

1

2

AT MICROFICHE
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A project of Volunteers in Asia

Sled-Type Corrugator/Irrigation-Furrow Former
ITDG Agricultural Equipment and Tools No. 14

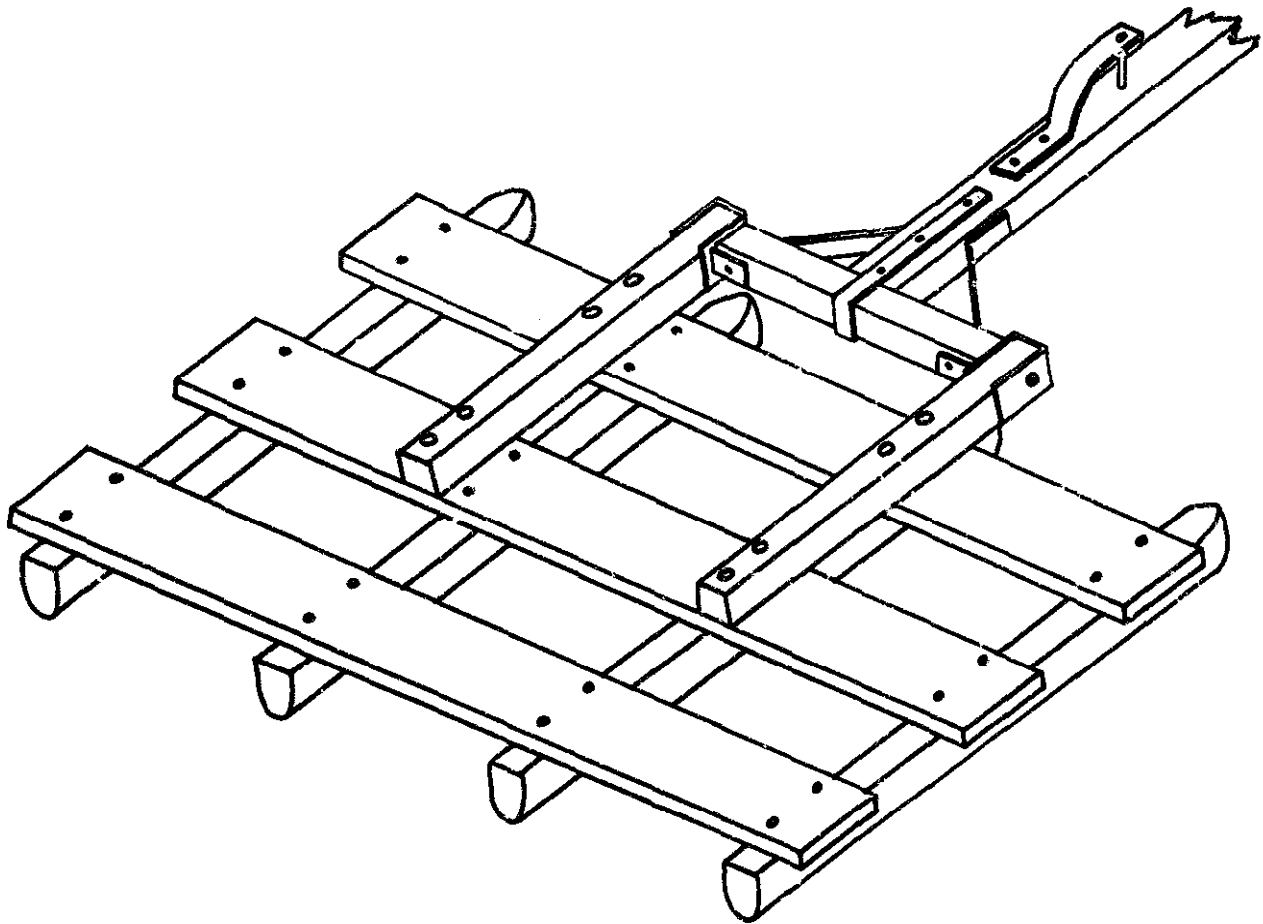
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SLED-TYPE CORRUGATOR/
IRRIGATION-FURROW FORMER

SLED-TYPE CORRUGATOR/IRRIGATION-FURROW FORMER

SOURCE: United States Department of Agriculture,
Soil Conservation Service.

DESCRIPTION: The function of this implement is to make small furrows,
or corrugations, for distributing water over a field.

The corrugations are run down the slope of the land. This
implement can be used after the field has been broadcast
seeded or before row-crop planting.

For maximum water carrying capacity, the inside surfaces of
the corrugations should be compressed and smooth. To achieve
this, ballast can be added to the implement as required.

The spacing of the corrugations will depend upon how rapidly the
the water moves laterally through the soil. The lighter the
soil texture, the wider apart the corrugations can be.

The implement design shown can be modified in size to suit
animal-draught or tractor-hitching as required.

Note: The figures in brackets are in millimetres.

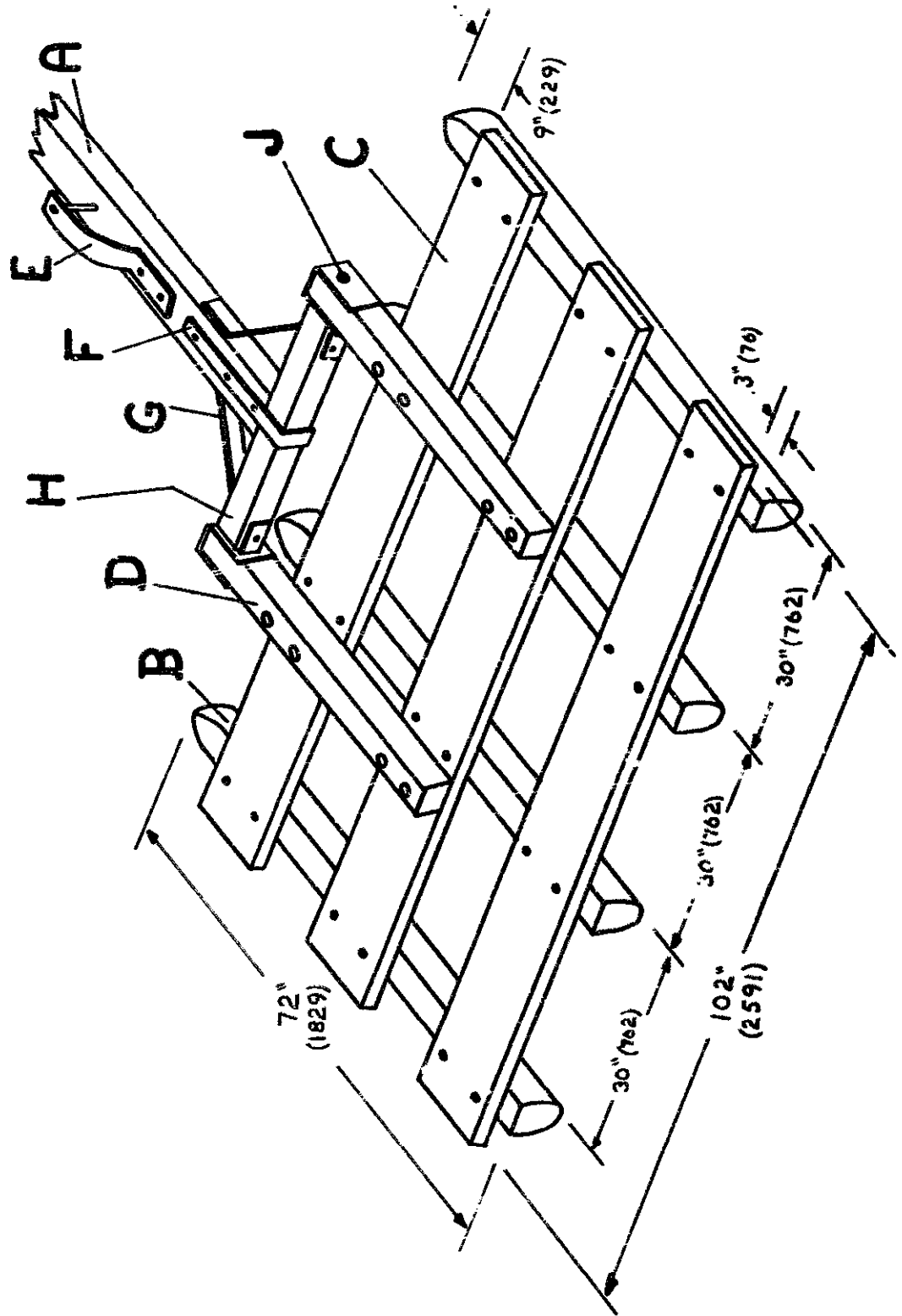
KEY:

<u>ITEM</u>		<u>QUANTITY</u>	<u>ITEM DESCRIPTION</u>
A	DRAUGHT SHAFT	1	4" x 6" (102 x 152) wooden beam of desired length.
B	RUNNERS	4	4" x 6" (102 x 152) hard wood, 72" (1829) long. Steel points can be fitted to the leading ends.
C	CROSS BOARDS	3	2" x 12" x 102" (51 x 305 x 2591) wooden board.
D	SHAFT CONNECTOR	2	4" x 4" x 48" (102 x 102 x 1219) wood, leading end reinforced with $\frac{1}{4}$ " x 4" x 16" (6.3 x 102 x 406) strap iron.
E	CLEVIS	1	$\frac{1}{4}$ " x 2 $\frac{1}{2}$ " x 12" (6.3 x 63 x 305) strap iron.
F	SHAFT STRAP	1	$\frac{1}{4}$ " x 1 $\frac{1}{2}$ " x 36" (6.3 x 38 x 914) strap iron.
G	SHAFT BRACE	2	$\frac{1}{4}$ " x 2" x 36" (6.3 x 51 x 914) strap iron.
H	CROSS PIECE	1	4" x 4" x 34" (102 x 102 x 864) wooden beam, reinforced with $\frac{1}{4}$ " x 4" x 16" (6.3. x 102 x 406) strap iron at each end.

J CROSS PIECE SCREWS 2 $\frac{7}{8}$ " (16) diameter steel screw,
12" (305) long.

BOLTS AND SCREWS

<u>QUANTITY</u>	<u>SIZE</u>	<u>PURPOSE</u>
1	$\frac{3}{4}$ " x 8" (19 x 203)	For attaching 'animal-draught' doubletree to clevis.
2	$\frac{3}{8}$ " x 6" (9.5 x 152)	Clevis to draught shaft.
7	$\frac{1}{2}$ " x 6" (12.5 x 152)	Shaft to cross piece.
8	$\frac{1}{8}$ " x 8" (9.5 x 203)	Shaft connectors to cross boards.
24	$\frac{5}{16}$ " x 8" (8 x 203)	Cross boards to runners.



15

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Single-Row and Three-Row Rice Seeders
ITDG Agricultural Equipment and Tools No. 15

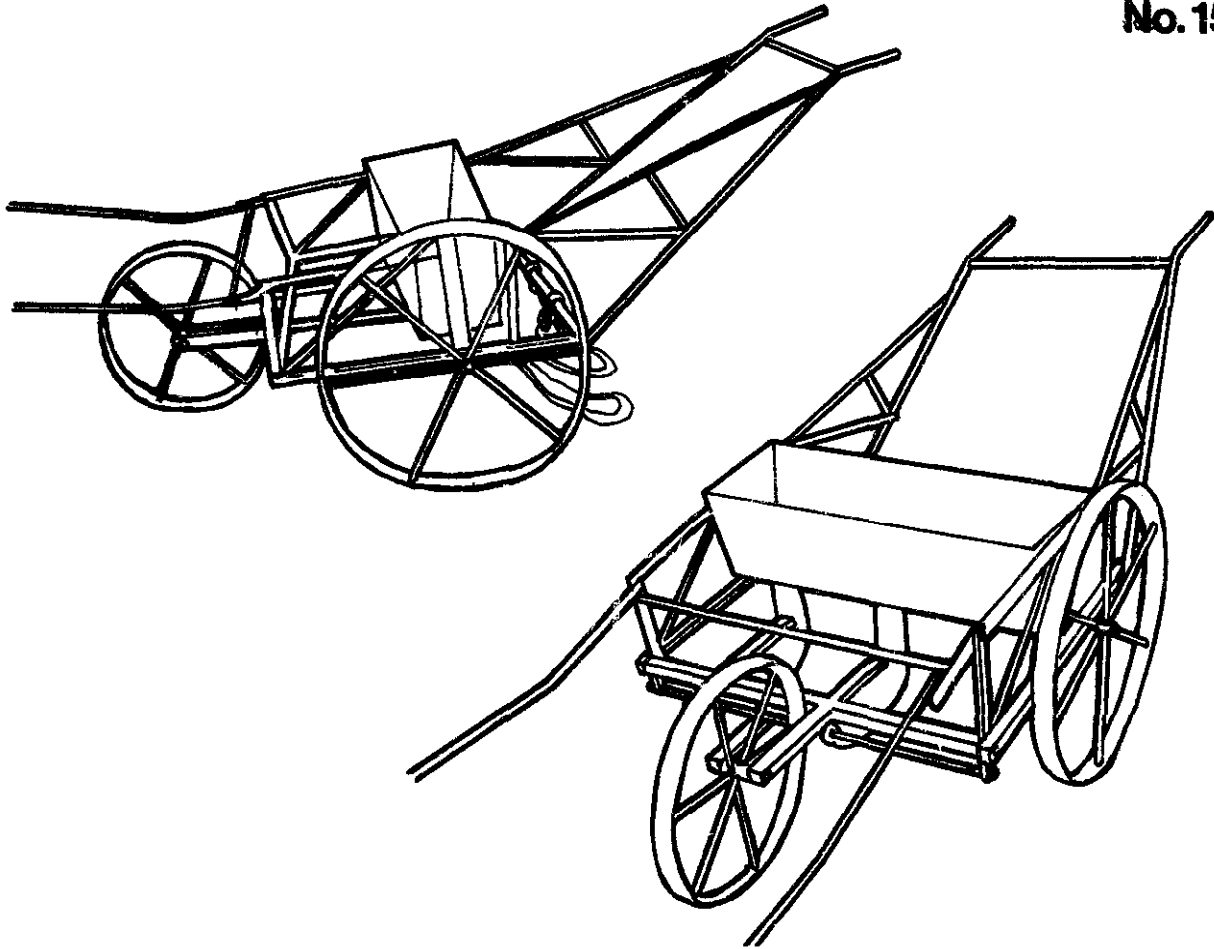
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SINGLE-ROW AND THREE-ROW
RICE SEEDERS (ZAMBIA)

**LOCALLY - BUILT SINGLE - ROW
RICE SEEDER**

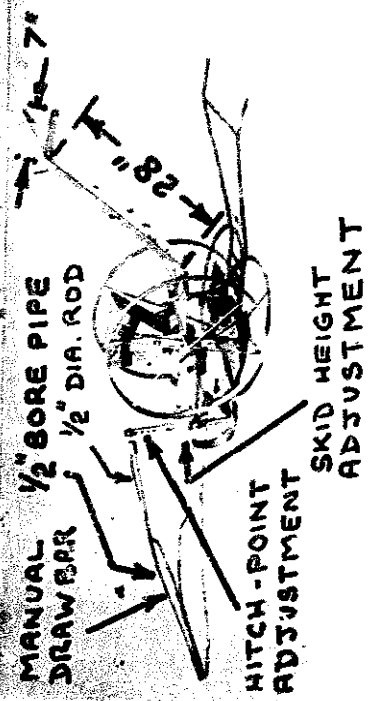


FIG. P.1.

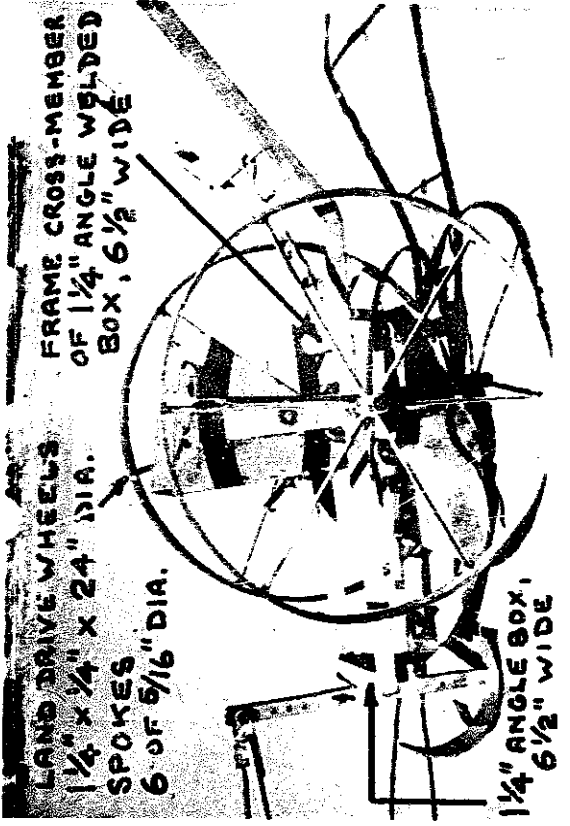


FIG. P.2.

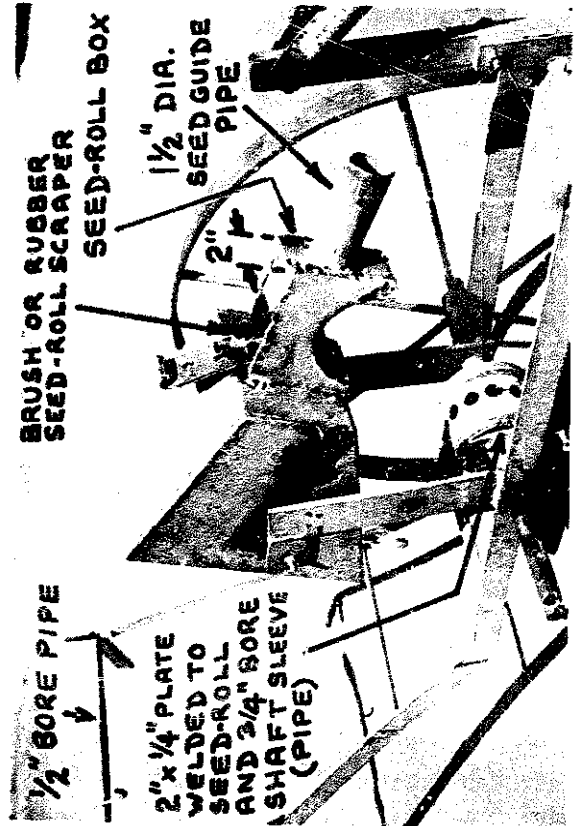


FIG. P.3.

