CHAPTER XIX

MOUTHPIECE AND LOCKUP

What Is the Occasion for Taking off a Mouthpiece?

QUESTION: I have heard machinists talk of taking off a mouthpiece, but I've never seen it done. What makes it necessary? — P.H., Riceville, Ia.

LOOMIS: Your life is still ahead of you. You've never really lived until you've taken off a mouthpiece.

When a mouthpiece has been honed so much you can't get a lockup, or so much that the vents are too shallow to cast a good slug, or if the vents have been opened so much on the bottom that you get back squirts, you will need a new mouthpiece. Sometimes putting on a heavier pot spring will start a mouthpiece to leaking and you cannot stop it without removing it. Rest easy. Your time will come soon enough.

How to Remove a Wedge Mouthpiece

QUESTION in *The Graphic Arts Monthly:* I would like to learn how to remove a mouthpiece that has been on a Linotype for fifteen years. I have religiously followed the method recommended by Mergenthaler, but always find four to seven screws that must be drilled out. Is it practical to perform this job on a cold crucible? — L.P., Norton, Kan.

LOOMIS: The neatest answer I've ever seen to this question was given in *The Inland Printer* for April, 1898: "Get a mouthpiece extractor from the Linotype Company." (Of course Mr. Lincoln didn't mean it the way it sounds; he undoubtedly meant, "Get a drift and go to work.") In the absence of the extractor, however, listen to

HARDING: This job should not be attempted unless a new mouthpiece and gib are at hand, because one or both parts may be ruined. Procure a drift. This tool is different for Linotype and Intertype.

Have the heat on. Loosen the front pot leg adjusting screws and the pot leg cap screws. Remove the shield from above the mold disk and note that its right side slips under a screw head. Open the vise, pull out the disk; remove the left-hand vise locking stud. Wedge a piece of hardwood between the end of the mouthpiece and the mold slide. Place the drift on the left end of the mouth-

piece and with a three-pound hammer drive the mouthpiece hard to the right, using blows that "follow through."

The tang of a file can be held between the lug on the mouthpiece gib and the crucible by an assistant to prevent the gib from sliding with the mouthpiece.

If the mouthpiece refuses to loosen with three or four blows, the left end will start to burr. If you swell the end of the mouthpiece very much, you cannot then drive it on through, for the swollen end will break the lips of the crucible. You will lose your seating for the drift, and will then have to saw the mouthpiece almost through from end to end until you can drive the two halves together and loosen the mouthpiece. Don't saw into the crucible.

LOOMIS: I like first to get a good slug from the machine — one that shows the end holes. Then I get around in front before I start hammering, and with a small file or a pin punch mark the position of the right-hand hole in the mouthpiece from the right end. This facilitates positioning the new mouthpiece, and by reference to the old slug you can move the new mouthpiece one way or the other if you wish.

I have discovered also in the last few years that penetrating oil is a great boon to the printing industry. Apply it half an hour before removing the mouthpiece, or, better yet, perhaps, the night before.

I prefer a linotype pig between the pot and the mold slide. I drill a hole through one end of the pig and put in a nail to prevent any possibility of its dropping through at the wrong time.

As to working the pot cold — I doubt it. I have experimented on a number of old pots, and the result always is the same: the hotter the pot, the easier the mouthpiece comes off.

To Remove a Screw-Type Mouthpiece

HARDING: The company makes a special tool for loosening the screws. Mark the position of the mouthpiece hole. Have the pot hot. Place the screw loosener in the screw slot and strike it a smart blow. Use a 6-inch screwdriver with a perfect blade. Be sure it fits the slot. You may use a Crescent wrench on the blade.

If the screw head breaks off or the screw cannot be loosened, you will have to drill it. Start with about a No. 45 drill that will go into the slot. Drill through the center. Follow with a No. 10 drill. Use plenty of oil on it. Use a ¼" drill and drill off the screw head. Remove the mouthpiece. Sometimes a small pipe wrench will extract the screw. Sometimes it will only tear it up. Use a No. 6 or No. 7 drill and drill through the center of the screw to the bottom. Clean out the hole with a ¼x24 tap. If the threads are ruined, tap the hole with a 16x24 tap and use an oversize 16x24 screw. Your branch office can supply these.

LOOMIS: Here again, penetrating oil is wonderful to loosen the screws. I have often had trouble with the screw loosener because it tends to swell the screw heads so they bind inside the counterbored hole in the mouthpiece.

If you drill the top screws on an electric pot, don't go through any farther than necessary. I once ruined a perfectly good mouthpiece heating element by drilling into it. You would have thought it was Fourth of July.

