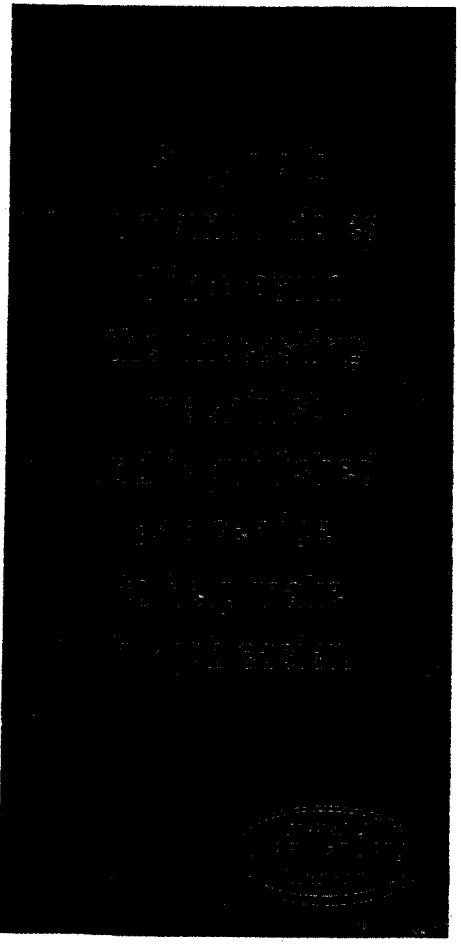
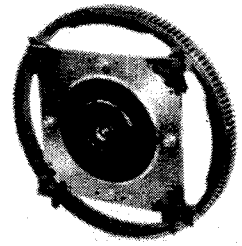
SHOP TALK

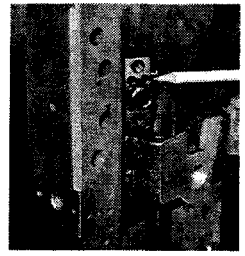
VOLUME 7 NO. 2

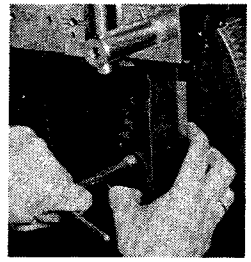
SUBJECT . .

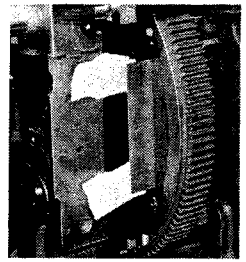
Step-by-step stud and block job

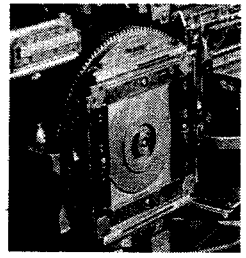












STAR PARTS Co. SOUTH HACKENSACK, NEW JERSEY

A DIVISION OF POWERS & EATON *Industries, Inc.*

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SHOP TALK

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HOW OLD ARE MATS?

When were matrices first used? Matrices, as defined by the dictionary, have been in use for thousands of years, since a matrix is described as "a mold or engraved die which will produce a raised surface when its image is transferred to another material by impression or by pouring."

In this broad sense, the scarab rings of Egyptian Pharaohs were matrices and were used as such when they were impressed in wax as an indication of royal authority.

The ancient Babylonians used a rather elaborate matrix in the form of a clay cylinder on which laws and decrees were impressed, letter-by-letter, while the clay was still damp. After the cylinder had hardened into a ceramic it was carried by messenger to other parts of their empire, where it was rolled on damp clay, producing a flat duplicate of the original message. This was actually a form of stereotyping and rotary printing. (Your editor believes it was the cylindrical message rather than the flat duplicate that was "backwards", as in linecasting slugs.)

Around 900 A.D. an inventive Chinese tried molding and hardening clay type, for which matrices of some kind must have been used. However, his type was too fragile, and Pi Cheng and his invention were apparently buried together.

The use of a matrix for casting hand type was first successfully accomplished in Korea around 1340 A.D. There are records of a typefoundry being established at that time for the purpose of setting a Chinese encyclopedia, a copy of which still exists. Although the Korean use of matrices to cast hand-set types predates Gutenberg by about 100 years, there is no doubt that the Oriental and Western discoveries of typesetting were independent of each other.

