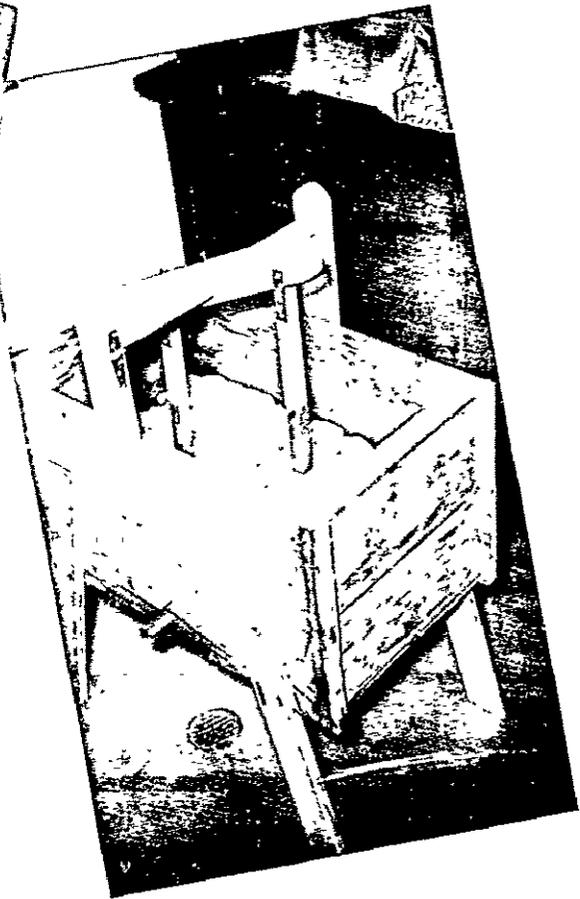
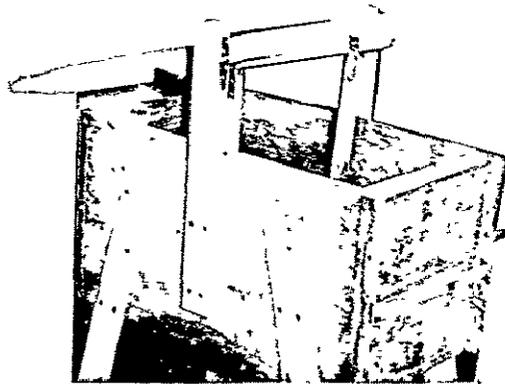


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How to make a

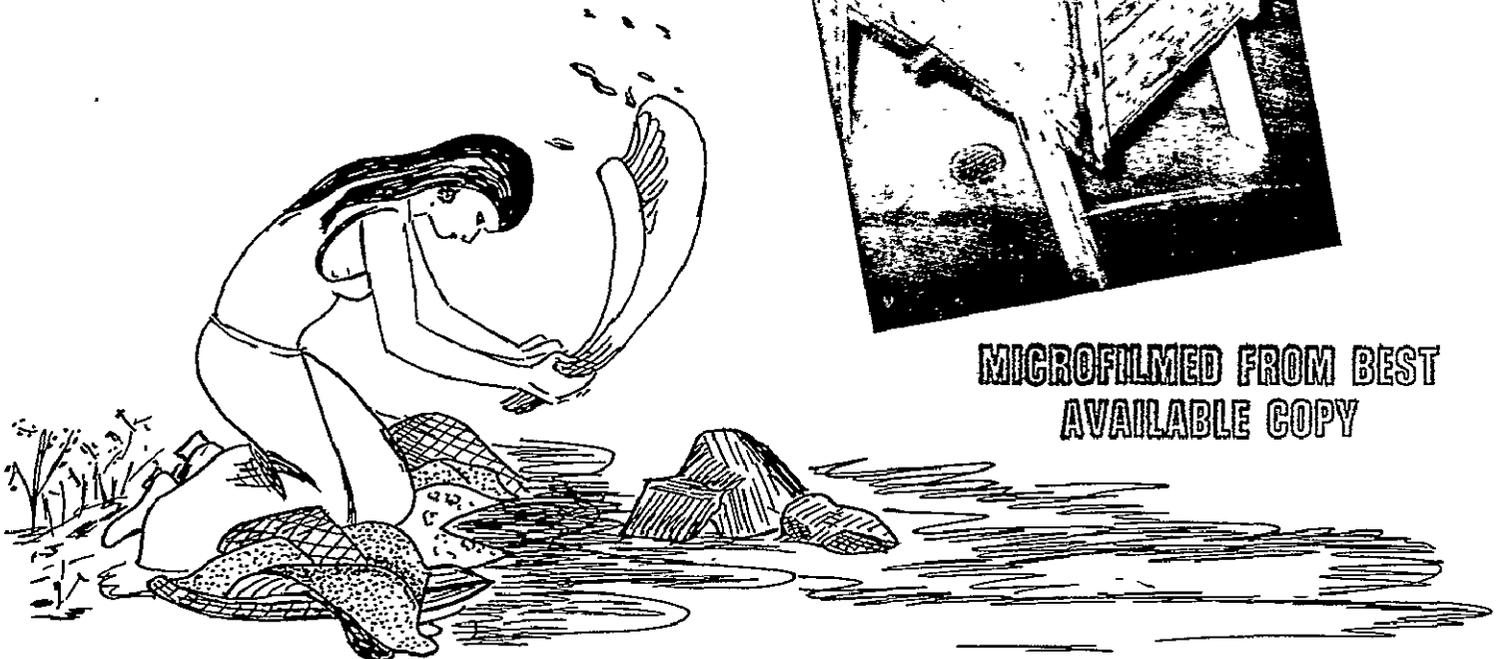
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WASHING MACHINE



