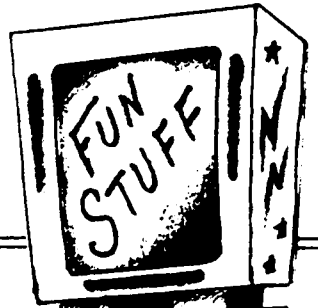


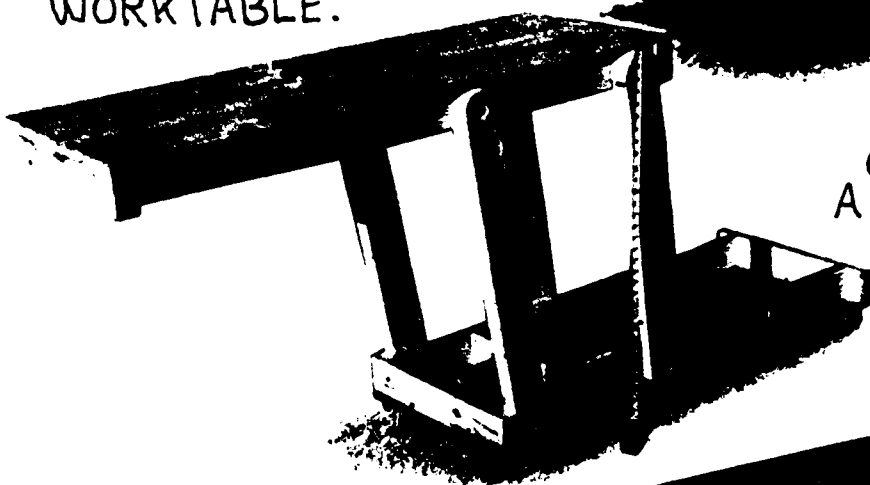
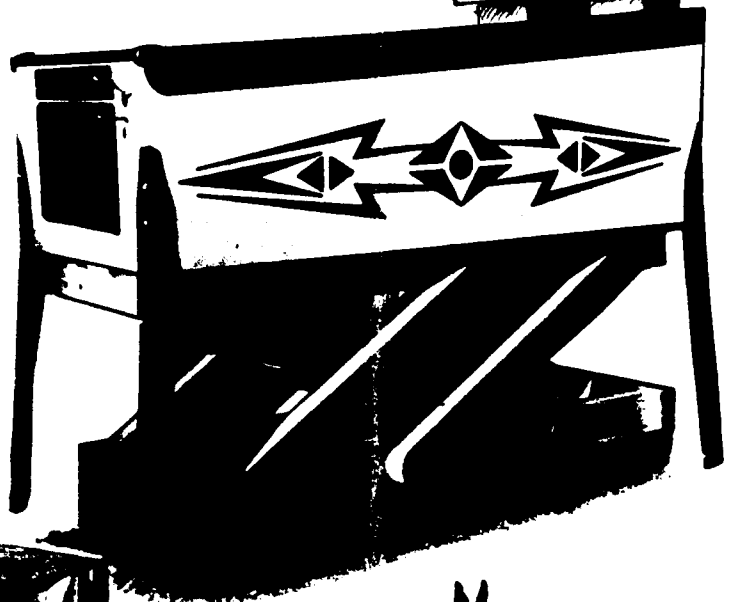
X-1