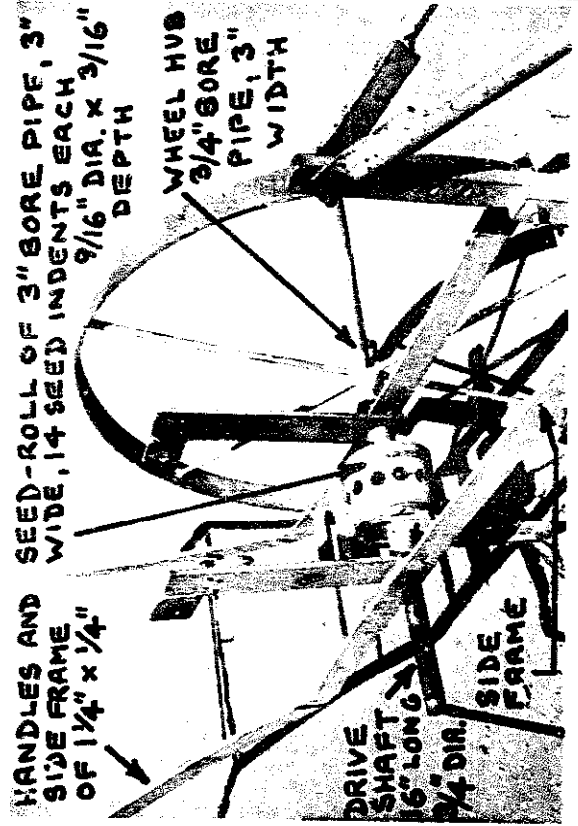


FIG. P.4.

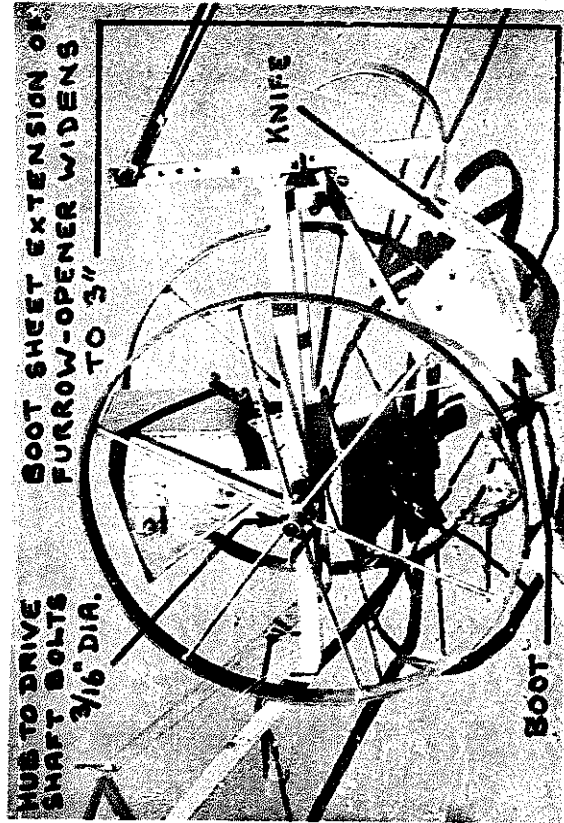


FIG.
P. 6.

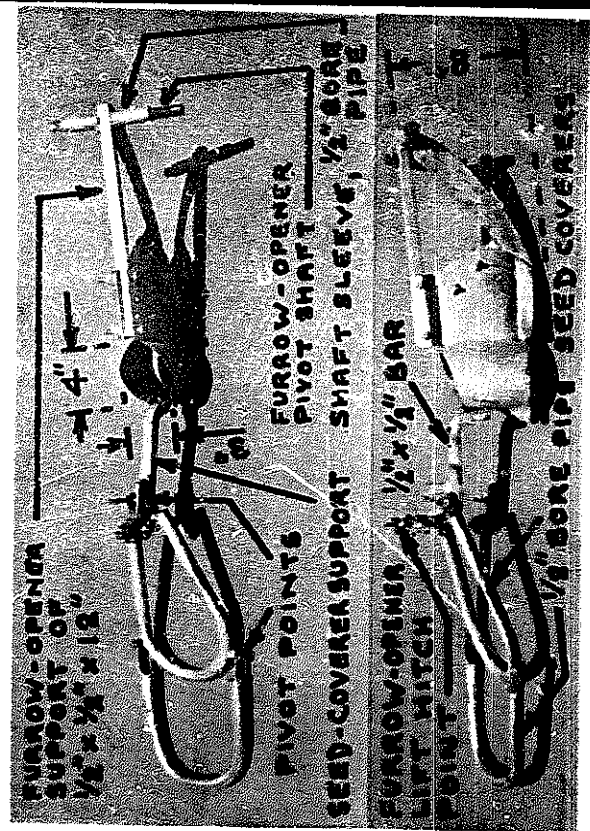


FIG.
P. 8.

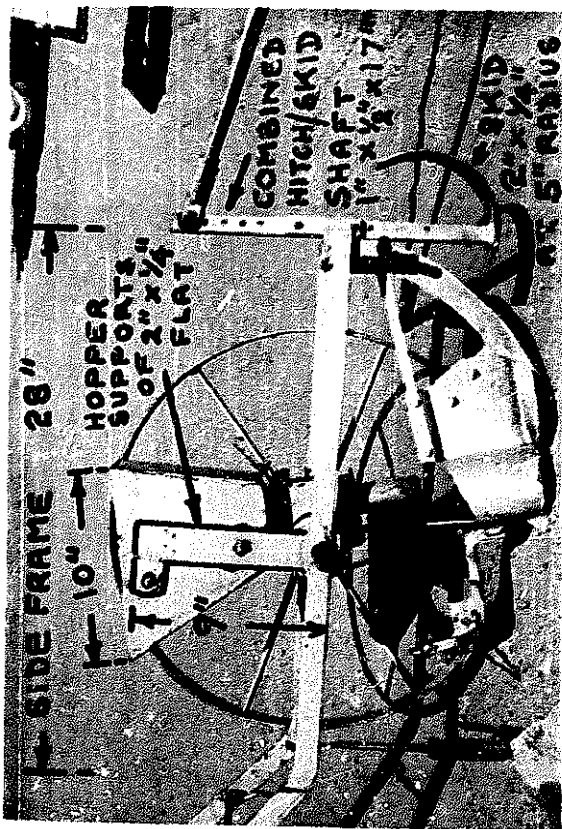


FIG.
P. 5.

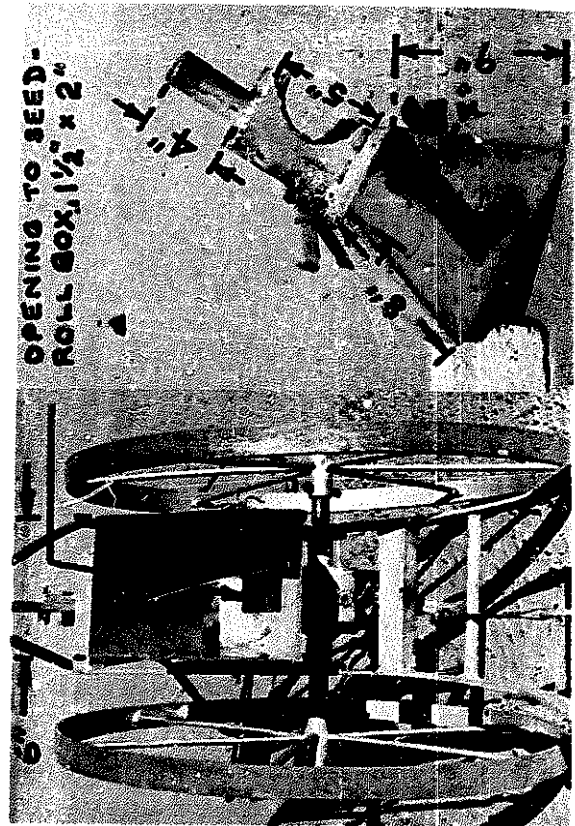


FIG.
P. 7.

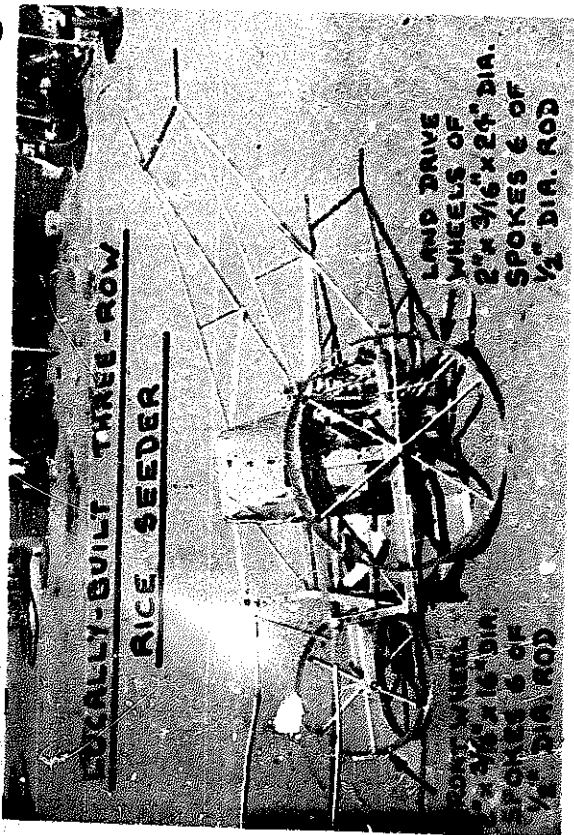


FIG.
P.9.

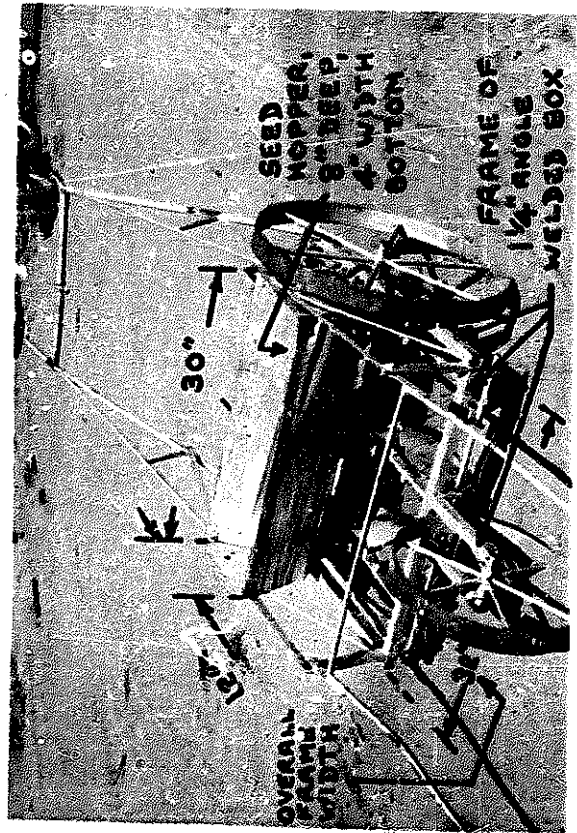


FIG.
P.10.

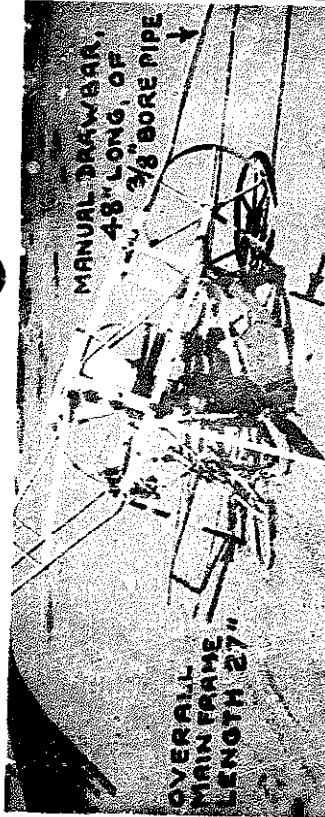


FIG.
P.11.

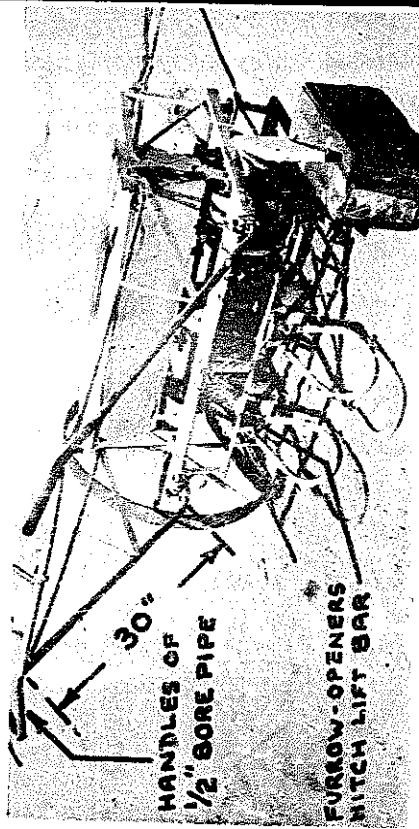


FIG.
P.12.

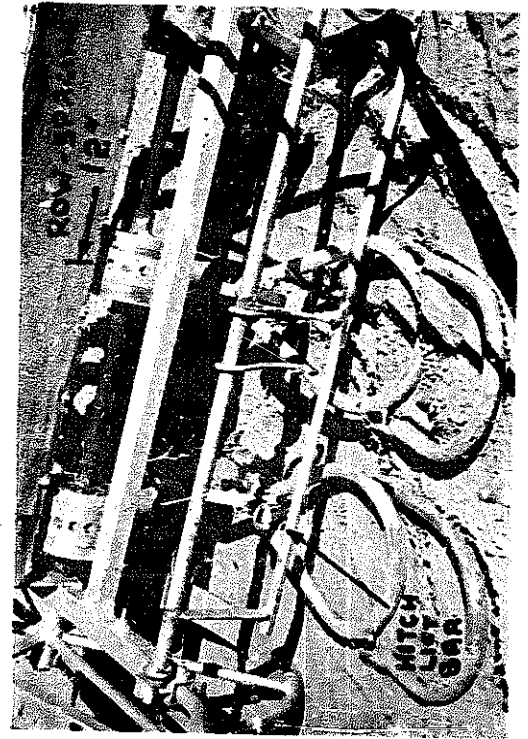


FIG.
P.13.

16

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A project of Volunteers in Asia

Rotary Weeder for Row-Planted Rice
ITDG Agricultural Equipment and Tools No. 16

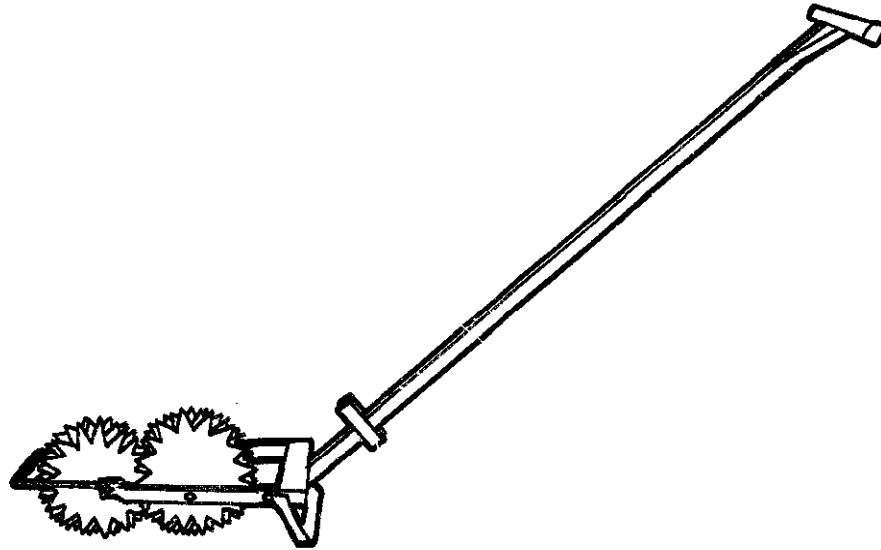
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ROTARY WEEDER
FOR ROW-PLANTED RICE

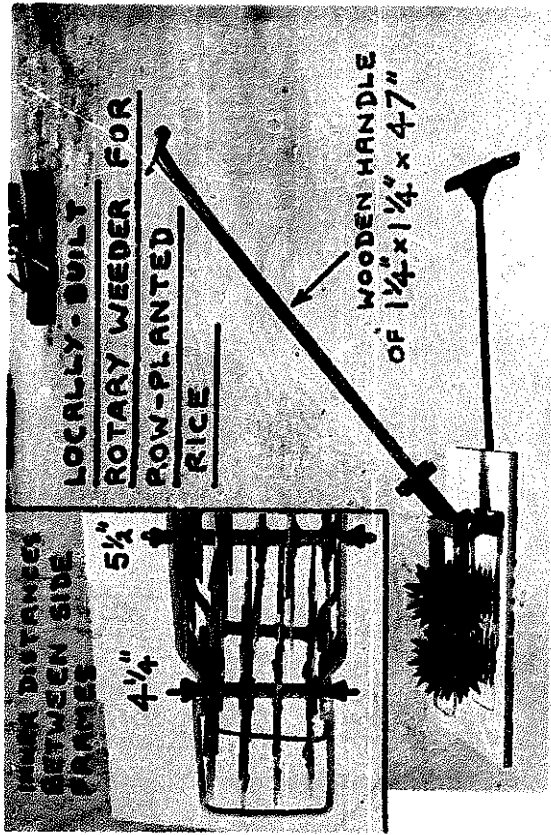


FIG.
W.1.

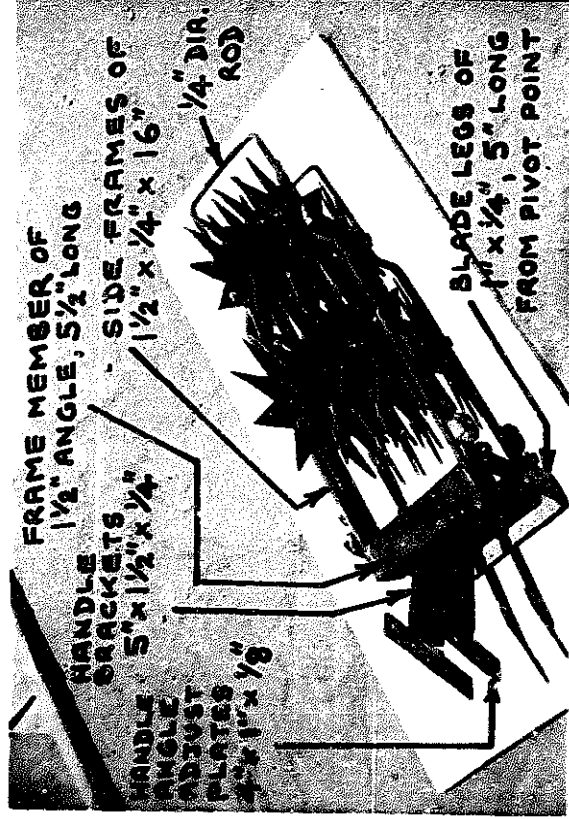


FIG.
W.2.

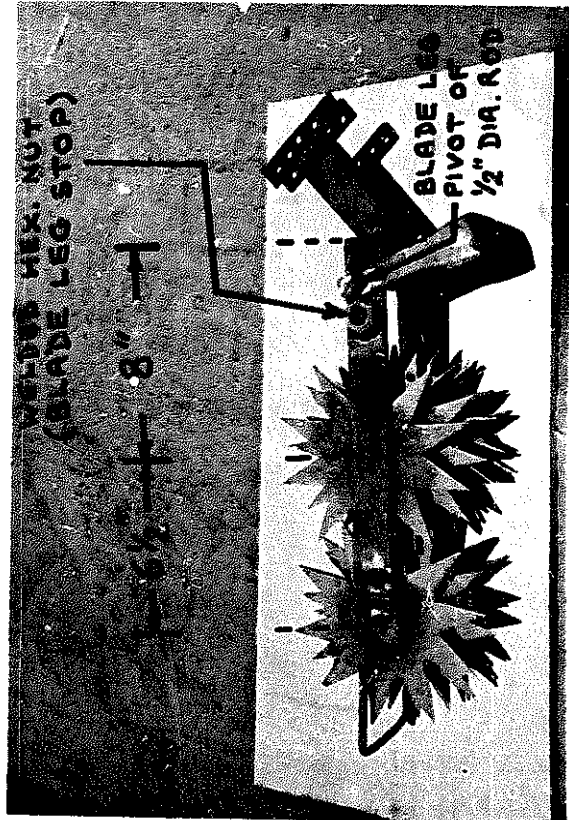


FIG.
W.3.



