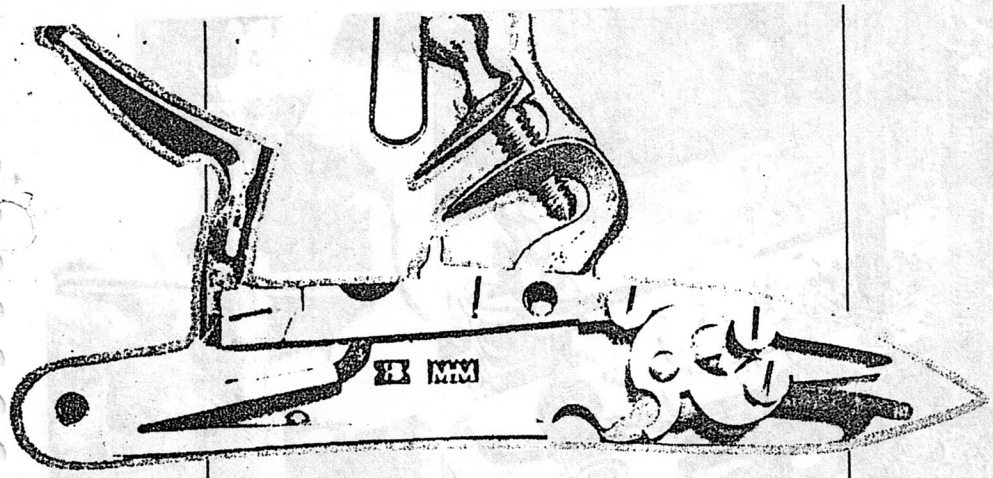

Precision Assembly of LOCK KITS

By JOHN BIVINS

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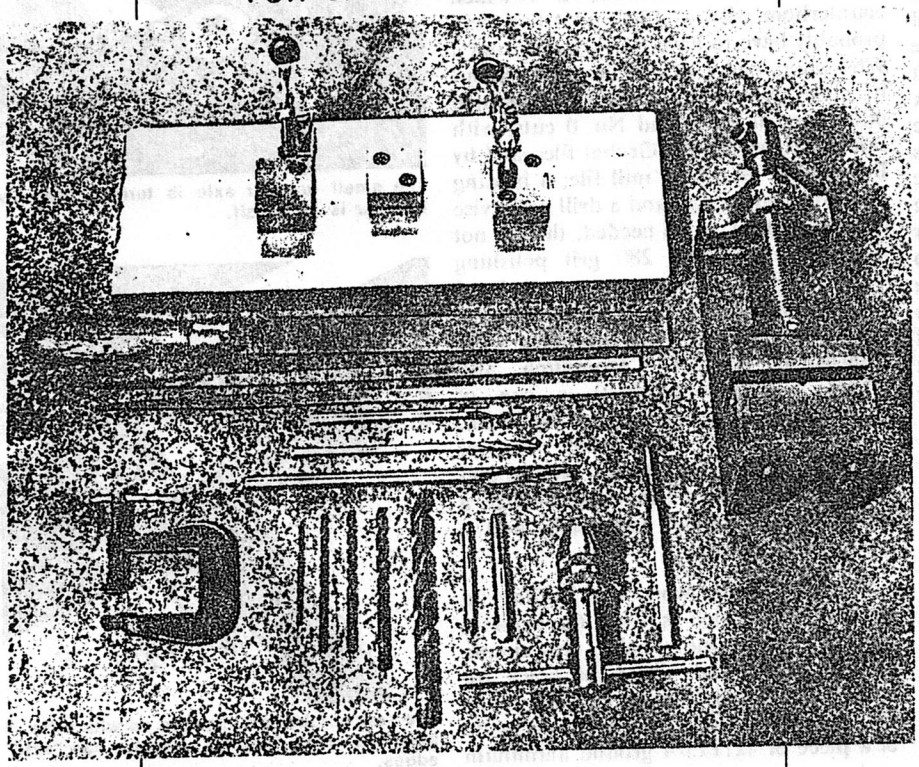
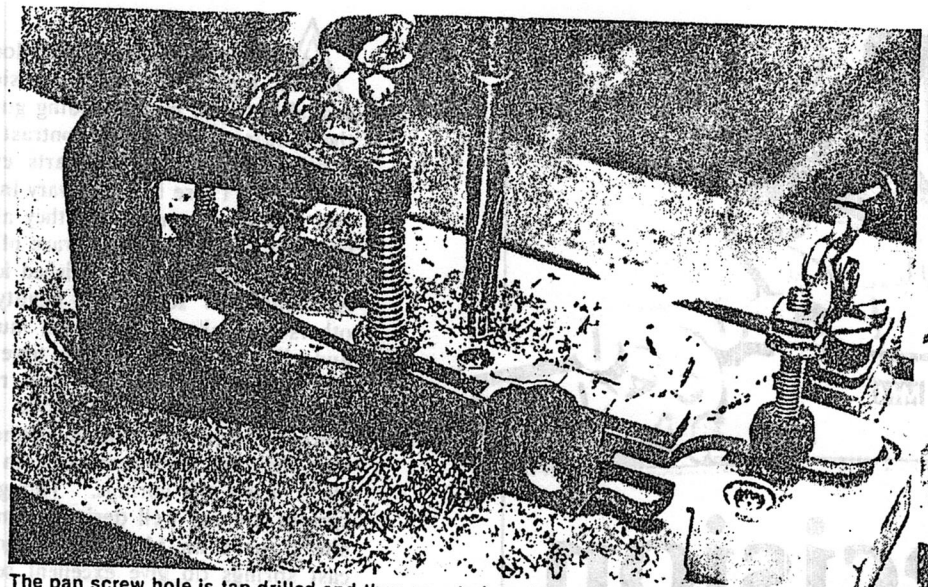


