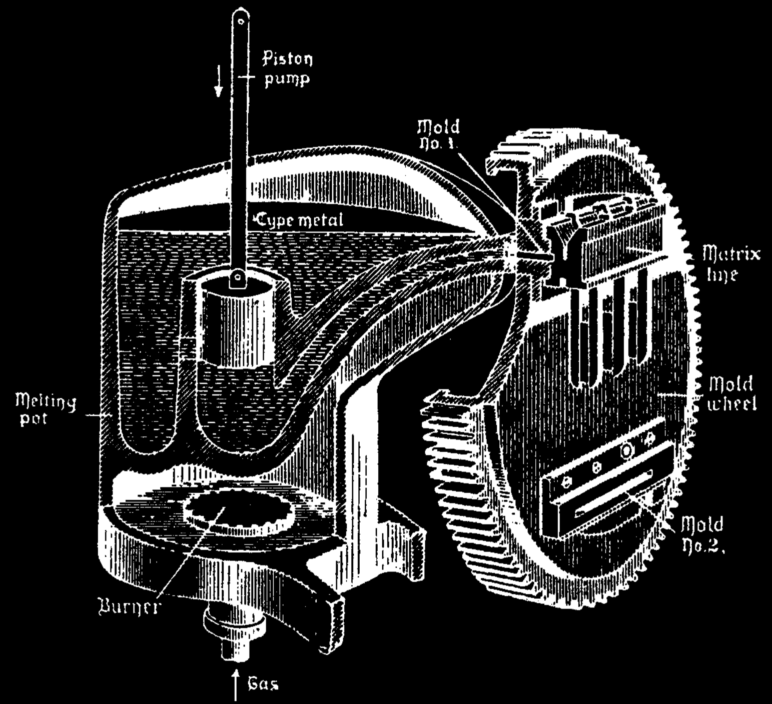
SHOP TALK

VOLUME 10 NO. 1



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SHOP TALK

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Text of this issue of SHOP TALK set in 9 pt. Impressum

STONE AGE PRINTING

by Alfred Archer

The unusual contraption shown on this page is the direct ancestor of the modern offset press. It is one of several lithographic presses developed over 150 years ago by Alois Senefelder, the inventor of lithographic printing.

He discovered that the porous surface of limestone, when ground flat, had an affinity for both oil-base inks and water. Thus when a *greasy* ink was applied to a dry stone, that area would later repel water. When water was brushed on the surface of the stone, ink would not adhere to the dampened stone, but only to the areas of the grease image.

Taking advantage of this principle, Senefelder prepared drawings and illustrations for lithographic reproduction by drawing on paper with an oil-base ink. This was transferred to a fine-grained Bavarian limestone by rubbing or burnishing. When the entire stone was first dampened and then ink applied to the surface, the ink adhered only where the oil-base image appeared.