PINBALL DOLLY

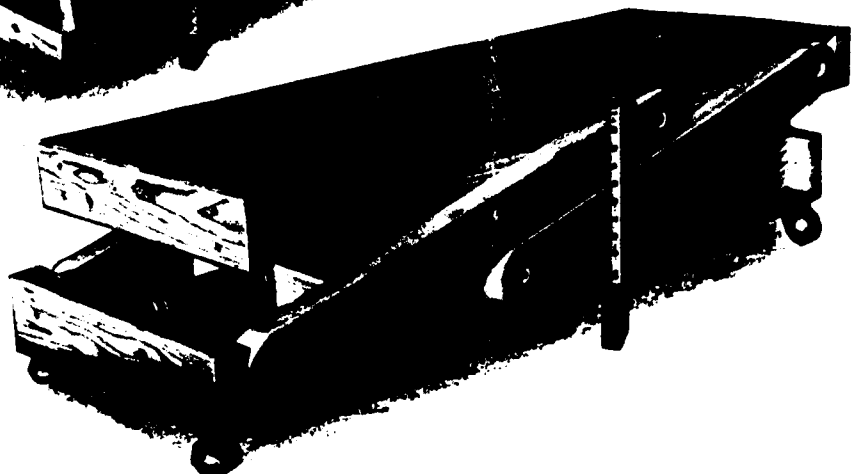


POWERED BY A
HORIZONTALLY-OPERABLE
HYDRAULIC BOTTLEJACK
WITH AN ADJUSTABLE
LENGTH POWER PISTON.
PROVIDES ABOUT 4½" OF
ADJUSTABLE LIFT.

EXTENDED MANUALLY
TO A HEIGHT OF 35",
X-1 UNIT DOUBLES AS
A VERSATILE ROLLAROUND
WORKTABLE.



MANUALLY
COLLAPSIBLE TO
A HEIGHT OF 13½"
AND CAN BE
STORED IN
ANY POSITION.



A
Bill
Cowles
Design

FABRICATING THE PIECES (THE HARD PART)

1) CUT ALL LUMBER TO SIZE, SAVING A SCRAP (OF 2"x4") FOR A PILOT HOLE TEMPLATE, TO AID IN MARKING & DRILLING OF 1/4" HOLES.

★ (MARK EACH PIECE SO THEY DON'T GET MIXED UP)

2) DRILL ALL HOLES AS SHOWN, BEGINNING WITH A (*) 1/4" (OR SMALLER) BIT.

NEXT DO THE COUNTERSINKING WITH THE 1" BIT AS SHOWN.

⇒ THIS MUST BE DONE BEFORE THE 3/8" BIT IS USED, OR THE 1" BIT WILL WOBBLE ALL AROUND A 3/8" HOLE!

AFTER ALL HOLES HAVE BEEN COUNTERSUNK, ON BOTH SIDES IN MOST CASES, GET OUT THE 3/8" BIT AND REAM THE HOLES TO SIZE, BEING CAREFUL TO MAINTAIN "SQUARENESS" TO THE WOOD.

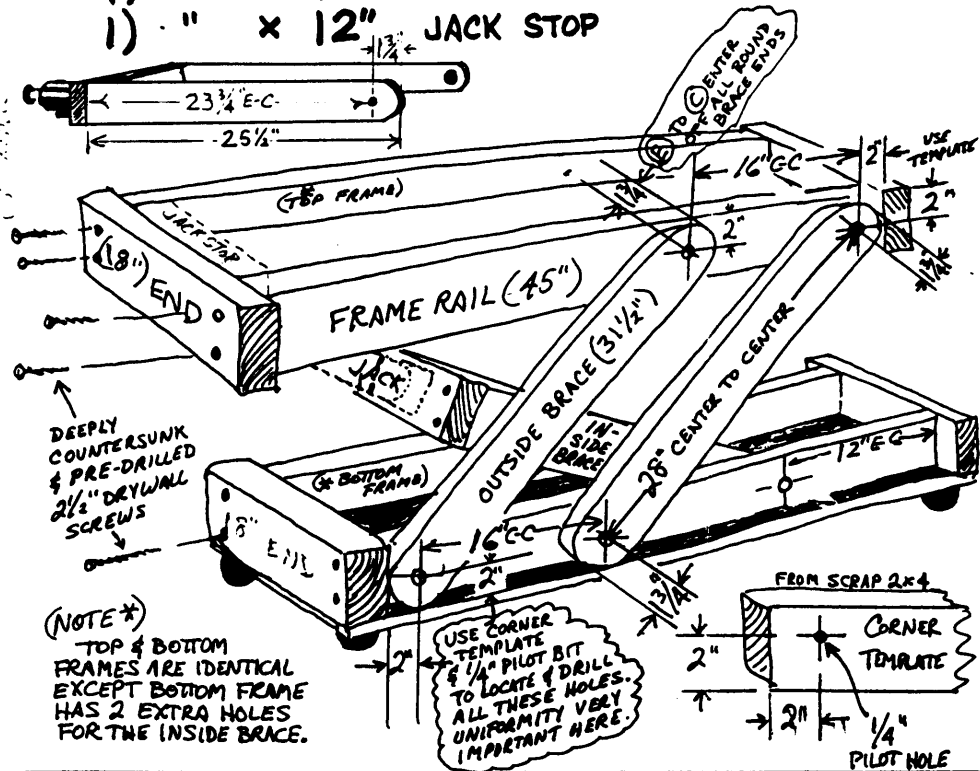
* LOCATING & DRILLING THESE HOLES PROPERLY IS PROBABLY THE MOST CRITICAL PART OF THIS (W)HOLE PROJECT, SO A LITTLE EXTRA TIME SPENT HERE TO BE AS ACCURATE AS POSSIBLE WILL PAY OFF IN THE END. A DRILL PRESS WOULD BE IDEAL HERE, BUT IF YOU DON'T HAVE ONE, (LIKE ME), A CAREFULLY DRILLED TEMPLATE WILL DO — AS A GUIDE AND LOCATOR FOR THE 10 HOLES NEEDED IN THE FRAME RAILS.