The m-o will seldom have a 16x24 tap and screws on hand. In that case, drill the hole with a size F or a 17/64" drill and tap it for 5/16x18. Screws for this are available at any hardware. You will have to use some patience to grind down the head, both around the edge and on the top.

HARDING: Before starting the mouthpiece job, you should have secured also a throat saw. When you get the mouthpiece off, probe out the throat, especially the sides. Then fill the pot, take off the pump stop bracket, hold a pig-mold under the mouth of the crucible, and tip the pot forward to flush out the dross. Especially see that the lips of the crucible are free of all dross.

Grinding in a Wedge Mouthpiece

Scrape all oxides and metal from the crucible while it is hot. Lay the mouthpiece on a block of wood face down and drive small brads through the end holes. Lift off the mouthpiece and tap the brads in until their exposed length is less than the thickness of the mouthpiece. Put the mouthpiece back on the brads. Spread a mixture of valve grinding compound and oil evenly on the inside and upper surface of the mouthpiece. Hold the mouthpiece against the upper crucible lip, and, with short strokes, grind until the mouthpiece and crucible show bright their entire length. A good many applications of compound may be necessary.

LOOMIS: I have found many mouthpieces (wedge and screw) that were not flat to start with. Get a straight edge (your garage mechanic may have a Starrett or Lufkin or Brown & Sharpe 12" rule, and they are usually pretty straight), lay it edge-on to the mouthpiece, and hold it up to the light. If you get the light in line with your eye and the crack, it will look like a big crack, but it isn't. See that it is the same width all the way across. This test can be accurate to within .001" of an inch. If the mouthpiece is bowed, lay the two ends on Linotype slugs with the bow up. Tap very gently with a plastic or rawhide hammer. GENTLY. Those mouthpieces bend incredibly fast. If you get it straight to start with, your work will be about seventy-five per cent less.

Fitting a Screw-Type Mouthpiece

LOOMIS: The traditional way to put on this type is also to grind it in, but I think I have evolved a better system. I use a flat stone — the same hone I use on the mouthpiece itself, and work on the crucible until it shows bright all the

way around the opening. I usually pull out or cut off the two pins that position the mouthpiece on the bottom, and remove the splash guard. You can drill out the stubs of the pins later and put in new ones. Then straighten the mouthpiece as told in the paragraph above, and you will need very little or no grinding at all.

On an Intertype, hold down and against the crucible to grind in.

To Seal a Mouthpiece

HARDING: It may be applied without a seal. Some machinists use graphite and oil, others use red lead and glycerine. Loomis uses white mixing ink. But be sure to put oil and graphite on the screw threads. Set the mouthpiece in position as marked and bring all screws up to a bearing. Use a screwdriver with a perfect blade that fits the screws. Start at the center and work out, to right and left, until all screws are tight. It may take a dozen times around.

A wedge mouthpiece may be applied either without a seal or with the same mixtures. Set it in position, then drive the wedge in tightly. Red lead and glycerine will make it harder to drive off the next time. Red lead and glycerine are also hard to apply when the machine is hot.

Always use graphite and oil on the gibs.

LOOMIS: Lawrence Morris finally persuaded me to try it without a sealer. It works.

What to Do if Mouthpiece Location Is Lost

HARDING: The mouthpiece may be re-located by removing the mold cap, putting liners in the mold, putting the mold in casting position, and holding out the mold disk turning handle while you pull the clutch and let the machine turn over until the mold disk locking studs enter the blocks. Now you can pull the pot forward against the disk and see that the end holes come inside of the liners for 30 picas. At this point you can shift the mouthpiece either way if necessary, by tapping with lead pig and discretion.

Holes Must Be Properly Positioned on Bottom of Slug

LOOMIS: I hope you pulled the plunger pin on that last test. Now let's turn the machine on over, after removing the liners (which should, of course, have good full tips on them for that test), and let the machine come to normal. Put the mold cap back on and seat the mold properly. (See *How to Seat a Mold,* page 134.)

Use your 30-pica liners and cast a slug. Examine the base. The mouthpiece holes should show round and full all along the smooth side, and the end holes should show full — both of them. They probably won't be perfectly aligned

the first time. Use the top and bottom pot leg adjusting screws to raise or lower the pot a little until you get the holes just resting on the smooth side of the slug. Loosen the front screw on each leg. Loosen the bottom screw on each leg. Use the top screw on each leg for adjusting. Each time you adjust, turn back the front screws and the bottom screws with your fingers. When you get it set, tighten the lock nuts on the two top screws.