Both in the Orient and in Western Europe the manufacture of the foundry matrix was a slow and tedious process. Each punch was laboriously chiseled, filed and engraved by hand. Although punch and matrix manufacture are mechanized today, the same basic steps are followed as were used over 500 years ago. The type designer first draws his letter on a scale somewhat larger than finished size. Then a steel punch is cut to exact letter size. This is driven into the matrix, which in turn is used for casting the letter or slug in type metal.

It is interesting to note that the depth of punch on matrices made nearly 300 years ago is almost exactly the same as the modern linecasting matrix. An instruction manual written in 1683 reads in part, "But here arises a question. How deep the punches are to be sunk into the matrices? The answer is a thick space deep. (This is approximately .042") They are

(continued on page 7)

Step-by-step stud and block job

By James Adamo *Ass't. Service Manager*

Jim Adamo's first job with Star Parts was apprentice assembler 20 years ago. He was soon promoted to machine rebuilder, then to a service engineer. Today, as assistant service manager, he is well known to many of our readers through his installation and service work in this country and in Latin America.

The new dowel holes, which are diagonally opposite the original ones, will be used in doweling the blocks to the vise frame. If your vise frame already has four existing holes in it, then it will be necessary to plug these so as to provide new material for the dowel holes which will be used for the new stud blocks. On machines using the front mold wiper that fastens to the right hand stud block, it will be necessary to use a longer screw, such as B-87-A. Since this screw goes through one of the dowel holes that we will be using, be certain you drill and ream the hole deep enough to allow the dowel pin to be driven down and clear of the screw hole. Place the right hand stud block in position and fasten loosely. (Screw hole for the front mold wiper should be facing to the left.) Slowly lock up the vise and bring the disk forward by hand so as to engage the mold disk stud into the stud block. Grasp the disk with both hands on the outer edge, rotate back and forth (approximately 3/8") and line up the vertical mold body by eye with the straight vertical edge of the ejector blade opening in the mold slide. The right hand stud block is still free at this point. We have now acquired a general squaring up or aligning of the mold body with the ejector blade opening. Slowly push the ejector blades forward until the leading edge of the blade is slightly behind the front edge of the mold body. With the aid of a feeler gauge, strips of newsprint, or brass shim stock, equalize the

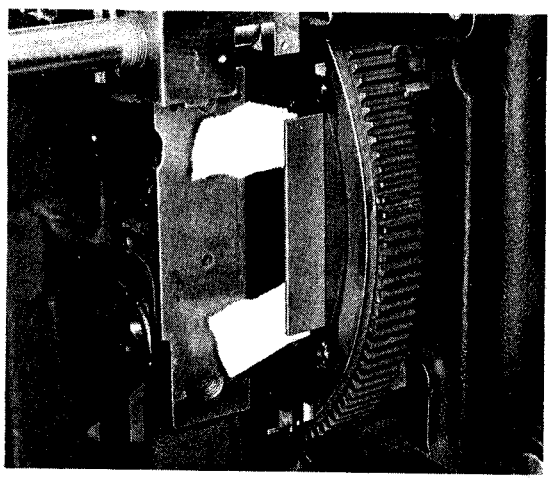

Figure 5. Thickness of paper or shim stock must be the same at top and bottom to properly align block.

clearance between the mold body and the inner edge of the ejector blade. This clearance will generally run from .002" to .007". Two strips of newsprint single or double, or other material, may be kept in place (top and bottom) to insure proper positioning, but must be double-checked with a feeler gauge of the correct size after the stud block has been tightened.

*** It is essential at this time to realize that equalizing the clearance between the mold body and**

ejector blade simultaneously "squares" the mold in casting position. A slight error at this point will affect the relationship between the mold in casting position, and the first elevator jaws and slide. This, in turn, will throw matrix alignment off.