The lithographic press illustrated may have been used to re-

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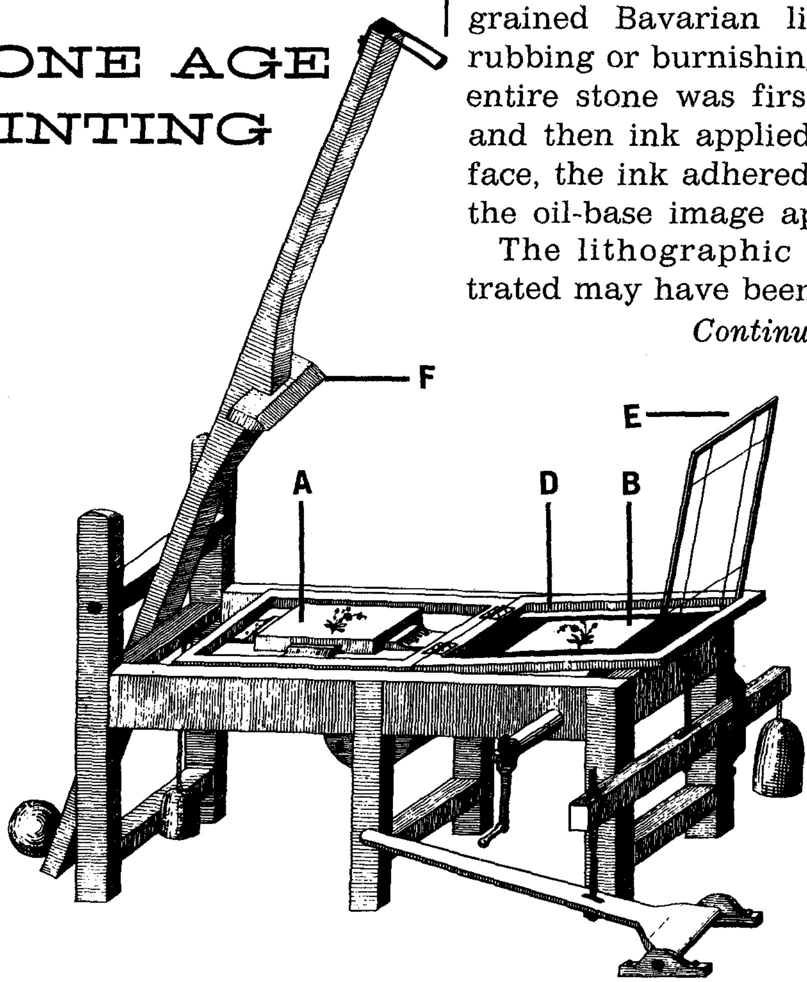


REMOVING A FROZEN POT PUMP PLUNGER

By Walter Butterworth
Assistant Service Manager

One of the difficult and sometimes embarrassing jobs that a machinist faces is the removal of a "frozen" pot pump plunger. A stuck plunger most usually is caused by improper cleaning of the plunger or the pot well. As the dross accumulates on the plunger it gradually becomes oversize and as the dross builds up inside the well it becomes narrower. Eventually the inevitable happens and the plunger sticks.

Another cause of stuck plunger is a piece of metal jammed between the plunger and the well. The most common source of foreign material is a wire from the cleaning brush breaking off while the well is being cleaned. That is one reason why we recommend the Star three-bladed scraper, which has no wire bristles to come loose. (Part numbers are Z-1 or Z-1-A depending on whether or not you need a universal joint on the shaft.)

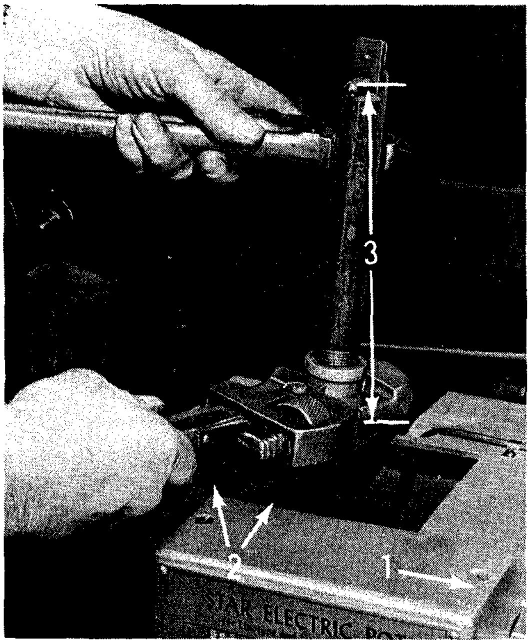
Another sure-fire invitation to trouble is trying to fit an oversize plunger to a worn well when the plunger is a little too oversize. This condition can become even more serious if a new plunger is put in the well while the plunger is cold. As it heats up it will expand and probably bind up. Always leave a new plunger in the heated metal for about 10 minutes before attempting to slide it into the well.

(The subject of oversize plungers and the proper way to fit them is covered in Shop Talk, Volume I No. 2. Copies are available without charge on request.)

Assuming that the plunger is frozen in the well, and that twisting and pulling with a wrench on the plunger rod doesn't do any good, here is a procedure which may help you.