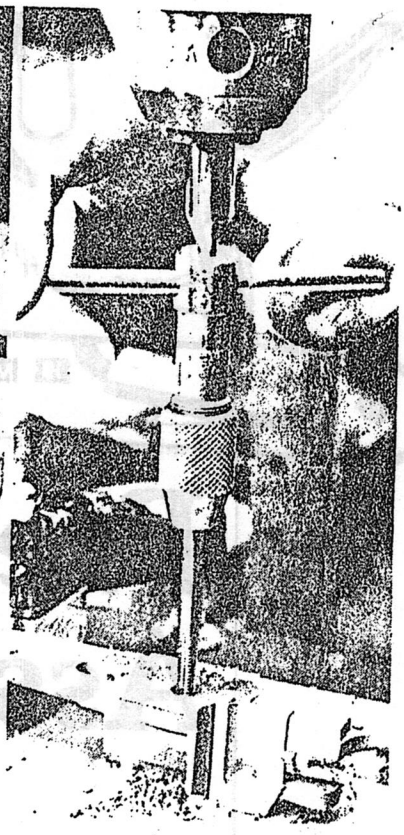
A LARGE VARIETY of lock kits, both flint and percussion, are available to the muzzleloading gunmaker these days — much in contrast to the relative paucity of such parts even ten years ago. These lock kits vary in quality and ease of assembly, and they also vary considerably in style and grace of design. Some kits will provide a finished lock that is a thing of sculptured beauty, while others have all the grace of a mud fence and will require considerable time cursing over a hot file to make them resemble something that looks like a lock. All kits, however, share a common technology in that they are investment cast in various steels, even the springs. Though some springs are not well designed, and don't always have an ideal flexing geometry, cast springs do give excellent service if properly heat-treated. I have had only two cast springs fill in service over the past ten years; most kit makers provide springs that are already heat-treated to avoid possible problems.

Most, if not all, lock kits on the market can be assembled into a good working unit, but how well the lock functions, and how long its working life will be is determined by the fellow who puts the thing together. Crooked holes, egg-shaped tumbler axles, wobbling frizzen fit, and other such niceties render an otherwise good lock fit only to be used for a shark-fishing sinker — you surely don't want a badly cobbled lock on your gun if you intend to have it go off with any regularity. For both reliability and longevity, a lock needs to be assembled precisely, with a close fit and good polish of its bearing areas. It's not enough for a lock to just function; it should utilize all of the mechanical capability designed into the components. Small assembly flaws have a cumulative effect in reducing ignition time of either a percussion or flint lock, especially in the latter.