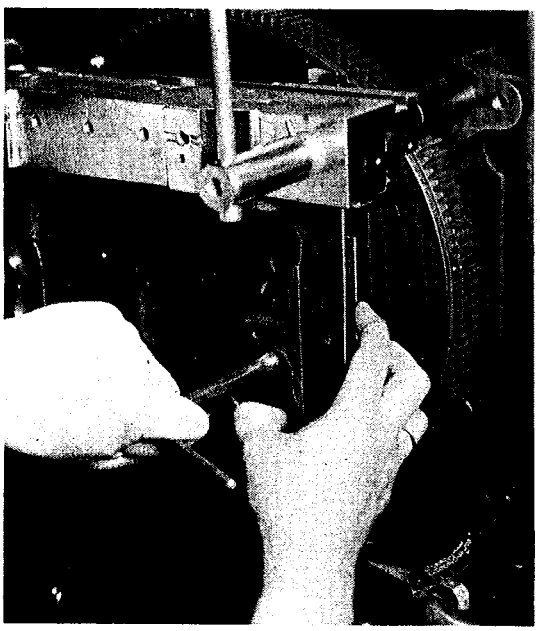

Figure 6. The use of a 30-em slug helps visually to line up the block with the edge of the vise frame.

Carefully maintaining the equalized clearance, place a 30 em slug against the right hand stud block. Turn the block as necessary so as to line up the exposed edge of the slug parallel with the vise frame. The block must line up evenly with the straight edge surface of the vise, or difficulty may be encountered when replacing front mold wiper (F-898 or U-96). Slowly alternating between the two fastening screws, tighten up the stud block carefully. If the block or disk moves out of alignment at this time, you must loosen up the stud block and go through the procedure once again. Move the mold disk slide back and forth into the stud block to check that the mold disk "pulls up" smoothly. Leave the disk forward, engaged in the stud block, and double-check clearance between mold body and inside surface of ejector blades. Running a feeler of the correct size up and down between the mold body and the inside edge of the ejector blades will generally give you a good "feel" as to whether the clearance is equal top to bottom.

Step 10—Before placing the left hand stud block (E-996 or U-4135) in position, remove one of the shoulder screws that permit the "floating" portion of the block to move. Using a regular 10 x 32 screw, center the floating stud on the base and lock in position. Open the vise, place the left hand stud block on the left hand stud on the disk, close the vise and bring the disk fully forward. Screw in the two stud block fastening screws but before tightening, align the block generally square. (Laying a 30 em slug on edge across the top of the block and leveling it off by eye will facilitate getting the block square.) Tighten up on the two screws using the same procedure as for the right hand block. Test again for smooth "pull-up". Push the disk back, open vise, and replace shoulder screw previously removed, allowing the stud portion of the block to float once again. Return again to the equalized clearance between the mold body and the blades and check. Replace the mold disk pinion and time it with disk. Attach ejector link to ejector lever.

Step 11—Lock up machine, and if possible, have someone turn

machine through a complete cycle by hand, as you check the mold disk spin, the advance into the blocks, and the forward motion of the ejector blades. Turn on power and check the same points under power. Turn off power. Replace left hand knife, bringing the fastening screws up to a slight bearing but do not tighten. Slip in the knife adjusting spring (E-759 or U-263). The two ends of the spring are to exert pressure on the knife. Carefully push in, hold the left hand knife over as far to the left as possible and tighten screws. Be careful of the cutting edge. After locking left hand knife as far to the left as possible, turn on power, run the machine to ejection position and push through ejector blades by hand to check for adequate clearance. Important—At no time is the left hand knife to be left in the path of the ejector blades. Turn off power.

Step 12—Replace liners and mold cap on the remaining mold body. This mold may now be used in casting position for checking matrix alignment. Set the liners, jaws, etc. for 30 em measure and run the machine to casting position. Open the vise. Place matrices (having the alignment toes measuring .125") one at each end of the first elevator jaws, approximately 3/8" from the face of each of the vise jaws. Close the vise, release the mold slide lever, and pull the disk forward to engage the studs in the blocks and the toes of the two matrices in the mold aligning grooves.

Using a large screwdriver or bar, separate the first elevator lever roll (E-8 or W-1) from the first elevator cam and insert an 8 to 10 point slug between the roll and the cam. This will exert upward pressure on the first elevator slide and pinch the matrix toes in the mold aligning groove. Using a thin screwdriver or a scribe, gently tap both mats and check for tightness. If both are even, then this alignment is correct. If one is tight and the other loose, then it must be corrected by shifting the lower part of the first elevator slide, using the lower gibs. On later style Intertypes an adjustment is provided in the form of an adjustable first elevator head key, allowing the first elevator head to be tipped.

