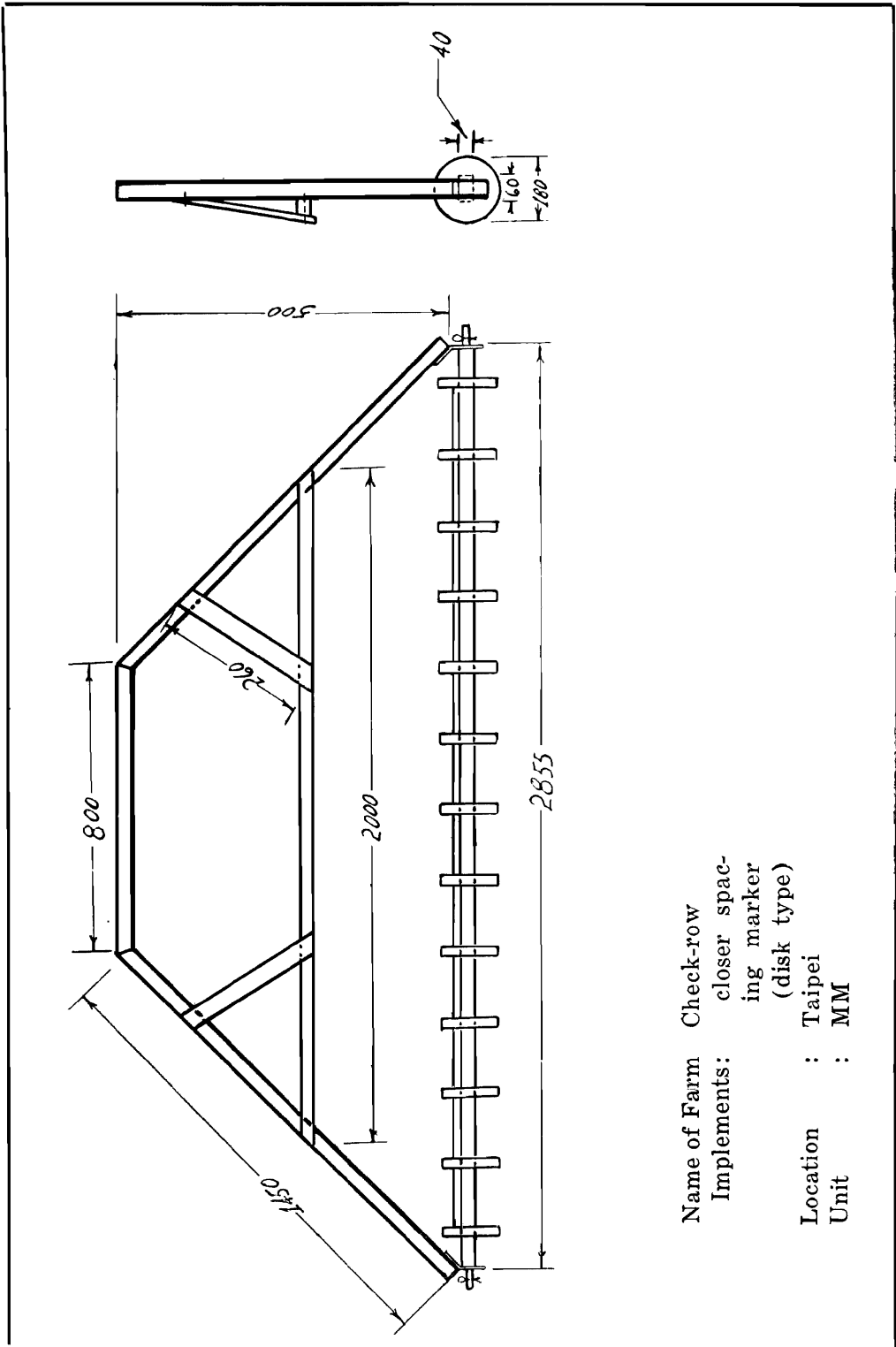
Origin : Traditional Chinese.

Remarks : 1. Simple and cheap
2. Suitable for transporting hand-pulled seedlings.
3. This implement is used in Heng-Chun where farmers do not use seedling basket, seedling tub etc.



- Classification : Planting Implements
- Name : Check-row closer spacing marker (disk type) 車輪式正條密植器
- Cost : NT.60—90
- Weight : Approx. 11 kg.
- Usage : Marking check-row spaces for transplanting rice seedlings.
- Operating Power : 1 man
- Material Used : Axle and bearing—Soft steel
Wheels and frame—Wood
- Season of Use: Before transplanting rice.
- Service Life : Approx. 10 years
- Method of Application : After draining the flooded, prepared fields, hold this implement and walk backwards. The wheels will mark the earth in rows. Swing the implement to the right and pull it backwards, crossing the previous marked rows to form check rows.
- Work Rate : Approx. 1 ha./Day
- Origin : Created in Taiwan 15 years ago.
- Remarks : 1. Suitable for clayey soils; on sandy soils it is useless.
2. The markings are accurate and distinct.
3. Used before transplanting to increase efficiency.





Name of Farm : Check-row
Implements : closing spacing marker
(disk type)
Location : Taipei
Unit : MM

Classification : Planting Implements

Name : Check-row closer spacing marker (rod type) 竹竿式正條密植器

Cost : NT\$2—5

Weight : 1.2—2.5 kg.

Usage : Marking check-row spaces for transplanting rice seedlings.

Operating Power : 1 man

Material Used : Bamboo

Season of Use: Before transplanting rice.

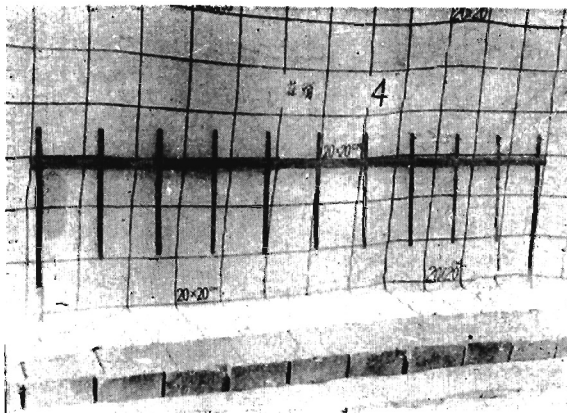
Service Life : 1—3 men

Method of Application : Same as disk type check-row closer spacing marker.

Work Rate : 0.1—0.2 ha./day

Origin : Introduced from Japan 15 years ago.

Remarks : 1. Suitable for sandy soils where wheel-type spacing marker fails to function.
2. Efficiency is low because of much more friction produced.



Classification : Planting Implements

Name : Transplanting snapper 播田管仔

Cost : NT\$2—3

Weight : 0.025—0.030 kg.

Usage : For transplanting rice seedlings.

Operating Power : 1 man

Material Used : Copper or iron sheets or bamboo tubs

Season of Use: While transplanting seedlings.

Service Life : Approx. 3 years

Method of Application : Hang it on the thumb, to separate the seedlings and stick them into the soil.

Work Rate : Approx. 0.2 ha./day

Origin : Developed in Taiwan from the mainland thumb protecting bamboo tube.

Remarks : 1. Help transplant seedlings on hard soil.
2. Help transplant seedlings deeper into the soil.
3. Can protect the thumb.
4. Used in Taipei and Taoyuan.



Classification : Planting Implements

Name : Seeding pipe 胡麻管

Cost : Approx. NT\$5

Weight : 0.3—0.6 kg.

Usage : To sow seasmes, jute seeds. etc.

Operating Power : 1 man

Material Used : Bamboo

Season of Use: March, April

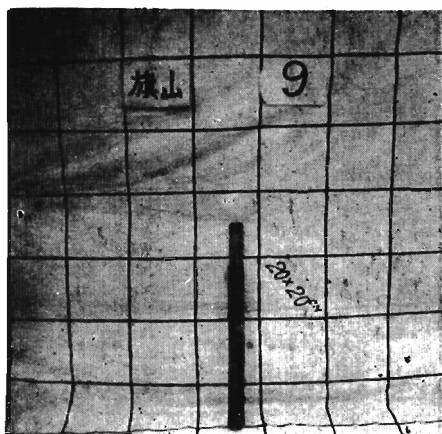
Service Life : About 10 years

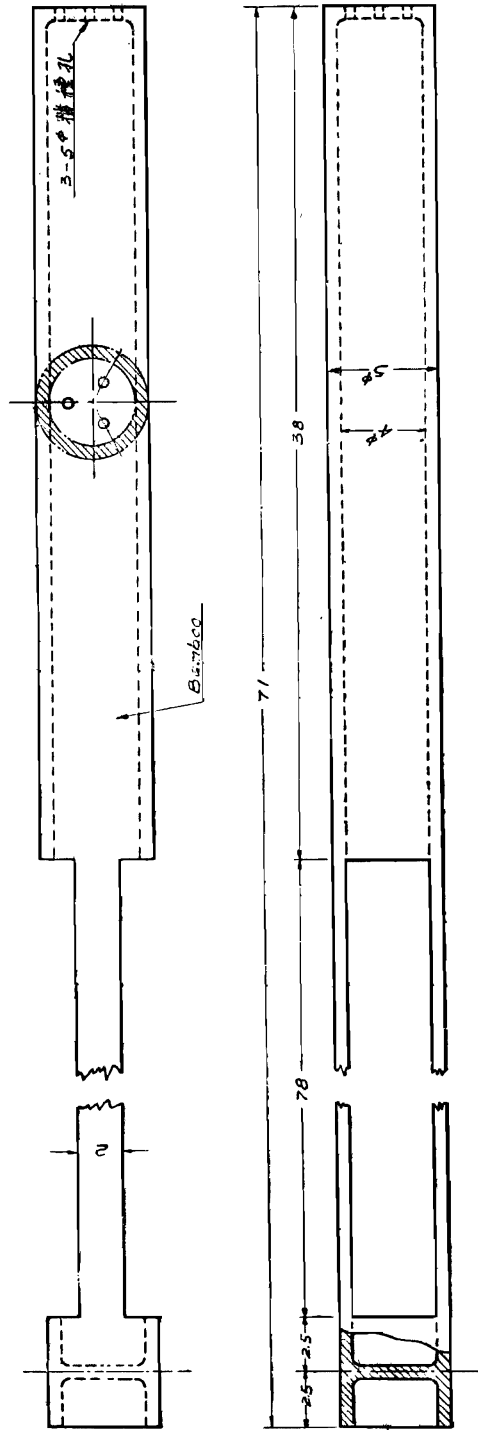
Method of Application : Place seeds mixed with fine soil into this tube. Shake tube while walking to dro seeds from the small holes onto the seedbed. This is the simplest seed drill.

Work Rate : Approx. 1 ha./Day

Origin : Traditional Chinese.

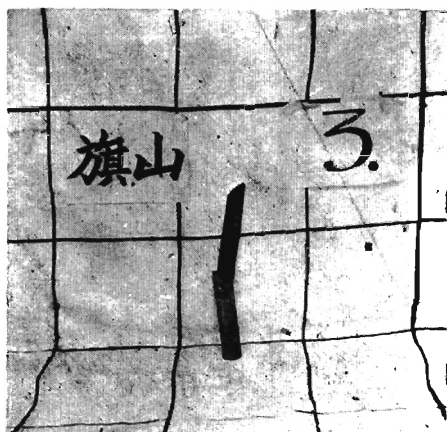
Remarks : 1. Suitable for sowing small seeds.
2. Simple and cheap.

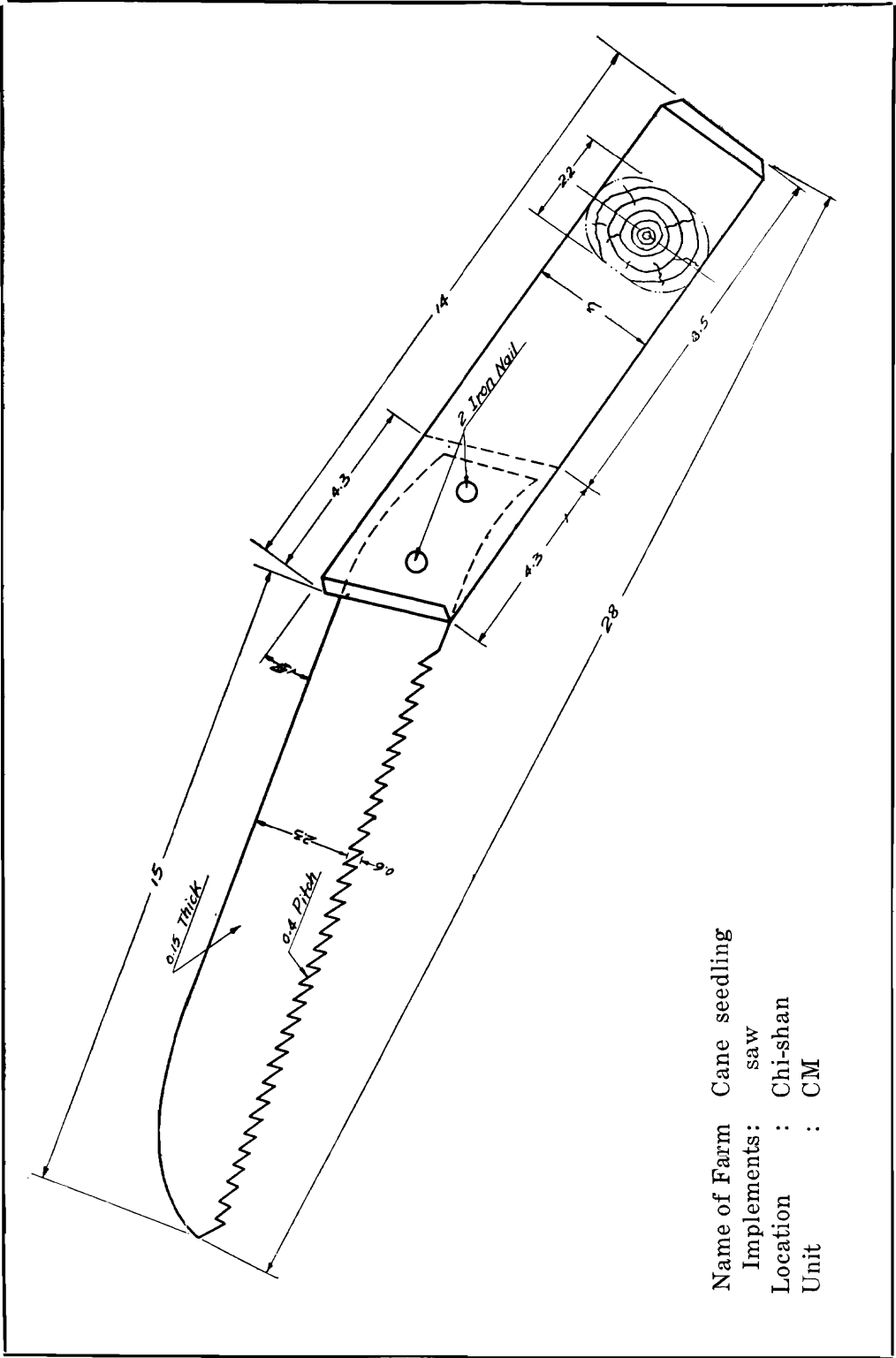




Name of Farm :
Implements: Seeding pipe
Location : Tou-liu
Unit : CM

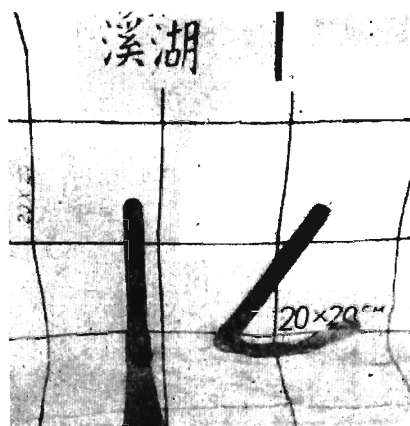
Classification : Planting Implements
 Name : Cane seedling saw 側芽鋸
 Cost : Approx. NT\$4
 Weight : Approx. 0.065 kg.
 Usage : To obtain lateral sprouts from sugar cane stalks.
 Operating Power : 1 man
 Material Used : Saw—Steel plate
 Handle—Wood
 Season of Use: Before transplanting sugar cane seedlings.
 Service Life : About 1 year
 Method of Application : Left hand—hold lateral sprout. Right hand—hold this saw and remove sprouts.
 Work Rate : Approx. 2,000 stalks/day
 Origin : Created in Taiwan.
 Remarks : 1. Will not injure sprouts while sawing off.
 2. Little energy is needed.



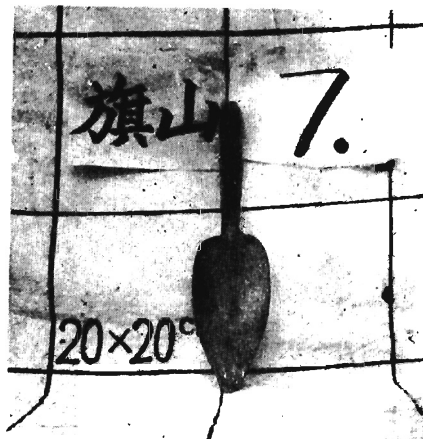


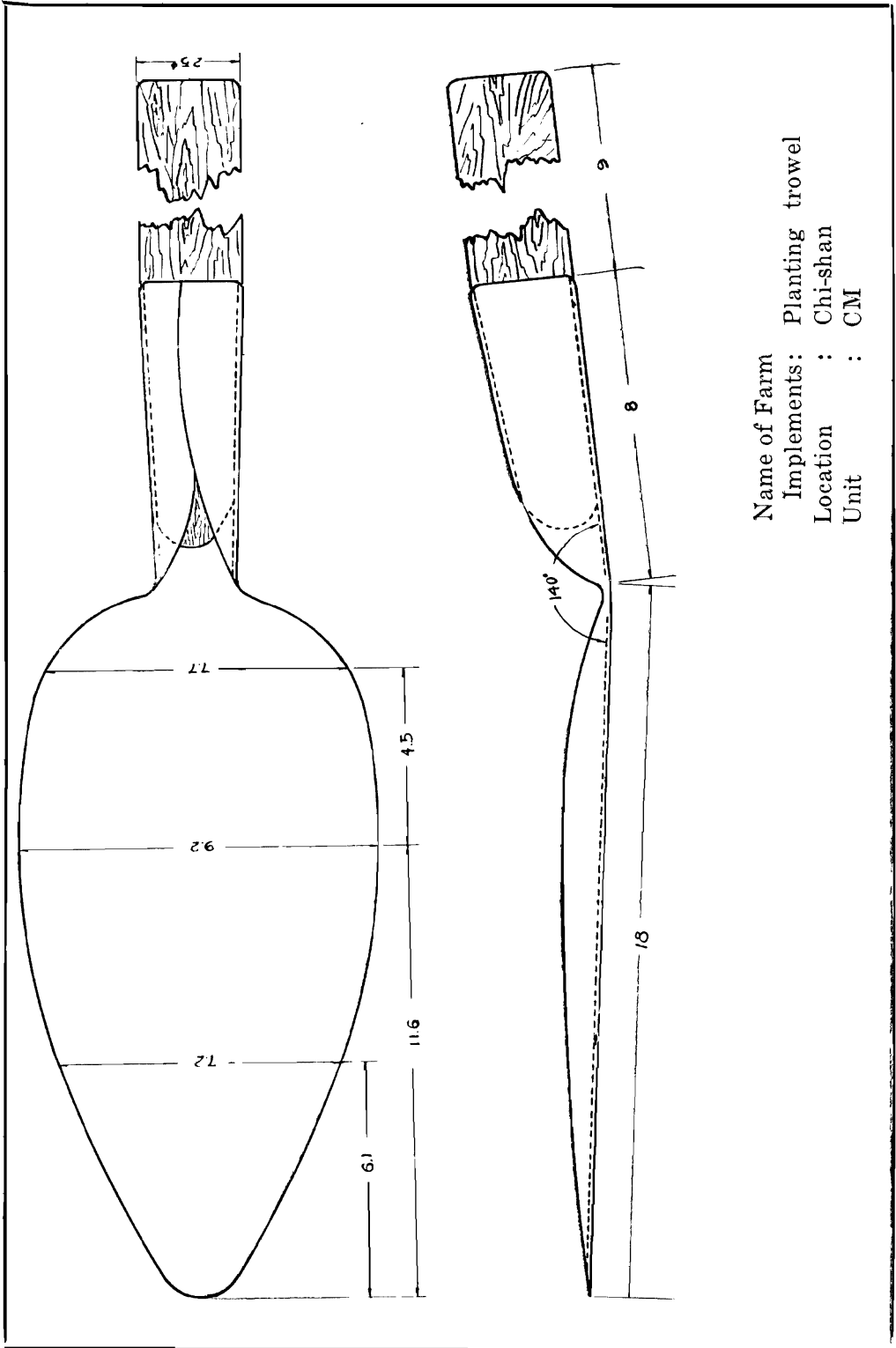
Name of Farm : Cane seedling
 Implements : saw
 Location : Chi-shan
 Unit : CM

Classification	: Planting Implements
Name	: Cane planting hoe 插甘蔗掘仔
Cost	: NT\$6—7
Weight	: 0.6—1.0 kg.
Usage	: For planting canes
Operating Power	: 1 man
Material Used	: Hoe blade: body—iron edge—steel Handle—Wood
Season of Use	: July to September
Service Life	: 3—4 years
Method of Application	: Right hand hold handle; dig hole slantwise into the soil. Shake and insert cane seedling along hoe blade into the hole. Pull the hoe blade out, and tramp on soil to firm it.
Work Rate	: Approx. 0.13 ha./day
Origin	: Developed in Taiwan after sugar cane was introduced.
Remarks	: 1. Suitable to use in loose soil. 2. Only takes one man to dig and plant. 3. Light and convenient. 4. Another man carry cane seedlings and place one each at the right spot for planting ahead the man with the hoe.



Classification :	Planting Implements
Name :	Planting trowel 鋤仔
Cost :	Approx. NT\$3
Weight :	Approx. 0.22 kg.
Usage :	For transplanting vegetables, flowering plants, and weeding.
Operating Power :	1 man
Material Used :	Blade—Steel Handle—Wood
Season of Use:	Year round
Service Life :	About 19 years
Method of Application :	Hold handle with right hand and shove soil.
Work Rate :	Weeding. 0.005 ha./day
Origin :	Introduced from Western countries.
Remarks :	1. Light and convenient. 2. Can dig up large portions of soil; suitable for transplanting. 3. This implement is now manufactured in Taiwan exclusively.





Name of Farm :
Implements : Planting trowel
Location : Chi-shan
Unit : CM

Classification : Intertillage Implements

Name : Short handle three-tooth weeding hook 三爪

Cost : NT\$4—5

Weight : 0.48—0.5 kg.

Usage : For intertilling and weeding on sugar cane fields.

Operating Power : 1 man

Material Used : Rake—Soft steel
Handle—Wood

Season of Use: From August to February

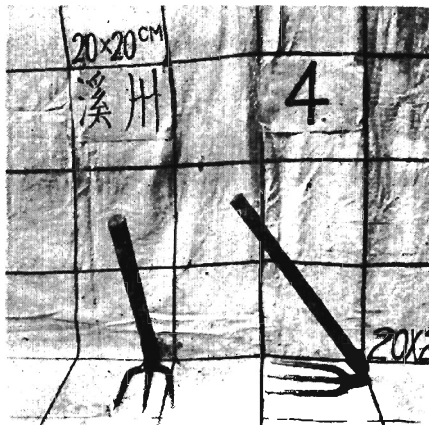
Service Life : About 3 years.

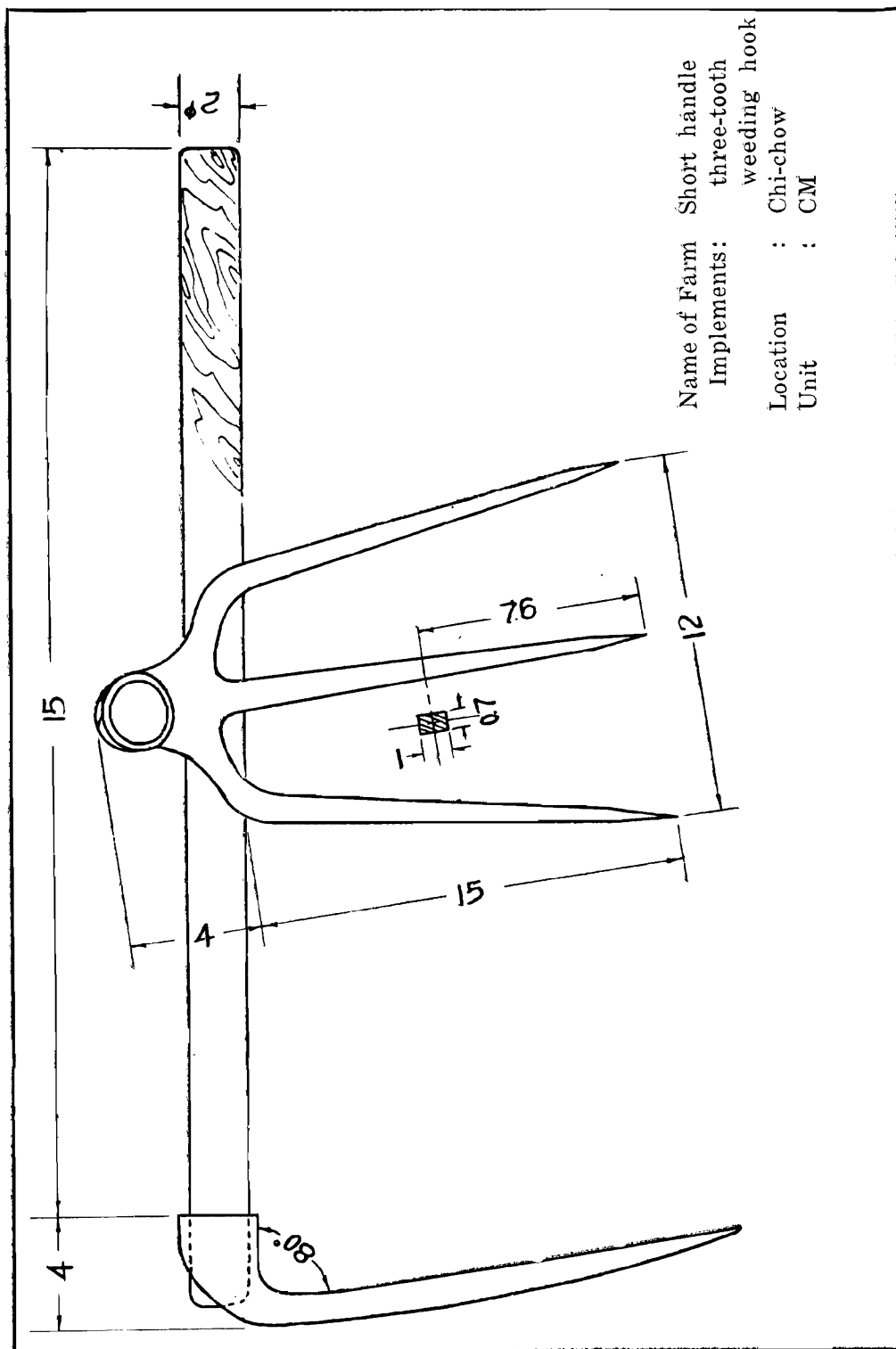
Method of Application : Use right hand to hold handle for intertilling; left hand for collecting weeds.

Work Rate : 0.03—0.05 ha./day

Origin : Traditional Chinese.

Remarks : 1. Spaces between teeth is too wide; not efficient.
2. Gradually superceded by four-tooth hook.





Classification : Intertillage Implements

Name : Three prong weeding hook 三齒

Cost : Approx. NT\$15

Weight : Approx. 0.5 kg.

Usage : For intertilling and weeding of vegetable gardens.

Operating Power : 1 man

Material Used : Hook—Soft steel
Handle—Wood

Season of Use: Year round

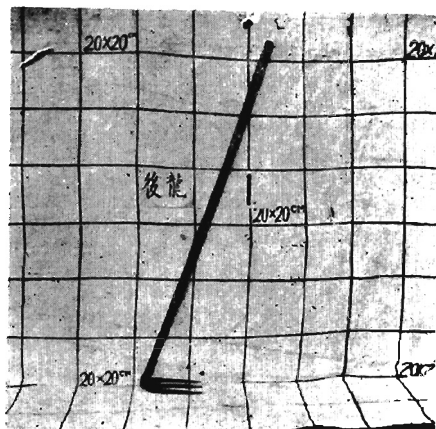
Service Life : 2—3 years

Method of Application : Hold handle with both hands strike onto earth to loosen dirt.

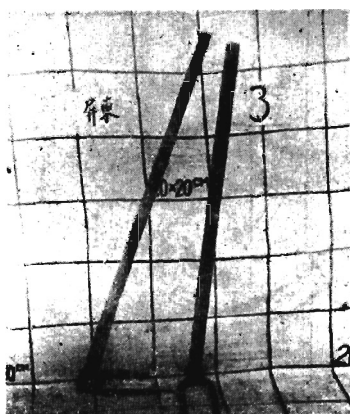
Work Rate : Approx. 0.15 ha./day

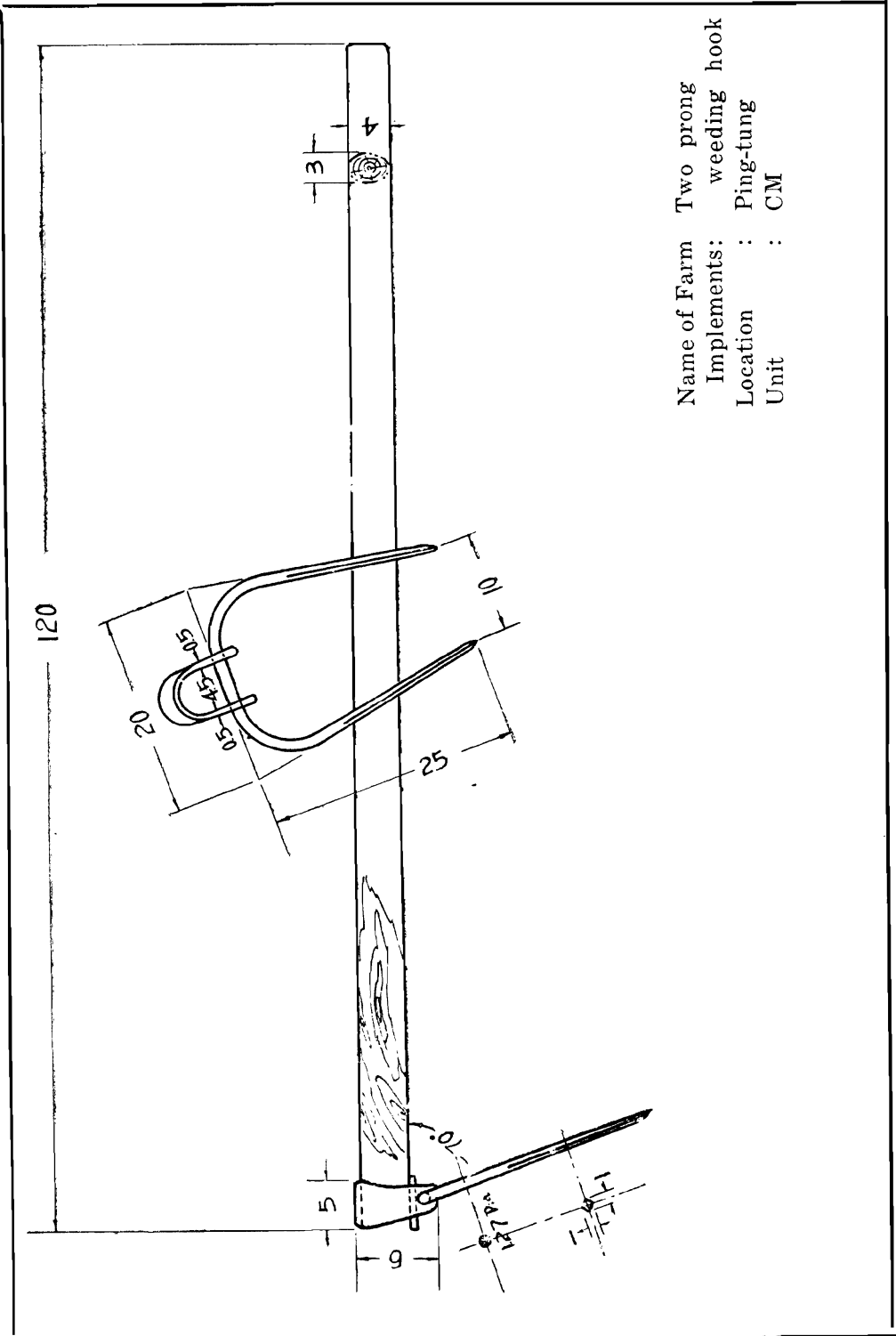
Origin : Traditional Chinese.

Remarks : 1. Design similar to rake-type hoe.
2. Narrower than rake-type hoe.



Classification	: Intertillage Implements
Name	: Two prong weeding hook 二齒
Cost	: NT\$10
Weight	: Approx. 1—2 kg.
Usage	: 1. Intertilling and weeding 2. Hooking sugar-cane leaves.
Operating Power	: 1 man
Material Used	: Hook—Soft steel Handle—Wood or Bamboo
Season of Use	: 1. Year round 2. December to April
Service Life	: About 5 years
Method of Application	: 1. Hold handle with both hands, strike down for weeding and loosening. 2. Walk backwards while pulling leaves.
Work Rate	: 1. 0.05—0.1 ha./day 2. Approx. 1 ha./day
Origin	: Traditional Chinese.
Remarks	: 1. Working on narrow strips. 2. Not injurious to sugar-cane plants. 3. Breaks clods into smaller pieces than with intertilling hoes.





Classification : Intertillage Implements

Name : Intertilling hoe 中耕鋤頭

Cost : Apprix. NT\$12

Weight : 2.8—3.0 kg.

Usage : For the 2nd and 3rd intertillage and cover fertilizer after just placed in rows

Operating Power : 1 man

Material Used: Hoe blade—iron body with steel edge
Handle—Wood

Season of Use: 90—120 days ater planting sugar cane

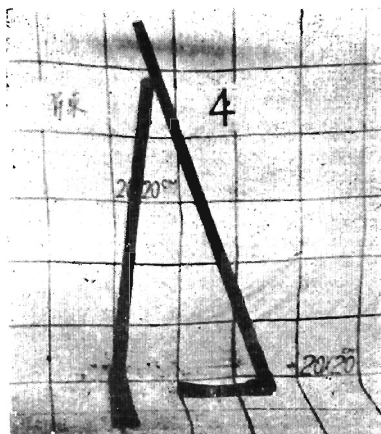
Service Life : About 5 years

Method of Application : Hold handle with both hands; strike down to stir and till soil.

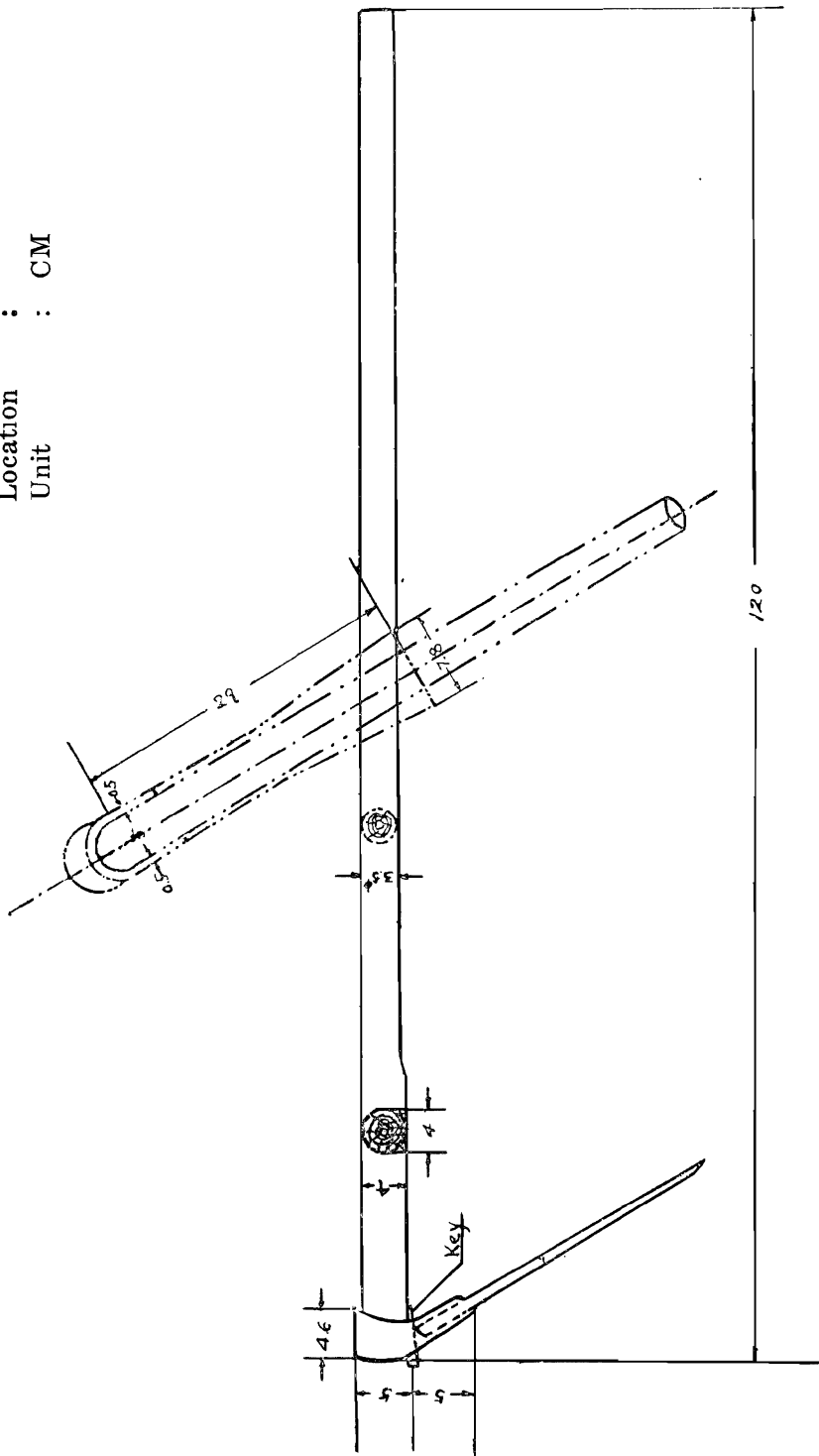
Work Rate : Approx. 0.05 ha./day

Origin : Designed by Taiwan Sugar Corporation.

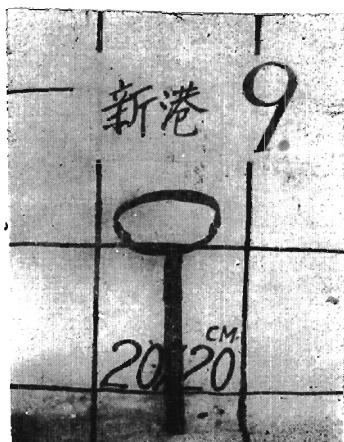
Remarks : 1. Working on narrow strips; suitable for tilling heavy soil.
2. Useful for breaking into earth and digging pits.

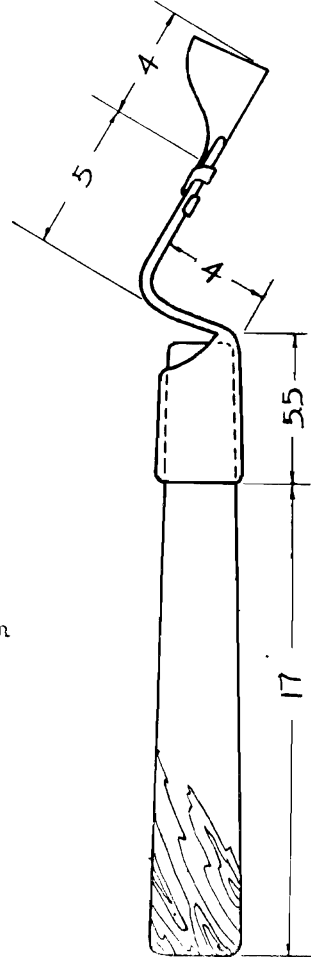
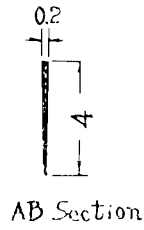
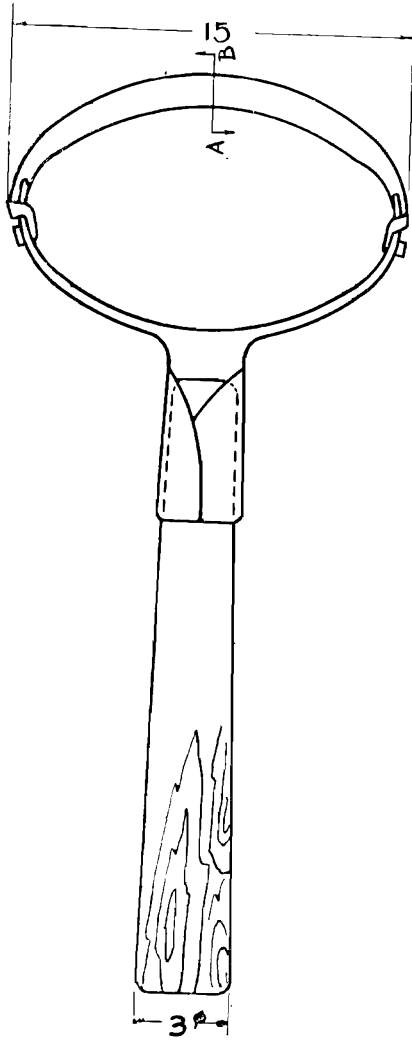


Name of Farm
Implements: Intertilling hoe
Location :
Unit : CM



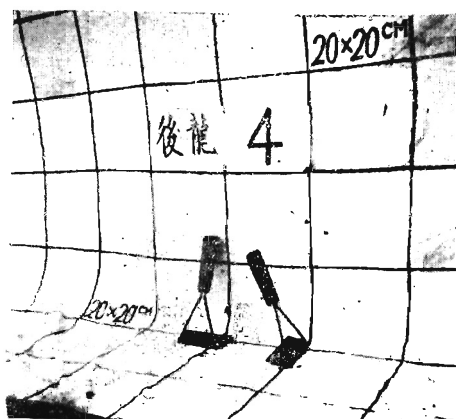
Classification : Intertillage Implements
 Name : Aborigines weed shaver
 Cost : Approx. NT\$3
 Weight : Approx. 0.38 kg.
 Usage : For cutting and eradicating weeds in millet, vegetable and bean fields.
 Operating Power : 1 man
 Material Used: Weeder—Shaving edge, steel blade; connecting part, iron.
 Handle—Wood.
 Season of Use: Year round
 Service Life : 3—5 years
 Method of Application : Right hand hold handle, left hand gather weeds.
 Work Rate : Approx. 0.1 ha./day
 Origin : Traditional aborigines
 Remarks : 1. Light and convenient
 2. Cuts grass with its shaving edge.
 3. Special implement of the A-Mei tribe aborigines.



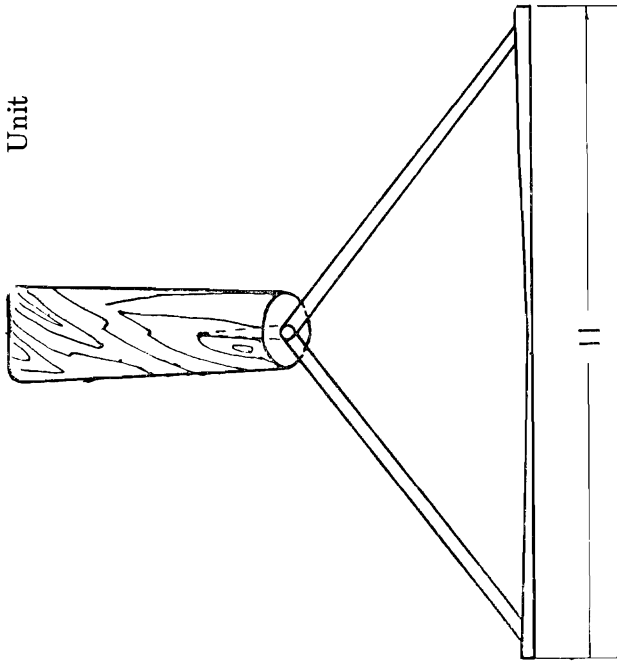
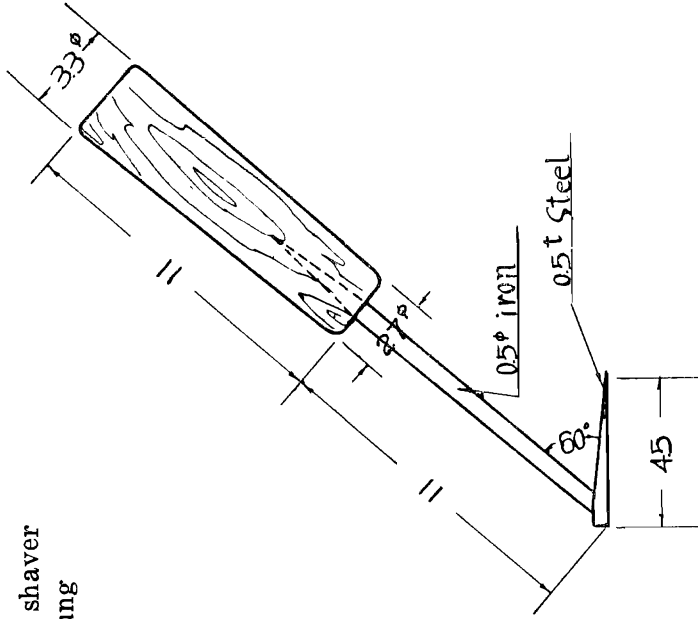


Name of Farm Aborigines
Implements: weed shaver
Location : Hsin-kang
Unit : CM

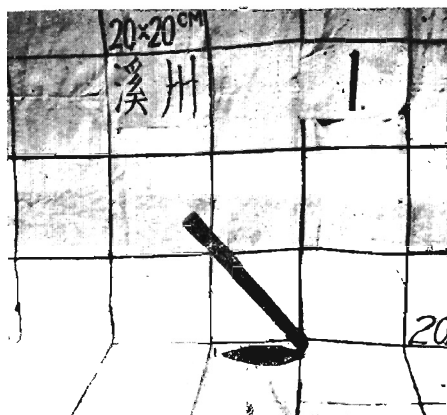
- Classification : Intertillage Implements
- Name : Weed shaver 草爬仔
- Cost : NT\$4—5
- Weight : Approx. 0.2 kg.
- Usage : Weeding in peaunt, sweet-potato and vegetable fields.
- Operating Power : 1 man
- Material Used: Handle—Wood
Shaver—Iron
- Season of Use: Year round
- Service Life : 2-3 years
- Method of Application : Use right hand to hold handle and shave, left hand gather weeds.
- Work Rate : 0.05—0.08 ha./day
- Origin : Created in Taiwan.
- Remarks : 1. Light.
2. Cheap.
3. Suitable for weeding shallow-rooted weeds on sandy loams.
4. Blade and iron wire are welded together.
5. This implement is still not widely adopted.

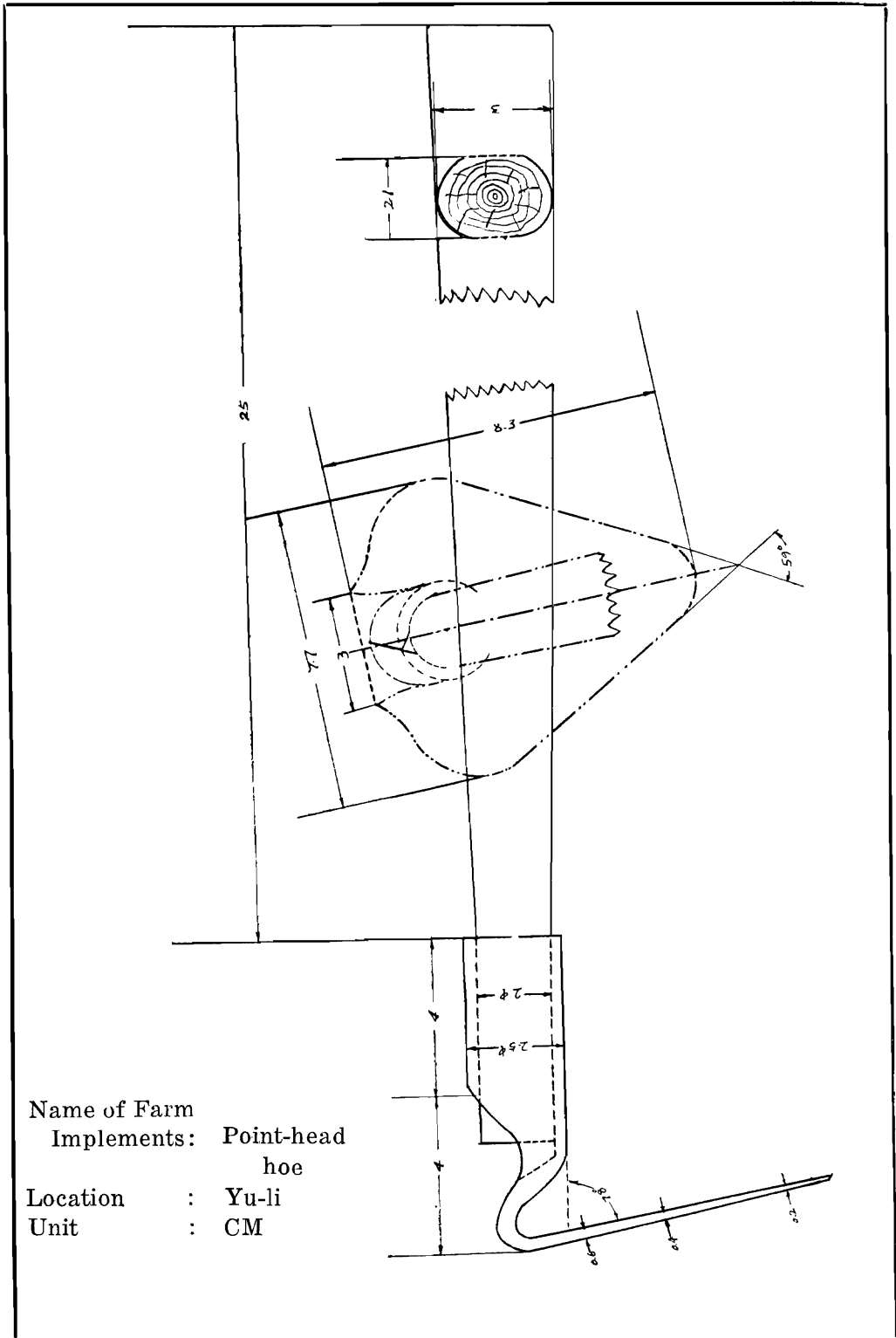


Name of Farm
Implements: Weed shaver
Location : Hou-lung
Unit : CM



- Classification : Intertillage Implements
- Name : Point-head hoe (short handle) 尖嘴掘仔
- Cost : NT\$2—6
- Weight : 0.25—0.4 kg.
- Usage : 1. For weeding and digging sweet potato.
2. Plantng sugar cane seedling pieces.
- Operating Power : 1 man
- Material Used: Blade—Soft steel
Handle—Wood
- Season of Use: 1. Year round
2. While planting sugar cane (Aug. to Nov.)
- Service Life : About 3 years
- Method of Application : 1. Right hand holds handle.
2. Dig a furrow with this imlement, place cane seed pieces into furrow; cover with soil.
- Work Rate : Approx. 0.05 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Pointed head can dig into gravelly soil.
2. Neck conecting blade and handle has elasticity.
3. Furrow dugged must be just enough for one stubble; other-wise, coverage will be difficult.
4. Used mostly at eastern parts of Taiwan and southern part of Changhwa Hsien.

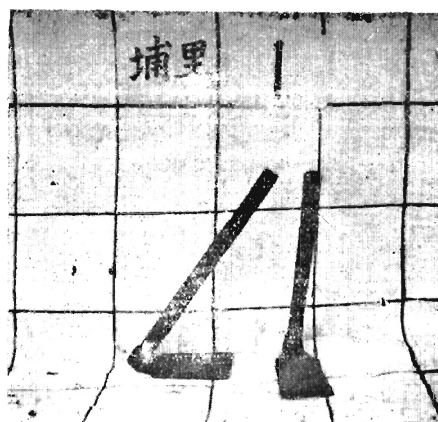


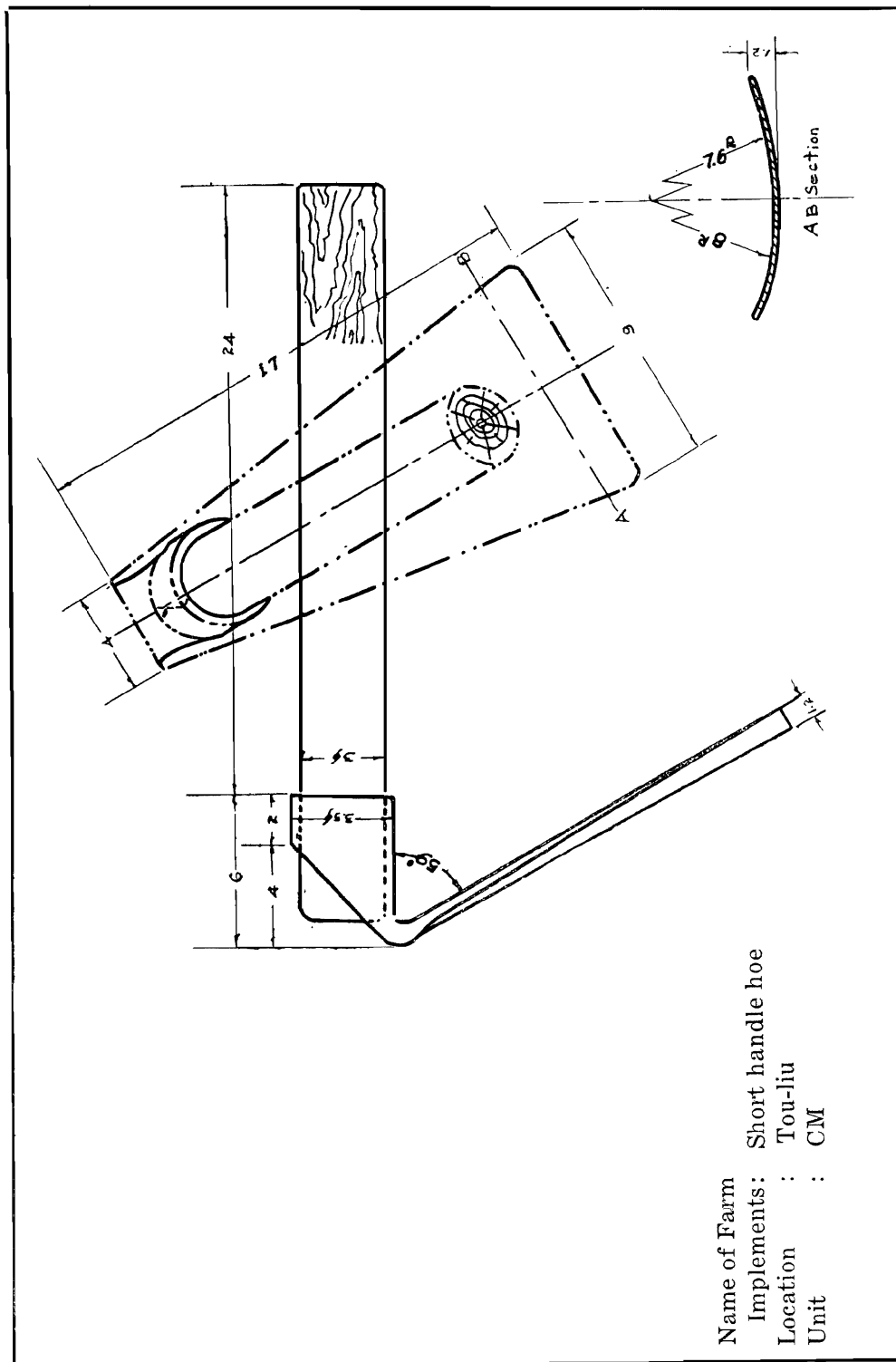


Name of Farm
 Implements: Point-head
 hoe

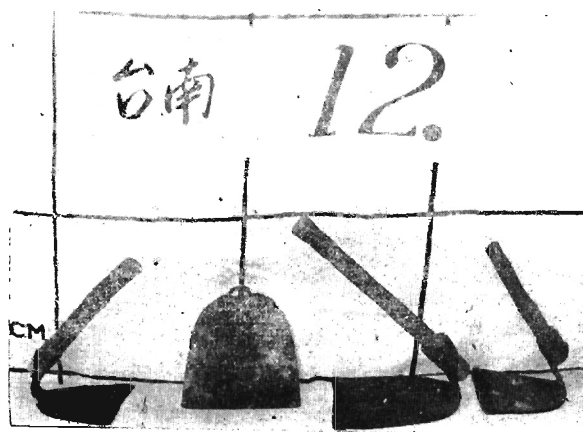
Location : Yu-li
 Unit : CM

Classification	: Intertillage Implements
Name	: Short handle hoe 手掘仔
Cost	: NT\$3—5
Weight	: 0.35—0.45 kg.
Usage	: For upland weeding, dig holes or furrows for planting and place fertilizers.
Operating Power	: 1 man
Material Used:	Blade—Soft steel Handle—Wood
Season of Use:	Year round
Service Life	: About 3 years
Method of Application	: Use one hand to hold handle for digging.
Work Rate	: 0.1—0.15 ha./day
Origin	: Traditional Chinese.
Remarks	: 1. Light and convenient. 2. Design is simple, easy to make. 3. Can be used for weeding and digging holes or planting.