Most lock kits assembled today are done so by hobby gunstockers who in general haven't the equipment in their own shops to make lock assembling chores both quick and precise. However, a hobbyist should be able to find access to a good drill press either in a friend's shop or in a high school vocational shop or a local technical school. A 1-inch belt sander speeds work considerably and provides a good surface finish, but such polishing and grinding can be done by

These are the basic hand tools needed for lock work, including small C-clamp; drills: 5/64, 7/64, 5/16; Nos. 29 and 19, 8-32 and 1/4-20 taps; tap wrench; center punch; 5/16 and 11/64 reamers; a special counterbore with .136 pilot; 1/4x8 pillar files in No. 4 and 0 cut; 8-inch mill file; the special holding jig discussed in the text; and a drill press vise.





The pan screw hole is tap drilled and then counterbored for the screw head. The cut should be shallow to leave excess screw head that may be dressed down later. Note the clamp. The photo at right illustrates tapping the pan screw hole. All screw holes should be tapped by starting the tap in a drill press to insure alignment.

hand. Parts that need precision lathe work, such as tumblers, can be sent to a machine shop with proper instructions; the balance of the tools needed are basically hand tools which will take an investment of some $20-$30 or more, but may be used to assemble quite a number of locks before they wear out.

We'll have a look here at the assembly of a Siler flintlock, done in a manner to get the most out of the lock. The procedure may be used for quite a number of other locks, including percussion locks. Caplocks may vary slightly with the addition of such things as stirrups on the mainsprings and adjustable sears, items which flintlocks seldom have. I illustrate the assembly of a Siler lock here since it is the lock I use for almost 100 percent of my jobs, and it is far and away the best thought-out lock kit on the market — and therefore the easiest to assemble. Bud Siler includes good instructions with his kits, but the instructions are intended largely for those who have no access to machinery other than a hand drill, so with apologies to good friend Bud, let's throw away those instructions and have a look at a slightly different way of doing it. I might add that most of this I learned from Bud back when he was assembling locks, which he no longer does. He only supplies kits.

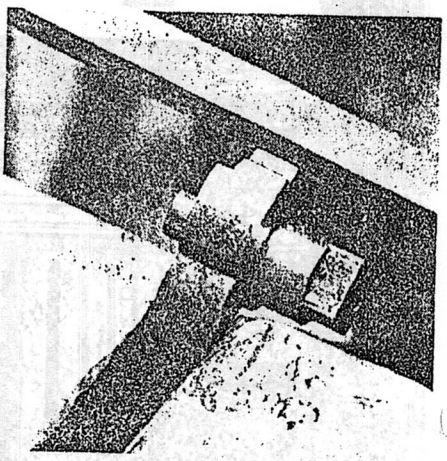
Monte Mandarino does most all of the lock work in our shop, and the procedure I'll outline here follows his usual efficient method of working, but of course the order of the work can be changed around considerably to suit the individual.

The Siler lock is a lock of Franco-German persuasion, ca. 1760-90 in style, and is made in two sizes, both in flint and percussion mode, and not long after you read this a left-hand version in the large size, long awaited by gunstockers, will be available. Bud uses 4140 steel for lockplates, both cock and upper jaw, pan, and bridle. The balance of the parts are cast in either spring steel or through-hardening tool steel; screws are turned from low-carbon free-machining screw stock.