THE 10 HOLES NEEDED IN THE BRACES ALSO NEED TO BE AS STRAIGHT & TRUE AS POSSIBLE, USING THE 1/4" PILOT BIT FIRST. (THE "TEMPLATE" CAN ALSO BE USED HERE TO HELP HOLD THE BIT "SQUARE," AFTER THE HOLE IS STARTED A LITTLE BIT.)

3) THE 4 OUTSIDE BRACES NEED TO BE RADIUS ROUNDED, USING A SCROLL, BAND, JIG, SABER OR ANY OTHER KIND OF SAW THAT CAN ROUND OUT BOTH ENDS. THE 2 INSIDE BRACE PIECES GET ROUNDED ONLY ON ONE END.

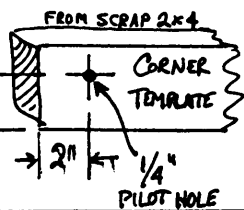
USE STRAIGHT LUMBER & AVOID KNOTS

- 4) 2"x4" x 31 1/2" OUTSIDE BRACES
- 4) " x 45" FRAME RAILS
- 4) " x 18" FRAME ENDS
- 2) " x 25 1/2" INSIDE BRACE
- 1) " x 12" " " END (BASE FOR JACK)
- 1) " x 12" JACK STOP



(NOTE *)
TOP & BOTTOM FRAMES ARE IDENTICAL EXCEPT BOTTOM FRAME HAS 2 EXTRA HOLES FOR THE INSIDE BRACE.

USE CORNER TEMPLATE & 1/4" PILOT BIT TO LOCATE & DRILL TO LOCATE & DRILL. ALL THESE HOLES. UNIFORMITY VERY IMPORTANT HERE.



← 96" →					
12	12	(1)	25 1/2	18	18
3 1/2			25 1/2	18	18
3 1/2 BRACE			31 1/2		31 1/2
RAIL (45")				(RAIL) 45"	
RAIL (45")				(RAIL) 45"	

(85 1/2")
 (93")
 (94 1/2")
 (90")
 (90")

5) 8'-0"
2"x4" S

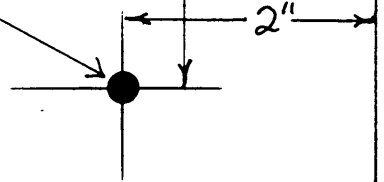
CORNER TEMPLATE

(FROM SCRAP 2"x4")

1/4" DIAM. HOLE

2"

2"



