

NAIL PUZZLE

This is a great little fill in project or could be developed into an enterprising production item. Your students will also gain experience in the use of a bending jig, heating metal, and finishing metal. The process of making this puzzle is relatively simple and is easily adapted to a variety of grade levels.

Materials:

All that is needed is a small bending jig Fig. and a pair of 20d common nails.

Procedure:

(1) Nail is first placed in bending jig, attach vise grip to pointed end of nail. The nails are heated from the stake to the vise grip. (Dull to bright red in color). This will allow for a smooth bend around the 3/8" center stake of the jig. The heat should be supplied from an oxyacetelyne torch.

(2) As bending progresses around the center stake, the point of the nail must be angled upward to match the 15° angle on the nail head holding device.

(3) Adjustment for proper solution of puzzle; the opening or closing of the loops can be done with either a screwdriver or a pliers.

(4) Clean with steel wool - paint if desired.

Solution:

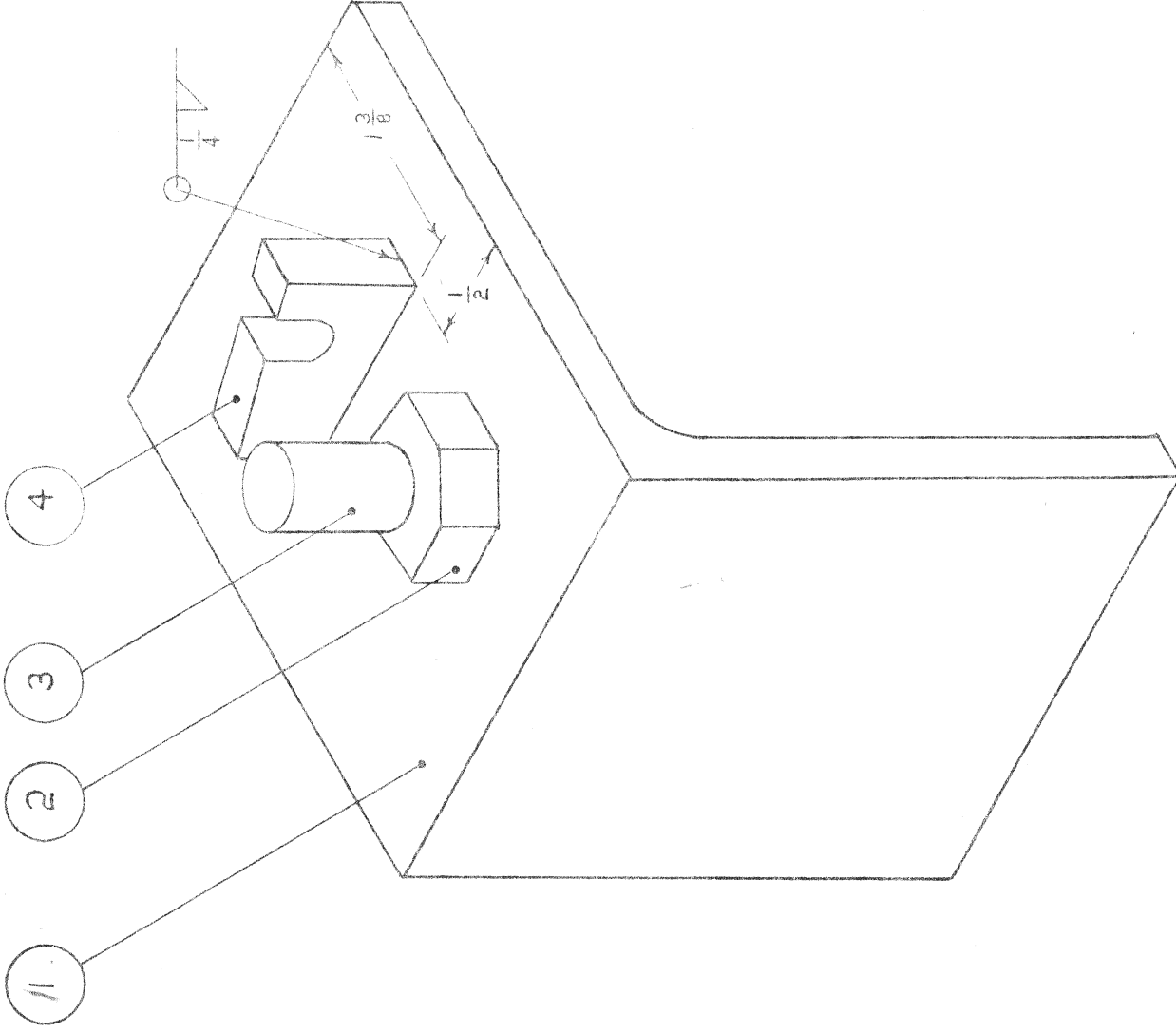
- (1) Grasp pointed ends of nails
- (2) Push together and cross heads of the nails
- (3) Continue twisting until heads have rotated into a flat plain
- (4) Push pointed ends together through loops and nails will come apart

Assembly:

Reverse above procedure.

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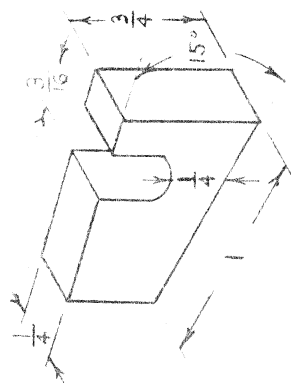
BILL OF MATERIALS