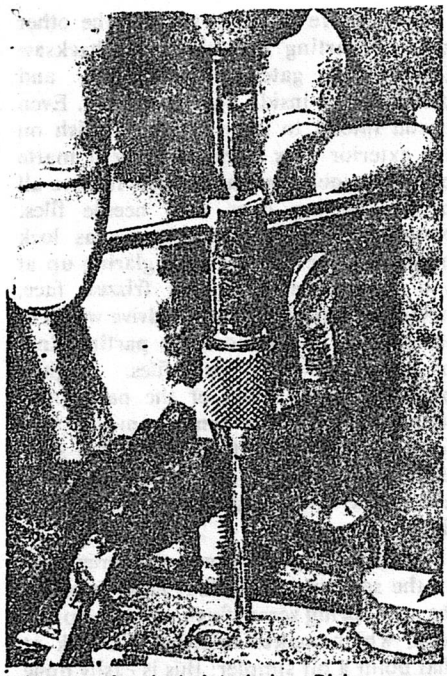
Hand tools and bits needed for precision assembly of a large-size Siler lock are a small C clamp; 5/64, 7/64, No. 29, No. 19, and 5/16 drill bits; 8-32 and 1/4-20 taps; (buy 2-flute "gun" taps if you can find them) a tap wrench turned at the top to receive a center (for use in the lathe and drill press); a center punch; 5/16 and 11/64 reamers; a 1/4-inch counterbore with a .1360 pilot (you will probably have to have this ground from a 9/64 pilot; make two while you're about it, since pilots are fragile); 1/4x8-inch pillar files in No. 4 and No. 0 cuts, with safe edges (we use the Grobet files sold by Brownell's), an 8-inch mill file; a holding jig (discussed below), and a drill press vise of good quality. Also needed, though not illustrated here, are 280 grit polishing cloth, 400 grit wet-or-dry paper, a hand vise (optional), a can of anti-scale compound (we use PBC, available from Brownell's; Kasenit Corporation also makes a similar product), a can of Kasenit hardening compound (optional), a small quarter-round needle file for removing parting lines from castings, and access is needed to a 1-inch micrometer, a lathes, a belt sander (optional), and a quality drill press.

Essential to this work is a holding jig for the lock, which is used for drilling, tapping, and reaming holes; this simple jig will insure that all of the holes are straight, to avoid binding moving parts. Our jig is a spartan affair, the base made of a piece of 4x11x3/4 ground aluminum

The small tumbler axle is turned, then the tumbler is faced off.



The sear notches are cleaned up with a No. 4 pillar file. Note that the pillar file has "safe" edges.

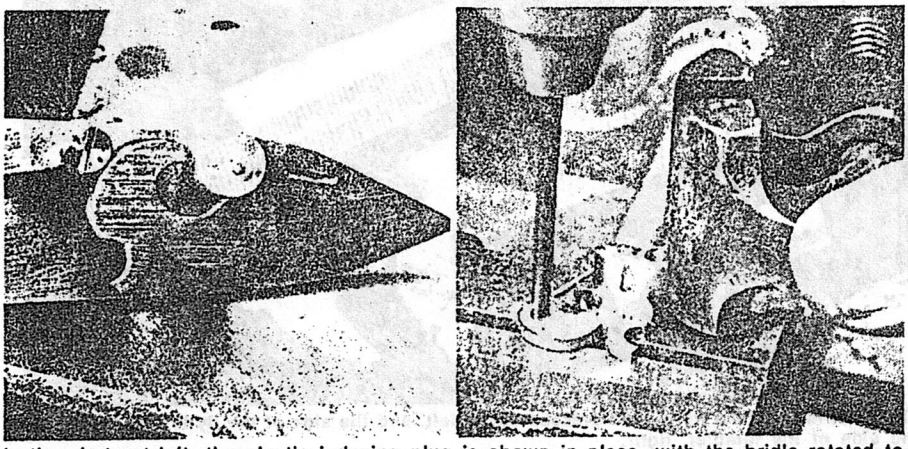


When tapping lockplate holes, Bivins uses a drill press center to insure that they are square. Light down-pressure is used on the spindle while starting the tap; after it is started, the drill press is raised, and the tapping is finished by hand.