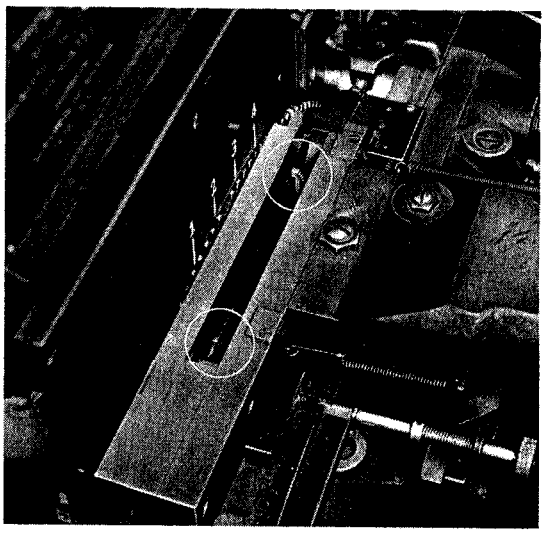

Figure 7. When both mats are tight, the first elevator jaws are properly aligned with the mold grooves.

Now that the first elevator head is parallel to the mold, we must be certain there is sufficient clearance between the toes of the matrices and the mold aligning groove at the time of mold advance. To make this adjustment, stop the machine after the mold has advanced, and loosen the large screw (E-429 or W-522) on the top center of the first elevator slide casting.

Place a .010" feeler gauge under the screw and tighten the screw until the two matrices both bear evenly and snugly against the mold aligning grooves. Lock the adjustment in this position and remove the feeler gauge. Remove the two "test" matrices.

(The ".010" shake" referred to above is somewhat less on machines using two-letter headletter matrices. In this case the clearance is approximately .005" to 007".)

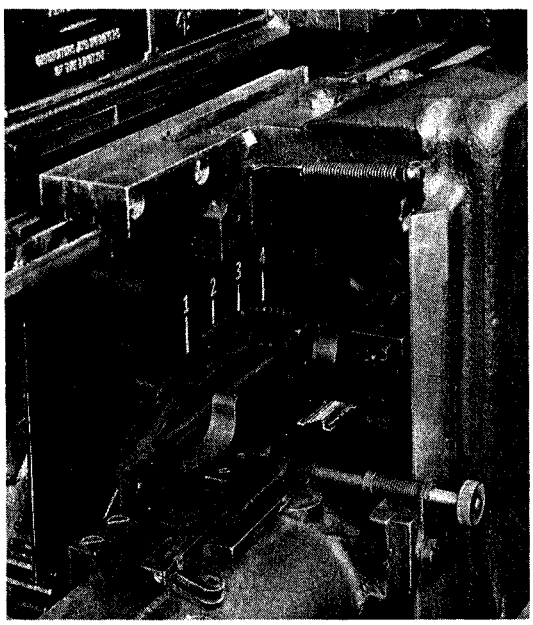

Figure 8. Unless a thin space under the large screw stops the machine, mat damage or squirts can occur.

Check the vise automatic adjustment by placing a thin space under the large adjusting screw, and make sure that the mold disk dog engages the vise automatic stop rod when the disk advances. With the thin space removed, the stop rod should depress so that it clears the forward motion of the mold disk dog.

Cast a full 30 em slug and stop the machine just before ejection. Then turn the machine by hand until the slug is half way out of the mold. Loosen the two left hand knife fastening screws, allowing the knife to slide over to the right against the extruded portion of the slug. Tighten the screws and complete ejection. This has now correctly positioned the left hand knife in relationship to the mold, and will be a starting point when adjusting slugs for parallel.

Step 13—We are now ready to replace the knife block and start adjusting side trim, but before replacing the block on vise, back off the two adjusting screws that are used to adjust the left hand knife. In the previous step, we aligned our left hand knife to a partly ejected slug and if these adjusting screws are not backed off they may possibly upset this setting. Mount the knife block securely and run the two adjusting screws finger tight to bank on the left hand knife.

Step 14—Important points to double check and possibly adjust after replacing studs and blocks.

1) Alignment, mats to mold. Position of type in respect to the slug. Step #12
2) Type high—back knife. Step #8
3) Parallel trim—side knives.
4) Up and down shake (.010") of first elevator slide. Step #12
5) Margins. Left hand and right hand.
6) Center adjustment (Quadder machines only).
7) Alignment of mouthpiece holes in respect to the mold cavity (within liners) and line-up to constant side of mold.