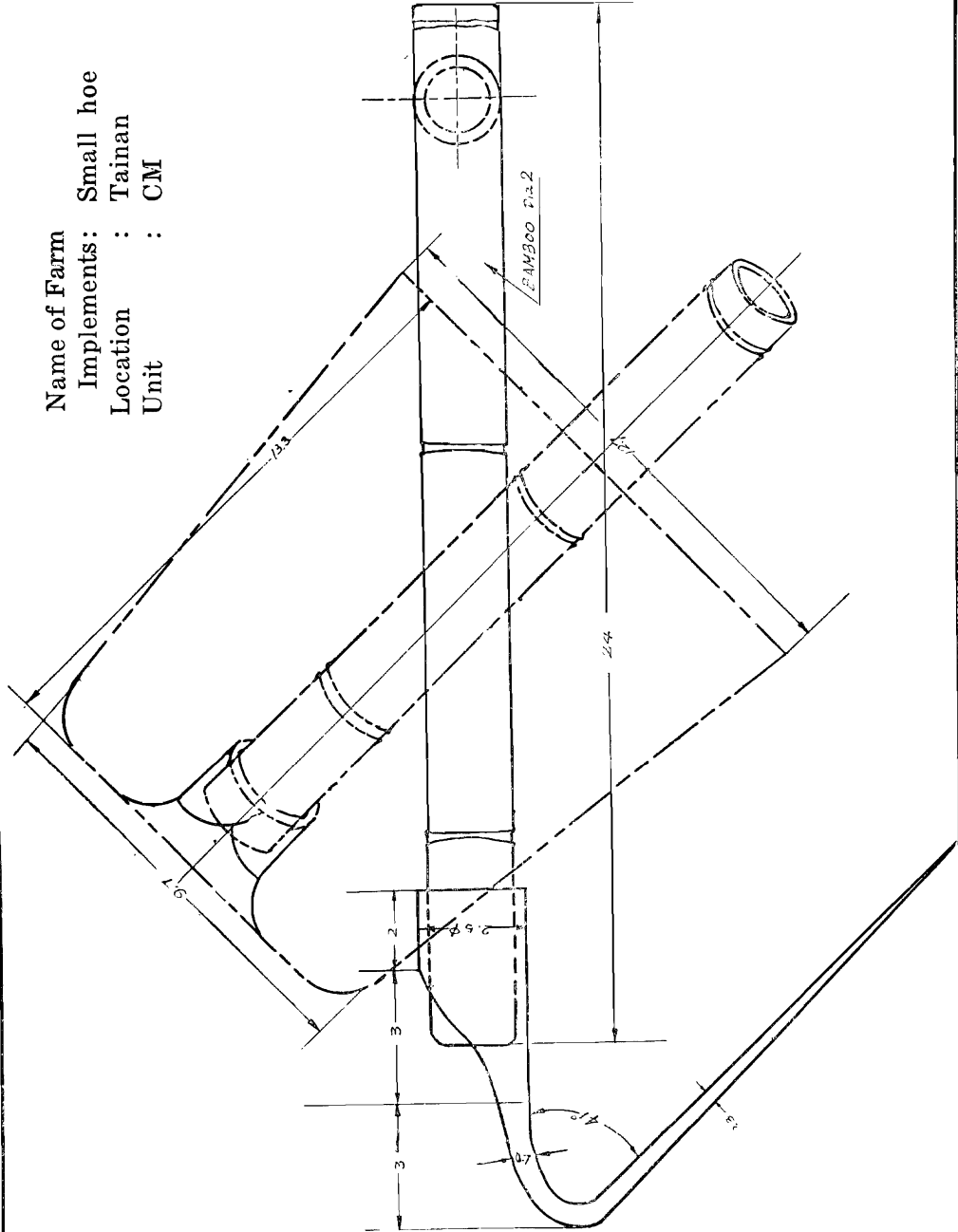




- Classification : Intertillage Implements
- Name : Small hoe 爬仔
- Cost : Approx. NT\$5
- Weight : Approx. 0.3 kg.
- Usage : 1. Southern part: intertillage on dry land
2. Peng-hu: harvesting peanuts
- Operating Power : 1 man
- Material Used: Blade—Soft steel
Handle—Bamboo or wood
- Season of Use: 1. Year round
2. August, September
- Service Life : 2—3 years
- Method of Application : Right hand hold handle to dig earth.
- Work Rate : Approx. 0.2 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Light and convenient.
2. Used also for digging planting holes.
3. Needs to bend down while work.



Name of Farm :
 Implements: Small hoe
 Location : Tainan
 Unit : CM



Classification : Intertillage Implements

Name : Weeding knife 除草刀

Cost : Approx. NT\$2

Weight : Approx. 0.15 kg.

Usage : For weeding

Operating
Power : 1 man

Material Used: Handle—Wood
Knife—Steel

Season of Use: Year round

Service Life : 2—3 years

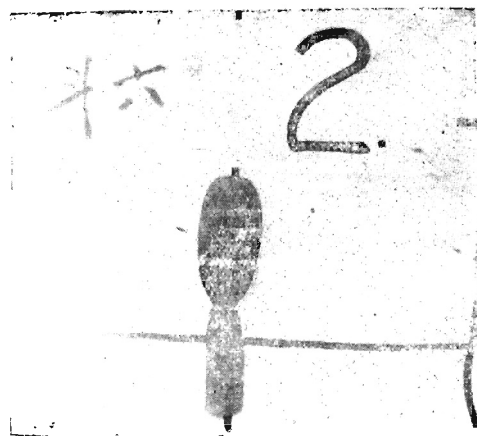
Material Used

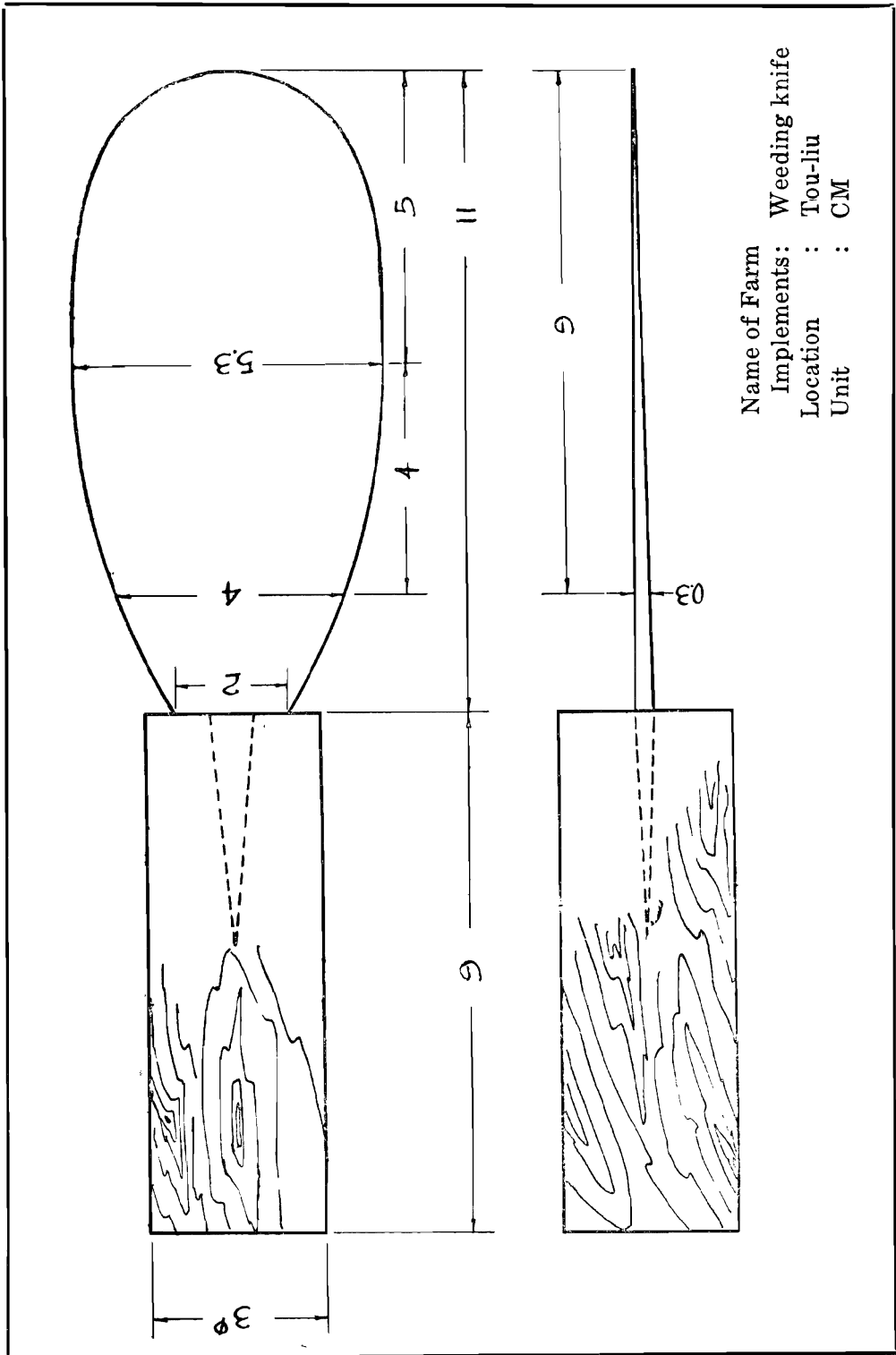
Application : Left hand hold grass; right hand hold handle and dig up weeds.

Work Rate : Approx. 0.03 ha./day

Origin : Traditional Chinese.

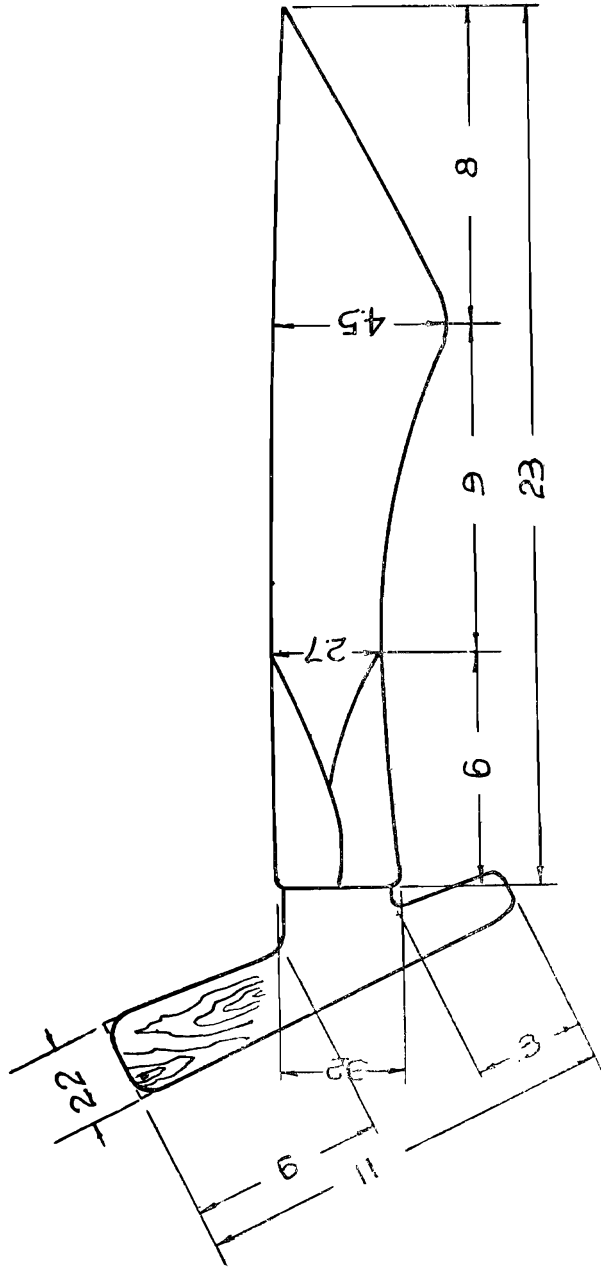
Remarks : Light and convenient.





- Classification : Intertillage Implements
- Name : Weeding matchet 草掘
- Cost : Approx. NT\$10
- Weight : 0.23—0.43 kg.
- Usage : For weeding in triangle-rush and vegetable fields.
- Operating Power : 1 man
- Material Used: Blade—Steel
Handle—Wood
- Season of Use: Year round
- Service Life : 4—5 years
- Method of Application : Use one hand to hold grass another hand to hold handle for digging up weeds.
- Work Rate : 0.02—0.1 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Handle is slantwise; suitable or weeding by hand.
2. Blade tip is pointed; applicable in digging weeds on compact heavy soil.
3. Specially used in sulfur fields of Pei-tou.



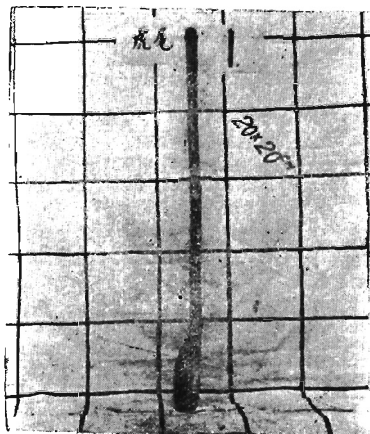


Name of Farm Weeding
 Implements: matchet
 Location : Pei-tou
 Unit : CM

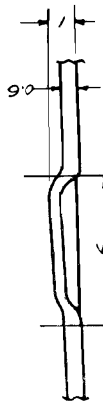
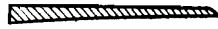
Classification : Intertillage Implements
 Name : Weed chopper 手鋤
 Cost : NT\$2—3
 Weight : Approx. 0.23 kg.
 Usage : Weeding in vegetable and jute fields.
 Operating Power : 1 man
 Material Used: Blade—Soft steel
 Handle—Wood
 Season of Use: Year round
 Service Life : Approx. 2 years
 Method of Application : Use one hand to hold weeds and another hand to hold handle for digging up weeds.
 Work Rate : Approx. 0.02 ha./day
 Origin : Traditional Chinese.
 Remarks : 1. Applicable on compact soils.
 2. Light and convenient.
 3. Special implement of south-western parts of Taiwan.



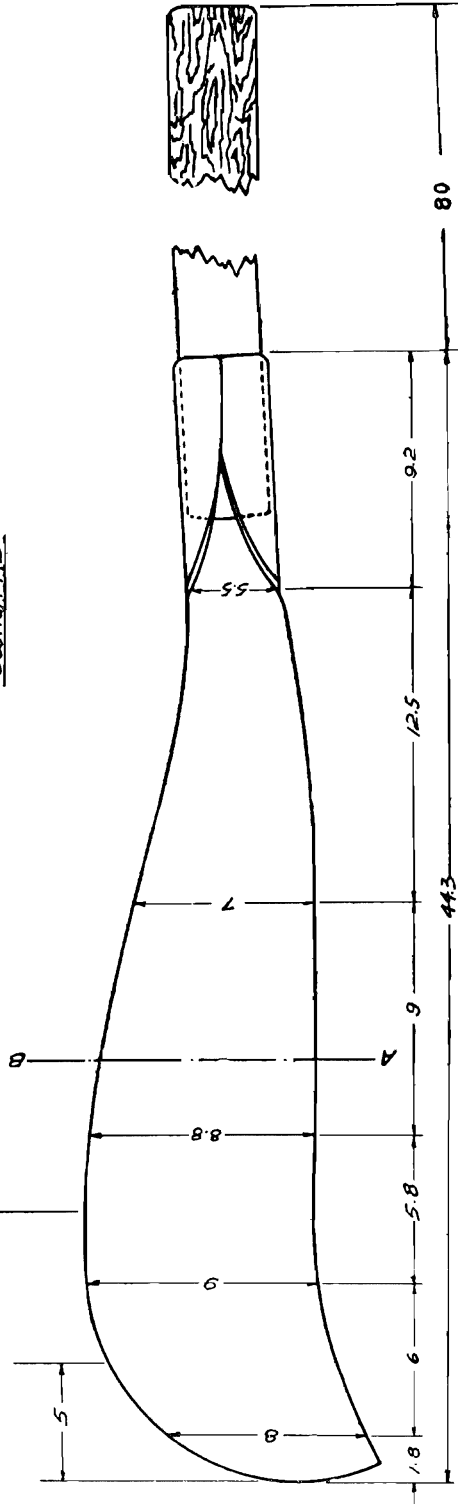
Classification : Intertillage Implements
Name : Ridge cutting knife 岸刀
Cost : Approx. NT\$15
Weight : 0.9—1.2 kg.
Usage : Eradication of weeds in field paths.
Operating Power : 1 man
Material Used: Blade—Iron body with steel edge
 Handle—Wood or bamboo
Season of Use: While prepare paddy fields
Service Life : 3—4 years
Method of Application : Stand on the field path. hold handle with both hands; swing knife to cut off weeds.
Work Rate : Uncertain
Origin : Traditional Chinese.
Remarks : 1. Can be worked from an upright position.
 2. Is paddy field implement.



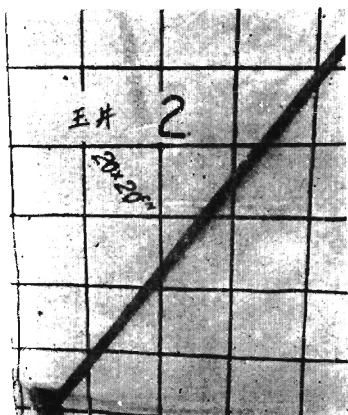
Name of Farm Ridge cutting
 Implements: knife
 Location : Chung-li
 Unit : CM

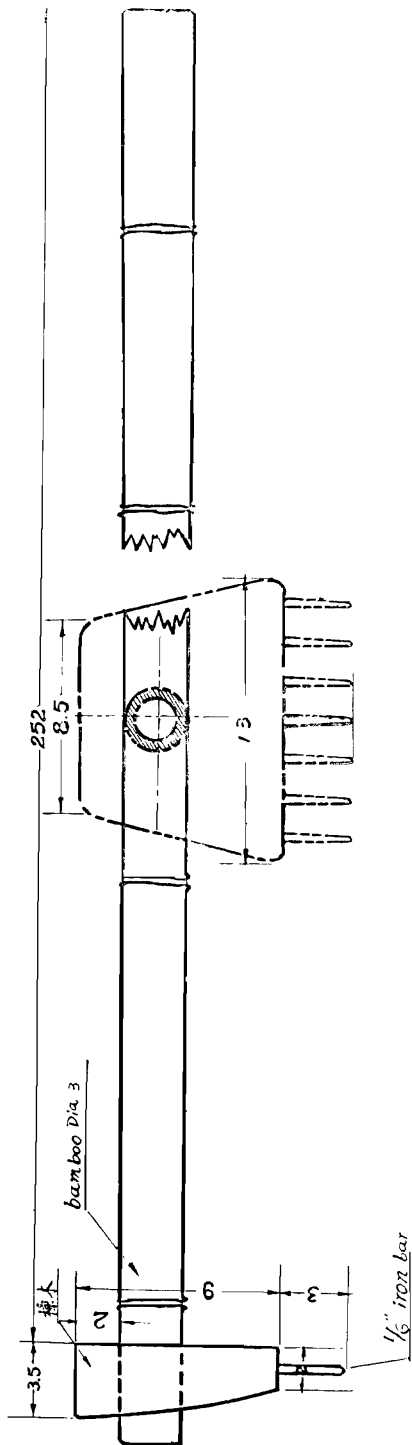


Section A-B



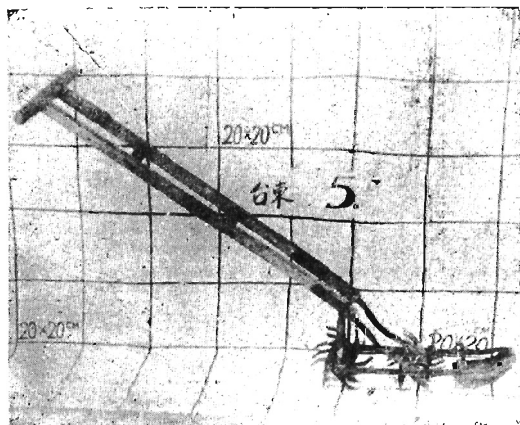
- Classification : Intertillage Implements
- Name : Weed smoother 田草鏟
- Cost : NT\$4—5
- Weight : Approx. 1.8 kg.
- Usage : For intertilling and weeding in paddy fields.
- Operating Power : 1 man
- Material Used: Teeth—Iron wire
Other parts—Wood
- Season of Use: August, September
- Service Life : Approx. 10 years if teeth are replaced from time to time.
- Method of Application : Hold handle with both hands; walk ahead and push smoother back and forth between the rows of paddy.
- Work Rate : 0.3—0.4 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Can be worked from a upright position instead of kneeling down in paddy fields.
2. Suitable for sandy soil.
3. Design is simple & cheap.
4. Special implement of Yu-ching.



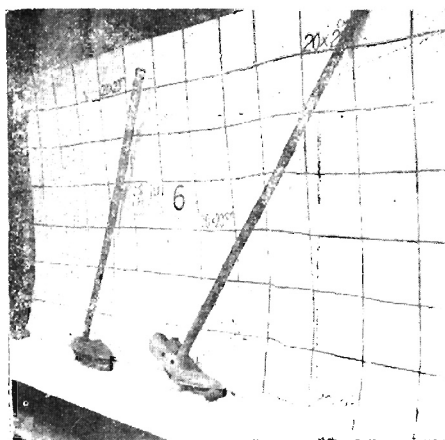


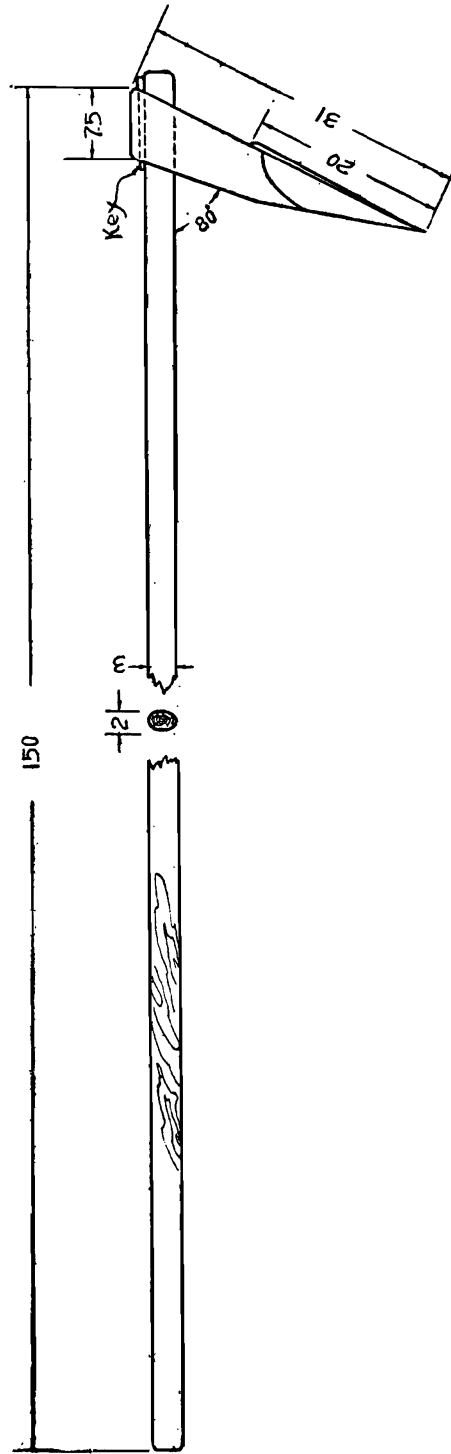
Name of Farm :
Implements : Weed smoother
Location : Yu-ching
Unit : CM

- Classification : Intertillage Implements
- Name : Rotary paddy cultivator 水田中耕除草器
- Cost : NT\$40—60
- Weight : Approx. 5 kg.
- Usage : For intertilling and weeding in paddy fields.
- Operating Power : 1 man
- Material Used: Cultivator—Soft steel
Handle—Wood
- Season of Use: 15—60 days after transplanting
- Service Life : 2—3 years
- Method of Application : Both hands hold handle; push and pull this implement back and forth between paddy rows. Cross-tilling for check-row weeding.
- Work Rate : 0.3—0.4 ha./day
- Origin : Introduced from Japan.
- Remarks : 1. Depths of intertillage is greater.
2. Efficiency is higher, compare to the working rate of hand weeding which is 0.1—0.12 ha./day only.
3. Cannot weed too near stalks.
4. Suitable for intertilling and weeding in sandy soil.
5. Can be worked from a upright position instead of kneeling down in paddy fields.



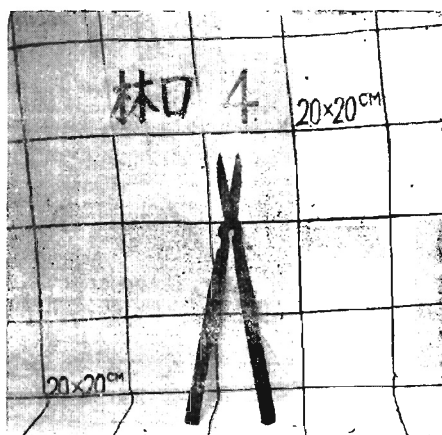
- Classification : Intertillage Implements
- Name : Plow share hoe 犁頭爬
- Cost : Approx. NT\$2
- Weight : Approx. 1.8 kg.
- Usage : For hilling up ridges of peanut fields.
- Operating Power : 1 man
- Material Used: Handle—Wood or bamboo
Cultivator—Cast iron plow share
Other parts—Wood
- Season of Use: For hilling up ridges of peanut fields.
- Service Life : Approx. 10 years if share is changed often.
- Method of Application : Hold handle with both hands; till backwards in between peanut rows.
- Work Rate : 0.3—0.4 ha./day
- Origin : Created in Taiwan.
- Remarks : 1. Use old plow share.
2. Suitable on sandy loams.
3. More efficient than hoes.
4. Do not need draft animal.
5. Implement used in Changhwa and Yunlin Hsien.



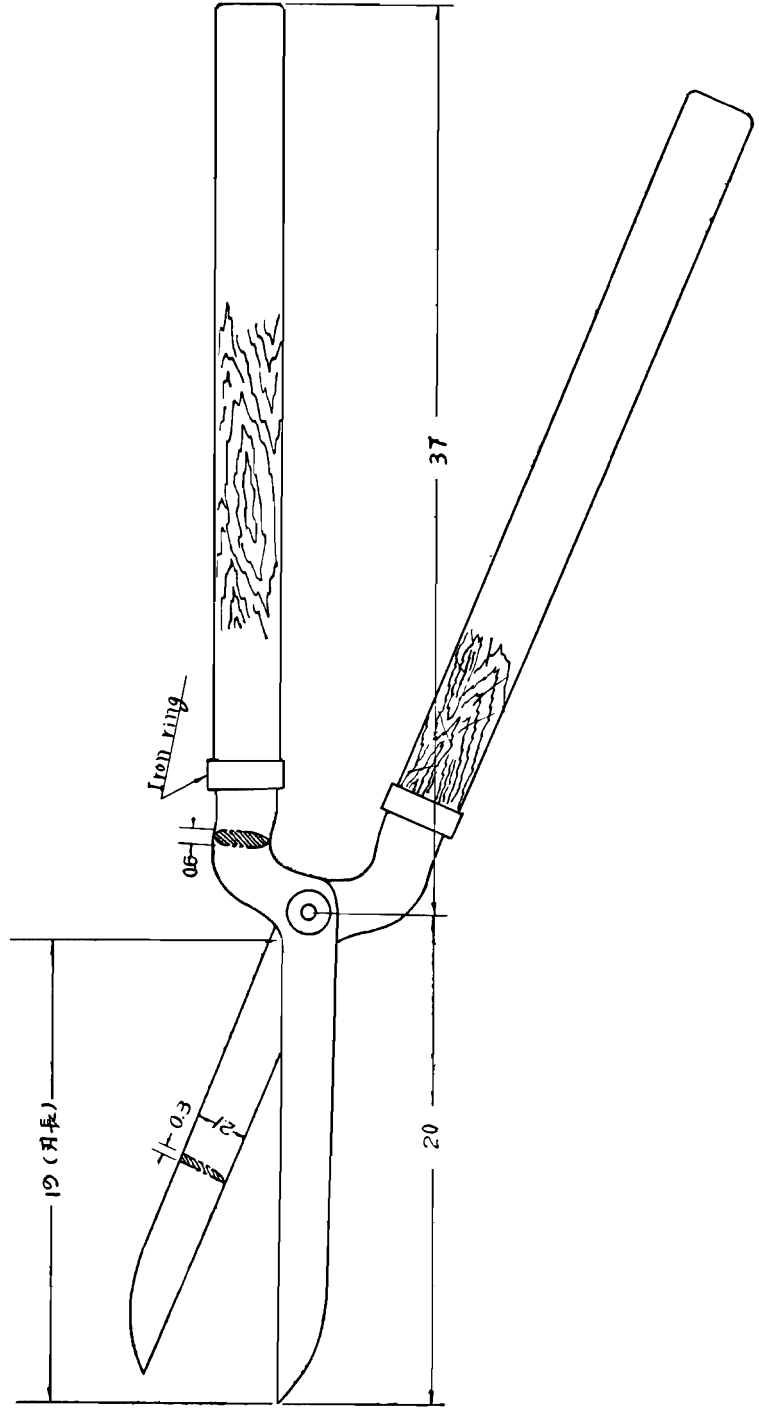


Name of Farm
Implements: Plow share hoe
Location : Chi-chow
Unit : CM

- Classification : Field Management Implements
- Name : Tea pruning shears 剪刀
- Cost : Approx. NT\$35
- Weight : 0.8—1.4 kg.
- Usage : 1. For pruning tea bushes.
2. For clipping fencing plants.
- Operating Power : 1 man
- Material Used: Blade—Soft steel
Handle—Wood
- Season of Use: 1. After winter plucking
2. Year round.
- Service Life : 15—20 years
- Method of Application : Hold handles, one in each hand, and operate like ordinary shears.
- Work Rate : Tea 60 bushes/day
- Origin : Introduced from foreign countries
- Remarks : 1. Handle is long for farther reach in pruning.
2. Handle is long; less energy needed.
3. Though it was introduced from abroad but the shears now used by farmers are all local made.



Name of Farm : Tea pruning
Implements : shears
Location : San-chia
Unit : CM



Classification : Field Management Implements

Name : Paddy pusher 稻押仔

Cost : Approx. NT\$3

Weight : Approx. 1.4 kg.

Usage : To push paddy stalks away from field pathes preventing tramping by passers by.

Operating Power : 1 man

Material Used: Wood

Season of Use: May, June, September, October

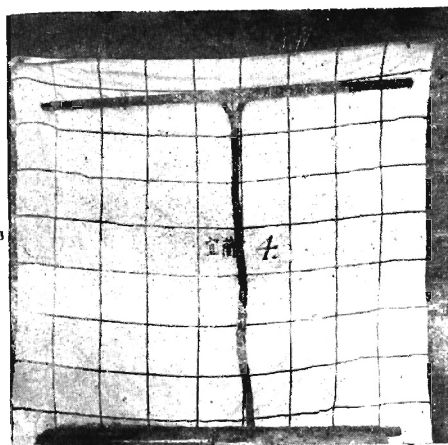
Service Life : Approx. 10 years

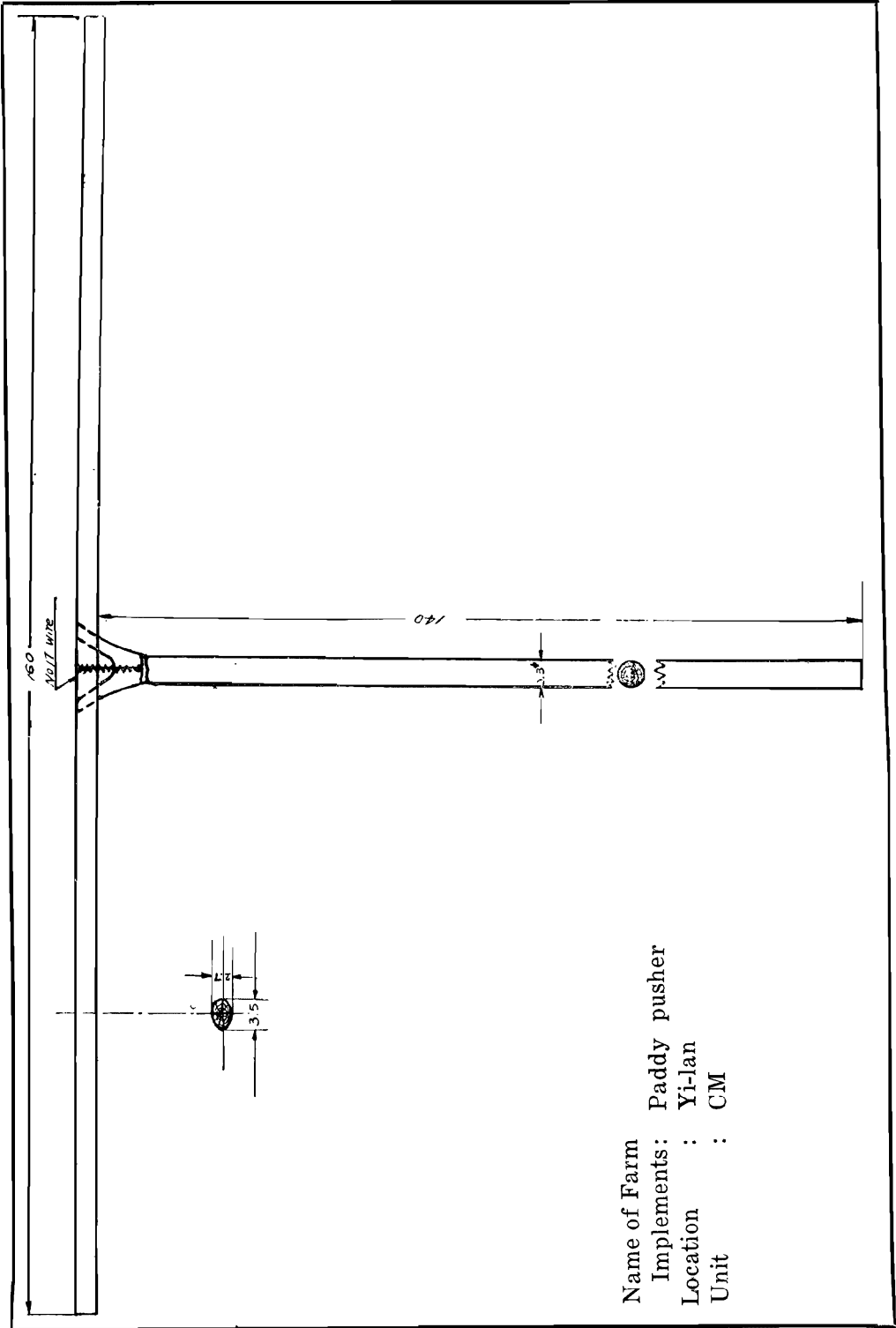
Method of Application : Hold handle with both hands, push away paddy stalks from pathway with transverse rod.

Work Rate : Uncertain

Origin : Traditional Chinese.

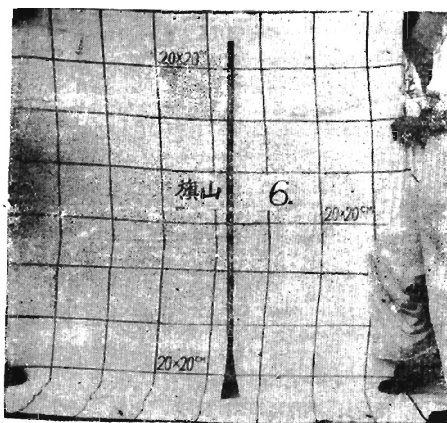
Remarks : 1. Farmers need not squat while working.
2. 7 or 8 hills of rice plants can be pushed over in one operation.

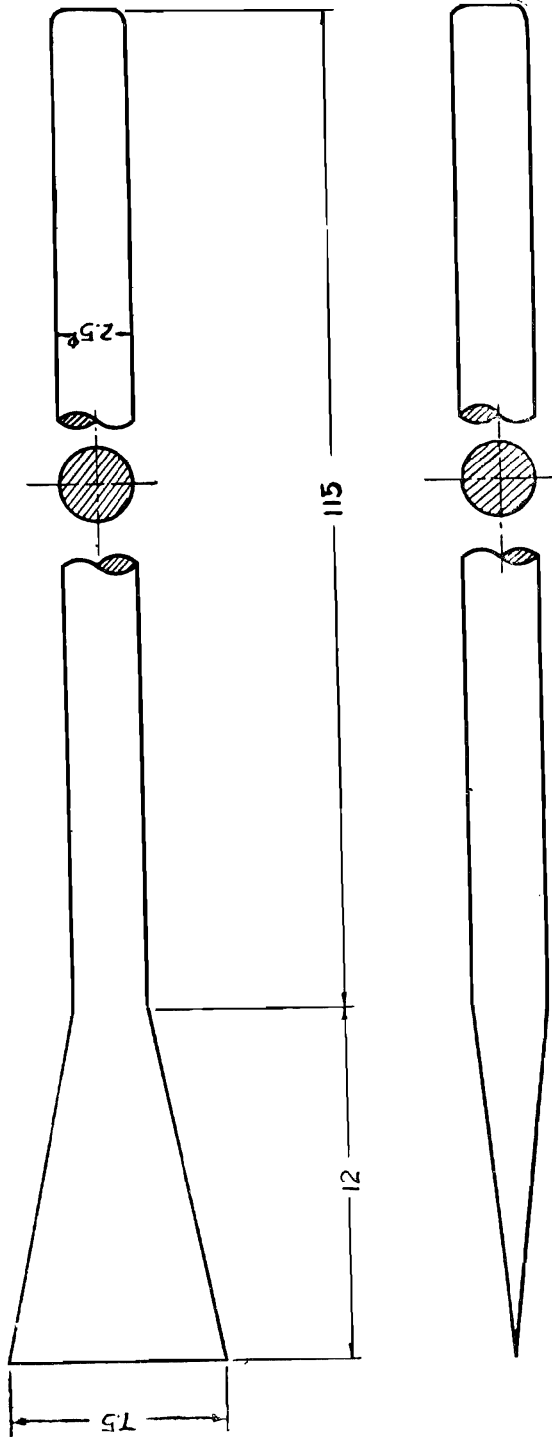




Name of Farm : Paddy pusher
Implements : Yi-lan
Location :
Unit : CM

- Classification : Field Management Implements
- Name : Banana chisel 芭蕉鑿仔
- Cost : Approx. NT\$40
- Weight : Approx. 4.8 kg.
- Usage : 1. To cut off non-fruiting tillers of banana.
2. To dig up banana suckers
- Operating Power : 1 man
- Material Used: Soft steel
- Season of Use: June to August
March to April
- Service Life : Year round
- Method of Application : Dig away earth around banana plant with hoe or spade. Both hands hold handle of chisel dig vertically into banana bush to cut off small suckers from mother plant, and shove it up.
- Work Rate : Approx. 0.5 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Heavy duty, utilizing weight for deep digging.
2. Can chisel off root system of banana plants.
3. Can be used as a lever.





Name of Farm
Implements: Banana chisel
Location : Chi-shan
Unit : CM

Classification : Field Management Implements

Name : Banana knife 芭蕉刀

Cost : Approx. NT\$3

Weight : Approx. 0.9 kg.

Usage : To chop down old banana plants.

Operating
Power : 1 man

Material Used: Blade—Iron body and steel edge
Handle—Wood

Season of Use: February and March

Service Life : 10—15 years

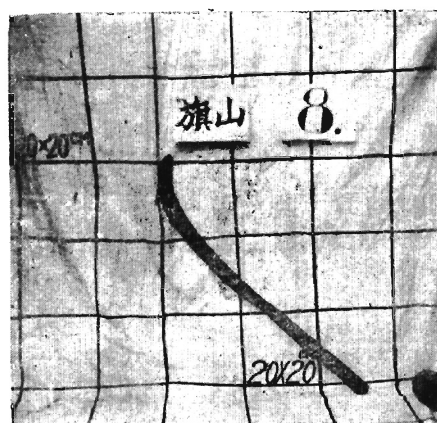
Material Used.

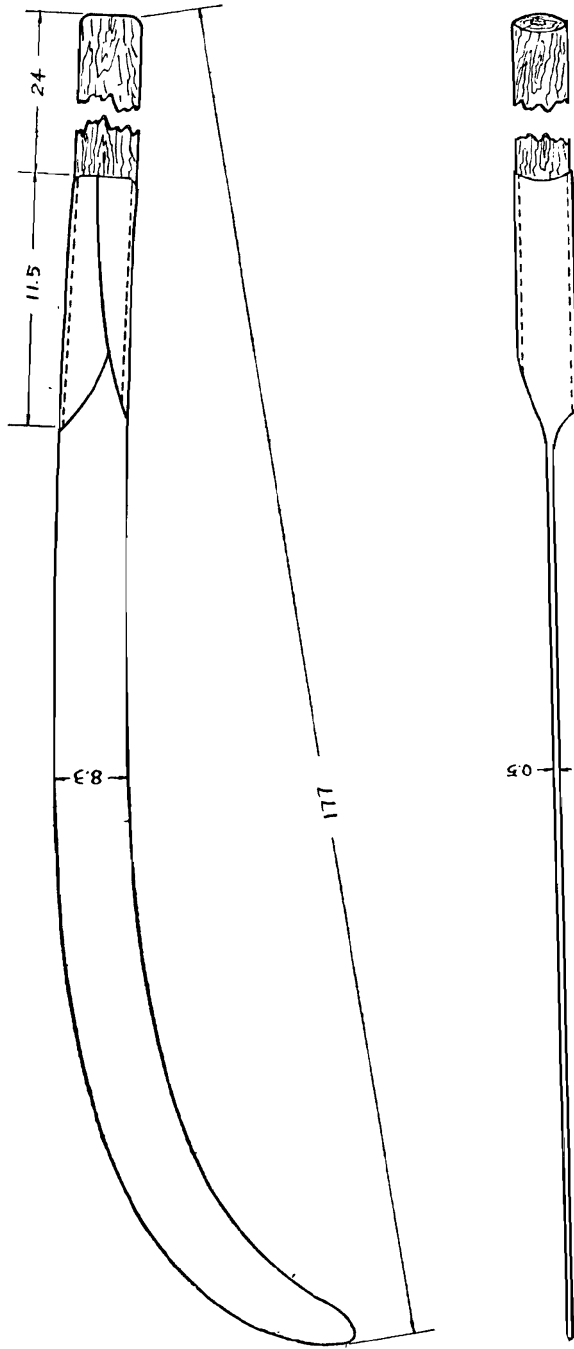
Application : Hold handle with both hands and chop down old trunk.

Work Rate : Approx. 1000 trees/day

Origin : Traditional Chinese.

Remarks : Functions as an axe.





Name of Farm
Implements: Banana knife
Location : Chi-shan
Unit : CM

Classification : Irrigation Equipment

Name : Water scoop 搨钩

Cost : Approx. NT\$3

Weight : Approx. 0.6 kg.

Usage : For lifting water

Operating
Power : 1 man

Material Used: Handle—Bamboo
Scoop—Bamboo mats or iron sheet

Season of Use: Uncertain

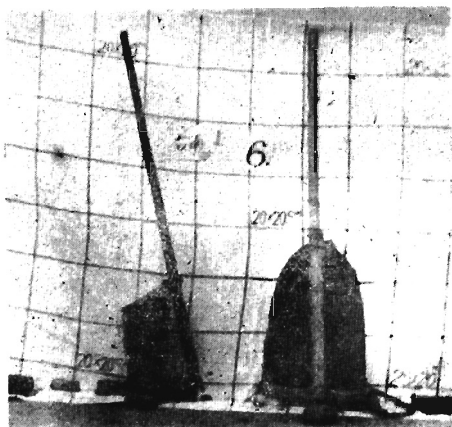
Service Life : About 5 years

Method of
Application : Stand in water; hold handle with both hands to scoop up water
for lifting onto higher place.

Work Rate :

Origin : Traditional Chinese.

Remarks : 1. Primitive implement.
2. Simple.
3. The water should not be too deep, approx. not deeper than
0.5 meter.



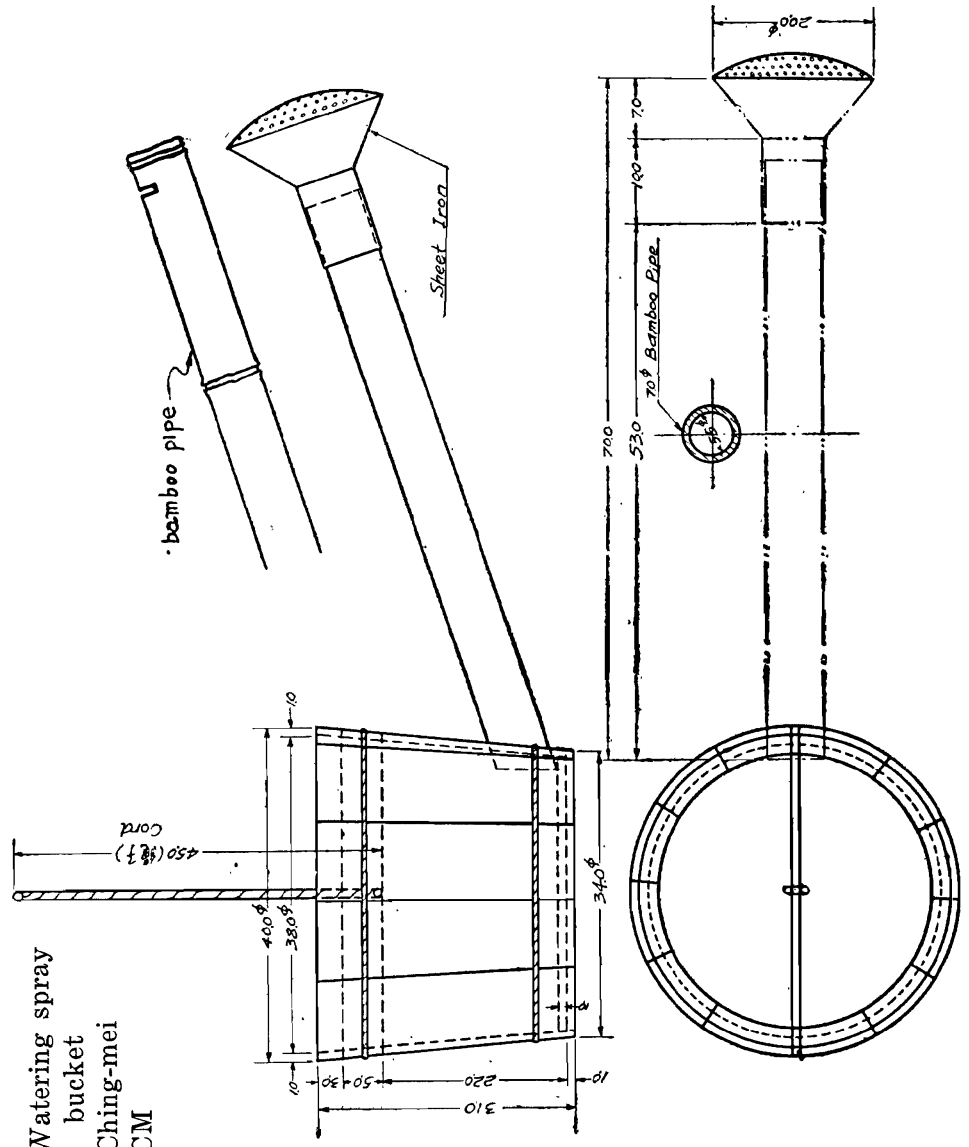
- Classification : Irrigation Equipment
- Name : Well water lifting bucket (pillar balance type) 桔槔
- Cost : NT\$300
- Weight : Unknown
- Usage : For lifting water from well, mostly used in the vegetable garden
- Operating Power : 1 man
- Material Used: Pillar—Wood, stone or bamboo.
Balancing arm—Wood or bamboo
Weight—Stone
Bucket—Wood
- Season of Use: Year round
- Service Life : 10—15 years
- Method of Application : Man hold the bucket-end and pull empty bucket into the well, lift up when filled with water. The weight on the other end helps in lifting and saving labor.
- Work Rate : 0.1—0.2 ha./day
- Origin : Traditional Chinese.
- Remarks : An assistant may help to pull a rope on the other end while lifting water filled bucket.



- Classification : Irrigation Equipment
- Name : Watering spray bucket 撒桶
- Cost : NT\$ 50—70
- Weight : 3.8—5.5 kg.
- Usage : To water vegetables
- Operating Power : 1 man
- Material Used: Bucket—Wood
 Extension pipe—Bamboo
 Spray head—Galvanized sheet
 Hoop and Suspender—Iron wire
- Season of Use: Year round
- Service Life : Approx. 15 years
- Method of Application : Fill buckets with water; suspend them on carrying pole; pour water out from spray head onto the vegetables.
- Work Rate : Approx. 30 liters/load
- Origin : Traditional Chinese.
- Remarks : 1. The old type had no spray head but a bamboo extension tubing with a semi-circle slit on top of the closed end, with such arrangement, water comes out in a fan shape.
 2. Mostly used in vegetable garden.



Name of Farm : Watering spray
 Implements : bucket
 Location : Ching-mei
 Unit : CM



Classification : Irrigation Equipment

Name : Sprinkling water pot 花撒

Cost : NT\$10—15

Weight : 0.5—1.5 kg.

Usage : For sprinkling water onto seedbed

Operating
Power : 1 man

Material Used: Galvanized sheet

Season of Use: Year round

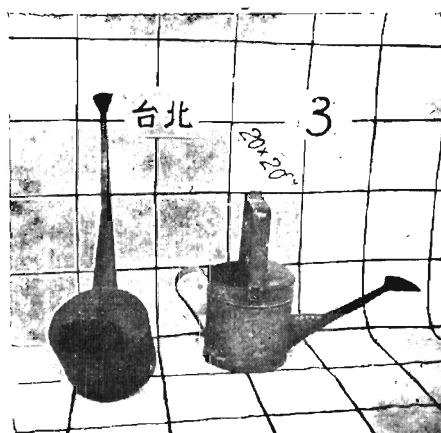
Service Life : About 5 years

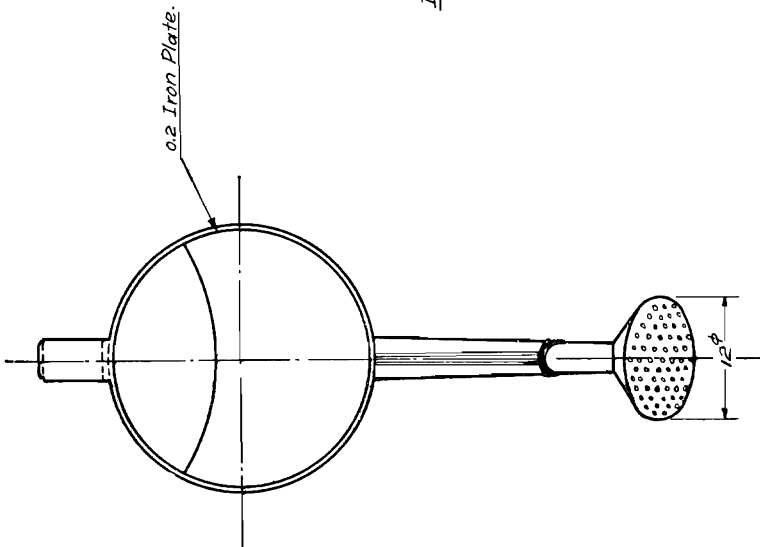
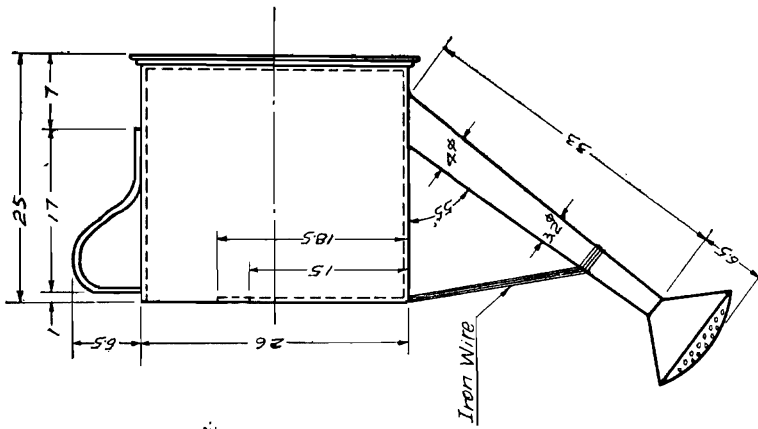
Method of
Application : Place water in can; hold handle with right hand, left hand tilt
extension to sprinkle water.
Smaller models can be operated with one hand.

Work Rate : Uncertain

Origin : Introduced from western countries.

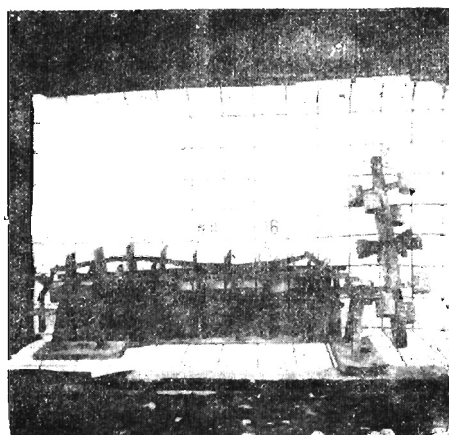
Remarks : 1. Drops are small, will not injure young sprouts.
2. All the present used are made locally.

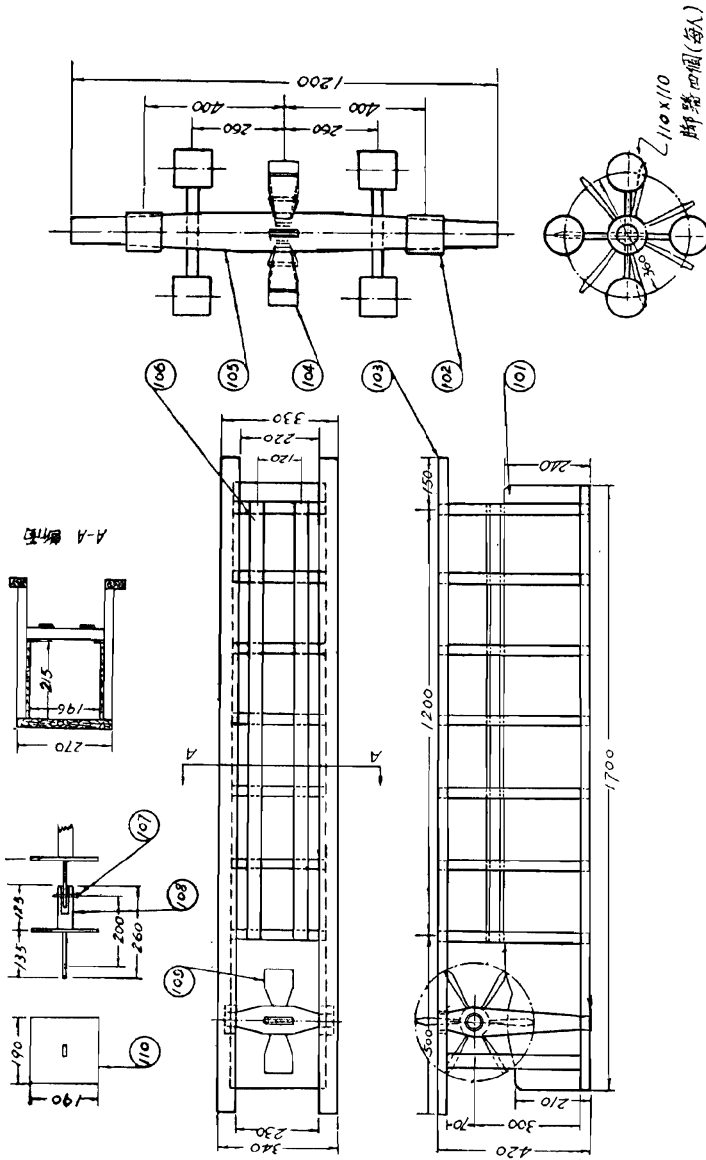




Name of Farm : Watering spray
Implements : pot
Location : Tai-tung
Unit : CM

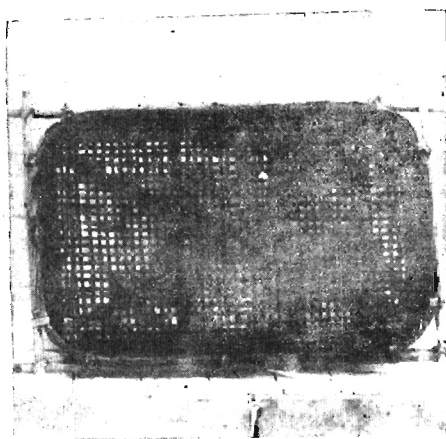
Classification :	Irrigation Equipment
Name :	Dragon pump 龍骨水車
Cost :	NT\$160—240
Weight :	Approx. 58 kg.
Usage :	For lifting water into higher fields from ponds or rivers.
Operating Power :	1—4 men
Material Used:	Frame) Bamboo Nails) Other parts—Wood
Season of Use:	Uncertain
Service Life :	10—15 years if water carrying vanes repaired often.
Method of Application :	After completely installed, cling to the superstructure frame with hands, step on foot treadle to turn the wheel which in turn moves the vanes and scoop up water.
Work Rate :	7—20 liters/sec.
Origin :	Traditional Chinese.
Remarks :	1. Suitable for shallow water. 2. Utilize body weight as propelling power. 3. Cost is low. 4. Easy to repair. 5. No metals used in construction. 6. This implement is gradually displaced by centrifugal pumps.





Name of Farm :
 Implements: Dragon pump
 Location : Taipei
 Unit : MM

Classification	: Fertilizer Application Implements
Name	: Manure sieve 糞篩
Cost	: Approx. NT\$30
Weight	: Approx. 25 kg.
Usage	: To sieve compost
Operating Power	: 3 men
Material Used:	Bamboo
Season of Use:	Year round
Service Life	: About 3 years
Method of Application	: Two men hold on two handles of bamboo frame and shake back and forth while third man load compost into sieve. Fine particles will be sieved.
Work Rate	: 5,000—10,000 kg./day
Origin	: Traditional Chinese.
Remarks	: <ol style="list-style-type: none"> 1. Bamboo will not rust. 2. Bamboo strip is smooth and slippery. 3. Can serve also as grain sieve. 4. Used in seed-bed of vegetable crops, to cover sowed seeds with fine manures.



Classification : Fertilizer Application Implements

Name : Manure fork 鐵叉

Cost : Approx. NT\$35

Weight : Approx. 1.5 kg.

Usage : For mixing, turning and moving compost.

Operating
Power : 1 man

Material Used: Handle—Wood
Fork—Steel

Season of Use: Year round

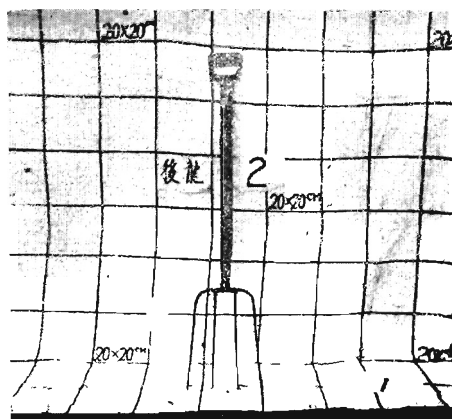
Service Life : About 10 years

Method of
Application : Hold handle with both hands; push fork into compost to turn
and lift compost.