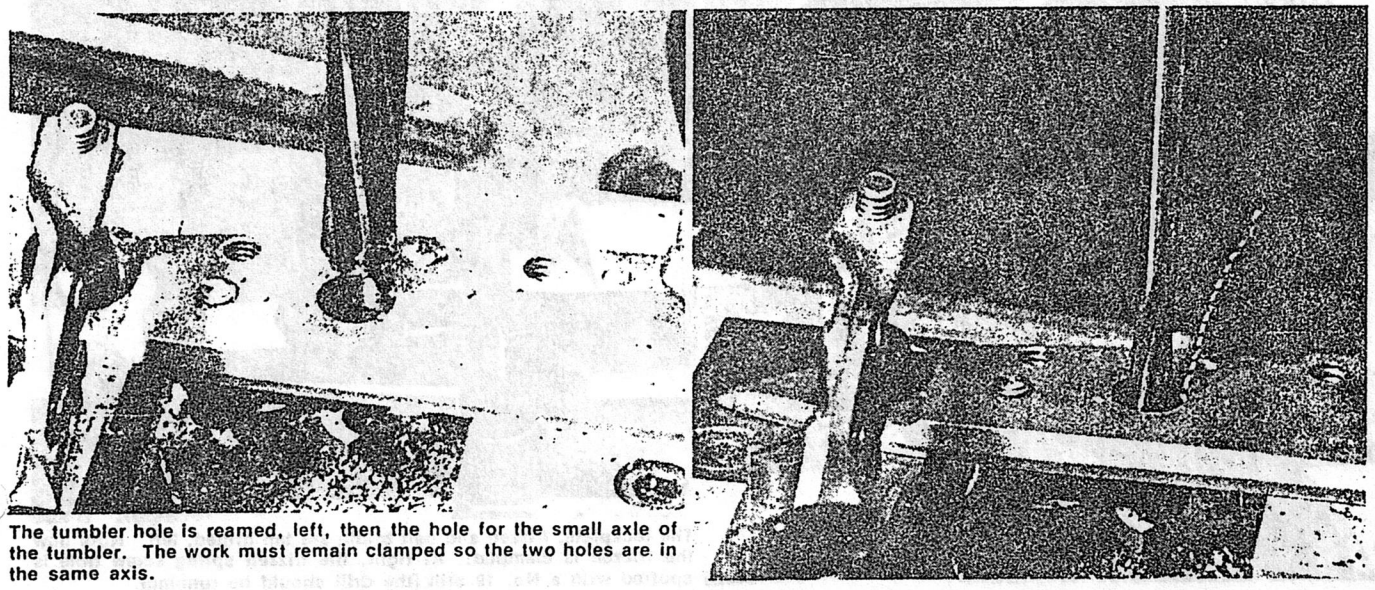
stock (steel would be fine, if surface ground). On the base are mounted three ground-steel pedestals 3/4-inch high. Two of these are 1 1/8 x 1 3/8, set on the centerline of the base plate, and 3 1/2 inches apart (measuring from the inside edges). The third pedestal is 1 1/8-inch square, and is positioned 1 3/8 inches from the inside edge of the right-hand pedestal; the centerline of this block is set 5/16-inch back from the centerline of the outside pedestals. Behind the outside pedestals are mounted two 40-pound Vlier toggle-clamps (Vlier's part number is 93121); these clamps are also mounted on 3/4-inch pedestals, though the outside pedestals could have been left 2 1/2 inches long to provide extra room for installing the clamps. The pedestals are secured to the aluminum base with 10-32 cap screws. This positioning of the pedestals will allow clamping both a large and small Siler lock, for work on either side of the lockplate. Spacing of the outside pedestals might need to be changed for other makes of lock kits.

We use a 1-inch belt sander for as much lock work as possible; it's particularly useful for leveling and polishing the inside of the lock plate, which must be smooth and free of casting surface characteristics if the mainspring, tumbler, and sear are to have uninterrupted action. An excellent finish may be obtained with the belt sander by using No. 80-grit belts for rough grinding and then finishing with 100-grit belts. For an extra-fine finish on parts that are belt-sanded, however, it's best just to go from the 80-grit belt to hand-polishing, polishing first with cloth-backed 280, backed with a file, finishing with 400 wet-or-dry paper. If you want the lock to have "London" quality inside, 600-grit paper may be used.