One of the easiest ways of getting most plungers out is to construct a plunger puller, which can be made in a short time without too much effort and from material usually found around the shop. You will need a ¾″ or 1″ diameter pipe about one foot long. The actual length of the pipe will depend on how far down in the well the plunger is stuck. You will also need a pipe coupling threaded to fit the pipe, two pieces of flat steel about 8″ x 1″ x ½″ and either a pin punch, round rod or heavy screwdriver. Other tools required will be two pipe wrenches or vise-grip pliers and a stock of Vitaflux or a good substitute.

Leave the pot heated and drain the metal down to the top of the well. Break off a good piece of flux and place it around the plunger. Let it "soak" while you measure the pipe to the required length. To do this, place the coupling on the pipe and screw it all the way on. Disconnect the plunger rod from the plunger lever by removing the pin, and chock the pot forward so the rod is clear of the lever. Remove the pot lid and place the two pieces of flat steel on the pot cover as shown in the illustration.



1. CHOCK THE POT FORWARD, BUT NOT IN LOCK-UP AGAINST MOLD.
2. PLACE PIECES OF FLAT STEEL SO THEY STRADDLE PLUNGER ROD.
3. USING PIPE, CUT TO PROPER LENGTH; BEGIN PULLING PLUNGER OUT.

Then slip the pipe over the plunger rod until it rests on the two pieces of steel. If the pipe comes higher than the top hole of the plunger rod, measure the distance from the bottom of this hole to the steel pieces and cut the pipe to this length.

Now your plunger puller is ready for action. Place it over the plunger rod again and slip a pin punch or some other round piece of steel through the top hole in the plunger rod. Grip the pipe with a pipe wrench and the coupling with a second wrench. Start turning the pipe out of the coupling slowly. If you feel a great resistance, stop for a while. You will probably find that the plunger will rise very slowly under the pressure you have already put on it.

If the plunger is stuck far down in the well, it will be necessary to add more steel under the coupling, retighten it and begin again.

Use of the plunger puller is one of the recommended ways of removing a stuck plunger. However, if everything else fails we heard of one machinist who tried quite a risky procedure and got away with it. He drained the pot of all its metal and using a blow torch, he concentrated its heat around the bottom of the well, inside the crucible. Then he placed dry ice on top of the plunger in the well. The heat expanded the well and the dry ice shrank the plunger and it came free. IT MUST BE EMPHASIZED THAT THERE IS CONSIDERABLE RISK IN THIS PROCEDURE AND IT SHOULD BE TRIED ONLY WHEN ALL OTHER METHODS HAVE FAILED.

After you get the plunger out, be sure to take all possible steps to prevent it from sticking again. Use a steel bristle plunger brush (A-2) and give the plunger a good cleaning. If it was stuck because metal was jammed between it and the well you should inspect the plunger for burrs and file them off.

While the plunger is still out of the pot, don't forget to clean the port hole in the well. The hook on the end of the A-3 mouthpiece wiper is designed for this purpose and it does a good job.

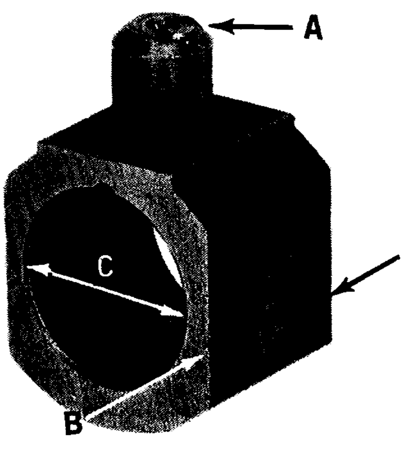
The best way of all to handle the frozen plunger problem is to prevent it from happening in the first place. Well-run composing rooms have a regular maintenance schedule for cleaning plungers and wells. Frequency of cleaning will vary from shop to shop. Once each shift is sufficient for manually-operated machines in a plant where metal is thoroughly cleaned before pigging. Composing rooms operating high-speed machines, or where pots dross up faster than they should, will require more frequent attention. The actual schedule will vary from shop to shop depending entirely on local conditions.