It is essential that both end holes get a full cast without interference from the liners. If one is partly covered, you can shift them some by moving the pot up or down on one end. For instance, suppose the right-hand hole is partly cut off. You can raise the right side of the pot a fraction and probably bring the hole in full without throwing the horizontal adjustment off too much. You have, of course, more leeway if you don't go below 8-point slugs. Machines vary, but you will find the middle holes will stand more interference than the end holes. (This is only for machines where for one reason or another you cannot move the mouthpiece enough to bring it into alignment.)

To Test the Lockup

HARDING: Daub the red lead on the back of the mold and push the disk back in casting position. Close the vise, raise the mold slide connecting lever, and connect the ejector blade. For safety, set the ejector for the shortest mold. Pull out the mold disk pinion and hold the disk so the studs will enter the blocks. The motor is off. Pull the controlling lever and have an assistant turn the cams until the metal pot locks against the back of the mold. Then back the cams till the mold disk retreats, open the vise, pull out the disk, and examine the lead now on the mouthpiece. There are times when this test is a little deceiving. Try this method of testing:

Clean mouthpiece and mold thoroughly; spread on the transfer compound; leave the mold in front of the mouthpiece, close the vise, and back the machine until the disk advances; use a pinch bar between pot lever and cam to pry the pot gently forward for the lockup test.

LOOMIS: Harding's test is a conventional test, but he warns you it may be deceiving, and he is right. I have seen a lot of different lockup tests, but I have stuck to one I learned from "Professor" Churchill at the New Orleans Mergenthaler School. You lower the first elevator to casting position; open the vise (it's a little easier if you drop it into the second position); turn the machine by hand until the pot lever roll is on the highest point of the short shoe; disconnect the mold slide.

Now have some red lead or litharge mixed into a paste form with oil. If you mix up a batch, the red lead will settle and the oil dries up. Squirt a little oil on it and rub it with the dauber made out of a part roll of 2″ gauze, wound tightly and tied in the middle until it is about ¾″ in diameter. Be sure the molds are clean. If you have not seated them yourself, or if they have never been seated by a professional machinist, this is a good time to do so. Take off

each mold; observe shims if any; clean molds and seats thoroughly and clean backs of molds. Replace each mold in its original place in the disk, with the same shims, and with the tighten 4 – tighten 3 – loosen 4 – tighten 4 – loosen 3 – tighten 3 ritual (see *Seating a Mold,* page 134).

Daub red lead on a mold with a spotting motion. Push the slide back against the mouthpiece with a little slam. Now open the slide and look at the mouthpiece. A perfect lockup will of course show solid color all the way around the holes, top and bottom and both ends. Often the ends won't show too well because the liners are shaved down.

Let's say the left end of the mouthpiece shows up light. Then the left end is too far from the mold. Loosen the bottom screw on the left pot leg. Turn the back screw on that leg out about half a turn. Turn the front screw up with your fingers. Turn the bottom screw up with your fingers. Try the test again.

Keep at it until the mouthpiece shows a full transfer top and bottom, and even from side to side.

On a pot leg with two screws front and back each, turn them up together.

When you're all through, tighten all lock nuts.

If one end in general shows heavier than the other, try adjusting the pot legs. If you get a fairly even impression all over but there is a hole in the middle, or if the mouthpiece shows high in the middle, try another mold. Occasionally but not often a mold will be defective. Not often, I said – just enough to make a check desirable. If the second mold shows up the same way, the mouthpiece needs honing. See *How to Hone a Mouthpiece,* page 181.

Some machinists use soot, but that is messy. Many like to turn the machine over under power, but this can be a fooler, as Harding suggests. Nemo Wraggett at the Minneapolis Star got good results by holding a piece of newsprint between mouthpiece and mold at lockup, but his machines were about as near mechanically perfect as a battery can be. For the man in the country, I like the red lead test. It never has let me down but once; there is a certain machine in Minnesota that has been worked over by at least five machinists, including me, and it has had everything replaced but the pot itself, and it will still squirt on a change-over from 30 picas to 20 picas.

One thing to remember about a poor lockup: it is entirely possible for a lockup to give good results on long slugs but squirts on short slugs; this will look like a bad-liner squirt, but it isn't always.

Venting the Mouthpiece

LOOMIS: There is quite a bit of confusion in terminology about venting the mouthpiece. There are two operations spoken of in connection with the vents. One is cutting the vents deeper; the other is opening the bottom ends of

the vents. My conclusion is that it is next to impossible to cut the vents deeper, though this is spoken of in many books on mechanism. What is commonly referred to as "venting" means making a slight opening at the bottom of the vent (or cross vent — they mean the same thing) for the air to escape, and that is the way I shall use the word.