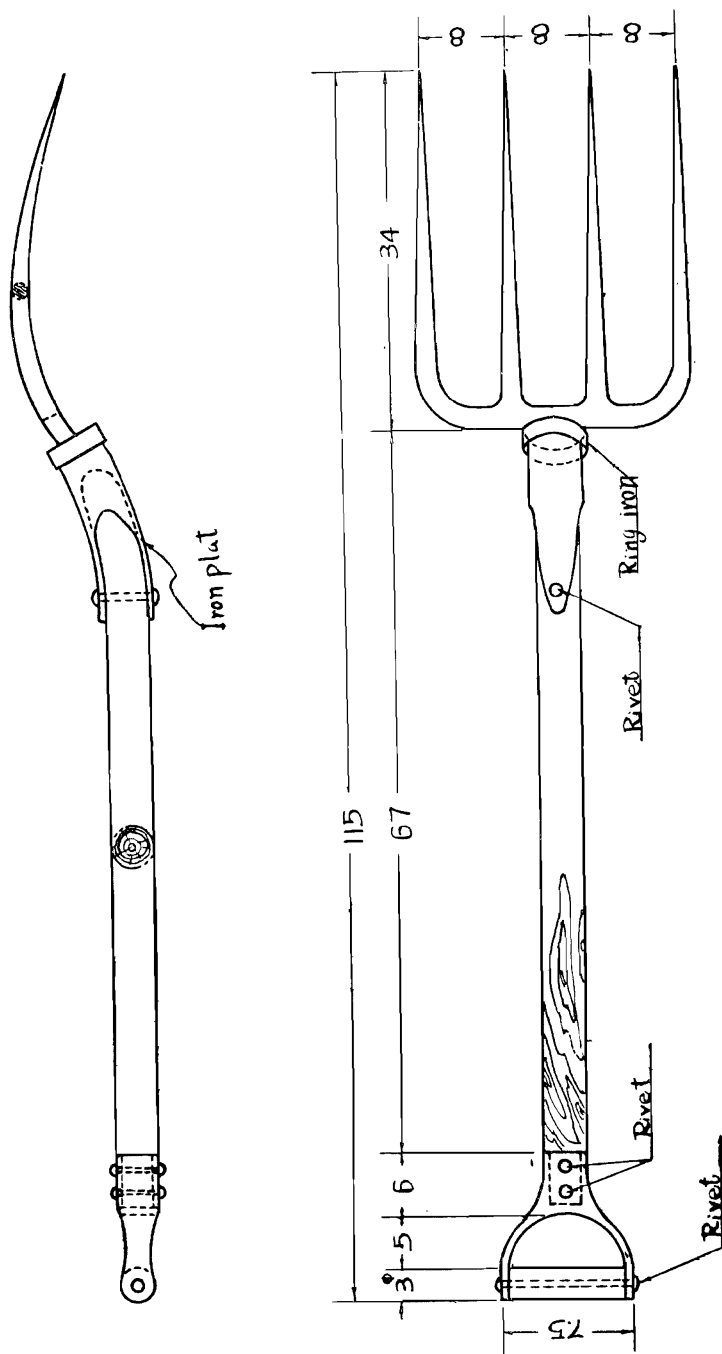
Work Rate : Approx. 20,000 kg./day

Origin : Introduced from western countries.

Remarks : 1. Fork tines enter compost easily; cross section is spindle
shaped.
2. The tines are slightly bent upward, easy to lift up manure.
3. Easy to pile compost or transport from any position.



Name of Farm
 Implements: Manure fork
 Location : Hou-lung
 Unit : CM



Classification : Fertilizer Application Implements

Name : Fertilizer chisel 施肥鐵鑽

Cost : Approx. NT\$9

Weight : Approx. 2.2 kg.

Usage : Drilling holes for placing fertilizer.

Operating Power : 1 man

Material Used: Chisel—Soft steel
Handle—Wood

Season of Use: August till February

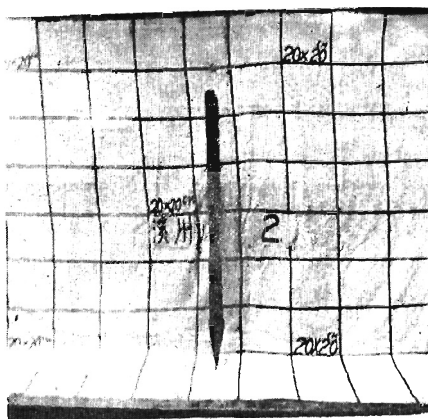
Service Life : About 5 years

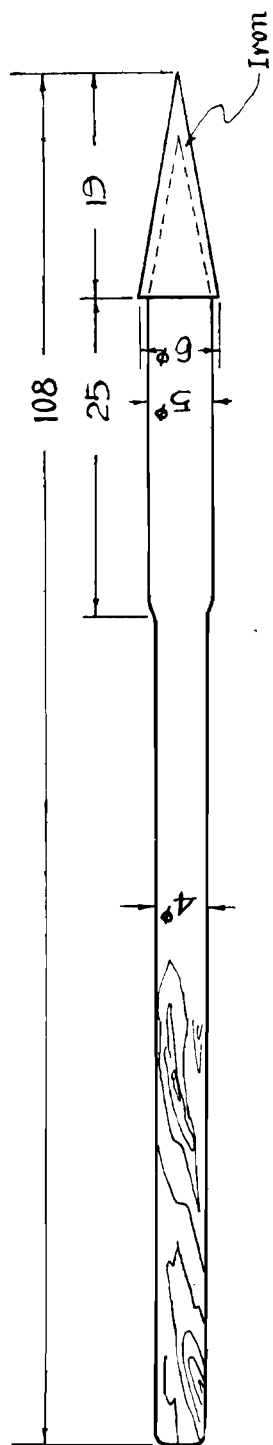
Method of Application : Hold handle with both hands, strike vertically down and open hole.

Work Rate : Approx. 0.3 ha./day

Origin : Designed by sugar-cane plantation of TSC.

Remarks : 1. Will not injure cane roots; can dig a deeper hole (approx. 15 cm).
2. The work rate is high.
3. Simple and convenient.





Name of Farm :
Implements : Fertilizer chisel
Location : Chi-chow
Unit : CM

Classification :	Fertilizer Application Implements
Name :	Night-soil barrel 桶水肥
Cost :	Approx. NT\$200
Weight :	Approx. 10 kg.
Usage :	For transporting night-soil.
Operating Power :	1 man to load the night soil, may put 3 barrels on one rear car for transport.
Material Used:	Barrel—Wood Hoops—Bamboo sheath
Season of Use:	Year round
Service Life :	3—4 years
Method of Application :	Place night-soil into barrel; plug it with wooden stopper; place on rear-car to transport.
Work Rate :	Approx. 200 liters/barrel
Origin :	Took shape from oil or soybean sauce barrels.
Remarks :	1. Night-soil will not be spilled. 2. Holds convenient amount for transportation. 3. Simple to make.



Classification : Fertilizer Application Implements

Name : Night-soil funnel 肥漏仔

Cost : Approx. NT\$10

Weight : Approx. 1 kg.

Usage : To funnel night-soil into a barrel.

Operating Power : 1 man

Material Used: Galvanized sheet

Season of Use: Year round

Service Life : Approx. 1 year

Method of Application : Place this funnel in the opening of the night-soil barrel. Use night-soil ladle and scoop night-soil thru funnel into barrel.

Work Rate :

Origin : Took shape from funnels of general uses

Remarks :

1. Night-soils flow smoothly into barrel.
2. Easily damaged.

Classification : Fertilizer Application Implements

Name : Night-soil ladle 尿撮

Cost : Approx. NT\$5

Weight : Approx. 1 kg.

Usage : Distributing night-soil; bailing water etc.

Operating Power : 1 man

Material Used: Ladle—Galvanized sheet
Handle—Bamboo

Season of Use: Year round

Service Life : 2 to 3 months

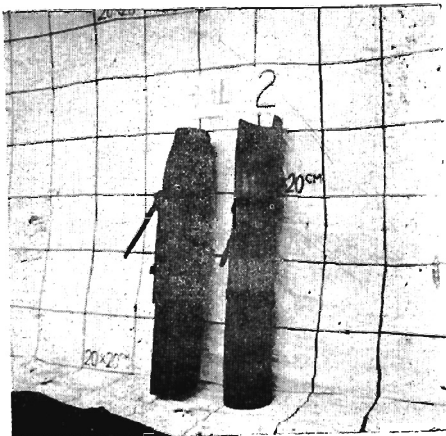
Method of Application : Hold handle with both hands; bail out night-soil to fill barrel or for distribution.

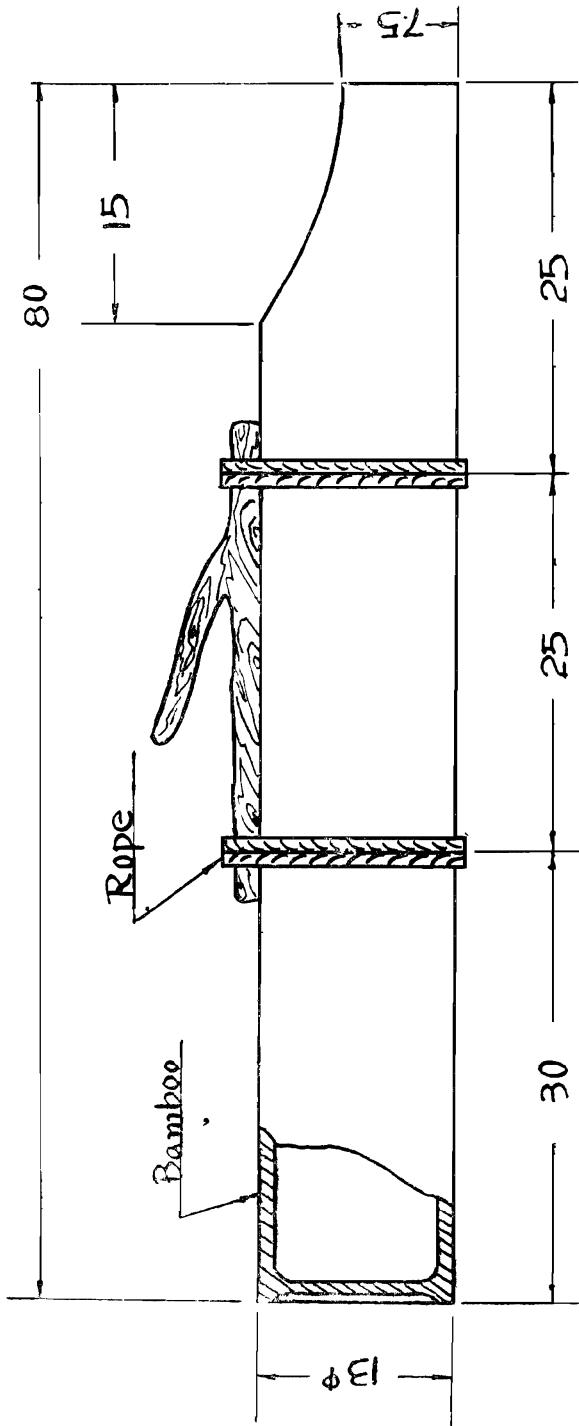
Work Rate : 4 to 5 liters/ladle

Origin : Traditional Chinese.

Remarks : 1. Light.
2. Service-life is short.
3. Used for many purposes.

- Classification : Fertilizer Application Implements
- Name : Water carrying bamboo tube 竹水桶
- Cost : Approx. NT\$2
- Weight : Approx. 1 kg.
- Usage : 1. To distribute night-soil.
2. To carry water.
- Operating Power : 1 man
- Material Used: Bucket—Bamboo
Hangers—Wood
- Season of Use: Year round
- Service Life : About 1 year
- Method of Application : After filling up the buckets with water or night-soil, transport them with carrying-pole.
- Work Rate : Approx. 13 liters/bucket
- Origin : Traditional from Tsou tribe aborigines.
- Remarks : 1. Can be easily made by the farmer.
2. No need to use ladle for bailing.
3. Capacity is small.
4. Deteriorate easily.





Name of Farm Water carrying
 Implements: bamboo tube
 Location : Shui-sheh
 Unit : CM

Classification : Fertilizer Application Implements

Name : Calcium cyanamide applicator 石灰氮施用器

Cost : Approx. NT\$2

Weight : Approx. 0.33 kg.

Usage : For the application of Calcium cyanamide.

Operating Power : 1 man

Material Used: Funnel—Galvanized sheet
Handle—Wood

Season of Use: 1. Before planting sugar-cane.
2. 2nd and last intertillage period.

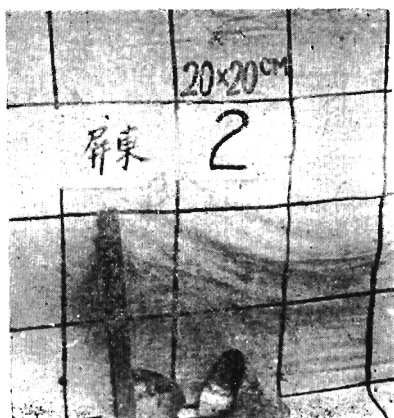
Service Life : About 2 years

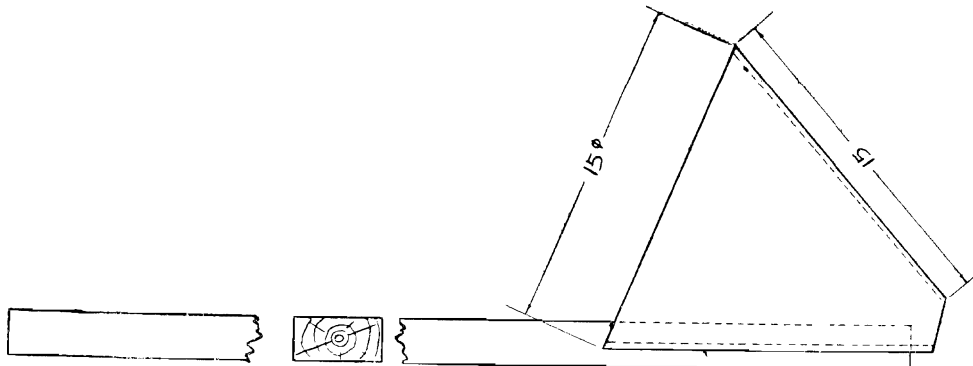
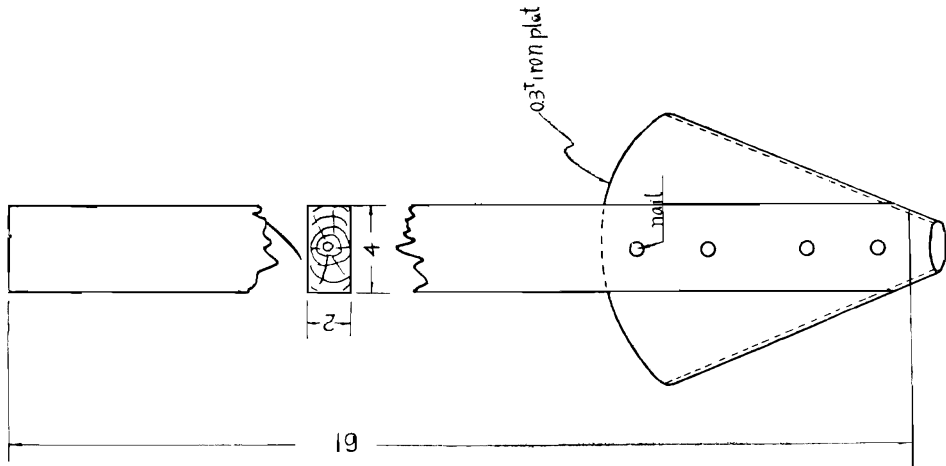
Method of Application : Left hand hold fertilizer container; right hand hold this implement. Bail Calcium cyanamide with it; fertilizer flows out from aperture on the bottom as farmer walks.

Work Rate : Approx. 0.3 ha./day

Origin : Invented by Pingtung Sugar-cane Plantation of TSC.

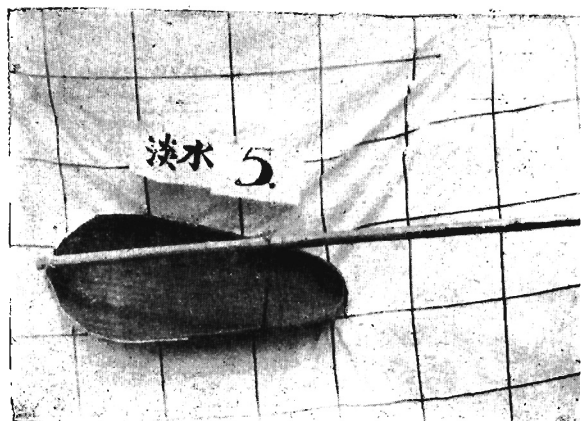
Remarks : 1. Design is simple.
2. Light.
3. Cost is low.
4. Need not touch cyanamide.
5. Fertilizer is not evenly distributed.
6. Used only in Pingtung Sugar-cane Plantation.

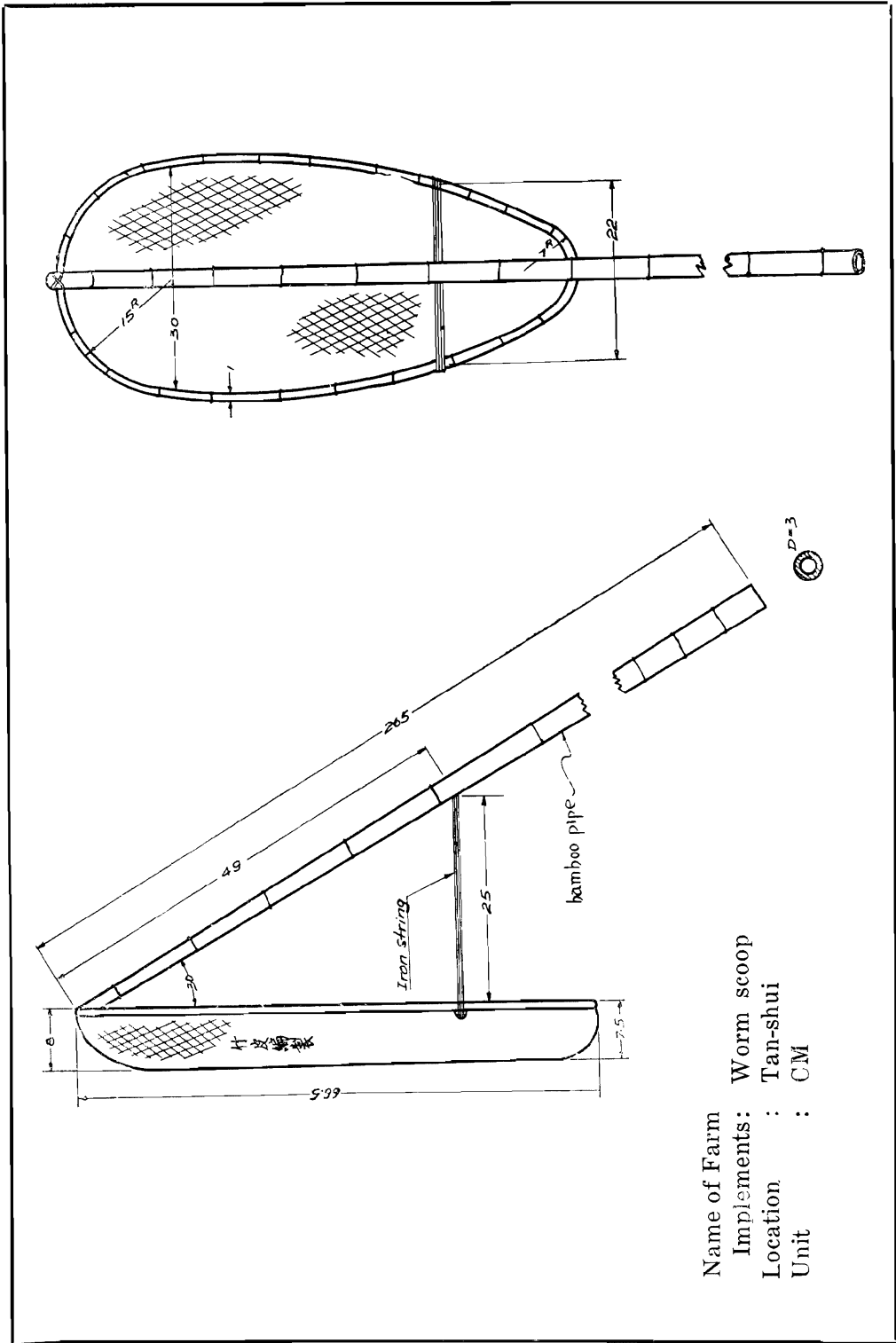




Name of Farm : Calcium
 Implements: cyanamide
 applicator
 Location : Ping-tung
 Unit : CM

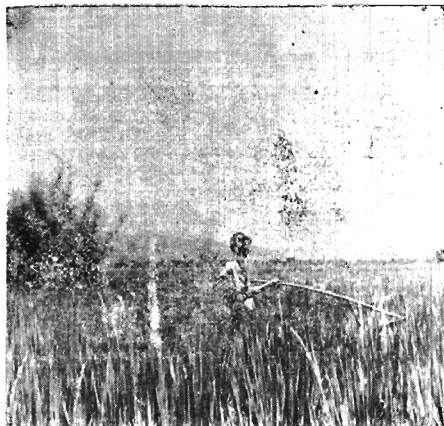
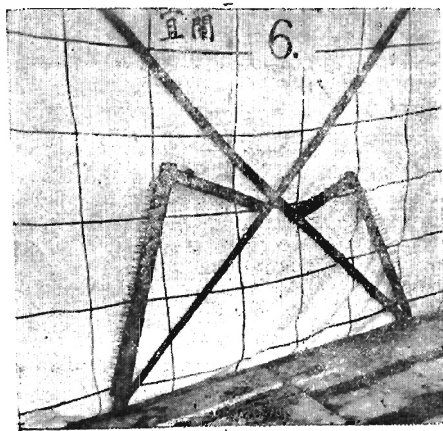
- Classification : Plant Protection Implements
- Name : Worm scoop 虫撮
- Cost : Approx. NT\$10
- Weight : Approx. 1.1 kg.
- Usage : To scoop and collect harmful insects from paddy fields.
- Operating Power : 1 man
- Material Used: Bamboo
- Season of Use: After second weeding.
- Service Life : About 6 years
- Method of Application : After rain or dew, while paddy leaves are still moist and the bugs are sluggish in movement, hold handle with both hands, swing across paddy leaves to catch bugs. Pour bugs on ground and destroy them.
- Work Rate : 0.5—1 ha./day
- Origin : Traditional Chinese
- Remarks : 1. Can eliminate bugs without chemicals.
2. Cannot eliminate all bugs.
3. Is a primitive implement.



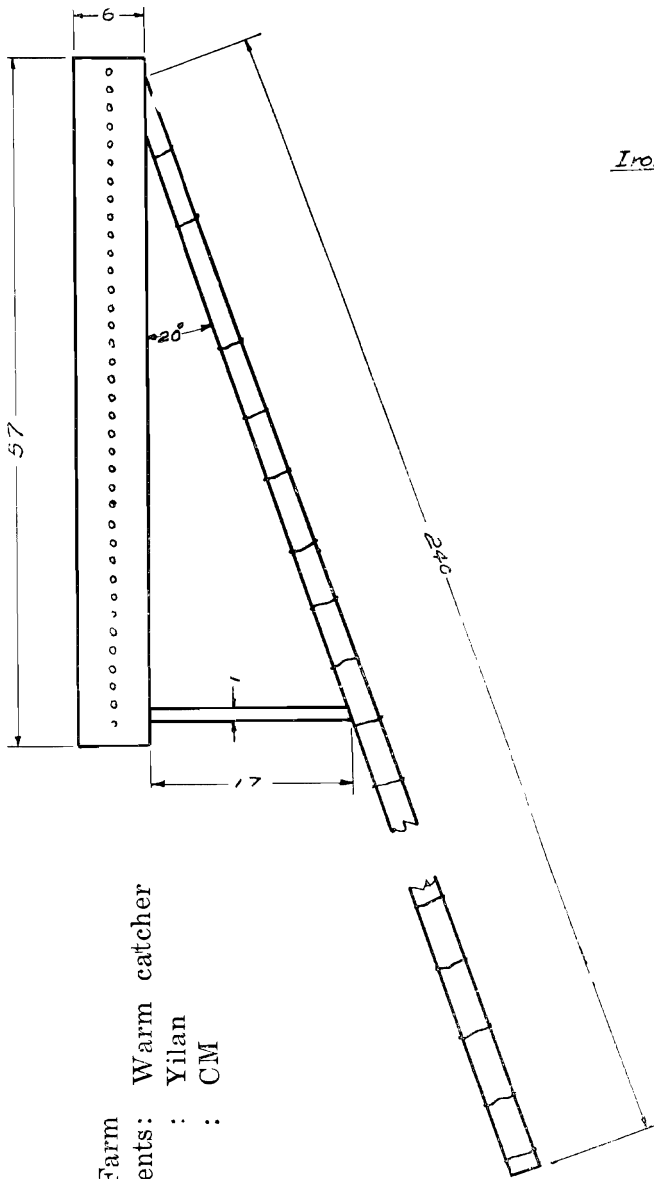


Name of Farm :
 Implements : Worm scoop
 Location : Tan-shui
 Unit : CM

- Classification : Plant Protection Implements
- Name : Worm catcher 鐵釘仔排
- Cost : Approx. NT\$3
- Weight : Approx. 13 kg.
- Usage : To shake down green worm and stem borer from rice plants onto flooded fields.
- Operating Power : 1 man
- Material Used: Handle—Bamboo
Nails—Iron
Other parts—Wood
- Season of Use: The second crop season of rice.
- Service Life : About 4 years
- Method of Application : About noon, while the sun is hot, hold handle with both hands and sweep across the paddy plants by jarring the worms into water to be drown.
- Work Rate : 1 ha./3 hrs.
- Origin : Created by Wu brothers of Yi-lan.
- Remarks : 1. Can be made by farmer themselves at a nominal cost.
2. Used in Yi-lan Hsien.

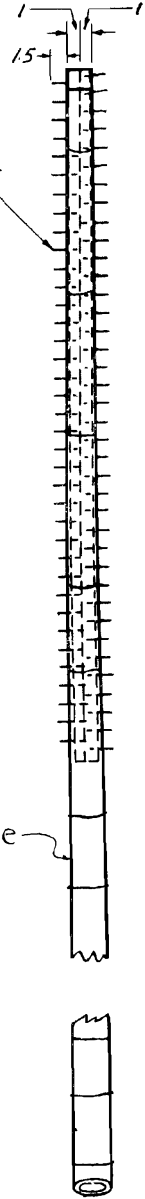


Name of Farm :
Implements : Warm catcher
Location : Yilan
Unit : CM

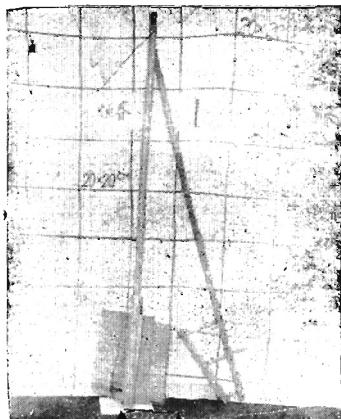


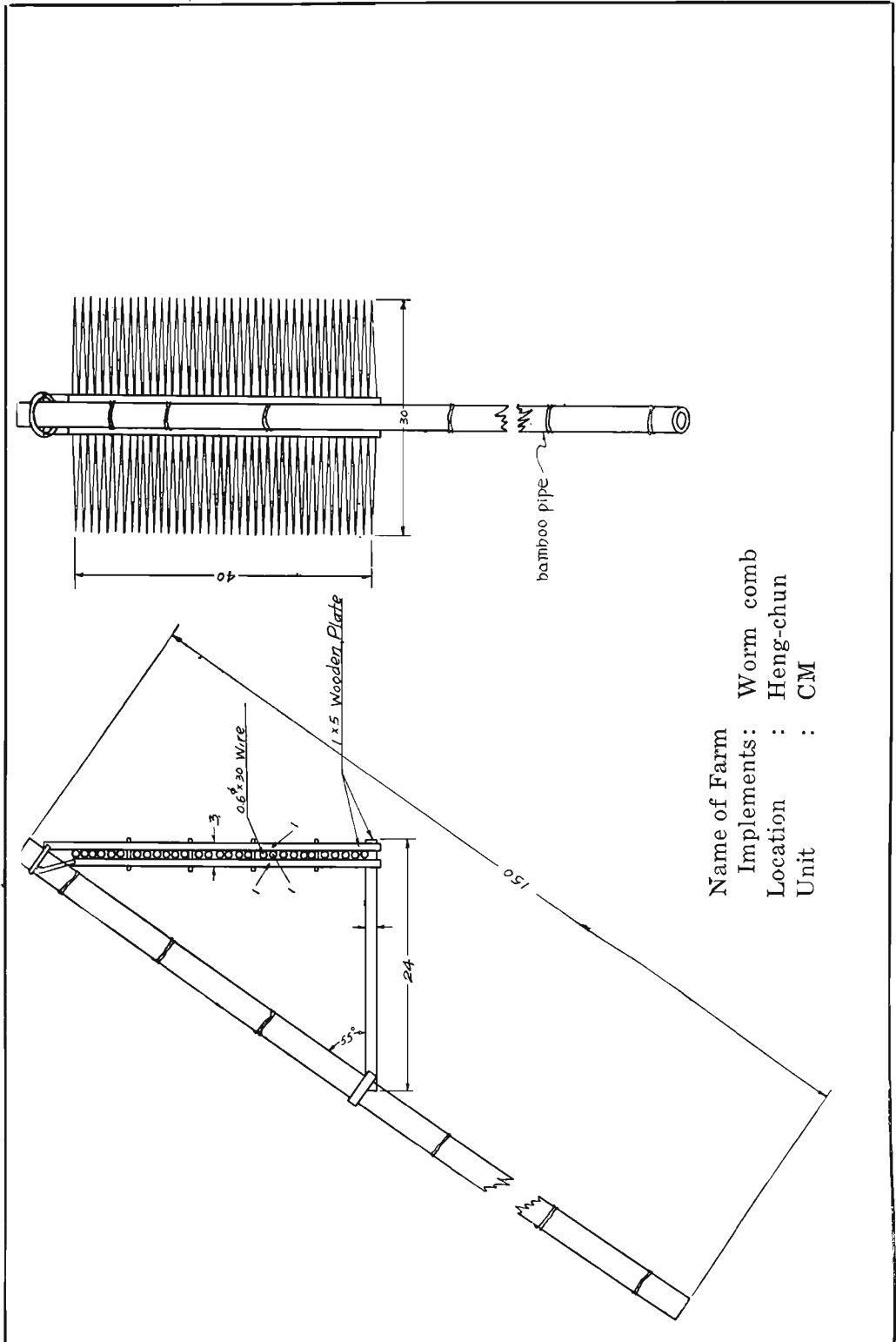
Iron Nail - Pitch = 1.5

bamboo pipe



- Classification : Plant Protection Implements
- Name : Worm comb 虫爪仔
- Cost : Approx. NT\$14
- Weight : Approx. 1.2 kg.
- Usage : To comb the leaves of rice plants.
- Operating Power : 1 man
- Material Used: Comb—Bamboo, iron wire and wood.
Handle—Bamboo.
- Season of Use: During the second weeding of the second crop of rice.
- Service Life : 1—2 years
- Method of Application : Similar to worm catcher but it can not be used after "heading" to prevent damage.
- Work Rate : Approx. 0.5 ha./noon
- Origin : Traditional Chinese.
- Remarks : 1. No chemicals necessary to destroy worms.
2. Cannot eliminate all worms.
3. Service life is short.
4. Kaohsiung Hsien Farmers' Association manufactures them.

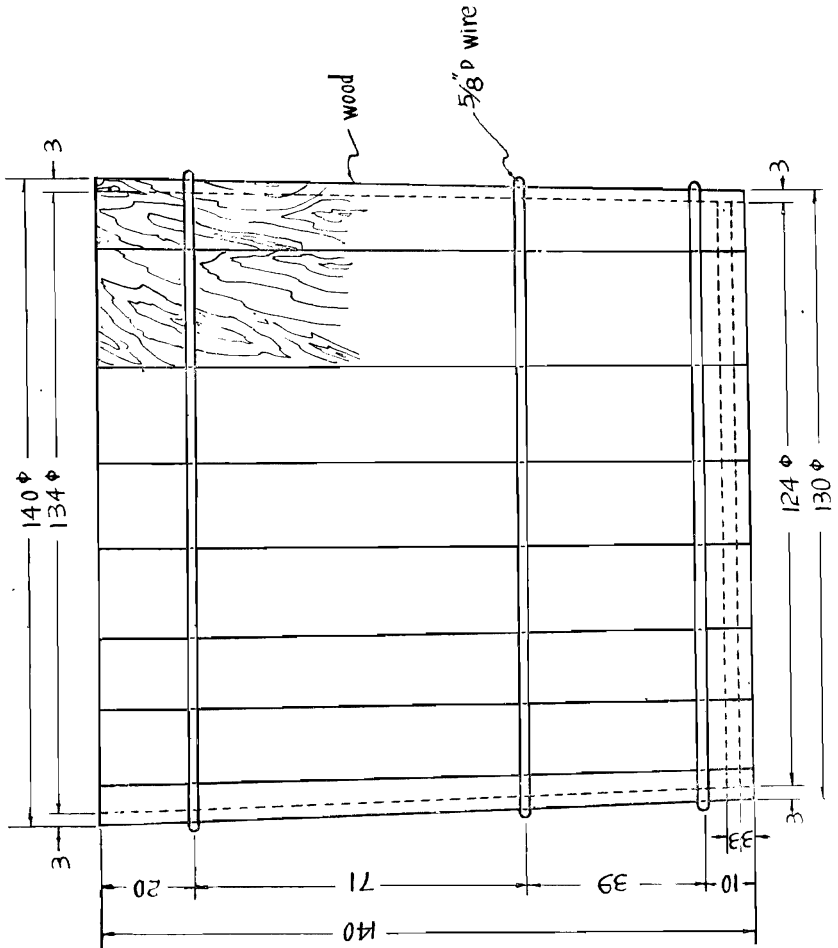




Name of Farm :
 Implements : Worm comb
 Location : Heng-chun
 Unit : CM

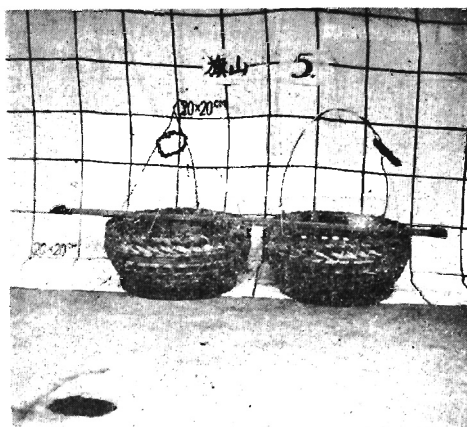
- Classification : Plant Protection Implements
- Name : Disinfection tub 消毒用桶
- Cost : Approx. NT\$200
- Weight : Approx. 30 kg.
- Usage : 1. To disinfect sugar-cane
2. To disinfect rice seeds.
- Operating Power : Man power
- Material Used: Hoop—Iron wires
Tub—Wood
- Season of Use: 1. July till October;
2. Before sowing rice to seed bed;
- Service Life : About 15 years
- Method of Application : 1. Place disinfectant into tub. Immerse seed-cane pieces containers under solution for disinfection.
2. Paddy seeds are usually immersed under solution, for one full hour.
- Work Rate : Approx. 150 hl/tub
- Origin : Enlarged from ordinary tubs.
- Remarks :



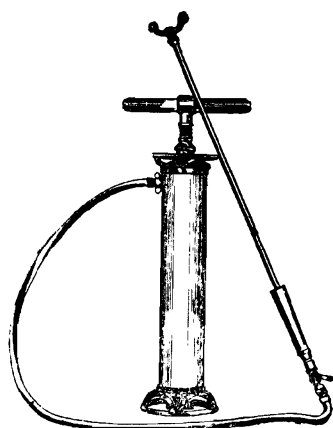


Name of Farm :
 Implements: Disinfection tub
 Location : Chi-shan
 Unit : CM

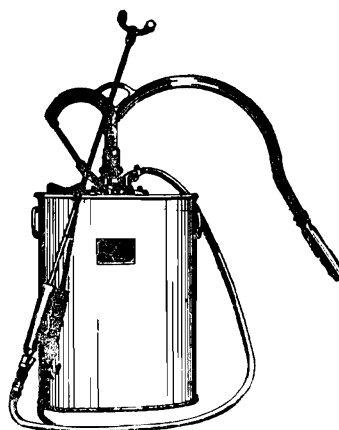
- Classification : Plant Protection Implements
- Name : Disinfection basket 消毒用籃
- Cost : Approx. NT\$5 each.
- Weight : Approx. 1.2 kg.
- Usage : 1. To disinfect sugar-cane seed pieces.
2. To transport farm produces.
- Operating Power : 1 man
- Material Used: Suspender—Iron wires
Basket—Bamboo
- Season of Use: 1. July to October.
2. Year round.
- Service Life : About 1 year
- Method of Application : Place baskets filled with sugar cane seed pieces, and dip into disinfection tub, one basket at a time, without unhitching.
- Work Rate : 400—500 seedings/load
- Origin : Traditional Chinese, use for disinfection starts 30 years ago.
- Remarks : 1. Need not unhitch baskets from carrying pole—increases efficiency.
2. Handling seed pieces in basket saves time and prevents injuries.
3. Seed pieces tend to float because basket has no cover.



Classification	: Plant Protection Implements
Name	: Sprayer 噴霧器
Cost	: About NT\$400
Weight	: Approx. 6-9 kg
Usage	: To spray liquid form insecticides.
Operating Power	: 1—2 men
Material Used	: Copper, rubber hose, asbestos
Season of Use	: Year round
Service Life	: About 10 years if hose are changed 1 or 2 times yearly.
Method of Application	: Only one man is required to operate the knapsack type. At least two persons are required for other types without build in tank, one to pump the sprayer and other to hold the spray gun.
Work Rate	: 0.1—0.2 ha./day
Origin	: Introduced from foreign countries.
Remarks	: 1. Simplicity in construction and operation. 2. Inexpensive but efficient. 3. The knapsack type used on paddy field, and 3½" cylindrical type for orange, vegetable, tobacco and cotton crops. 4. Most hand sprayers are made locally.

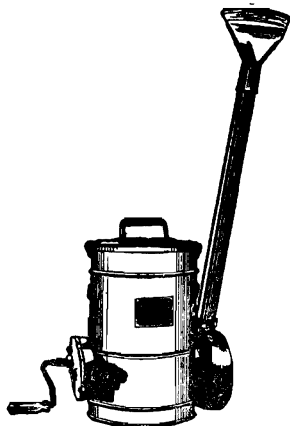


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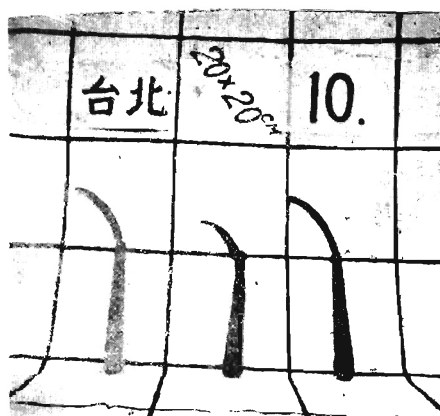
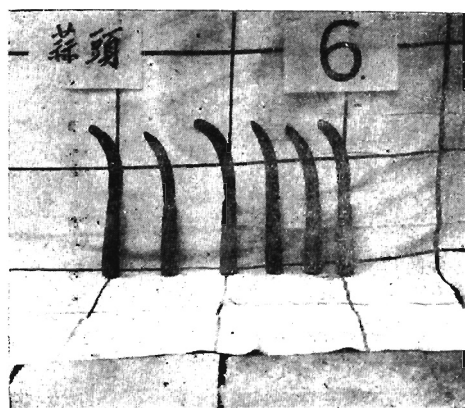


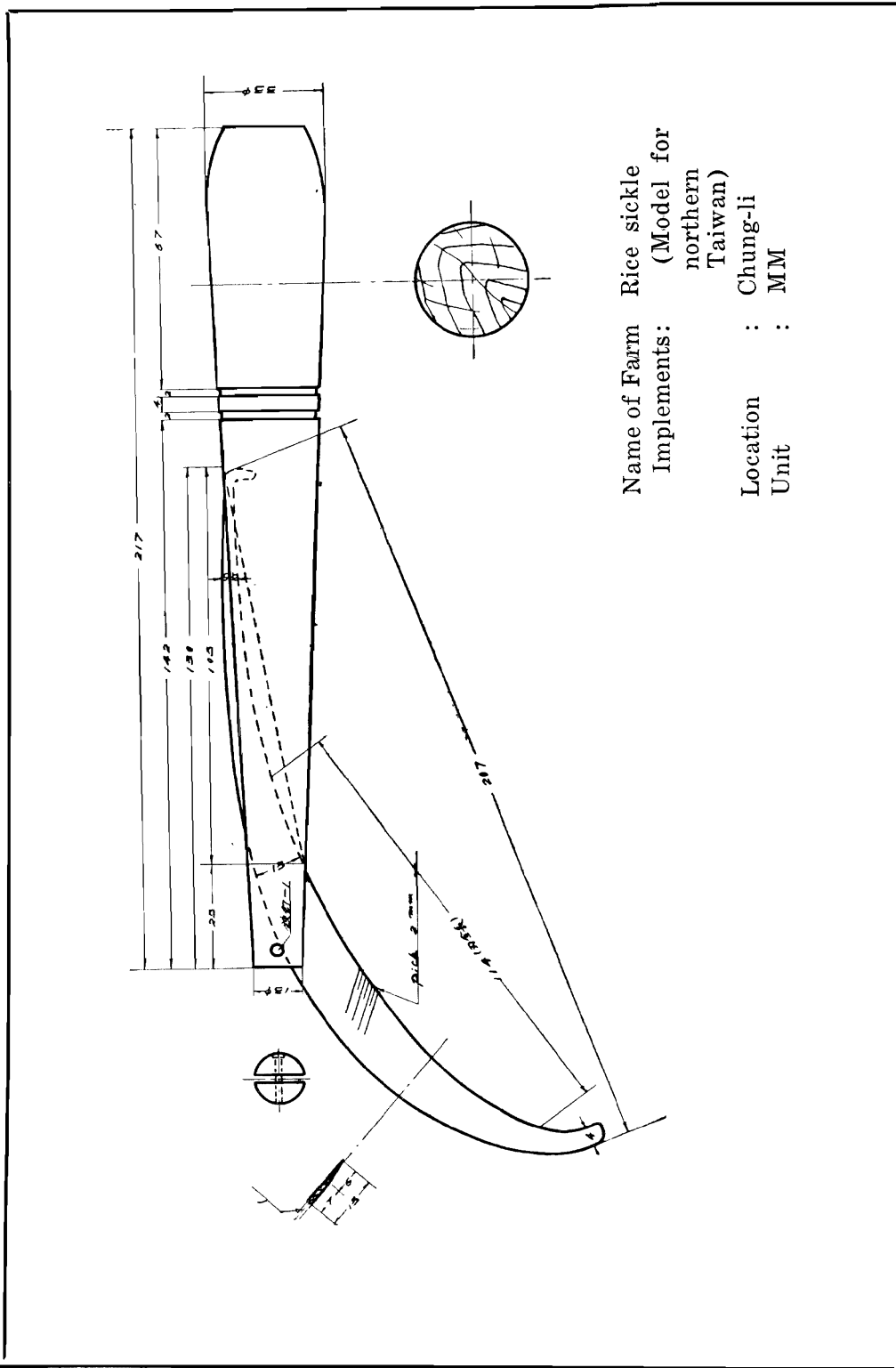
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- Classification : Plant Protection Implements
- Name : Dusters 噴粉器
- Cost : NT\$200—400
- Weight : Approx. 4—5 kg.
- Usage : To broadcast powder form insecticides.
- Operating Power : 1 man
- Material Used: Copper and/or aluminum
- Season of Use: Year round
- Service Life : About 5—7 years
- Method of Application : Crank the handle of blower for dusting.
- Work Rate : 0.4—0.5 ha./day
- Origin : Introduced from foreign countries.
- Remarks : Nowadays mostly made by local manufactories.

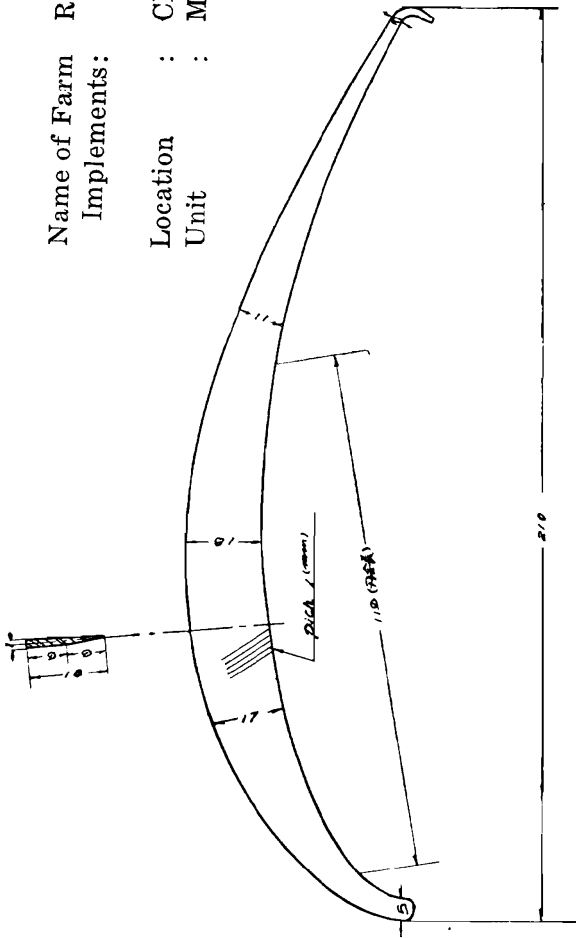


- Classification : Harvesting Implements
- Name : Rice sickle . 鎌刈仔
- Cost : NT\$1.5—2.0
- Weight : 0.05—0.10 kg.
- Usage : To reap paddy crops.
- Operating Power : 1 man
- Material Used: Sickle—Wrought iron with steel edge
Handle—Wood
- Season of Use: While harvesting paddy crops.
- Service Life : Two rice harvesting seasons
- Method of Application : Left hand hold stalks; right hand hold sickle and cut across.
- Work Rate : Approx. 0.2 ha./day
- Origin : Traditional Chinese
- Remarks : 1. Handy and light.
2. Tooth-bladed; good for cutting paddy stalks.
3. Blade edge made of cast steel; other parts wrought iron. Possesses automatic sharpening character while using.
4. Can be used in cutting vegetables when too dull for cutting rice.
5. Three kinds are all made in Chung-li, where is the production center for rice sickles: a) Single-toothed model for central parts which is sharper. b). Double-toothed model for north-east parts which is sturdier. As to c) the model for southern Taiwan, though some were produced in Chung-li but black-smiths in the south also produce some for local farmers.

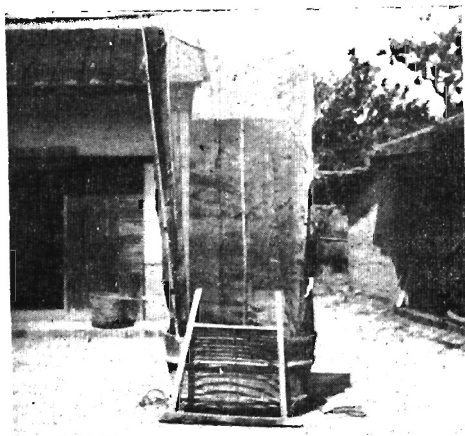




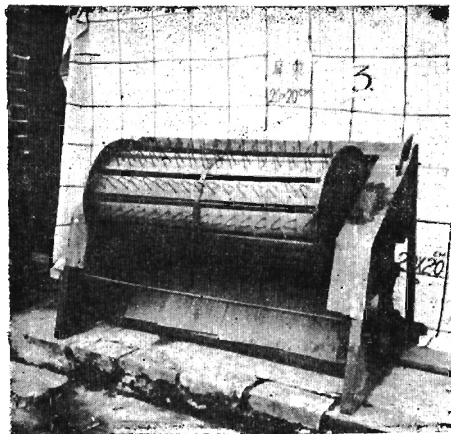
Name of Farm Implements: Rice sickle
(Model for central Taiwan)
Location : Chung-li
Unit : MM



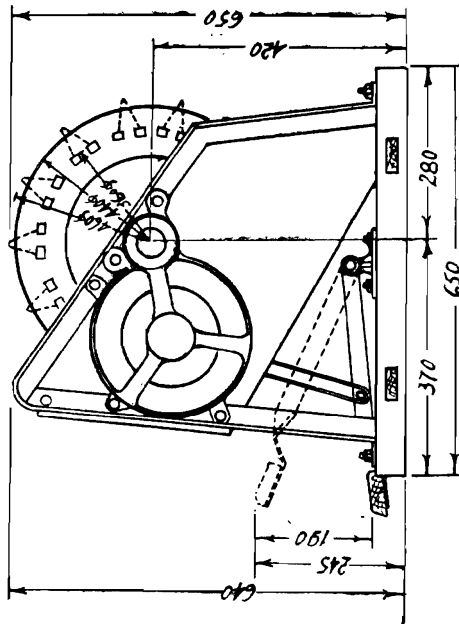
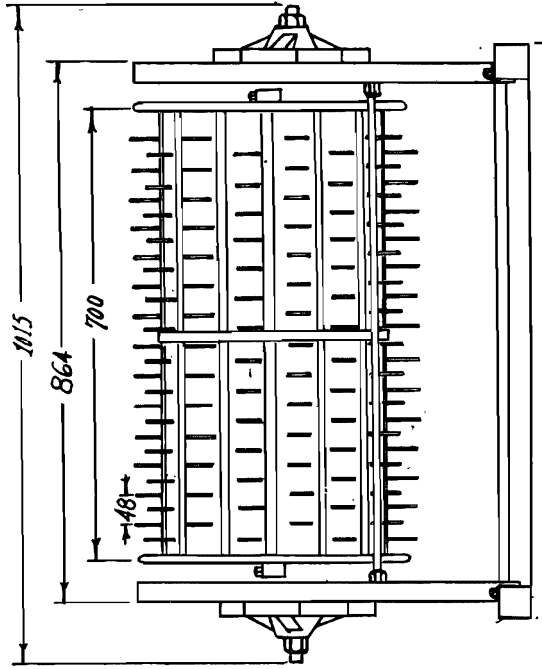
- Classification : Harvesting Implements
- Name : Rice threshing tub 摔桶
- Cost : NT\$200—300
- Weight :
- Usage : For threshing native varieties of paddy rice.
- Operating Power : 2 men each time
- Material Used: Tub—Wood
Threshing ladder—Wood sides and bamboo cross members.
Poles—Bamboo.
Cover screens—Jute.
- Season of Use: While reaping paddy rice.
- Service Life : About 10 years
- Method of Application : Place threshing ladder in, and screen over and around tub. Hold a bundle of paddy stalks with both hands; beat against ladder; grains will fall into tub; push tub forward to follow the harvesting persons to formulate a movable working team.
- Work Rate : Grains approx. 1,200 kg./day
- Origin : Traditional Chinese.
- Remarks : 1. Primitive equipment.
2. Exhausting and enervating to user.
3. Grains and straws are fairly well segregated.
4. Not suitable for Pon-lai paddy rice.
5. Used by farmers in the southern and eastern parts where more native rice is raised.



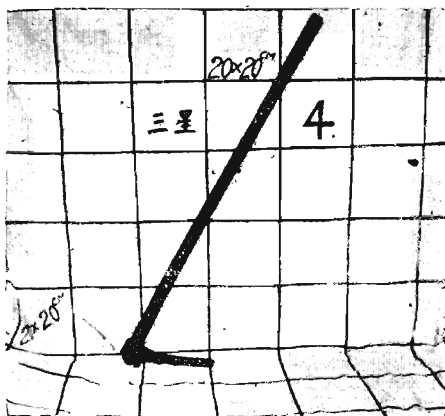
- Classification : Harvesting Implements
- Name : Pedal rice thresher 脫穀機
- Cost : Thresher NT\$300—530
Thresher and box NT\$450—730
- Weight : Approx. 80 kg.
- Usage : For threshing paddy crops.
- Operating Power : 1—4 men
- Material Used: Threshing teeth, gears, connecting rod, accessories—Iron or steel
Frame, box—Wood
- Season of Use: While reaping rice crops.
- Service Life : 10—20 years, if properly maintained and repaired.
- Method of Application : Press on foot pedal to turn tooth-cylinder. Thrust a handful of rice stalks with heads first onto cylinder. Grains will be beaten off from stalk by teeth into receptacle. Can be transported to follow workers in the fields.
- Work Rate : 2,000-3,000 kg. of grains/day
- Origin : Introduced from Japan. Box added in Taiwan.
- Remarks : 1. Less energy required.
2. Efficiency high.
3. Design simple.
4. Receptacle has 2 sleds, can be towed in paddy field easily.
5. There are four models: northern, central, southern and aboriginal.

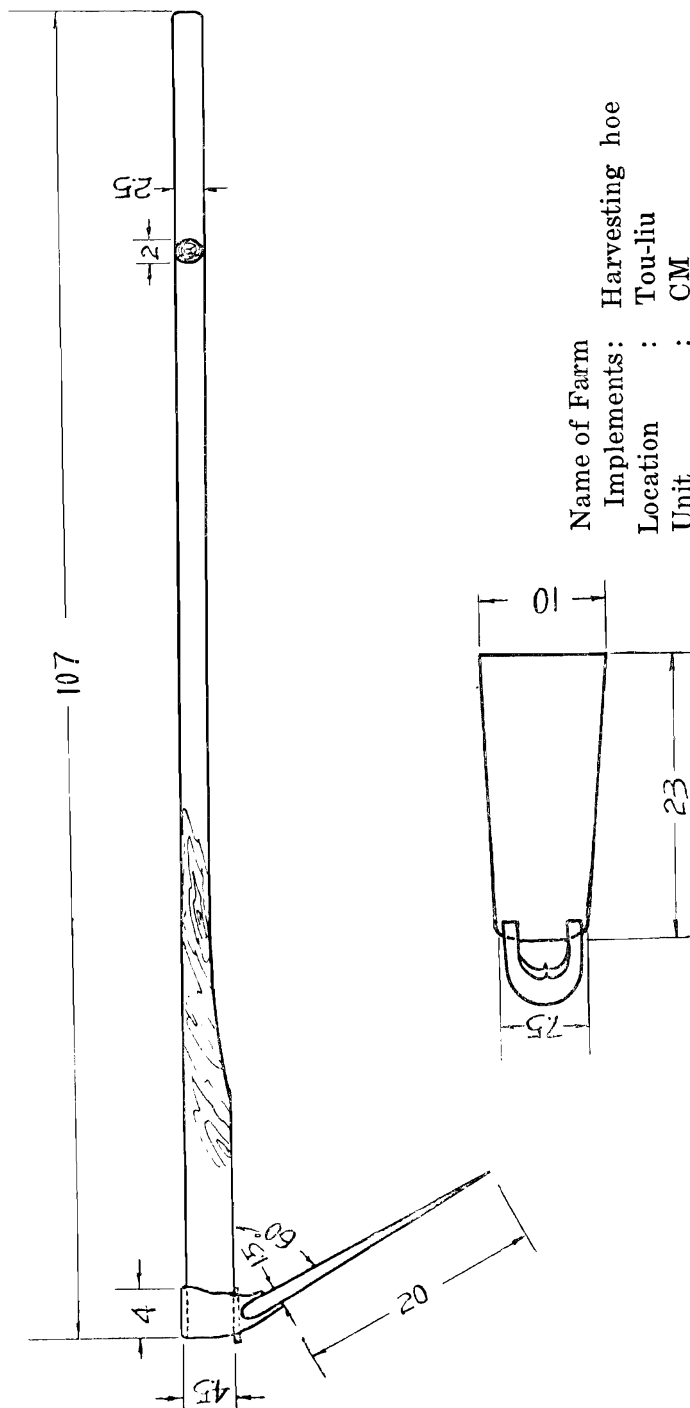


Name of Farm Pedal rice
 Implements: thresher
 Location : Pingtung
 Unit : CM



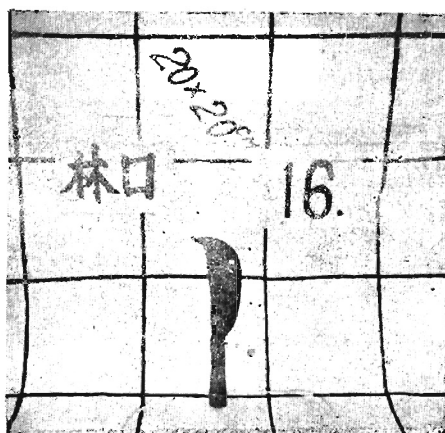
- Classification : Harvesting Implements
- Name : Digging hoe 鋤仔
- Cost : Approx. NT\$7
- Weight : Approx. 2.5 kg.
- Usage : To dig sugar-cane, taro and other root crops.
- Operating Power : 1 man
- Material Used: Blade—Soft steel
Handle—Wood
- Season of Use: November to March
- Service Life : About 3 years
- Method of Application : Both hands hold handle; dig by striking into earth.
- Work Rate : Approx. 0.1 ha./day.
- Origin : Traditional Chinese.
- Remarks : 1. Blade is narrow and long; can dig deep into soil and will not injure roots.
2. Light.

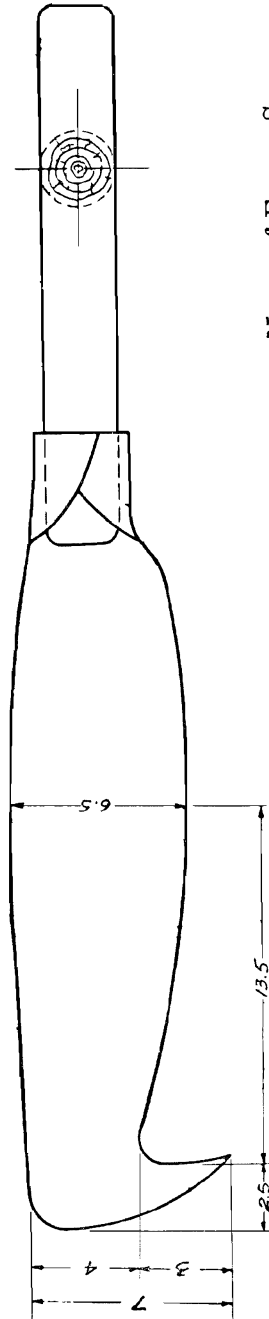
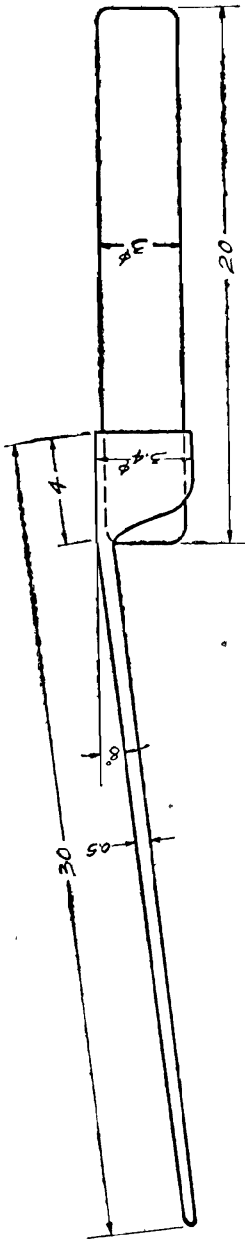




Name of Farm :
 Implements : Harvesting hoe
 Location : Tou-liu
 Unit : CM

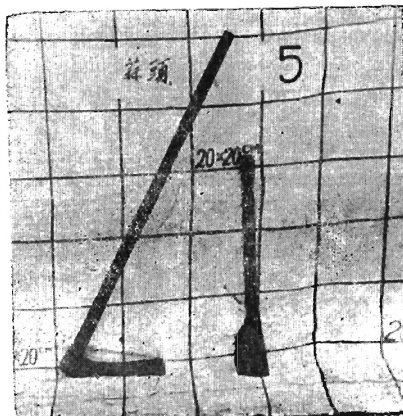
- Classification : Harvesting Implements
- Name : Sugar-cane hacking knife 甘蔗刀
- Cost : Approx. NT\$7
- Weight : Approx. 0.26 kg.
- Usage : For remove tops, roots and leaves while harvest sugar-cane.
- Operating Power : 1 man
- Material Used: Blade—Iron body with steel-edge
Handle—Wood
- Season of Use: November to March
- Service Life : About 2 to 3 years
- Method of Application : Hold handle with right hand; trim off top of sugar-cane held in left hand. Succeedingly chop off roots and shave off leaves and rootlets.
- Work Rate : Approx. 900 kg./day
- Origin : Traditional Chinese.
- Remarks : 1. Tip of blade extends into a hook which can be used to dig up sugarcane stalks.
2. Center of gravity is at the forefront; easy to chop or pare.
3. There is a hole in blade; can be hung on nail.