REPLACING POT LEG BUSHINGS

We have two styles of pot leg bushings. The old style (F-207 and U-165) which we refer to as "round", have one adjusting screw front and back. The later style (F-4545) which are used on later Linotypes, have two adjusting screws front and back and we refer to these as "square" bushings.

Both styles of bushing are manufactured in regular width, usually for the right side, and oversize for the left. The regular measures 1.000″ and the oversize 1.015″. F-4545 is available 1.025″ when specified.

Bushings wear in three different areas — the stud portion (A) on the top; the sides (B) where the bushing rides against both the vise frame and the base of the machine; and on the inside diameter (C) where it rests on the shaft. Of course, the vise frame shaft may also show signs of wear after many years of use.



BUSHING PART NUMBERS

	Round
F-207	Linotype, standard
U-165	Intertype, standard
F-207-L	Linotype, .015″ oversize
U-165-L	Intertype, .015″ oversize
	Square
F-4545-1	Linotype, standard
F-4545-2	Linotype, .015″ oversize
F-4545-3	Linotype, .025″ oversize

If the stud portion of the bushing has become worn it will affect the alignment of the mouthpiece holes to the body of the mold. Wear on the sides of the bushings, which contact the vise frame and machine base, will cause sidewise shifting of the pot and vise frame. This, in turn, affects side knife trim and general lock-up of the vise frame.

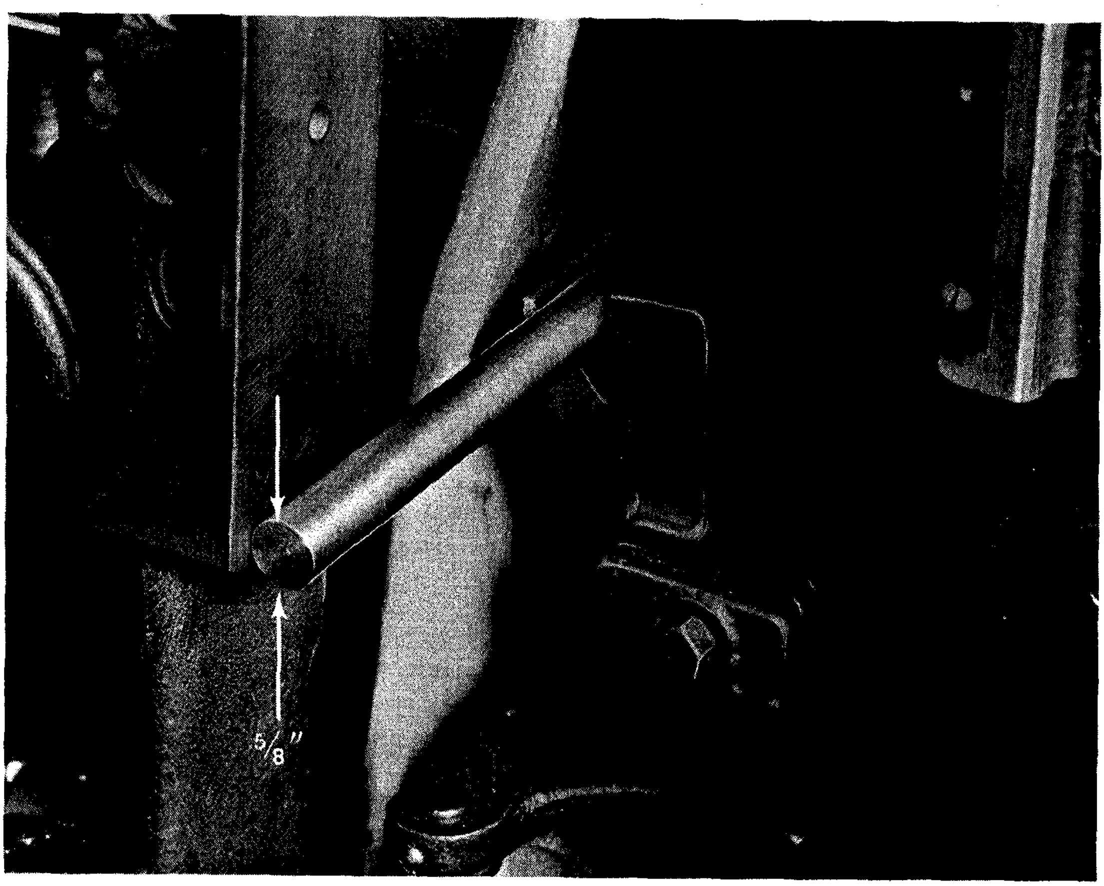
When either the inside diameter of the bushing or the vise shaft is worn, the pot is then free to "float", which will cause problems in both front and back lock-up. At times it is possible to detect a worn shaft or bushings by placing a finger near the lower part of the pot leg and the vise frame. Then have someone run the machine around. If either the bushings or the shaft have considerable wear you will be able to feel an up- and- down movement when the pot moves forward for lock-up. If the bushings require replacement, it is advisable to replace the vise shaft at the same time. (B-131 or U-230)