FIG.
W.4.

17

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A project of Volunteers in Asia

Multi-Action Paddy-Field Puddling Tool
ITDG Agricultural Equipment and Tools No. 17

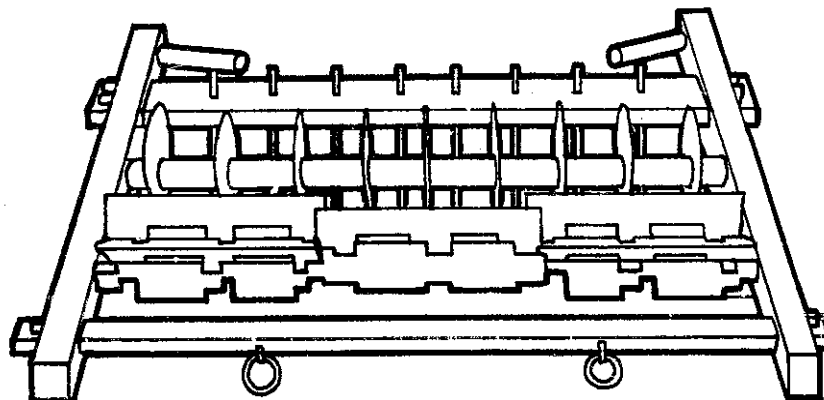
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MULTI-ACTION PADDY-FIELD
PUDDLING TOOL (JAPAN)

MULTI-ACTION PADDY FIELD PUDDLING TOOL, SUITABLE FOR LOCAL CONSTRUCTION.

FIG.
CP.1.

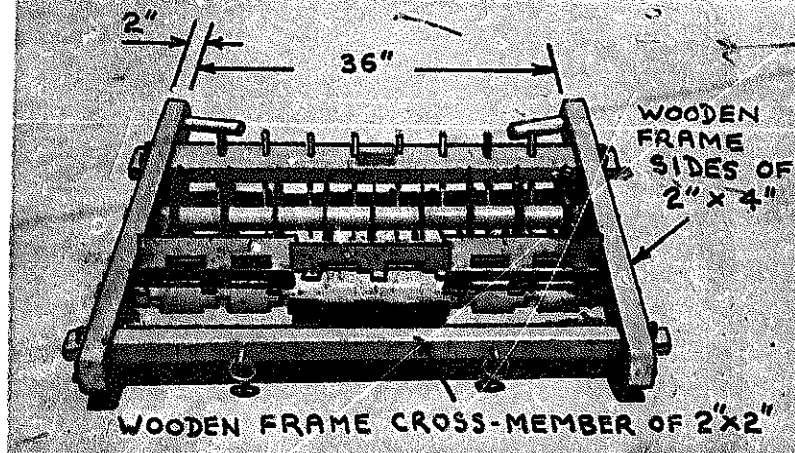
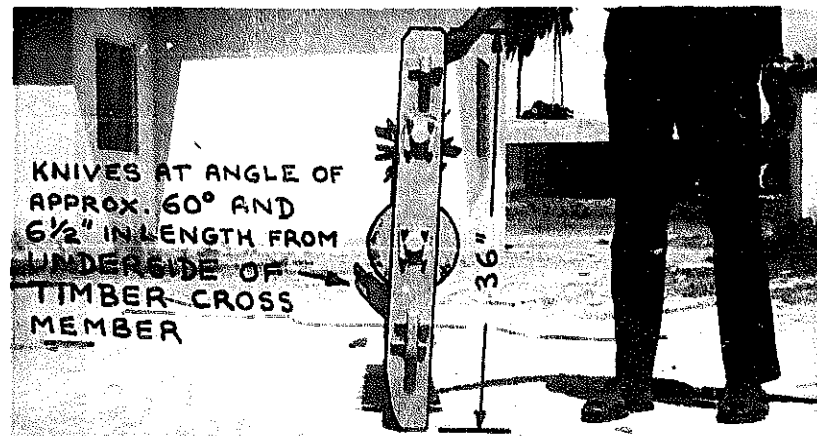


FIG.
CP.3.



KNIVES AT ANGLE OF APPROX. 60° AND 6 1/2" IN LENGTH FROM UNDERSIDE OF TIMBER CROSS MEMBER

FIG.
CP.2.

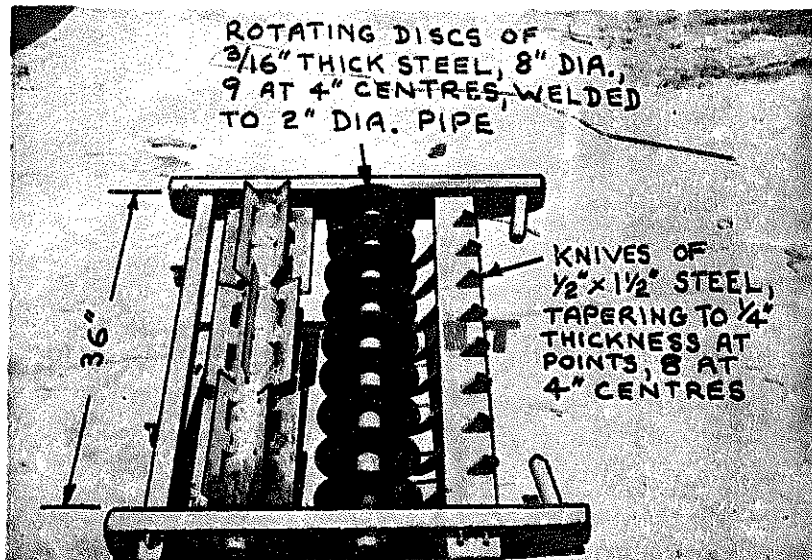


FIG.
CP.4.

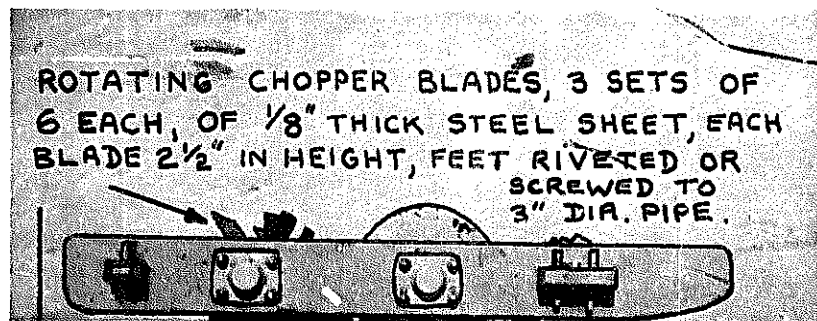
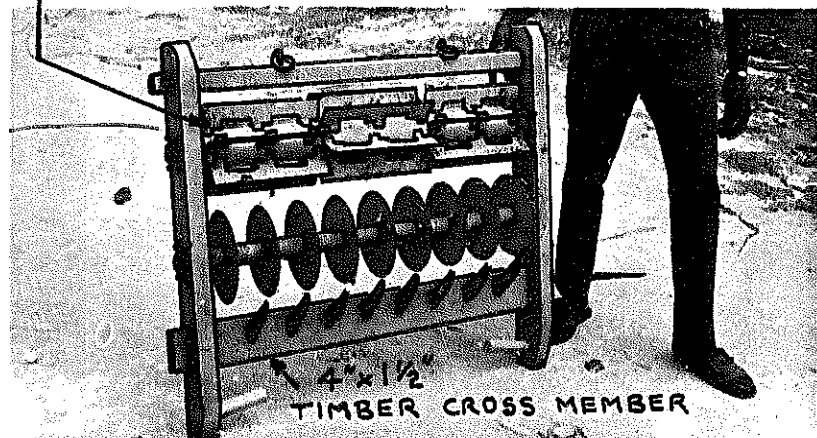


FIG.
CP.5.



4" x 1 1/2" TIMBER CROSS MEMBER

27

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Cassava Grinder

ITDG Agricultural Equipment and Tools No. 27

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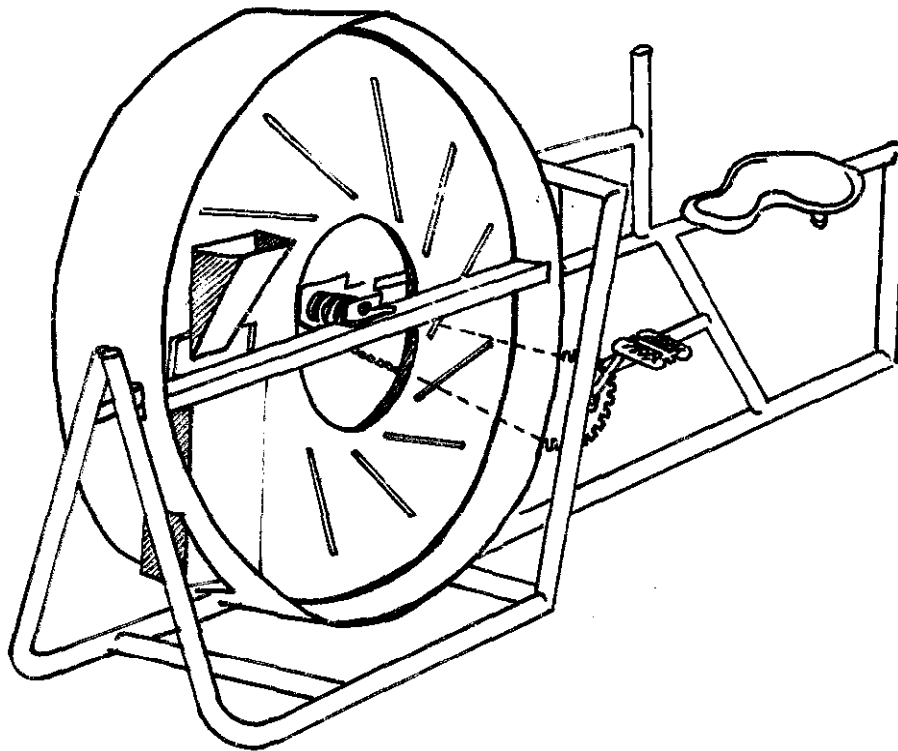
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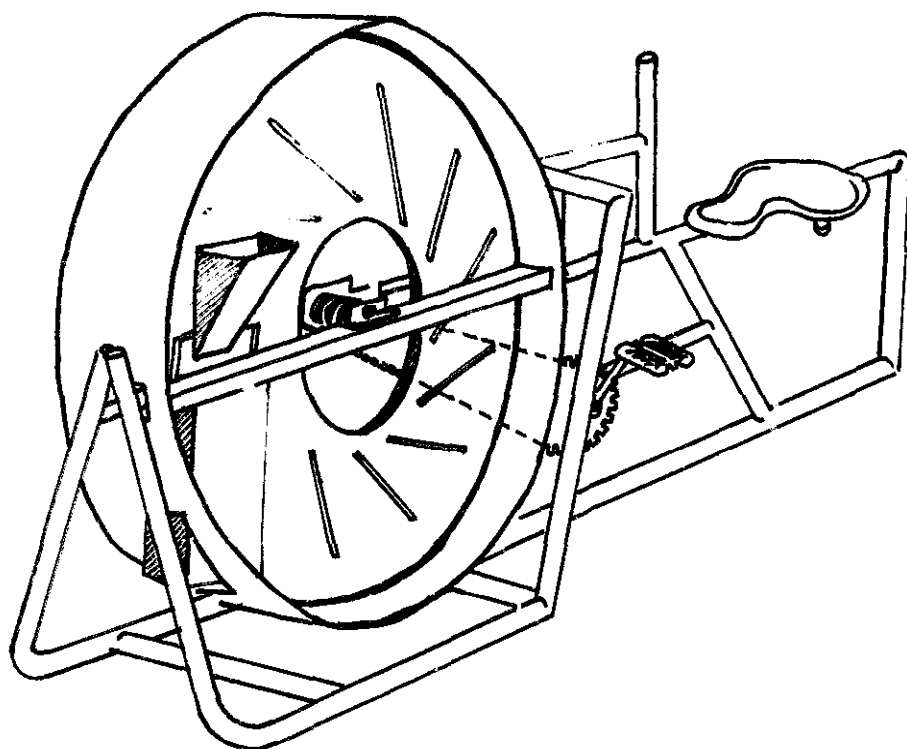
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CASSAVA GRINDER
(ZARIA, NIGERIA)

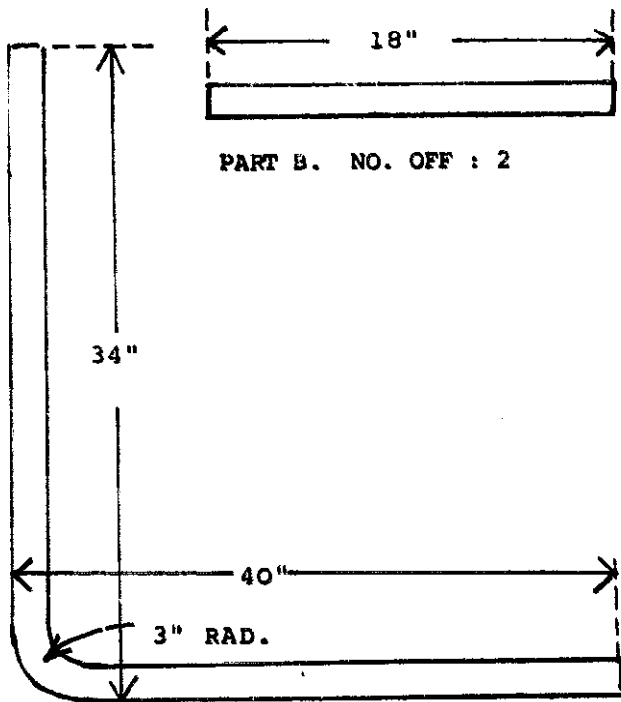
DESIGN: S. W. EAVES

DRAWING: C. J. HILL AND J. LEE

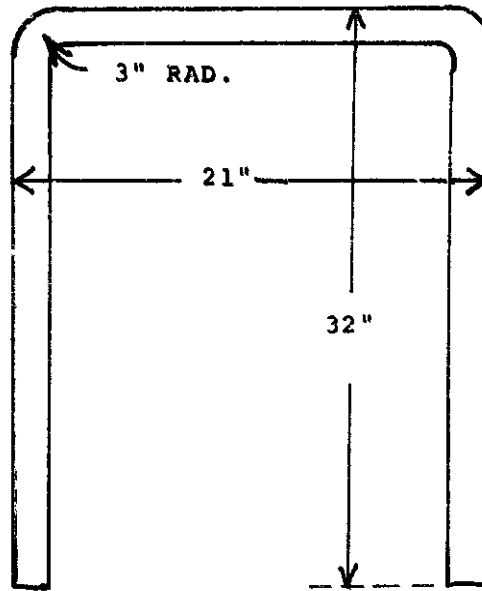


STAGE 1. A-FRAME

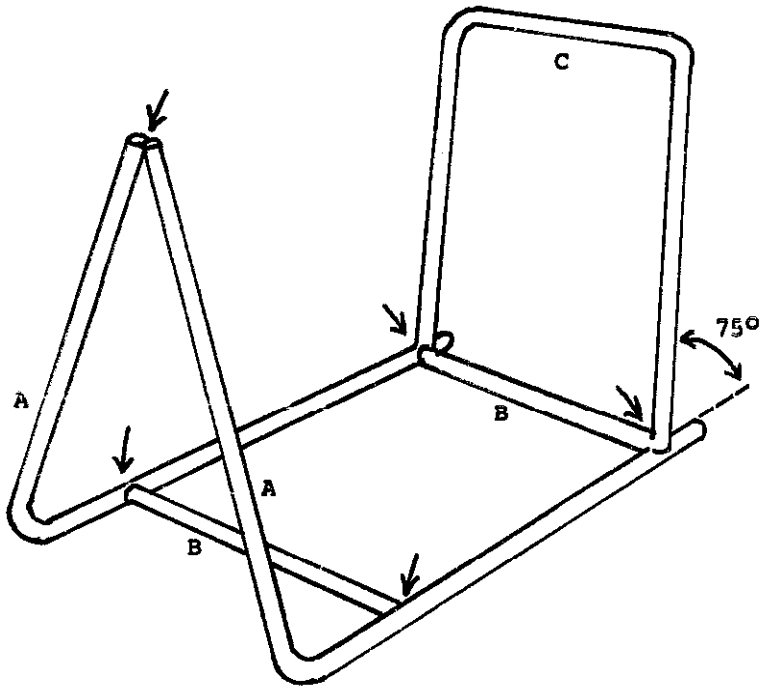
MATERIAL : 1½" GALVANIZED IRON TUBE (G.I.)