Cast twenty-five slugs to warm it up. Then stop the machine immediately after the pot breaks away. With an extension light look behind the disk. You will now see the sprues you are getting. On a new mouthpiece you may not see any. (The sprue is the slender squirt of metal that drops out of the cross-vent at the cast.) Now you will have to "vent" the mouthpiece. As I said above, this is an inaccurate term, for the mouthpiece was vented when the half-moon-shaped cross-vents were milled in it. But "venting," as I use it, is necessary for a good slug.

Gas pots require more sprue than electric pots. The ideal is a sprue 3/4" in length, but electric pots frequently run well on 1/4". At any rate, be slow to vent. If it is a gas pot, cast at least twenty-five slugs before you start venting, for as the mold gets hotter the sprue will get longer. On a gas pot with a new mouthpiece I aim at a sprue about 3/8" to 1/2" long, because you will often find another 1/4" will develop after a week's use. Therefore, don't be in too big a hurry to get the full 3/4".

Now lower the vise, pull out the disk. Get a sharp pocket-knife and a small 4-ounce hammer. Stand at one side. Hold the blade of the knife at the bottom of the cross-vent and tap it once, gently, with the 4 ounce hammer. Go all the way across like this. Cast a dozen more slugs and then look again. This time some sprues will be pretty full, but some won't show. Count the ones that need a little more. Write down the numbers, starting from the right. Open up the machine and give those numbers a little tap.

When I say "a little tap," that is exactly what I mean — a tiny tap. Some mouthpieces are astonishingly soft. Now try it again. If they don't all show up as they should, forget it for the time being. Run it a week and then look again. This venting is a tricky business. In my early days I vented a few pots, staying with it until I had 3/4" sprues all the way across, but later I was amazed to discover that my carefully vented mouthpieces ejected about a pound of metal at each cast. It was very embarrassing — but that's the way pots are. The amount of venting actually necessary is very little. You can hardly see it. When you are through, take the smooth side of your perfect oil stone and make a couple of passes to eliminate the tiny swellings thrown up by the knife blade.

What to Do When You Get the Vents Too Big at the Bottom

LOOMIS: Ordinarily they can be closed a little by tapping the knife blade into the mouthpiece a little to each side of the cut, on the edge, and thus swelling the sides of the cut together. Center punches have been used, and even a

ball pein hammer from underneath. But this is messy business at best, and probably will mean another new mouthpiece before too long, because, as I said, the sprues will grow. So be very cautious in your first venting.

Also, to reassure you, it is well to note that occasionally you get a mouthpiece that is brittle, and when you try to close the vent you only flake off chunks of cast iron. This is not only embarrassing; it is humiliating.

In spite of all my experience, I vented too much on my Model 15 a year ago. With a new mouthpiece, electric pot, I ran it several days. There were no sprues. I vented with extreme care, for this would be one mouthpiece that was perfect — just a very light tap against a knife blade with a 4-ounce hammer. A week later I was hiding my head. The sprues were three inches long. The only explanation I know is that the mouthpiece was unusually soft. I had to butcher it — use a prick punch at each of the vents, sometimes peen up from below. Since then I have talked to Milt Anderson, who tells me he usually does this job that shouldn't be needed by using the knife blade at either side of the vents, on the corner of the mouthpiece, swelling the metal over to close up the vent. This sounds like a neater and more nearly certain way to repair a bungled job.

Shallow Cross Vents

LOOMIS: It is true that the cross vents must be vented or you will have trouble getting a good face on large type. It is also true that the cross vents themselves — the half-moons — must be deep enough and long enough. A proper vent should be just about two picas from top to bottom. I can't give you a figure on the depth, because it would take a special instrument to measure the depth, but I have always assumed the vents are made by milling cutters, and if they are long enough they should be deep enough. (Offhand, I'd say about 1/16" at the deepest place). The top of the vent should be about a pica above the hole in the mouthpiece, and the bottom of the vent just about reaches the bottom edge of the mouthpiece. It is well to examine a new mouthpiece when you get it. I say again that I seriously doubt that a machinist can materially deepen or enlarge the vents themselves. I once installed a new one that had shallow vents, and could not get a good face on the 14-point bold. That's what makes a machinist's life so fascinating — the unexpected.

Cleaning out the Vents and the Holes

LOOMIS: It is common practice in the Northwest to scrape out the vents and the holes. Some use a discarded spaceband. Some grind the end of a file to fit the vent. Some buy a special "venting" tool and scrape upward with the tool fulcrummed against the dummy mold slot.