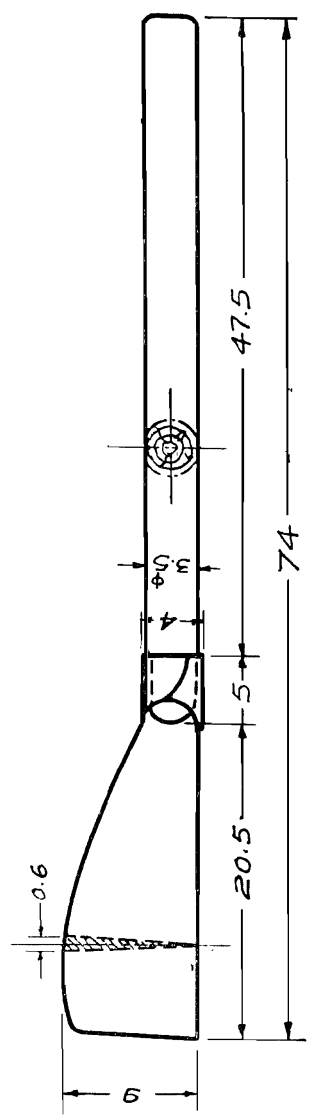
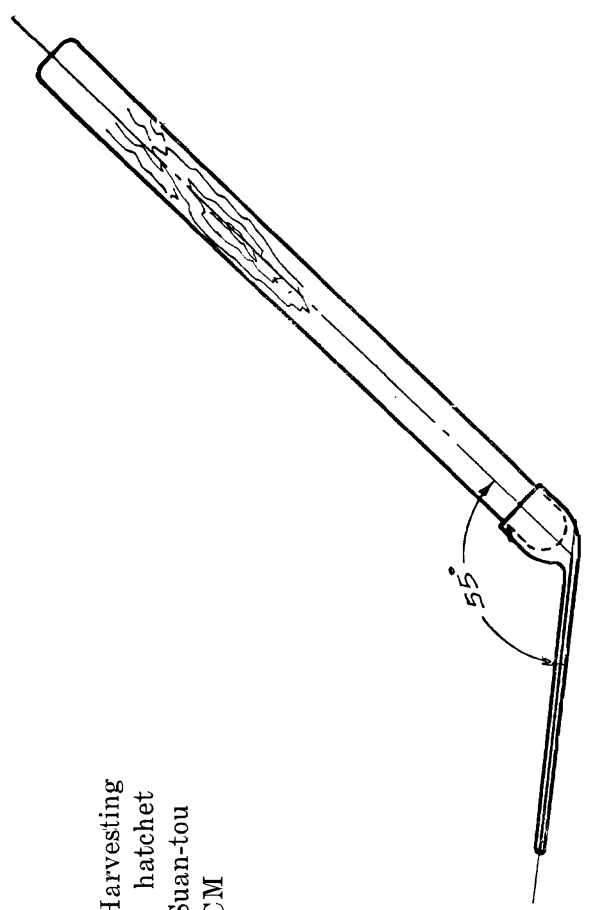


Name of Farm : Sugar cane hacking knife
 Implements : Tou-liu
 Location :
 Unit : CM

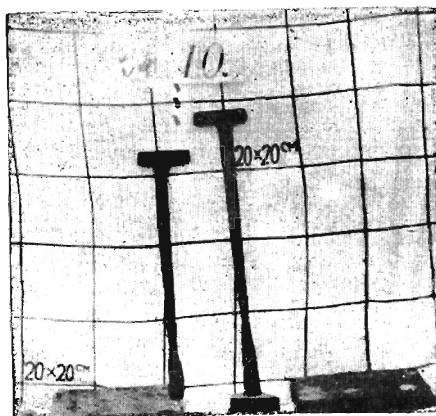
- Classification : Harvesting Implements
- Name : Harvesting hatchet 大槌
- Cost : Approx. NT\$8
- Weight : 0.5—1.2 kg.
- Usage : For cutting jute, sesbania or sugarcane.
- Operating Power : 1 man
- Material Used: Blade—Steel
Handle—Wood
- Season of Use: July till September
- Service Life : About 2 years
- Method of Application : Left hand hold jute; right hand hold hatchet to chop off stems close to ground surface.
- Work Rate : Approx. 0.07 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Handle and knife bends approx. 50°; suitable for cutting stems near the ground.
2. Harvest rapidly.
3. Roots are left underground.
4. Not used at present for harvesting sugarcane.



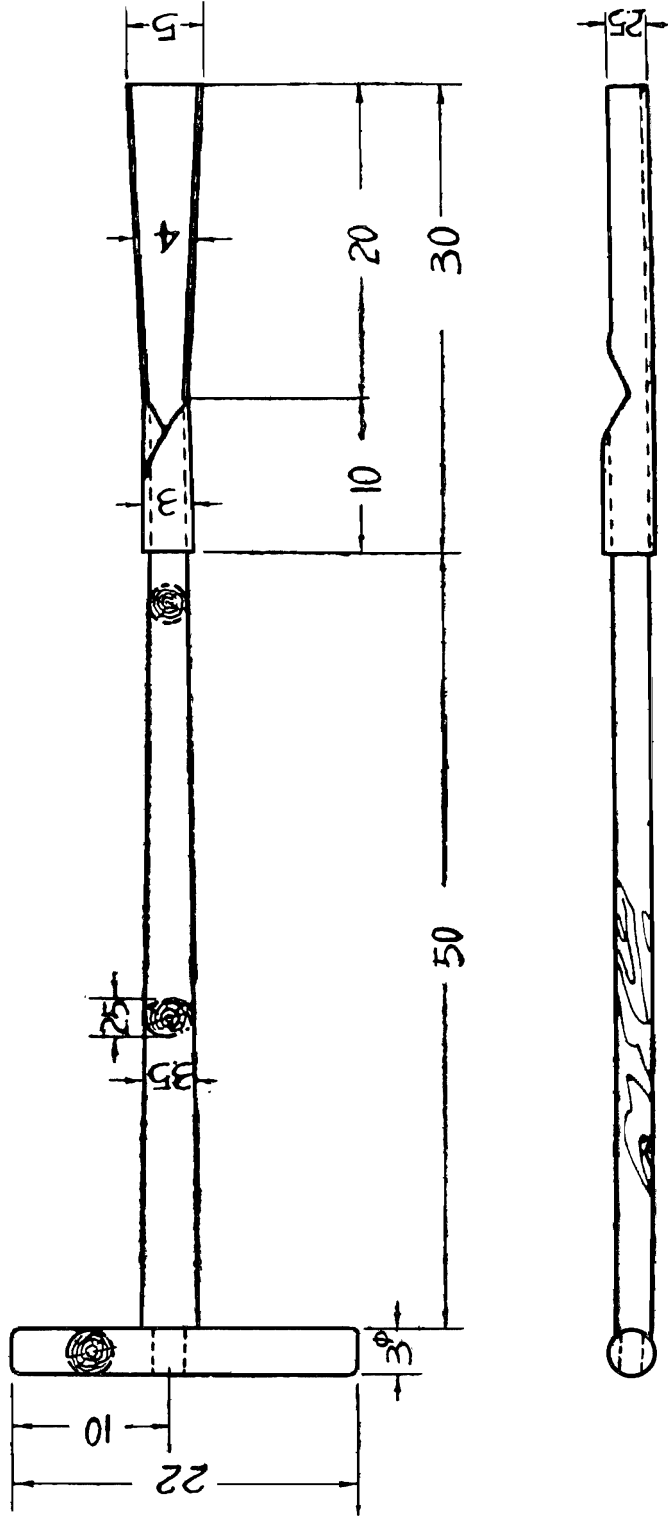
Name of Farm : Harvesting
Implements: : hatchet
Location : : Suan-tou
Unit : : CM



Classification : Harvesting Implements
 Name : Jute harvesting digger 黃麻鑿仔
 Cost : Approx. NT\$20
 Weight : Approx. 0.9 kg.
 Usage : For digging jute.
 Operating Power : 1 man
 Material Used: Blade—Soft steel
 Handle—Wood
 Season of Use: July, August
 Service Life : 1 to 2 years
 Method of Application : Hold handle with both hands, dig for jute roots.
 Work Rate : Approx. 0.07 ha./day
 Origin : Developed from straight handled shovel.
 Remarks : 1. Can gather underground rhizomes.
 2. Requires greater amount of energy.
 3. Handle is T-shaped, to give a better hold.



Name of Farm : Jute harvesting
 Implements : digger
 Location : Jen-teh
 Unit : CM



Classification : Harvesting Implements

Name : Sweet-potato digging shovel 番薯掘

Cost : Approx. NT\$5

Weight : Approx. 0.38 kg.

Usage : For digging sweet potatoes.

Operating
Power : 1 man

Material Used: Digger—Soft steel
Cutting attachment used—rice sickle.

Season of Use: May to August
October to February

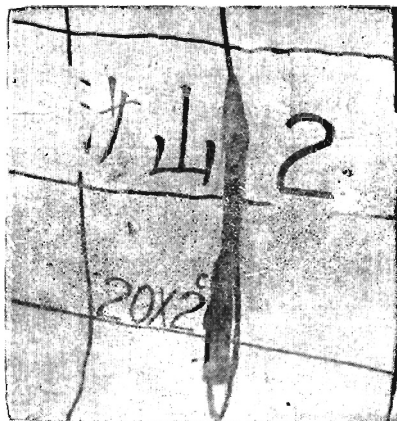
Service Life : 3 to 4 years

Method of Application : Before regular harvesting season, use this implement to dig for sweet potatoes. Turn handle; use sickle end to sever vines.

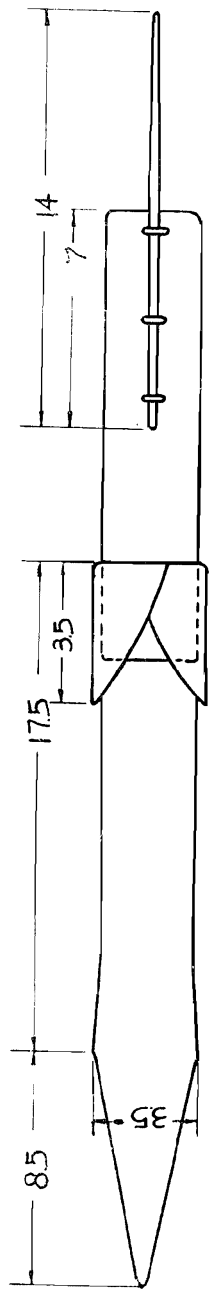
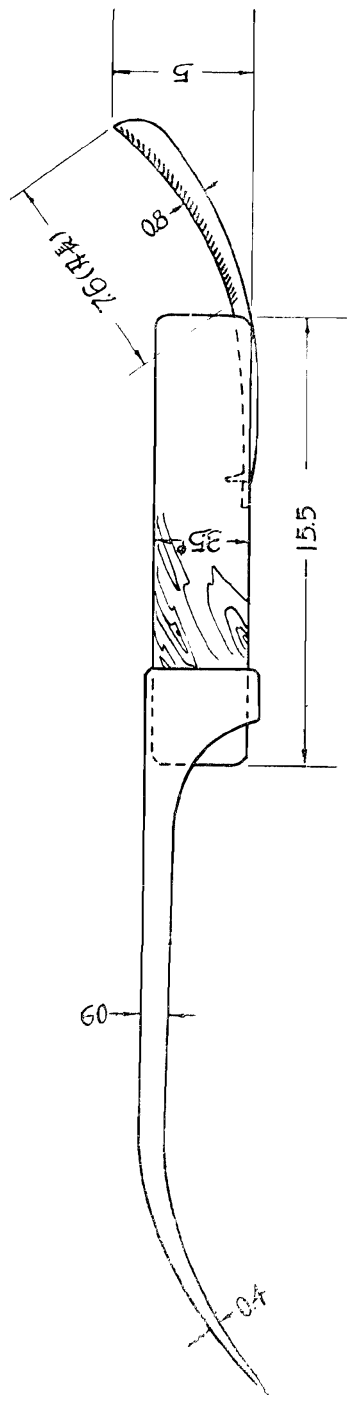
Work Rate : 300—400 kg./day

Origin : Traditional Chinese

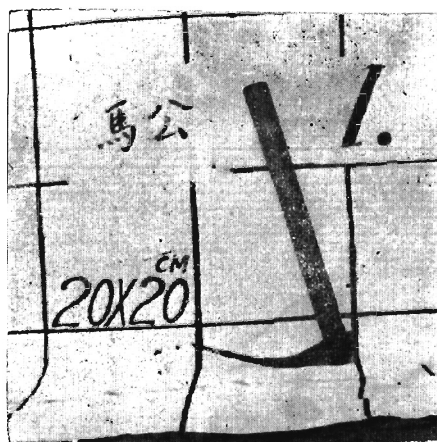
Remarks : 1. Suitable for small scale digging.
2. The sickle at the handle end can cut vines.

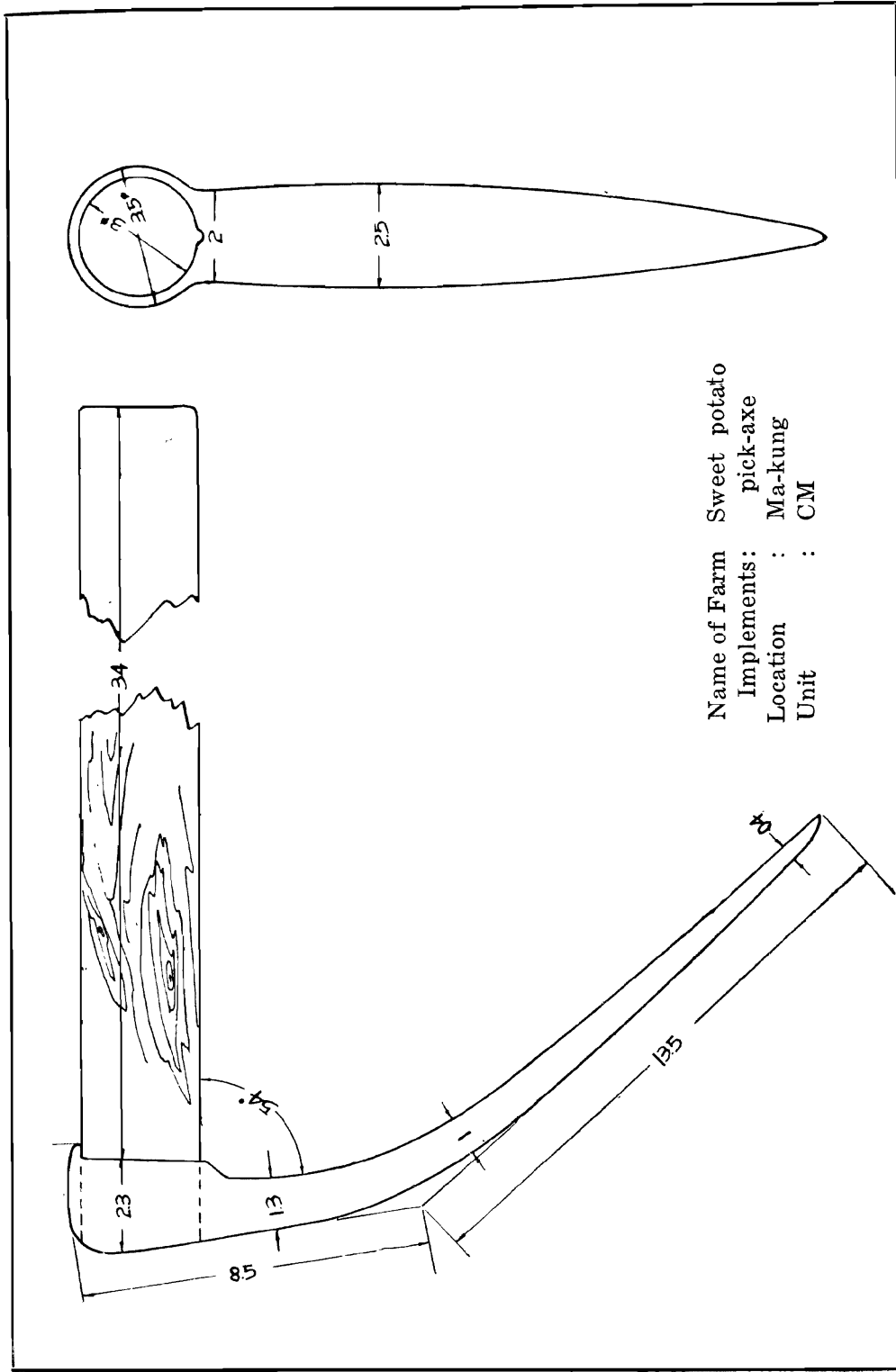


Name of Farm Sweet potato
Implements: digger
Location : Sha-shan
Unit : CM



Classification	: Harvesting Implements
Name	: Sweet-potato pick-axe 據搭掘
Cost	: Approx. NT\$5.00
Weight	: 0.3—0.6 kg.
Usage	: 1. To dig for sweet potato. 2. For weeding.
Operating Power	: 1 man
Material Used:	Blade—Soft steel Handle—Wood
Season of Use:	Year round
Service Life	: 2—3 years
Method of Application	: Hold handle with right hand; loosen earth and dig up sweet potatoes or weeds. Usually used in digging sweet potatoes before harvesting season.
Work Rate	: 1. Approx. 500 kg./day 2. 10—20 M ² /day
Origin	: Traditional Chinese.
Remarks	: 1. Suitable for digging on heavy soils. 2. Blade is narrow and pointed. 3. When loosening earth produces a large moment. 4. A special implement of Peng-hu.





Classification : Harvesting Implements

Name : Peanut harvesting knife 土豆揸

Cost : Approx. NT\$2.00

Weight : Approx. 0.11 kg.

Usage : For picking peanuts.

Operating
Power : 1 man

Material Used: Blade—Soft steel
Handle—Wood

Season of Use: June and November

Service Life : 2 to 3 years

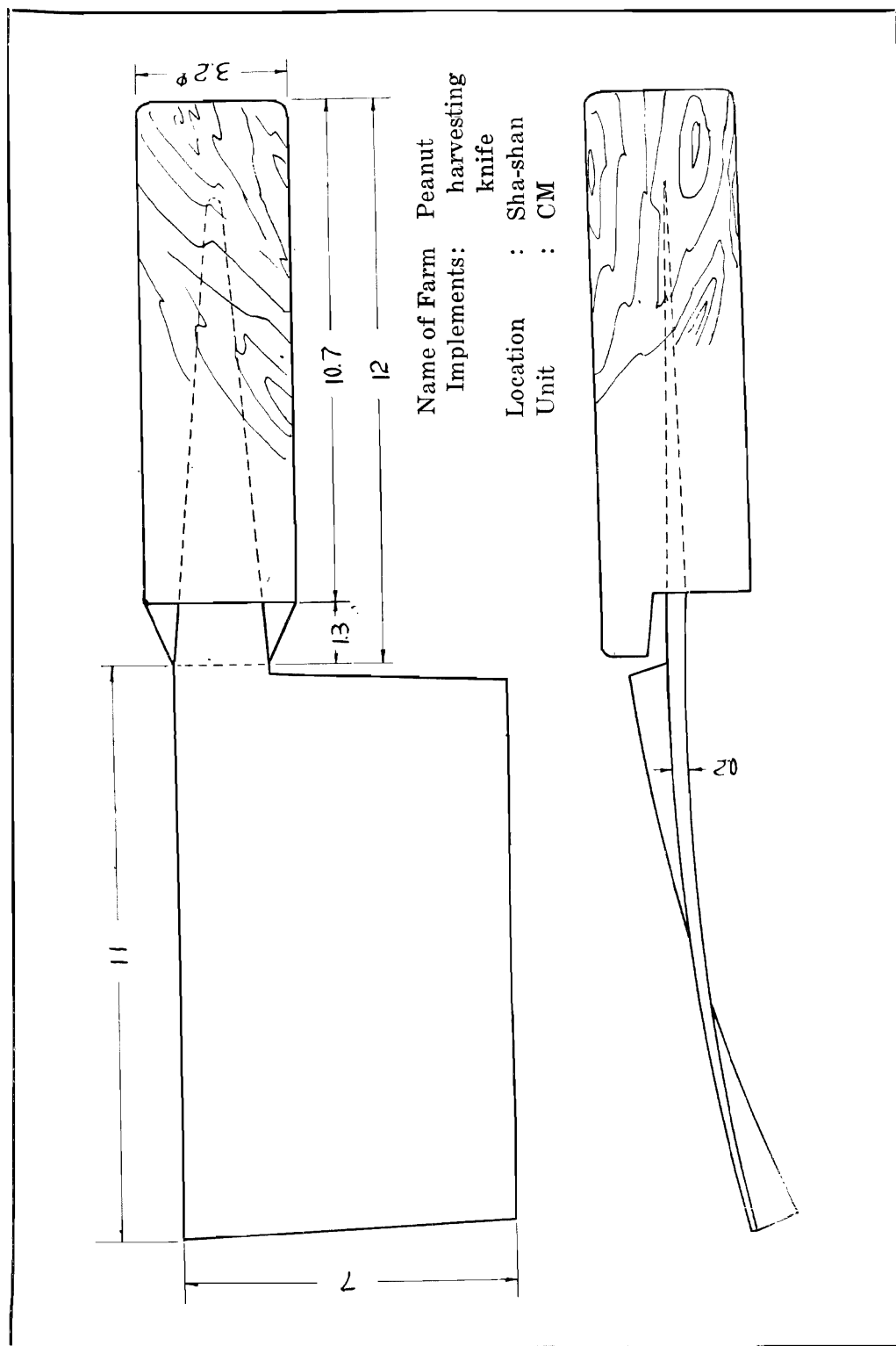
Method of
Application : Right hand hold implement; sever peanuts from roots; pick up
peanuts as one goes along.

Work Rate : Approx. 60 liter/day

Origin : Traditional Chinese.

Remarks : 1. Light, convenient and cheap.
2. Is a primitive implement with low efficiency.
3. A special implement of Chang-hua Hsien.





Classification : Harvesting Implements

Name : Peanut basket 土豆籃

Cost : NT\$2—3

Weight : Aprox. 0.45 kg.

Usage : To hold peanuts picking.

Operating Power : 1 man

Material Used: Bamboo

Season of Use: June, November

Service Life : 2 years

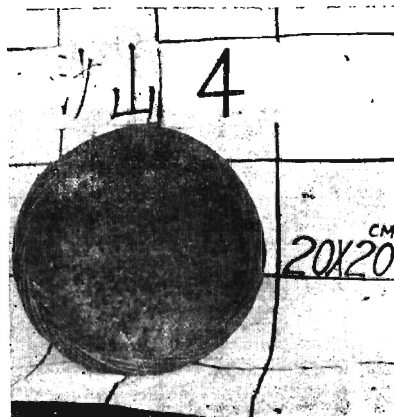
Method of Application : Left hand drag along this basket to hold picked peanuts.

Work Rate : Aprox. capacity 14 liter/basket

Origin : Traditional Chinese.

Remarks :

1. Basket is shallow; peanuts can be thrown in from a squatting position.
2. Diameter is greater than height, basket will not tip over.
3. Used along with peanut harvesting knife.



- Classification : Harvesting Implements
- Name : Peanut siece 土豆篩
- Cost : NT\$3—4
- Weight : Approx. 8.6 kg.
- Usage : To separate soil on peanuts after picking.
- Operating Power : 1 man
- Material Used: Bamboo
- Season of Use: June to August
November to December
- Service Life : 3 to 4 years
- Method of Application : Hold edge of basket; move around to shake off soil and sand. Then pick out the leaves.
- Work Rate : Approx. 100 liter/day
- Origin : Traditonal Chinese.
- Remarks : 1. Light and cheap.
2. Will not rust. Bamboo surface is smooth; peanuts can be shaken around easily.
3. Used also for sieving larger vegetable seeds and sesbania seeds.



Operating Harvesting Implements

Power : Tea-leaf basket 茶籃

Cost : NT\$6—7

Weight : Approx. 1 kg.

Usage : To hold picked tea leaves.

Operating
Power : 1 man

Material Used: Bamboo

Season of Use: While picking tea leaves.

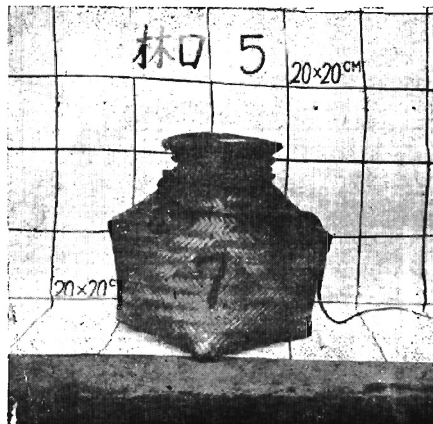
Service Life : 1—2 years

Method of
Application : Place suspender of this basket over one shoulder and let it hang to one side. Place picked leaves into it.

Work Rate : 3—4 kg. of leaves/basket

Origin : Traditiona Chinese.

Remarks : 1. Tea leaves will not be spilled while walking.
2. No cover, easy to throw leaves in.



Classification : Harvesting Implements

Name : Grass sickle 鎌仔

Cost : NT\$10—15

Weight : 0.5—0.5 kg.

Usage : Cutting grass or harvesting triangle rush.

Operating
Power : 1 man

Material Used: Handle—Wood
Blade—Iron body and steel edge

Season of Use: Year round

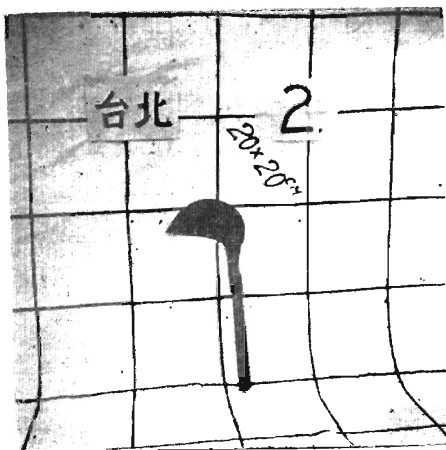
Service Life : About 2 years

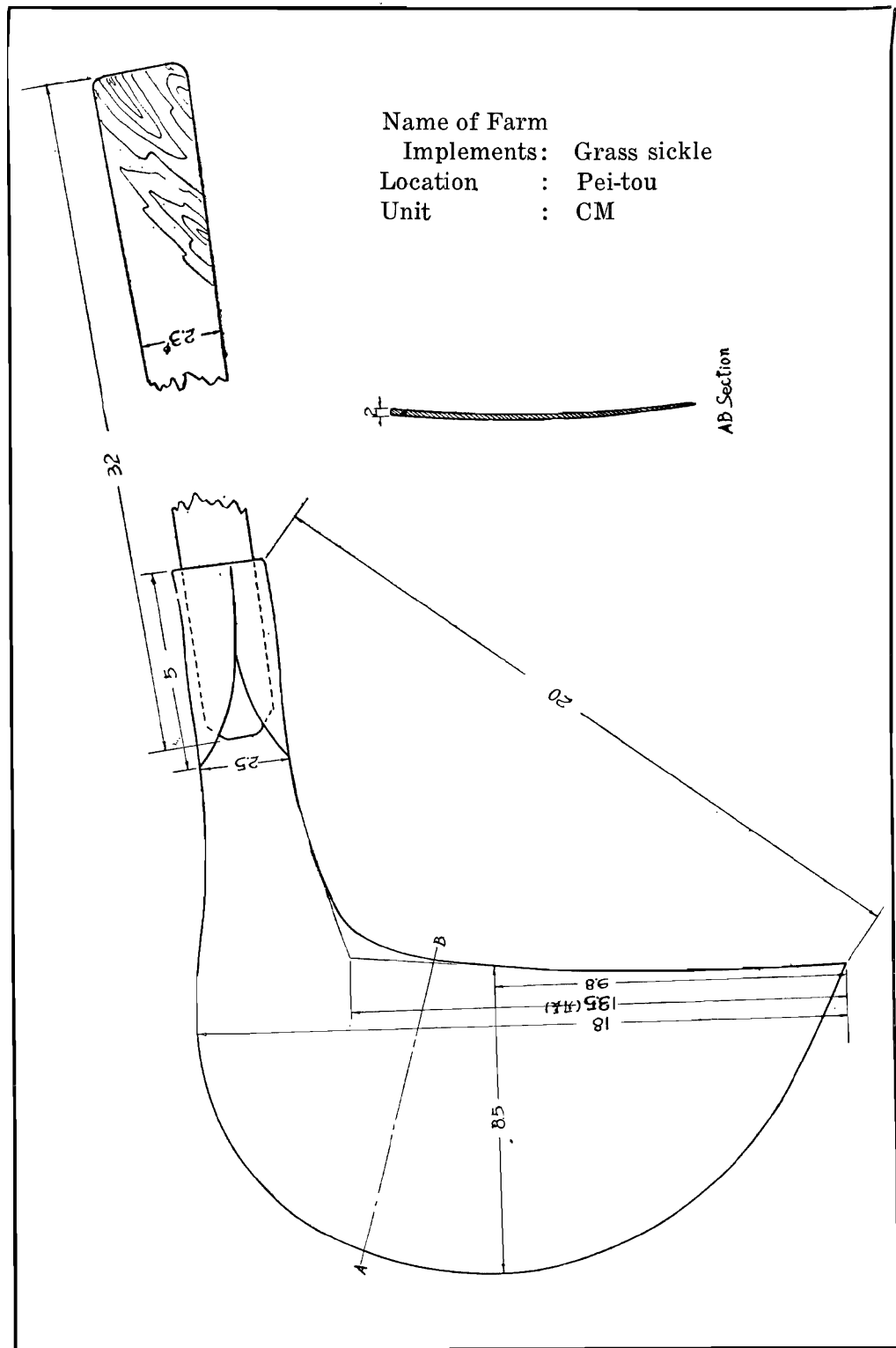
Method of
Application : Left hand hold grass; right hand hold sickle; pull to cut grass.

Work Rate : Uncertain

Origin : Traditional Chinese.

Remarks : 1. Used also in cutting small tree stems.
2. Heavy in weight and sturdy in construction.
3. Efficiency is low.





Name of Farm

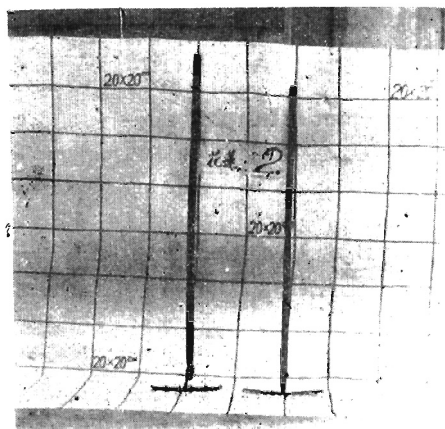
Implements: Grass sickle

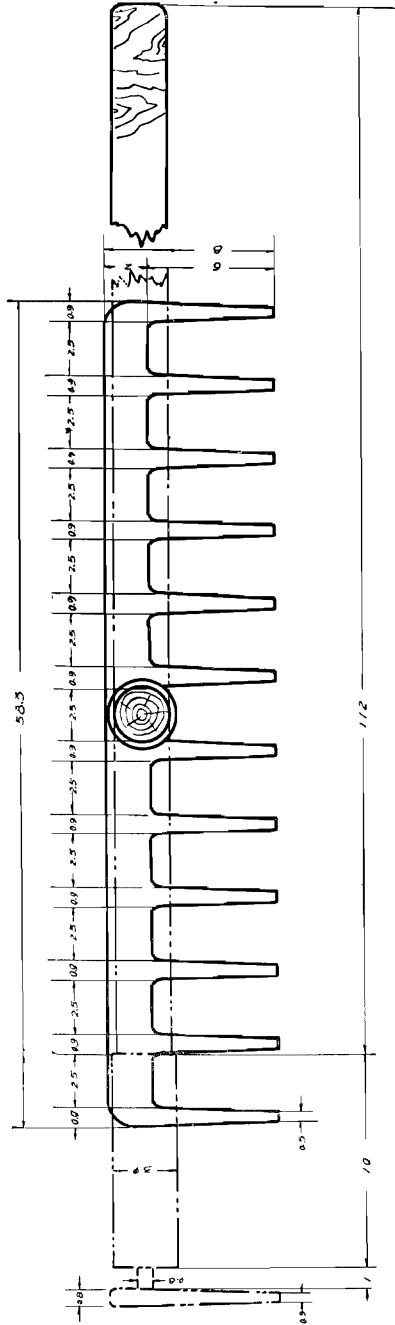
Location : Pei-tou

Unit : CM

AB Section

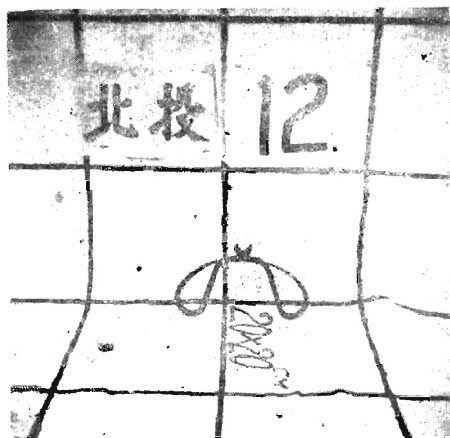
Classification	: Harvesting Implements
Name	: Hand rake 鐵耙
Cost	: NT\$10—15
Weight	: 06.—1.4 kg.
Usage	: 1. To gather grass. 2. To rake up leaves among grains.
Operating Power	: 1 man
Material Used:	Prongs—Soft steel Handle—Wood or bamboo
Season of Use:	1. Year round. 2. When reaping paddy crops.
Service Life	: About 5 years
Method of Application	: 1. To gather up grass or weeds after cutting them. 2. Use this implement to separate straws and trashes from grain.
Work Rate	: 1. Uncertain 2. 1,200—1,800 kg/day
Origin	: Introduced from foreign countries.
Remarks	: 1. The space between prongs are suitable for gathering grass without gathering soil. 2. Wider rakes are more efficient. 3. Sturdier than bamboo rakes.



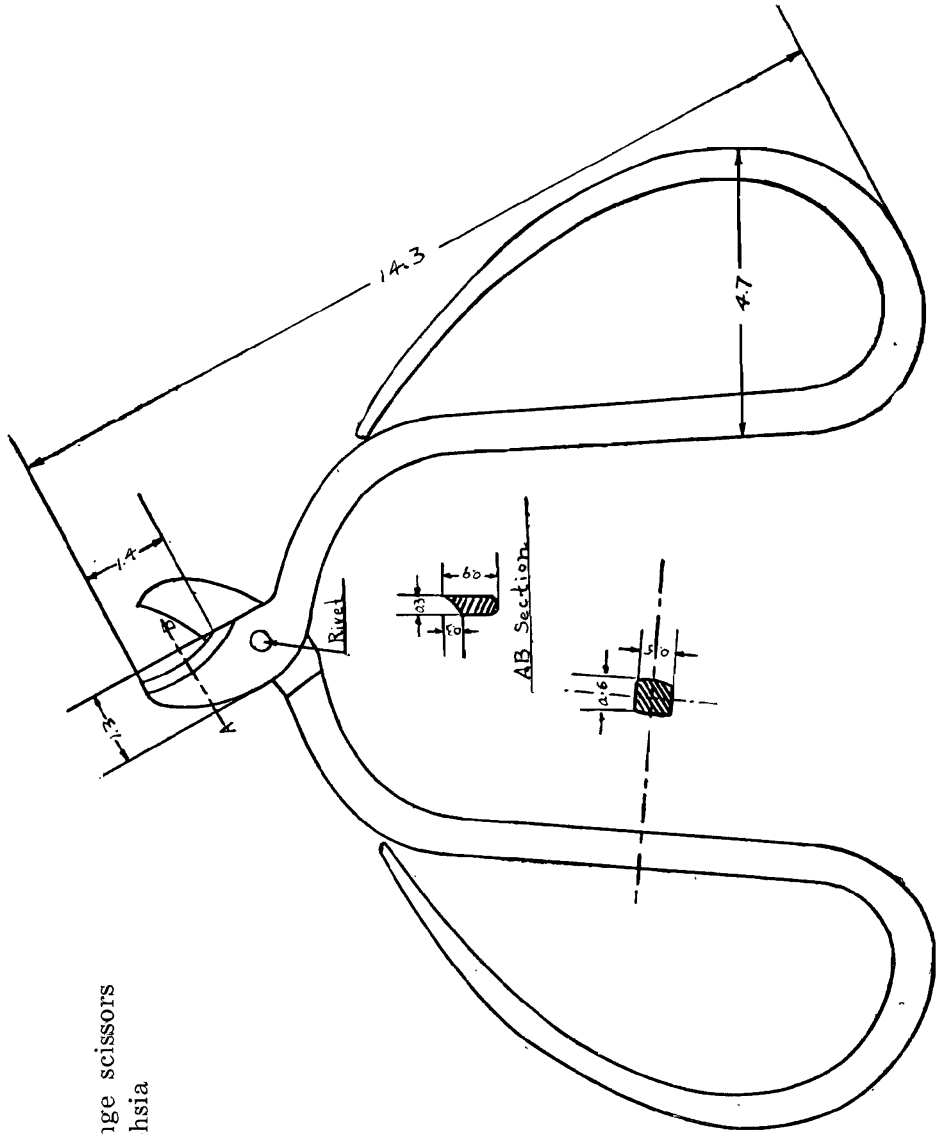


Name of Farm
Implements: Hand rake
Location : Hua-lien
Unit : CM

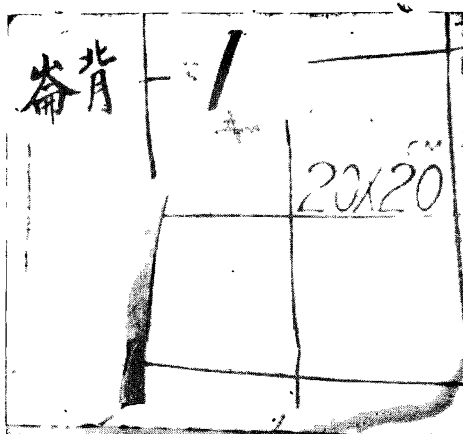
Classification : Harvesting Implements
 Name : Orange scissors 柑仔剪
 Cost : Approx. NT\$6
 Weight : 0.1—0.2 kg.
 Usage : For picking oranges
 Operating Power : 1 man
 Material Used: Scissors—Iron
 Cutting edge—Steel
 Season of Use: December till February.
 Service Life : About 3 years
 Method of Application : Hold orange in one hand, and cut the stalk with scissors.
 Work Rate : Approx. 1,000 oranges/day
 Origin : Introduced from foreign countries 40 years ago.
 Remarks : 1. Light and convenient.
 2. Blade is short and not pointed; will not injure fruits.
 3. It is manufactured locally.

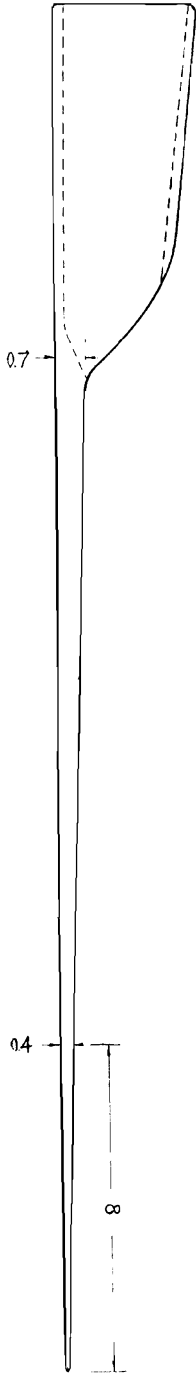


Name of Farm
Implements: Orange scissors
Location : San-hsia
Unit : CM

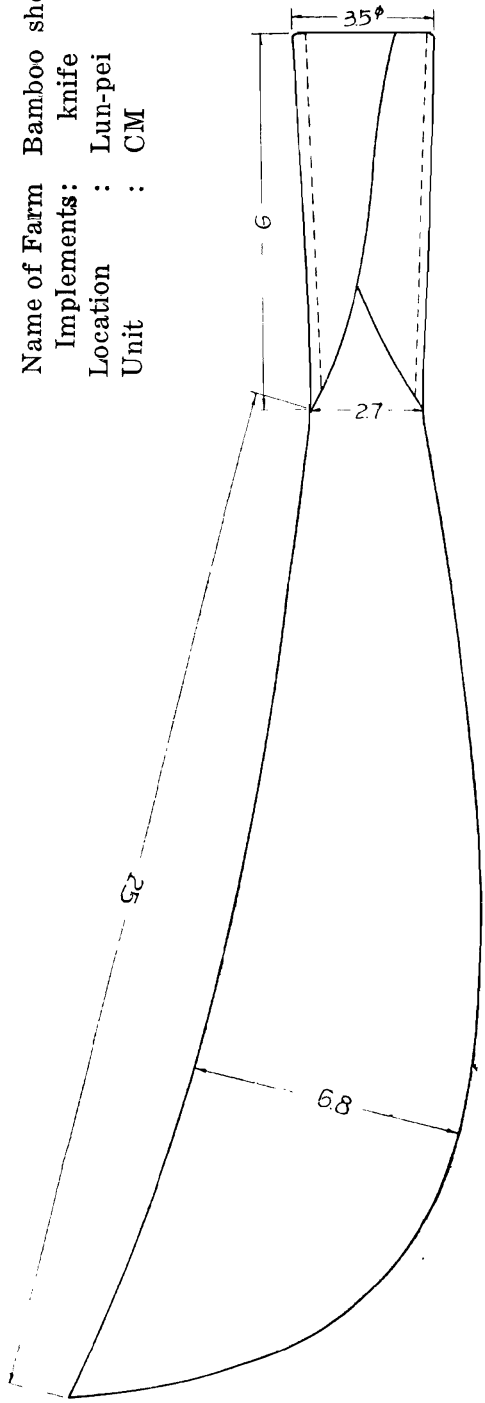


Classification : Harvesting Implements
 Name : Bamboo-shoot knife 筍刀
 Cost : Approx. NT\$ 12
 Weight : Approx. 0.55 Kg.
 Usage : To dig up bamboo shoots.
 Operating Power : 1 man
 Material Used: Knife—Iron
 Knife edge—Steel
 Season of Use: April to September
 Service Life : About 5 years
 Method of Application : Use knife tip to dig up soil around shoot; insert knife on root of shoot; hold handle with left hand; beat on handle with right hand to cut off shoots.
 Work Rate : Uncertain
 Origin : Traditional Chinese.
 Remarks : 1. Can used as a chisel as well as a knife.
 2. If the shoot is too hard to be cut by this knife, then the shoot is too tough to be eaten.
 3. Used widely in Yunlin Hsien.

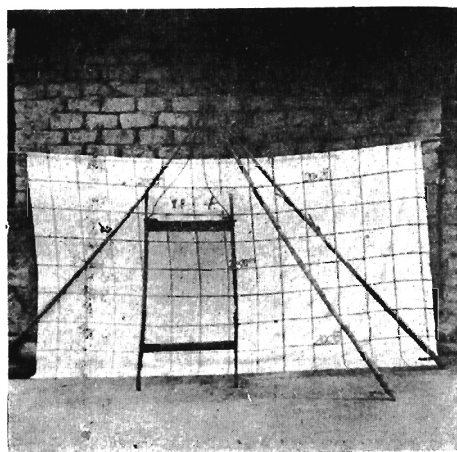




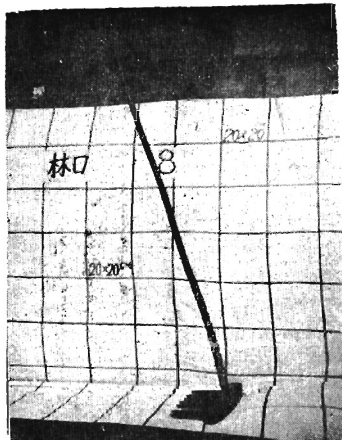
Name of Farm Bamboo shoot
Implements: knife
Location : Lun-pei
Unit : CM

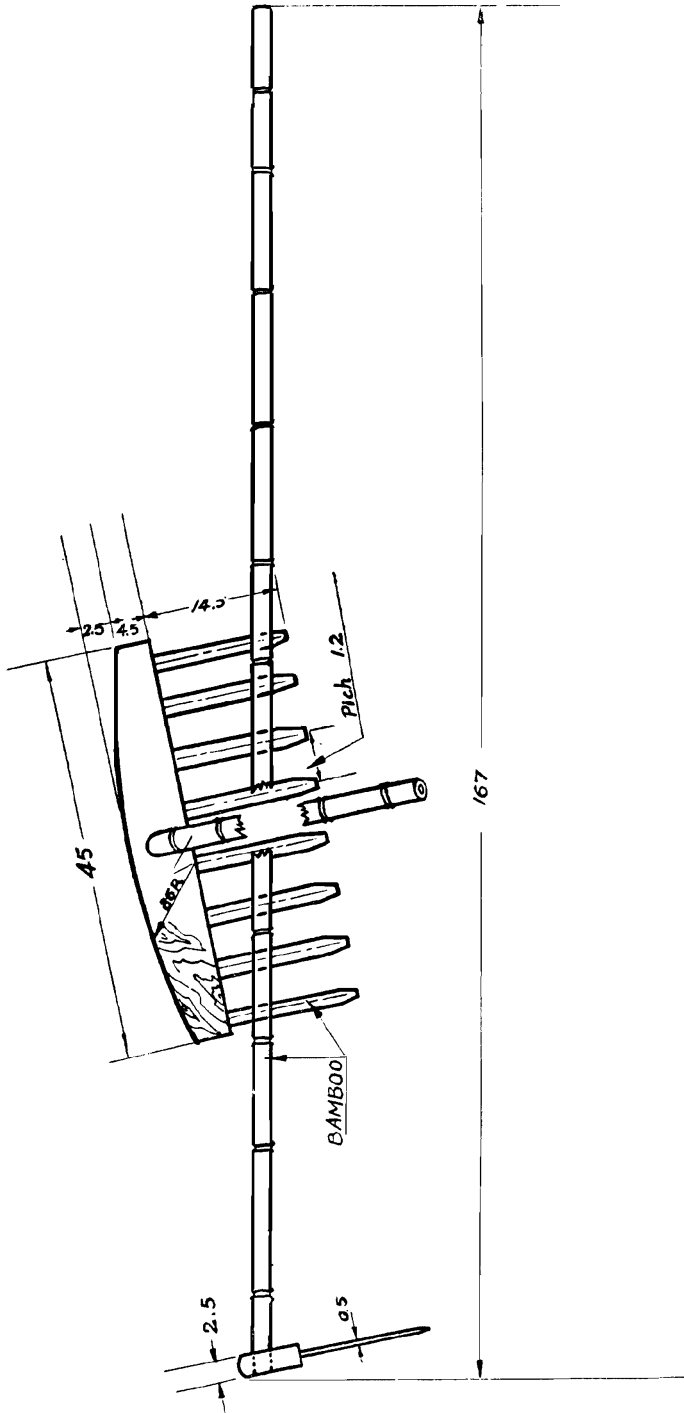


Classification :	Processing and Storage Equipment
Name :	Chaff sieve 穀篩
Cost :	Approx. NT\$15
Weight :	Wood 25 kg. Bamboo 0.7 kg.
Usage :	To separate straws and leaves from grain.
Operating Power :	1 man
Material Used:	Screen—Steel wire Frame—Wood Poles—Bamboo Rope—Jute
Season of Use:	While cleaning and drying grain.
Service Life :	
Method of Application :	Set this implement on the drying ground. Place grains in the sieve; hold frame and shake around. Grains will fall thru sieve; straw and leaves will be remained on the sieve.
Work Rate :	1,200—1,800 kg/day
Origin :	Traditional Chinese, using steel screen about 20 years ago.
Remarks :	<ol style="list-style-type: none"> 1. Sieve is tied to a frame with ropes; less energy is needed to shake the sieve. 2. The support frame is made of 3 poles; can be moved around and set up easily. 3. Wooden frames are also used.



Classification : Processing and Storage Equipment
 Name : Grain handling rake 穀爪仔
 Cost : NT\$3—4
 Weight : 1.2—1.5 kg.
 Usage : To turn and to spread grains on drying ground.
 Operating Power : 1 man
 Material Used: Tooth, handle, wedge—Bamboo
 Back board—Wood
 Season of Use: For drying grains.
 Service Life : About 10 years if tooth is changed often
 Method of Application : Hold handle with both hands to spread grains over ground. Rake up leaves and other trashes.
 Work Rate : 1,200—1,800 kg. of grains/day
 Origin : Traditional Chinese.
 Remarks : Teeth break easily not sturdy. . .





Name of Farm : Grain handling
 Implements : rake
 Location : Ling-kou
 Unit : CM

Classification : Processing and Storage Equipment

Name : Grain Sweeper 穀扒

Cost : Approx. NT\$3

Weight : 1.2—1.8 kg.

Usage : To spread out, gather and turn over grains for drying.

Operating Power : 1 man

Material Used: Handle—Bamboo
Sweeper—Wood

Season of Use: While drying grains.

Service Life : 5—8 year

Method of Application : Hold handle with both hands; move or turn grain.

Work Rate :

Origin : Traditional Chinese.

Remarks : 1. Design is simple.
2. Push back and forth to turn grain.



Classification : Processing and Storage Equipment

Name : Grain scraper 大拖

Cost : Approx. NT\$20

Weight : 4—5.5 kg.

Usage : To spread and gather up grains.

Operating
Power : 2—3 persons

Material Used: Board and handle—Wood
Rope—Jute

Season of Use: While drying grains.

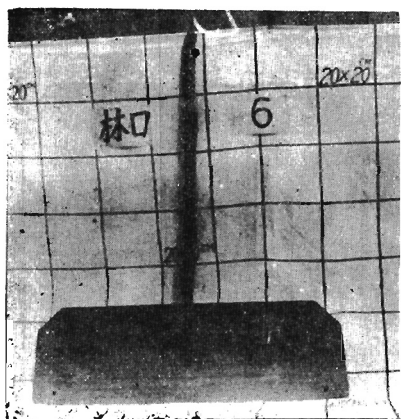
Service Life : About 15 years

Method of
Application : One man in the back holds handle; one or two persons pull with
ropes from in front. This scraper will be able to move grains in
quantity.

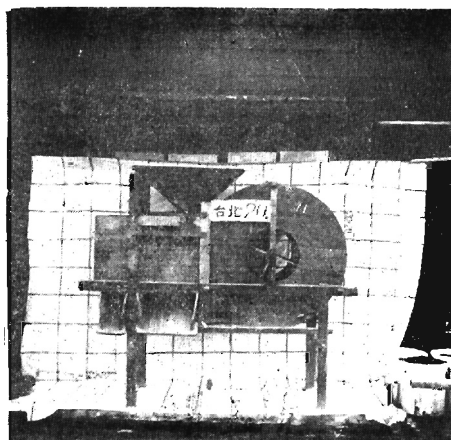
Work Rate :

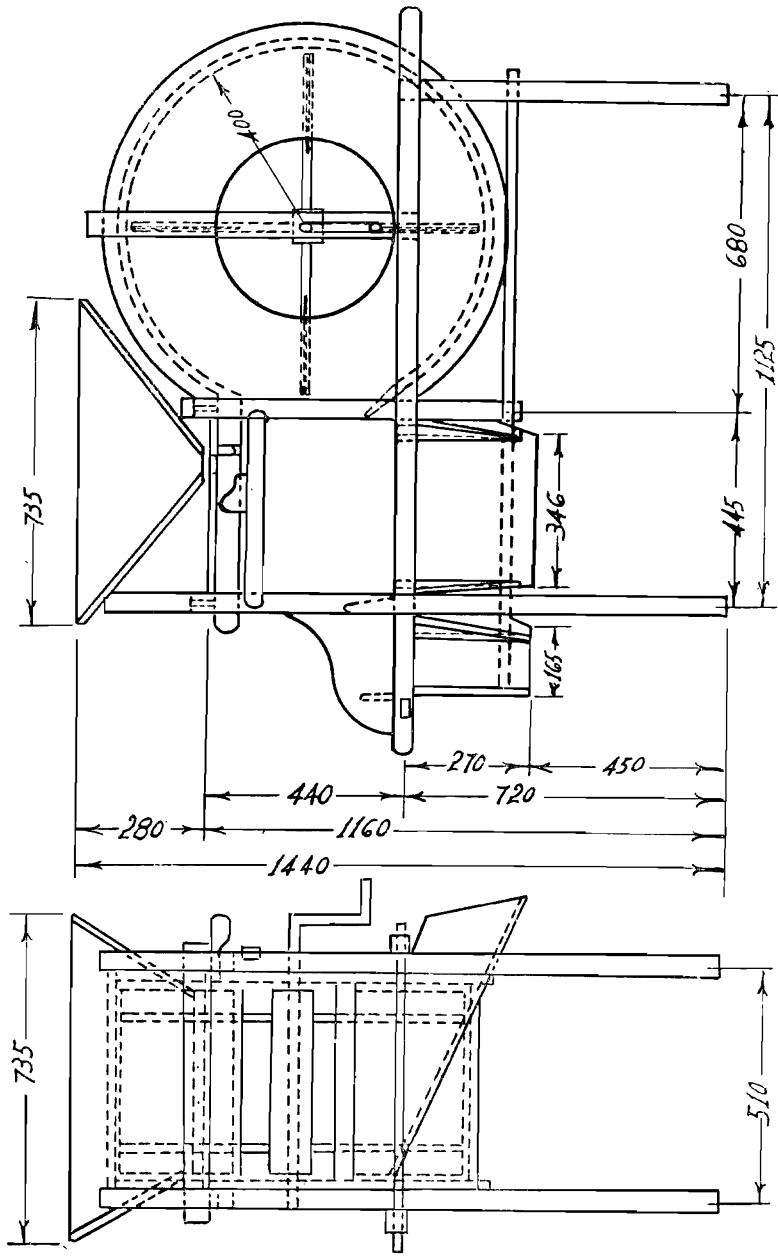
Origin : Traditional Chinese.

Remarks : 1. Design is simple.
2. Will not crush grain.



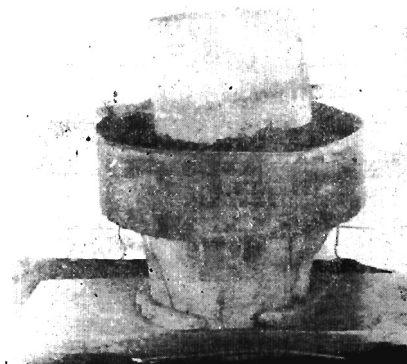
- Classification : Processing and Storage Equipment
- Name : Winnower (Fanmill) 風鼓
- Cost : NT\$250—450
- Weight : Approx. 43 kg.
- Usage : To clear away dust and grain husks.
- Operating Power : 2 men
- Material Used: Hand crank—Iron
Bearing—Steel
Other parts—Wood
- Season of Use: After drying; before storage.
- Service Life : 40—50 years
- Method of Application : One man feeds the winnower by pouring grain into funnel. Another man turns crank. Grain falls out of chute owing its own gravity, while husks and other lighter objects are being carried away according their weights and the wind velocity.
- Work Rate : Approx. 180 hl./day
- Origin : Traditional Chinese.
- Remarks : 1. Design is not scientific; wind often whirls.
2. Size is large and clumsy.
3. Recently the use of ball-bearing has been incorporated into this hand operated winnower to reduce friction.

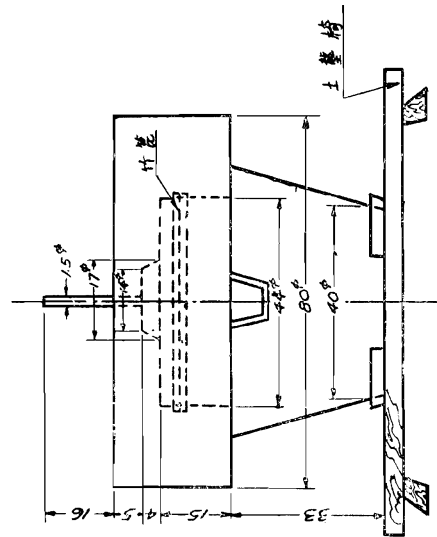
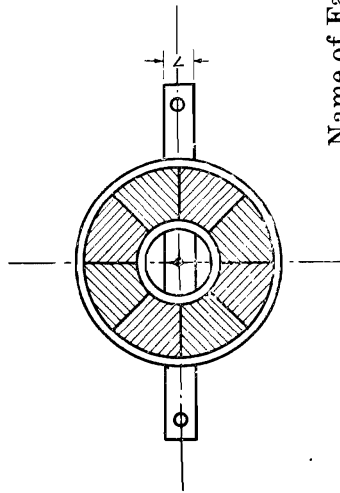
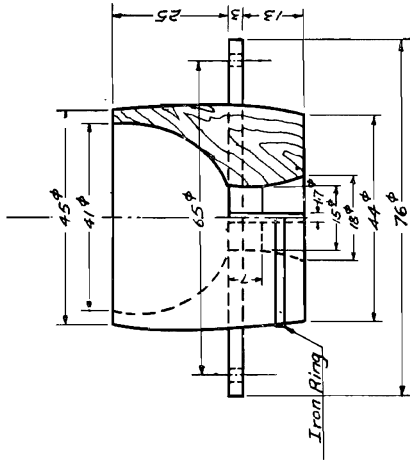
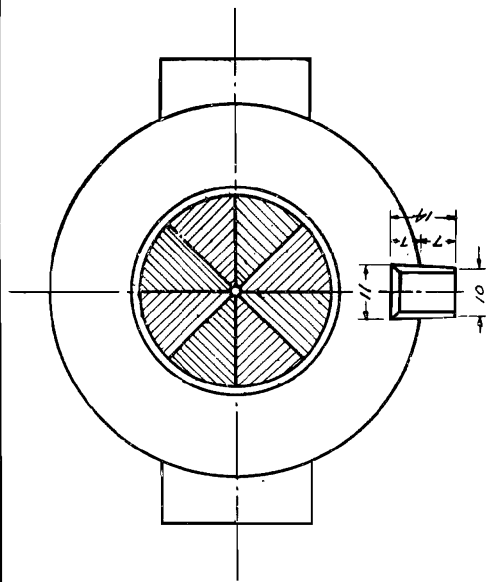




Name of Farm
 Implements: Winnower
 Location : Su-ao
 Unit : CM

- Classification : Processing and Storage Equipment
- Name : Pice huller 土礱
- Cost : NT\$60—160
- Weight : Approx. 100 kg.
- Usage : To remove husks from grains.
- Operating Power : 1—3 men
- Material Used: Body—Red earth mixed with certain amount of salt.
All connecting and fastening parts and pivot bearing—Iron
Husking teeth—bamboo
- Season of Use: Year round
- Service Life : About 30 years
- Method of Application : Place grain into funnel at the top, 1 or 2 men are required to operate by turning the handle. The action of the movable upper plate will husk paddy to brown rice.
- Work Rate : Produce brown rice 20—30 hl./day
- Origin : Traditional Chinese.
- Remarks : 1. This is an old-fashion farm equipment not efficient.
2. Used by aborigines and backward farmers.