PART A. NO. OFF : 2
TRUE LENGTH : 69"



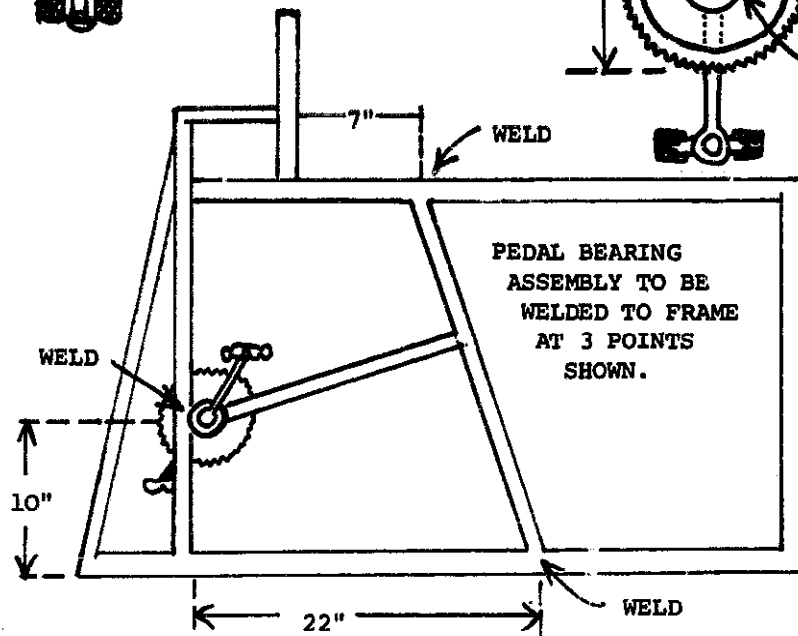
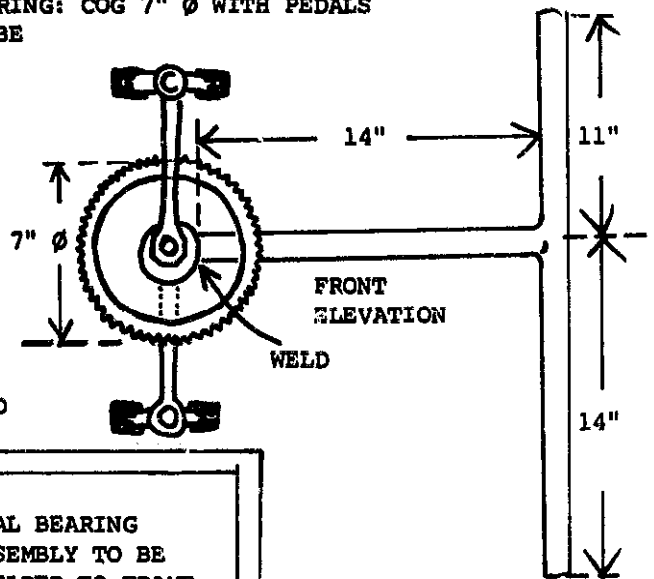
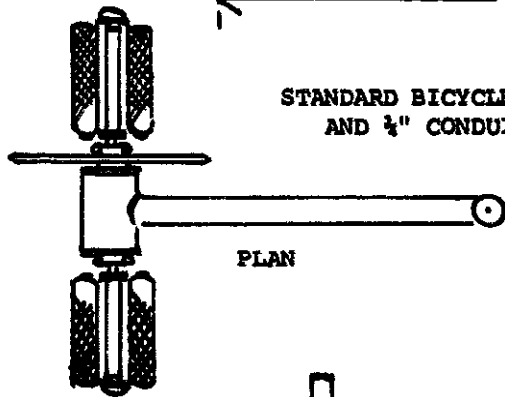
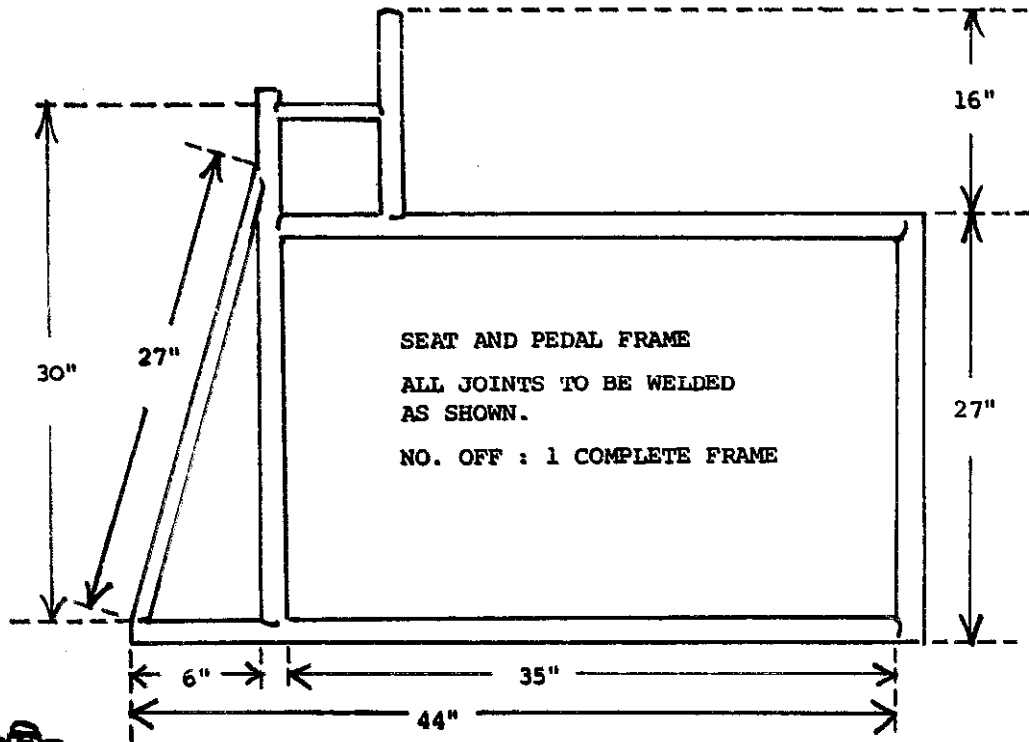
PART C. NO. OFF : 1
TRUE LENGTH : 80"



FRAME ASSEMBLY : WELD ALL JOINTS AT ARROWS AS SHOWN

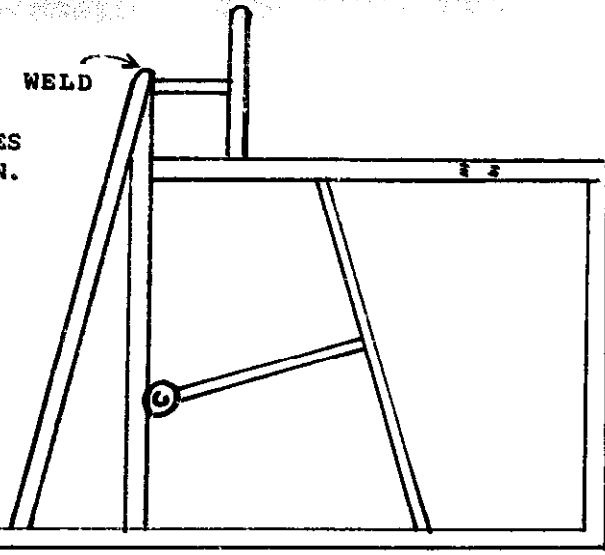
STAGE 2. SEAT AND PEDAL FRAME

MATERIAL : 1 1/2" G.I. TUBE AND 1/2" CONDUIT

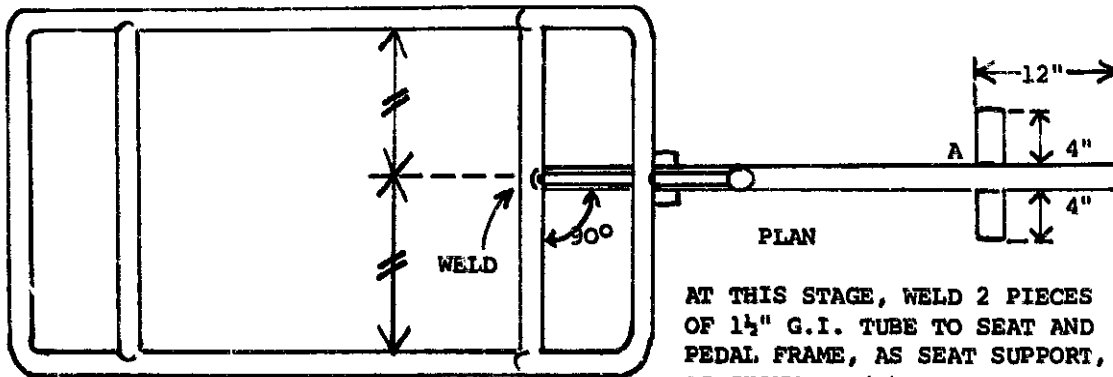


ASSEMBLY OF FRAMES : THE FRAMES ARE WELDED AT THE POINTS SHOWN. THE SEAT AND PEDAL FRAME MUST BE LOCATED

- A) IN THE CENTRE OF THE "A" FRAME (STAGE 1)
- B) VERTICAL
- C) 90° TO THE "A" FRAME (AS SHOWN BELOW)



FRONT ELEVATION

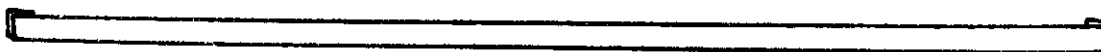
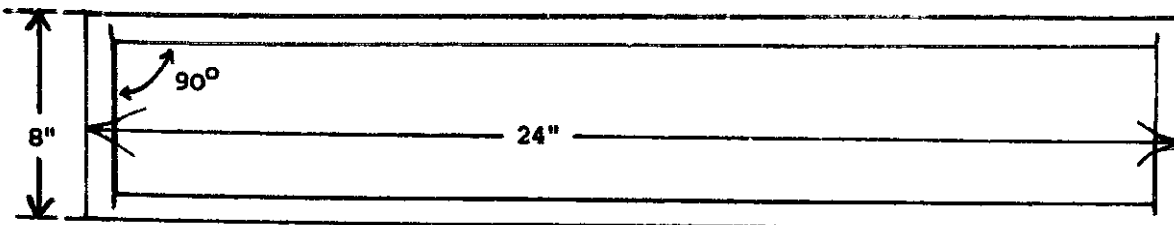
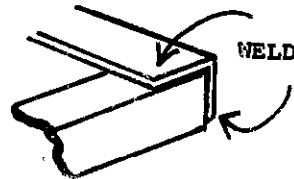


AT THIS STAGE, WELD 2 PIECES OF 1½" G.I. TUBE TO SEAT AND PEDAL FRAME, AS SEAT SUPPORT, AS SHOWN AT (A) ABOVE

WHEEL SUPPORT FRAME :

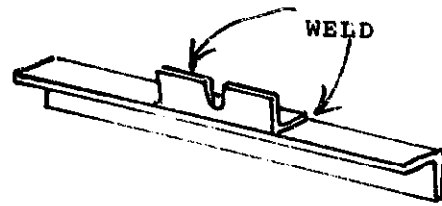
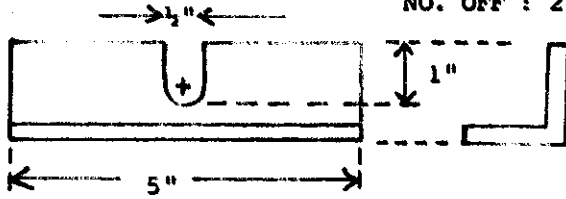
CUT 2 LENGTHS OF 24"
AND 2 LENGTHS OF 8"
AND WELD AS SHOWN

MATERIAL : 1½" x 1½" M.S. ANGLE
NO. OFF : 1 COMPLETE FRAME

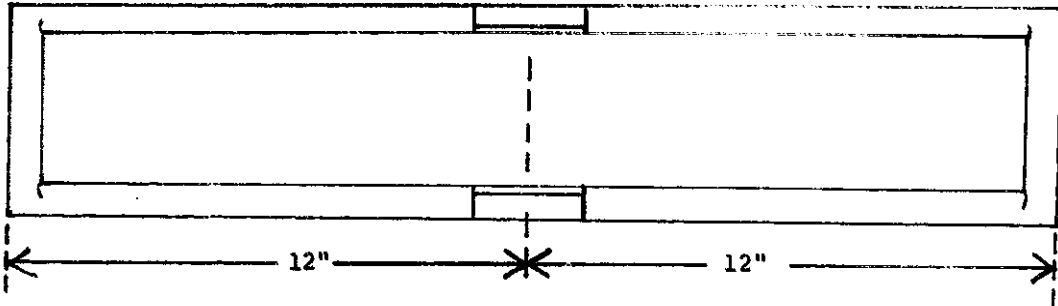


WHEEL SUPPORT BRACKETS . MATERIAL : 1½" x 1½" M.S. ANGLE

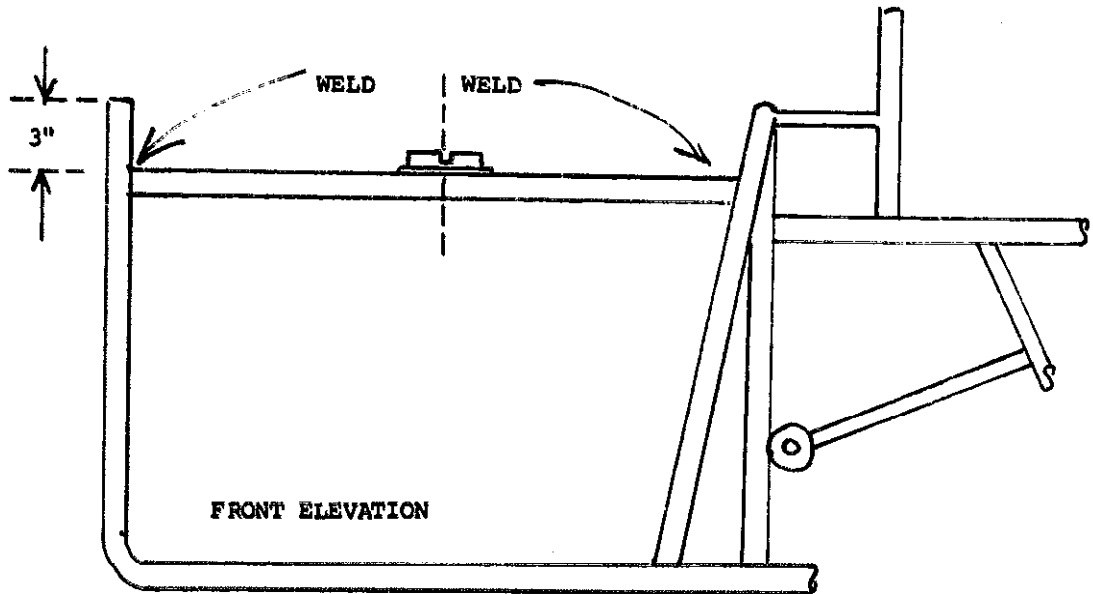
NO. OFF : 2



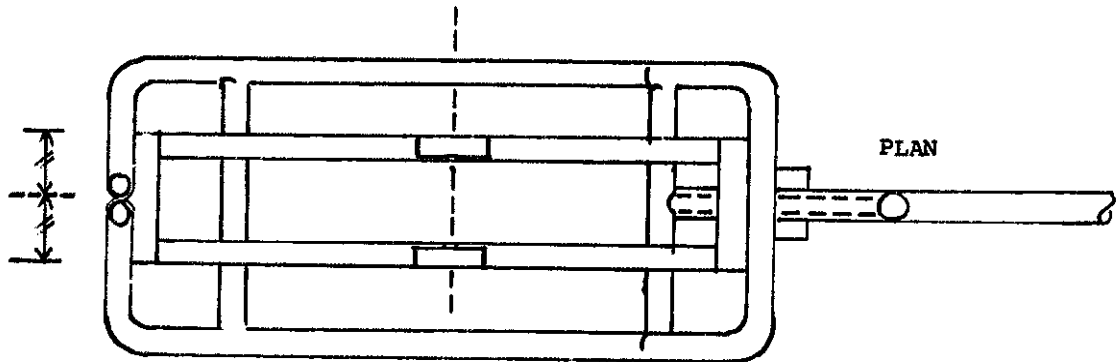
WHEEL SUPPORT FRAME



WELD WHEEL SUPPORT FRAME TO "A" FRAME AS SHOWN BELOW :