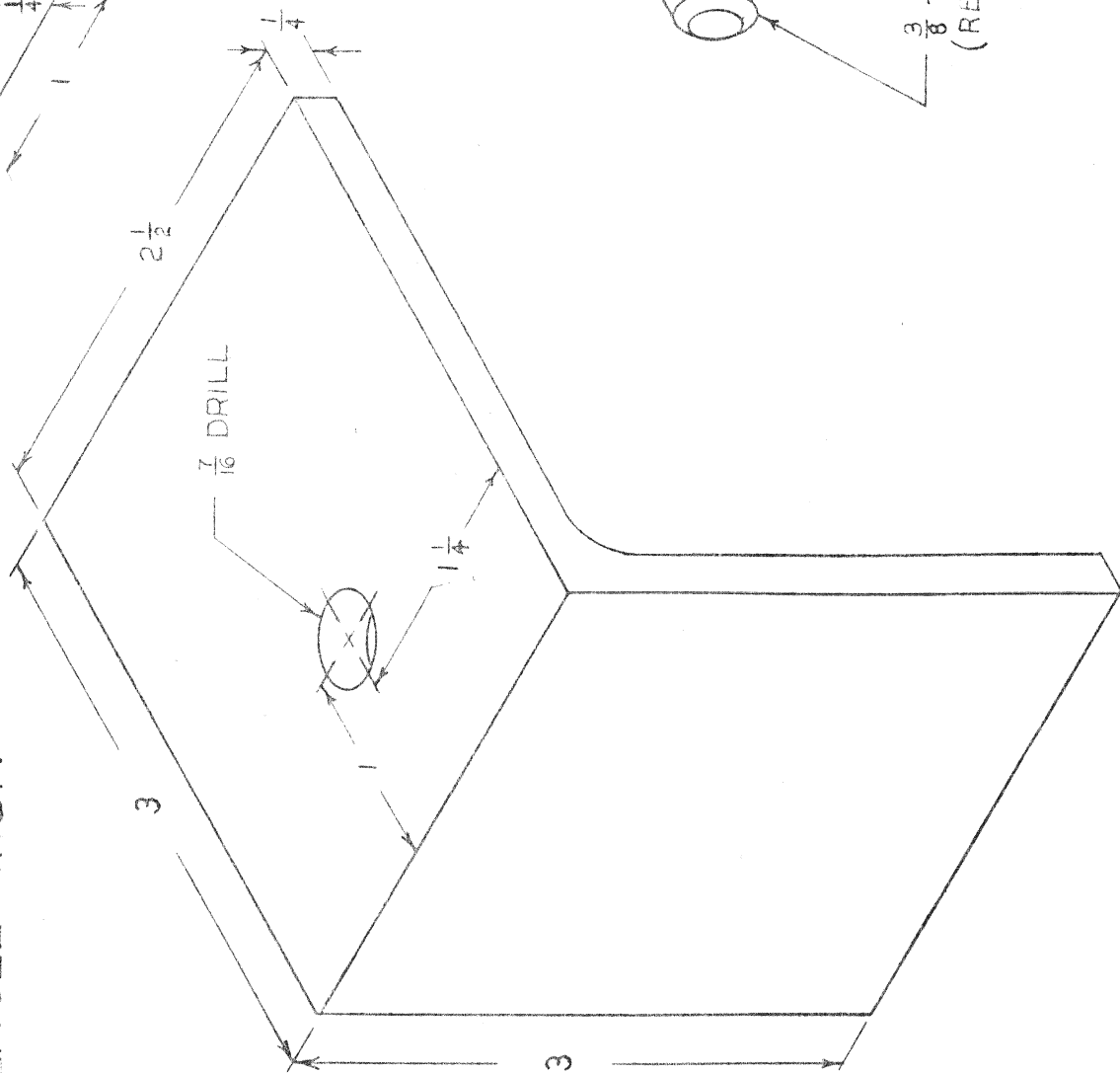
ITEM	QTY.	DESCRIPTION
1	1	1/4" ANGLE IRON
2	2	3/8"-16 UNC - 2B
3	1	3/8"-16 UNC - 2A
4	1	1/4" x 1/4" x 1/4" FLAT

TOMAHAWK HIGH SCHOOL
 DRAWN BY: *Greg Johnson*
 9/28/83

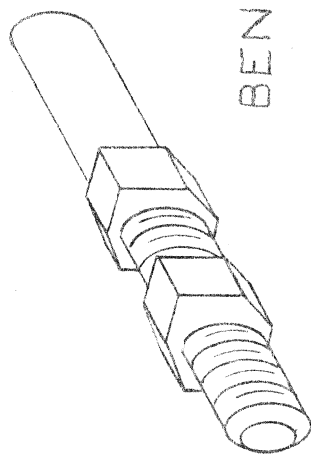
NAIL HEAD HOLDER



ANGLE IRON

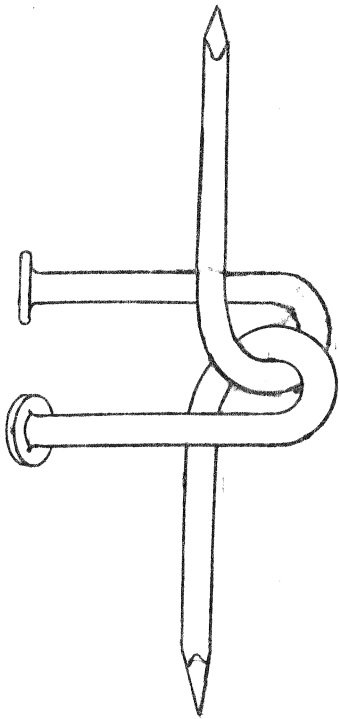


BENDING POST

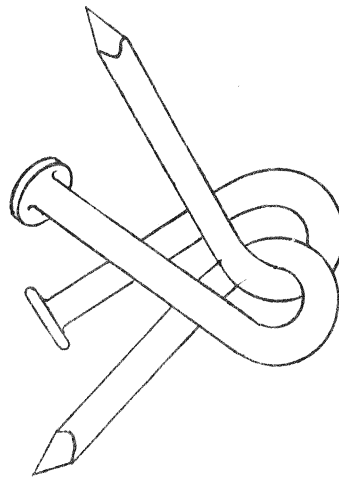


3/8 - 16 UNC - 2A x 2"
(REMOVE HEAD OF BOLT BY CUTTING)