Lock assembly begins with belt-sanding the inside of the plate, working around the lug that receives the pan. If the lock is to have the exterior polished, then go ahead and belt sand the exterior longitudinally, since heavy stock removal must be done before fitting the pan to insure a tight fit. The pan is next fitted to the plate by lightly cleaning up the pan casting inside the flange with files. The pan should then slip tightly onto the lock plate, requiring a blow or two from a mallet to drive it home. Pull the pan off and lightly belt sand the bottom of the lug to remove the cast surface. Tap the pan back in place, clamp the lock pan-side-down in the jig, and clamp the pan in position with a small C-clamp. Tap drill the pan screw location with a No. 29 drill, using plenty of cutting oil or tapping fluid — as you should do on *all* drilling and tapping described here. Using the 1/4-inch counterbore, counterbore the hole for the screw head, leaving the cut shallow so that .005-.010 of screw head will be left standing above the surface. Leaving the pan on the lockplate, clearance drill the hole in the lug, setting the drill press stop so that the bit won't pull down into the tap hole in the lockplate. Tap the hole 8-32, using a



In the photo at left, the plastic indexing plug is shown in place, with the bridle rotated to correct position [bearing against the plug.] In the right photo, the sear screw hole is clearance drilled in the bridle while the bridle is held in a hand vise.



The tumbler hole is reamed, left, then the hole for the small axle of the tumbler. The work must remain clamped so the two holes are in the same axis.

60-degree center in the drill press chuck to center the tap wrench; use a light down-pressure on the spindle while starting the tap; after it is started, raise the drill press and finish tapping by hand. A tap wrench with a center-spot on the top works fine for this, though the B-Square tap wrench works better. A mechanical tapping head is all right with careful use, but they represent an investment of $75-100. In any event, *all* screw holes in the lock should be tapped in this fashion for straightness and evenness of thread unless you have an uncanny eye for starting a tap straight by hand. Some do — I don't.

Install the pan screw, and belt sand it off flush with the pan lug; this will remove the casting gate on the lug at the same time. Go lightly, and remove no more metal than is needed to clean the surface. File the screw off flush with the outside of the lock.

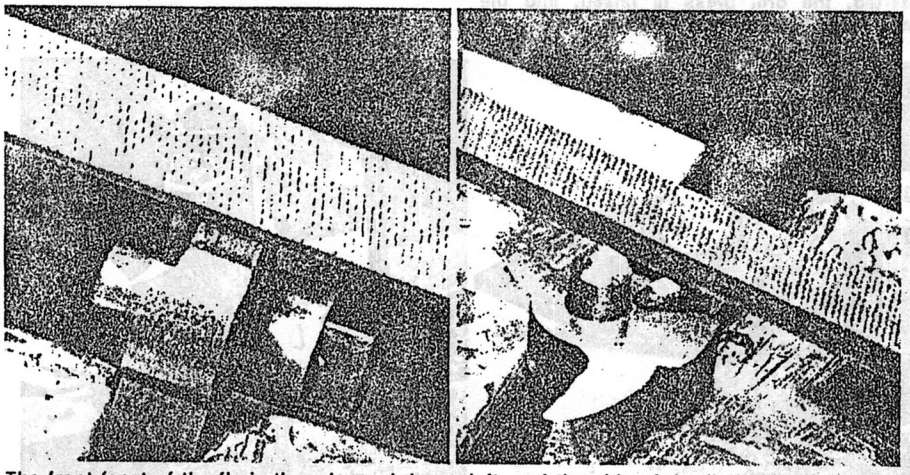
In readying the internal parts for installation, the most important component, which is indeed the "heart" of the lock, is the tumbler. Since investment castings can be out of concentricity as much as .003-.004, the tumbler must be lathe-turned for best results. Hand-filing the axles while the tumbler is spinning in a drill tends to accentuate the "oval" as-cast shape of the axles. Fitting the large axle into the lathe collet, turn the small axle to .1714; this will provide a slip-fit in a reamed 11/64 hole, since the reamer diameter is .1719. After turning the axle, face off the tumbler with the lathe bit just enough to clean it up. Some prefer to turn a bolster ring around the axle at this point, approximately .220 in diameter and .010 high, relieving the rest of the tumbler face. If this is done, a bolster approximately .400-inch in diameter is turned on the opposite side, around the big axle. This was often done on fine-quality London locks of the late 18th Century, and of course the reason is to reduce bearing area of the tumbler to a very small area to reduce friction. I wouldn't recommend this too highly unless you intend to case-harden the lockplate, since that tiny bolster will tend to wear a ring in an unhardened plate or bridle.