BEFORE
3/8" BIT

1" Wood
BIT

3/8" x 3" ALL-THREAD ROD
3/8" NUT
3/8" WASHER
3/8" T-NUT

COUNTERSINK T-NUT
AND WASHER TO BE
FLUSH WITH WOOD

1/2"

(FRAME RAIL)

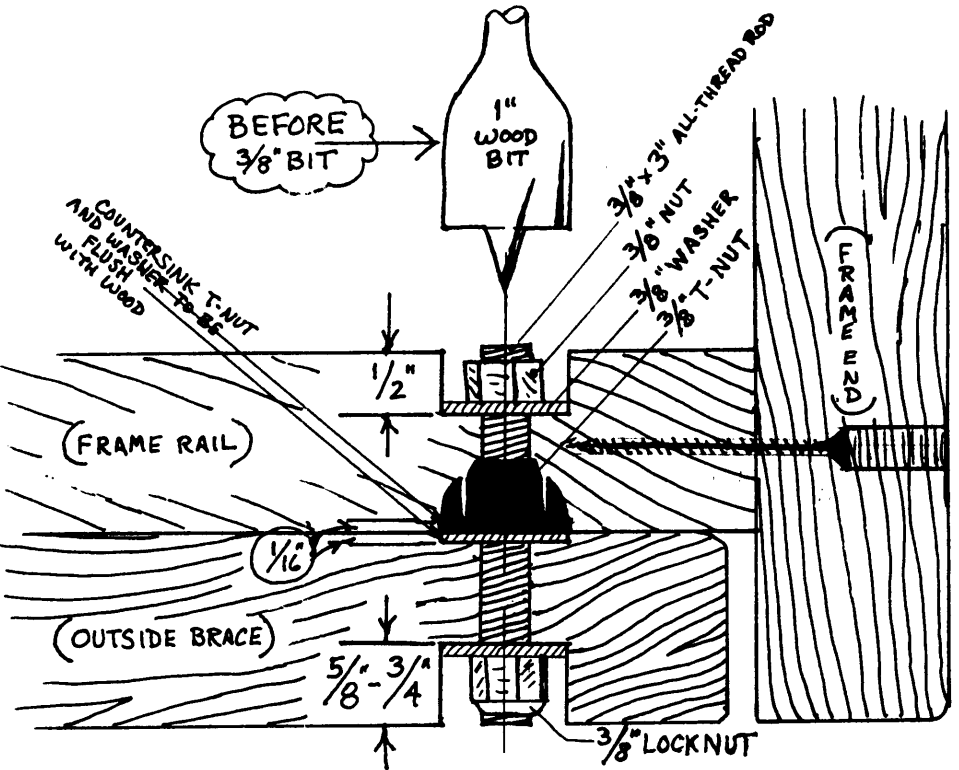
(FRAME END)

1/16"

(OUTSIDE BRACE)

5/8" - 3/4"