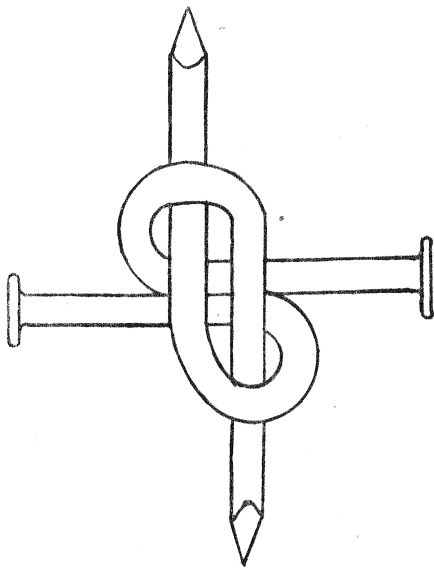
DRAWN BY: *94*
9/27/83



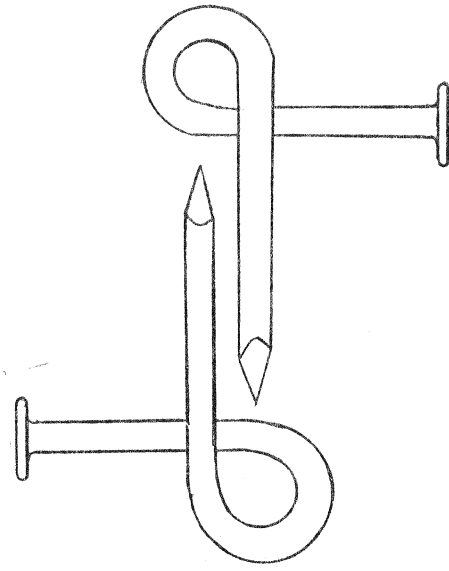
1



2



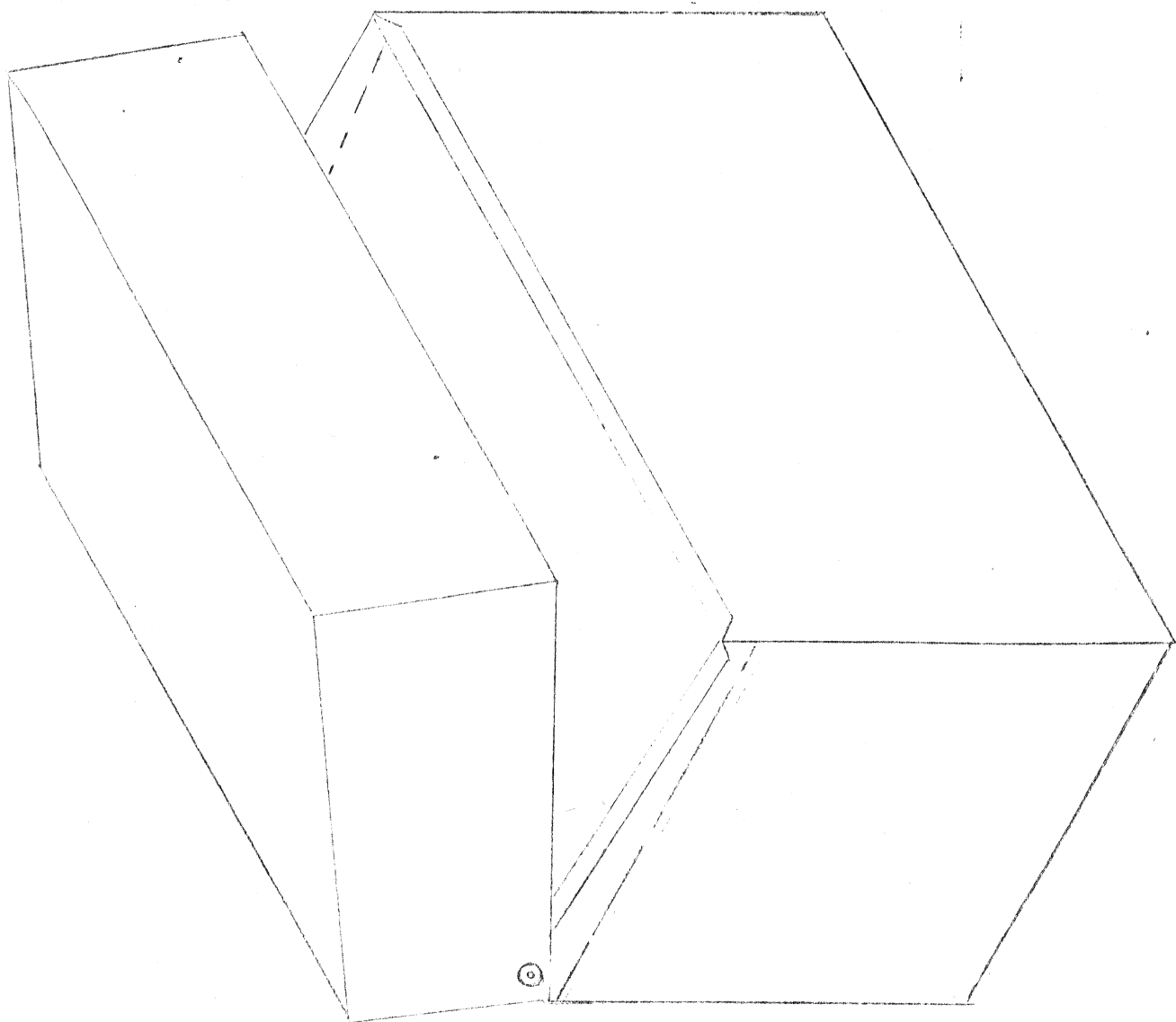
3

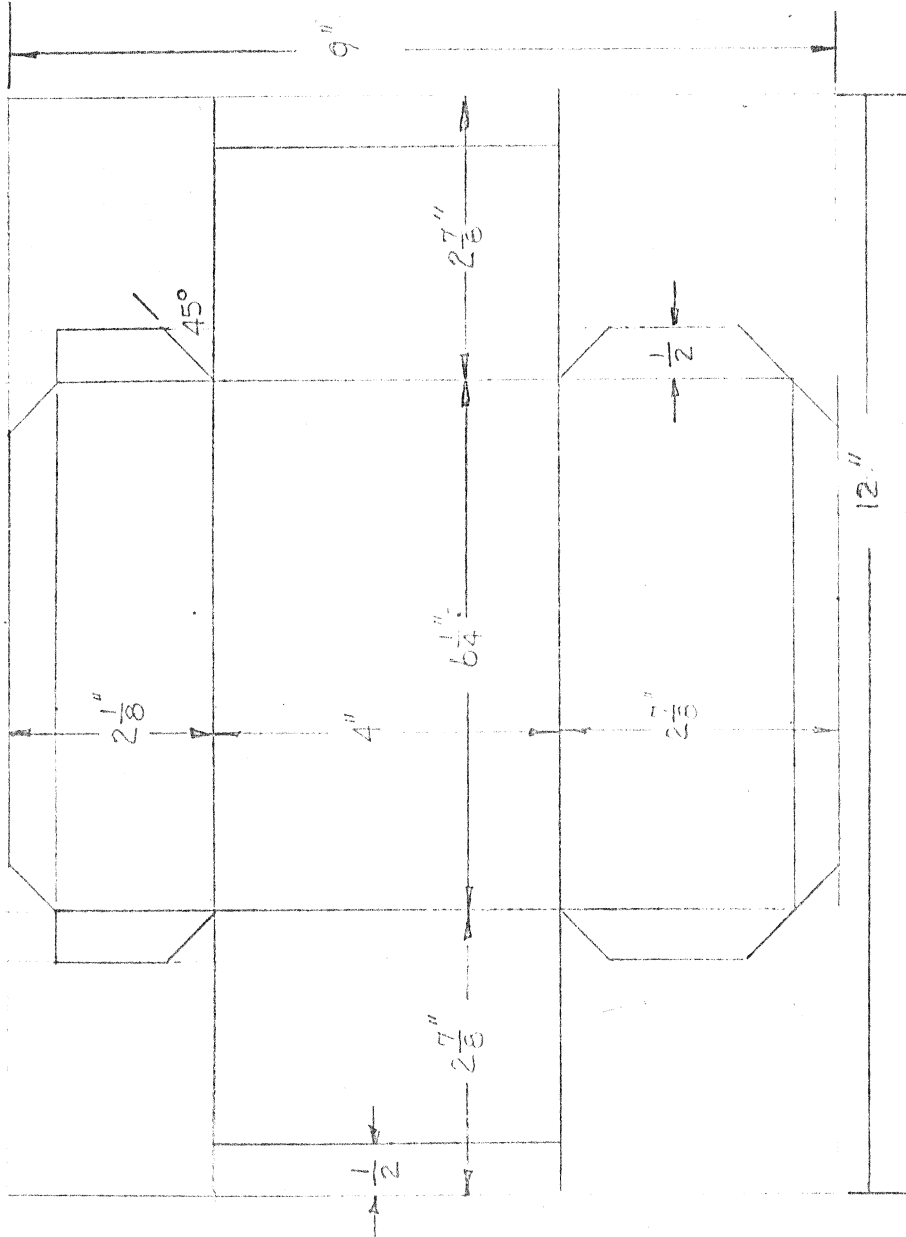


4

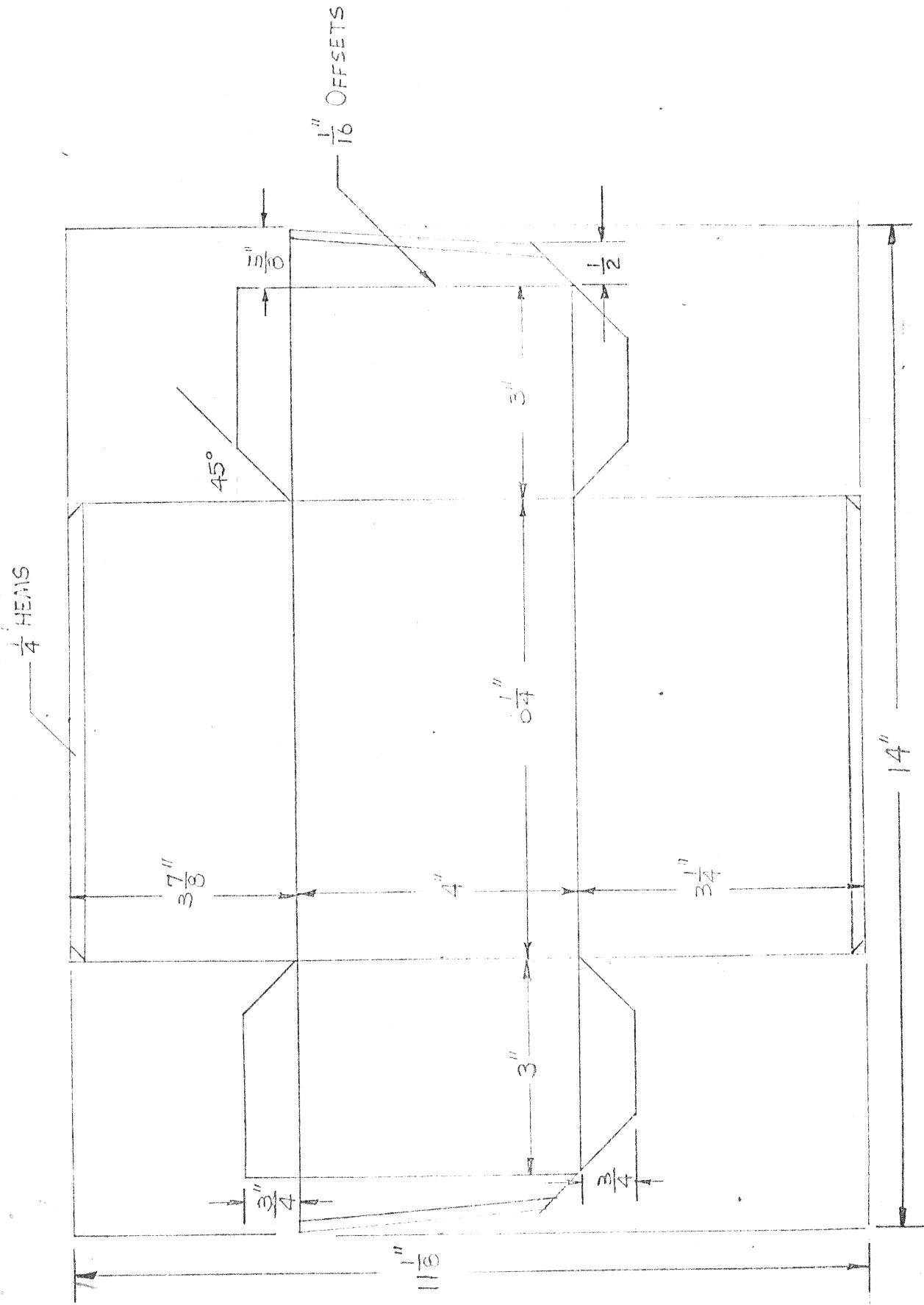
HOW TO DISASSEMBLE NAIL PUZZLE

DRAWN BY: J.E. JOHNSON	10/7/82
TOMAHAWK HIGH SCHOOL TOMAHAWK, WISC	

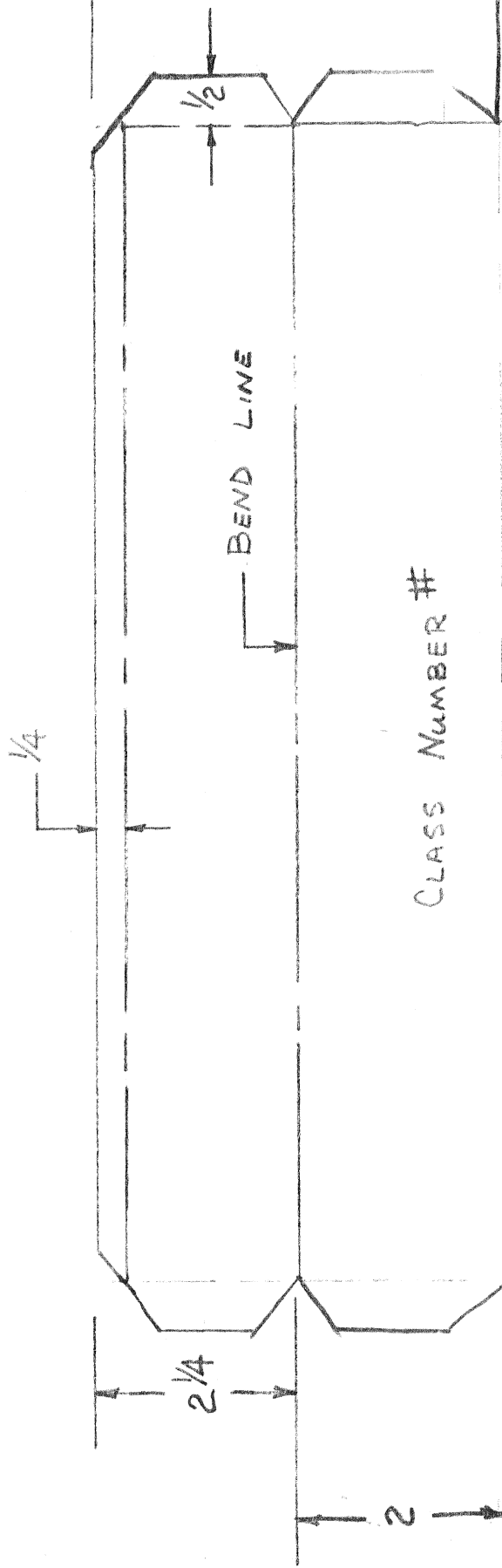




COVER- COMPUTER DISC STORAGE BOX



Bottom-Computer Disc Storage Box



CLASS NUMBER #

— DUST PAN —

HEM

45°

$5\frac{1}{4}$

$2\frac{1}{2}$

2

10

2

12

$\frac{1}{4}$

14

Electricity — PROJECT SECTION



Fig. 18-47. The screwdriver Test Light. (Courtesy: Prof. D. T. Burbank, San Jose State College.)