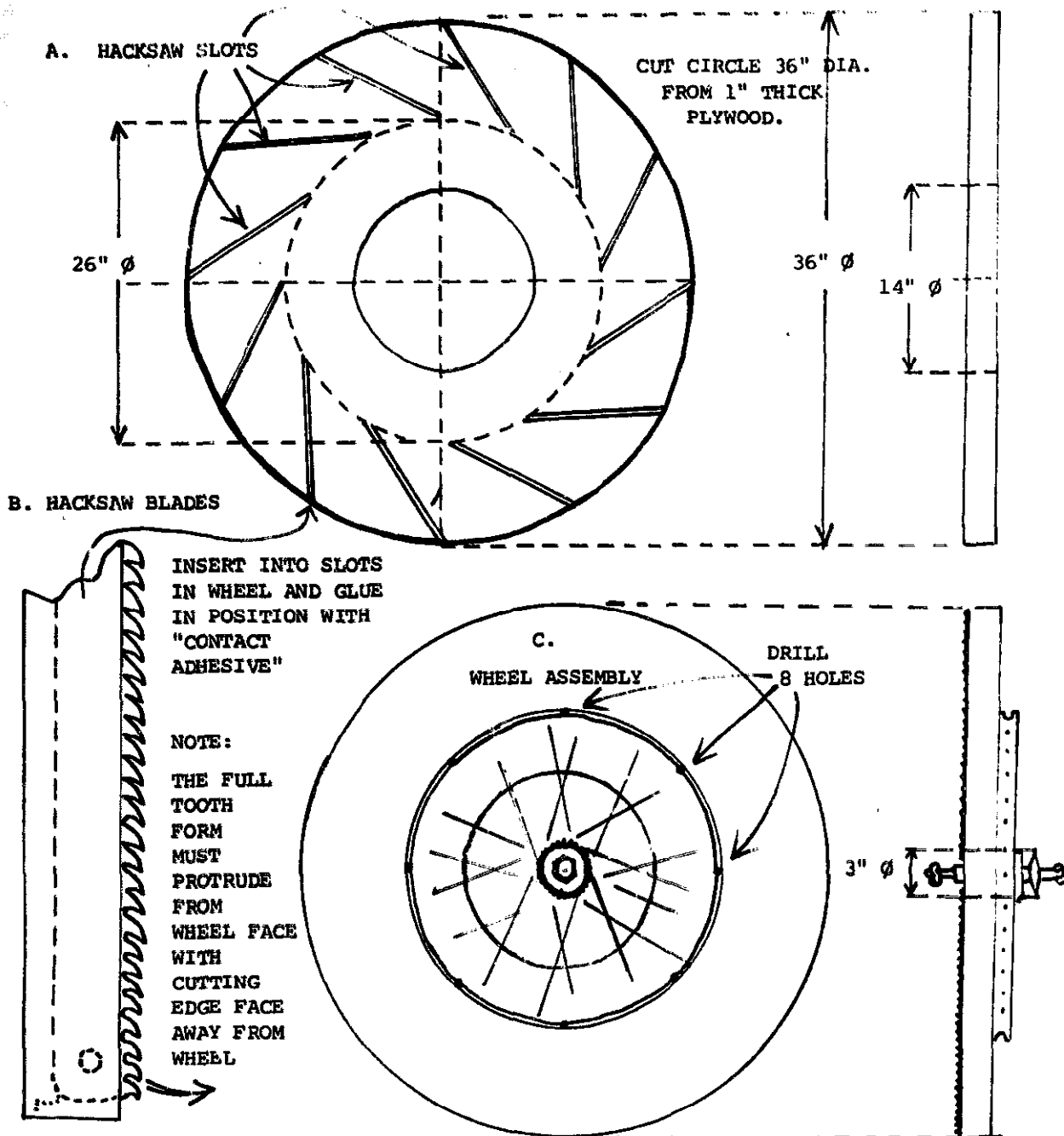
FRONT ELEVATION



PLAN

STAGE 3. GRINDING WHEEL

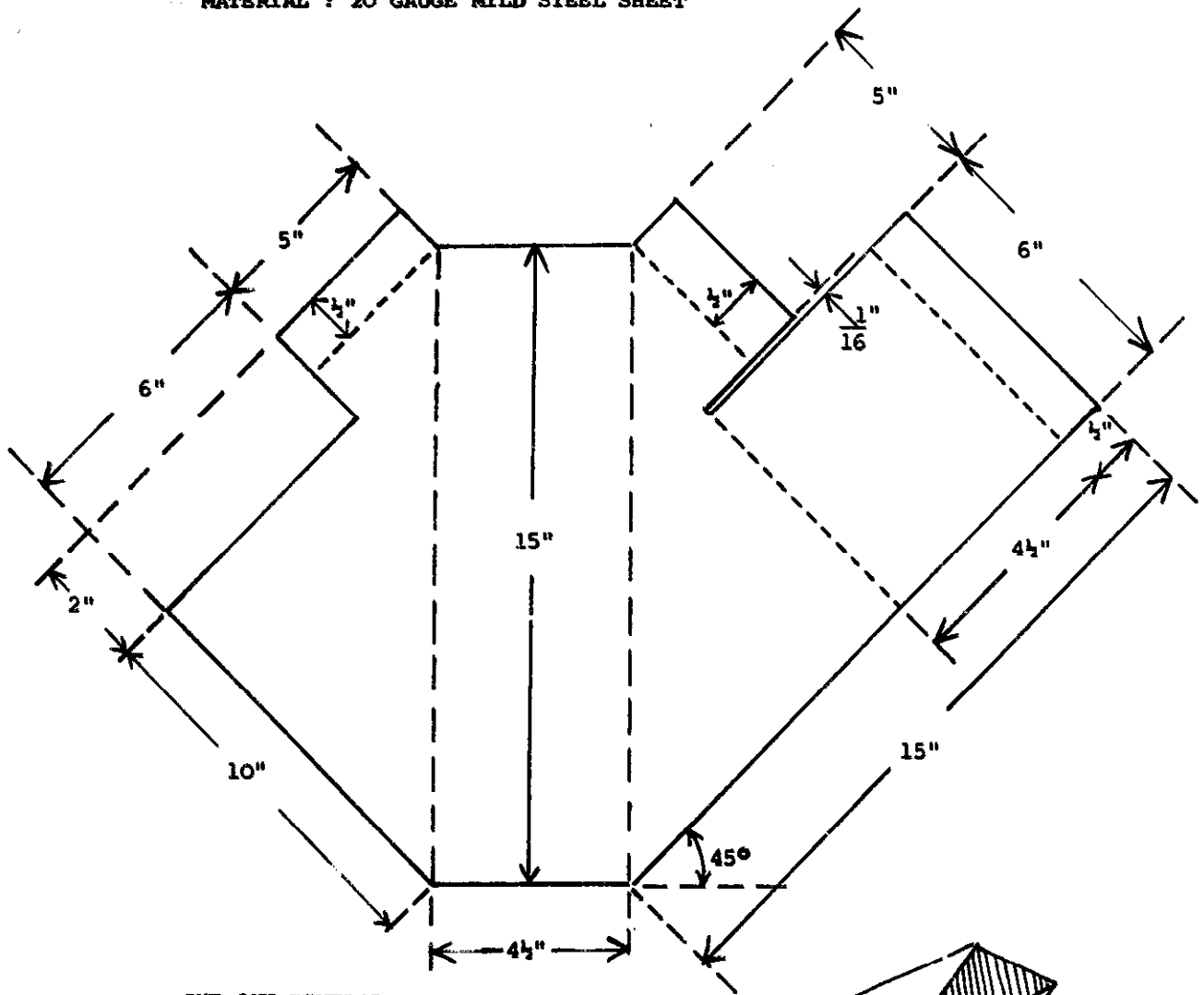
MATERIAL : 1" THICK PLYWOOD; 12 HACKSAW BLADES 9" LONG;
SPOKED BICYCLE WHEEL 26" ϕ WITH BEARING AND GEAR 3" ϕ



- A. TO CUT HACKSAW SLOTS IN WHEEL :
- 1) DIVIDE CIRCUMFERENCE OF WHEEL (36" DIA.) INTO 12 EQUAL PARTS.
 - 2) DRAW CIRCLE 26" DIA. AND ALSO DIVIDE INTO 12 EQUAL PARTS.
 - 3) CUT SLOTS WITH HACKSAW BLADE IN PATTERN SHOWN ABOVE.
- IMPORTANT ! SLOTS MUST BE MADE BEFORE CENTRE HOLE (14" DIA.) IS CUT OUT.
- C. BICYCLE WHEEL IS DRILLED AT POINTS SHOWN AND SCREWED ONTO REVERSE SIDE OF GRINDING WHEEL.

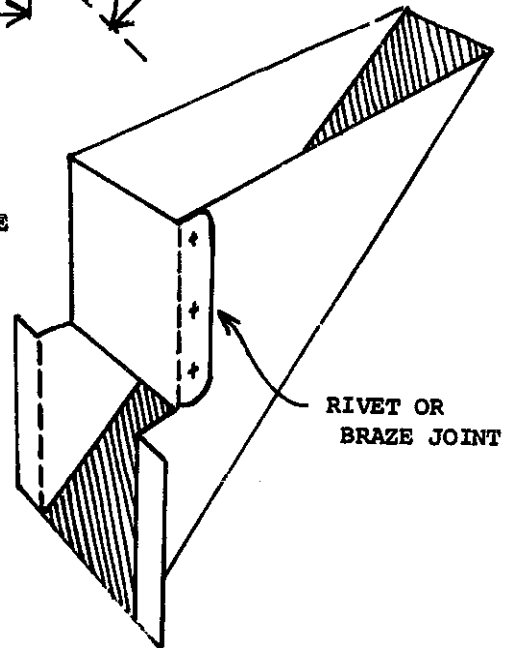
STAGE 4. INPUT HOPPER

MATERIAL : 20 GAUGE MILD STEEL SHEET



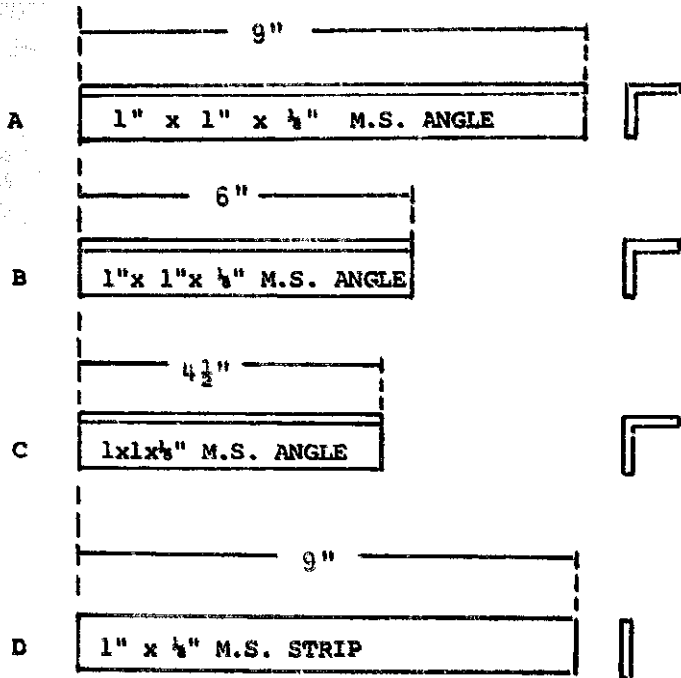
CUT OUT DEVELOPMENT

BEND INTO SHAPE
AS SHOWN HERE

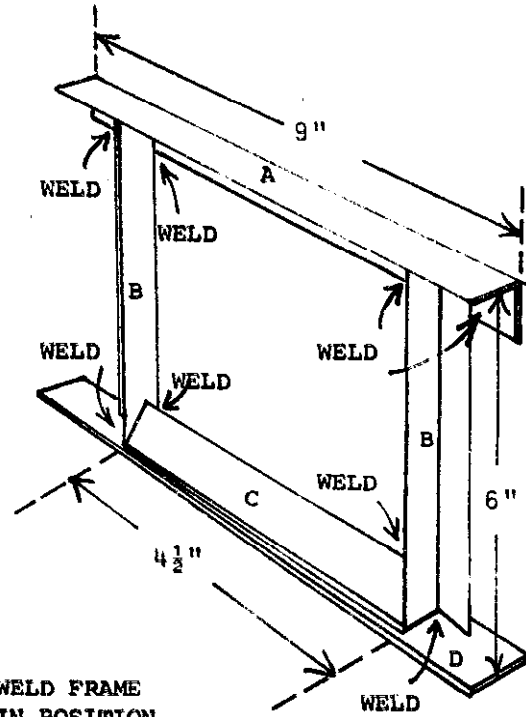


RIVET OR
BRAZE JOINT

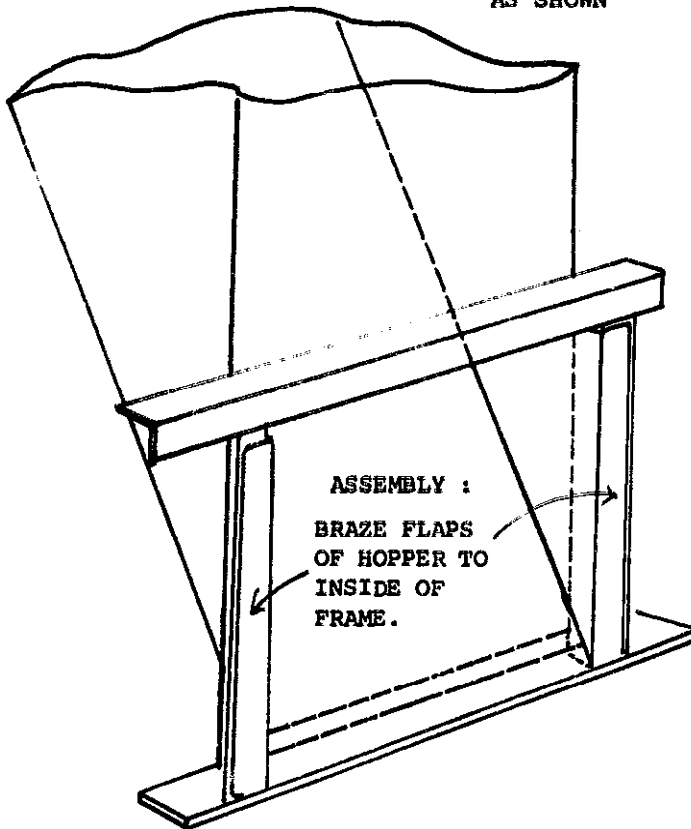
STAGE 5. HOPPER HOLDER AND ASSEMBLY WITH HOPPER



CUT 1 EACH OF A, C AND D. CUT 2 OF B.

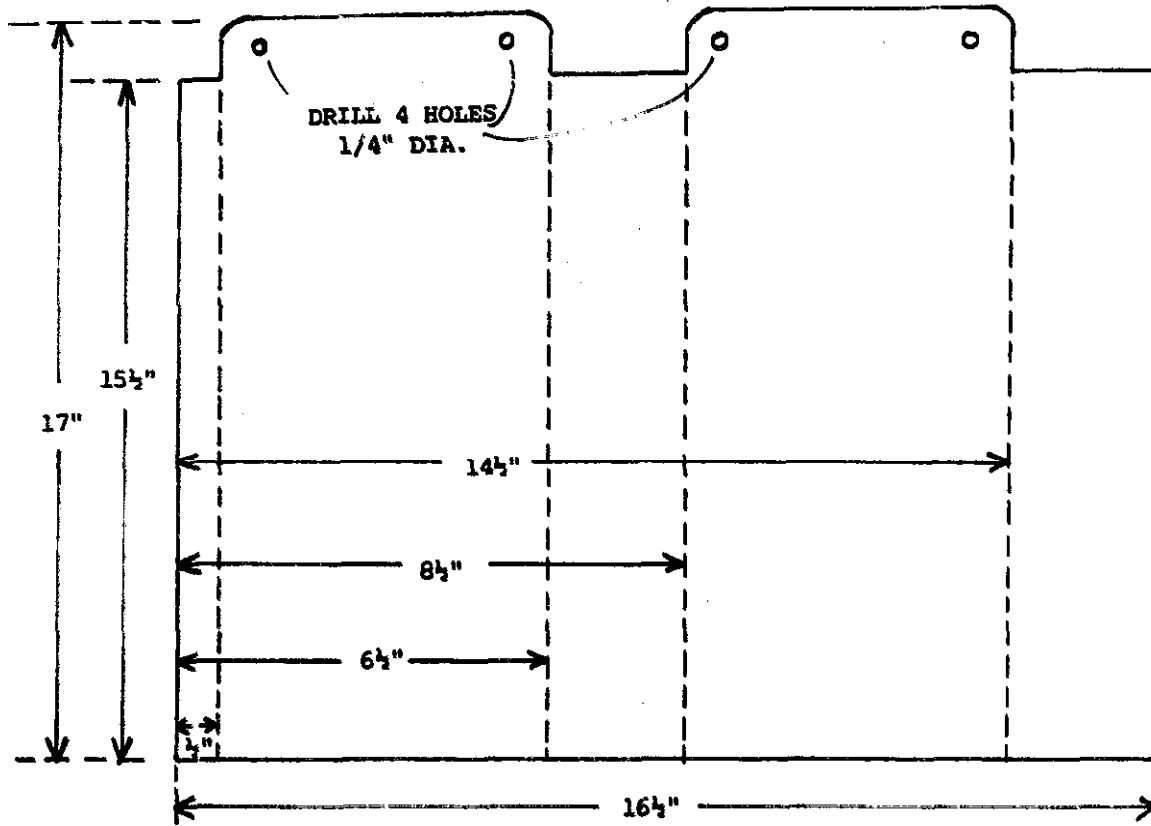


WELD FRAME
IN POSITION
AS SHOWN



STAGE 6. DELIVERY CHUTE

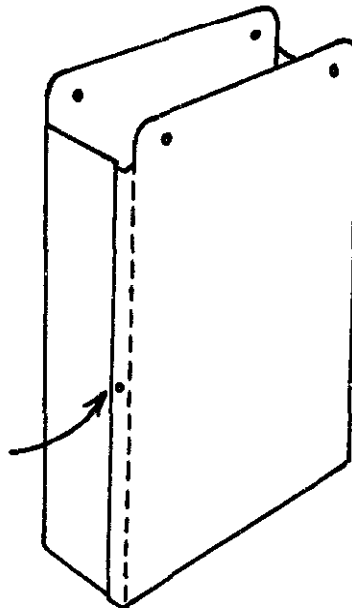
MATERIAL : 20 GAUGE M.S. SHEET. NO. OFF : 1



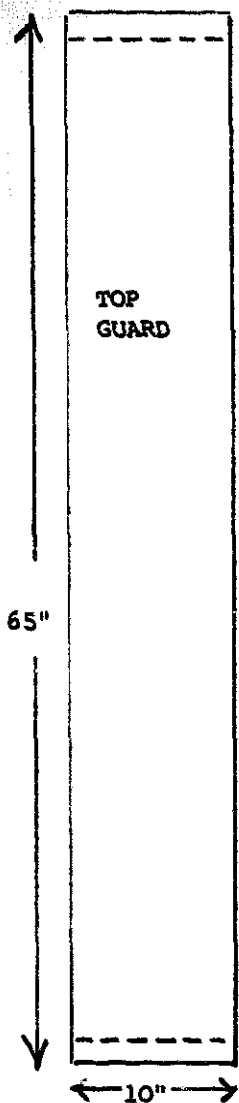
CUT OUT DEVELOPMENT

BEND INTO
SHAPE SHOWN

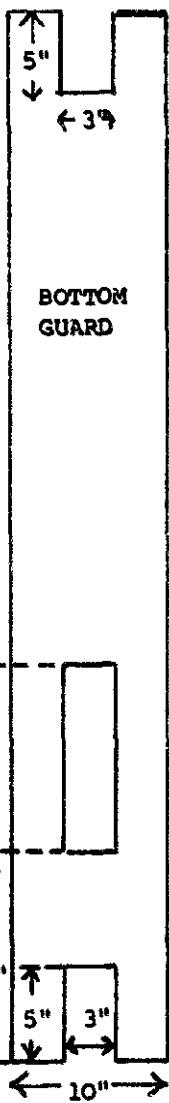
RIVET OR
BRAZE JOINT



STAGE 7. GUARD AND SEAT

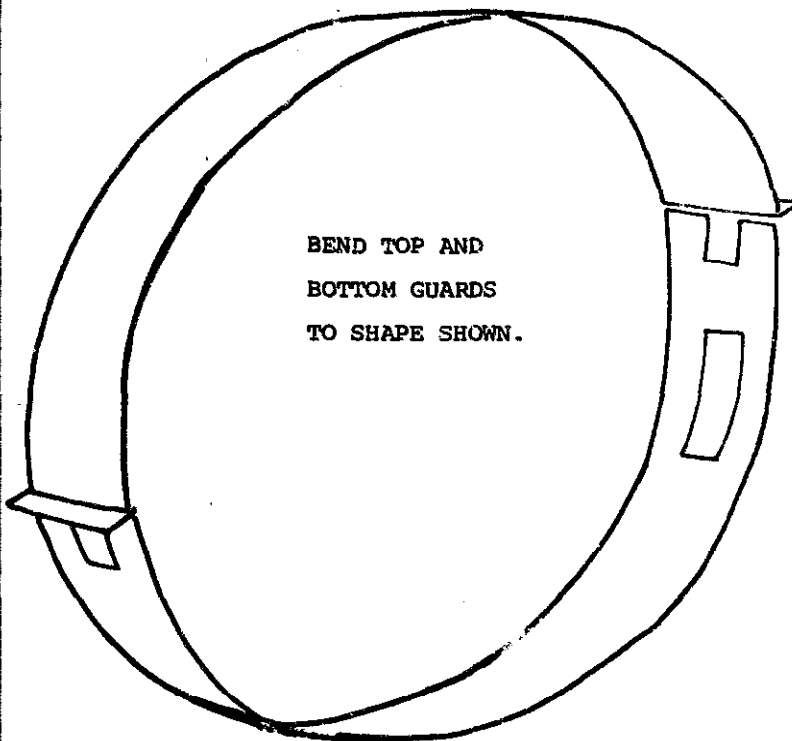


TOP
GUARD

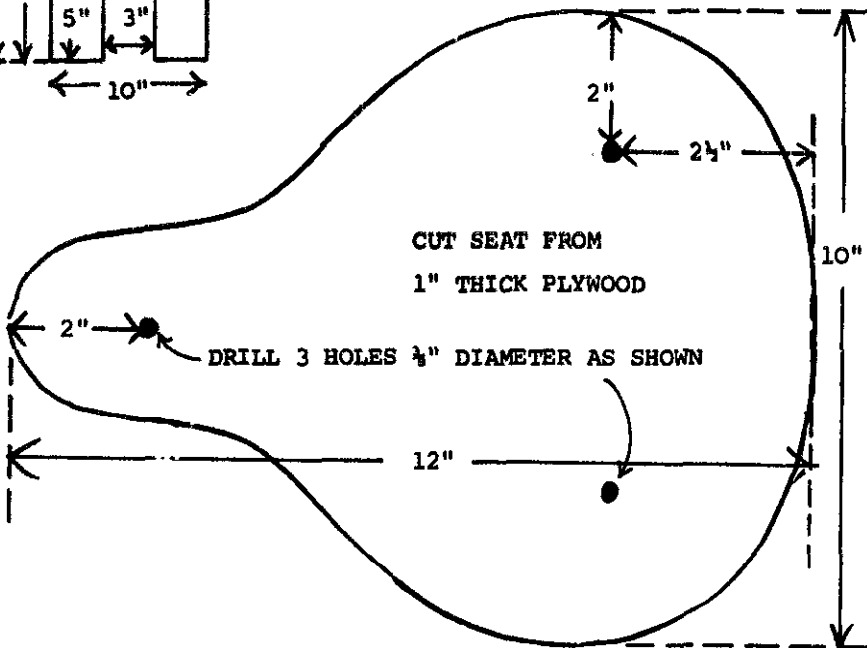


BOTTOM
GUARD

CUT 1 EACH TOP AND BOTTOM GUARD
FROM 20 GAUGE M.S. SHEET.