3/8" LOCKNUT

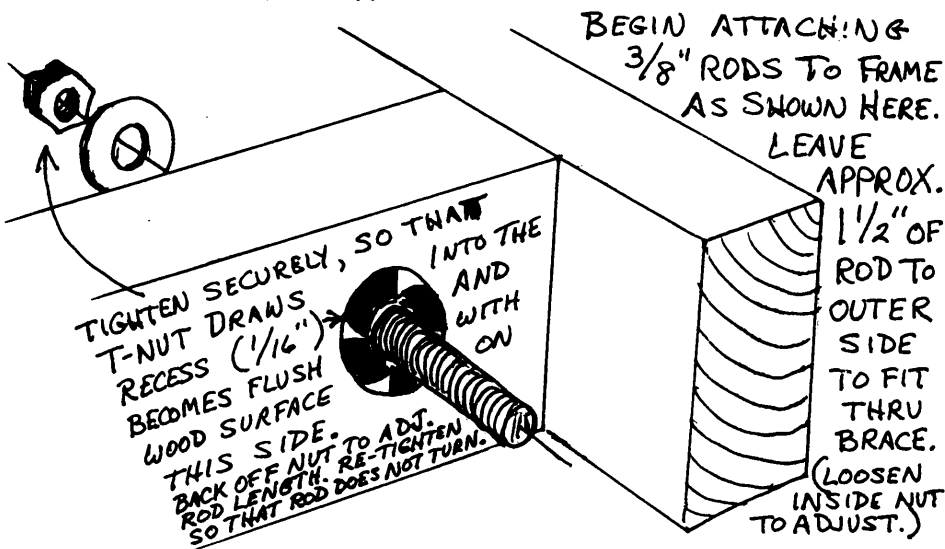


ASSEMBLY (THE FUN PART)

ASSEMBLE THE TOP & BOTTOM FRAMES, USING $2\frac{1}{2}$ " DRYWALL SCREWS (COUNTERSUNK DEEPLY FOR MAXIMUM PENETRATION). NAILS COULD ALSO BE USED. A LITTLE "ELMER'S" GLUE HERE COULDN'T HURT.

THIS WOULD BE A GOOD TIME TO ATTACH THE BOTTOM PLYWOOD PANEL, USING SCREWS OR NAILS. I PREFER DRYWALL SCREWS TO WOODSCREWS BECAUSE OF THEIR NARROWER SWANK AND LESS TENDENCY TO SPLIT WOOD. (ALTHO PRE-DRILLING IS STILL THE BEST WAY TO GO.) A LITTLE GLUE WOULDN'T HURT HERE, EITHER.

ATTACH THE CASTERS TO THE BOTTOM, WITH 3 OF THE 4 SCREWS LONG ENOUGH TO PENETRATE THRU THE PLYWOOD INTO THE FRAME. THE 4TH SCREW CAN BE A SHORTER ONE.

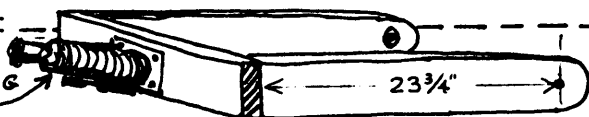


AFTER ALL 8 RODS FOR THE 4 OUTER BRACES ARE ON, THE BRACES CAN BE INSTALLED, CONNECTING THE TOP FRAME TO THE BOTTOM.

IT MAY BE NECESSARY TO LOOSEN A ROD OR TWO TO FACILITATE THE ATTACHMENT OF THE LAST BRACE. AFTER THEY ARE ALL ASSEMBLED AND TIGHTENED TO DESIRED FIRMNESS (OR LOOSENESS), BY TIGHTENING (OR LOOSENING) THE OUTER LOCKNUTS; THE INNER NUTS CAN ALWAYS BE LOOSENED TO TURN THE ROD AND BRING IT JUST FLUSH TO EDGE OF THE OUTER LOCK-NUT.

ONE NOTE HERE: YOU CAN USE REGULAR $\frac{3}{8}$ " NUTS ON THE OUTSIDE AND THEY'LL WORK PRETTY GOOD FOR A WHILE, BUT THEY WILL LOOSEN UP AND EVEN FALL OFF. (MINE DID.)

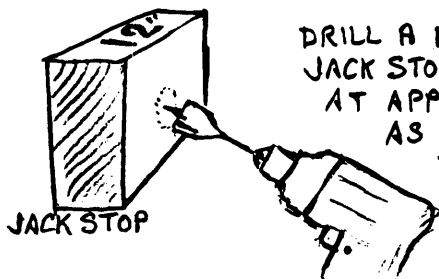
THE INSIDE BRACE RODS DON'T USE THE T-NUT METHOD, JUST A NUT & WASHER ON THE INSIDE AND OUT.



WHEN SELECTING A BOTTLE JACK, MAKE CERTAIN THAT IT WILL OPERATE IN A HORIZONTAL POSITION. SOME WILL NOT.

ALSO NOTE THE POSITION THE HANDLE WILL BE IN TO DETERMINE IF IT WILL BE SUITABLE FOR THIS PURPOSE.