Disassembled to show parts placement.

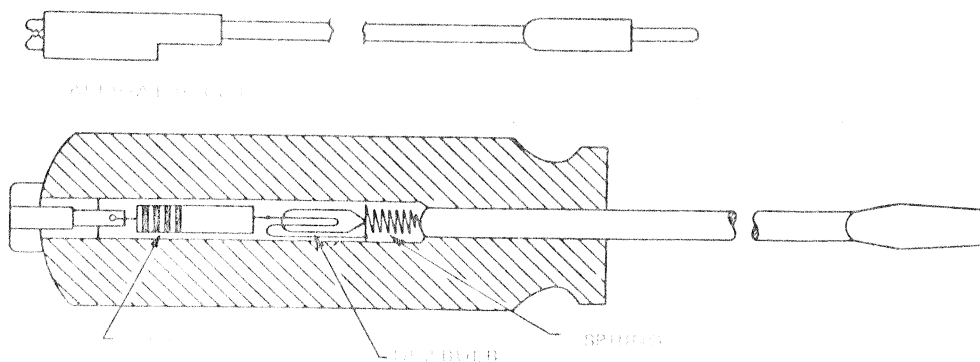


Fig. 18-48. Detail assembly drawing of the Test Light.

3. Pour acetone into the hole, then pour it out immediately. This clears up drill cuts and makes the handle transparent again.
4. While the inside of the hole is still soft from the acetone, thread a banana jack into the hole several times. Remove the jack and set the handle aside to harden.
5. A small spring is made of brass spring wire. The NE2 fits into one end of the spring. One lead of the NE2 is soldered to the spring.
6. The leads of the resistor are cut and the resistor is soldered between the banana jack and the other lead of the NE2. See Fig. 18-48.
7. The length of the assembly should be constructed so that as the banana jack is screwed into the handle, the spring is compressed.
8. Prepare a length of a #18 test lead wire with a banana plug on one end and an insulated alligator clip on the other.
2. Connect the alligator clip to one terminal of a variable dc source. Gradually increase the voltage. The light should glow at about 90 volts.
3. Connect the alligator clip to the end of a spark plug cable of an automobile engine. Then start the engine. If ignition is operating properly, the light will flash. It is not necessary to touch the screwdriver to the spark plug.

CAUTION: Touch only the handle of the screwdriver or you might get a shock.