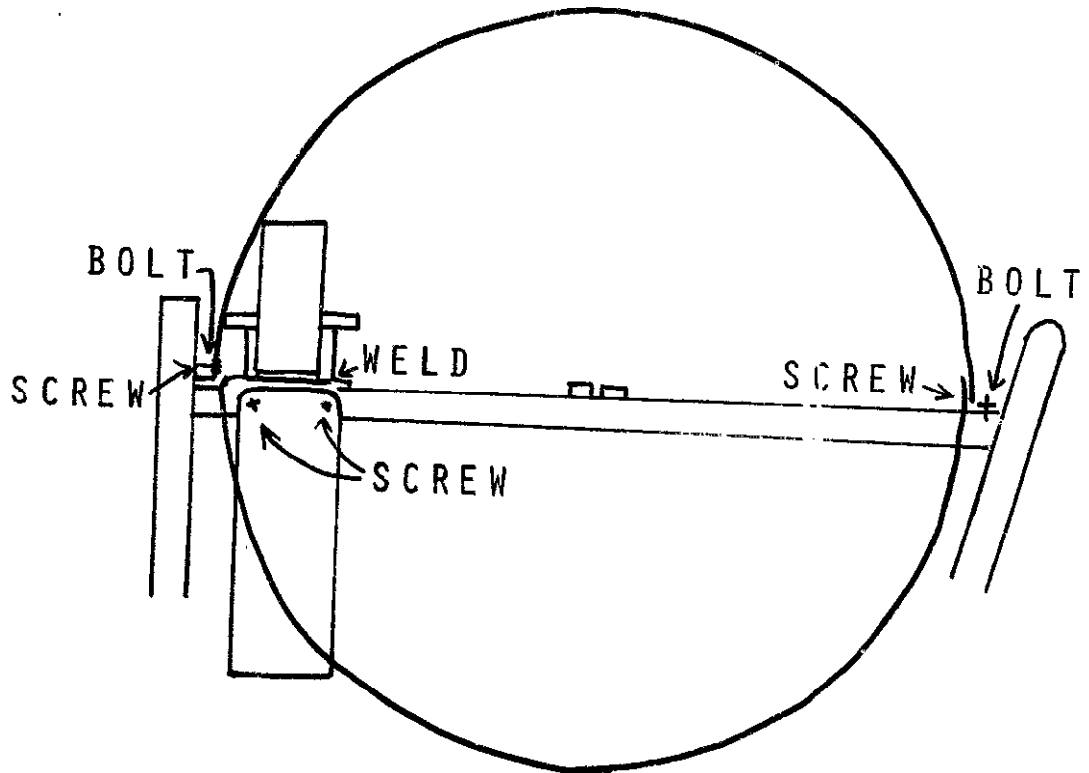
BEND TOP AND
BOTTOM GUARDS
TO SHAPE SHOWN.



CUT SEAT FROM
1" THICK PLYWOOD

DRILL 3 HOLES 3/4" DIAMETER AS SHOWN

STAGE 8. FINAL ASSEMBLY



1. BOLT TOP GUARD TO WHEEL SUPPORT FRAME.
2. WELD INPUT HOPPER TO WHEEL SUPPORT FRAME AT POINT 3" FROM L. H. SIDE.
3. SCREW DELIVERY CHUTE TO WHEEL SUPPORT FRAME DIRECTLY UNDER INPUT HOPPER.
4. LOCATE SLOT IN BOTTOM GUARD ONTO DELIVERY CHUTE AND SCREW BOTTOM GUARD TO TOP GUARD.
5. LOCATE GRINDING WHEEL ONTO WHEEL SUPPORT BRACKETS AND TIGHTEN NUTS.
6. CONNECT WHEEL COG TO PEDAL COG WITH CORRECT LENGTH OF DRIVE CHAIN.
7. BOLT SEAT TO SEAT FRAME.
8. CLEAN WELDED AREAS AND PAINT.
9. APPLY TWO COATS OF POLYURETHANE VARNISH TO GRINDING WHEEL.
10. TEST.

28

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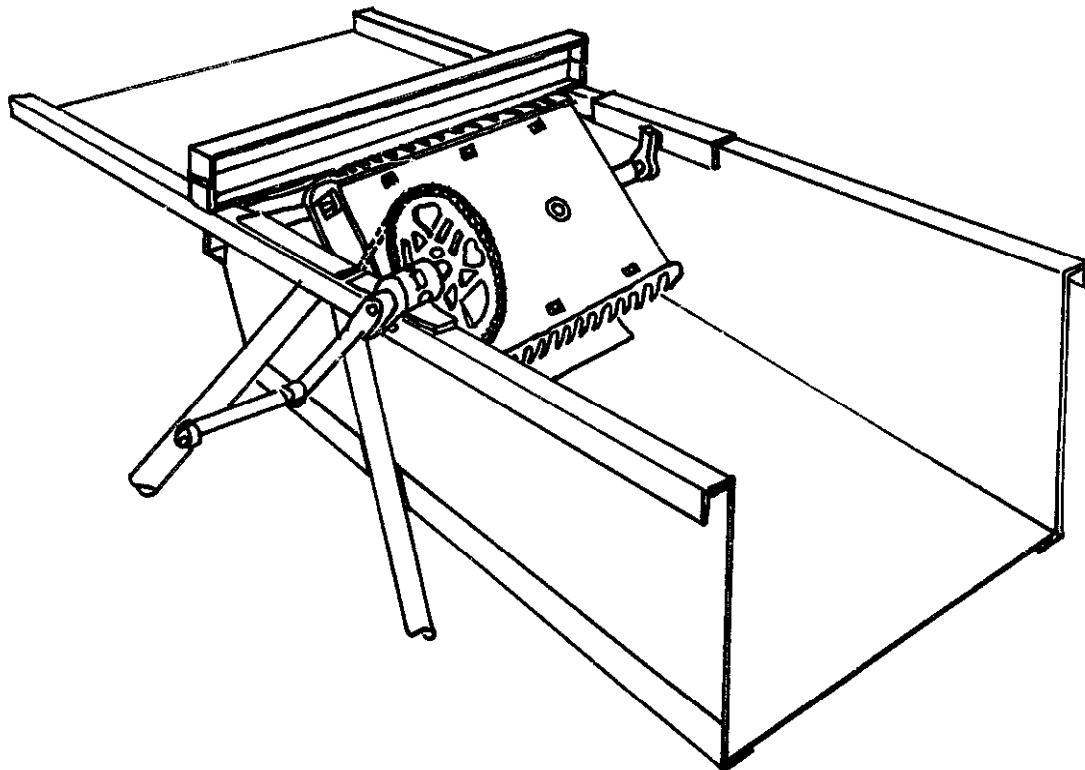
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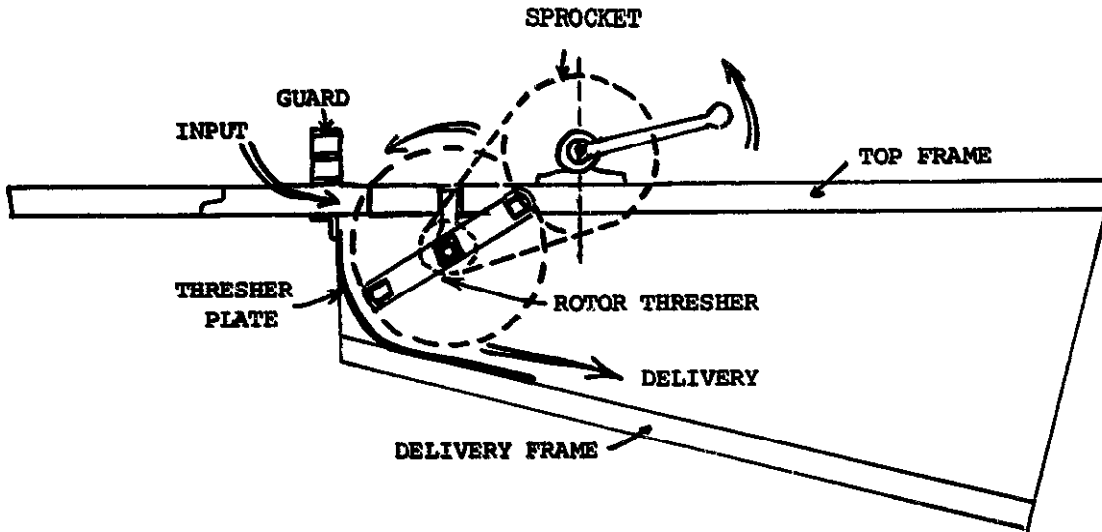
ROTARY CORN THRESHER
(ZARIA, NIGERIA)

DESIGN: S.W. EAVES
DRAWING: C.J. HILL AND J. LEE

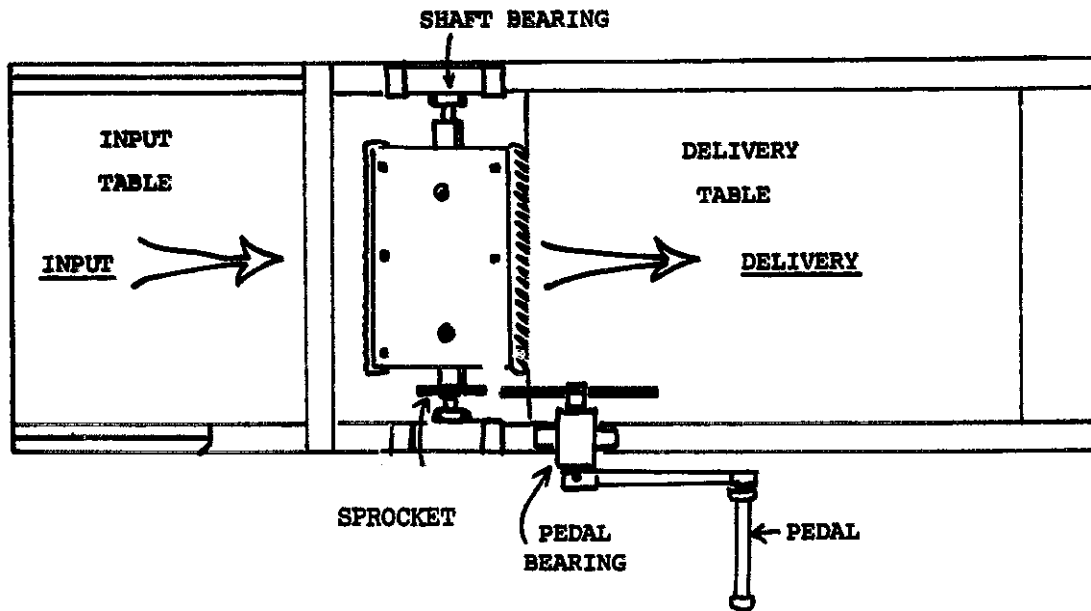
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ROTARY CORN THRESHER

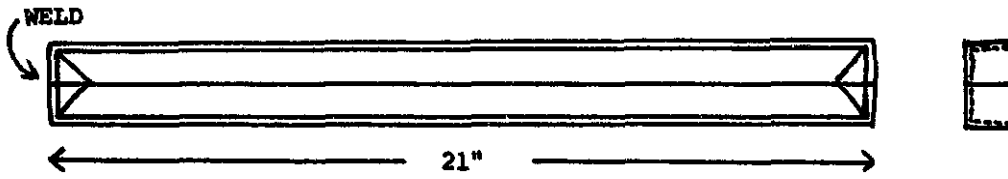
**OPERATION :
(SIDE ELEVATION)**



OPERATION (PLAN) :



STAGE 1. GUARD AND COMPONENT PARTS AND TOP FRAME



THE GUARD IS MADE BY CUTTING TWO PIECES OF ANGLE IRON 24" LONG, FORMING A 90° ANGLE ON EACH END (FIG. 1) AND WELDING.

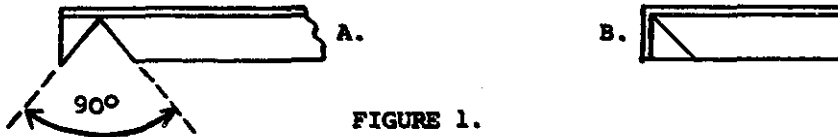
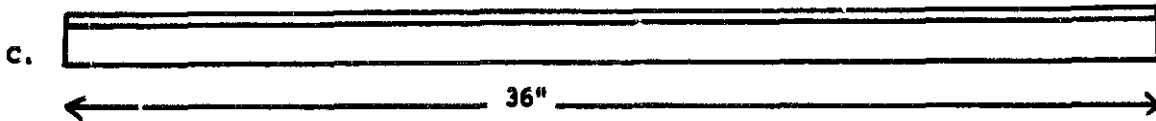
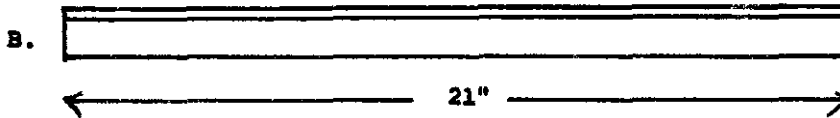
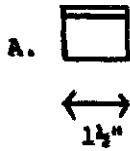


FIGURE 1.

MATERIAL : 1½" x 1½" x ¼" MILD STEEL ANGLE

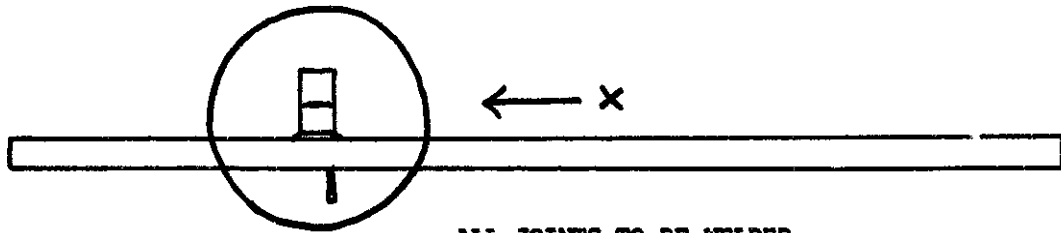
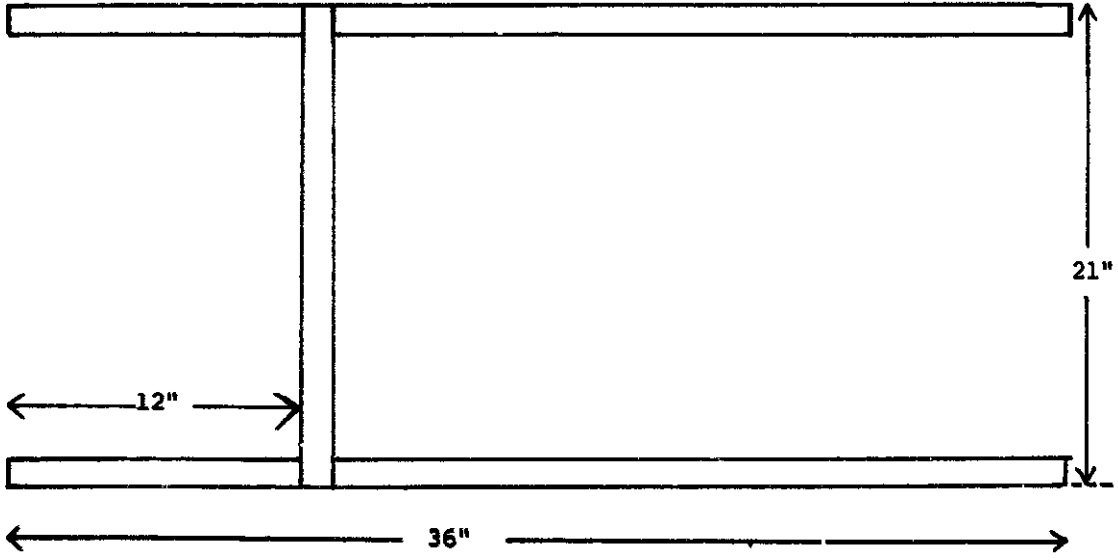
NO. OFF : ONE COMPLETE FRAME



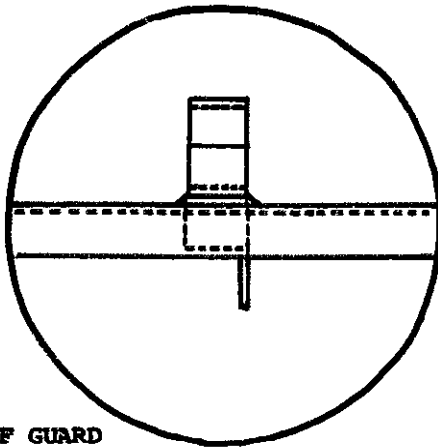
MATERIAL : 1½" : 1½" x ¼" MILD STEEL ANGLE

NO. OFF : A : 2; B : 1; C : 2.

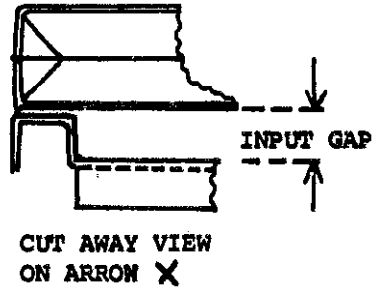
STAGE 2. ASSEMBLY OF TOP FRAME AND GUARD



ALL JOINTS TO BE WELDED



DETAIL OF GUARD AND INPUT GAP FABRICATION



CUT AWAY VIEW ON ARROW X

STAGE 3. ROTOR THRESHER

A. THE BLADES OF THE ROTOR NEED TO BE OF SUCH DESIGN AS TO GIVE A THRESHING ACTION. IN THE PROTOTYPE MODEL, THE ROTOR BLADES WERE COMBINE HARVESTER BLADES (FIGURE 1).

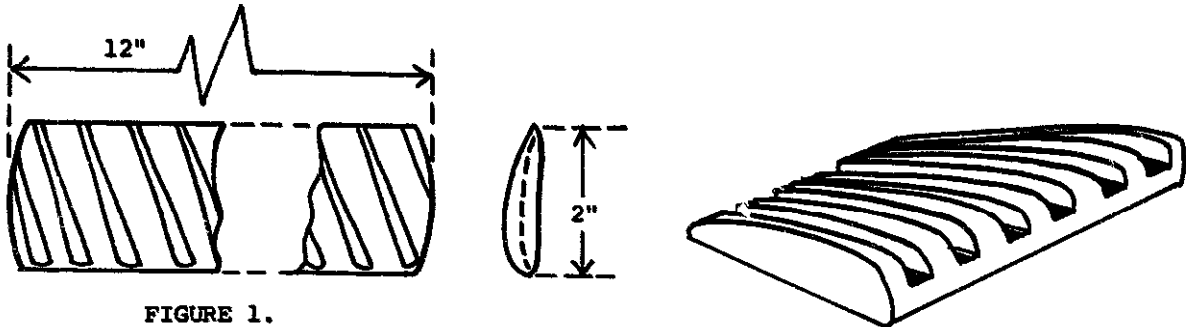


FIGURE 1.

HOWEVER, IT IS NOT ESSENTIAL THAT THE BLADES BE OF THE DESIGN IN FIG. 1. FIGURE 2. SHOWS A METHOD OF FABRICATING BLADES TO GIVE A THRESHING ACTION. MATERIALS WERE : $\frac{1}{4}$ " x 2" MILD STEEL PLATE AND $\frac{1}{2}$ " ϕ MILD STEEL ROD.