ALSO LOOK FOR ONE WITH A FLAT ENOUGH SURFACE AT THE BASE WITH ROOM TO DRILL AT LEAST 2 HOLES FOR MOUNTING SCREWS.



DRILL A RECESS INTO THE JACK STOP ABOUT $\frac{1}{3}$ WAY THRU, AT APPROX. THE SAME ANGLE AS THE JACK WILL BE. THIS WILL SECURE THE TIP OF THE JACK.

THIS PHOTO SHOWS THE ORIGINAL JACKSTOP, WHICH WAS CUT FROM A SMALL STRIP OF $\frac{3}{4}$ " PLYWOOD

CHANGING IT TO THE THICKER PIECE OF 2×4 GIVES THE DOLLY A LITTLE BETTER LIFT UNDER THE GAMES USING 31" LEGS.

THIS IS A GOOD PLACE TO CHECK AND ADJUST THE LIFTING RANGE OF THE DOLLY, BEFORE THAT JACKSTOP IS SECURED IN PLACE. COMPENSATIONS FOR VARIABLES IN CHOICE OF PLYWOOD THICKNESS, CASTER SIZE, JACK PISTON TRAVEL, ETC., CAN BE EASILY MADE HERE (OR UNDER THE BASE OF THE JACK, MOVING THE WHOLE JACK FORWARD.)

NOTE THE 6" ELL BRACKETS IN THE ABOVE PHOTO. THESE WERE NECESSARY WITH THE SHORT JACKSTOP, BUT COULD PROBABLY BE ELIMINATED IF THE $2 \times 4 \times 12$ JACKSTOP USED IS A SNUG FIT AND PROPERLY ATTACHED THRU THE SIDE RAILS USING 3 LONG ($2\frac{1}{2}$ ") DRYWALL SCREWS ON EACH SIDE, PRE-DRILLED & COUNTERSUNK DEEPLY, (AS DONE ON THE FRAME ENDS).

BEFORE DRILLING, NOTE THE LOCATION OF THE 2 SCREWS FROM THE FRONT TO AVOID CONFLICT WITH THEM. ALSO A LIBERAL AMOUNT OF GLUE HERE WOULD BE A DEFINITE PLUS.

ABOUT ALL THAT'S LEFT NOW IS TO ATTACH THE PIECE OF PLYWOOD TO THE TOP. !

USING SHORTER ($1\frac{1}{2}$ ") DRYWALL SCREWS AND NO GLUE SHOULD MAKE IT A SNAP TO CHANGE THE TOP IN THE FUTURE.

★ X-1 DOLLY PARTS ★

- 5) 2" x 4" x 8'-0"
- 2) 1/2" or 3/4" PLYWOOD, 18" x 48"
- 4) 2 1/2" SWIVEL CASTER WHEELS (HARD RUBBER BEST)
- (2) 6" STEEL ANGLE BRACKETS - OPTIONAL
- 1) HYDRAULIC BOTTLEJACK, HORIZ.-OPERABLE
- 8) 3/8" WOOD NUTS (T-NUTS)
- 28) 3/8" WASHERS (1" DIAM.)
- 12) 3/8" NUTS
- 8) 3/8" LOCKNUTS
- 30") 3/8" A.T.R. (ALL-THREAD ROD) CUT INTO 10 PIECES 2 7/8" LONG
- 36) 1 1/2" DRYWALL SCREWS
- 24) 2 1/2" " "
- (1) ELMER'S GLUE - OPTIONAL

★ TOOLS NEEDED ★

- | | |
|---------------------------|-----------------------------|
| TABLESAW OR SKILSAW | 3/8" DRILL MOTOR |
| SABRESAW (TO ROUND 2x4'S) | BITS: 1/16" 1/8" 1/4" 5/16" |
| HACKSAW (TO CUT 3/8" ROD) | 1" WOOD-BORING BIT |
| FILE (TO ROUND OFF BURRS) | COUNTERSINK BIT (OPTIONAL) |
| | PHILLIPS-HEAD DRIVER BIT |