This is heresy, but I am about to disagree again. I have run two separate batteries of machines and quite a number of single machines in the last thirty years, and I am almost ashamed to say that I have never scraped a vent. I merely

wipe the mouthpiece with a cloth every day. And so far there have been no ill effects.

The same goes for the mouthpiece holes. It is a wide-spread practice, not confined to this area, to poke the holes out every day, and at least once a month or once a year to drill them out on general principles. I see no need whatever for this unless you are having trouble. I never do it, and so far I have not had that kind of trouble. The real trouble in mouthpiece comes from behind and not in front.

How to Stop a Leak in a Mouthpiece

LOOMIS: No matter how carefully you put on a mouthpiece, it may leak a little. Each time you open up the vise, during your lockup test, inspect the mouthpiece for leaks. You may find two or three small ones, where a pinhead of metal oozes out. These you can ignore for a few days. They will usually seal themselves by corrosion. If they don't, they'll get bigger. Let's say they're a little bigger than you like, either at the ends, top or bottom, or at the screw heads. Don't be too quick to jerk off the mouthpiece. Get a nickel's worth of epsom salts and mix it with an equal amount of table salt. Dissolve all you can in a small glass of water. Get a small oil can and fill it full of the saturated solution. (You can get soda straws; dip them in the solution and hold your finger over the open end; then you can apply the solution — but an oil can is more efficient, though it will corrode in a few days and be useless.) Wipe all metal off of the place where it oozes out, and dribble your solution on the place until you build up a white, hard film.

The heat of the mouthpiece will harden the stuff almost immediately. Try casting again. Be patient. You may have to spend an hour at it, but you can generally stop small ones this way. And if you can stop them for a little while, they will seal themselves — with corrosion, I suppose.

Harding especially recommends a saturated solution of zinc and hydrochloric acid — soldering fluid. Drop particles of pure zinc in one ounce of the acid until no more will be dissolved. Use a glass tube or medicine dropper to apply several coats while the mouthpiece is hot, and allow to stand, preferably overnight. I've never tried this, but it sounds reasonable.

Harding lists also rubber stamp compound, equal parts of lye and salt mixed with water and applied to a cold pot; chloride of lime and cold water applied hot.

How to Hone a Mouthpiece

LOOMIS: If a mouthpiece shows consistently light on the right end, for about the width of the straight-matter slug, it is well to be suspicious of the mold. A mold that sees long service will sometimes be worn down on that end.

Check it against another mold if you have one. Or take off the one mold and hold it up to the light (after cleaning) and try a straight-edge on it. Sometimes you can see the low area.

But let's say you have an old mouthpiece that needs to be trued up. I've heard of machinists who could do this with a file, and I've known some pretty good file artists, but I tried this a number of times and gave it up. It was too much work to hone out the file marks.

This is my method: get a No. 109 Carborundum stone. This is 1x2x6", with one side fine and one medium. (India stones are good but cut much more slowly.) Now hold the stone up to the light and try your straight-edge on it. About one stone out of four is crooked — some as much as 1/32" — and you cannot get a flat mouthpiece without a flat stone.

Open the mold slide. Have a number of rags handy, folded up to use as pads. Have a can of cutting or threading oil to use on the stone. Wipe the metal from the mouthpiece. Standing at the side, squirt plenty of oil on the stone and then lay the stone flat on the mouthpiece. You can feel it when it is flat. Now go back and forth, short strokes. After twenty-five or thirty strokes, stop and look it over. You can tell from the mouthpiece where you are hitting and how far you have to go. Ordinarily about fifteen or twenty minutes will take care of a mouthpiece. Sometimes they require a couple of hours, but the difficulty then is that you will have taken off so much metal that you have reduced the depth of the cross vents.

The main thing in honing is to keep the stone flat on the mouthpiece. When the mouthpiece begins to look flat, try the red lead. You may have to adjust the pot legs.

Mouthpiece Does Not Lock up at Lower Edge

LOOMIS: We discussed this above on page 170, but there is another angle to be brought out. On old mouthpieces, sometimes the bottom edge just seems to be too far back. The mold posts are okay, the mold itself is good and the two parts of the mold are in line, and the mouthpiece seems to be flat when tried with a flat stone.

In this case, bring the pot legs forward as far as they will come. I don't know why, but perhaps the crucible itself is "bent in" a little from thousands of lockups. Ordinarily you can get a good lockup by bringing the legs forward, but sometimes you cannot. In these cases I have had to hone the mouthpiece at a new angle, taking most off the top and almost none from the bottom, until a lockup could be secured. I do not use a file.

