

and then laid out, shaped and drilled to dimension. Squareness is important so that the Steam Cylinder lines up with the Pump Cylinder. The 1/2" distance between the Pump centerline and the Crosshead Guide centerline must be parallel to avoid binding. The few thousandths of an inch clearance in these holes will permit tunking around a bit until the Crosshead and Piston Rod slide free. The **CRANKSHAFT** has a 1/16"

pin offset .050", carrying the **SLIDE** which fits in the **YOKE** of the Valve Rod. The **VALVE ROD** was made by sweat soldering two machined parts to form the Yoke. Fit the Slide so it runs free and easy in the Yoke without sloppiness since the Valve travel is a very small amount. Perhaps you can machine the Yoke out of the solid and have a stronger Rod. Open the 2-56 die to make a close fit in the Valve Nut thread.

5/8" deep and then drill 1/16" for guide 1/32" short of breaking through. Use a new drill so the hole will be as smooth and accurate as it can be. A 3/16" bottoming tap is a help here. Now, for a compressed air setup for occasional runs and showoff, the Stuffing Box end can be fitted with a simple close-fitting .086" hole. A good coating of light grease will make a fair seal. The remaining Steam Chest parts are plain machining. Make sure of flatness where the Valve slides on the Plate. Keep out all sloppiness at the Valve Nut since the Valve travel is very small as mentioned above.

Since the force of the steam tends to spread apart the 1/8" thick Cylinder and Pump mountings, a nut was added to the lower end of the **CROSSHEAD GUIDE**. Snug up this nut just a bit until there is a sign of binding on the Piston Rod. A drop of "Lock 'N Seal" will keep the nut in place. Match the distance across the holes in the Crosshead to the related holes in the Bracket.

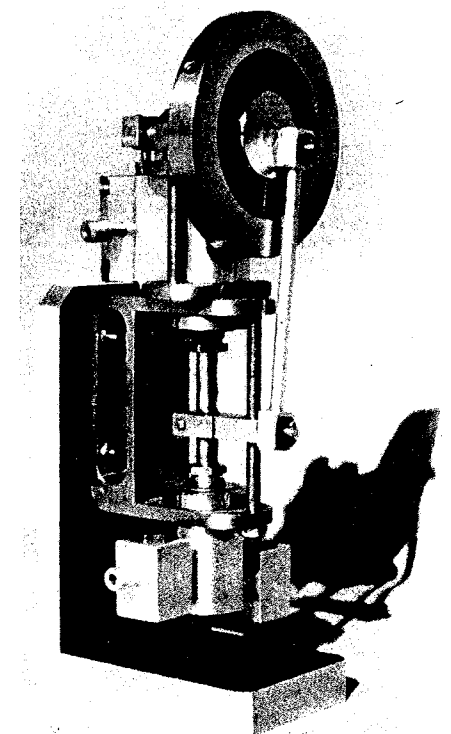
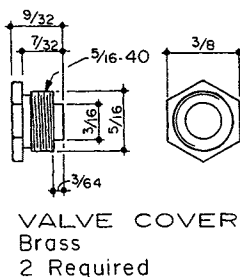
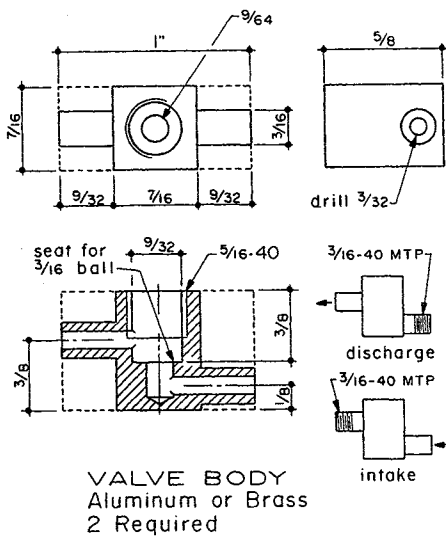
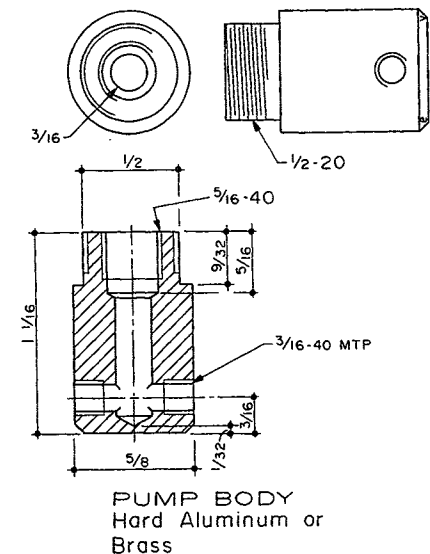
The **PUMP BODY, VALVE BODIES** and **COVERS** are straight machine shop practice and pretty well explained. The only reminder would be to thread the Valve Bodies for intake and discharge mounting. Seat the Ball Valves by holding a short brass rod with a dimpled end on the ball and giving it a light blow with a small hammer. Make the corner clean and accurate to make it easier to produce a good seat. This type of Valve can find other uses in your collection of miniatures.