**INTERNATIONAL
COOPERATION
ADMINISTRATION**

UNITED STATES OF AMERICA
August, 1958



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AVAILABLE COPY**

FOREWORD

Today the vast majority of women around the world still do the family washing in the old primitive way. Daily they trudge to the nearest stream, which is often dirty or polluted, and spend hours at the backbreaking job of beating and scrubbing clothes by hand. The results are far from satisfactory. Clothes wear out rapidly in the scrubbing process and are not as clean as they should be.

Now there is a way to improve this inefficient custom practiced where money and electricity are scarce. Specialists of the United States International Cooperation Administration have designed and built a washing machine which is inexpensive, simple to make and easy to operate. This booklet gives drawings and information to build this machine.

WASHINGTON, D. C.
AUGUST, 1958

A HANDMADE WASHING MACHINE

In response to requests from Home Economics Specialists of USOMs, a simple hand-operated washing machine has been developed in ICA/W especially designed to use materials likely to be available in most countries and to require only semi-skilled carpenter or furniture-making skills.

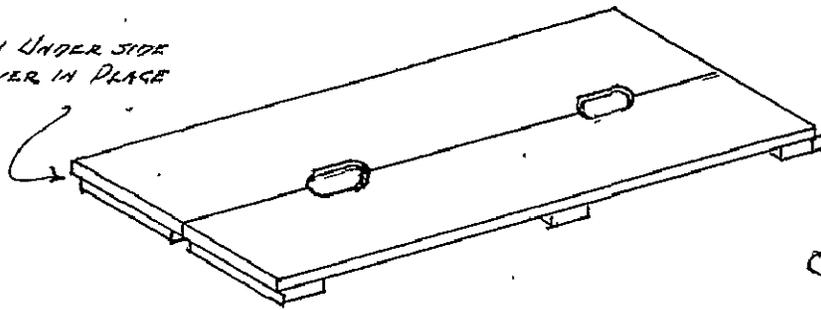
A pilot model of the machine was made by the U. S. Department of Agriculture in their shops and tested in the Home Economics Laboratory at Beltsville, Maryland. Under test conditions a comparison with standard electric commercial washers was very favorable. The new model should be a decided improvement to conserve clothing over methods now in use in most countries where ICA is giving assistance. This is especially true where clothes are beaten or scrubbed on rocks. It will also save a considerable amount of labor. If the cost of this machine is too great for one family, it could be used by several. However, too many users will probably mean severe wear or breakage and difficulties for times of use.

The machine reverses the principle employed in the usual commercial washer in which the clothes are swished through the water for various degrees of a circle until the water is moving and then reversed. To keep this machine simple, the clothes stay more or less stationary while the water is forced back and forth through the clothes by the piston action of the plungers. One plunger creates a suction as it rises and the other plunger creates a pressure as it moves downward. Since the principle involves the churning action of the water, the slope at the corners of the machine bottom is important for best action.

The machine needs a rectangular tub for this method of operation. The rectangular box also is easy to build and does not require skilled cooperage methods. In general, any moderately strong wood that will not warp excessively (such as cedro in Central America) will be satisfactory. The sides should be grooved for the ends and bottom of the tub as indicated and bolted with threaded rods extending through both sides with washers and to permit it to be drawn tight. The through bolting is important; otherwise, leaks are inevitable.