After finishing the small axle and its adjacent tumbler side, turn the tumbler around, and with the small axle held in a collet, turn the large axle to .3120, which will be a slip-fit in the .3125 hole provided by a 5/16 reamer. Face off this side as well, and face off the end of the axle at the square. Center drill the end face of the square, tap drill with a No. 29 drill, and, with an 8-32 tap in the tailstock, start the threads by turning the lathe by hand while advancing the tailstock feed. Finish tapping by hand; this method should insure that the cock screw doesn't pull the cock out of line when it is tightened.

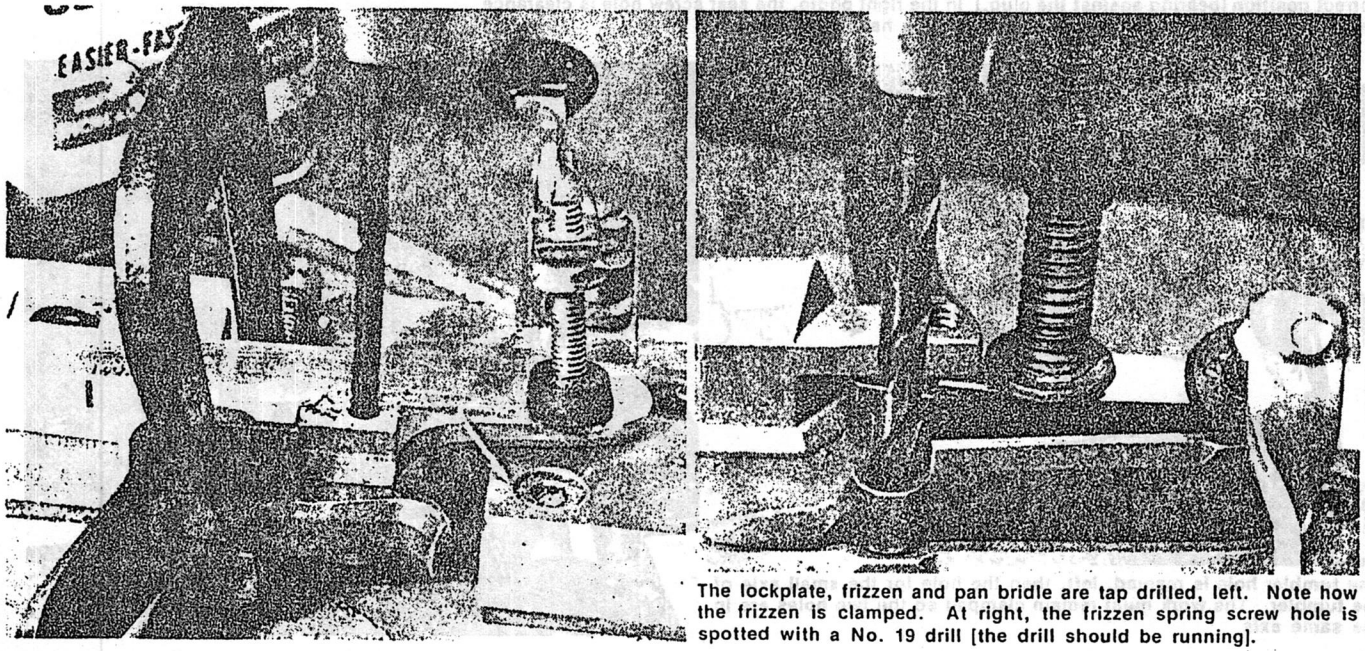
Now you're ready to prepare the other parts. Starting with the cock, hacksaw the casting gate off the back, and belt-sand the inside flat of the cock. Even if you intend to leave the cast finish on the exterior (this works fine for a matte browning job), you should now remove all of the parting lines with needle files. Nothing looks so cheesy to me as lock parts with the parting lines glaring up at you. Now belt-sand the frizzen face, holding the frizzen over the drive wheel of the sander, and remove the parting lines on the front face with files. Lightly belt-sand the bottom of the pan cover, taking care not to remove more stock from one side than the other. Belt-sand the casting gate off the back of the top jaw of the cock, and file off the parting lines.