The Cylinder **HEADS** on this engine serve two purposes. The Lower Head has a 1/2-20 threaded projection which anchors the steam assembly to the Bracket. The round 1/2-20 **NUT** is used here and similarly on the Pump Body. This Nut could be hexagon shaped. The Upper Head has projections which provide the Crankshaft Bearings, and the two Heads and Steam Cylinder are held together by the 1-1/4" long **BOLTS**. At assembly, it will take a bit of time for a good line-up in relation to the Steam Chest and Bracket.

As the manufacturers claimed, it is a simple pump and assembly is no great problem. After it was lined up and turning easy with about 15 minutes of running time, well lubricated, it made a good showing at 5 to 10 psi air.

For the **CYLINDER**, start out with an 11/16" x 27/32" x 7/8" block. Lay out all lines and hole centers. While it is rectangular, drill all holes and mill the 1/16" slots. The 1/16" steam passages at 28° should be started with an end mill at the slant surface. Where these holes enter the milled slots is not serious but, after boring the 1/2" hole, make sure there is at least a 5/64" opening where it breaks into the bore. Make a 1/16" end mill cut if necessary. Chuck in the 4-jaw and center on the Cylinder bore. Bore to a fine, smooth finish for the 1/2" Piston. Use this Cylinder as a gauge when making the **PISTON** to a close fit.

The **STEAM CHEST** is a bit cramped for space although it worked out O.K. Here you can see the value of the 40 series of thread at the **PACK NUT**. This makes it possible to get at least 1-1/2 to 2 threads engaged and leave room for a couple turns of packing. Snug up the Pack Nuts only finger tight for a start. When drilling for the Valve Rod, run the #43 drill in