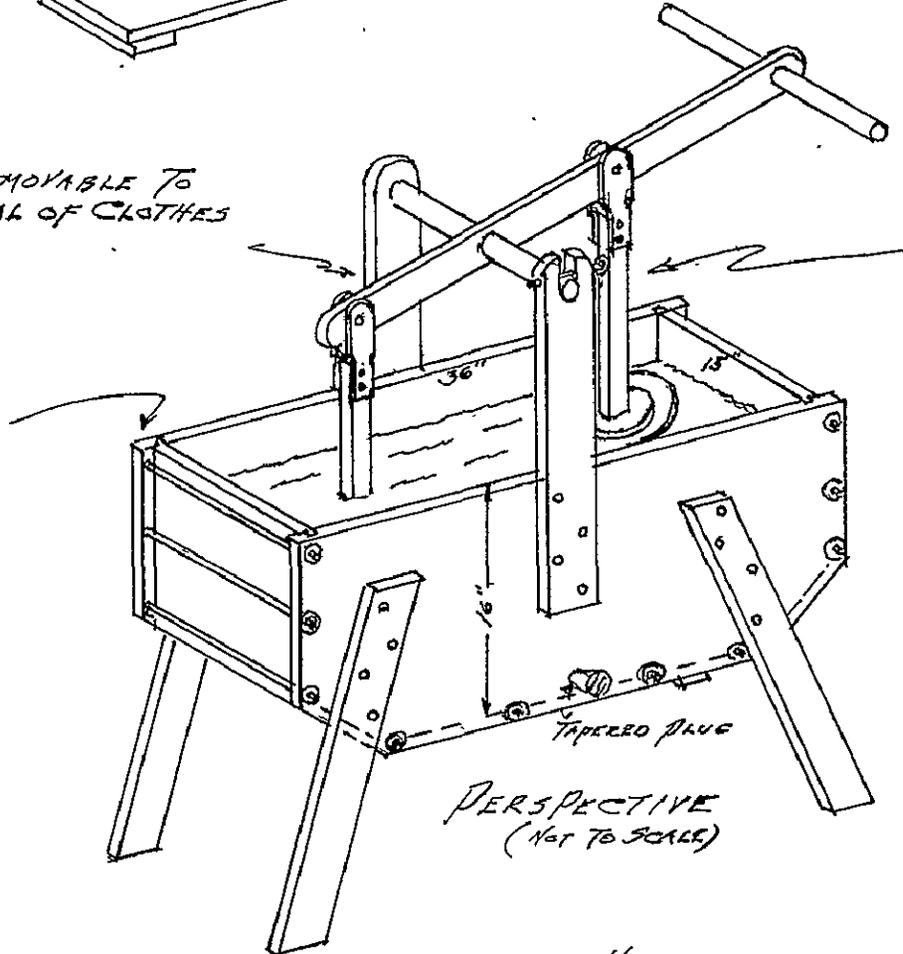
The size indicated on drawings is considered sufficient for an average family in the U. S. The same principle may be used for a larger or smaller machine provided basic proportions are maintained. The tub should be slightly less than half as wide as it is long to get a proper surge of water. The pistons should be wide enough to move within a couple of inches of each side of the tub. The lever pivot should be high enough to permit the plungers to move up and down several inches without the edge of a lever hitting the edge of the tub. Likewise, rods on the plungers must be long enough to permit plungers to go well into the water so that clothes come completely out of water at the highest position.

CLEATS ON UNDER SIDE
TO HOLD COVER IN PLACE

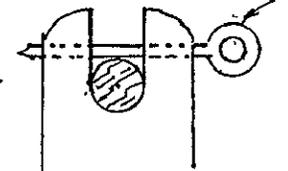


WOOD SPLASH COVER

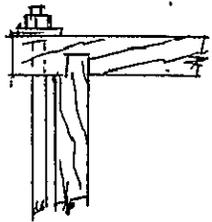
LEVER & PISTONS REMOVABLE TO
FACILITATE REMOVAL OF CLOTHES



REMOVABLE PIN



DETAIL OF
BEARING



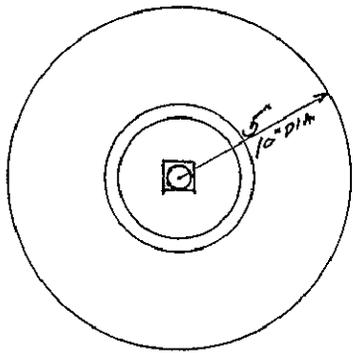
DETAIL OF CORNER

TAPERED PLUG

PERSPECTIVE
(1/4" TO SCALE)