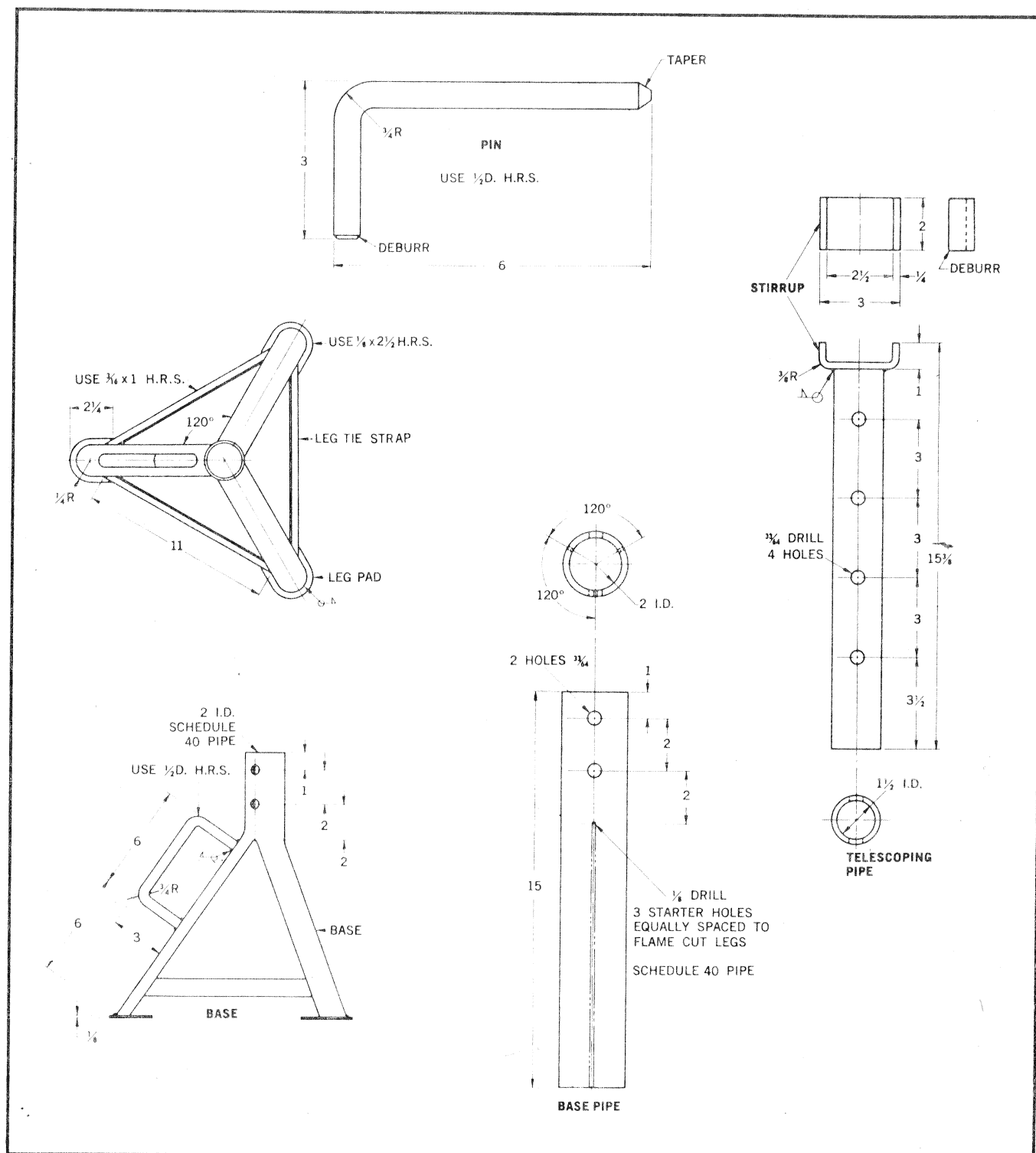
QUIZ — PROJECT XIII

TESTING YOUR TEST LIGHT

1. Connect the alligator clip to one terminal of the 120 volt ac line. Touch the screwdriver tip to the other terminal of the line. The handle should glow.
5. 1. Connect the tester across a variable 0-135 volts ac source. At what voltage does the light glow?
2. Gradually decrease voltage. At what voltage does the light go out?

NOTE: You have now determined the ignition and extinction voltage of the NE2 glow lamp.

3. Why is the 220 kilohm resistor used in series with the NE2 light?
4. Describe the method of using the test light to discover a burned out fuse in your home lighting system. Discuss with your instructor.



diameter) has four holes spaced 3 in. apart. One-in. height adjustments are possible by placing the pin in either of the 2-in. spaced holes.

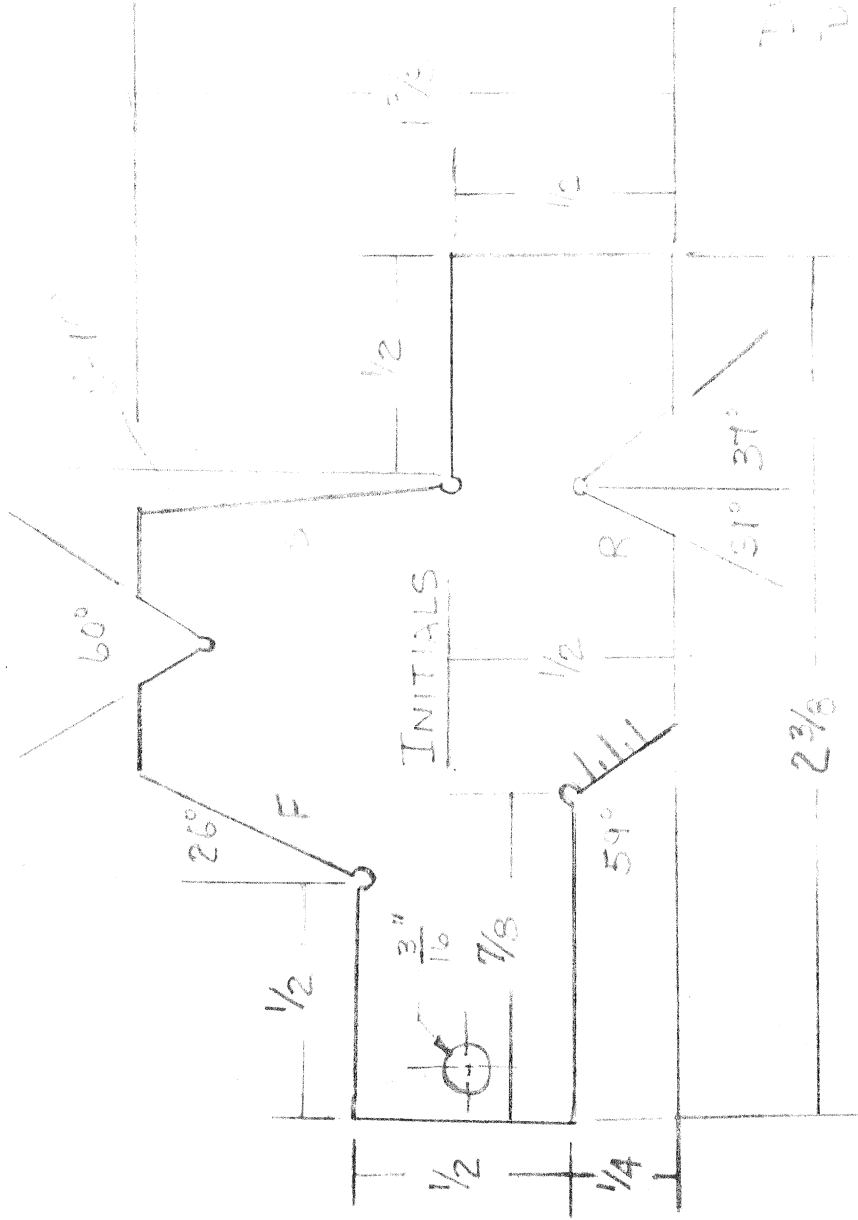
The carrying handle is added as another desirable feature. Place it at the point of balance for carrying. It makes easier the task of sliding it into position under a vehicle.

Welding the stirrup and pads in place gives students a chance to weld around corners. There are only a few welds in the project; handle, pads, straps, and stirrup; but these are varied enough to require good technique development.