How to Drill out Mouthpiece Holes

HARDING: If a little dross collects behind the mouthpiece, you may be

forced to drill out some holes. This is especially true on a mouthpiece that has been used on short measure only for a long time, and which now you want to use on long measure. Use a 1/16″ or No. 52 drill; use threading oil or grease graphite on it, and drill slowly and cautiously. Don't use too much pressure.

If you do break off a drill and cannot get hold of it to pull it out, take a small punch and tap it on through, leaving it in the throat until the next time the mouthpiece is off.

Should You Enlarge Mouthpiece Holes?

HARDING: Sometimes, in the hope of producing a more solid slug, the mouthpiece holes are enlarged by using a No. 51 drill or even larger. But this is a matter for an experienced machinist to decide. Larger holes sometimes produce complications in the form of back squirts.

Sometimes a Perfect Mouthpiece Won't Work

LOOMIS: Once in a while — usually on a single-mold machine — a strange situation occurs. The machinist either hones the old mouthpiece to perfection, or puts on a new mouthpiece, only to find that he cannot get a lockup because the mold itself is an oldtimer and badly worn. In the course of millions of lockups, the mouthpiece has shaped itself to fit an untrue mold, and they have worked well together, but the new mouthpiece refuses to co-operate. If you suspect this, first be sure your hone is perfect, by testing it with a straight-edge; then take off the mold and check it against the straight-edge. On a very old mold you may find some astonishing conditions.

In such a case the only real remedy is to get a new mold. Some owners have had their molds ground down to flatness, but this necessarily reduces the height of the slug, which is not convenient, to say the least.

Cold Face Caused by Throat Clogged

HARDING: The symptoms of a clogged crucible are a pitted, ragged face. The condition develops gradually. It calls for removal of the mouthpiece and cleaning out the throat with a throat saw.

It is believed that metal in poor condition has a great deal to do with this trouble. An excess of antimony may produce dross in the throat, and of course zinc, copper or arsenic above very low limits will give trouble.

LOOMIS: Within my experience, dross in the throat (which usually turns out to be a thin coating of reddish oxide against the inside of the mouthpiece), is first indicated by inability to get a good face. It eventually looks frosty, and the giveaway is that no amount of heat has much effect.

But suppose your mouthpiece looks good, with nice deep vents, and you'd like to be sure about the dross before you take it off. How to know?

I am about to reveal a carefully guarded trade secret. Thirty years ago I found out about dross in the throat, and tried to figure out how to be sure before removing the mouthpiece. I drilled holes in the side of the throat (which I later plugged with screws) so I could look in. I tried to push a flashlight bulb up inside the throat on two wires. I even investigated buying one of those lucite things the doctor uses to look around curves inside of your stomach — but that was $650. After much experimentation with those same old crucibles at Edlund's, I figured it out. Here is what you do (and I've never told but one person before):

Have the pot full of metal, and hot. Take off the pot top, the short line stop bracket, the splash shield. Have somebody with well padded hands and arms hold a pig-mold under the mouthpiece. Now bring the pot forward until the metal pours out of the mouthpiece in thirty little streams. If any hole is even partly clogged, the stream will not be full and round and properly curved. You will see at once the difference. This test has never failed. If you find a hole like that, you will find something behind it that doesn't belong there.

I believe that most dross in the throat or up against the mouthpiece is caused by a combination of things: allowing the metal level to run low in the pot, failure to skim off the dross, lack of care in keeping ordinary trash out of the metal. Nor do I discount the importance of maintaining theoretical proportions of the metal, and by no means would I countenance contamination of the metal by zinc, copper, and other impurities.

Read what I said about metal again. I said that I had quit using poor metal as an excuse for casting trouble. That is not to say that poor metal will not lead to dross in the throat. It might. I don't know. Don't take a chance.

Quick Drop Will Improve Face on Big Sizes

QUESTION: We have recently bought a font of 18-point Gothic, but we are having trouble getting a good face on it. A machinist from a nearby town has checked over the pot and lockup and put on a new mouthpiece. What else can we do? — A.B., Bucklin, Kan.

LOOMIS: If your crucible throat is clean, your mouthpiece well vented, and the vents open enough to throw a fair-sized sprue, your plunger making a good full stroke, and your slugs reasonably solid, then I suggest you send to the company for a quick drop. This gadget is fastened to the plunger cam and can be flipped in or out of use in a few seconds. When you want to cast heavier faces, you put the quick drop into operation. It has the effect of making the plunger cam extend farther and break more sharply, so the drop of the plunger is delayed and then comes all at once. This will give you a better face, usually with the sacrifice of some solidity in the slug.