To replace the bushings, loosen the vise shaft locking screw in the base of the machine at the left hand end of the shaft. Loosen only the front pot leg adjusting screw and nuts, and remove the pot leg straps. Use a block of wood or a small "jack" to brace the pot, so its pressure on the vise shaft and bushings is relieved.

Drive the vise shaft to the left just enough to free the right hand bushing. Remove the bushing and measure it with a micrometer. This bushing will usually measure approximately 1.000″ side-to-side, although there may be a few thousandths of wear. If the old bushing measures .002″ or .003″ less than one inch, replace it with a new, standard one inch bushing.

If you have any doubt about the original size of the right hand bushing, there is a simple test to make. Remove the mold disk and slide, and the knife block. Place a piece of ⅝″ round stock in the dovetail of the column where the ejector slide fits and then close the vise. The rod should just touch the machined side of the vise frame. Fit the new bushing to bring the vise frame in line with the rod as described above.

After the right hand bushing



is fitted, drive the vise shaft back to the right far enough to remove the left hand bushing. Take a micrometer reading of the old bushing and lay it aside.

Now take the old right hand bushing and insert it in the spot previously occupied by the left hand bushing. Slide a feeler gauge in on the side of the bushing until you have a snug fit. Remove the bushing and feeler and measure both together. Grind or file the new oversize bushing to the dimension of the larger of the two micrometer readings.

Insert the new bushing and drive the shaft in from the left side of the machine. Replace the pot leg straps and then bring the front adjusting screws up to a bearing on the new bushings. Fasten the vise shaft in position with the lock screw.

Replace the mold disk and slide. It is then very important to check "pull up" of the mold disk on to the mold disk stud blocks. If you made any change in the width of the right hand bushing, this will affect the smooth engagement of the studs and blocks. If the disk pulls up smoothly, replace the knife block and check to be sure that the pot-to-mold lock up adjustment has not been affected.

STONE AGE PRINTING *Continued*

produce the original of the illustration itself, which dates back to the early 1800's. It was operated by placing a sheet of paper (B) on the tympan (D) and folding down the frisket (E) to hold the paper in position. Then both the tympan and frisket were folded over the inked stone (A), and probably backed up with several layers of paper and a copper sheet. To obtain an impression, the long vertical lever was swung down and latched into position. The "impression blade" (F), covered with leather and then greased, was under controlled foot-pressure as the stone and the tympan assembly were cranked under it.

This was a slow and tedious process but it reproduced maps, illustrations and manuscripts more economically than ever before. Basically the same process and a similar press are used today for fine lithographic art prints.

Today's high-speed offset presses reflect 150 years of progress since the first "stone age" printing. The process itself has undergone basic changes, since the stone is now used only in very rare instances. An impression cylinder has been substituted for the impression blade; photomechanical means are used for reproducing the type or illustration on a metal plate (instead of the stone); and a rubber offset roller now does the actual printing by transferring the ink from the metal plate to paper. However, modern offset printing (so named for the offset or transfer cylinder) still uses the incompatibility of oil and water to each other as the basis of the printing process.

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