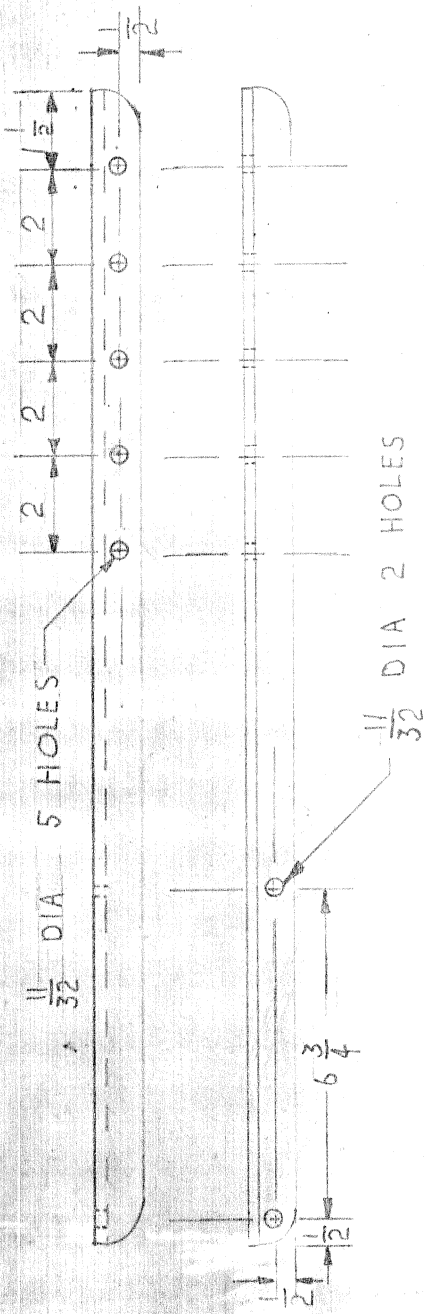
Bill of Materials

Quantity	Part	Material	Size
1	Tripod base	Pipe	2" x 17"
1	Telescoping member	Pipe	1 1/2" x 14"
3	Leg tie straps	3/16" x 1"	
1	Stirrups		1/4" x 2"
3	Pads		1/8" x 2 1/2"
1	Pin retainer	Twin link chain	12"
1	Pin	HRS	1/2" dia.
1	Handle	HRS	1/2" dia.
		paint as desired	

TOOL BIT GRINDING GAUGE

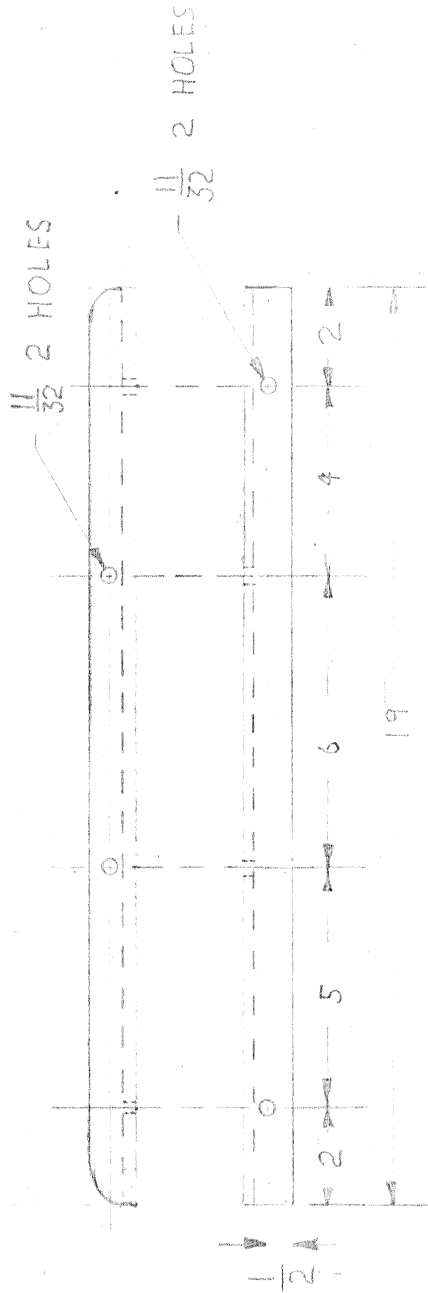


Drawn $\frac{5}{16}$ "
 Dimension lines $\frac{1}{4}$ "
 16 ga BRASS



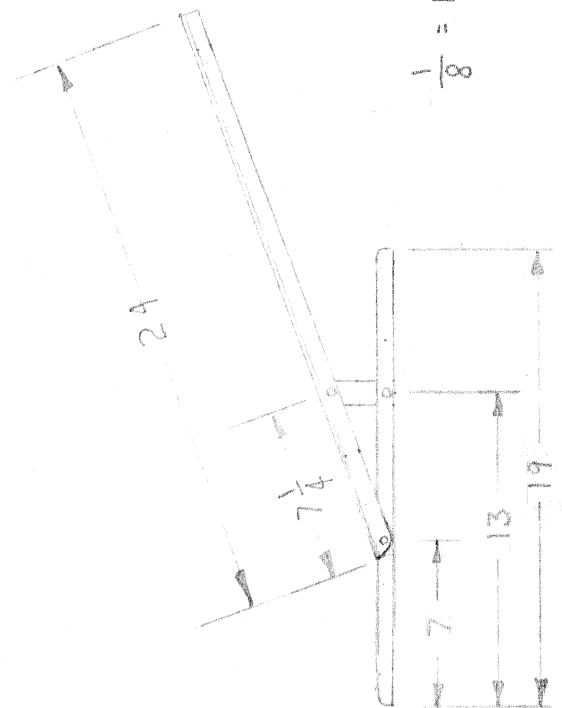
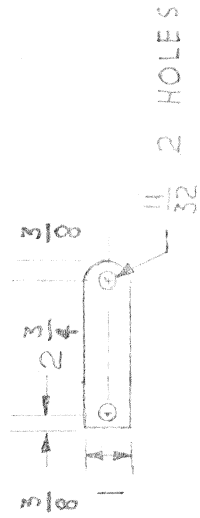
MAKE ONE RIGHT
AND ONE LEFT