With bigger type — 24- and 30-point in heavy faces — you will need a quick drop and everything else you can get, but, even so, do not expect to cast slugs that will print on enameled stock. Both companies have done a lot of work

toward securing better printing surfaces on 18-point and larger, but linecasting display type is still largely newspaper material.

On big stuff it sometimes is difficult to get a good face at a certain spot on a certain word. This is caused by the mat itself, for the way it has to be made throws up an obstacle to the smooth flow of metal. In such a case, try shifting the word to right or left. Sometimes half a pica will make a big difference.

MISCELLANEOUS SLUG TROUBLES

Letters Fall Off of Slug

QUESTION in *The Graphic Arts Monthly:* I enclose a 9-point, 13-em slug, cast on a Model 14. We get from twelve to twenty slugs like this to the galley. The lower case *o* seemed to peel off when I rubbed my finger across it. It is not the mats, for they run fine on our other machine. I have cleaned out the throat and the mouthpiece. I don't think it's the metal, because the other small machine uses the same metal. Can you suggest something? — B.C., Parkston, S. D.

HARDING: I believe so. The mouthpiece hole on the left end is nearly all cut off. This hole that is partly closed causes the metal to spray to the right, so the metal cools too fast. Raise the pot on the left side about half a turn of the adjusting screw. This should swing the hole over onto the slug unless you have seated the mouthpiece too far to the left — which is not likely.

Slug is Cold on One End Only

QUESTION: I have always had trouble getting a good sharp face on the right end of the slug. Do you think this indicates dross behind the mouthpiece? — C.N., New Braunfels, Tex.

HARDING: No, I don't think so. Here again the slug is missing a mouthpiece hole. This time it is the right end, and the hole is completely covered, as you will see by observing the long open space on the other end. Maneuver your pot legs. You might have to take off the mouthpiece and move it over — in which case I suggest putting on a new mouthpiece. In a case like this, use the test given under *What to Do if Mouthpiece Location Is Lost,* page 176, to be sure the mouthpiece is in the right place.

Hollow Slugs — Causes and Cure

QUESTION: We are having complaints because sometimes a slug from one of our machines caves in on the dry mat roller. Will you go into this trouble?

HARRY G. POTTLE in *Who's Who in the Composing Room:* Such slugs usually feel light when you pick up a handful. Saw a sunken slug in half and

you will find an air cavity underneath the sunken letter. Usually such a slug breaks easily in the fingers. This is an old trouble that has acquired new importance with modern stereotyping machinery.

There are three fundamental causes of hollow slugs:

1. Imperfect pump action; 2, incomplete solidification; 3, ventage.

The second is due to excessive heat or unusually poor metal; the third has been discussed under *Venting the Mouthpiece,* page 178.

Let us consider the first one here. The intake holes in the sides of the well must be cleaned out, and the plunger must ride just above them. As the pot moves forward before the cast, it also rises, and the bottom of the plunger closes the holes before the plunger descends. An oversize plunger cam roll will raise a plunger that rides too low.

The plunger works well at from .002″ to .0035″ clearance in the well. Oxides will interfere with free movement of the plunger and cause hollow slugs. A worn plunger can hardly be replaced with a new one to advantage. The well is bigger at the bottom after years of use. You can buy a new crucible. The job of reaming is for an expert with plenty of equipment.

The stress of the plunger spring is important. It has been my observation that the smaller expansion-type springs suffer more from spring-set than the bigger compression springs. These are not expensive and should be among the first replacements when you have casting trouble. When you take off the old one, compare its length with the new one. Usually you will find the old one shorter.

Where the slugs are subjected to extreme pressure, as in dry-mat rollers and making wax molds, better slugs will be obtained with less spring stress; the pump lever should have a roll with roller bearings to minimize wear.

A plunger should have a full stroke. On short slugs you may have to drill a hole in the bottom. Drill a 1/8″ hole part way and follow through with a No. 52.

In my opinion the condition of the metal supply is more responsible for oxides in the throat than anything else. The melting point of antimony is 1166°, and there would never be enough heat under the pot to melt it if an accumulation of excess antimony should occur.

HARDING: When the metal or mouthpiece is too hot, the metal in the base of the slug does not have time to cool before the metal pot backs away, and the molten metal runs out of the mold. This does not look like the hollow slug Pottle talks about, but it makes an unsolid bottom to support the slug.