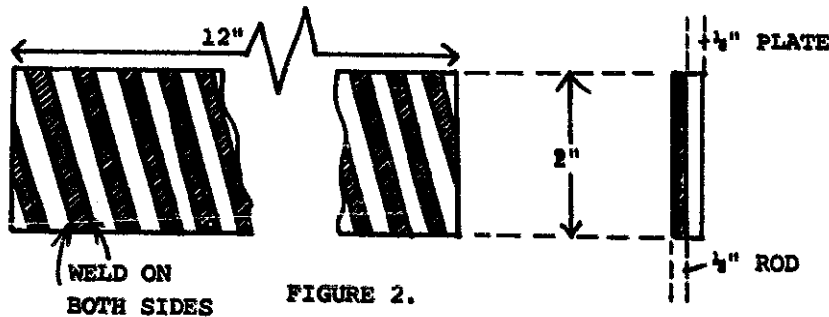
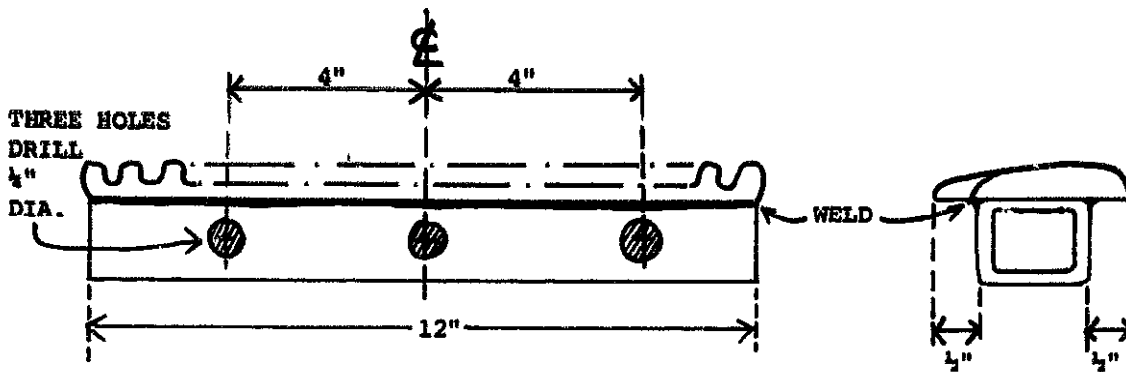


FIGURE 2.

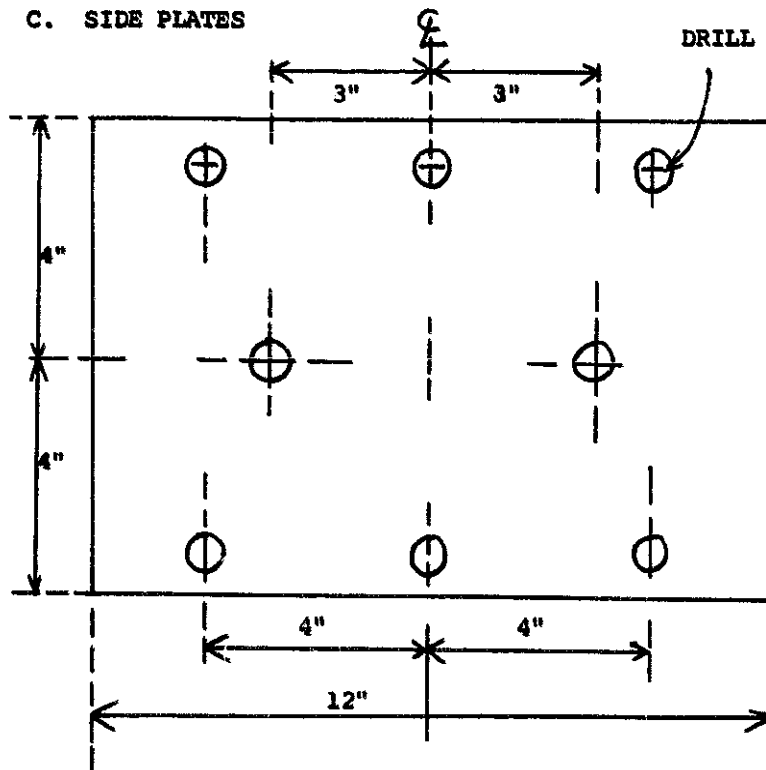
NOTE: RODS MUST BE SPACED AT $\frac{1}{4}$ " INTERVALS AND WELDED AT A SLIGHT ANGLE, AS SHOWN.
 NO. OFF : 2 BLADES,
 ONE RIGHT HAND ,
 ONE LEFT HAND

B. BLADES : WELD ROTOR BLADES TO SQUARE SECTION, ONE LEFT HAND AND ONE RIGHT HAND.

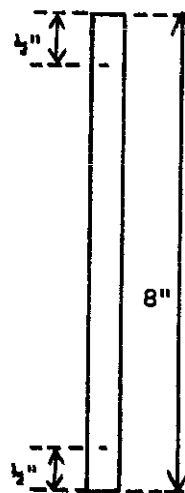


MATERIAL : 1" x 1" MILD STEEL SQUARE SECTION
 NO. OFF : TWO

C. SIDE PLATES

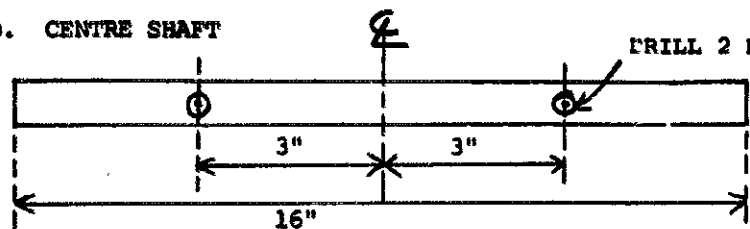


DRILL 8 HOLES 1/4" DIA.



MATERIAL : 1/4" THICK PLYWOOD
NO. OFF : 2.

D. CENTRE SHAFT



DRILL 2 HOLES 1/4" DIA.



MATERIAL : 1" x 1" MILD
STEEL SQUARE SECTION
NO. OFF : 1.

THE BEARINGS FOR THE ABOVE CENTRE SHAFT ARE TWO STANDARD BICYCLE PEDALS, AS SHOWN BELOW IN FIGURE 3.

NOTE : THE PEDALS MUST BE A TIGHT FIT IN THE SQUARE SECTION ENDS. THE SPROCKET (SEE FIG. 4 NEXT PAGE) MUST BE FITTED TO ONE SIDE OF SHAFT BEARING BEFORE ASSEMBLY OF BEARING.

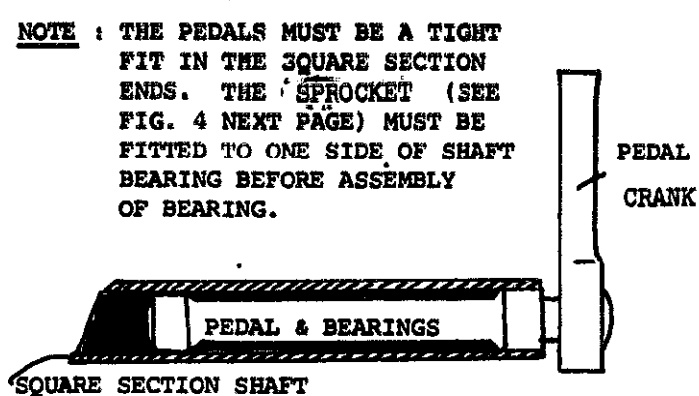


FIGURE 3. (SECTION ON AA)

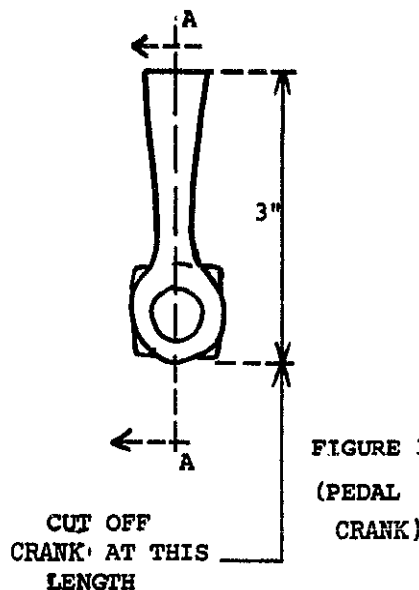
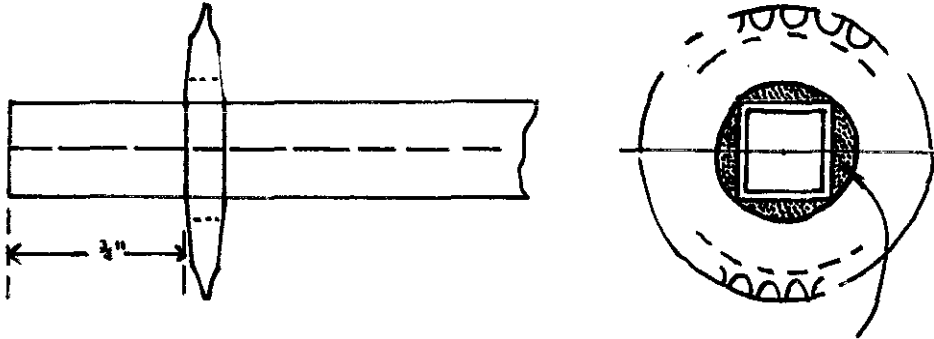


FIGURE 3.
(PEDAL
CRANK)

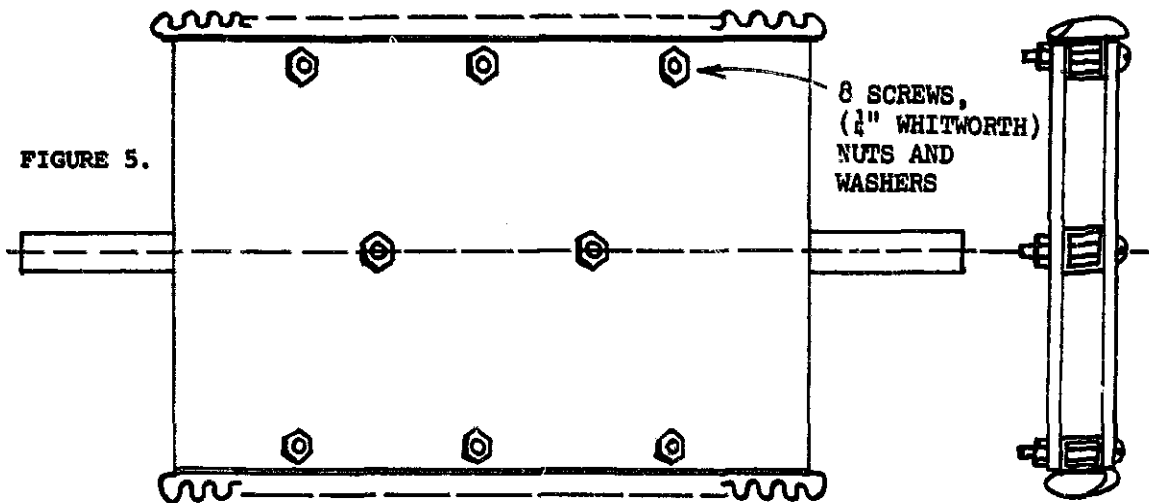
FIGURE 4.



THE SPROCKET FOR THE CENTRE SHAFT IS OF THE "FREE WHEEL" TYPE WITH A 3" OUTSIDE DIAMETER AND 1½" INSIDE DIAMETER. FITTING IS SHOWN IN FIGURE 4.

APERTURES TO BE FILLED WITH A MIXTURE OF EPOXY RESIN AND SAND.

FIGURE 5.



E. ASSEMBLY OF ROTOR THRESHER BEFORE FITTING OF CENTRE SHAFT BEARINGS

STAGE 4. ROTOR THRESHER ADJUSTING PLATES

MATERIAL : 1½" x 1½" x ¼" MILD STEEL ANGLE
NUMBER OFF : 2.

DRILL 5/16" DIA. HOLES ELONGATED 1½"

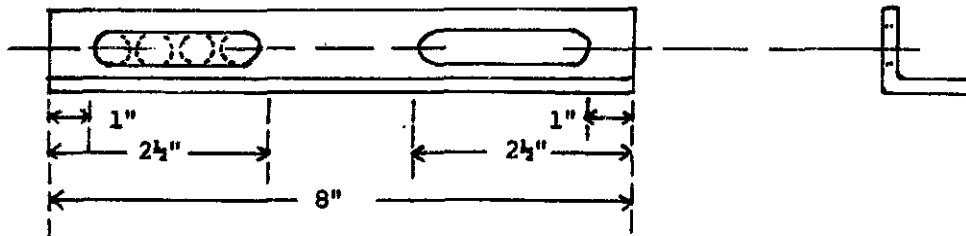
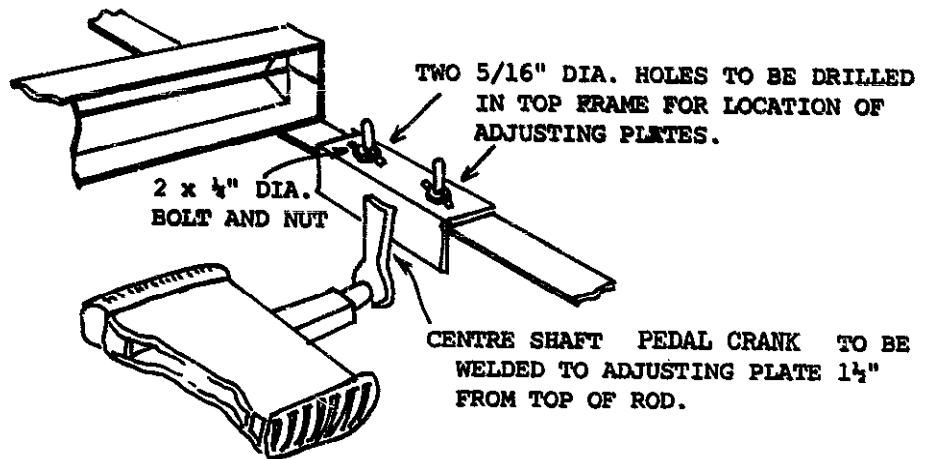


FIGURE 6. ASSEMBLY OF CONNECTING ROD AND ADJUSTING PLATES

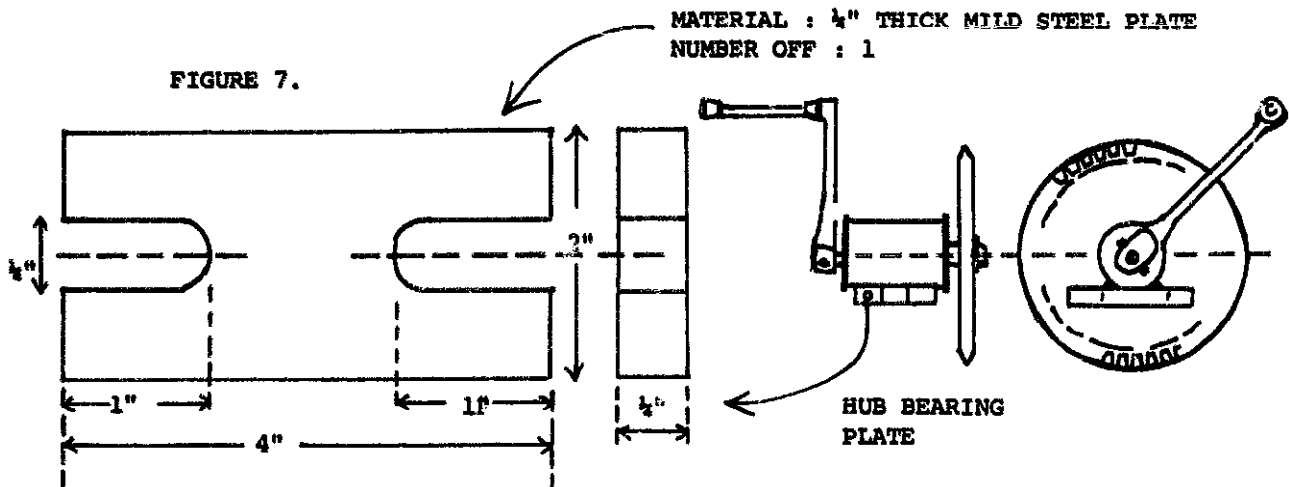


STAGE 5. DRIVE

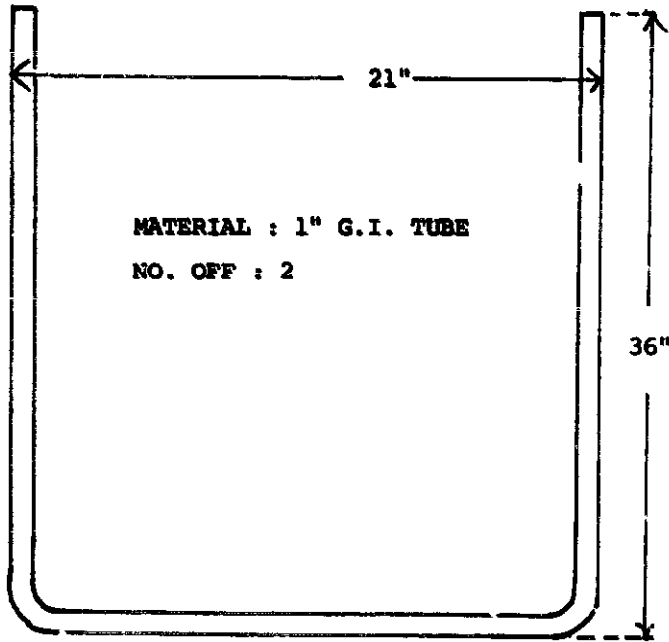
DRIVE IS OBTAINED FROM A BICYCLE PEDAL CONNECTED THROUGH A HUB BEARING TO A 7" ϕ SPROCKET. A STANDARD BICYCLE CHAIN CONNECTS THE SPROCKET TO SPROCKET ON CENTRE SHAFT.

THE DRIVE ASSEMBLY IS BOLTED TO THE LEFT HAND SIDE OF TOP FRAME APPROX. 10" FROM GUARD. ENSURE THAT THE TWO SPROCKETS ARE IN LINE BEFORE FITTING CORRECT LENGTH OF CHAIN.

FIGURE 7 SHOWS ASSEMBLY WITH DETAIL OF HUB BEARING FIXING PLATE.