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Vauxhall Donkey Pump

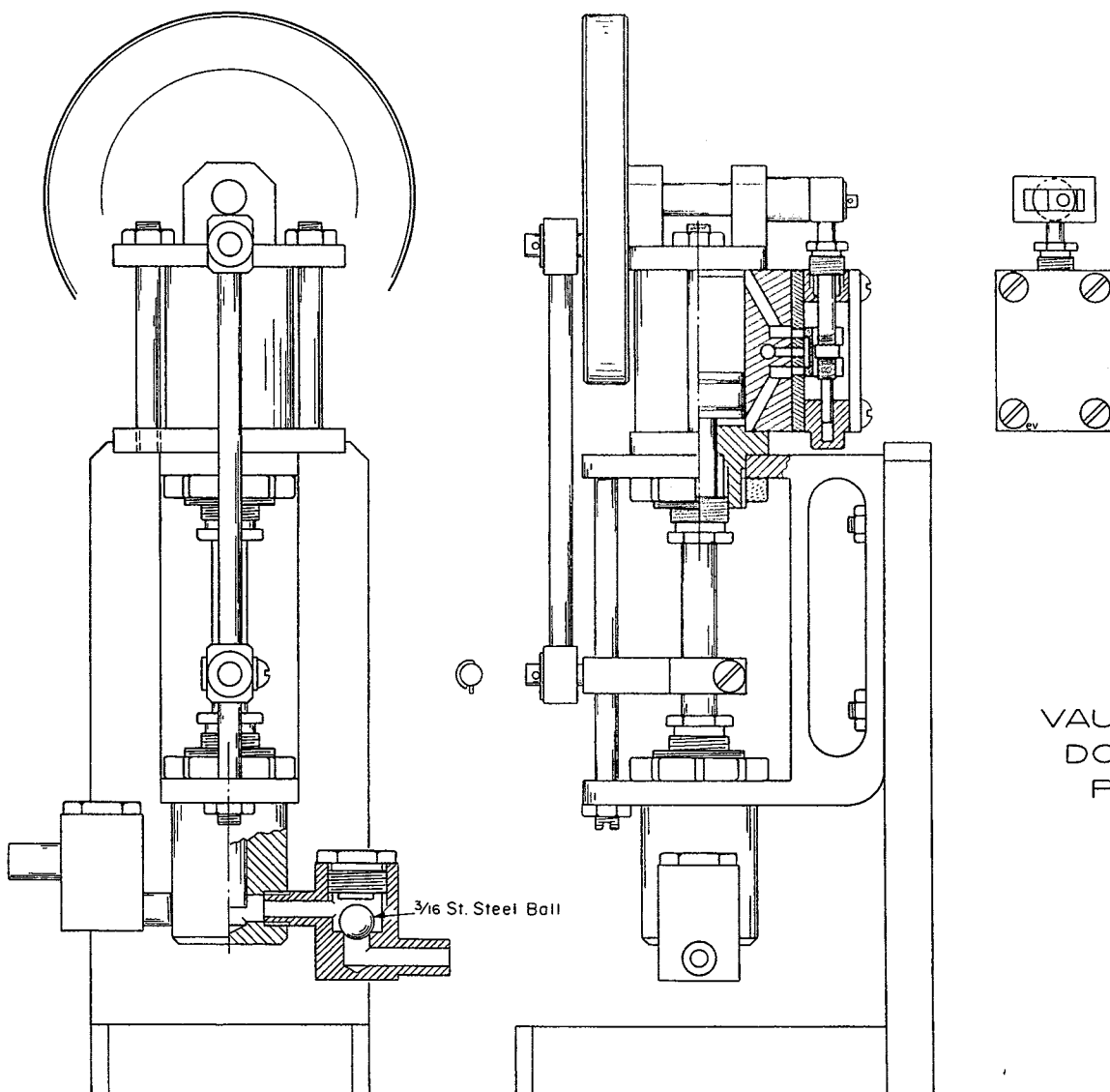
Graham Baker of Mareeba, Queensland, Australia, sent in the suggestion for this engine. The Vauxhall Steam Pump is a wall-mounted unit and used for boiler feed water and other water transfer applications. The force of the steam is directly applied to the pump plunger and easily rotates a flywheel to operate the steam valve. The general principle and appearance are fair on this miniature, machined from bar stock and using common screws. The original pump had a large casting con-

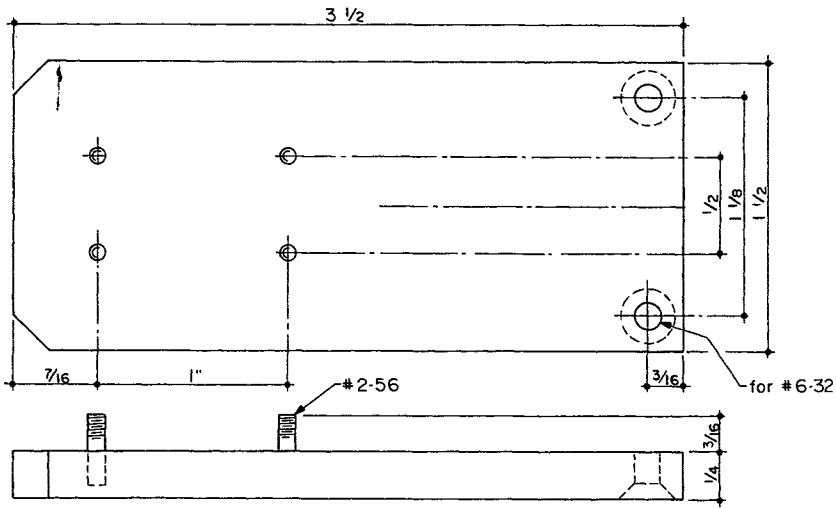
taining the pump valves and was a bit more compact than this copy. Two simple ball valve bodies are used here, making an easier model to build. Here is a chance for you to use some of your own ideas, making the pump cylinder and valve chambers in one compact unit. This engine has a double-acting steam cylinder and single-acting pump.

The drawings pretty well tell the story and only some points that came out in building this engine will be mentioned.