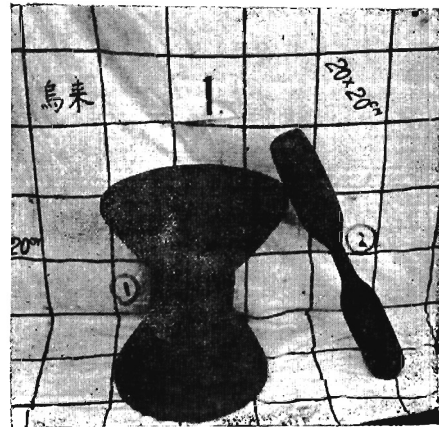
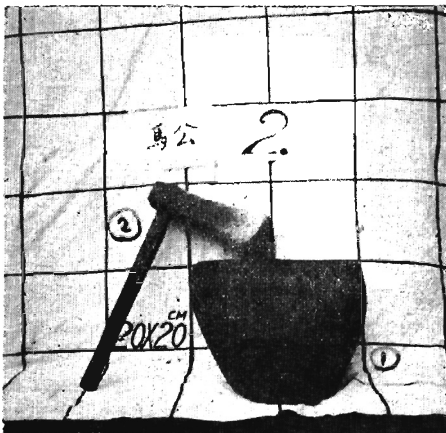


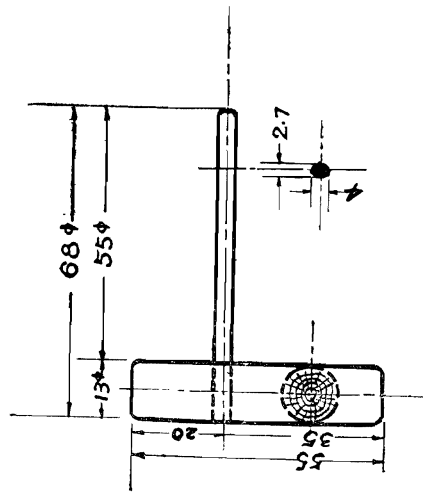
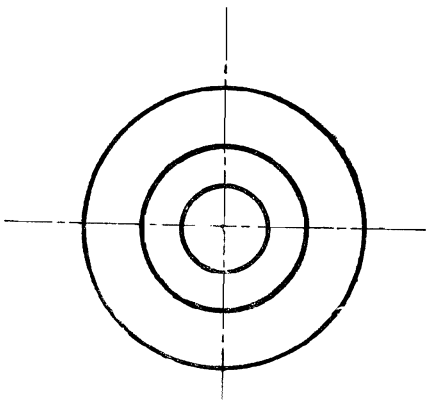
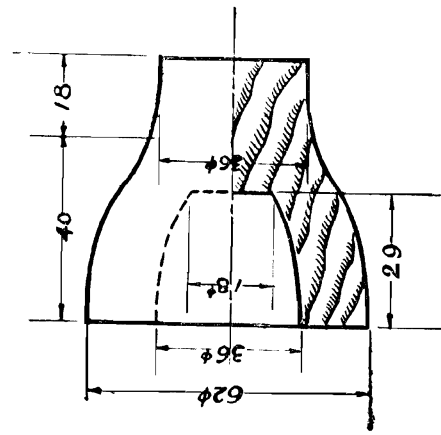
Name of Farm :
 Implements: Rice huller
 Location : Tai-tung
 Unit : CM

- Classification : Processing and Storage Equipment
- Name : Rice cleaning sieve 米漏
- Cost : Approx. NT\$120
- Weight :
- Usage : For cleaning rice.
- Operating Power : 1 man
- Material Used: Screen—Steel or copper wire
Other parts—Wood
- Season of Use: While hulling grains.
- Service Life : About 20 years, if screen is changed often.
- Method of Application : Polished rice is fed into the funnel at the top and allowed to fall on the screen which separates the broken grain from the full kernel. Unpolish or unhulled rice is hand picked from screen among polished whole kernels.
- Work Rate : Brown rice 50—60 hl./day
- Origin : Traditional Chinese, but underway of change and improvement.
- Remarks : 1. Efficiency is not too great.
2. Cleaning has to be repeated several times before a thorough job can be done.



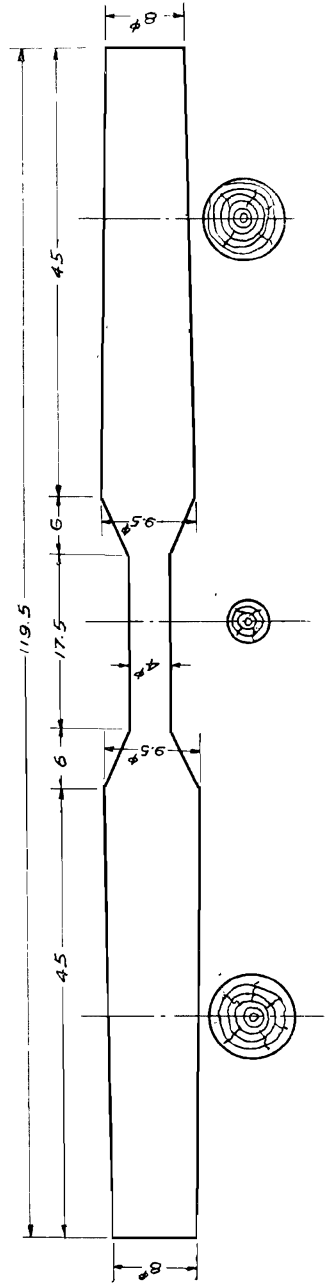
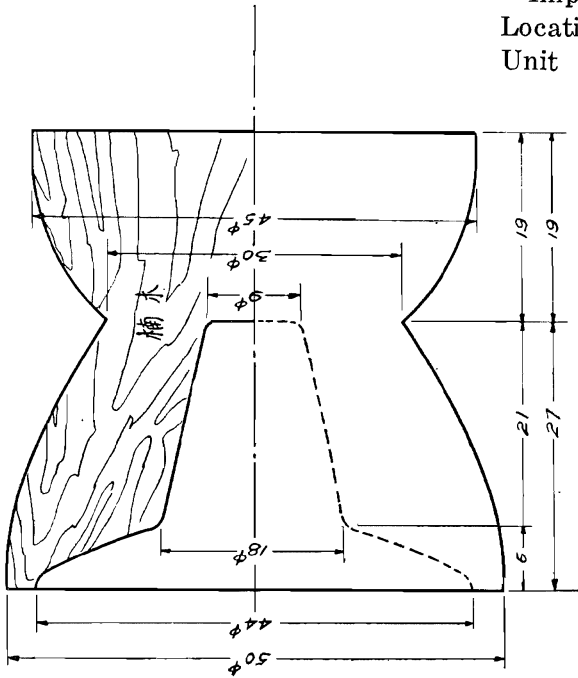
Classification :	Processing and Storage Equipment
Name :	Hand pestle and mortar 杵及精臼
Cost :	Mortar approx. NT\$100 Pestle approx. NT\$10
Weight :	Mortar: Stone 100 kg. Wood 45 kg. Pestle: Stone 5 kg. Wood 3 kg.
Usage :	1. To hull grains. 2. To knead rice-flour dough in cake making.
Operating Power :	1—3 men
Material Used:	Mortar—Stone or wood Pestle—Stone or wood Pestle handle—Wood
Season of Use:	Year round
Service Life :	Stone—50 years Wood—30 years
Method of Application :	Place paddy grain or brown rice into mortar container; pound with pestle. 1—6 persons, hold one pestle each to pound one by one till job is done. (In the aborigines area usually 1—6, other area 1—3)
Work Rate :	Approx. 25 kg./day
Origin :	Traditional Chinese.
Remarks :	1. Is an old-fashion equipment; efficiency is low. 2. Suitable for hulling small portions of grain.



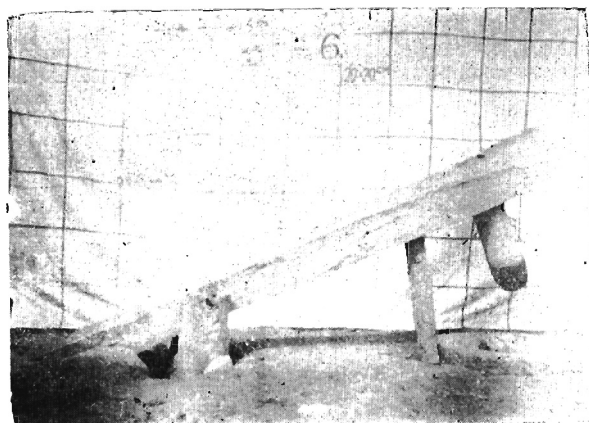


Name of Farm : Pestle and mortar
 Implements : mortar
 Location : Tai-tung
 Unit : CM

Name of Farm Mortar and
 Implements: pestle
 Location : Hsiu-lin
 Unit : CM



Classification : Processing and Storage Equipment
 Name : Treadle mortar 脚踏精白
 Cost : Approx. NT\$150
 Weight :
 Usage : Hulling and polishing
 Operating Power : 1—2 men
 Material Used: Mortar, pestle and supports—Stone
 Bearing—Soft steel
 Beam—Wood
 Season of Use: Year round
 Service Life : About 10 years
 Method of Application : Operator holds supporting railing to keep balance; step on beam one foot at a time and releases to move beam up and down for polishing rice.
 Work Rate : Approx. 100 kg./day
 Origin : Traditional Chinese.
 Remarks : 1. Utilizing body weight as operating power.
 2. Work is especially heavy.
 3. Old-fashioned farm equipment.
 4. Used sparingly in the eastern parts.



Classification : Processing and Storage Equipment

Name : Flail 連枷

Cost : Approx. NT\$2

Weight : Approx. 1.2 kg.

Usage : To thresh beans and peas from pods.

Operating
Power : 1 man

Material Used: Wood or bamboo

Season of Use: May to June, January to March.

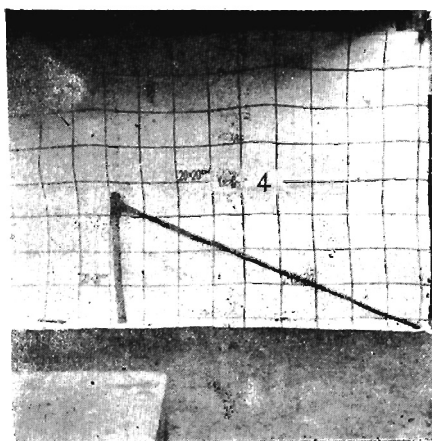
Service Life : 2—3 years

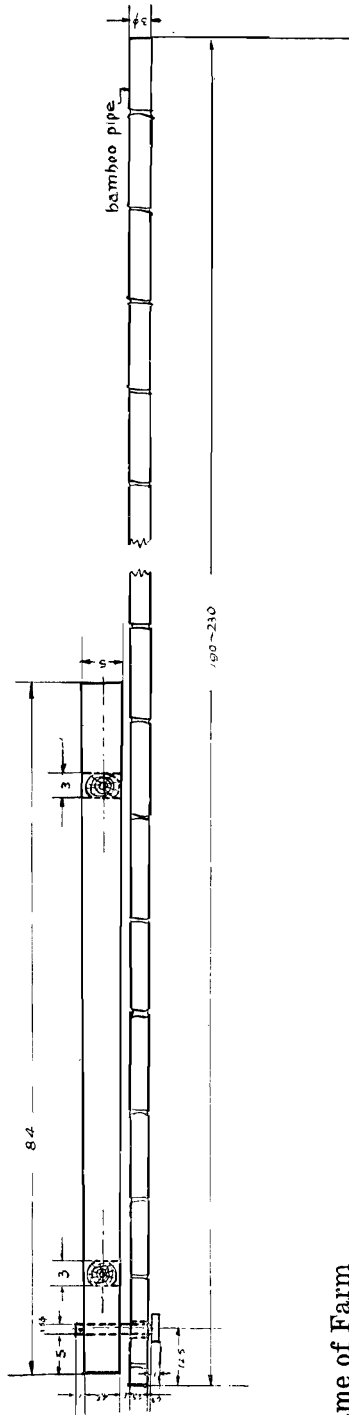
Method of
Application : Sun dry bean plants till noon, till pods are ready to burst. Hold flail with both hands; beat with the swiple.

Work Rate : Approx. 20 l/hour

Origin : Traditional Chinese.

Remarks : 1. Simple and convenient.
2. Cheap.





Name of Farm
Implements: Flail
Location : Heng-chun
Unit : CM

Classification : Processing and Storage Equipment

Name : Jute stripper 黃麻刀

Cost : Approx. NT\$20

Weight : Approx. 2.7 kg.

Usage : Decorticates jute.

Operating
Power : 2 men

Material Used: Knife—Soft steel
Frame—Wood or bamboo

Season of Use: July and August

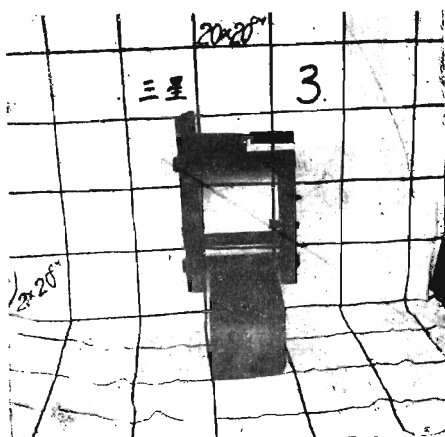
Service Life : About 20 years

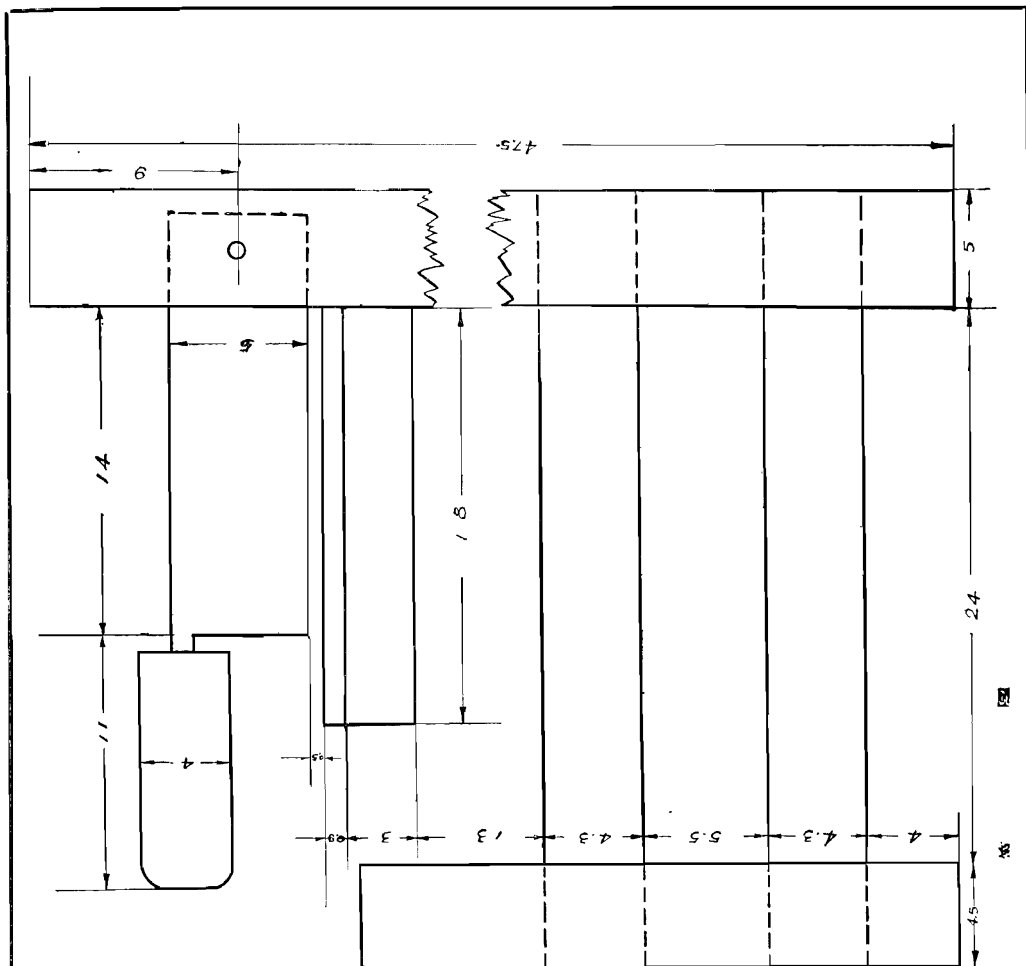
Method of
Application : Hand strip about 20 cm. of bark; then place knife of the stripper
between bark and fibers; Another man pull fibers to separate
from bark. Usually the stripper is placed on a long stool.

Work Rate : Approx. 120 kg. fibers (wet)/day

Origin : Traditional Chinese.

Remarks :



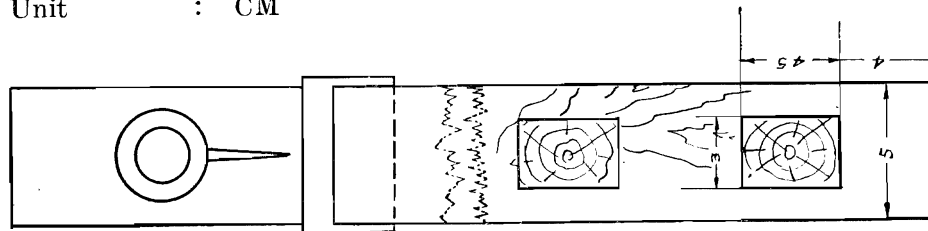


Name of Farm

Implements: Jute stripper

Location : Chiao-chi

Unit : CM



Classification : Processing and Storage Equipment

Name : Rope twister 絞車

Cost : Approx. NT\$30

Weight :

Usage : To make ropes

Operating Power : 3 men

Material Used: 4 cranks—Iron
Frame—Wood

Season of Use: Uncertain

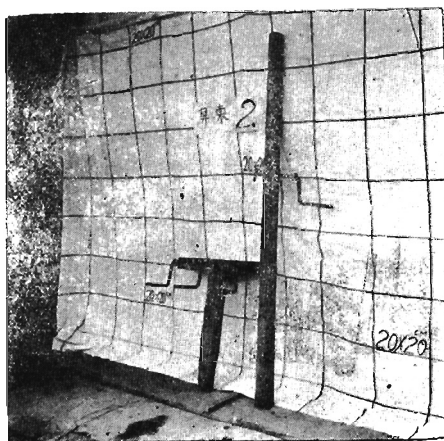
Service Life : About 30 years

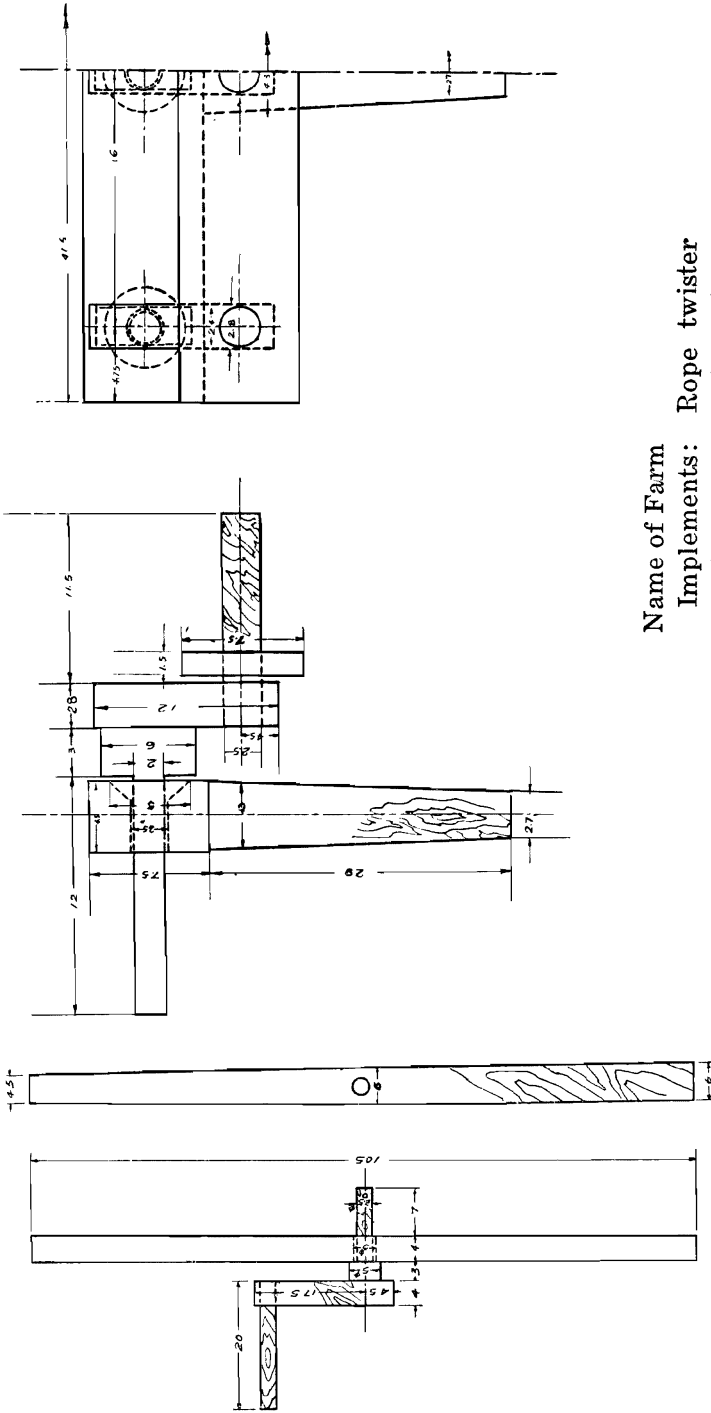
Method of Application : Place frame securely on one end of a long stool. Attach one end of fiber to crank, turn clockwise; another man add on fiber to be twisted. Make 3 strands at the same time; then interwist the 3 to one on the back crank.

Work Rate : About 30 meter/day

Origin : Traditional Chinese.

Remarks : 1. Is old-fashioned; efficiency low.
2. Design simple.
3. Cheap.





Name of Farm :
 Implements: Rope twister
 Location : Chiao-chi
 Unit : CM

Classification : Processing and Storage Equipment

Name : Ramie decortivating knife 苧麻刀

Cost : Approx. NT\$5

Weight : Approx. 0.15 kg.

Usage : Decorticates the ramie.

Operating
Power : 1 man

Material Used: Blade—Soft steel
Handle—Wood

Season of Use: May, July, August, October.

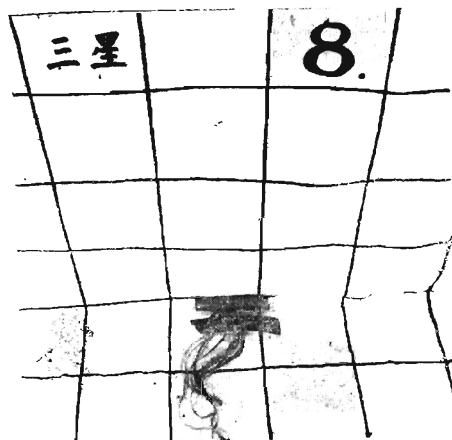
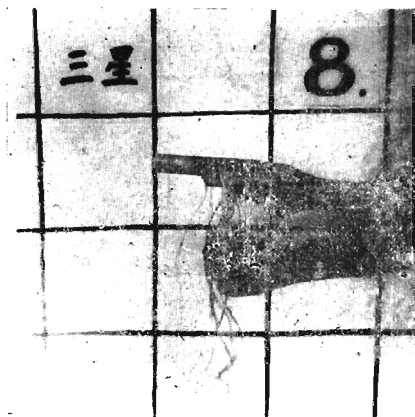
Service Life : 2—3 years

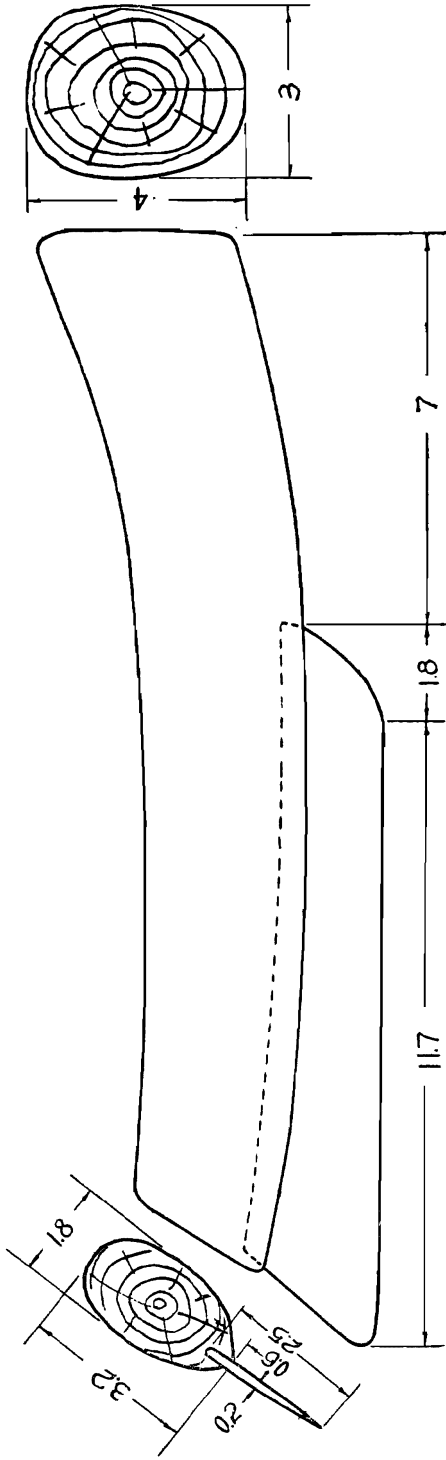
Method of
Application : Place a bamboo tube over thumb; hold knife in left hand. Press ramie stem in between knife and bamboo tube pull hard for decortication.

Work Rate : Dry fiber 7—8 kg./day

Origin : Traditional Chinese.

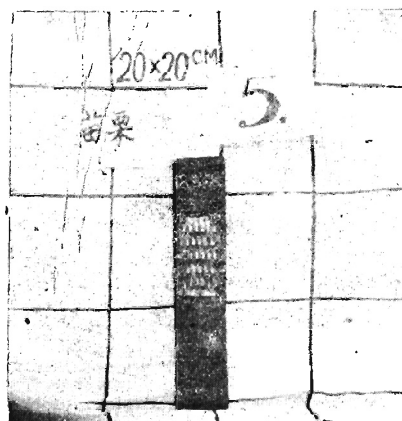
Remarks : Simple.





Name of Farm Ramie decorti-
Implements: cating knife
Location : San-hsing
Unit : CM

- Classification : Processing and Storage Equipment
- Name : Sweet-potato slicer 番薯簽擦
- Cost : Approx. NT\$5
- Weight : Approx. 0.35 kg.
- Usage : To make sweet-potato slices and turnip slices.
- Operating Power : 1 man
- Material Used: Slicer—Bronze or iron sheet
Board—Wood
- Season of Use: February, March, May, June.
- Service Life : Iron sheet—About 2 years
Bronze—About 5 years
- Method of Application : Slant slicer with raised cutting edge of holes upward; hold sweet-potato and scrap on holes. Slices of sweet-potatoes will be formed on the other side.
- Work Rate : Approx. 60 kg./day
- Origin : Traditional Chinese.
- Remarks : 1. Simple.
2. Efficiency is low.
3. The strips are long and clean.



Classification : Processing and Storage Equipment

Name : Sweet-potato slicing machine 番薯簽機

Cost : Approx. NT\$750

Weight :

Usage : To make sweet-potato slices.

Operating Power : 1—4 men

Material Used: Tooth knife pieces—Steel
Frame—Soft steel and wood
Other parts—Cast iron

Season of Use: February, March, May, June.

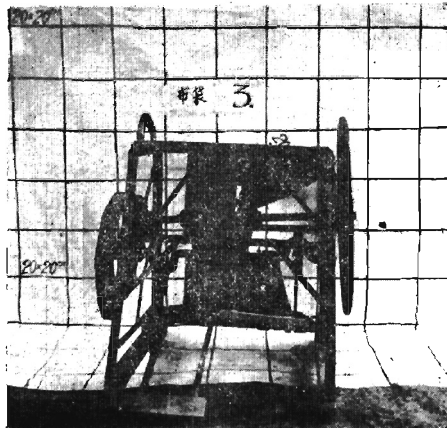
Service Life : About 20 years if teeth changed often

Method of Application : Step on treadle to rotate barrel. Pour potatoes through funnel into barrel. Numerous tooth holes on inside wall of barrel cut potato into slices which drop into receptacle.

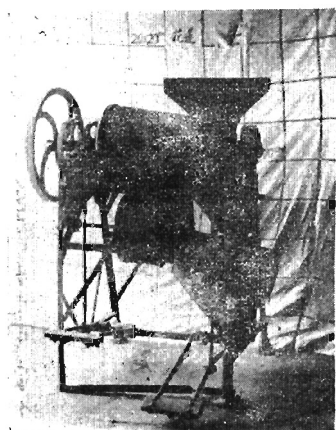
Work Rate : At most 600 kg./hour

Origin : Created in Taiwan

Remarks : 1. Efficiency is high.
2. More shorter-slices are produced.
3. Speed, 80 rpm.
4. The flywheel may be changed to pulley for power driven.



Classification : Processing and Storage Equipment
 Name : Castor seed hulling machine 蓖麻脫壳機
 Cost : Approx. NT\$800
 Weight :
 Usage : For shelling castor seeds and peanuts.
 Operating Power : 2 men
 Material Used: Soft steel and cast iron.
 Season of Use: Uncertain
 Service Life : About 20 years if repaired often
 Method of Application : Step on treadle to turn machine. Pour castor beans into feeding funnel. Castor beans pass thru grinder, fanmill and barrel sieve. The shelled, half-shelled beans and shells come out separately.
 Work Rate : Approx. 40 hl./day
 Origin : Created in Taiwan.
 Remarks : 1. Pour half-shelled castor-beans into feeding funnel again along with unshelled beans to complete shelling.
 2. Can be used for peanut shelling, but not very efficient.



Classification : Processing and Storage Equipment

Name : Tobacco air curing mat 菸簾

Cost : Approx. NT\$1

Weight : Approx. 1 kg.

Usage : For air curing tobacco leaves.

Operating
Power :

Material Used: Bamboo

Season of Use: December to March.

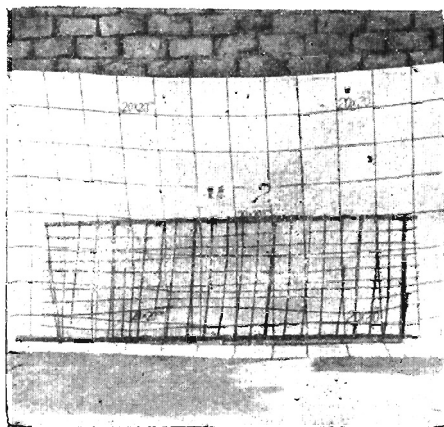
Service Life : About 2 years

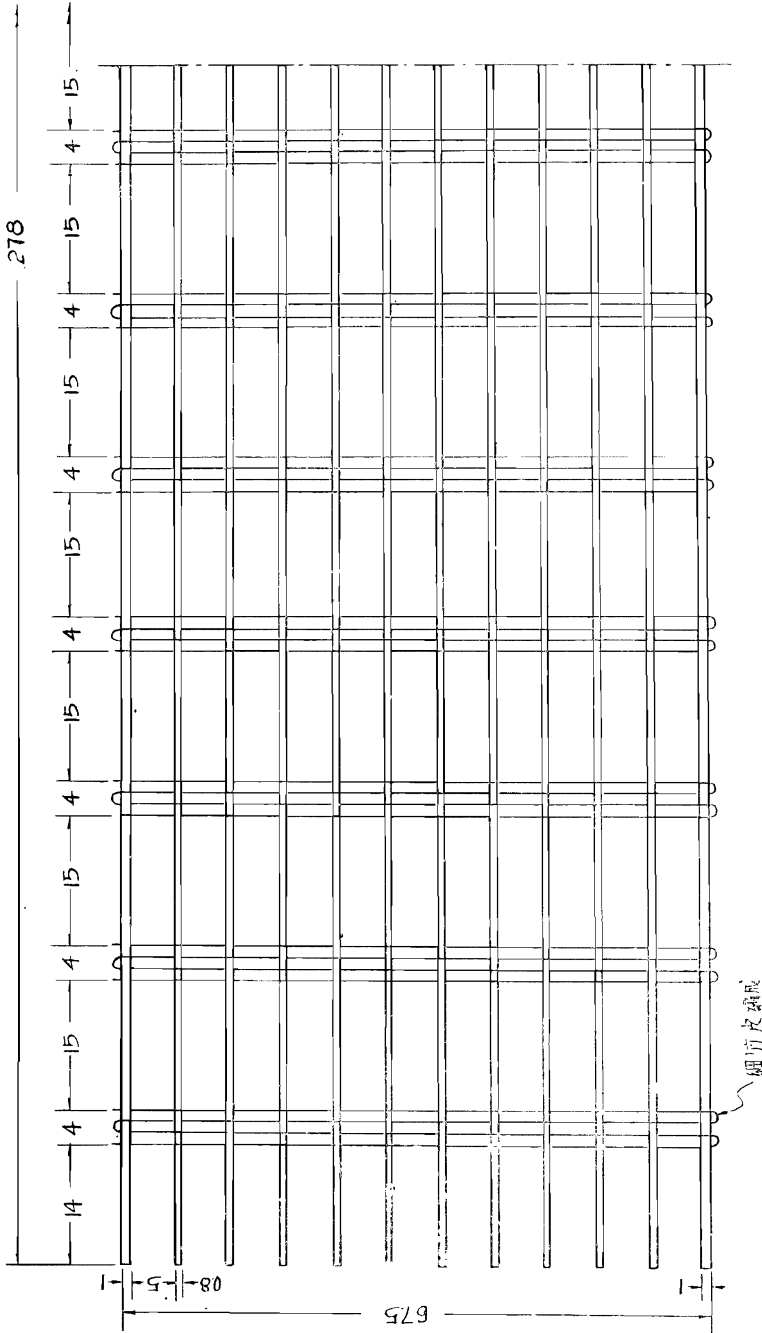
Method of
Application : Place tobacco leaves in between two mats.

Work Rate : Dry leaves approx. 0.3 kg./mat

Origin : Traditional Chinese.

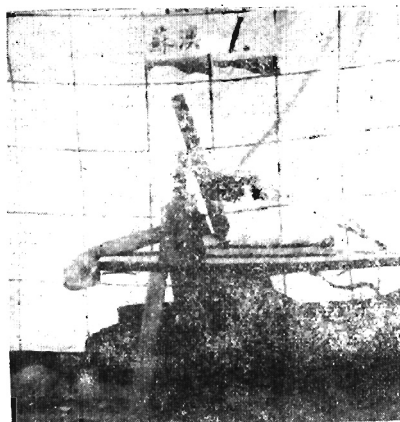
Remarks : 1. Simple; farmer can make it himself.
2. Convenient; leaves clamped in between mats will not be blown away.
3. Flue curing almost completely superseded air curing now.

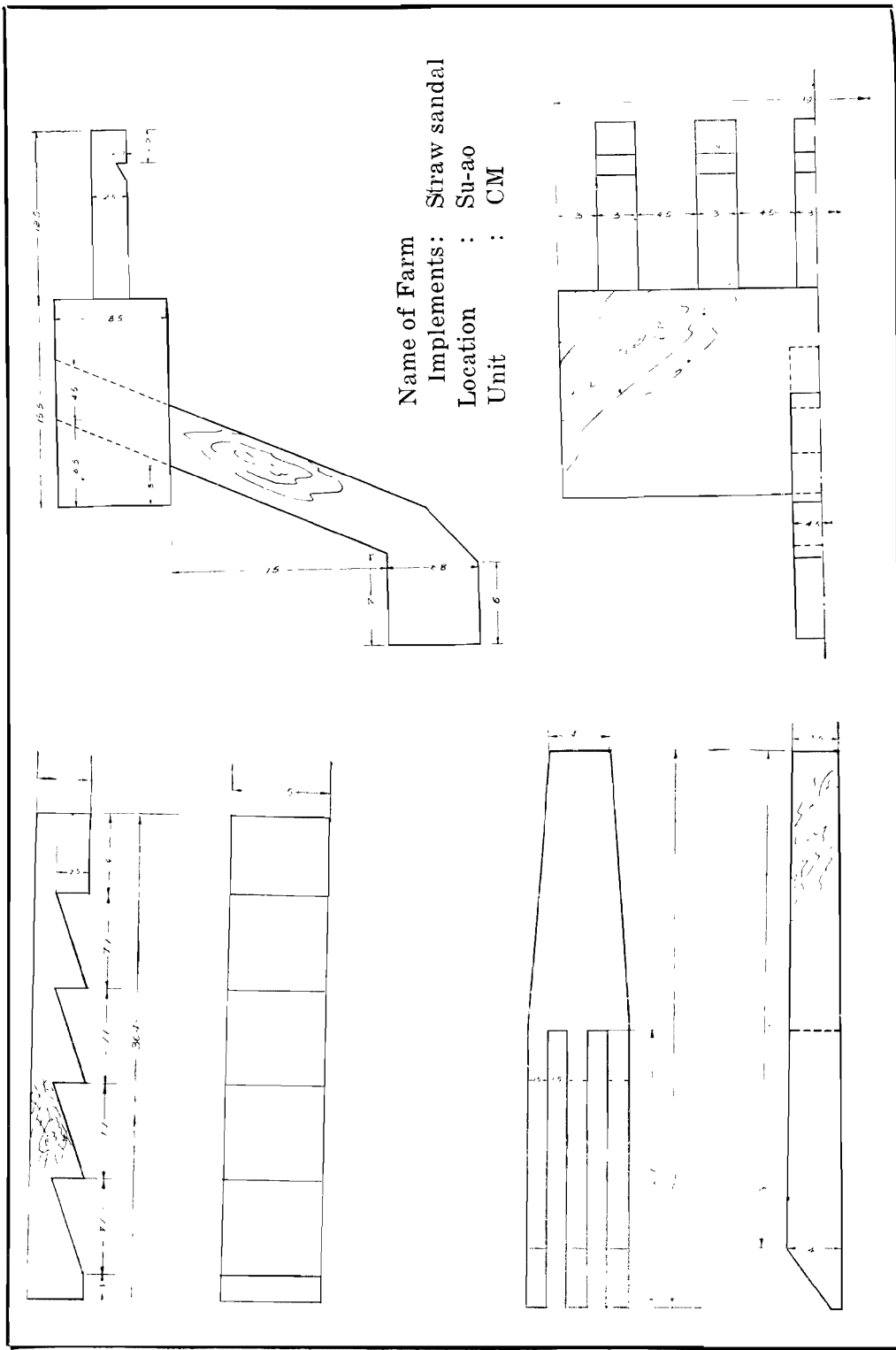




Name of Farm : Tobacco air
 Implements : curing mat
 Location : Lo-tung
 Unit : CM

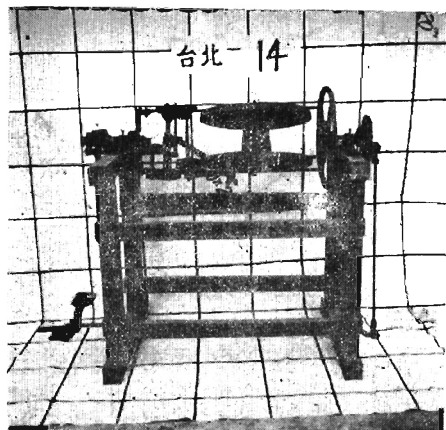
Classification : Processing and Storage Equipment
Name : Straw sandal rack 草鞋爬
Cost : Approx. NT\$10
Weight :
Usage : To make straw sandals for men and buffaloes.
Operating Power : 1 man
Material Used: Wood
Season of Use: Year round
Service Life : 30—50 years
Method of Application : Place rack firmly on stool. Wind a rope around protruding hanger and adjuster; tie the other end around the operator's waist; this acts as a frame for weaving the sandal sole.
Work Rate : Man sandals 12—16 pairs/day
Buffalo sandals 30—40 pairs/day
Origin : Traditional Chinese.
Remarks : 1. Can make 3 kinds of straw sandals.
2. Is old-fashioned; efficiency low.

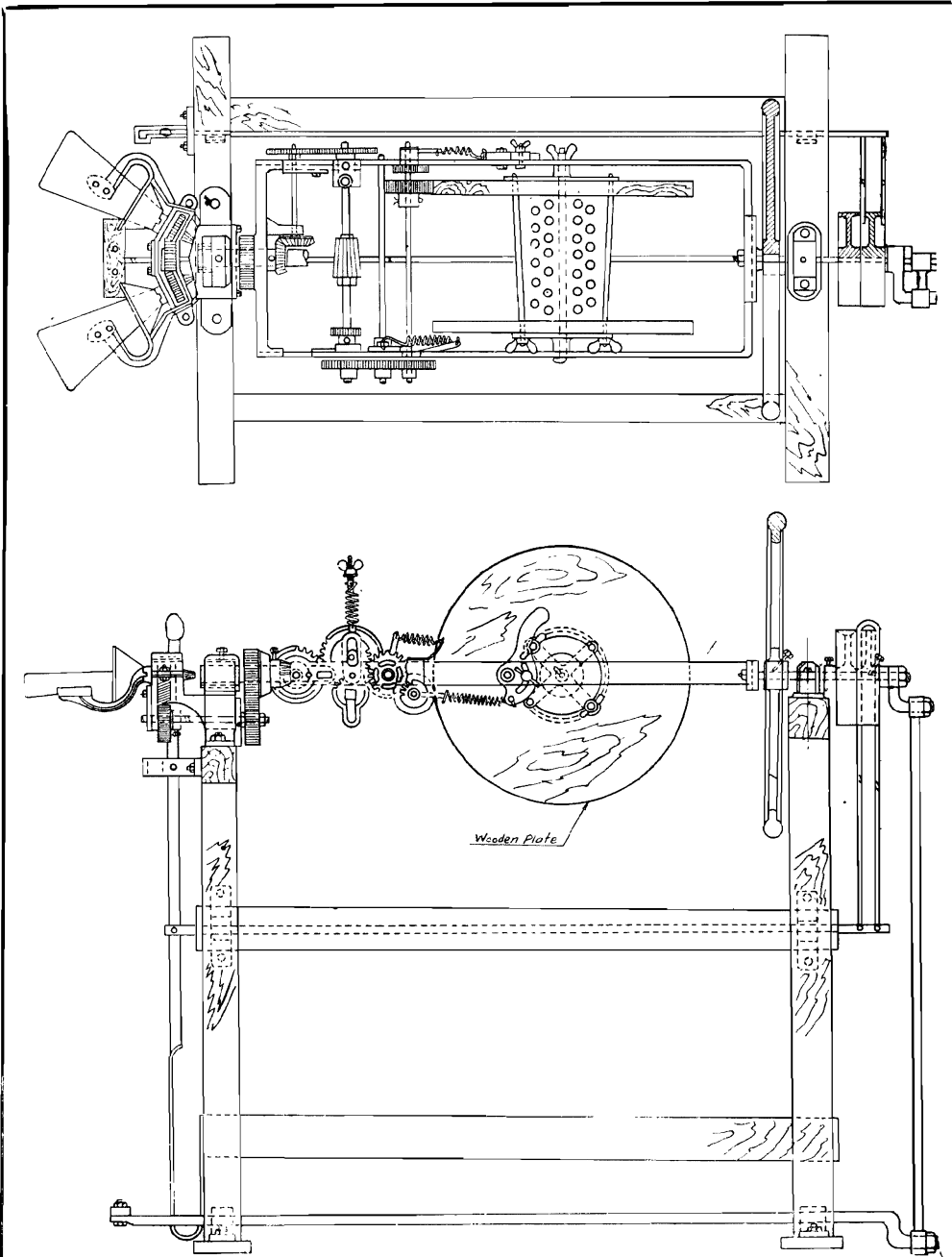




Name of Farm :
 Implements : Straw sandal
 Location : Su-ao
 Unit : CM

Classification	: Processing and Storage Equipment
Name	: Straw rope machine 草繩機
Cost	: NT\$220—320
Weight	: Fine rope machine approx. 33 kg. Coarse rope machine approx. 50 kg.
Usage	: Twist rice straw into ropes.
Operating Power	: 1 man
Material Used:	Stand—Wood Machine—Soft steel, cast iron.
Season of Use:	Year round
Service Life	: About 10 years if repaired often
Method of Application	: 1. Remove leaves from straw. 2. Wet to soften straw. 3. Insert 3—5 stalks into straw feeder. 4. Step on treadle start rotation; this will twist straw into ropes. 5. The finished rope is wound onto spools.
Work Rate	: Fine rope approx. 20 kg./day Coarse rope approx. 60 kg./day
Origin	: Introduced from Japan.
Remarks	: 1. Efficiency is high. 2. Method of use is simple. 3. All gears are made of cast iron; crude but cheap.





Name of Farm

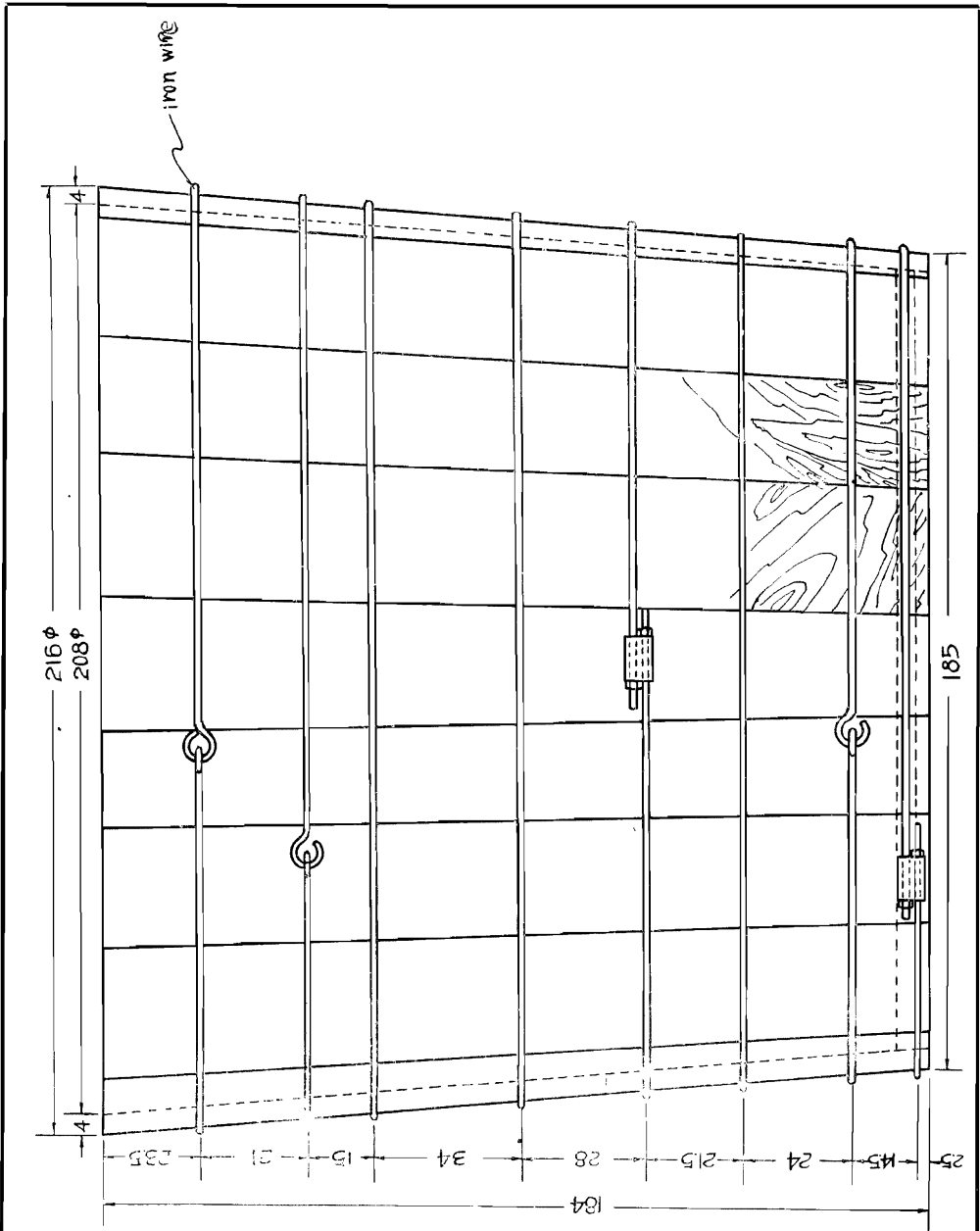
Implements. Straw rope
machine

Location : Tao-yuan

Unit : CM

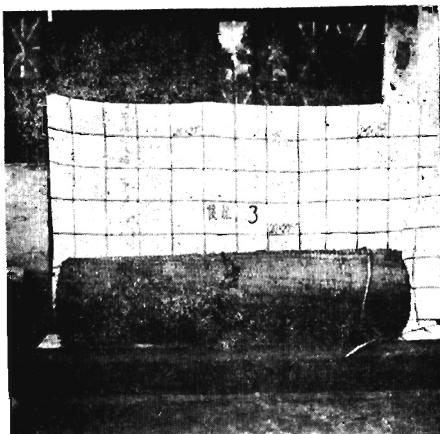
Classification : Processing and Storage Equipment
Name : Bin 大桶
Cost : Approx. NT\$200
Weight :
Usage : To salt vegetables
Operating Power :
Material Used: Hoops—Bamboo or steel wire
Bin—Wood
Season of Use: Year round
Service Life : About 10 years
Method of Application : Place cleaned vegetables into bin; add salt. Press down with heavy weight and cover with thatches. Put bin out in the yard.
Work Rate : Approx. 50 hl./bin
Origin : Traditional Chinese.
Remarks : 1. Can hold large quantities of vegetables.
2. Made of wood which does not rust.
3. Cost is low.



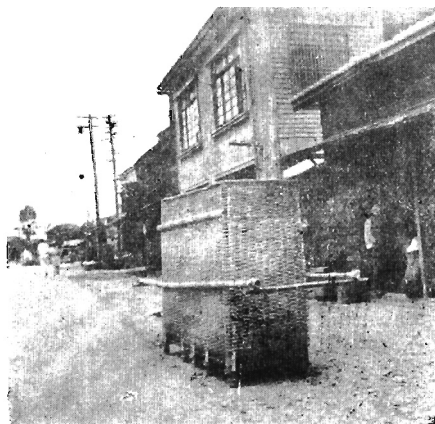


Name of Farm
 Implements: Bin
 Location : Lo-tung
 Unit : CM

- Classification : Processing and Storage Equipment
- Name : Grain storing bamboo mat 笨仔
- Cost : Approx. NT\$100
- Weight :
- Usage : For storing grains.
- Operating Power :
- Material Used: Bamboo strips and ropes.
- Season of Use: After harvested the first crop of rice in June.
After harvested the second crop of rice in October.
- Service Life : About 10 years
- Method of Application : Place board on ground. Roll up mat and tie it with ropes or iron wires; place it vertically on board and store grains inside.
- Work Rate : Upmost 2,500 kg./mat roll.
- Origin : Traditional Chinese.
- Remarks : 1. Can be easily rolled up when not in use.
2. Can be set up anywhere
3. Can adjust to desired sizes.
4. Economical.
5. Grains stored in can be easily damaged by rats and other pests.
6. Popularly used in Hsinchu Hsien.



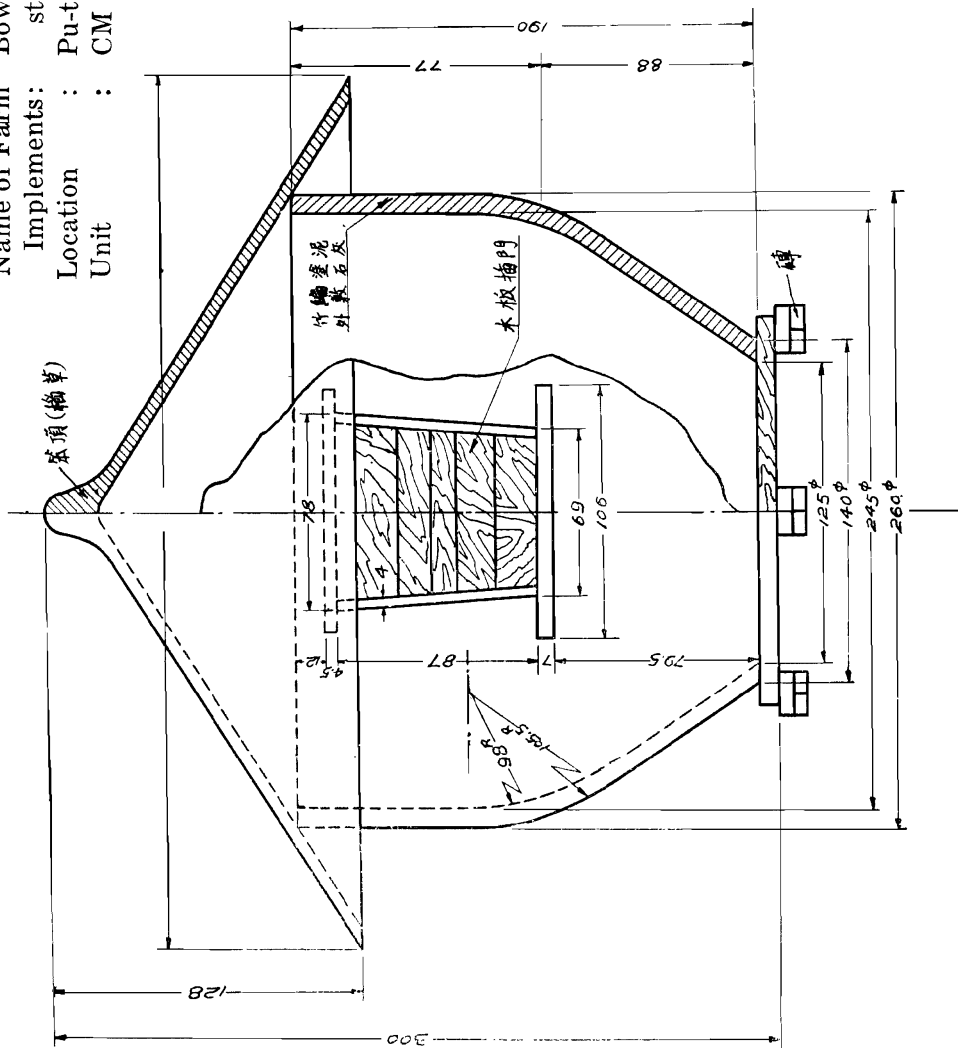
Classification : Processing and Storage Equipment
 Name : Grain storing bamboo bin 筍罎
 Cost : NT\$100—200
 Weight :
 Usage : For storing grains.
 Operating Power :
 Material Used: Bamboo
 Season of Use: Year round
 Service Life : About 15 years
 Method of Application : Place grains in bin.
 Work Rate : 800—1,200 kg./Bin
 Origin : Traditional Chinese.
 Remarks : 1. Raised from ground on legs to prevent moisture affecting grains.
 2. Simple and economical.
 3. No cover, rats and insects easily invade the bin.



- Classification : Processing and Storage Equipment
- Name : Bowl type storage hut 鼓亭架
- Cost : Approx. NT\$1,000
- Weight :
- Usage : For storing grains.
- Operating Power :
- Material Used: House top: Thatch or straw
Bottom and opening: Wood
Wall: Bamboo, mud and lime.
- Season of Use: Year round
- Service Life : About 30 years if repaired often.
- Method of Application : Grains are poured into hut from the opening.
- Work Rate : 30 to 80 hl./hut
- Origin : Traditional Chinese.
- Remarks : 1. Economical, out-of-door grain storage of fairly large size.
2. Shaped like a bowl; walls can stand pressure.
3. Less possibilities for rat invasion.
4. Used by the seaside farmers of central. and southern parts of Taiwan.



Name of Farm Bowl-type
 Implements: storage hut
 Location : Pu-tai
 Unit : CM



Classification : Processing and Storage Equipment

Name : Rice sweeper 爬不仔

Cost : Approx. NT\$3

Weight : Approx. 0.6 kg.

Usage : 1. To shovel grains into grain carrying pan.
2. Used in the storehouse for handling grain.

Operating Power : 1 man

Material Used: Wood

Season of Use: Year round

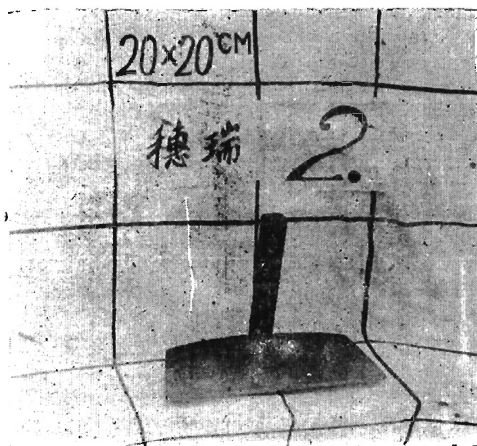
Service Life : About 20 year

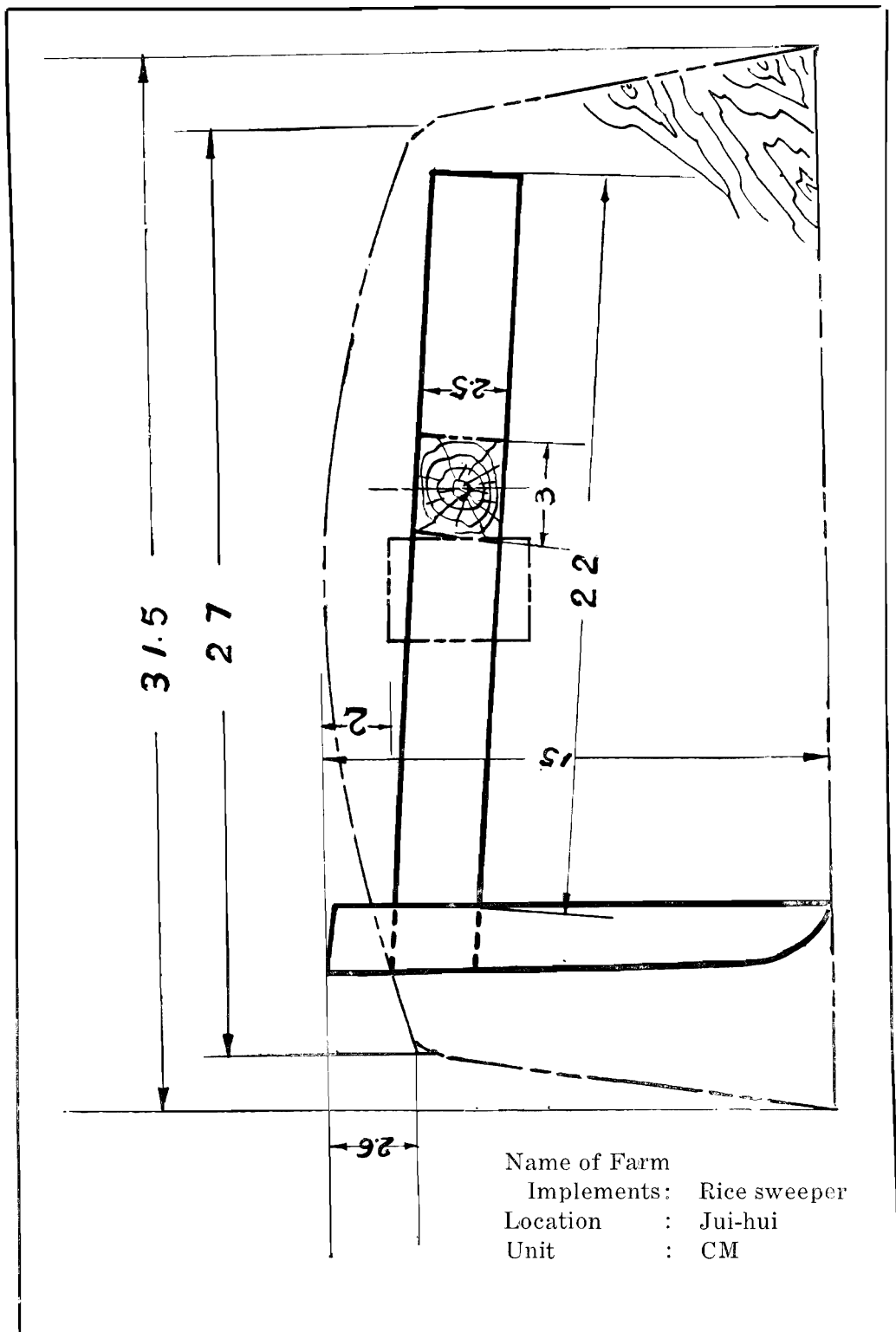
Method of Application : Place grain carrying pan in a lower level; pull grain into it with this sweeper.