11/32 ALUMINUM



MAKE ONE RIGHT
AND ONE LEFT

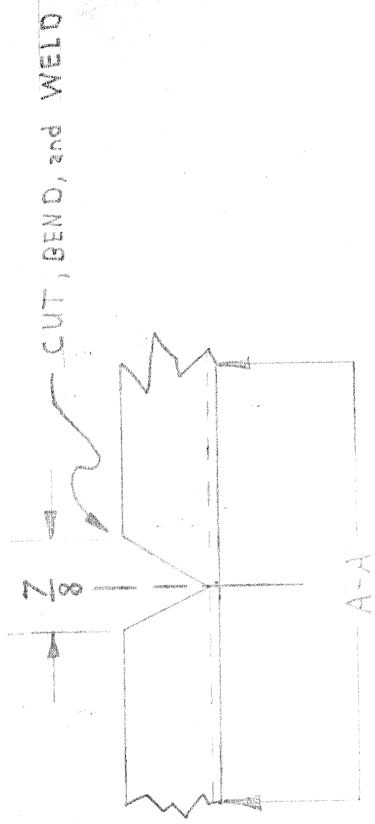
11/32 x 3/2 STEEL



$\frac{1}{8} = 1$

TREE STAND 1/4" - 1"

KEN HILGENDORF 2/22/78 244

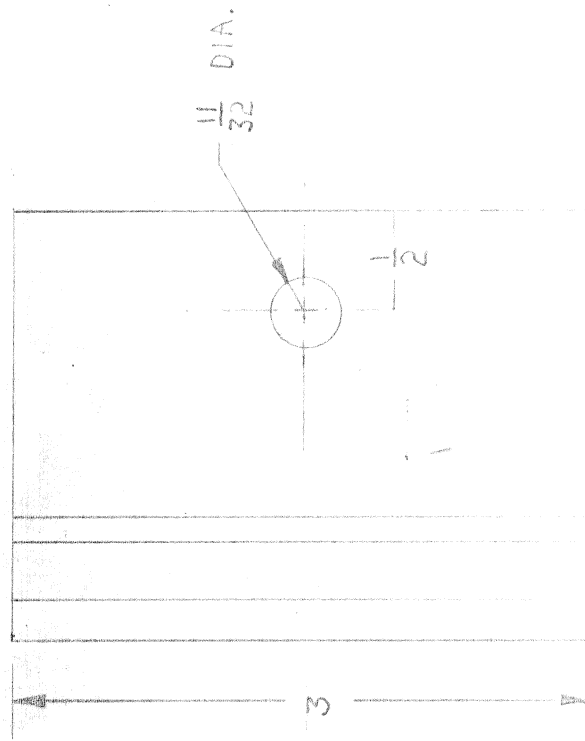
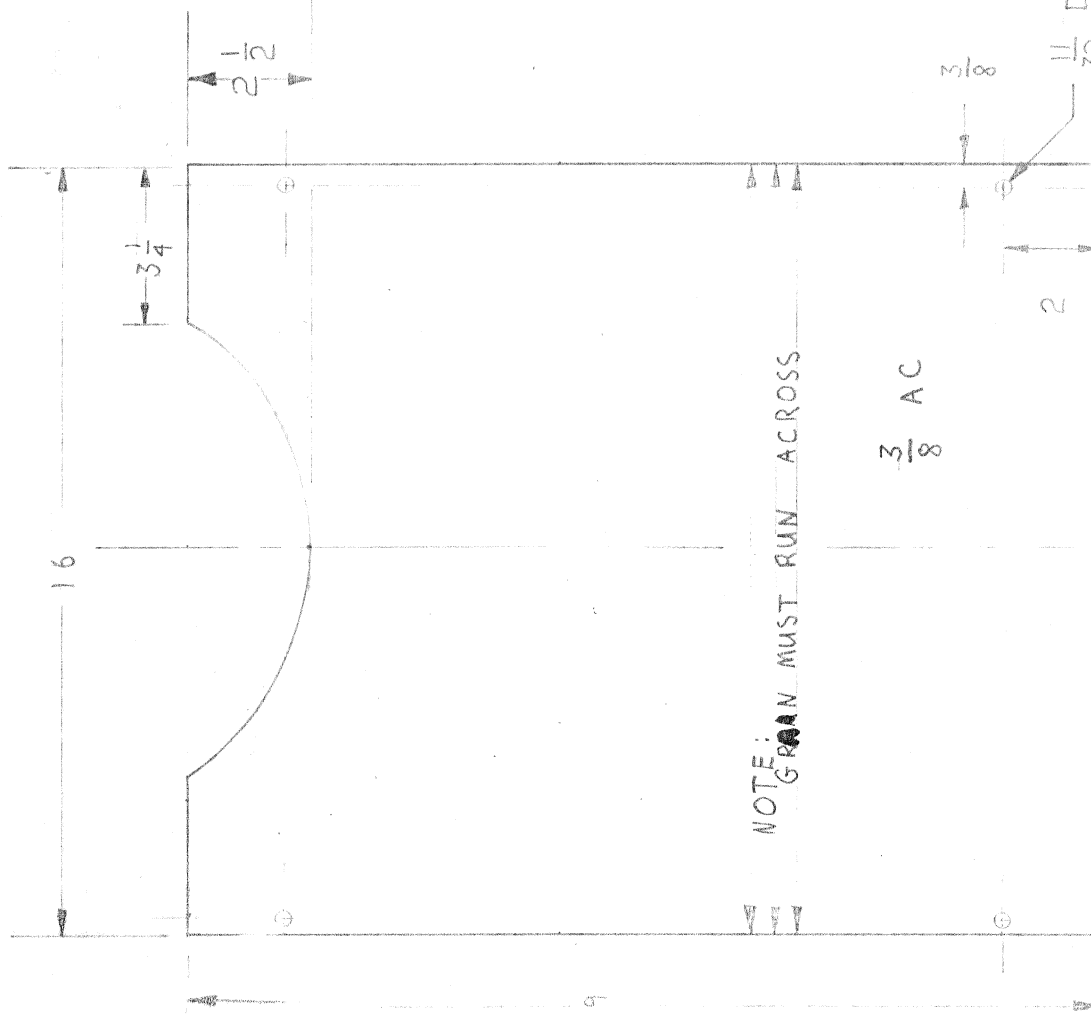


11/32 DIA. 2 HOLES

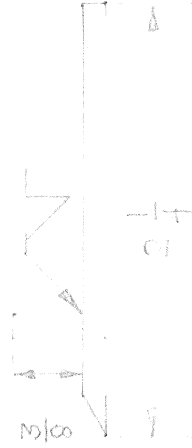


1 x 1 x 1/8 STEEL ANGLE

TREE STAND / 1" = 1"	3 of 4
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$\frac{1}{8}$ STEEL
SHARPEN THEN
WELD



TREE STAND

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4 of 4