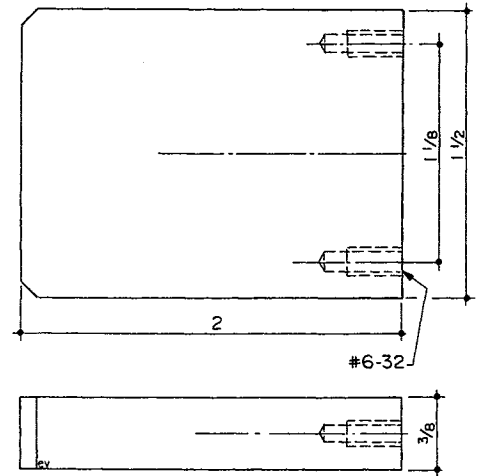
The **BASE**, **COLUMN** and **FLY-WHEEL** are common machine shop practice. The Base and Column are up to the builder. Since this is a wall-mounted engine you can use your imagination and make it wider and look like a boiler room wall.

The **BRACKET** can be made out of the solid or built up like the one shown. On the original, this Bracket, the Steam Cylinder and Pump Body were one casting. Here the 1/8" thick projections were soldered with 430° solder to a 1/2" x 3/4" x 1-5/8" block

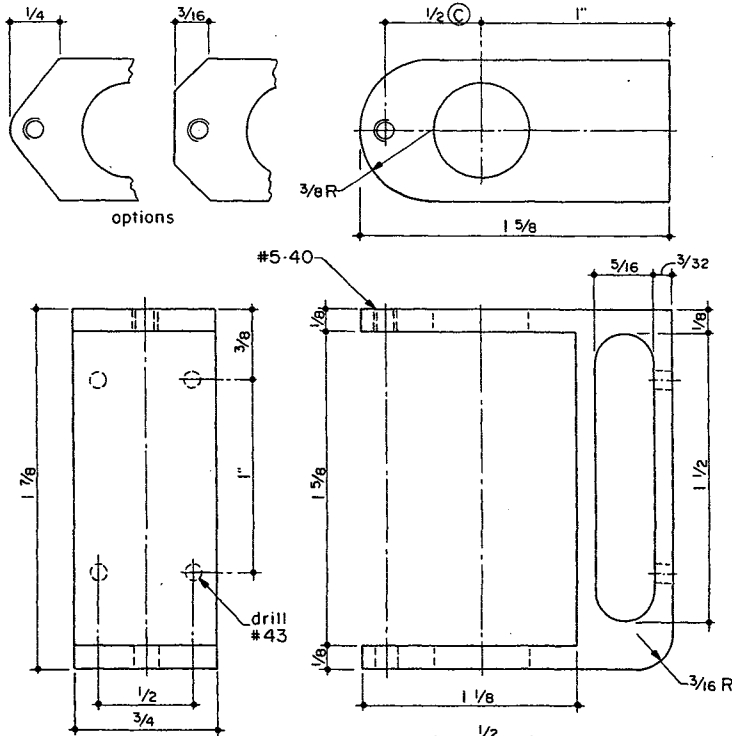




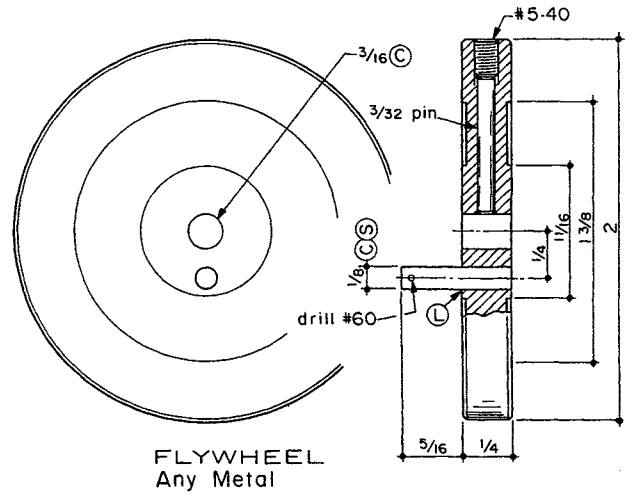
COLUMN
Any Metal



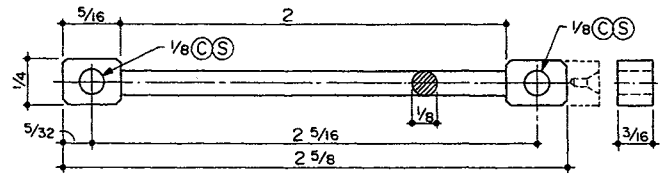
BASE
Any Metal



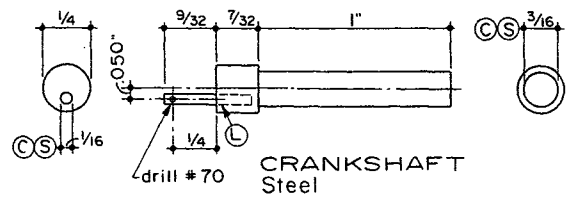
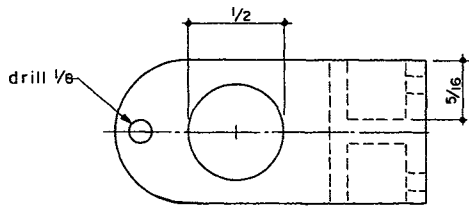
BRACKET
Any Metal



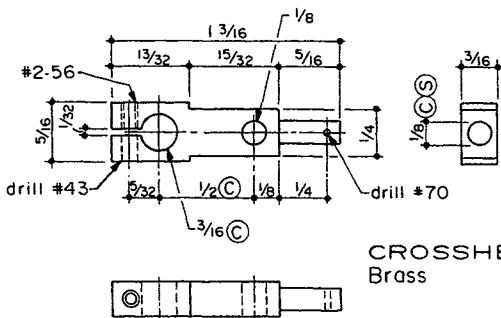
FLYWHEEL
Any Metal



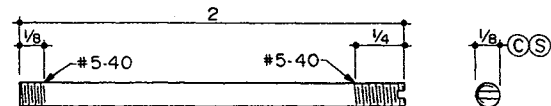
CONNECTING ROD
Hard Aluminum
or Brass



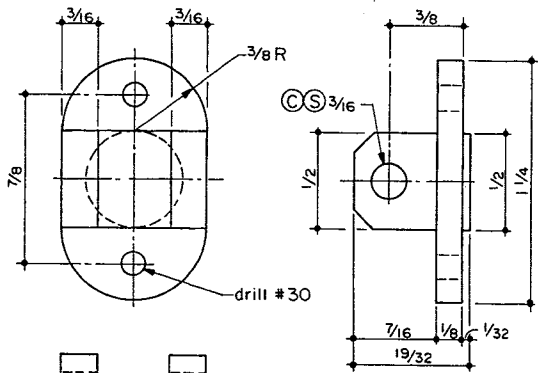
CRANKSHAFT
Steel



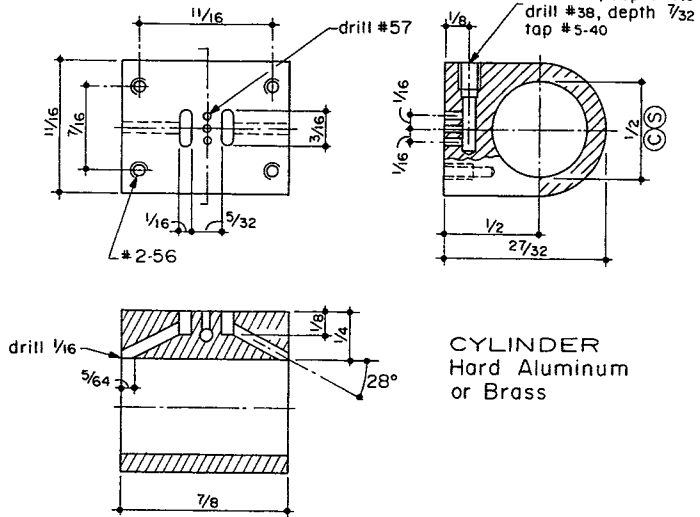
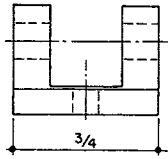
CROSSHEAD
Brass