Work Rate : Uncertain

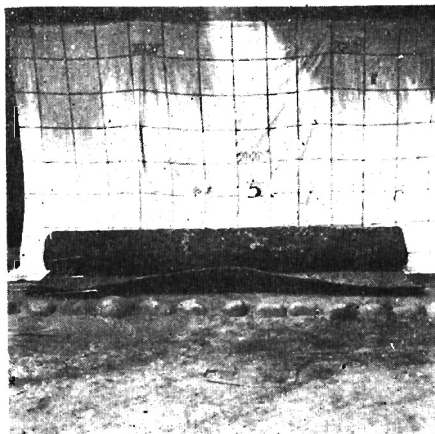
Origin : Traditional Chinese.

Remarks : Handle is short; can be used in a congested store-houses.





- Classification : Processing and Storage Equipme
- Name : Crop drying mat 籐籬
- Cost : Approx. NT\$100
- Weight :
- Usage : Spread on ground used as drying ground.
- Operating Power :
- Material Used: Split rattan or bamboo strips.
- Season of Use: Year round
- Service Life : About 5 years
- Method of Application : Unroll and spread over ground pour grain on it for air drying, or fresh tea leaf on it for withering.
- Work Rate :
- Origin : Traditional Chinese.
- Remarks : 1. Keeps crops clean with the least damage.
 2. Speeds up gathering, especially before a thunder shower.
 3. Tanshui mats are made from bamboo and used for drying tea leaves.
 4. Aborigines mats which are used for drying grain, are made from rattan. They are called "Basonan." o



Classification : Processing and Storage Equipment

Name : Mat tray 簸箕

Cost : NT\$7—40

Weight : 0.37—20 kg.

Usage : 1. For suning seeds.
2. For beating sesame, shell peanuts.
3. For segregating paddy grain from white rice.
4. For fermentation.
5. For rolling vegetable leaves

Operating
Power :

Material Used: Bamboo or rattan

Season of Use: Year round

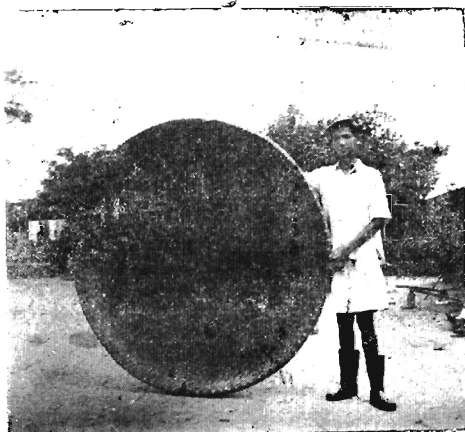
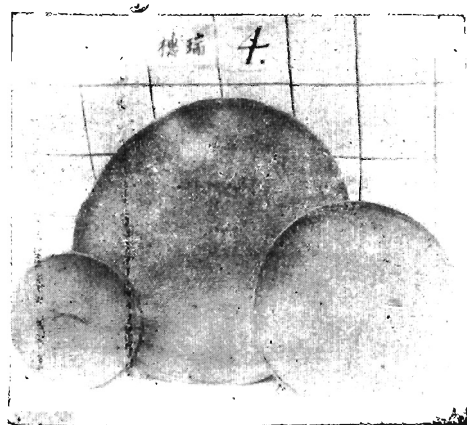
Service Life : 5 to 10 years

Method of
Application : 1. 2. 4. 5. Place objects onto mat-tray.
3. Place polished rice into tray, hold frame and swing tray
around. Paddy, rices, husks, can be separated.

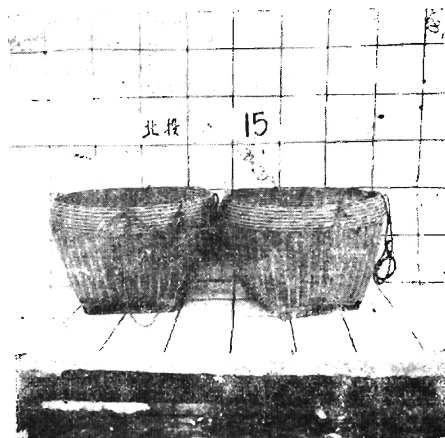
Work Rate :

Origin : Traditional Chinese.

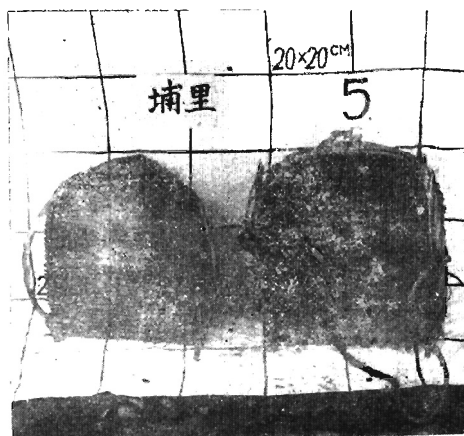
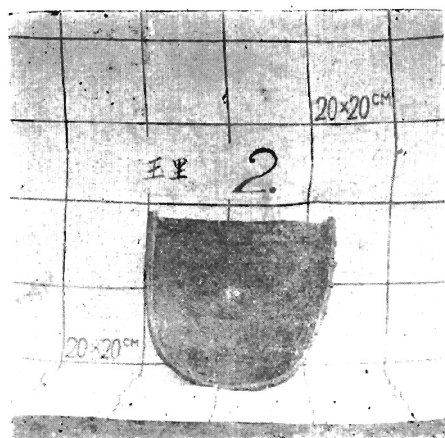
Remarks : Durable and Sturdy.



- Classification : Transportation Equipment
- Name : Grain basket 米籃
- Cost : Approx. NT\$35
- Weight : Approx. 2.9 kg.
- Usage : For transporting grains and other farm produces.
- Operating Power : 1 man
- Material Used: Basket—Bamboo or rattan
Ropes—Jute
- Season of Use: Year round
- Service Life : About 5 years
- Method of Application : Place crops in two baskets. Rope onto carrying pole and lift with shoulder.
- Work Rate : Grain about 70 kg./load
- Origin : Traditional Chinese.
- Remarks : 1. Suitable for transporting 101 articles.
2. Simple and convenient.
3. Can endure moisture.
4. Light in weight.



- Classification : Transportation Equipment
- Name : Carrying pan 箕
- Cost : Approx. NT\$4
- Weight : Approx. 0.7 kg.
- Usage : For transporting grains and other articles.
- Operating Power : 1 man
- Material Used: Bamboo and rattan
- Season of Use: Year round
- Service Life : About 5 years
- Method of Application : Place mouth of pan against grain pile; sweep grain in by hand or sweep. Lift load and pour into another receptacle.
- Work Rate : 15-25 kg./pan
- Origin : Traditional Chinese.
- Remarks : 1. Convenient for loading and unloading grains.
2. Can endure moisture.
3. There are also more sturdy types with rope attachment for carrying manures, earths, grasses, pebble and whatnot. These come in pairs to be carried on two end of a shoulder-carrying pole.



Classification : Transportation Equipment

Name : Vegetable basket 菜籠

Cost : NT\$2—7

Weight : Approx. 2 kg.

Usage : For transporting vegetables

Operating Power : 1 man

Material Used: Bamboo

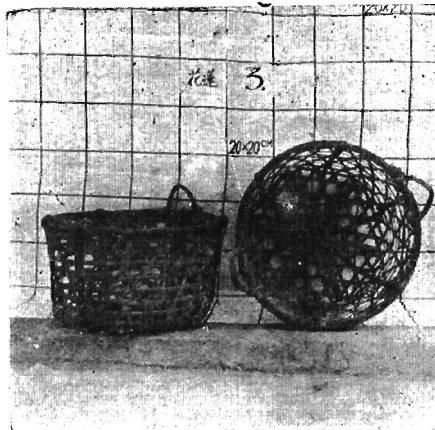
Season of Use: Year round

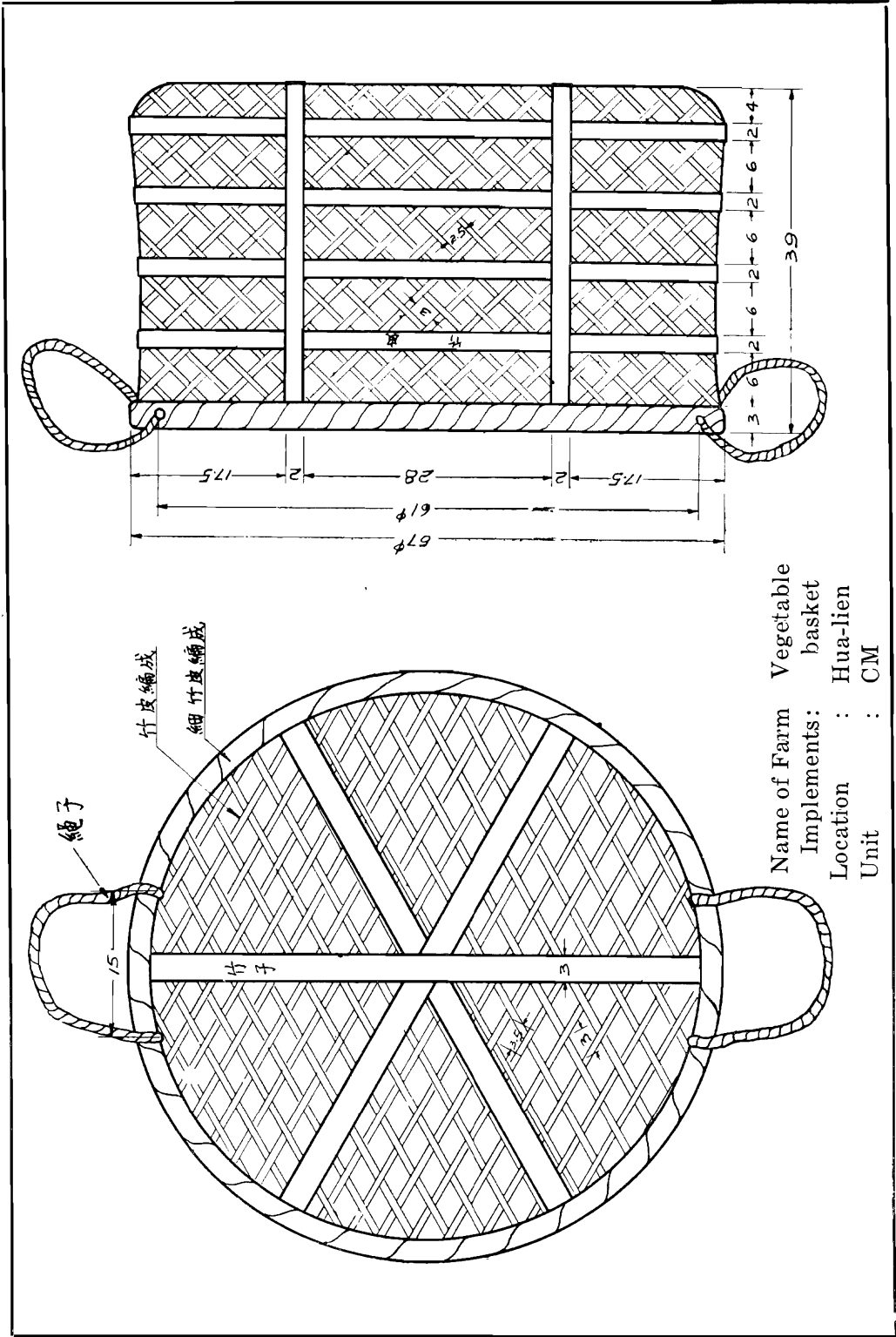
Service Life : 0.5—3 years

Method of Application : Place vegetables in baskets which are usually carried on a shoulder-pole.

Origin : Large approx. 10 kg./Basket
Small approx. 7 kg./Basket

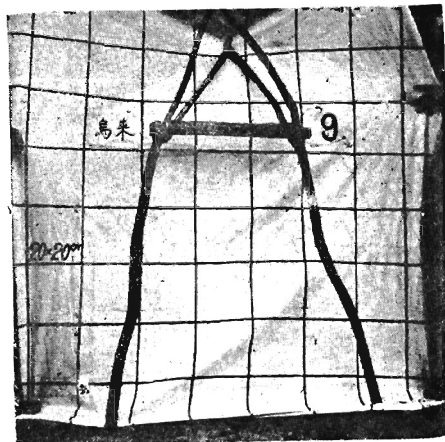
Remarks : 1. Light and convenient.
2. Can endure exposure to heat and moisture.

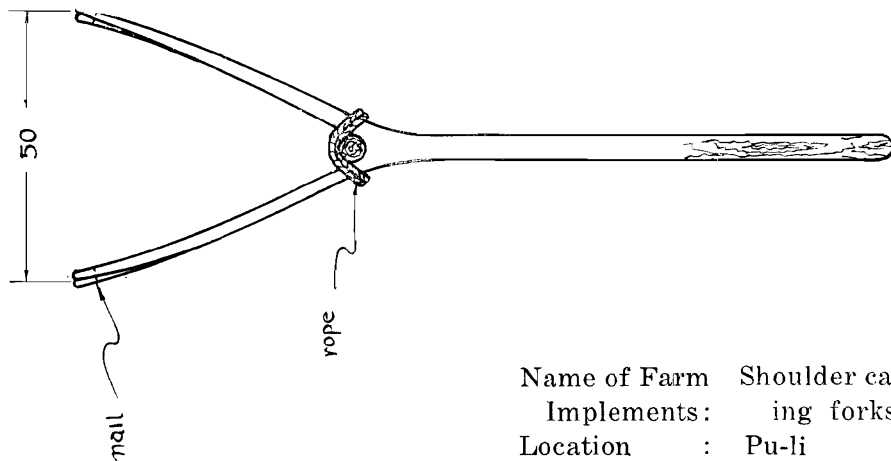




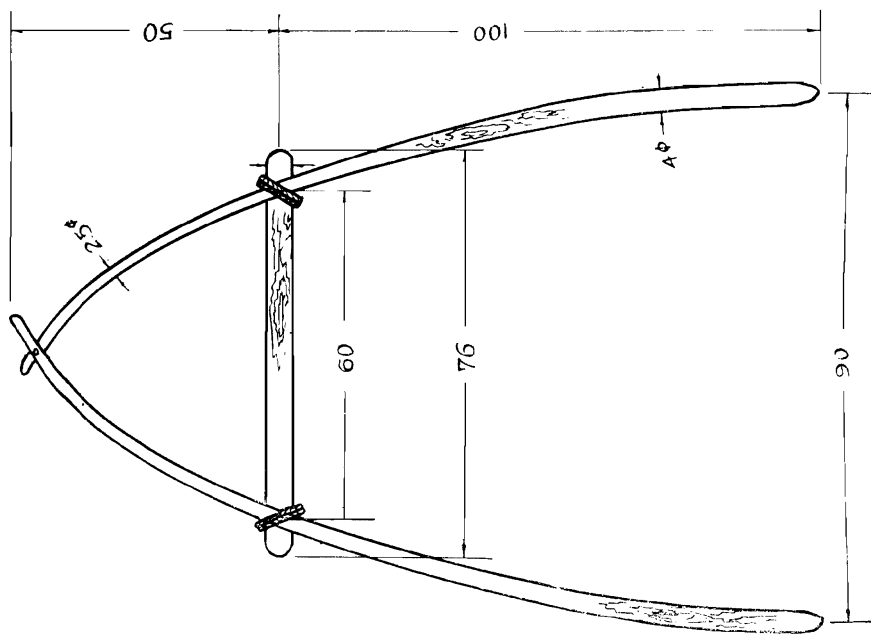
Name of Farm : Vegetable
 Implements : basket
 Location : Hua-lien
 Unit : CM

- Classification : Transportation Equipment
- Name : Shoulder carrying forks 柴馬仔
- Cost : Approx. NT\$10.00
- Weight : Approx. 6 kg
- Usage : For transporting fire wood or sugarcane.
- Operating Power : 1 man
- Material Used: Tree branches or bamboo
- Season of Use: Year round
- Service Life : About 5 years
- Method of Application : Place goods in the fork rest cross member on shoulder. Hold legs with two hands to balance.
- Work Rate : 60—90 kg./load
- Origin : Traditional Chinese.
- Remarks : 1. Suitable for transportation on rugged mountain paths.
2. No need to unhitch for taking a rest.
3. Easy to unload goods.

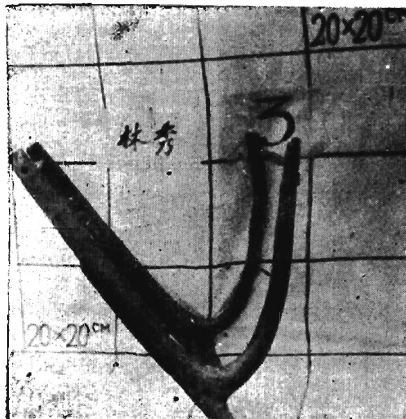


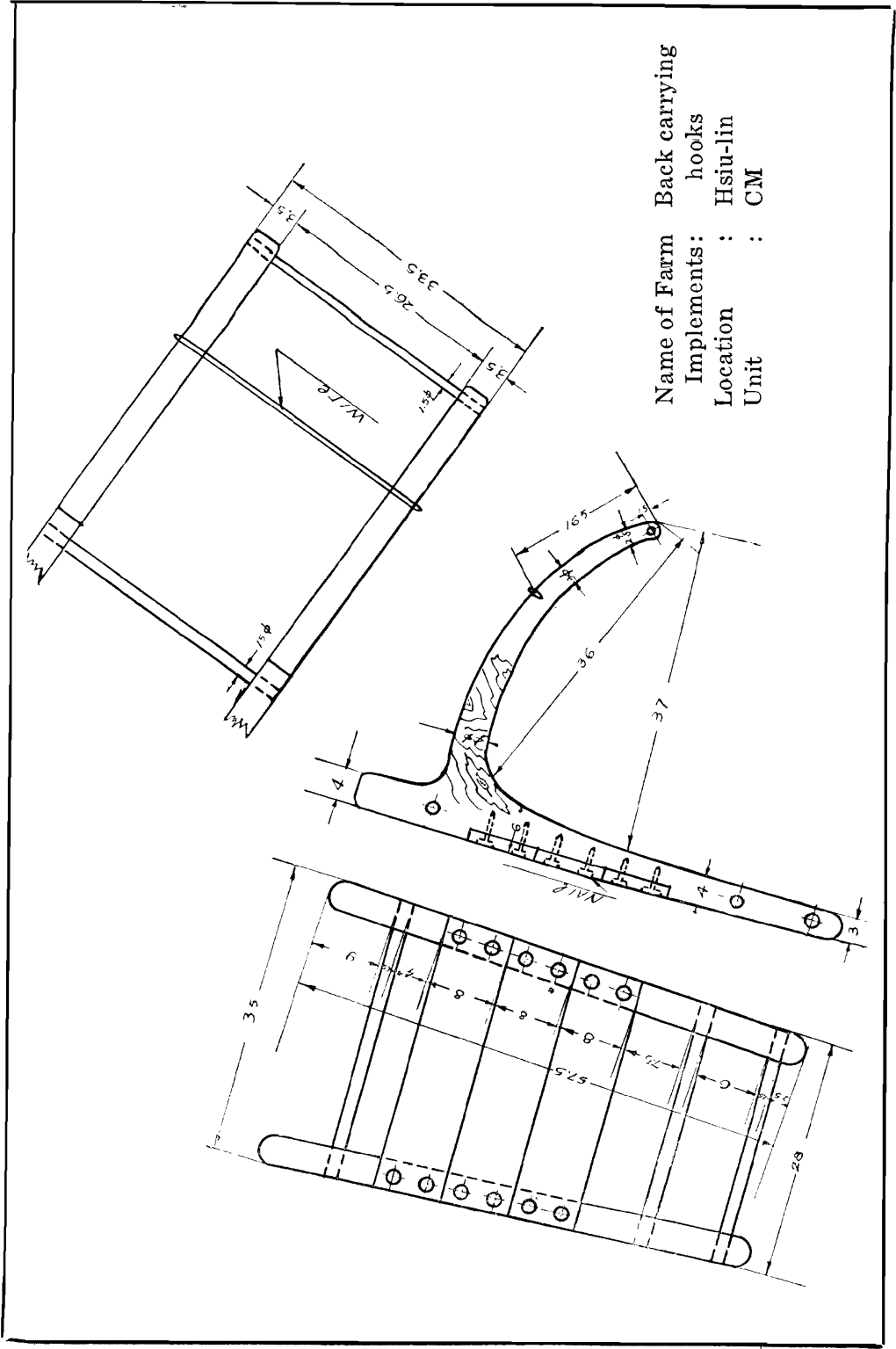


Name of Farm Shoulder carry-
 Implements: ing forks
 Location : Pu-li
 Unit : CM



Classification : Transportation Equipment
 Name : Back carrying hooks 措架 (Pa-ga)
 Cost : Approx. NT\$8
 Weight : Approx. 1.6 kg.
 Usage : For transporting logs
 Operating Power : 1 man
 Material Used: Hooks—Tree branches (with 2 iron wires and rattan cords)
 Season of Use: Year round.
 Service Life : About 10 years
 Method of Application : Place logs in hook and carry it on back.
 Work Rate : Approx. 60 kg./load
 Origin : Traditional Aborigines.
 Remarks : 1. Can transport logs on rugged mountain paths.
 2. Used by eastern aborigines.





Name of Farm : Back carrying
Implements : hooks
Location : Hsiu-lin
Unit : CM

Classification : Transportation Equipment
 Name : Back carrying board (Wua-gin)
 Cost : Approx. NT\$5.00
 Weight : Approx. 2 kg.
 Usage : For carrying goods on back.
 Operating Power : 1 man
 Material Used: Wood and ropes
 Season of Use: Year round
 Service Life : 1—2 years
 Method of Application : Tie goods on this board. Wind ropes around protruding objects on top. Thrust arms through shoulder straps for carrying.
 Work Rate :
 Origin : Traditional Aborigines
 Remarks : 1. Protects body from rough surface of the load.
 2. Can be easily made at farm home.
 3. Used by aborigines of Wu-lai.



Classification : Transportation Equipment

Name : Back carrying sack (Toh-kan)

Cost : Approx. NT\$40.00

Weight :

Usage : For transporting goods

Operating Power : 1 man

Material Used: Ramie ropes

Season of Use: Year round

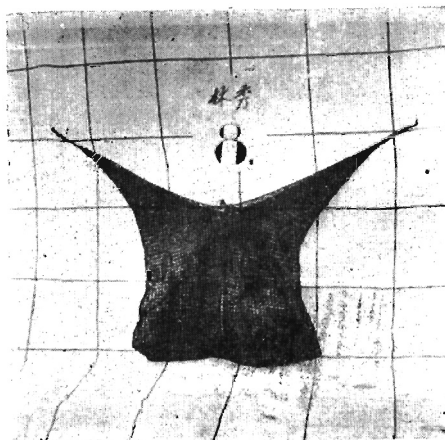
Service Life : About 10 years

Method of Application : Place sweet-potato or other produces in sack; hang straps on shoulders to carry.

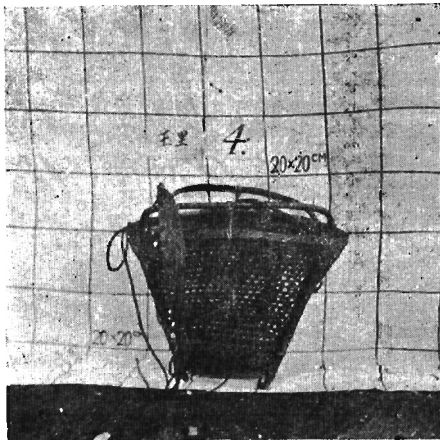
Work Rate : 30—50 kg./load

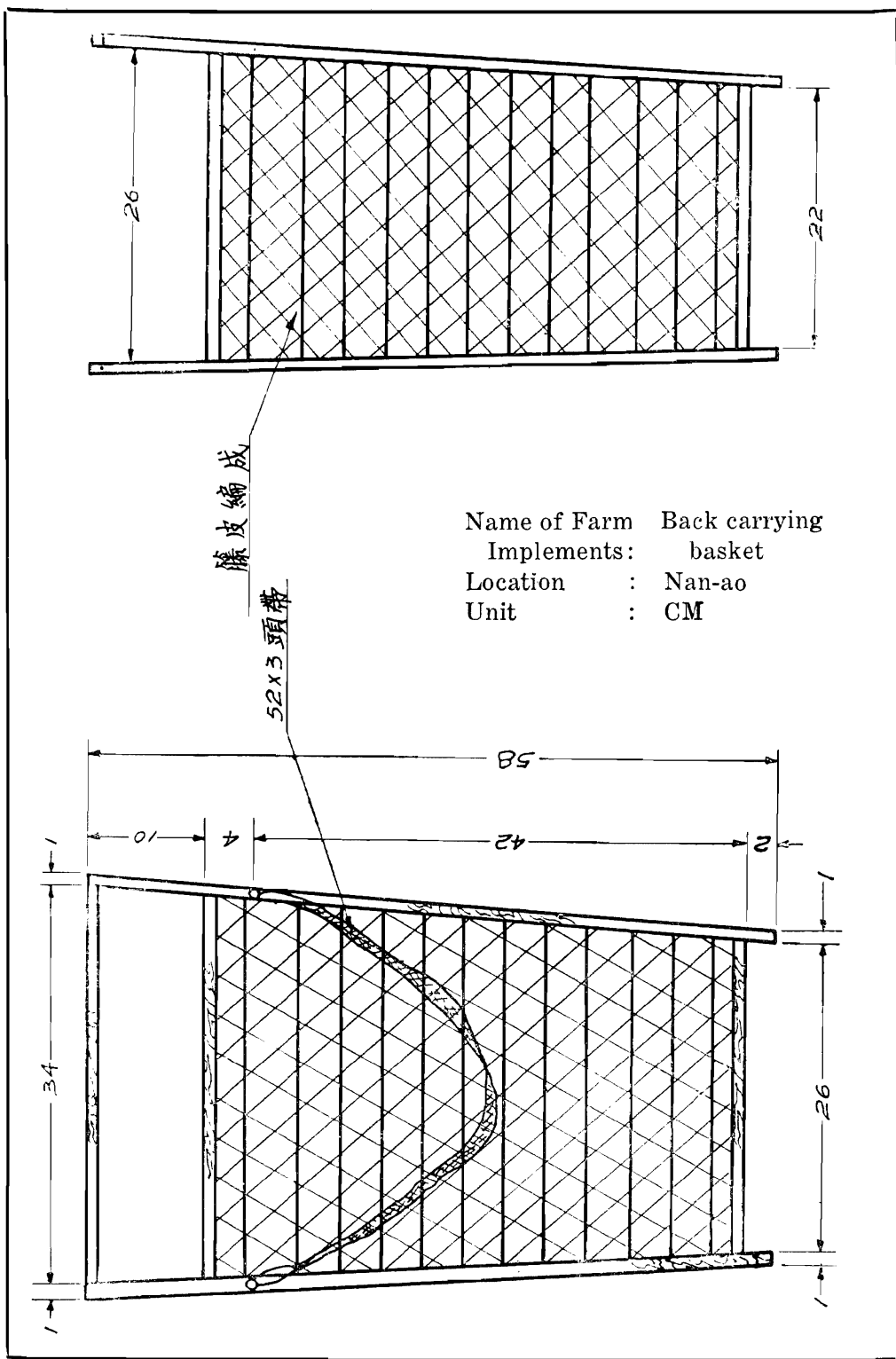
Origin : Traditional Aborigines.

Remarks : Conventonal equipment used among aboriginal males.



- Classification : Transportation Equipment
- Name : Back carrying basket 籐籠 (Balangan)
- Cost : Approx. NT\$20
- Weight : 0.4—2 kg.
- Usage : For transporting goods
- Operating Power : 1 woman
- Material Used: Rattan
- Season of Use: Year round
- Service Life : About 3 years
- Method of Application : Place good in basket; hang straps on forehead and carry on back.
- Work Rate : The largest, 60 kg./basket
- Origin : Traditional Aborigines.
- Remarks : 1. Conventionally equipment for aboriginal women.
2. Weight is on the forehead.
3. Sturdy and durable.

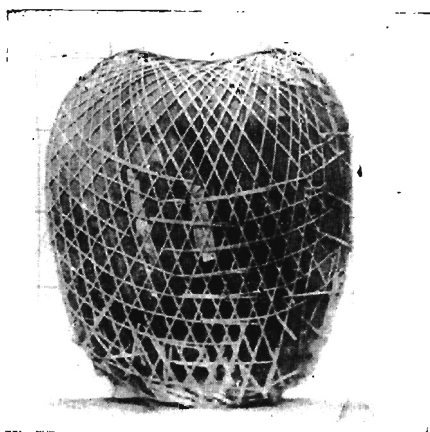




Classification : Transportation Equipment
 Name : Rear cart 手拉車
 Cost : Approx. NT\$1000
 Weight :
 Usage : For transporting goods
 Operating Power : 1 man
 Material Used: Frame, shaft and bearing—Iron or soft steel
 Tire—Rubber
 Season of Use: Year round
 Service Life : About 10 years
 Method of Application : Usual size—Both hands hold handle; hang straps over shoulder and pull. If too heavily loaded, drawn by cattle.
 Small size—Hitch onto bicycle to be drawn.
 Work Rate : Usual—800—1000 kg./cart
 Small—500—800 kg./cart
 Origin : Introduced from Japan.
 Remarks : 1. Men are operating powers.
 2. Is two-wheeled.



- Classification : Equipment for Miscellaneous Purposes
- Name : Rain shield 龜殼
- Cost : Approx. NT\$10.00
- Weight : Approx. 1 kg.
- Usage : For protection against rain during weeding in paddy fields.
- Operating Power :
- Material Used: Frame—Bamboo
Other—Bamboo leaves, palm leaves.
- Season of Use: Whenever it rains while weeding.
- Service Life : About 5 years.
- Method of Application : Hang the rope straps on shoulders; wear coolie hat on head to protect farmer from rain while weeding on knees in the paddy field.
- Work Rate : Can protect one person
- Origin : Traditional Chinese.
- Remarks : 1. Cheap
2. Will not interfere weeding on knees, yet protects farmer from rain.
3. Used in middle and northern part of Taiwan.



Classification : Equipment for Miscellaneous Purposes

Name : Coir rain coat 棕蓑

Cost : Approx. NT\$40

Weight : 1.4—2 kg.

Usage : For protection against rain.

Operating
Power :

Material Used: Palm coir

Season of Use: On raining days

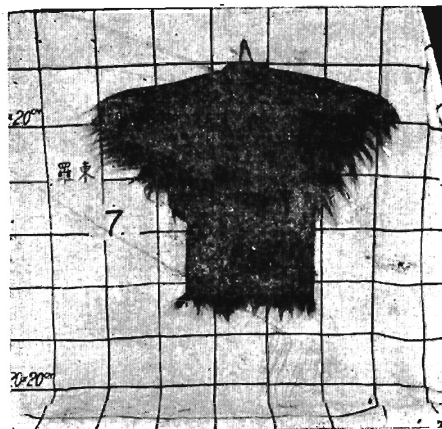
Service Life : About 10 years

Method of
Application : Wear as a rain-boat.

Work Rate : Protects 1 man

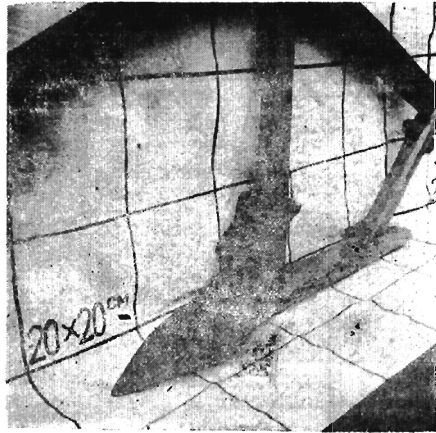
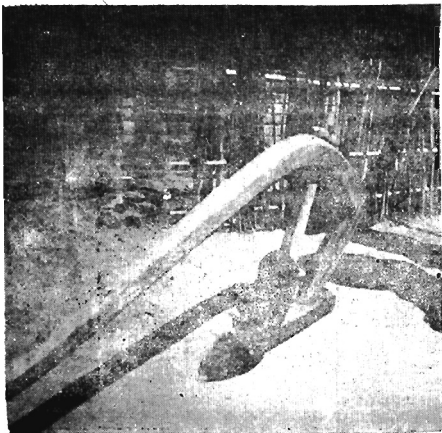
Origin : Traditional Chinese.

Remarks : 1. Sturdy and durable.
2. Heavy.
3. Suitable to wear for work.
4. A necessity for farmers.

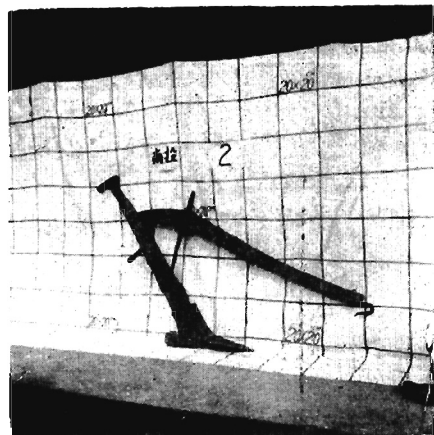
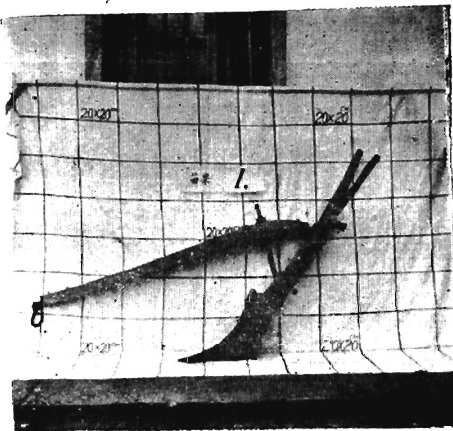


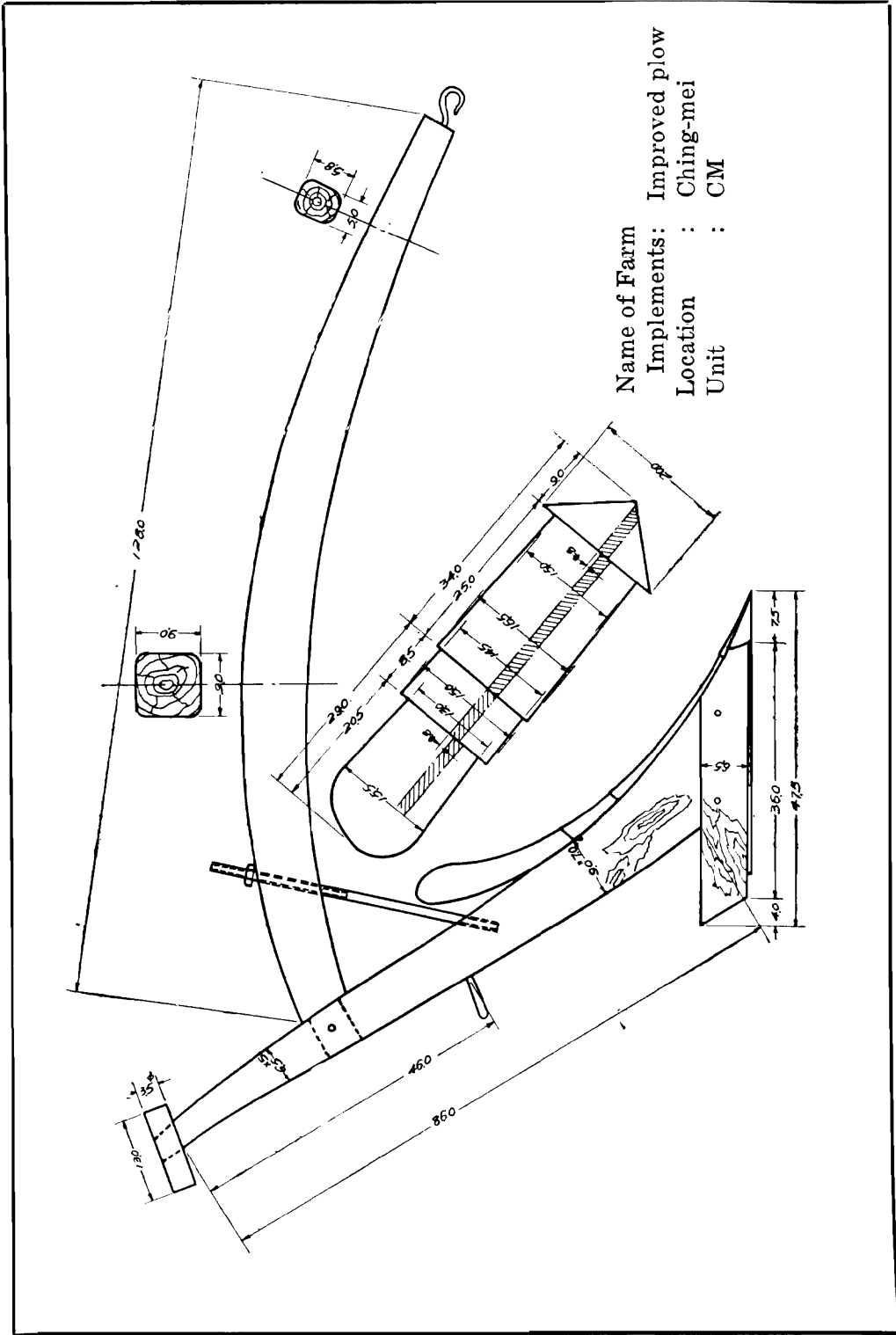
II. Animal-drawn Farm Implements

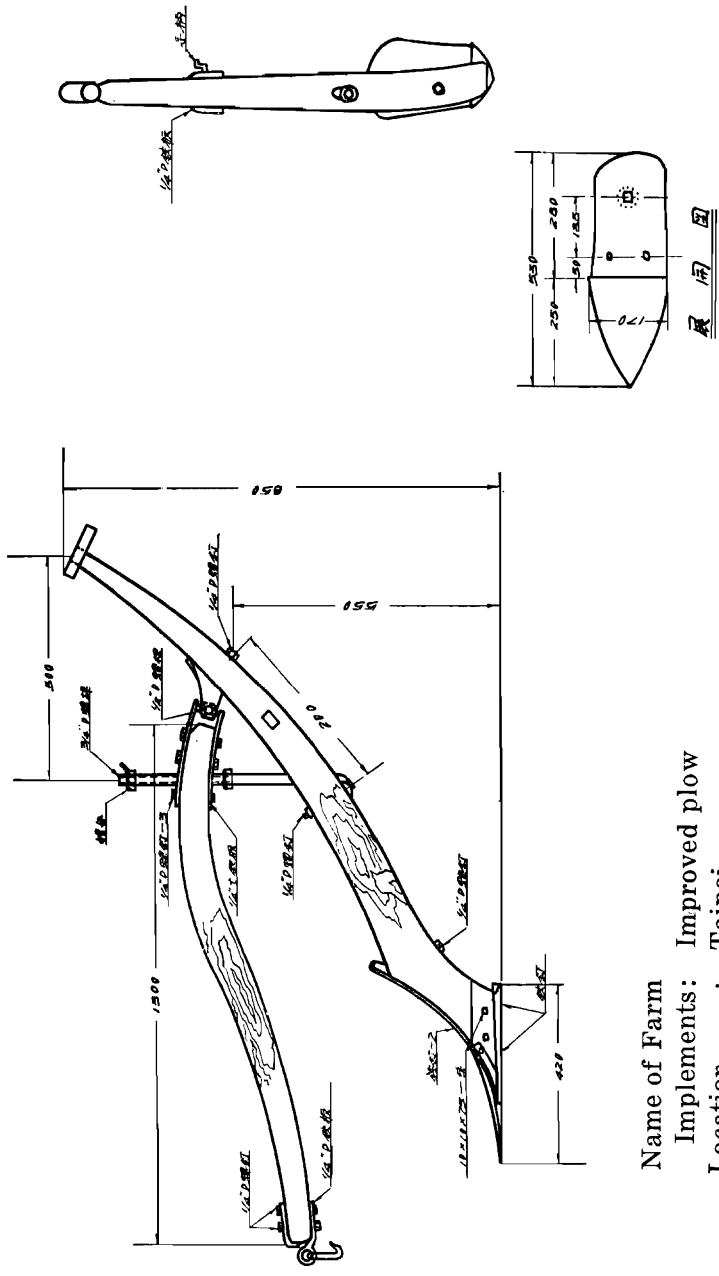
- Classification : Land Preparation Implements
- Name : Conventional plow 在來犁
- Cost : NT\$40—80
- Weight : 10.8—15.6 kg.
- Usage : For plowing, intertilling, harvesting sweet-potatoes, and opening up furrows for planting purposes.
- Operating Power : 1 ox and one man
- Material Used: Plow share—Cast iron, seldom bronze.
Moldboard—Cast iron, seldom bronze.
Hitch—Wrought iron
- Season of Use: Year round
- Service Life : About 10 years
- Application : Hitch plow on evener which is drawn by an ox or a buffalo, farmer
Method of hold the handle to guide the plow for plowing.
- Work Rate : Plowing: 0.2—0.3 ha./day ..
Intertilling: 0.5 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Light, cheap.
2. One animal only.
3. Easy to open furrows and build ridges.
4. Depth of plowing—10 cm.
5. Turning of furrow slice is incomplete.
6. Not durable.



- Classification : Land Preparation Implements
- Name : Improved plow 改良犁
- Cost : NT\$50—150
- Weight : 11.5—25.8
- Usage : For plowing, intertilling, building ridges and harvesting sweet potatoes.
- Operating Power : 1 ox and one man
- Material Used: Bottom sled piece—Cast iron .
Moldboard and share—Cast iron, wrought iron, seldom cast steel
Hitch and screws—Soft steel
Other parts—Wood
- Season of Use: Year round
- Service Life : About 5—10 years if parts changed often.
- Method of Application : Hitch to evener to be drawn by ox or buffalo.
- Work Rate : Plowing: 0.1—0.3 ha./day
Intertilling: 0.5 ha./day
- Origin : Introduced from Japan and modified in Taiwan.
- Remarks : 1. Greater depth of plowing (approx. 15—20 cm.).
2. Turning of furrow slice is more complete.
3. Sturdy.
4. Needs one animal.
5. Heavy.
6. Expensive.
7. Not suitable for hilling or building ridges.
8. Turn furrow slices to the right.







Name of Farm : Improved plow
 Implements : Taipei
 Location : CM
 Unit :

Classification : Land Preparation Implements

Name : Lister 培土用雙面犁

Cost : Approx. NT\$100

Weight : Approx. 17.5 kg.

Usage : For building ridges and hilling.

Operating

Power : 1 ox and 1 man.

Material Used: Moldboard and share—Cast iron

Wings	} Soft steel
Clevis	
Hitch	
Screws	
Other parts—Wood	

Season of Use: October, November

Service Life : 5—10 years

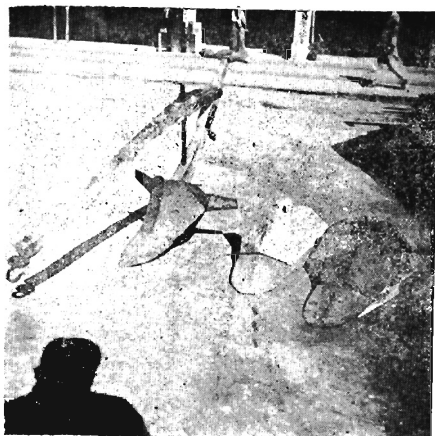
Method of

Application : After field being well prepared, use lister to run along the prospective planting line to make ridges; two operations are often necessary for complete hilling.

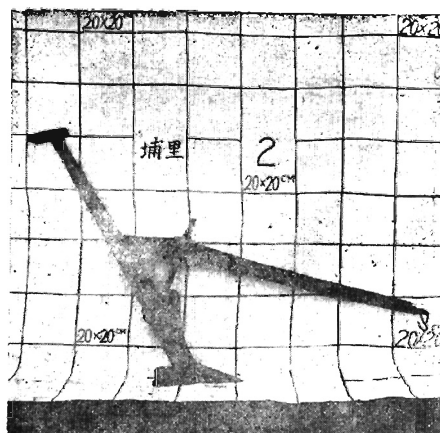
Work Rate : Approx. 1.5 ha./day

Origin : Improved from double moldboard plow.

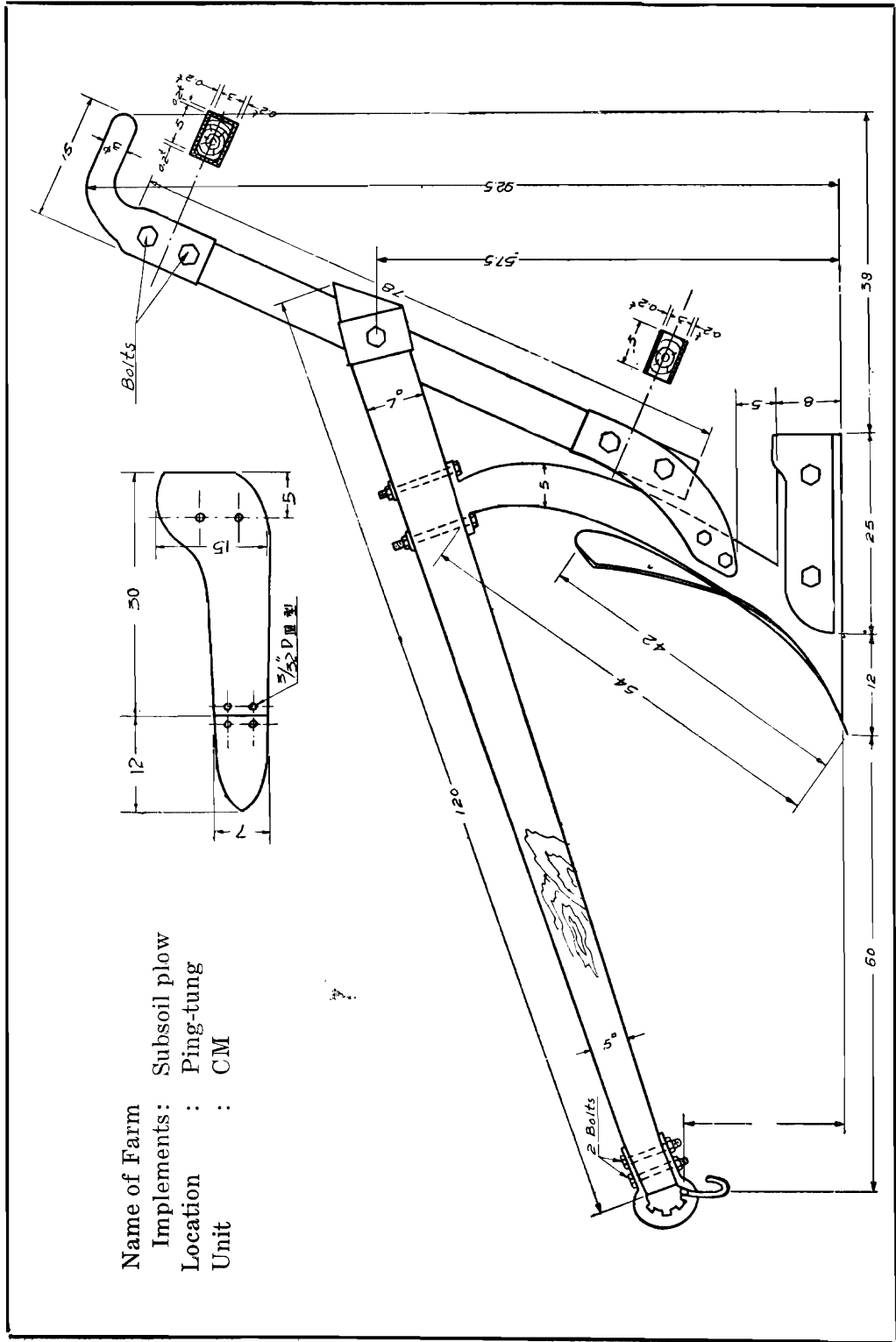
Remarks : 1. Efficiency is high.
2. Design is simple.
3. Light and convenient.
4. Used in Tai-chung Hsien.



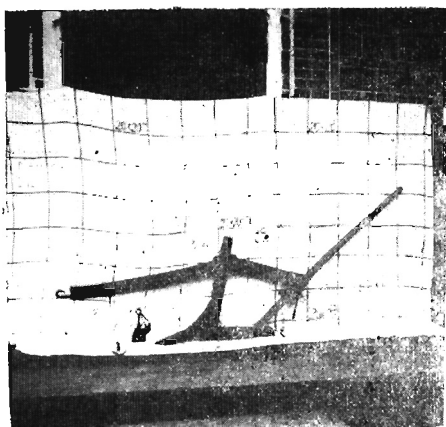
- Classification : Land Preparation Implements
- Name : Subsoil plow 底軟犁
- Cost : NT\$50—120
- Weight : 9—11.4 kg.
- Usage : 1. Loosening subsoil.
2. Opening narrow furrows for placing fertilizer.
3. For intertillage in sugarcane fields.
- Operating Power : 1 ox and one man
- Material Used: Plow share and sled piece—Cast iron
Moldboard, brace, frog and screw—Wrought iron.
Plow handle and beam—Wood
- Season of Use: 1. Before planting sugarcane
2. Before applying fertilizer, i.e. 60—90 days after planting
3. 3rd intertillage
- Service Life : About 5 to 10 years if share is changed yearly
- Method of Application : Hitch onto evener to be drawn by ox or water buffalo.
- Work Rate : 1—1.2 ha./day
- Origin : Developed in Taiwan.
- Remarks : 1. Can plow up hard ground.
2. Furrow slices are often broken up into fine pieces.
3. Sturdy.
4. Quantity of soil turned is ample; will not bury the cane seedlings.
5. Cut a narrow strip of ground.
6. Turn furrow to the right.



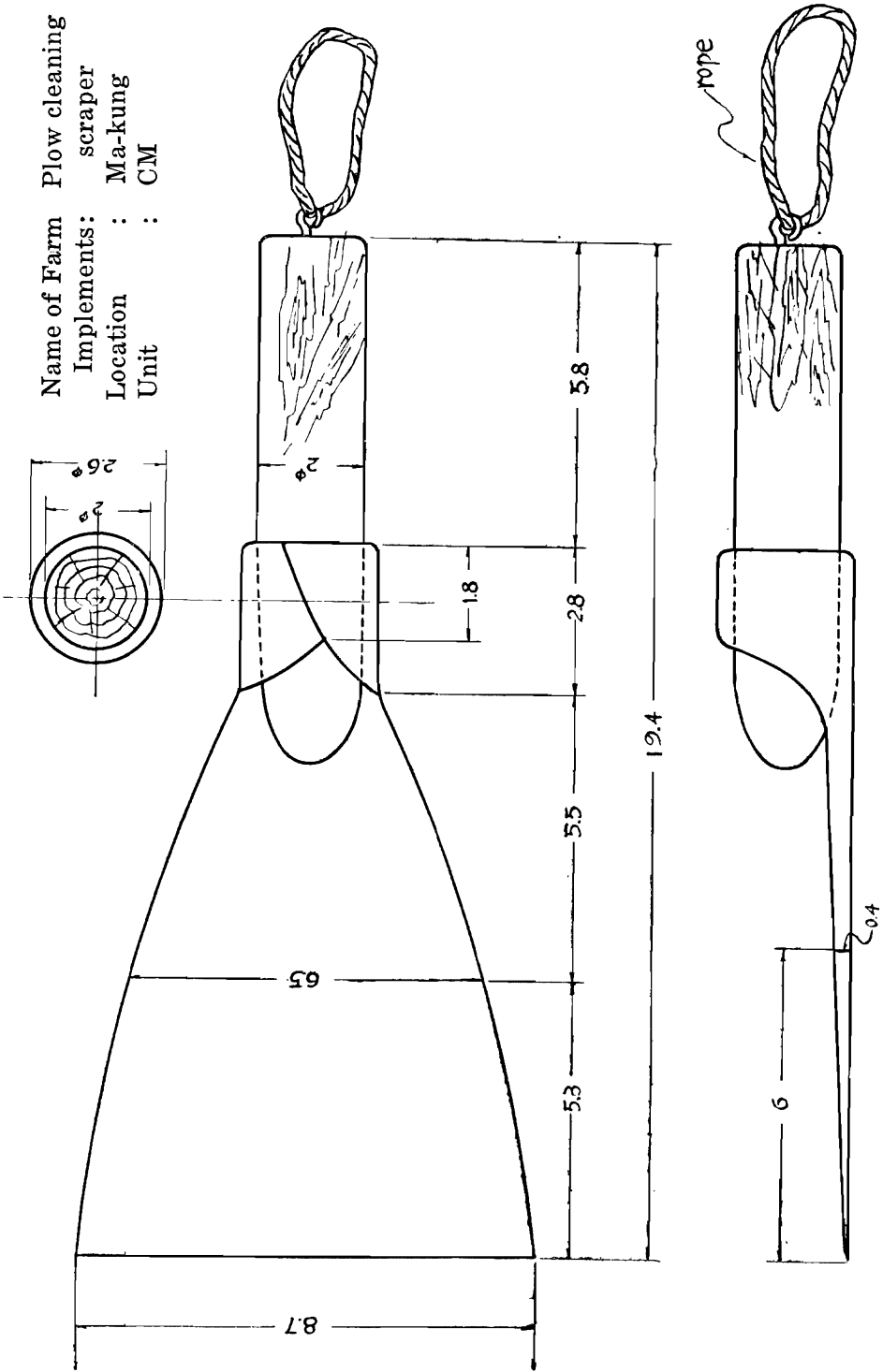
Name of Farm :
 Implements : Subsoil plow
 Location : Ping-tung
 Unit : CM



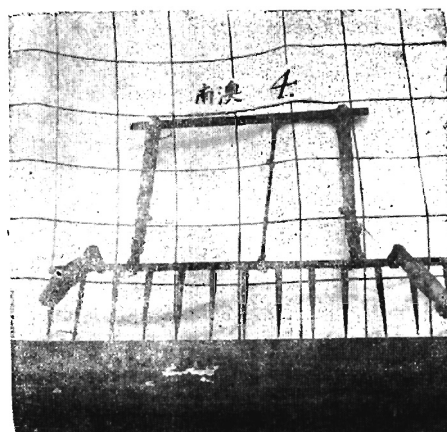
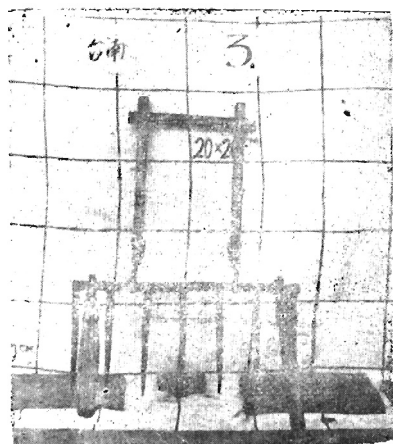
- Classification : Land Preparation Implements
- Name : Plow cleaning scraper 犁突
- Cost : NT\$1—2
- Weight : Approx. 0.2 kg.
- Usage : To remove soil stuck on plow; i.e. helping scour.
- Operating Power : 1 man
- Material Used: Body—Soft steel or iron
Handle—Wood
- Season of Use: Clean mold board and share after plowed one row or two.
- Service Life : About 15 years
- Method of Application : Usually hung on plow handle by a rope attached to it. Scrap to clean the share and mold-board after finishing one row or when there are too much soil stick on.
- Work Rate :
- Origin : Traditional Chinese.
- Remarks : A special implement for Penghu where plow does not scour well.



Name of Farm : Plow cleaning
 Implements : scraper
 Location : Ma-kung
 Unit : CM



- Classification : Land Preparation Implements
- Name : Comb harrow 手耙
- Cost : Approx. NT\$180
- Weight : 9—12 kg.
- Usage : For breaking up soil clods and levelling field.
- Operating Power : 1 ox and one man
- Material Used: Handle, hitch—Wood
Harrow—Wrought iron
- Season of Use: Paddy fields—Before transplanting
Dry land—While prepare land for seeding.
- Service Life : 5—10 years
- Method of Application : Hitch onto an ox for work. Sometimes bamboo pieces are fastened between the spiked teeth make it a solid board to move earth as a scraper.
- Work Rate : Paddy field: approx. 1 ha./day
Upland fields: approx. 0.8 ha./day
- Origin : 5—10 years
- Remarks : 1. Can be used on both paddy and upland fields.
2. The amount of earth to be moved for levelling land is adjustable, although the adjustments can be made only by experienced hands.
3. Has either 7 or 13 teeth which are usually 10.5—13 cm. apart.