STAGE 6. STAND



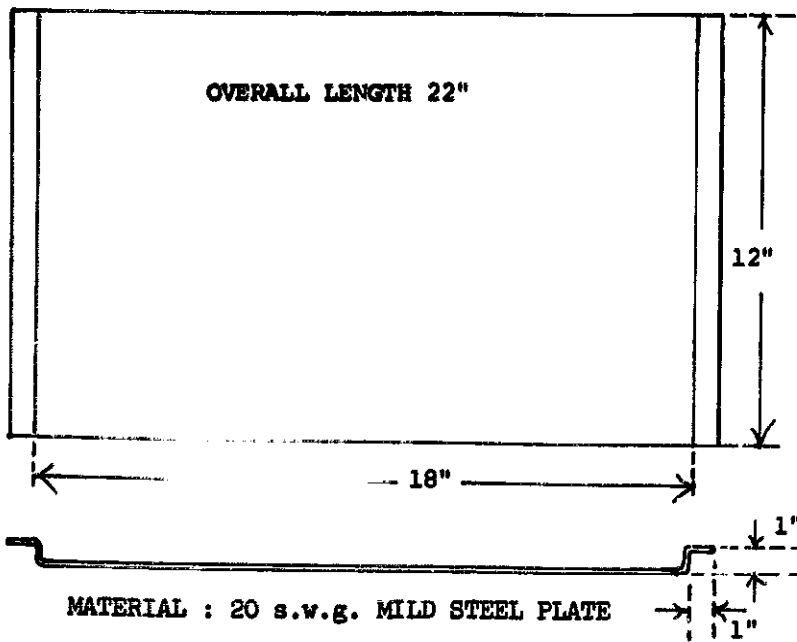
STAGE 7.
DELIVERY
FRAME



MATERIAL : 1 1/2" x 1 1/2" x 1/4"
MILD STEEL ANGLE

NO. OFF : 2

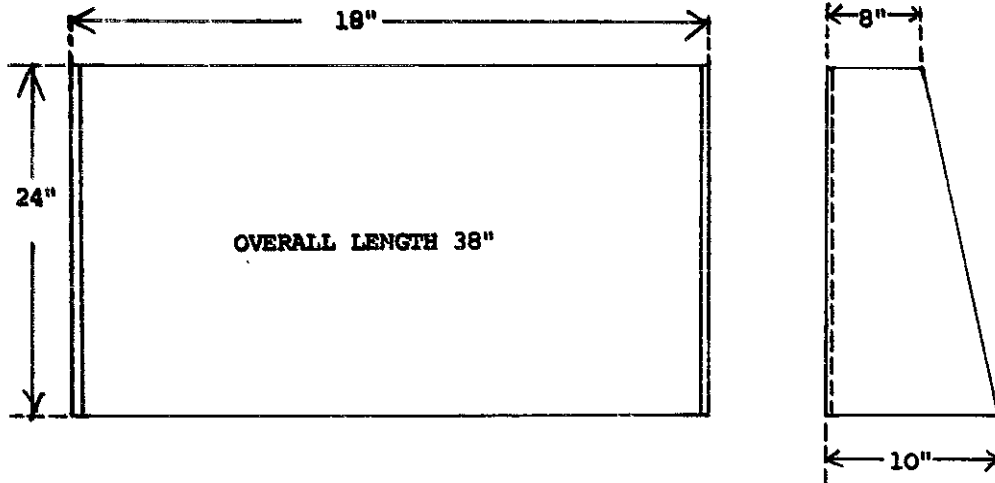
STAGE 8. INPUT TABLE



MATERIAL : 20 s.w.g. MILD STEEL PLATE

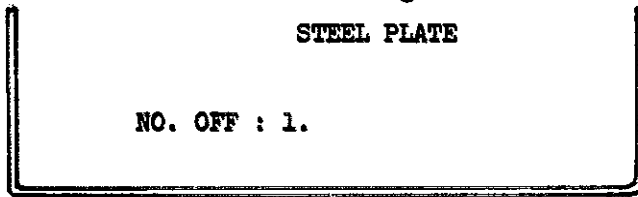
NO. OFF : 1.

STAGE 9. DELIVERY TABLE

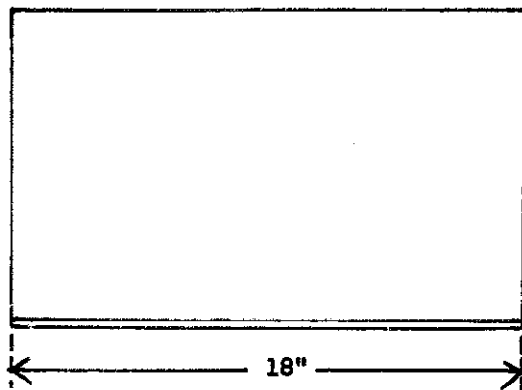


MATERIAL : 20 s.w.g. MILD
STEEL PLATE

NO. OFF : 1.

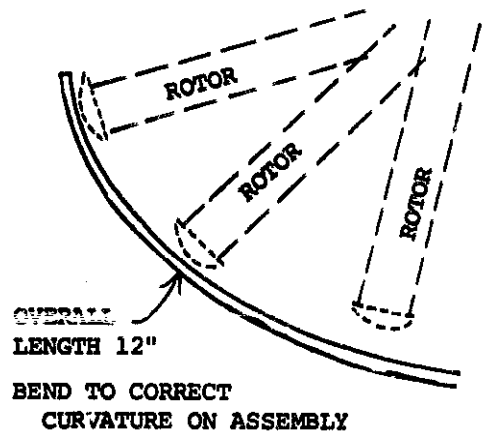


STAGE 10. THRESHER PLATE



MATERIAL : 16 s.w.g. MILD STEEL PLATE

NO. OFF : 1.



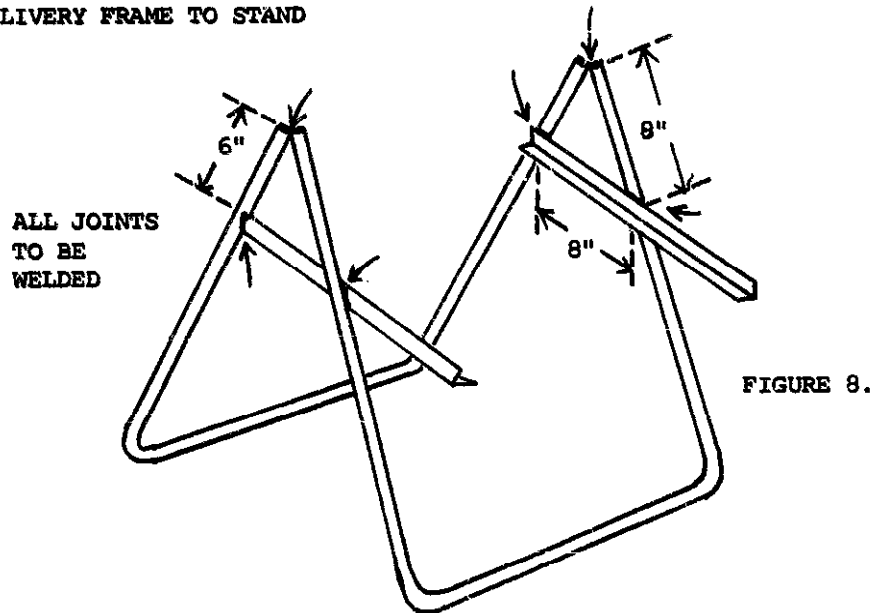
NOTE: ON ASSEMBLY THE THRESHER PLATE IS WELDED BETWEEN THE INPUT GAP AND THE DELIVERY TABLE.

THE GAP BETWEEN THE ROTOR AND THRESHER PLATE CAN BE ADJUSTED BY MOVING THE ROTOR THRESHER ADJUSTING PLATES.

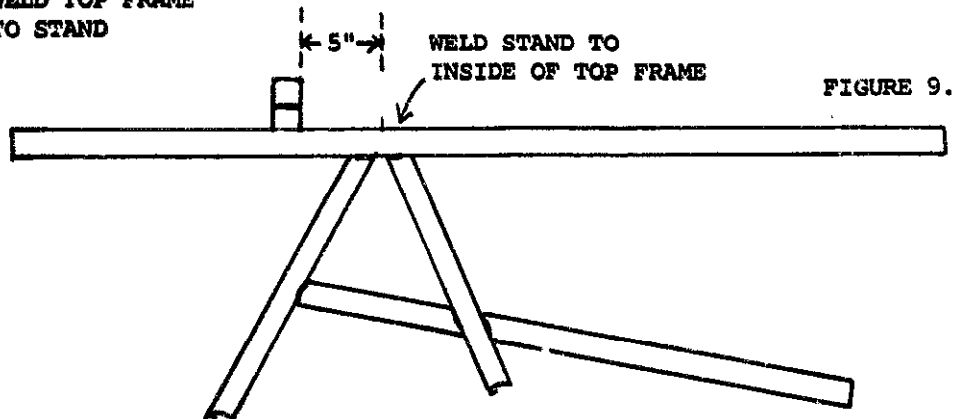
THE CORRECT GAP IS APPROX $\frac{1}{4}$ ". FOR GUINEACORN (SORGHUM).

STAGE 11. FINAL ASSEMBLY

1. WELD DELIVERY FRAME TO STAND



2. WELD TOP FRAME TO STAND



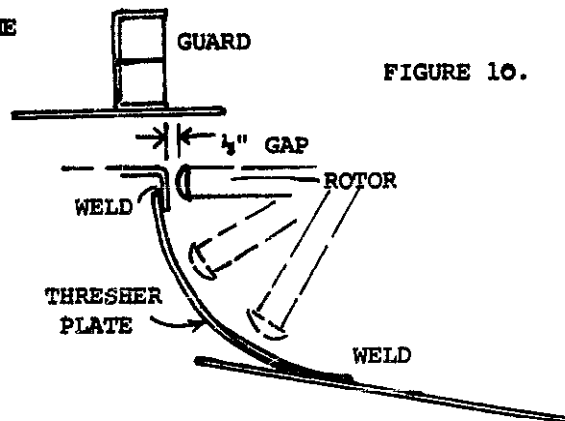
3. LOCATE INPUT TABLE IN POSITION ON TOP FRAME (SEE COVER DRAWING)

4. LOCATE DELIVERY TABLE IN POSITION IN DELIVERY FRAME (SEE COVER DRAWING)

5. WELD THRESHER PLATE IN POSITION AND ADJUST GAP (FIG. 10).

6. CLEAN WELDED AREAS

7. LUBRICATE AND PAINT



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Lifter

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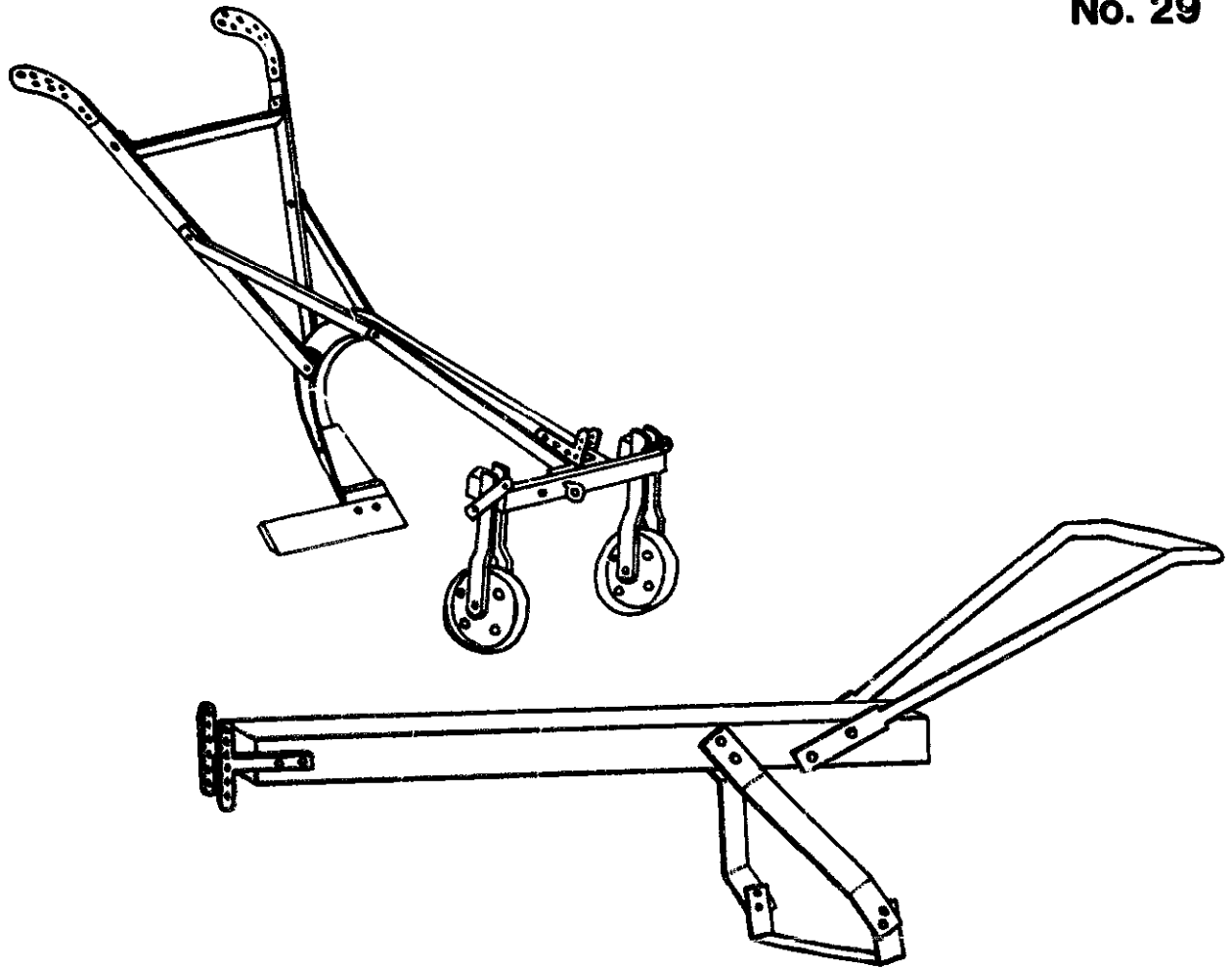
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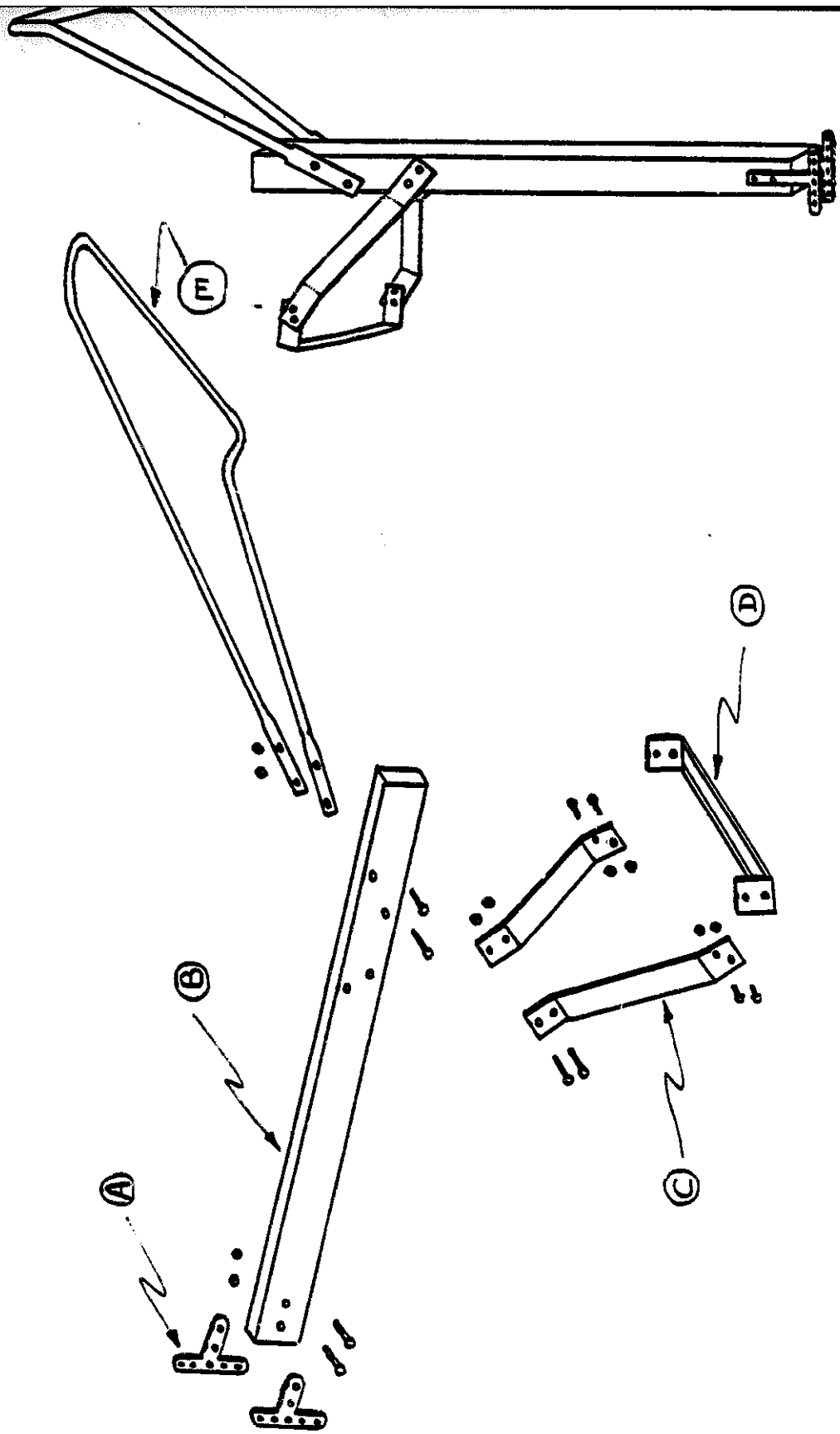


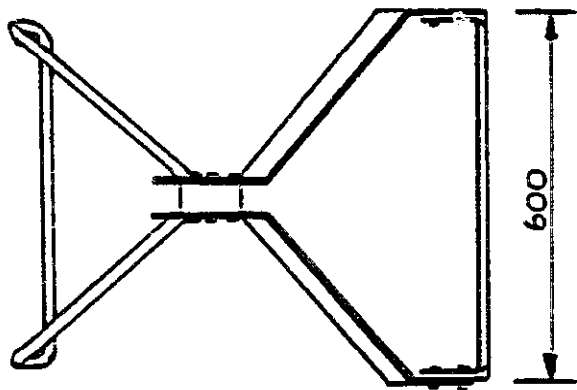
I.D.C.-BORNU GROUNDNUT LIFTER

I.T. GROUNDNUT LIFTER

DESIGN: JOHN BOYD

DRAWING: BERNARD WINLO



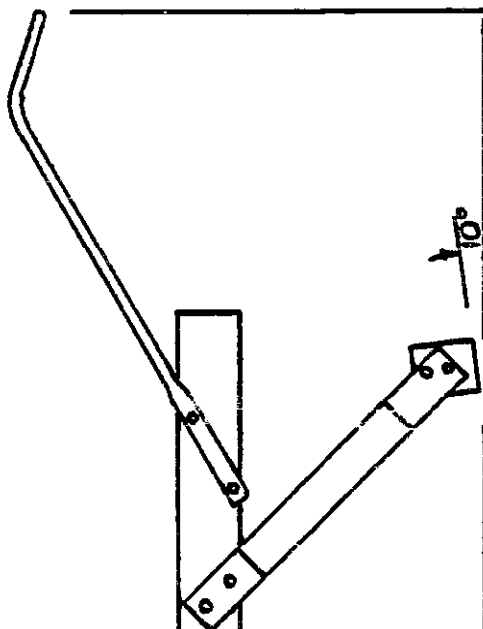


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