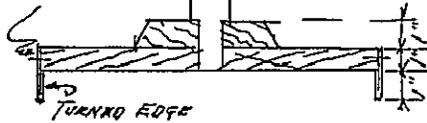
HAND OPERATED WOOD CHEST
WASHING MACHINE

YCP-1CA-4/25/58



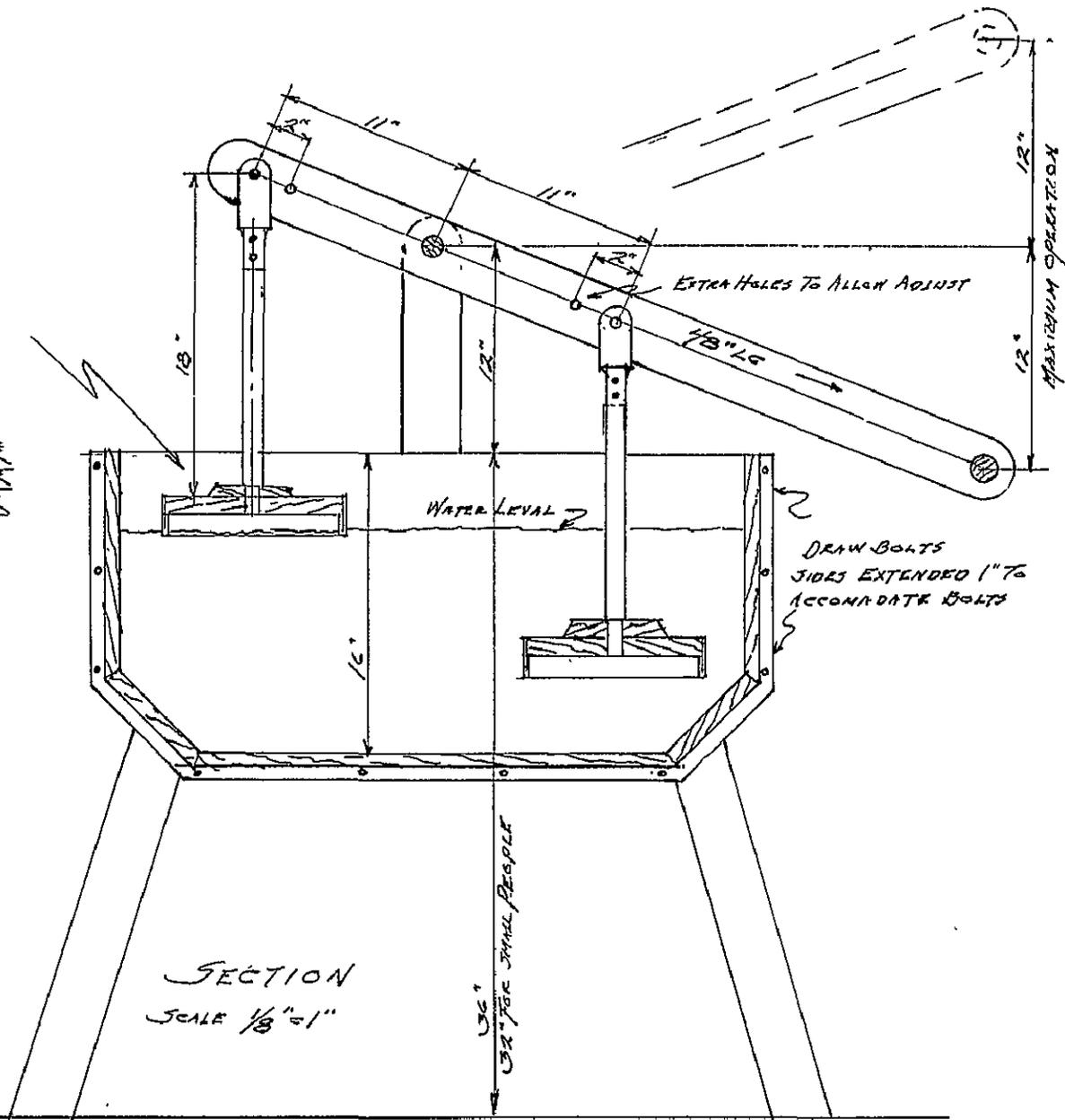
PLAN

HEAVY SHEET
METAL EDGE



SECTION

DETAIL OF PLUNGERS
NOT TO SCALE.