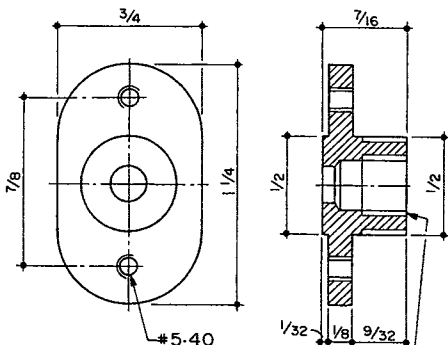
CROSSHEAD GUIDE
Steel



HEAD
Brass

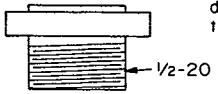


CYLINDER
Hard Aluminum
or Brass

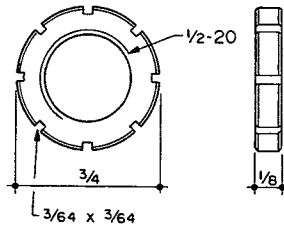


HEAD
Brass

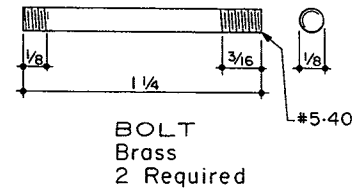
drill #12 thru
drill 9/32, depth 11/32
tap 5/16-40



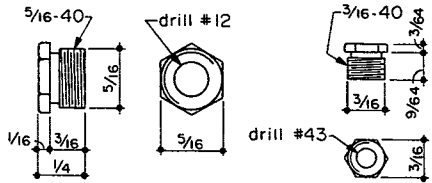
- Ⓢ close fit
- Ⓞ smooth
- Ⓣ flat
- Ⓛ "Loctite"
- MTP model taper pipe thread



NUT
Brass
2 Required

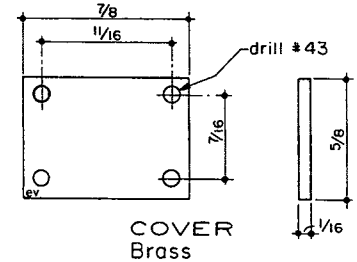


BOLT
Brass
2 Required

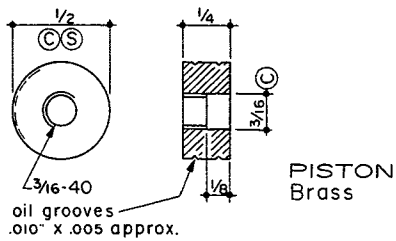


PACKNUT
Brass
2 Required

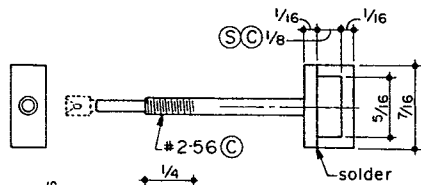
PACKNUT
Brass



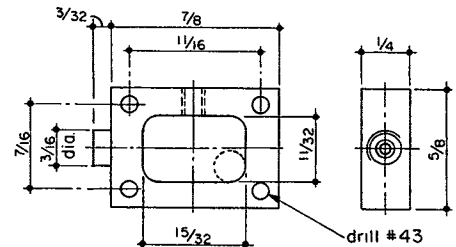
COVER
Brass



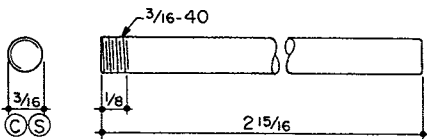
PISTON
Brass



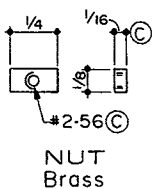
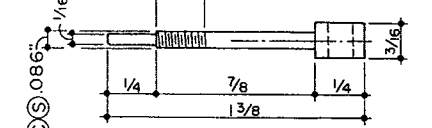
VALVE ROD
Brass



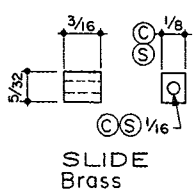
STEAM CHEST
Hard Aluminum
or Brass



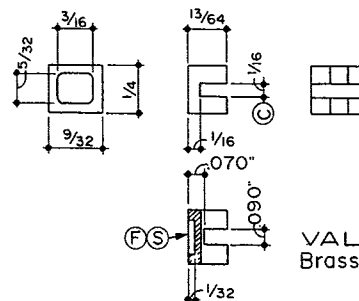
PISTON ROD
Brass or St. Steel



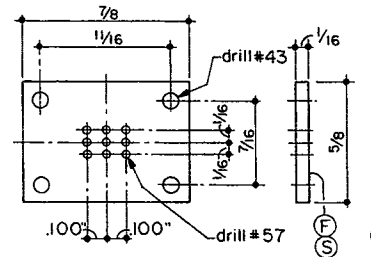
NUT
Brass



SLIDE
Brass



VALVE
Brass



VALVE PLATE
Brass

Vauxhall Donkey Pump