8) Transfer points, if first elevator slide and/or first elevator jaws had to be adjusted because of matrix alignment.

9) Mold disk turning handle in relationship to mold turning, shoes in square pinion, braking, action of mold disk spin, etc.

10) In figuring the clearance of the ejector blade within the mold cavity, the thickness of a standard blade is .053". Using this figure, add the clearance you arrived at between the mold body and the inner edge of the blade. (Step #9.) Now subtract approximate size of a 5 point liner and you will know the clearance between the outer edge of the blade and the mold cap.

Example:

5 pt. mold opening (cap to body)		.066
Clearance between mold body and inner surface of blade	.004	
Thickness of blade	.053	.057
Clearance between mold cap and outer surface of blade		.009

Step 15—Assemble remaining parts to machine, leaving front mold wiper off. Carefully drill and ream holes for stud block dowel pins. Insert pins. Replace front mold wiper. Proceed with adjusting the side knives for parallel trim and final type high adjustment of the back knife.

(continued from page 2)

seldom sunk any deeper than a thick space: and the reason is because the breaking or battering the face of the punch should not be too much hazarded."

It seems the early typesetters knew what they were about, and although we have been able to mass-produce matrices, in several areas we have not been able to improve on the basic principles established so long ago.

Alfred Archer

Previous issues of SHOP TALK have covered a wide variety of machine adjustment areas. The major articles are listed below. To obtain any of this material, just drop a line to the editor of SHOP TALK. As long as the supply lasts, these are yours for the asking.

Descenders—Keep Them on the Slug
How to Use Oversize Pot Plungers
Checkpoints for Distributor Box Problems
Assembling Elevator Adjustments
Timing Distributor Screws
Front Lockup
Drills and Taps
Do's and Don'ts of Distributor Adjustments
The Matrix Cycle—How to Check
Parts Inventory—Some Suggestions
Smooth Matrix and Spaceband Assembly
The Hairline Problem
Hints on Matrix Care

Stud and Block Check List

Before beginning the stud and block job it's a good idea to check whether any parts related to good front lock-up may also be needed. The replacement of worn studs and blocks may be only part of the answer and additional work may be required.

For instance, an older mold disk may have excessive wear in the hub, and the installation of a new hub on Linotypes or the peel-type washer (W-4296) on the Intertype may help considerably. The use of oversize mold cap clamping screws will compensate for worn holes and will keep the Linotype cap down snug.

Naturally, if the mold disk is cracked or warped, this is the ideal time to replace it. (You'll save the price of the studs and keepers because they are included with new Star disks.) Excessive use of shims to obtain proper mold alignment is another indication that the disk may be due for retirement.

It's a good time, too, to check for wear on the Linotype ejector blades and the ejector blade controller. The extra projection on the Star ejector blade controller will help take up some of the wear in a worn ejector system.

Most of the tools required for the stud and block job are readily available, such as a micrometer, an adjustable open end wrench, pin punch, hammer, and so forth. The T-wrench shown in Figure 6 is available through the Mohr Saw Company in Skokie, Illinois and is very handy for this job. You will also need an electric drill, a #14 drill and 3/16" reamer. A long feeler gauge is required for correct adjustment of the mold disk slide and is useful in aligning the mold cap body with the ejector blade.

So, make a general check-up of worn parts which may be needed and make sure that all the tools for the job are on hand. This is a good way to be sure that the stud and block job will go smoothly once it has been begun.

Check List of Parts and Tools for Stud and Block Job

	For Linotype	For Intertype	
4	F-1264	U-89	Studs
4	F-1265	U-88	Keepers
4	F-1266	W-505	Screws
1	E-537-A	U-87-A	Block, r.h.
1	E-995	U-4135	Block, l.h.
4	E-184-A	W-322-A	Block pins
1	M-28	M-28	Stud Lubricator
1	M-28-S	—	Stud Lubricator
8	F-14	—	Cap screws
4	F-584	—	(add A for oversize)
1	—	W-4926	Peel washer

Check for new mold disk, ejector blades, mold disk banking block, hub (Lino), ejector blade controller (Lino).

Tools:

Electric drill	Pin punches	Feeler gauge (long) or shim stock
Micrometer	Hammer	Other standard machinist's tools
#14 drill	Open-end wrench	
3/16" reamer	T-wrench	