SECTION
SCALE 1/8"=1"

HAND OPERATED WASHING MACHINE

xep-102 6/20/68

MATERIALS FOR WASHER

Tub Construction - Moderately firm softwood (such as Cedro of South America) free from large heartwood growth

2 pieces - 1" x 18" x 3'2" - sides
2 pieces - 1" x 12" x 1'4" - ends
2 pieces - 1" x 6" x 1'4" - bottom
1 piece - 1" x 16" x 2'2" - bottom
4 pieces - 1" x 4" x 2'6" - legs
2 pieces - 1" x 10" dia - round plungers
2 pieces - 1-1/2" x 5" dia - round plungers
2 pieces - 1" x 8" x 3'0" lg. cover*
6 pieces - 1" x 3" x 8" - lg. cover*

*The cover may be omitted if not wanted.

Operating Parts - Moderately firm hardwood such as Caoba of South America.

1 piece - 1" x 3" x 4'0" - long lever
2 pieces - 1-1/8" square 15" lg. plungers
2 pieces - 1-1/8" x 3" x 2'0" long - uprights
2 pieces - 1-1/4" round 18" long - pivot and handle

Metal Parts

4 pieces iron or brass plate 1/4 x 1-1/2" x 6" long - plunger connection
10 rods 1/4 or 5/16" diameter, 18" long with threads and nuts on each end - iron or brass
2 washers about 1" diameter with hole to fit rods
1 rod 1/4" x 6" with loop end for retaining pivot
6 bolts 1/4" x 2" long
24 screws 1-3/4" x #10 - flat head
50 - 2-1/2" nails
Strip Sheet Metal with turned edge - 2-1/2" wide, 6'0" long
Small quantity of loose cotton or soft vegetable fibre for caulking seams

Minimum Tools Needs

Tape measure or rule
Hatchet
Saw
Wood chisel 1/2 or 3/4" wide
Screw driver
Adjustable wrench
1/4" drill, gimlet or similar tool
Draw knife or plane and coping saw would be useful but not essential.

INSTRUCTIONS FOR MAKING WASHER

Mark and groove sides for end and bottom members

Drill holes for cross bolts

Cut off corners and trim ends of side members length

Level ends and bottom pieces to fit into groove in side members

Mitre bottom and end members together

Assemble and bolt

Cut and install legs

Caulk seams between ends and bottom members with loose cotton or other vegetable fibre to make watertight. If joints to side members are carefully made, they probably will not need caulking.

Bore hole and make plug for draining tub. NOTE: This is shown on side in drawing but it is better in bottom of tub.

Make and install pivot members (uprights)

Make and install plunger lever - NOTE: The cross pivot member (round) should be shouldered or notched at each pivot to prevent side movement.

Make plungers and install.

DIRECTIONS FOR WASHING IN HOMEMADE WASHER

A. Pre-treatment:

1. If clothes are stained, treat stains by recommended methods before washing.
2. Dampen and rub with soap the areas of garments which come in close contact with the body, such as collars and cuffs.
3. If clothes are especially dirty, the soil may be easier to remove if they are soaked.

B. Soaking:

1. Fill washer, a separate tub or container with cool or lukewarm water. Be sure there is sufficient water to float the clothes and thus provide thorough soaking.
2. Put clothes in the container of water and soak. A maximum time of fifteen minutes is adequate.
3. When the soak time is up wring water out of clothes.
4. If washer has been used for soaking, empty it.

C. Washing:

1. Fill washer to water line (15 gallons) with warm or hot water depending on what is available.
2. Shave soap into fine pieces and dissolve by heating in a small quantity of water. Add the solution to the wash water. Be sure there is enough soap to make a lasting suds. The quantity needed will depend upon the hardness of the water, the type and quantity of soil.
3. Put the clothes in the washer distributing them evenly. A six-pound load will wash cleaner than a larger load.
4. Put the washer mechanism in place.
5. Wash at a moderate speed (about 50 strokes per minute) for at least ten minutes or longer if it seems necessary.
6. At the end of the wash period wring the water out of the clothes.
7. Drain water from the washer.
8. Rinse washer until free of suds and residue.

D. Rinsing:

1. Refill the washer with cold or warm water.
2. Put the clothes in the washer and put the washer mechanism in place and wash at least three minutes (at 50 strokes per minute).
3. Wring water out of clothes and hang to dry.
4. Empty washer, rinse until clean.
5. Put stopper in washer.

E. Storing washer:

1. To prevent the wood from drying out and the washer leaking, add one to two inches of water to the washer.
2. Put the mechanism in place and put on the lids.