A low metal pot, a dry bearing, dross ring in the well, or mouthpiece badly out of alignment with the mold, may cause hollow slugs. If the first slug is solid but they rapidly become hollow, look for the plunger riding too low in the well.

See that the plunger lever makes a full, free stroke when the plunger is disconnected. If it doesn't, remove the plunger spring and clean and lubricate the bearings.

IMPERIAL METAL COMPANY in *Type Metal Alloys*: The following will cause hollow slugs: loose or tight plunger, hot or cold metal, dirty metal, weak spring, mold disk hot, mouthpiece holes clogged, vents too shallow or not open at the bottom, throat clogged, deteriorated metal, roughness back of the mouthpiece.

LOOMIS: There isn't much left. These boys have covered the ground. But I'll tell one that shows what a traveling machinist gets into. It was on a machine in a small plant here in Minneapolis. I rebuilt the pot and somebody else put it in the machine. They got shells only, and I got the blame. But it turned out that somebody at some time in the past had put a transfer spring in place of the plunger spring. They had made a hook at the bottom so the spring went on all right and you wouldn't notice, but the spring did not retain its stress and went down with a soft, mushy action. It took me several hours to put the finger on this one.

What Causes Chilled Slugs?

IMPERIAL METAL COMPANY: Lack of heat, an undersize plunger, too much water or air used for cooling, dirty mouthpiece or jets, poor lockup, improper pot alignment, unfit metal, lack of ventage, and sometimes lack of tension of the plunger spring.

HARDING: Also drafts, dirty plunger, poor lockup, or oil in the mold cell.

LOOMIS: Do not forget dross behind the mouthpiece. I remember when I hit a little town west of Lincoln, Nebraska, with $1.56 in my pocket and the gas-tank almost dry, and I — that was dross behind the mouthpiece.

Chilled Spots on Large Type

LOOMIS: This agrees with my own experience. Many times on large type you get a chilled spot at the same place on a certain letter, but move the word 6 points one way or the other and it is all right. Apparently this results from the stream of metal hitting divisions in the matrix die which deflect the metal. The Ludlow avoids this entirely by using a slot instead of holes. The slot runs the entire length of the mouthpiece, and thus there can be no cold spots.

Frosty Face on One End of Small Slug

QUESTION: When I get to hanging the elevator on straight matter, invariably the right end of the slug comes out frosty. It won't do it on the first dozen slugs, and if I went slow it wouldn't do it at all, but it is hard to tell the boss on pressday, "Yes, I know you need the type, but I can't hang the machine because the slugs will get cold." — K.B.T., Gallup, N. M.

LOOMIS: I have several times faced this trouble — once on a memorable night west of Huron — but maybe I've told that one before. There are a number of things to check. For some reason they never seem to cure the trouble, but here they are:

1. It doesn't help much to raise the temperature.
2. See that the slugs are good and solid, which indicates proper ventage.
3. Be sure the throat is not clogged with oxides.
4. See that the plunger is raised above the holes in the well.
5. Gas throat burners must be burning properly.
6. Be sure both end holes of the mouthpiece show full and are not partially obstructed.

One quick remedy is to drill the mouthpiece holes a very little bigger — but this can lead to complications. Here is what I have found: Check all the above items, then check the pot packing and all burners and deflecting or baffle plates. See *Packing the Crucible,* page 198.

This latter job, if thorough and careful, will generally do the work.

What Makes Shiny Bottoms on Slugs?

HARDING: The first thought is cold metal. If this is true, the face of the slug will have the characteristic melting ice appearance. Anything that causes a poor lockup will cause shiny bottoms, and this probably is the most frequent cause, for obviously if one end of the mold is held away from the mouthpiece, there will be more metal there to trim off.

Also metal on the back of the mold, a dull back knife or a back knife screwed up until the heel rubs against the slug, broken pot lever spring, tight upper bearing of pot lever.

LOOMIS: In summary, most shiny slugs go back to one of three causes: poor lockup, improperly set back knife, or cold metal. It is also true that a worn mold disk stud — usually the old-style small stud — will cause a very mysterious slick bottom. The knife seems to start digging, and the play at the end of the stud seems to encourage it. See *Setting the Back Knife,* page 217.

What Causes Stuck Slugs?

IMPERIAL METAL COMPANY: Dirty molds, warped mold cap, bad liners, hot metal, weak clutch spring, oily clutch leathers, (rarely) dull trimming knives, jammed ejector blade, low metal level, knife wiper does not drop low enough to permit the blade to clear, no play between forked lever and collar (see *Starting and Stopping Adjustments,* page 250), metal between mold cap and liners which makes the slug thicker than it should be.

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