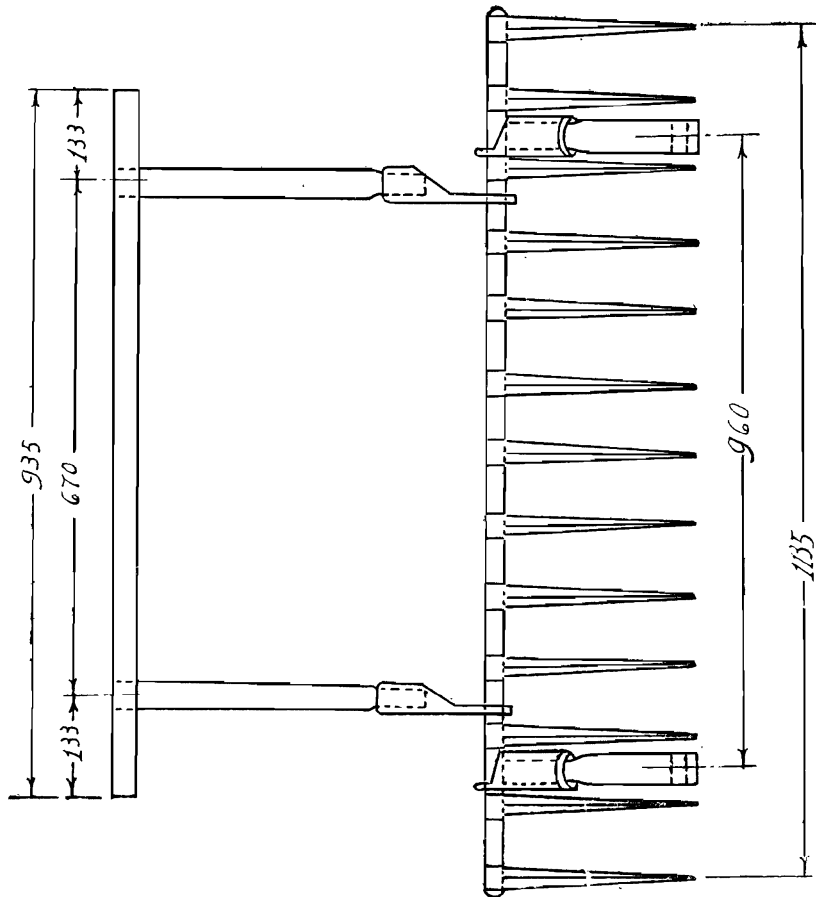
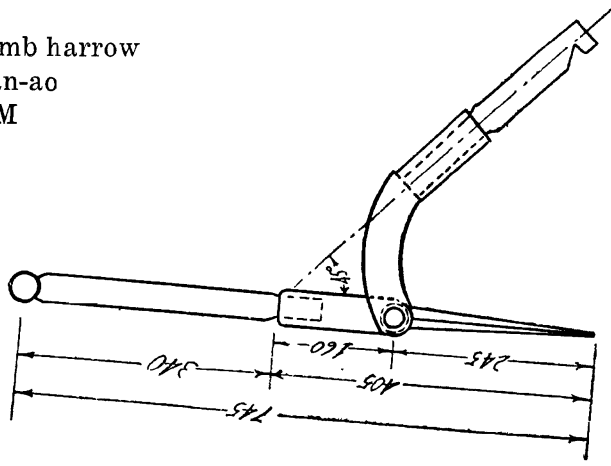


Name of Farm

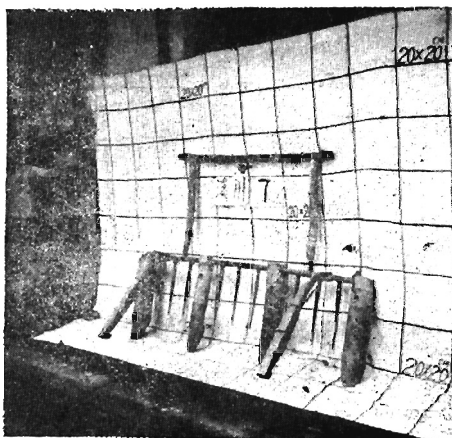
Implements: Comb harrow

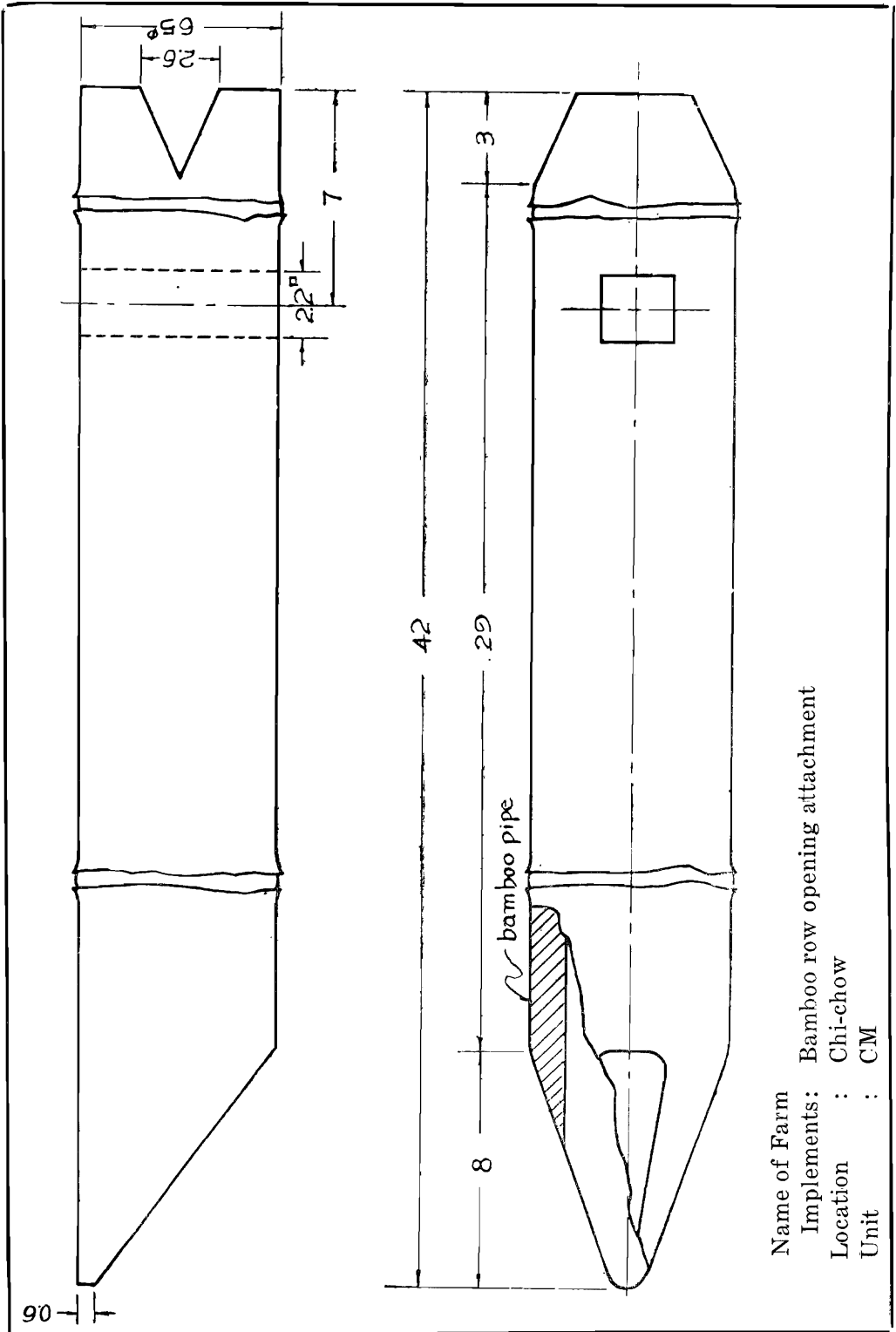
Location : Nan-ao

Unit : MM



- Classification : Land Preparation Implements
- Name : Bamboo row-opening attachment 竹管
(to be attached onto comb harrow)
- Cost : Each tube NT\$0.5
- Weight : Approx. 0.6 kg.
- Usage : Open seed-bed furrows for planting
- Operating Power : 1 ox and one man (after mounted to comb harrow).
- Material Used: Bamboo
- Season of Use: February, March, July, August.
- Service Life : About 3 years
- Method of Application : According to the desired width, tie firmly 3 or 4 bamboo tubes with ropes onto the teeth of comb harrow. Drag this implement by an ox to open up furrows.
- Work Rate : About 1 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Efficiency is high.
2. Design is simple and material is cheap.
3. Row distance can be adjusted.





Classification : Land Preparation Implements

Name : Leveling pole 埤管
(to be attached onto comb harrow)

Cost : Approx. NT\$30.00

Weight : 3.7—8 kg.

Usage : To level paddy fields

Operating Power : 1 ox and one man (after attached to comb harrow)

Material Used: Hook—Soft steel
Other parts—Wood

Season of Use: While preparing paddy fields.

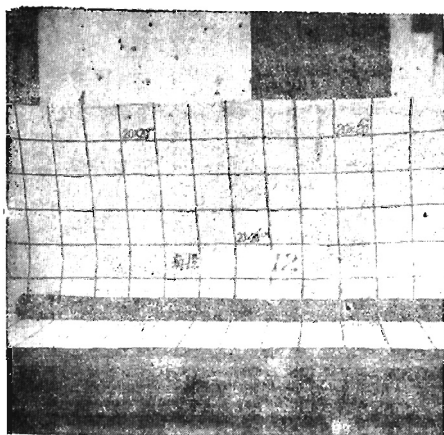
Service Life : 20—40 years

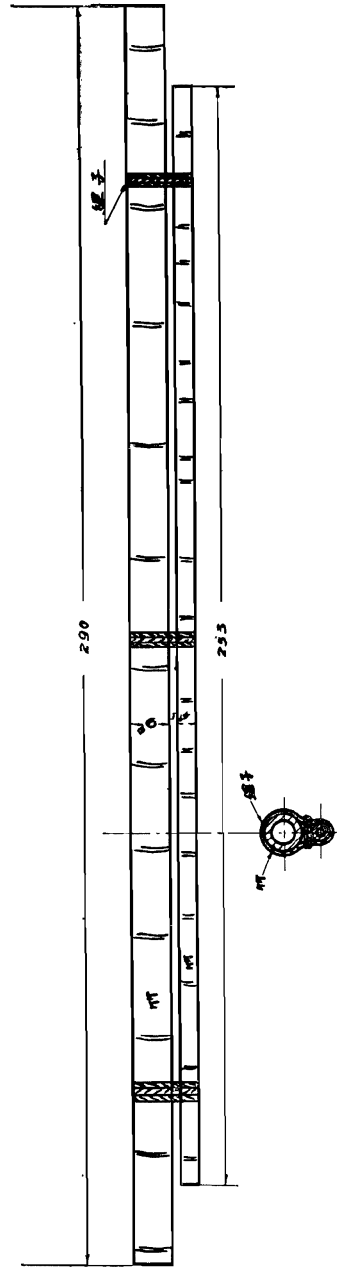
Method of Application : Attach the pole to the teeth of comb harrow.

Work Rate : Approx. 3 ha./day

Origin : Traditional Chinese.

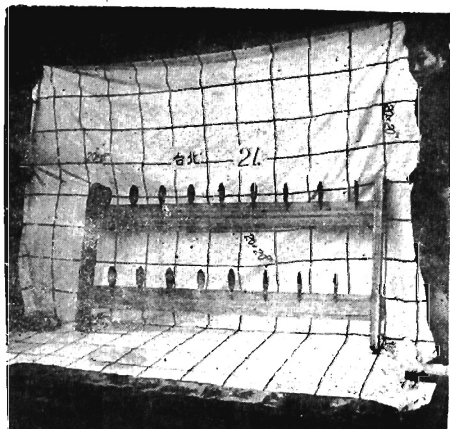
Remarks : 1. Design is simple and has long service life.
2. Sometimes bamboo poles are used instead of wooden ones.



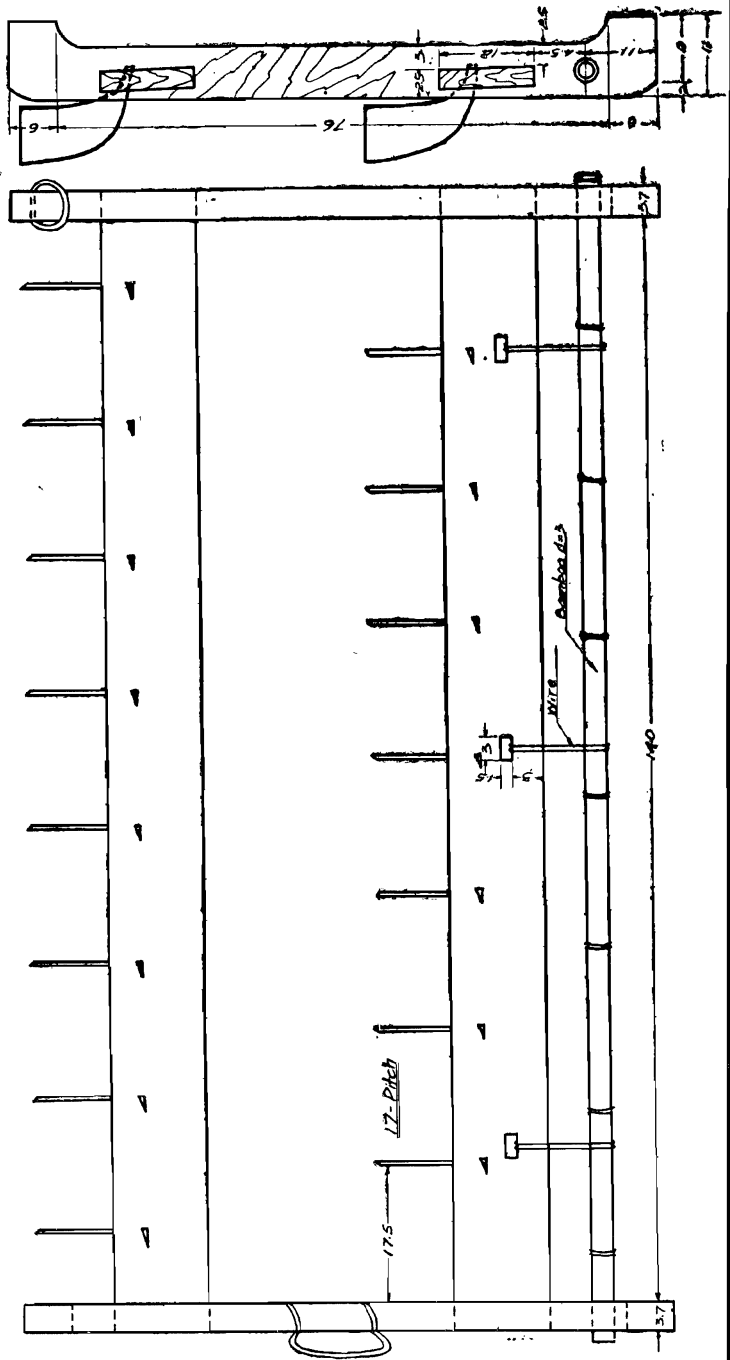
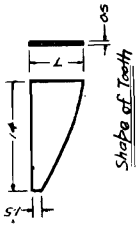


Name of Farm Implements: Levelling pole (Bamboo made)
 Location : Hsiu-lin
 Unit : CM

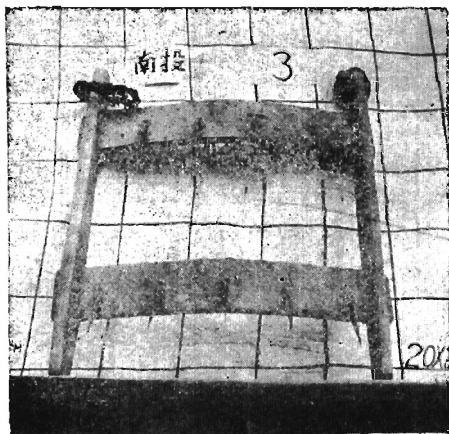
- Classification : Land Preparation Implements
- Name : Knife tooth harrow 割耙
- Cost : NT\$60—80
- Weight : 18—18.5 kg.
- Usage : Make seed-beds more fine and even.
- Operating Power : 1 ox and one man
- Material Used: Knife blade—Mostly cast iron and wrought iron, seldomly use bamboo or hard wood
Harrow frame—Wood
- Season of Use: Before transplanting
- Service Life : About 25 years
- Method of Application : Hitch to draft cattle to work. Operator stand on frame to weight it down with his body weight.
- Work Rate : Approx. 1 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Design is simple and not easily damaged.
2. Can be carried by one person.
3. Cost is low.

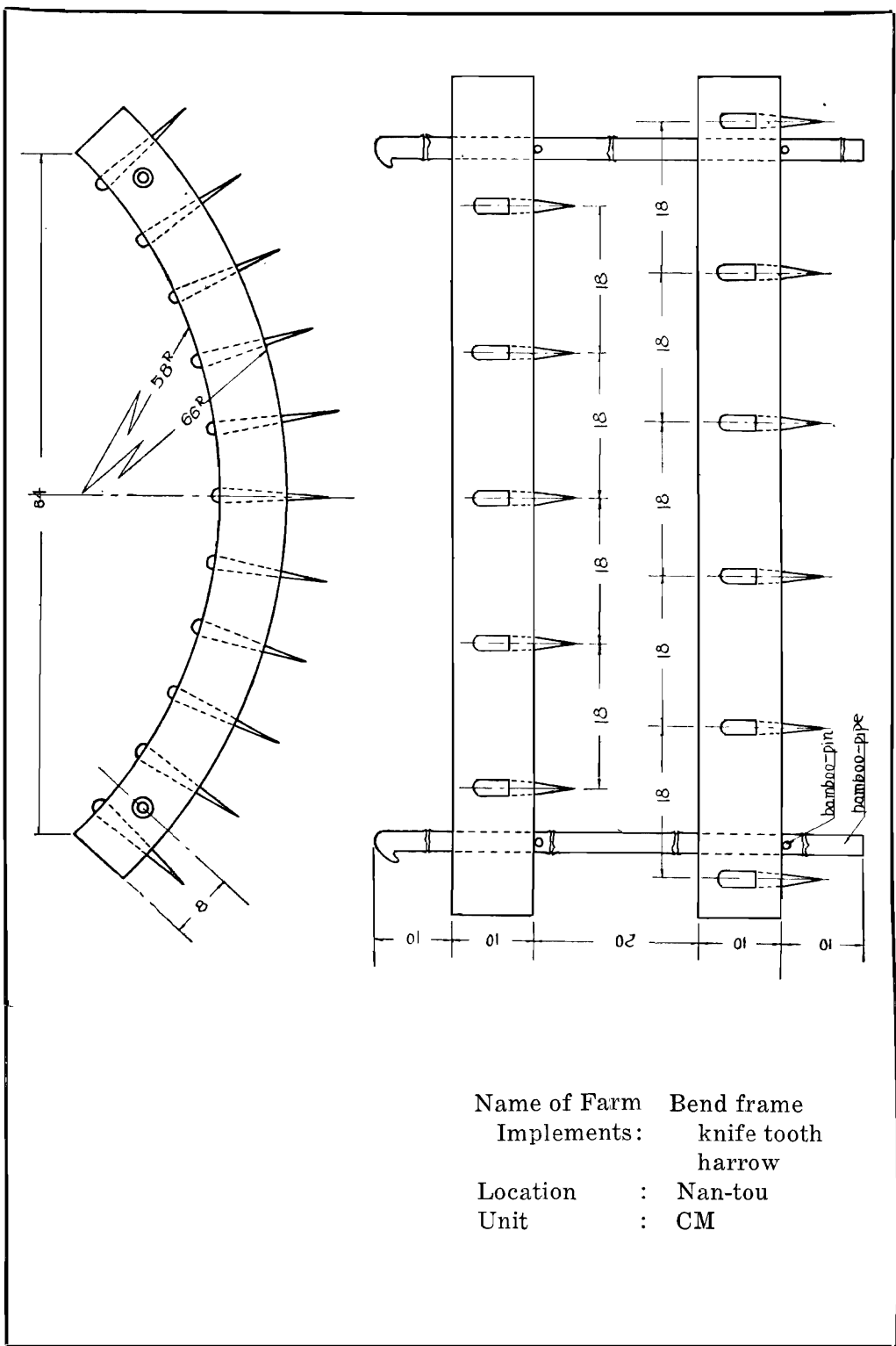


Name of Farm Knife tooth
Implements: harrow
Location : Nan-ao
Unit : CM



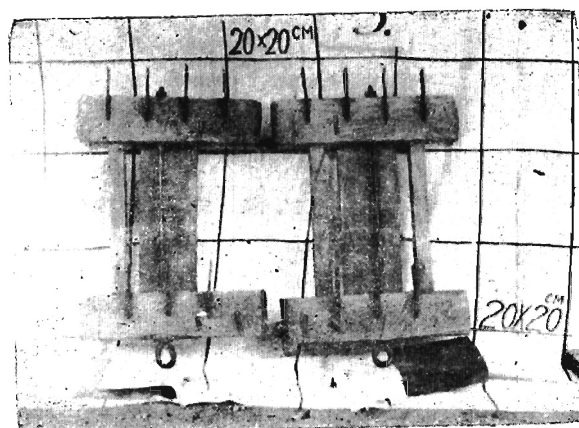
- Classification : Land Preparation Implements
- Name : Bend frame knife-tooth harrow 灣割耙仔
- Cost : Approx. NT\$40
- Weight : Approx. 7.2 kg.
- Usage : For between row harrowing and intertilling of row crops.
- Operating Power : 1 ox and one man
- Material Used: Knife blade—Bamboo or wrought iron
Other parts—Wood
- Season of Use: Year round
- Service Life : About 10—20 years if knives are changed often
- Method of Application : Operator stand on harrow frame, to be drawn by a draft animal.
- Work Rate : Approx. 1 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. The curvatures of frame are not adjustable.
2. Can utilize body weight to bear down while harrowing.
3. Used in Nantou, Chiayi and Tainan areas.



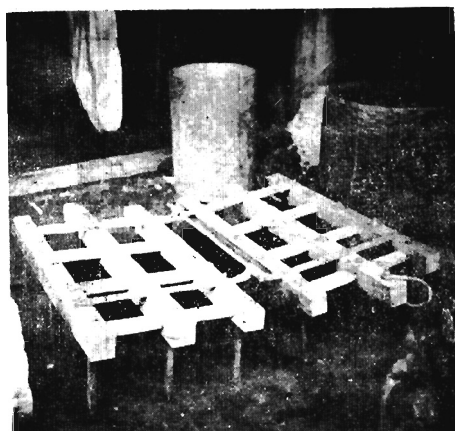


Name of Farm Bend frame
 Implements: knife tooth
 harrow
 Location : Nan-tou
 Unit : CM

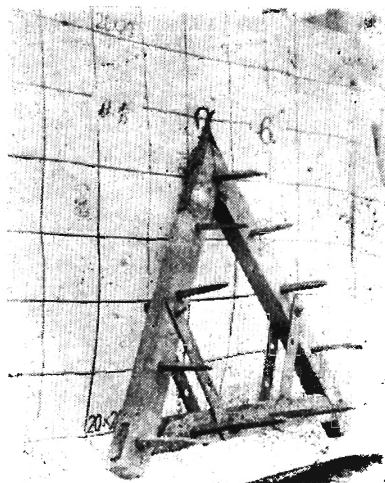
Classification : Land Preparation Implements
 Name : Flexible knife-tooth harrow 軟骨割耙
 Cost : Approx. NT\$50
 Weight : Approx. 10.2 kg.
 Usage : Between ridge harrowing and intertilling of row crop.
 Operating Power : 1 ox and one man
 Material Used: Knife blade—Soft steel
 Hook, bolts—Soft steel
 Other parts—Wood
 Season of Use: Used before and after planting sugar-cane and sweet potatoes.
 Service Life : About 20 years. if knives changed often.
 Method of Application : Ox drawn, operator stands on the harrow's frame while working.
 Work Rate : Approx. 1 ha/day
 Origin : Developed in Taiwan 20 years ago.
 Remarks : 1. Can do between row harrowing and intertilling.
 2. Utilizing body weight to increase harrowing depth.



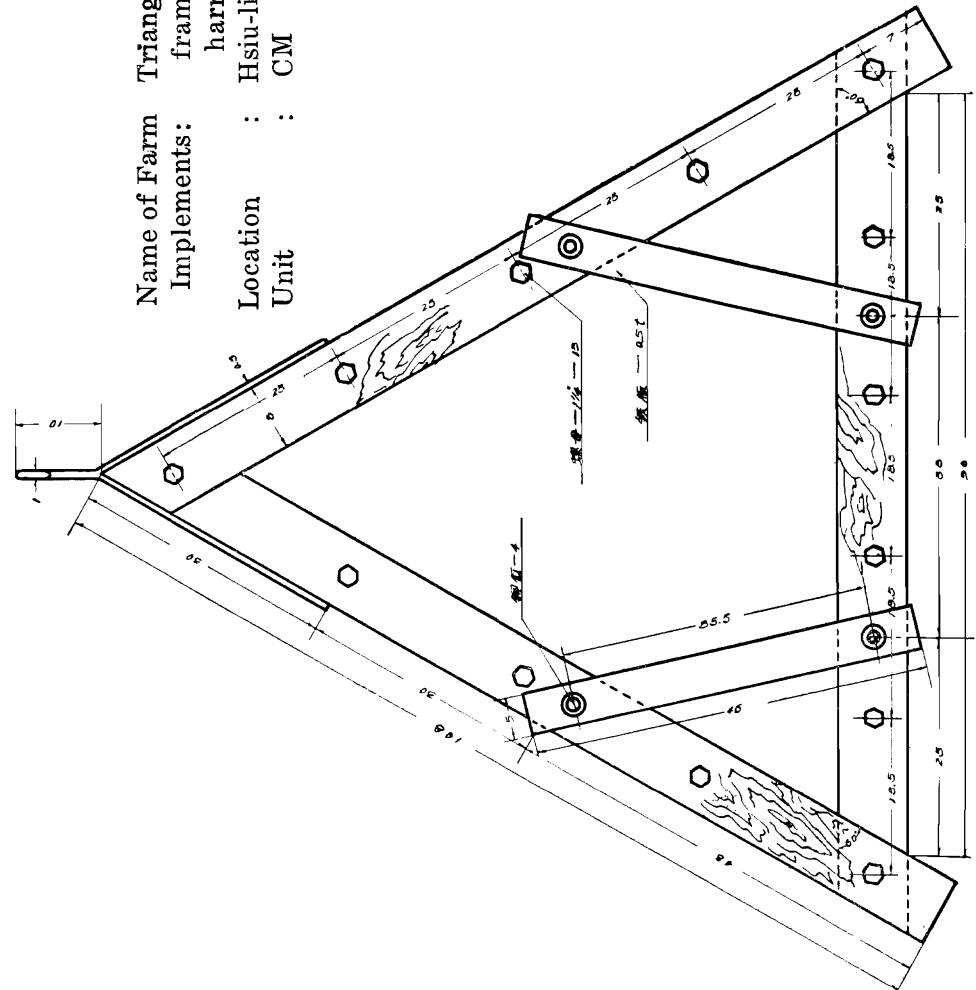
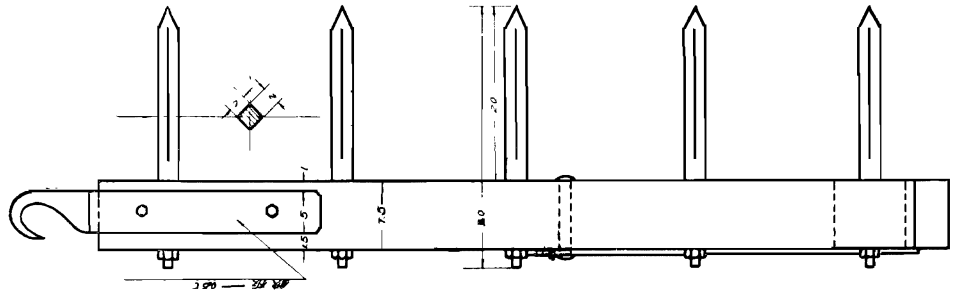
- Classification : Land Preparation Implements
- Name : Flexible spike harrow 合爪
- Cost : Approx. NT\$250
- Weight : Approx. 42 kg.
- Usage : For upland harrowing
- Operating Power : 1 ox and one man
- Material Used: Spikes—Soft steel
Frame—Wood
- Season of Use: Year round
- Service Life : About 15 years
- Method of Application : Hitch the right front hook onto evener drawn by ox; tie the left rear hook with a rope pulled and controlled by farmer. Pull rope to lift harrow and release clogging grass.
- Work Rate : 0.5—0.6 ha./day
- Origin : Introduced from Japan.
- Remarks : 1. Can gather grass while harrowing.
2. Can be separated into two for carrying around.
3. Can be dragged from both ends.
4. Implement is heavy, because operator's weight is not utilized.
5. Used in Yu-li and Jui-sui areas.



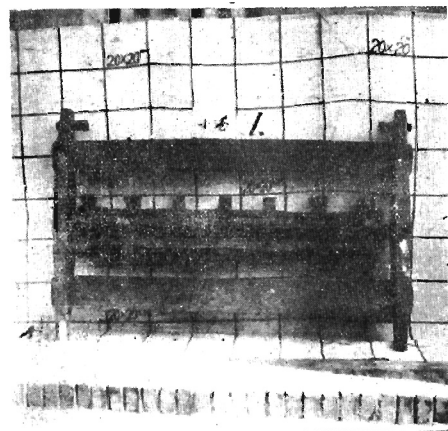
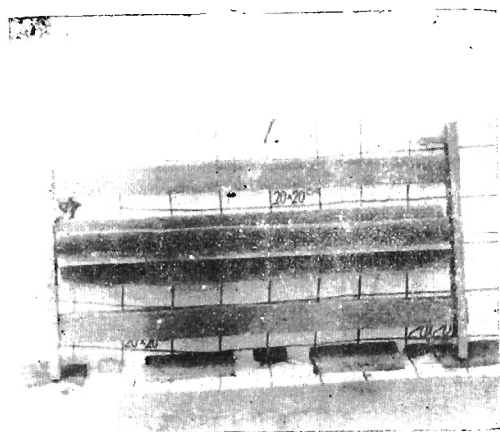
- Classification : Land Preparation Implements
- Name : Triangular-frame spike harrow 三角釘耙
- Cost : Approx. NT\$180
- Weight : Apprix. 90 kg.
- Usage : Harrow dry land, especially gravel land.
- Operating Power : 1 ox and one man
- Material Used: Frame—Hard Wood
Spikes, hooks—Soft steel
- Season of Use: Year round
- Service Life : 5—8 years
- Method of Application : Hitch this implement onto evener drawn by animal.
- Work Rate : 0.5—0.6 ha./day
- Origin : Introduced from Japan.
- Remarks : 1. Can gather grass while harrowing.
2. Implement is heavy; operator's weight is not utilized.
3. Not convenient to transport.
4. Used in Hualien and Hsiu-lin

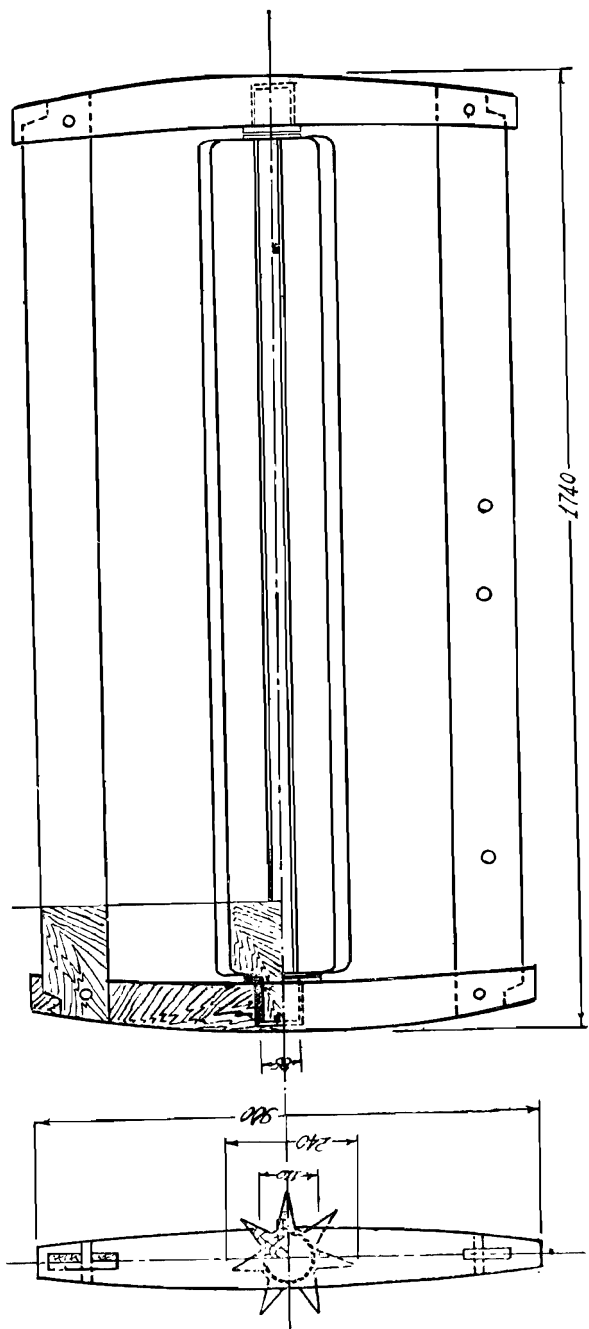


Name of Farm Implements : Triangular frame spike harrow
 Location : Hsiu-lin
 Unit : CM

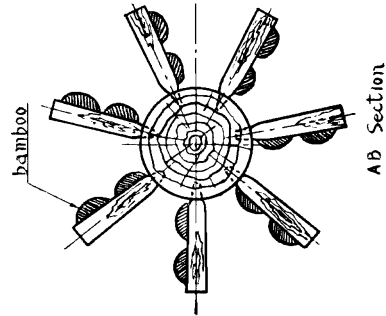
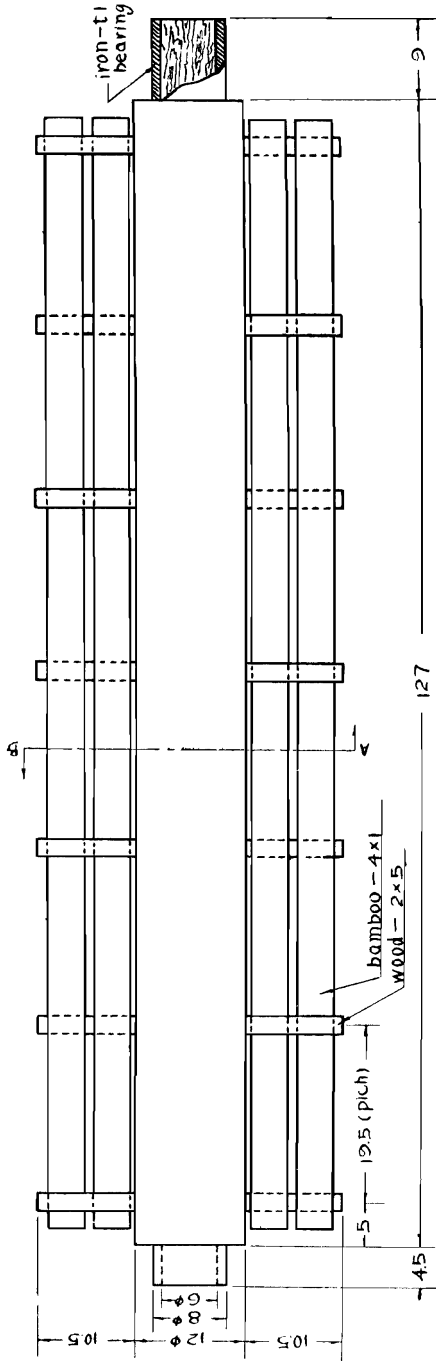


- Classification : Land Preparation Implements
- Name : Paddy field pulverizing roller 膠桶
- Cost : NT\$150—220
- Weight : 26—48 kg.
- Usage : To pulverize soils of paddy field, mixing stalks into soil and also for ground levelling.
- Operating Power : 1 ox and one man
- Material Used: Roller bearing—Soft steel
Frame—Wood
Roller—Wood, iron or bamboo
- Season of Use: Before transplanting
- Service Life : Wooden blades: 6—10 years
Iron blades: 10—20
- Method of Application : Hitch on to a draft animal and the operator stand on frame while working.
- Work Rate : Approx. 1 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Good for turning and mixing grasses and stalks.
2. Pulverizing efficiency very high.
3. The rear frame acts as leveller.
4. Roller made from one piece of wood where large size timber are produced, otherwise (1) made into several wooden blades and assemgle together, (2) wood central shaft and spikes, with heavy bamboo mat blade and (3) iron blades.





Name of Farm : Paddy field
 Implements : pulverizing roller (with one-piece wood roller)
 Location : Tai-tung
 Unit : MM



Name of Farm Implements Paddy field pulverizing roller (Bamboo bladed roller)
 Location Chiao-tzu-tou
 Unit CM

Classification : Land Preparation Implements

Name : Pulverizing roller hook 膠礮鈎

Cost : Approx. NT\$1

Weight : Approx. 0.6 kg.

Usage : Manipulate the direction of the roller.

Operating Power : 1 man

Material Used: Bamboo

Season of Use: Before transplanting while using roller

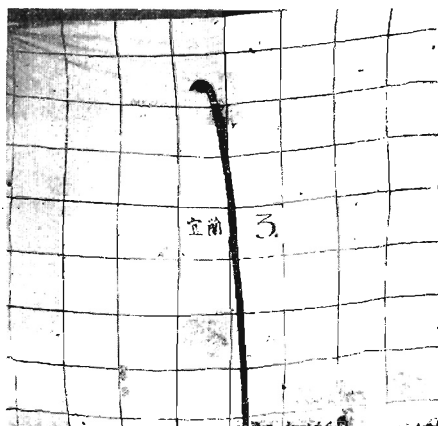
Service Life : About 10 years

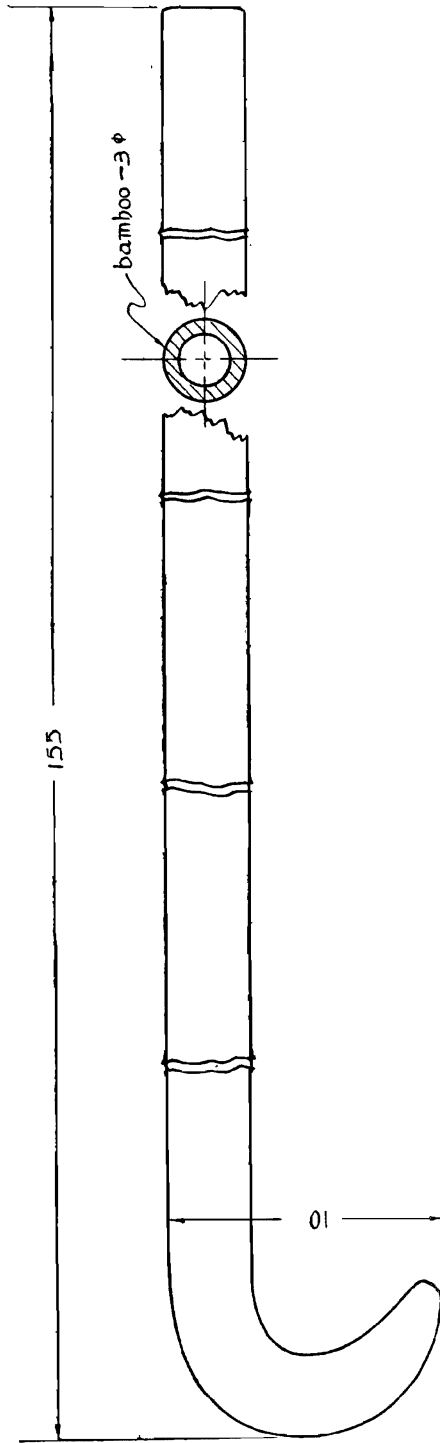
Method of Application : Farmer able alight from roller frame. Use hook to raise one end of roller to help change course or make turns.

Work Rate :

Origin : Traditional Chinese.

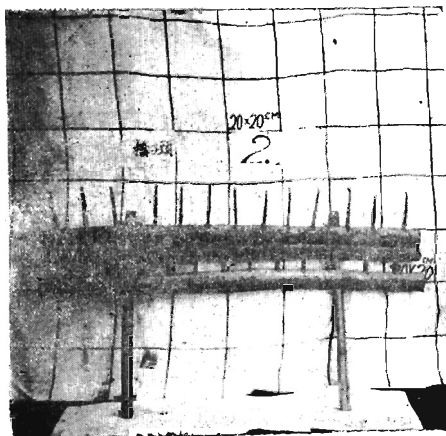
Remarks : To save farmer from excessive bending and walking.



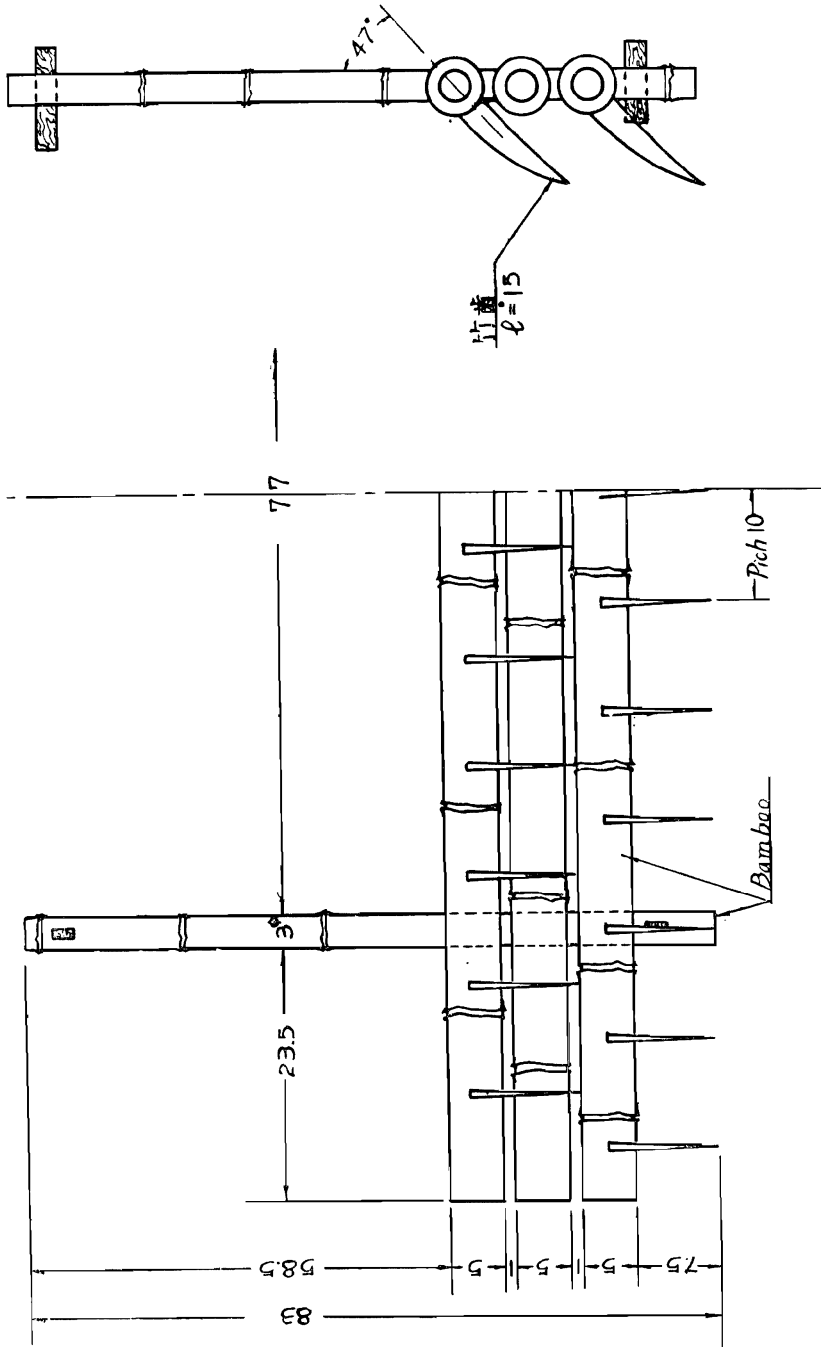


Name of Farm Pulverizing
Implements: roller hook
Location : Yi-lan
Unit : CM

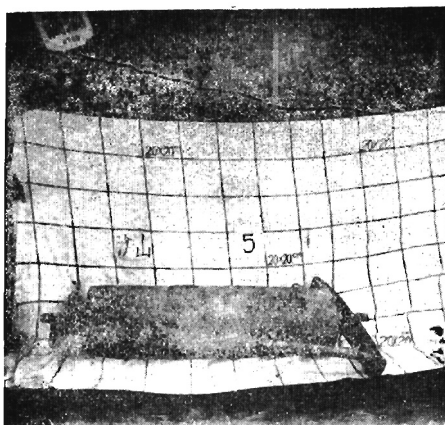
- Classification : Land Preparation Implements
- Name : Bamboo harrow 竹叩齒
- Cost : Approx. NT\$25
- Weight : Approx. 7.5 kg.
- Usage : Harrow dry land.
- Operating Power : 1 ox and one man
- Material Used: Bamboo
- Season of Use: Before seeding upland rice, sesame and peanuts (Sept.—March)
- Service Life : 0.5—1 year
- Method of Application : Hitch on to a draft animal, operator stands on frame while working.
- Work Rate : Approx. 1 ha./day
- Origin : Imitation of spike harrow.
- Remarks : 1. Made entirely with bamboo; light.
 2. Can harrow and level ground.
 3. Usable only on light sandy soil with proper moisture content.
 4. Utilizes body weight.
 5. Breaks easily, but easy to repair.
 6. Used in Kaohsiung and Tainan Hsien.

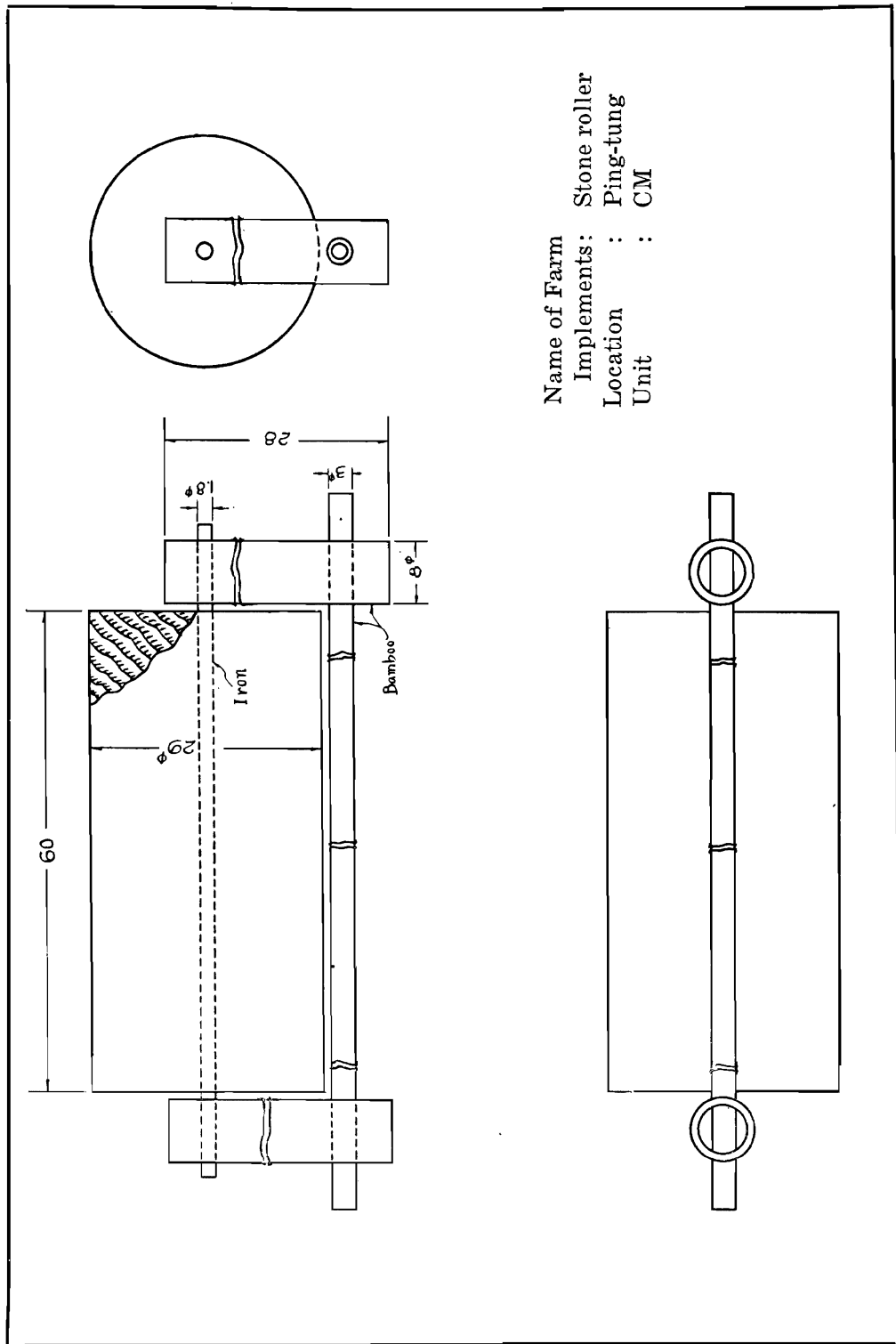


Name of Farm
 Implements: Bamboo harrow
 Location : Chiao-tzu-tou
 Unit : CM

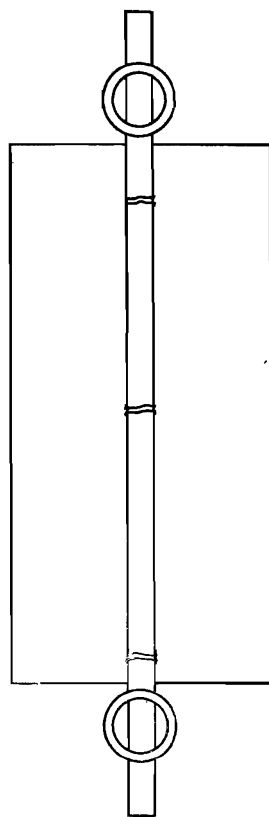


- Classification : Land Preparation Implements
- Name : Stone roller 石輪
- Cost : Approx. NT\$200
- Weight : 140—500 kg.
- Usage : 1. To compact the loose and light soils.
2. To level and compact drying ground.
3. To crush pods of beans and peas.
- Operating Power : 1 ox and one man
- Material Used: Roller—Stone
Other parts—Wood
- Season of Use: March, June, September, October, November and December
- Service Life : About 50 years if frame repaired yearly
- Method of Application : To be drawn by draft cattle for crushing bean pods. To spread bean plants about 20—30 cm. thick on drying ground in the morning for sun drying till noon. Roll over to crush and open pods
- Work Rate : 1. 1 ha./day for compacting soils
2. 0.5 hl./hour for crush bean pods.
- Origin : Traditional Chinese.
- Remarks : 1. It is suitable and more efficient for crushing heavy soil clods than the knife tooth harrows.
2. More efficient than flailing in opening bean pods.
3. Used in sugar plantations in Changhua, Yunlin, Chiayi and Tainan Hsiens.

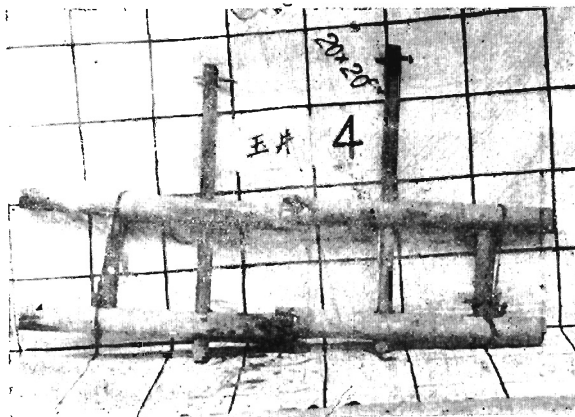




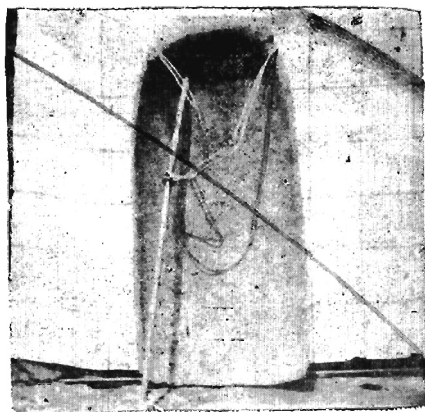
Name of Farm : Stone roller
Implements : Ping-tung
Location :
Unit : CM



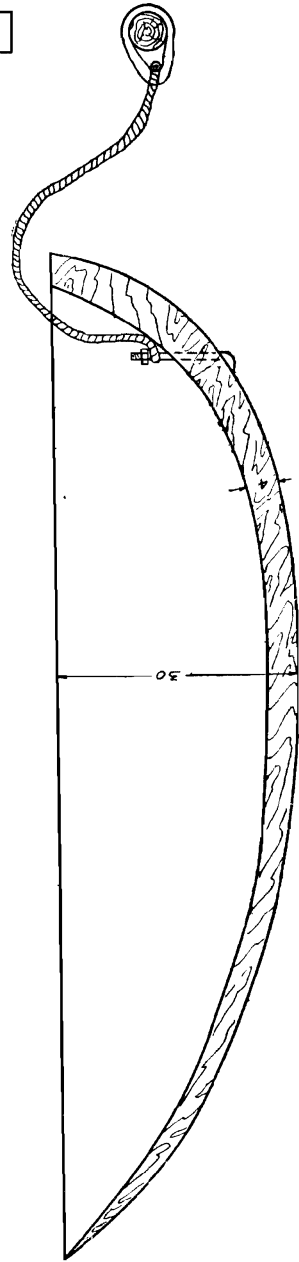
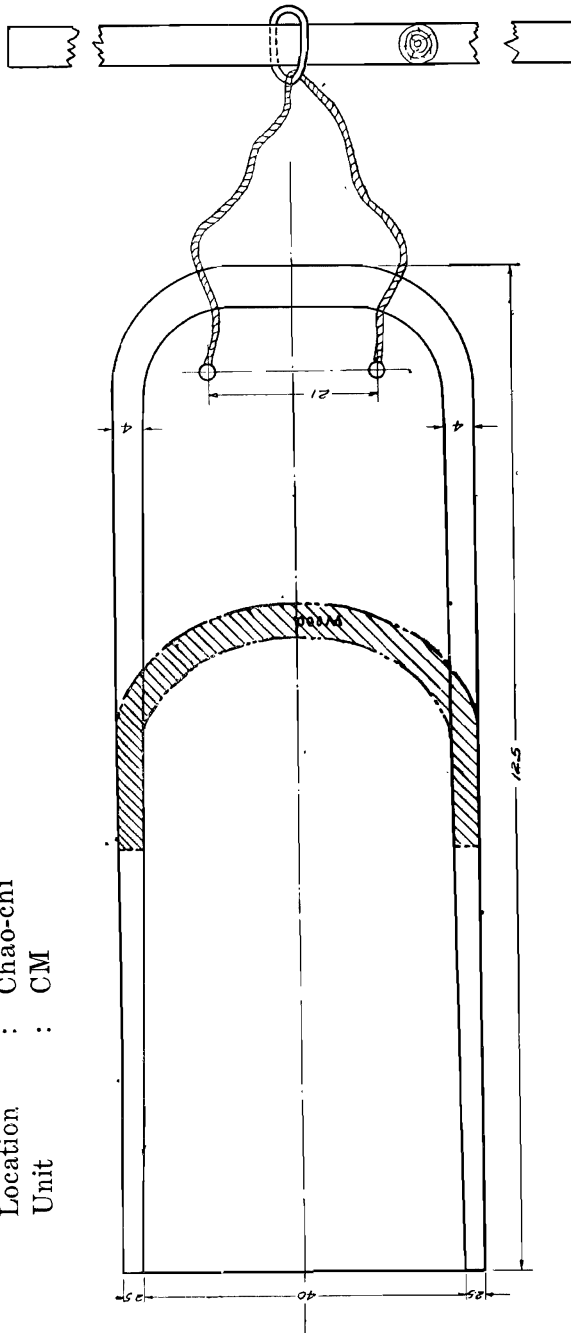
Classification : Land Preparation Implements
 Name : Flexible bamboo plank 踏合仔
 Cost : Approx. NT\$3
 Weight : Approx. 6 kg.
 Usage : To compact soils in sugarcane furrows.
 Operating Power : 1 ox and one man
 Material Used: Bamboo
 Season of Use: Before planting sugarcane from July to November
 Service Life : About 5 years.
 Method of Application : Tie harness rope on hitch to work.
 Farmer should stand on plank while working.
 Work Rate : Approx. 1 ha./day
 Origin : Traditional Chinese.
 Remarks : 1. Economical.
 2. May be made in farmers' home easily.
 3. Utilizes body weight to work.
 4. Used on light soil.
 5. Used in Tainan Hsien.



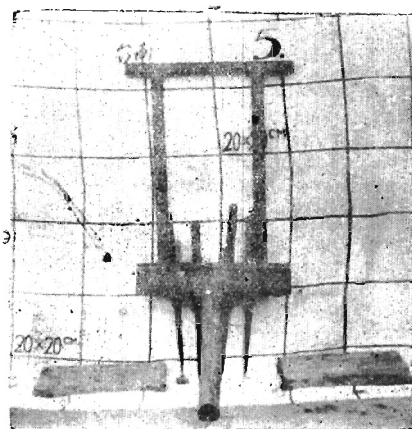
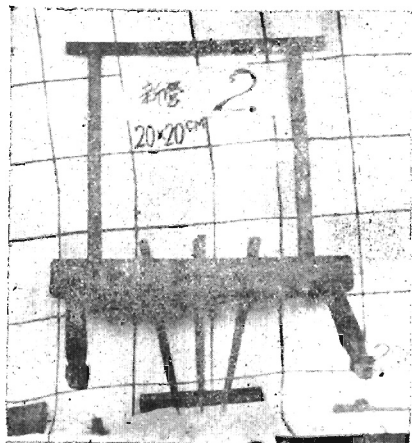
Classification	: Land Preparation Implements
Name	: Soil scoop 土拖
Cost	: Approx. NT\$180
Weight	: 24—30 kg.
Usage	: Move earth
Operating Power	: 2 men or 1 ox and 1 man
Material Used	: Camphor wood, rope, and bamboo pole
Season of Use	: December and March
Service Life	: About 15 years
Method of Application	: Pull closely against ground to heap soil into scoop; one man or one ox pull rope in front, one man press and push in the back.
Work Rate	: Soil approx. 300 kg./scoop
Origin	: Traditional Chinese.
Remarks	: <ol style="list-style-type: none"> 1. Soil in Yi-lan delta carried down by irrigation water and flood usually silted up at mouth of irrigation channel and must be moved back. 2. Field plots in Yi-lan area are large, earth moving work can not be effectively done by small implements as in other areas. 3. Special implement of Yilan Hsien.



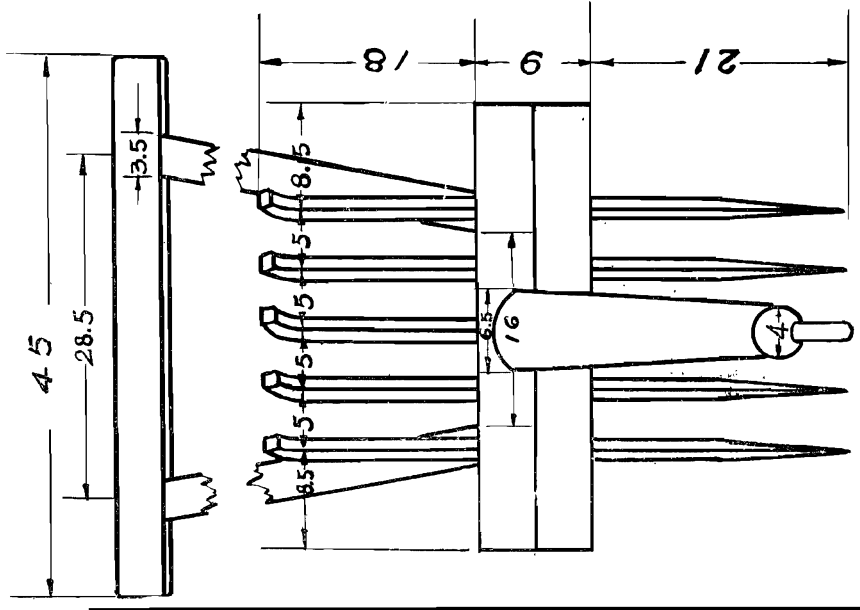
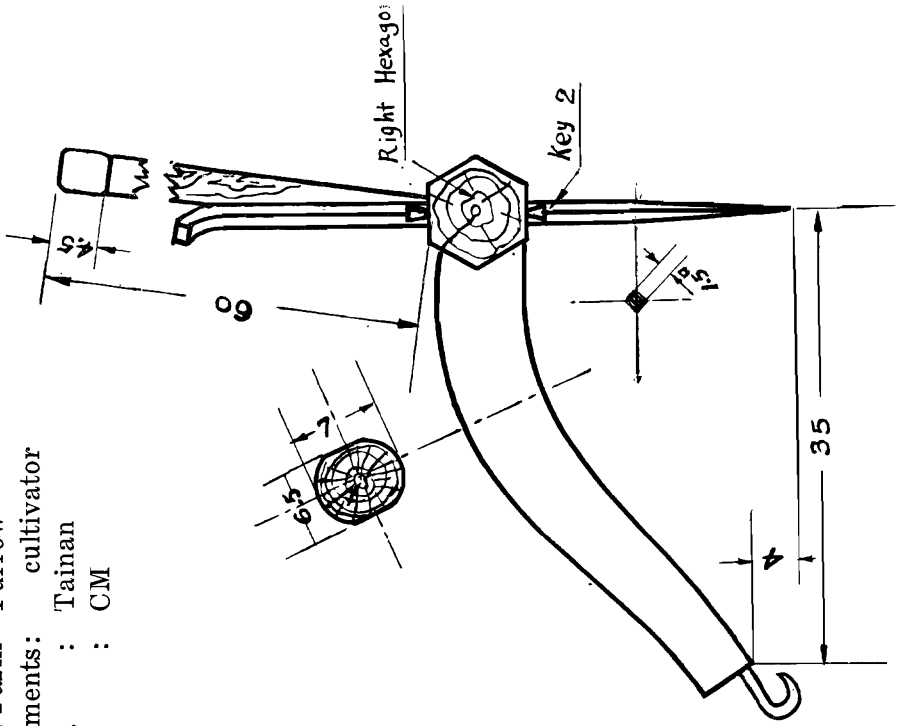
Name of Farm
Implements: Soil scoop
Location : Chao-chi
Unit : CM



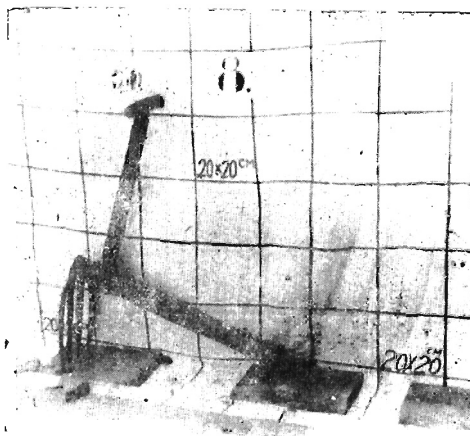
- Classification : Intertillage Implements
- Name : Furrow cultivator 耙仔
- Cost : NT\$40—80
- Weight : 7.5—15 kg.
- Usage : For intertilling of upland rice, beans, jute and miscellaneous upland crops.
- Operating Power : 1 ox and one man
- Material Used: Teeth—Soft steel
Other parts—Wood
- Season of Use: Year round
- Service Life : About 20 years
- Method of Application : Drawn by ox in front; man hold handle-bar control from behind.
- Work Rate : 0.3—1.0 ha./day
- Origin : Traditional Chinese.
- Remarks : 1. Suitable for upland crops.
2. Number of teeth varies with width of rows, usually between 3—7.
3. Efficiency is high.



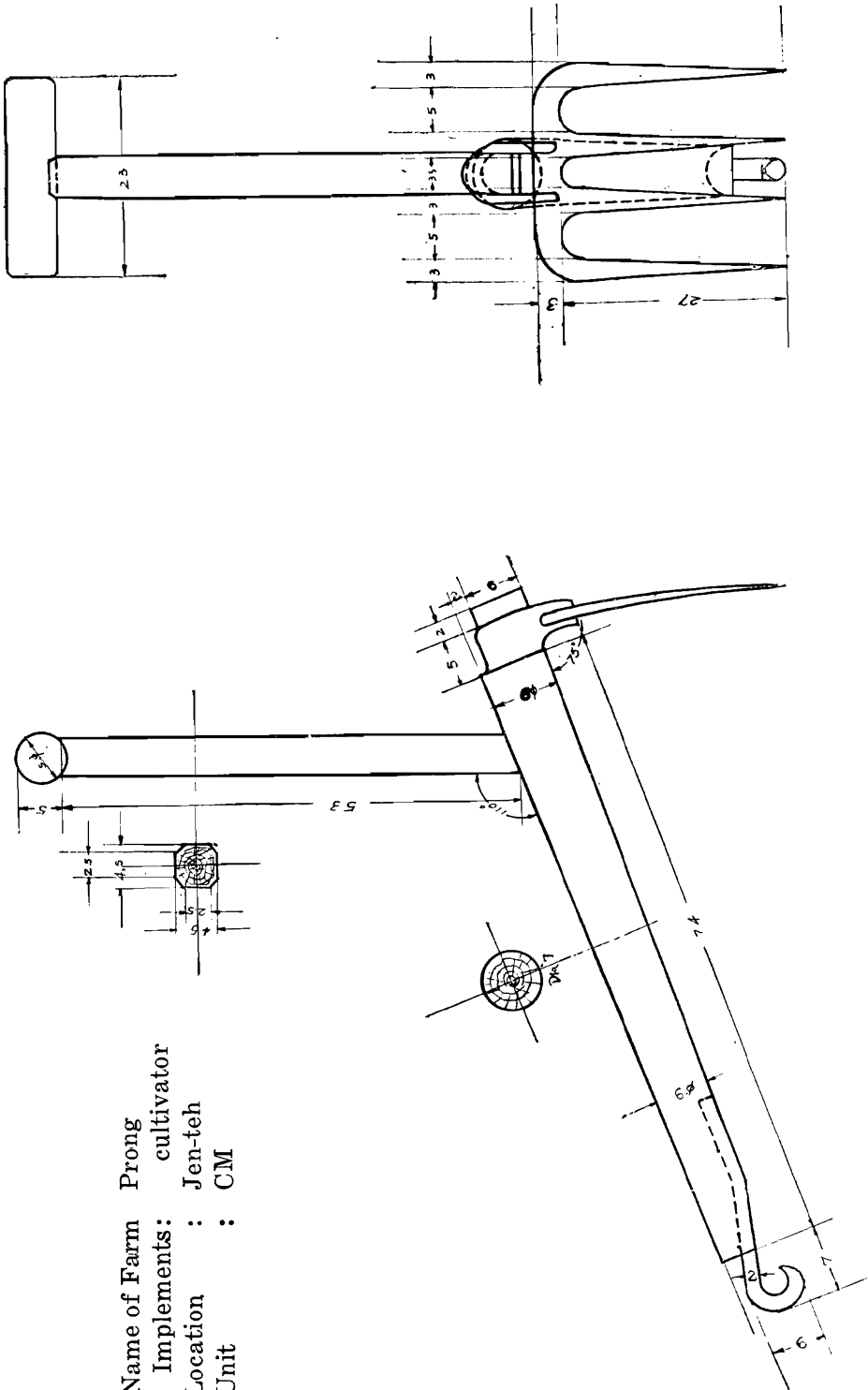
Name of Farm Furrow
Implements: cultivator
Location : Tainan
Unit : CM



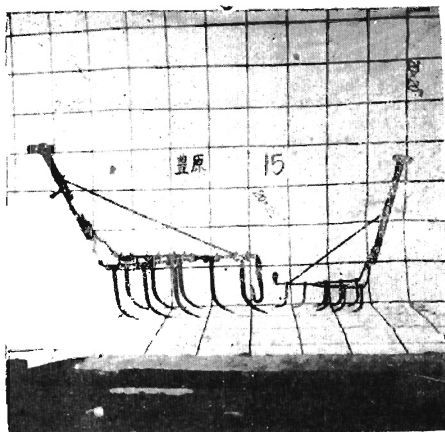
Classification :	Intertillage Implements
Name :	Prong cultivator 鐵耙
Cost :	NT\$50—70
Weight :	5.4—13.8 kg.
Usage :	For intertilling of beans, sweet potatoes, sugarcane, upland rice, jute and other crops.
Operating Power :	1 ox and one man
Material Used:	Prong and clevis—Soft steel Others parts—Wood
Season of Use:	Year round
Service Life :	5—10 years
Method of Application :	To be drawn by ox in front, man holds handle for control from behind.
Work Rate :	0.4—1.0 ha./day
Origin :	Traditional Chinese.
Remarks :	1. Efficiency is high. 2. It's functions differing from cultivator in the following points: (a) Also used for building ridges. (b) Can eradicate fine weeds. (c) Clod is large after cultivating.



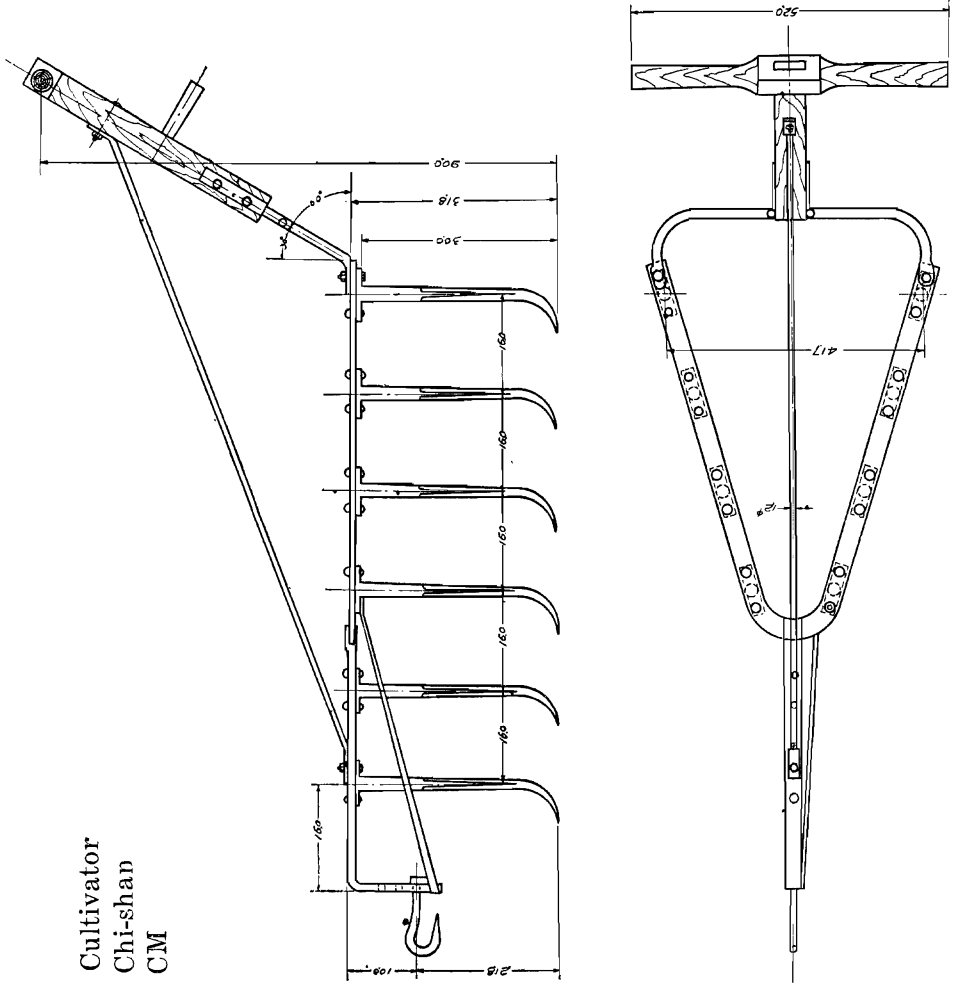
Name of Farm Prong
Implements: cultivator
Location : Jen-teh
Unit : CM



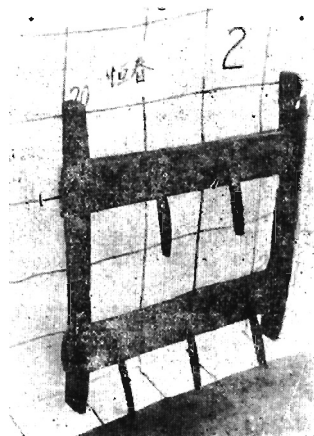
- Classification : Intertillage Implements
- Name : Cultivator 蜈蚣犁
- Cost : Large: NT\$100—130
Small: NT\$30
- Weight : Large: approx. 15 kg.
Small: approx. 3 kg.
- Usage : For intertilling, weeding, and covering fertilizers after application.
- Operating Power : Large: 1 ox and one man
Small: 1 man
- Material Used: Teeth—Steel
Handle—Wood
Others parts—Iron
- Season of Use: August to January.
- Service Life : 10—15 years, if teeth repaired yearly.
- Method of Application : Large: Drawn by ox; man presses down handle to work. To release clogging grass or stalks, lift handle.
Small: Pull cultivator by ropes strapped on shoulders walk in between paddy rows. This operation is required for planting tobacco before rice is harvested.
- Work Rate : Large: 0.4—1 ha./day
Small: 0.1 ha./day
- Origin : Created in Taiwan
- Remarks : 1. Suitable for light soil, if work on heavy soil, requires higher soil moisture content.
2. Efficiency is high.



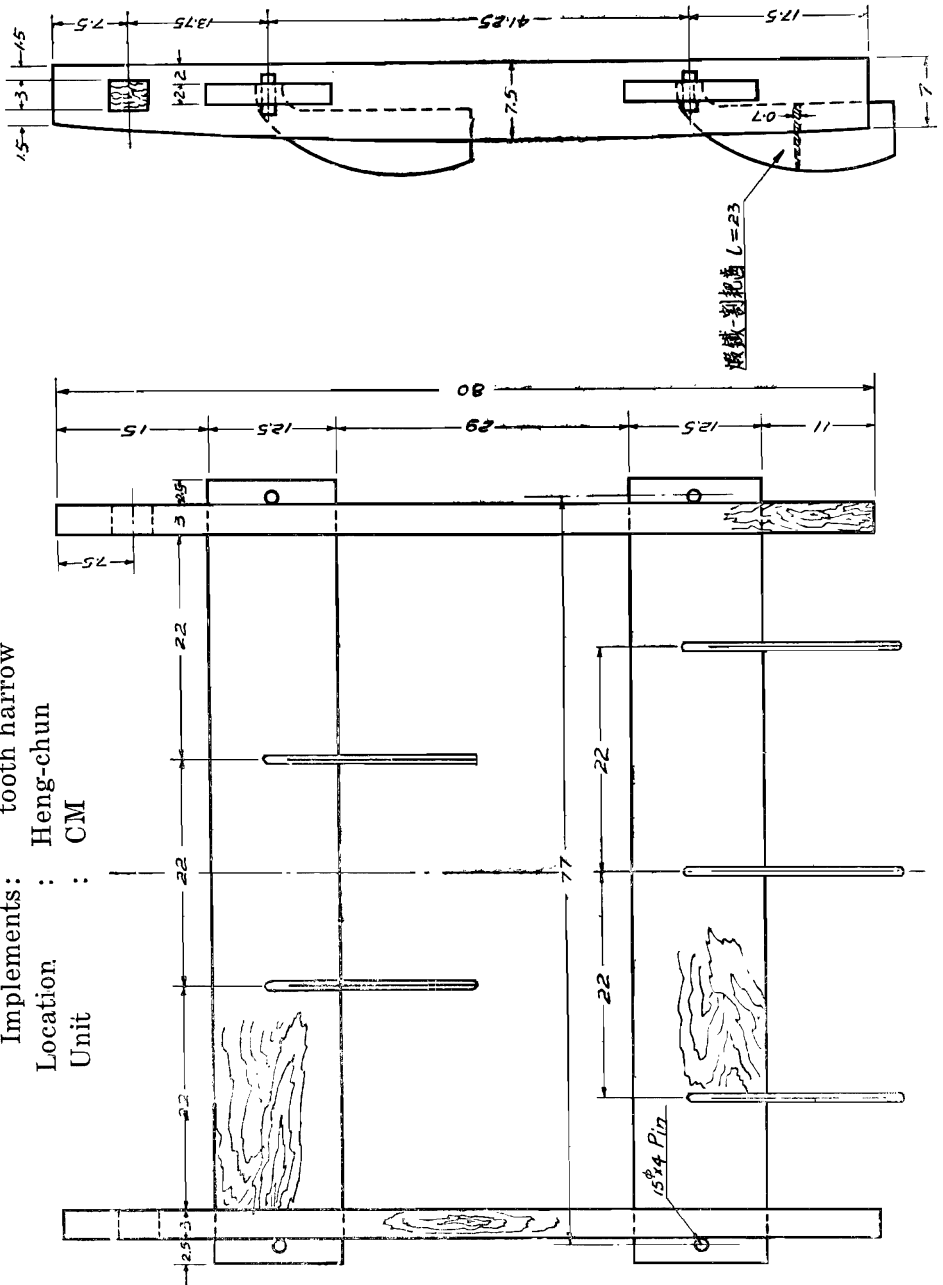
Name of Farm :
Implements :
Location :
Unit :



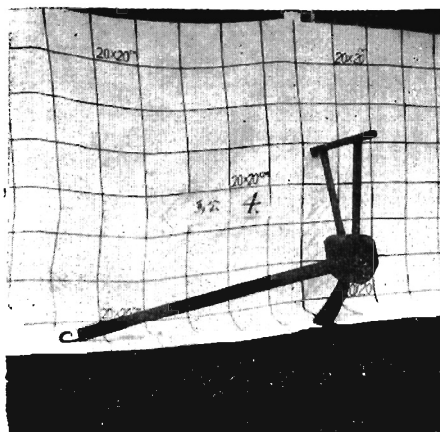
- Classification : Intertillage Implements
- Name : Between row knife tooth harrow 割耙仔
- Cost : NT\$30—40
- Weight : Approx. 7 kg.
- Usage : For intertilling and pulverizing sugarcane fields.
- Operating Power : 1 ox and one man
- Material Used: Knife blades—Wrought iron
Other parts—Wood
- Season of Use: December to March
- Service Life : About 10 years
- Method of Application : Stand on harrow frame drawn by ox. Harrow approximately 2 to 3 times along each row for good results.
- Work Rate : Approx. 1 ha./day
- Origin : Created in Taiwan about 150 years ago.
- Remarks : 1. Is narrow enough to pass through between sugarcane rows.
2. Can utilize body weight to bear down.



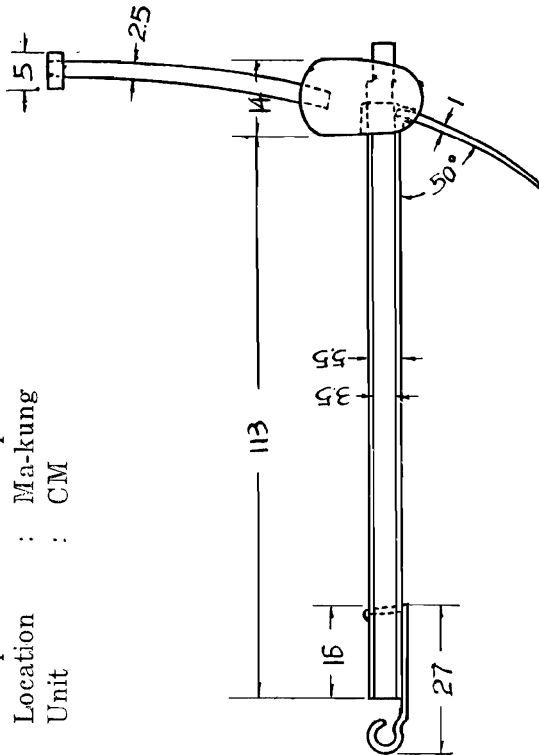
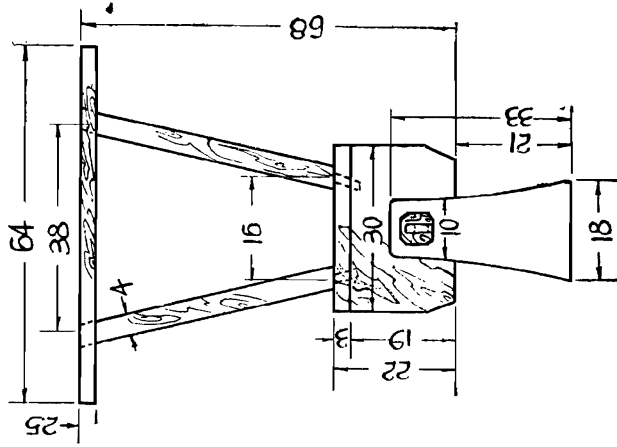
Name of Farm : Between row knife
 Implements : tooth harrow
 Location : Heng-chun
 Unit : CM



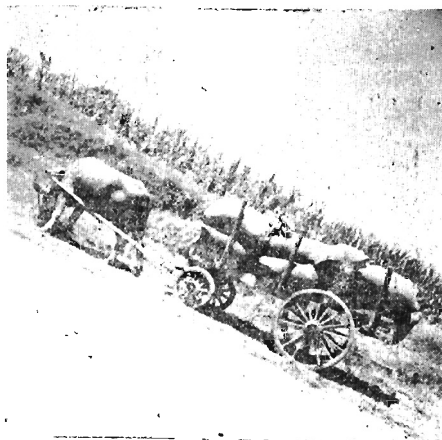
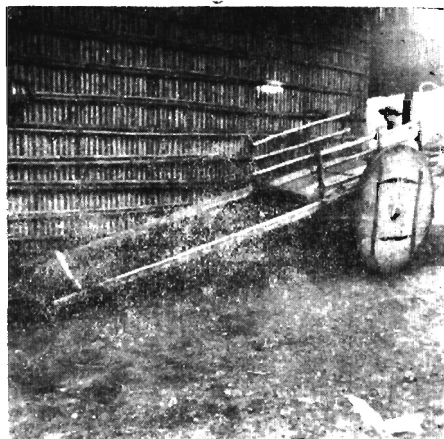
Classification : Harvesting Implements
 Name : Hoe plow 鋤頭犁
 Cost : Approx. NT\$100
 Weight : Approx. 1.2 kg.
 Usage : For digging peanuts, sweet potatoes and breaking up dry land.
 Operating Power : 1 ox and one man
 Material Used: Hoe blade and clevis—Soft steel
 Other parts—Wood
 Season of Use: July till November
 Service Life : About 7 years if repaired often
 Method of Application : Hitch plow onto evener drawn by ox. Before using this plow, excessive vegetations on land have to be cut and move away first.
 Work Rate : 0.2—0.3 ha./day
 Origin : Traditional Chinese.
 Remarks : 1. Plow up a very small strip.
 2. Cannot plow deeply.
 3. Do not turn soil.
 4. Sturdy, comparatively.
 5. Center of gravity tends to be at the lower back part.
 6. Hitch hook's opening turn upward.
 7. Use short handle hoe to dig up peanuts after field being opened and stirred by this implement.
 8. Special implement of Peng-hu.

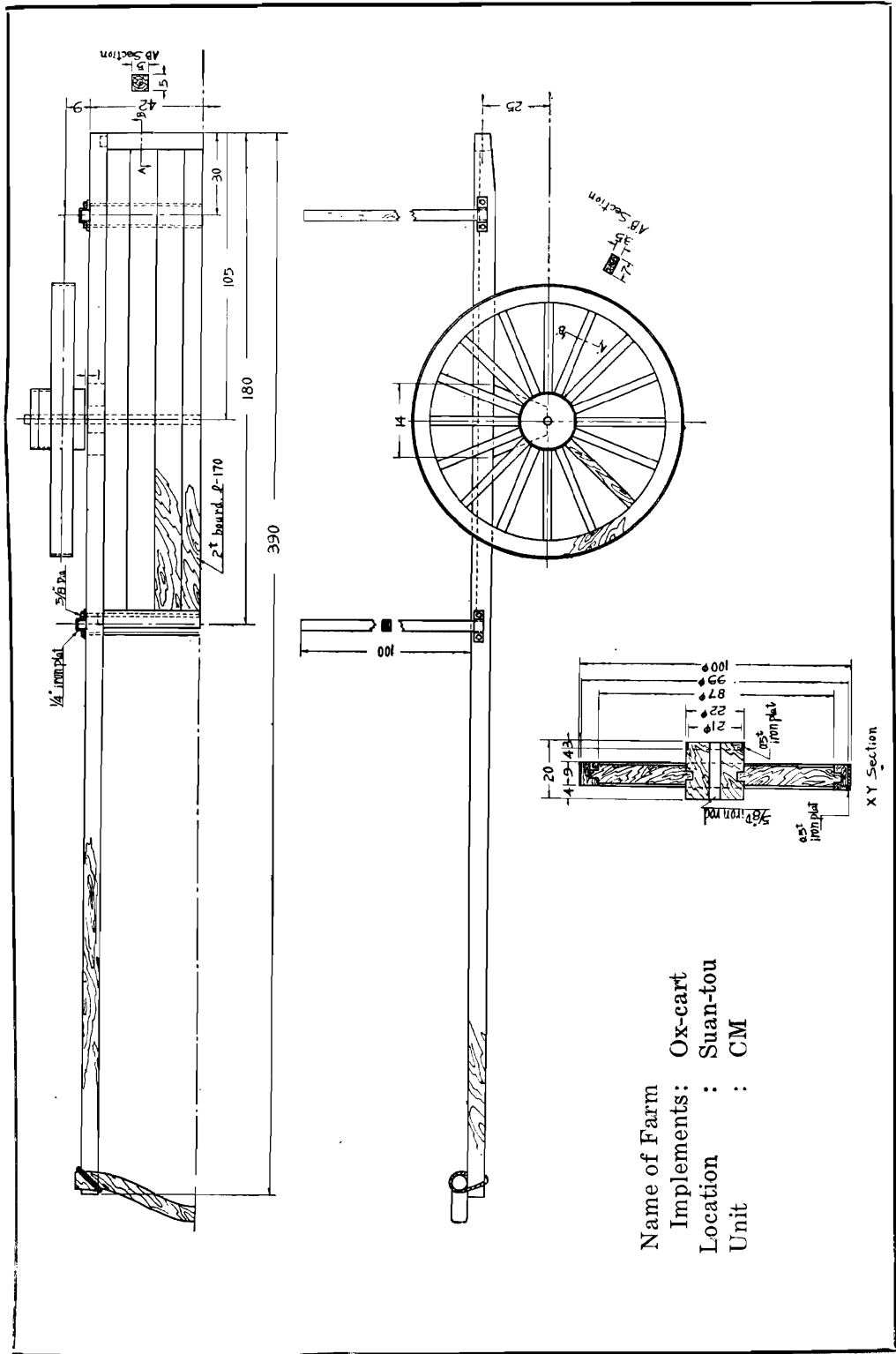


Name of Farm
Implements: Hoe plow
Location : Ma-kung
Unit : CM



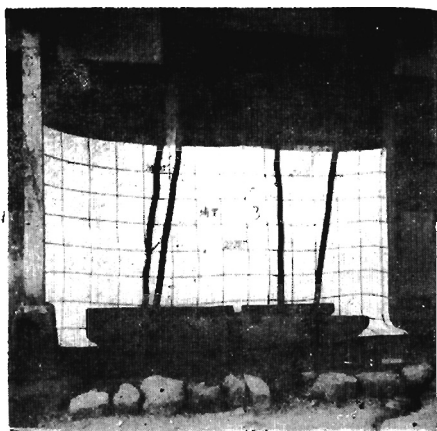
Classification : Transportation Equipment
 Name : Ox cart 牛車
 Cost : Approx. NT\$1000
 Weight :
 Usage : Serve all kinds of transportation purposes.
 Operating Power : 1—3 ox
 Material Used: Shaft and Bearing—Soft steel
 Wheel—Wood and steel or pneumatic tires
 Other parts—Wood
 Season of Use: Year round
 Service Life : About 15 years if repaired often
 Method of Application : Place yoke on ox's shoulder for hitching.
 Work Rate : 600—1500 kg./cart
 Origin : Traditional Chinese.
 Remarks : 1. Cost is low; ox is the driving power.
 2. Able to go into fields.
 3. Can travel on rugged or muddy roads.
 4. If width of tires is too narrow, road will be damaged.
 5. Cart may have 2 or 4 wheels. There are three types of wheels: solid wooden wheel with iron tire, wooden spoke wheel with iron tire or pneumatic tire.





Name of Farm :
 Implements : Ox-cart
 Location : Suan-tou
 Unit : CM

Classification : Transportation Equipment
Name : Sled carrier 木馬
Cost : NT\$50—60
Weight : Approx. 60 kg.
Usage : For transport goods on sloping roads.
Operating Power : 1 ox
Material Used: Four 5/8" iron rods
All other parts—Wood
Season of Use: Year round
Service Life : 2—3 years
Method of Application : Hitch onto draft animal
Work Rate : Up slope 300 kg./load
Down slope 600 kg./load
Origin : Traditional Chinese (originally used in logging stations)
Remarks : 1. Can transport on inclined slopes and narrow paths.
2. Cheap.
3. Easily damaged; loading capacity is limited.
4. Equipment used in Pu-li and other aboriginal territories.



Classification : Devices for Employing Draft Animal

Name : Yoke 牛担

Cost : NT\$10—15

Weight : Approx. 1.5 kg.

Usage : To transmit drafting power to the load.

Operating
Power :

Material Used: Wood or bamboo

Season of Use: Year round

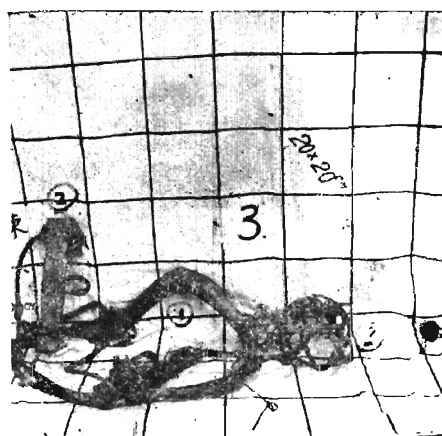
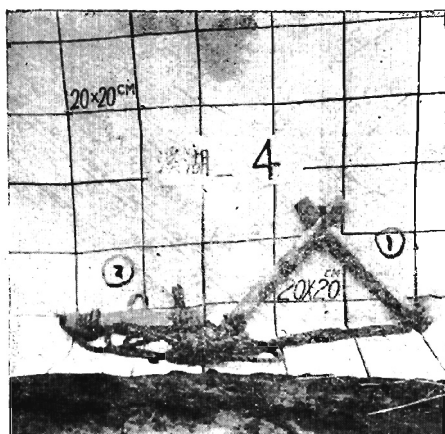
Service Life : Ordinary yoke—15 years
Adjustable yoke—5 years

Method of
Application : Hang yoke in front of ox's shoulder. Fasten ox bows around ox's neck onto yoke to prevent yoke from slipping off.

Work Rate :

Origin : Traditional Chinese.

Remarks : 1. Ordinary yokes are sturdy; but curvature large and do not fit ox snugly.
2. The curvature on the adjustable yoke can be arranged to fit the neck and shoulder of ox but service life is short.

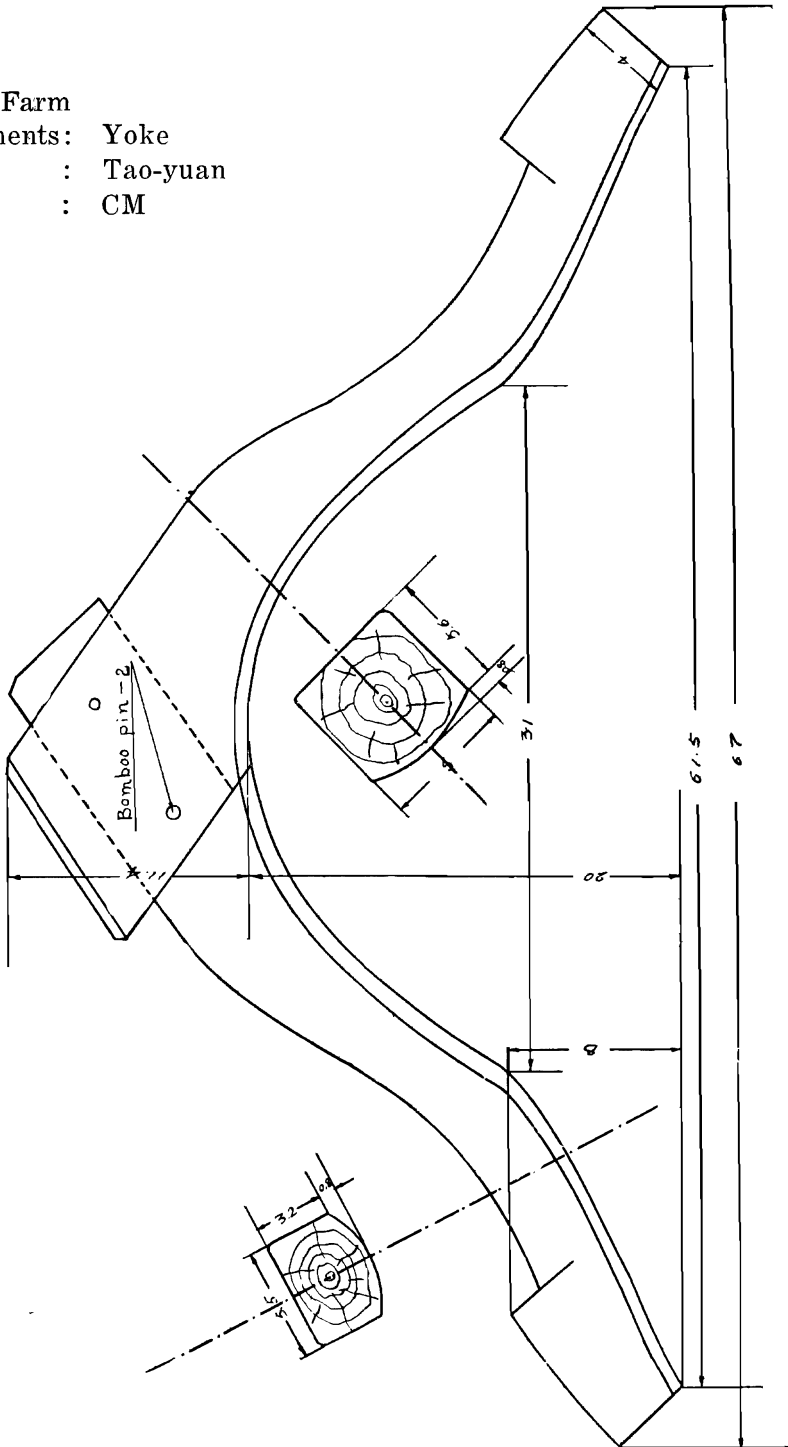


Name of Farm

Implements: Yoke

Location : Tao-yuan

Unit : CM



Classification : Devices for Employing Draft Animal

Name : Evener 牛後蹄

Cost : Approx. NT\$5

Weight : Approx. 1 kg.

Usage : For even transmission of power to load.

Operating Power :

Material Used: Evener—Wood
Hitching ring—Soft steel

Season of Use: Year round

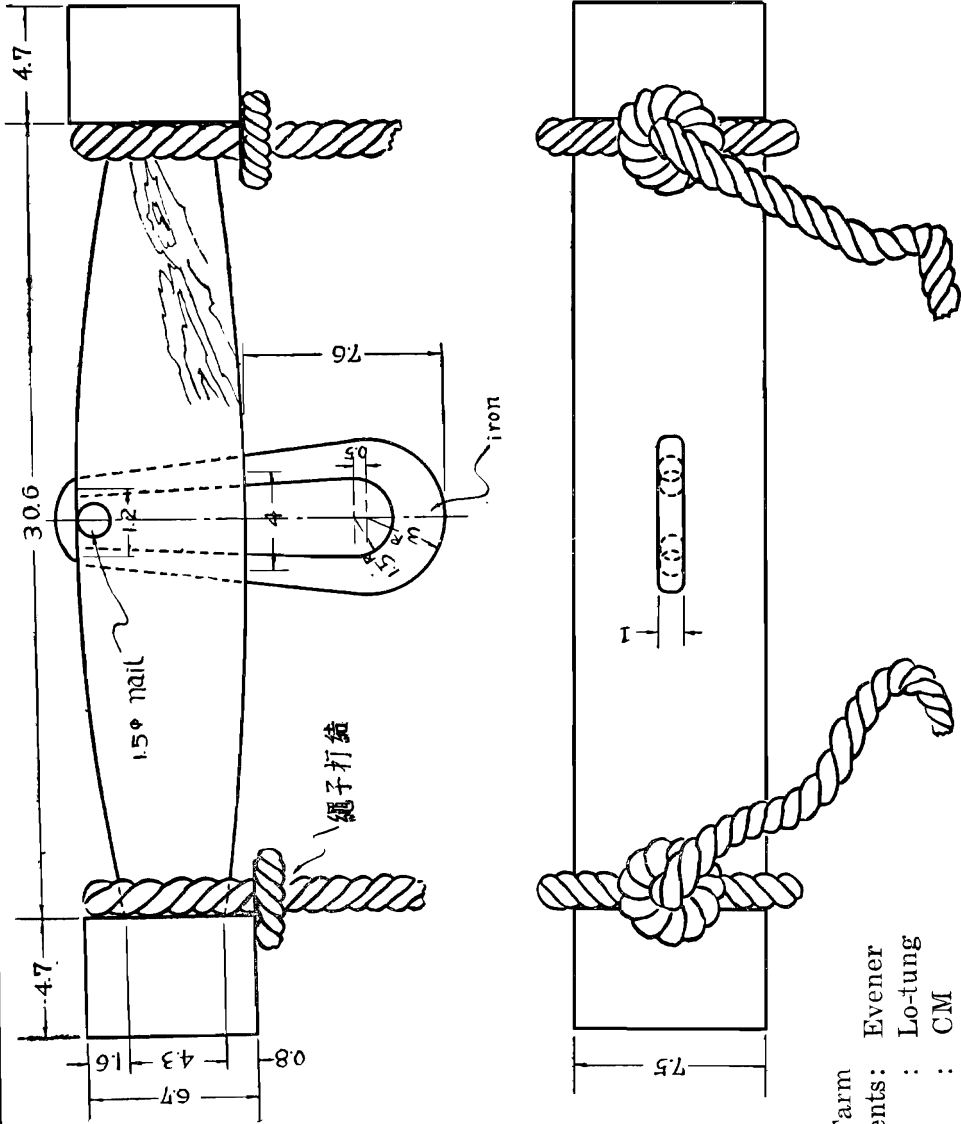
Service Life : About 10 years

Method of Application : Tie harness ropes onto yoke, hitch onto clevis of implement.

Work Rate :

Origin : Traditional Chinese.

Remarks : 1. Fasten harness so it will not tangle ox's feet.
2. There is team evener in addition to the above mentioned individual animal's evener.
3. Light weight, will not affect the smooth going of both cattle and implement.



Name of Farm : Evener
 Implements : Lo-tung
 Location :
 Unit : CM

Classification : Devices for Employing Draft Animal

Name : Ox muzzle 牛嘴籠

Cost : Approx. NT\$1

Weight : Approx. 0.15 kg.

Usage : To cover ox's mouth prevent it from eat up crops while working.

Operating
Power :

Material Used: Bamboo strips or rattan

Season of Use: While intertilling and harvesting sweet potato.

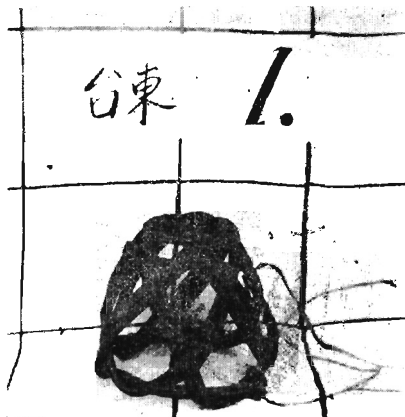
Service Life : About 2 years

Method of
Application : Use strings to fast muzzle onto horns loosely.

Work Rate :

Origin : Traditional Chinese.

Remarks :



Classification : Devices for Employing Draft Animal

Name : Nose ring (for ox) 牛鼻環

Cost : Metal NT\$2
Ramie NT\$1

Weight : 0.040—0.080 kg.

Usage : To control ox from disobeying order.

Operating
Power :

Material Used: Ring—Bronze
Wire—Iron

Season of Use: Year round

Service Life : 5 years

Method of
Application : When ox is 2 or 3 years old, bore a hole through nasal septum and fasten a nose ring through it. Tie ring with rope to pull ox.

Work Rate :

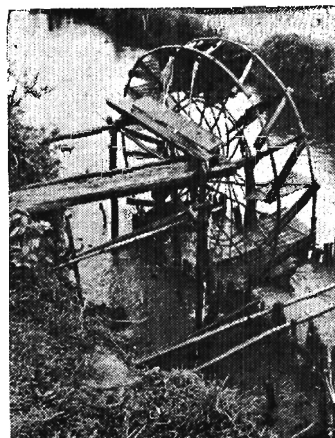
Origin : Traditional Chinese.

Remarks : 1. Cattle is more docile when wearing nose ring.
2. Rattan nose rings are used among aboriginal tribes.

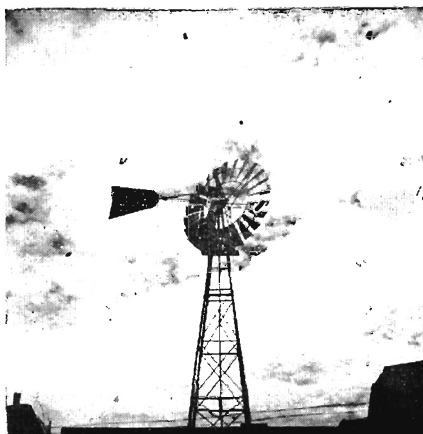
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III. Water and Wind Powered Farm Implements

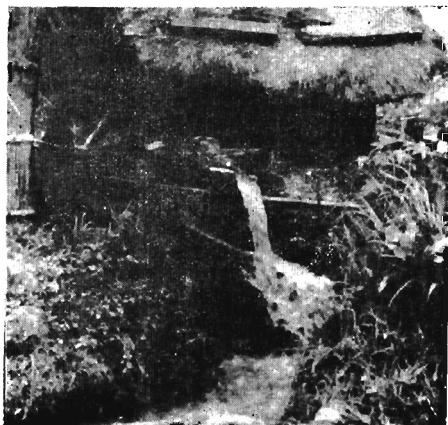
Classification : Irrigation Equipment
Name : Water wheel 筒車
Cost : Approx. NT\$300
Weight : Uncertain
Usage : To lifting water for irrigate fields
Operating Power : Water current
Material Used: Water-trough and stand—Wood
 Other parts—Bamboo
Season of Use: Year round
Service Life : 2—3 years if repaired often
Method of Application : Place water wheel into a river or stream. The current will push vane-blades to rotate wheel, filling up water tubes with water and moving upward till they reach the top then starting to pour water into the trough which conducts water to fields through canals or ducts.
Work Rate : Approx. 1 ha./Unit
Origin : Traditional Chinese.
Remarks : 1. No power cost.
 2. Suitable for irrigating small area.
 3. There are different sizes, varying from 2.5 to 10 meters in diameter.

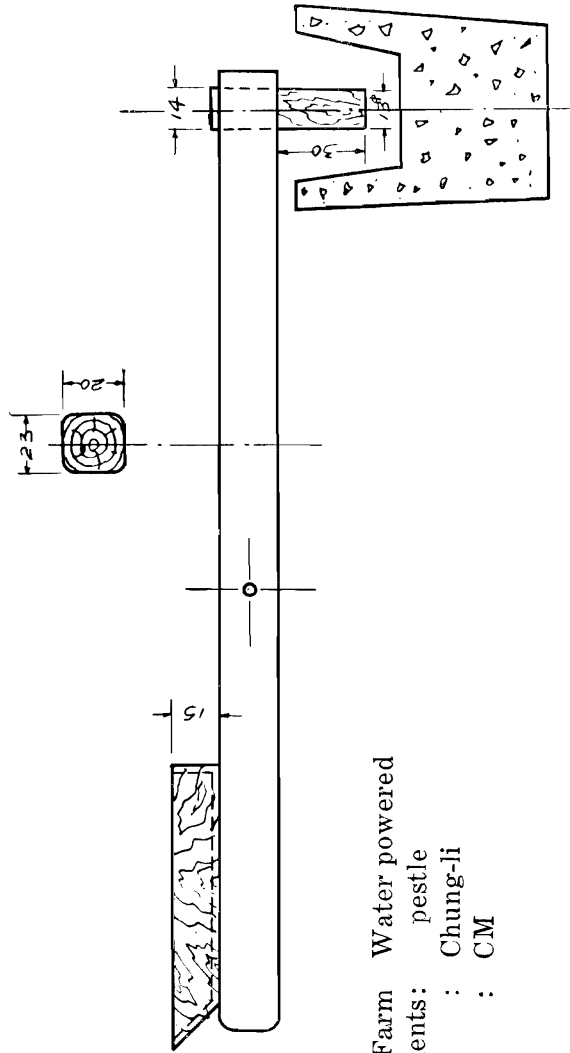
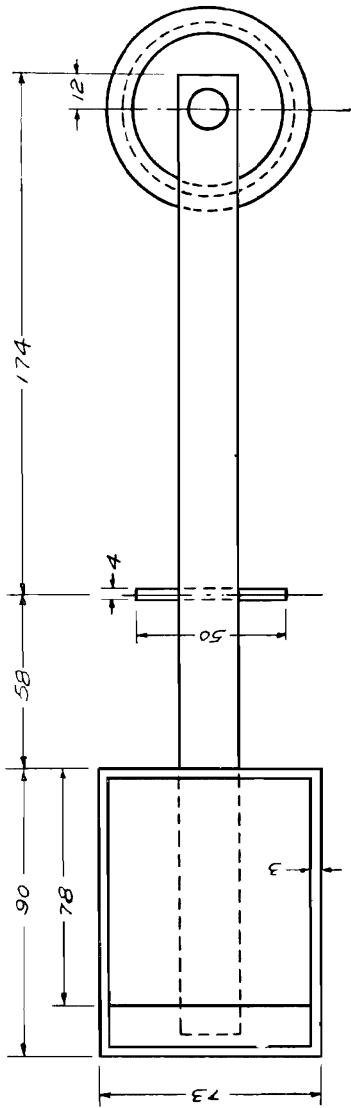


Classification	: Irrigation Equipment
Name	: Wind mill 風車
Cost	: NT\$7,000—8,000
Weight	:
Usage	: Lift water, for farmstead use, for fish culture ponds, and also for small scale irrigation.
Operating Power	: Wind
Material Used:	Tower—Angle irons Vane blades—Heavy gauge galvanized sheet Pump gears—Cast iron
Season of Use:	Year round
Service Life	: About 30 years
Method of Application	: Install wind mill about 20 ft. higher than the surrounding structures and trees. Connect the mill with piston pump to lift water to tank or pond for various uses.
Work Rate	:
Origin	: Introduced from foreign countries.
Remarks	: 1. Start to work at wind velocity 4 m/sec. 2. Usually used on shallow wells. 3. A tank or reservoir is necessary as there might be windless period in a day. 4. There is only one workable windmill now left in Tainan.



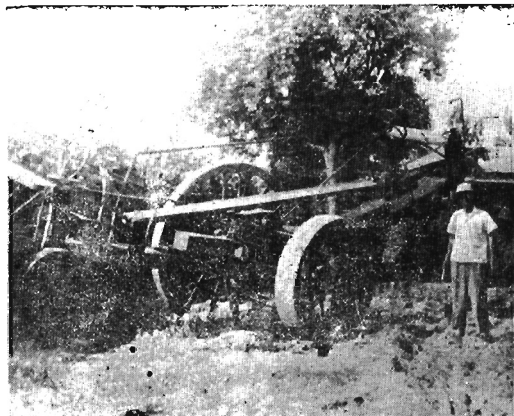
Classification : Processing Equipment
 Name : Water powered pestle 水碓
 Cost : Apprix. NT\$100
 Weight :
 Usage : For polishing rice
 Operating Power : Water currents
 Material Used: Mortar, pestle—Stone
 Rotating shaft—Soft steel
 Other parts—Wood
 Season of Use: Year round
 Service Life : About 20 years if repaired yearly
 Method of Application : Water is conducted into trough. The weight of inflow will left pestle. The level will automatically release water while pistle reached the top position. Pestle will pound down to the mortar while water released. Repeat this action to perform work.
 Work Rate : Approx. 20 liter of rice/mortar
 Origin : Traditional Chinese.
 Remarks : 1. Utilizes potential difference of small streams
 2. No direct cost for power.
 3. Mortar and pestle are installed in the house to protect from damage and theft.





Name of Farm : Water powered
 Implements: : pestle
 Location : : Chung-li
 Unit : : CM

Classification	:	Land Preparation Machineries
Name	:	Steam plow 蒸汽犁
Cost	:	Unknown
Weight	:	
Usage	:	1. For deep plowing. 2. For building ridges. 3. For pulverizing soil. 4. For compacting soil.
Operating Power	:	Steam engine, 120—250 HP.
Material Used:		Iron and steel
Season of Use:		1. June to August 2. 3. 4. Jan to April
Service Life	:	Over 40 years if well cared and replace worn parts timely
Method of Application	:	Line up 2 steam engines along an upland field. Tie wire rope between two engine to drag plow, roller, harrow by winding winch. Operate back and forth to prepare land.
Work Rate	:	Gang plow: 6 ha./day Heath plow: 3 ha./day Roller, Harrow: 12 ha./day
Origin	:	Introduced from Germany and England
Remarks	:	1. Can deep plow to about 60 cm. 2. Service life is long. 3. Can build ridge up to 0.5 m. high. 4. Heavy and clumsy to move. 5. Requires 7 men to operate; 2 foremen. 2 plow and winch operators and 3 engine operators. 6. Refilling water and coal inconvenient. 7. Must gather up cane leaves before operation. 8. Not difficult to repair. 9. Gradually become obsolete.

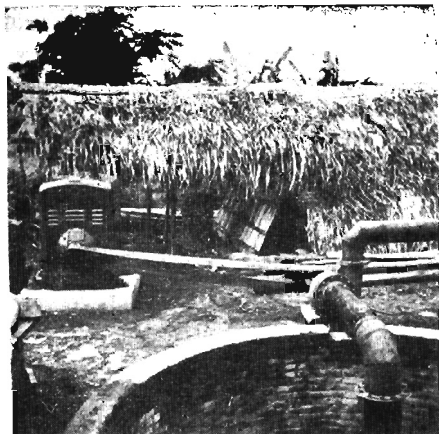


IV. Mechanical Powered Farm Implements

Classification :	Land Preparation Machineries
Name :	Agricultural tractor 農用曳引機
Cost :	NT\$35,000—80,000 (for small and medium size wheel tractor, vary with size)
Weight :	1500—3800 lbs.
Usage :	Serve as farm power for both movable and stationary works.
Operating Power :	Gas engine or diesel engine
Material Used:	Steel, iron, rubber etc.
Season of Use:	Year round
Service Life :	10—15 years
Method of Application :	Attach working implement to tractor for field operations, use pulley and belt for stationary work.
Work Rate :	A 20 H.P. tractor will out work 5—6 water buffaloes on dry land.
Origin :	Introduced from foreign countries.
Remarks :	<ol style="list-style-type: none"> 1. Efficiency high. 2. Can perform work that can not be done with either man power or animal power. 3. Crawler type tractors of 50—100 H.P. are also used for reclamation of new land and very deep plowing of gravel land. 4. Mostly used in sugarcane plantations of Taiwan Sugar Corporation.



- Classification : Irrigation Equipment
- Name : Centrifugal pump 離心抽水機
- Cost : NT\$500—1000 without engine, (vary with size)
- Weight :
- Usage : To lift water for irrigation.
- Operating Power : Electrical motor, diesel engine or tractor power-take-off.
- Material Used: Steel and iron
- Season of Use: Year round
- Service Life : 10—15 years
- Method of Application : Install pump beside a pond, river or well with a lifting head no more than 20 feet, conduct lifted water to canal through pipe.
- Work Rate : A 4" pump with 5 HP. prime mover, will lift about 3000 cubic meter water per hour (lift height 20') able to take care of seven hectares of paddy field.
- Origin : Introduced from foreign countries.
- Remarks : Local made ones are also available now.



Classification : Plant Protection Equipment

Name : Power sprayer 動力噴霧機

Cost : NT\$3,000

Weight :

Usage : Spray liquid form insecticides to control plant pests and diseases.

Operating Power : Gasoline engine or kerosene engine

Material Used: Steel and iron

Season of Use: Year round (depends on crop raised)

Service Life : 10 years

Method of Application : Start engine to build up pressure and open spray gun to spray thoroughly on plant for effective control.

Work Rate : 3—10 gal. per min. vary with pressure and nozzle size

Origin : Introduced form foreign countries, after restoration.

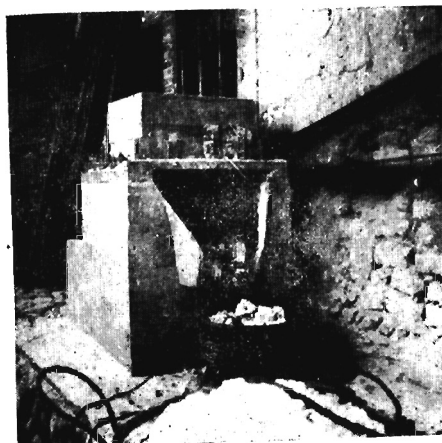
Remarks : In Taiwan, only 1—3 H.P. sprayers are now in use, mostly on a community project basis.



Classification	: Processing Equipment
Name	: Ramie decorticating machine 苧麻剥皮機
Cost	: Approx. NT\$1,000
Weight	:
Usage	: For decorticate ramie, jute, and sisal.
Operating Power	: 1½—5 H.P. motor or engine
Material Used:	Iron and steel
Season of Use:	June, September and December
Service Life	: About 10 years
Method of Application	: Insert 3 or 4 sticks of freshly cut ramie, jute, or sisal leaves into machine (tip-end first). The core and flesh will be crushed by rotating grinder, and produce crude fibers.
Work Rate	: Dry fibers approx. 75 kg./day
Origin	: Introduced from foreign countries.
Remarks	: 1. Hard on the hands to hold on. 2. Fiber production rate lower than if peeled by hand, owing to heavy losses.



Classification : Processing Equipment
 Name : Cassava mill 樹薯絞
 Cost : Approx. NT\$500
 Work Rate :
 Usage : For grinding sweet potatoes and cassava.
 Operating Power : 3 H.P. motor
 Material Used: Frame—Brick and cement
 Milling roller, shaft—cast iron, soft ste
 Season of Use: Year round
 e Life : 10—20 years, wearing parts has to be replaced timely
 Method of Application : Place cassava in mill; the milling roller, that propelled by belt and pulley, will crush and grind cassava. The grounded cassava will drop down to receptacle to be carried away for starch making.
 Work Rate : Cassava approx. 1200 kg./day
 Origin : Introduced from foreign countries after restoration.
 Remarks : 1. Very efficient.
 2. Design simple.
 3. Speed 1400—1500 RPM.
 4. Starch producing rate is 24—28%, of rough cassava.
 5. Used in Nan-tou Hsien.



ERRATA

for

**A Preliminary Study of Farm Implements
Used in Taiwan Province**

Page number (or indications of location)	Line	Error	Correction
Notes to the readers	10	All	Most of
Reference	6	Iapanese	Japanese
3	7	through	thorough
3	35	commisioned	commissioned
3	42	book on titled	book titled
4	13	Check-row	check-row
7	4	Watering spray pot	Sprinkling water pot
8	18	looming stool	looming rack
8	21	114. Back carrying hook frame	104. Grain storing bamboo mat
8	32	hock	hook
18	1	Outfit	outfit
22	2	narrow	narrower
23	15	Sickle	sickle
24	36	one-handle	one-handed
25	4	pull	rear
31	5	maker	marker
31	11	implecents	implements
31	22	Check-row	check-row
37	26	manufacturing	manufacturing
41	19	steal	steel
42	22	Irrigation spraying pot	Sprinkling water pot
44	last column 6th row	Ilan	Yilan
46	first column 4th row	Watering spray pot	Sprinkling water pot
49	36	slicer	slicing machine
51	35	circumstan	circumstances

Page number (or indications of location)	Line	Error	Correction
All tables between pages 53-103	first column 7th item	Material used	Material used
53	14	m3/day	m3/day
53	16	digginv	digging
57	14	m3/day	m3/day
57	18	twoman	two men
68	12	from the furrow and furrow and hilling up	from the furrow, and hilling up
76	10	Transplanting	transplanting
82	13	seedbed basket	seedbed/basket
82	15	protectinf	protection
85	14	basket tub	basket/tub
85	17	scralching	scratching
87	9	bshrdcmfwecf cmfcm	(should be omitted)
87	11	smugly	snuggly
93	11	to dro seeds	to drop seeds
97	17	one an to	one man to
105	10	afer	after
107	8	Weeder—Shaving edge, steel blade; connecting part, iron.	Weeder: shaving edge —steel; blade and con- necting part—iron.
111	19	conecting	between
115	5	intertillage	intertilling
150	6	car	cart
150	13	car	cart
151	Opposite (1) near the right hand margin	(nothing)	(2).
164	5	sugar cane	sugar cane seed pieces
168	1	Protecton	Protection

Page number (or indications of location)	Line	Error	Correction
169	24	bun	but
177	Name of farm implements	Harvesting hoe	Digging hoe
184	8	used—rice sickle	—used rice sickle
191	2	siece	sieve
197	11	ahe	the
205	12	from in front	from front
207	5	clear	clean
207	21	reluca	reduce
209	2	Pice	Rice
217	10	till noon	from morning to noon
225	15	60 kg./day	600 kg./day
226	14	600 kg./day	6000 kg./day
230	2	rack	looming rack
253	14	Conventonal	Conventional
254	13	Conventionally	Conventional
258	10	rain-boat	rain-coat
269	11	hande	handle
271	20	ony	only
273	7	anl	and
287	23	assemgle	assemble
313	5	trasnport	transport
Cover page for Section III.		Placed between pages 322 & 323	Should be placed between pages 321 & 322
Cover page for Section IV.		Placed between pages 326-327	Should be placed between pages 325-326
331	7	ste	steel

(The End)

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