We usually grind down the screw seat on the sear spring of Siler locks to make the sear spring screw flush with the spring edge, which makes inletting the lock at that point a bit simpler; this is easily done

(Continued on page 48)



The front facet of the fly is then dressed down, left, and the side of the fly is filed flush with the side of the tumbler, right.



The lockplate, frizzen and pan bridle are tap drilled, left. Note how the frizzen is clamped. At right, the frizzen spring screw hole is spotted with a No. 19 drill [the drill should be running].

Lock Kit Assembly

(Continued from page 25)

on the side of a 1/8-inch cut-off wheel on the bench grinder. For appearance's sake, lightly belt-sand the edges of the frizzen, spring, mainspring, and sear spring. Both the top and bottom of the mainspring should be lightly belt-sanded, and the inside as well. Avoid overheating the spring, since it is already heat-treated. The inside of the mainspring should then be polished out with 280-grit cloth backed on a thin file or sheet-stock scrap to remove the grinding marks, which are at right-angles to the spring — a most definite no-no unless you like to hear the eventual musical tinkle of a breaking spring. The polish marks do not have to be totally parallel with the spring; many old mainsprings, in fact, exhibit diagonal file marks inside, but diagonal cuts don't cause opposing stress points the way right-angle filing or polishing marks do. Should you find a pin-hole near any edge of a mainspring, return it to the maker. That, however, is an exceedingly rare occurrence in a Siler spring.

If you wish, the inside edge of the mainspring may be relieved to the rear of the pivot stud by grinding on the belt-sander; this prevents the entire main beam of the spring from dragging on the lockplate, and many English lockmakers were fond of doing it. However, don't be tempted to take any of the inside edge of the spring off until the spring has been tried in the assembled lock, for reasons we shall see below.

Hand polish the un-machined portions of the tumbler, going over the notches very lightly with a No. 4 cut pillar file to clean up. Infrequently the half-cock notch will need to be cleaned out with a thin escapement file. Don't mess with fullcock notch angles at this point.

Belt-sand both inner and outer faces of the bridle, and file and polish the edges if you desire. The edges don't look bad left as-cast, since foundries commonly sand-blast castings to remove investment.

Using the sander and hand-polishing, finish the sear; a hand-grinder may be used to polish the radius if you have one. Lightly square up the sear nose with the No. 4 pillar file; don't change the angle. The main beam of the sear may be relieved from the rear of the sear screw position back, if desired; grinding away .010 of metal at this point reduces bearing area on the lock plate and tends to give a little better sear action.

Holding the screws between two fingers, polish the lathe marks off all the screw heads, with a strip of 280-grit held flat on a bench-top with the left hand. Finish with 400.

Now, with the lockplate clamped in the holding jig pan-side-up, drill all of the main holes in the lockplate, including the mainspring pivot stud hole, with a No. 29 drill. *Do not*, however, drill the frizzen spring screw hole at this time. Drill the frizzen spring pivot stud hole with a 7/64 drill. Tap the holes at the rear of the pan 8-32, using the same method outlined above with the pan installation. Drill a screw clearance hole in the front lug of the bridle (No. 19 drill), first drilling a pilot hole with a No. 29 drill. The bridle is best clamped in the drill press vise. Screw the plastic indexing plug supplied with the kit into the sear spring hole, attach the bridle with its front screw, swivel the bridle up until it bears against the bottom of the plastic plug, and tighten the bridle screw. Then, with a new, well-pointed tap, screw the tap into the sear screw hole from the outside of the lock until it lightly marks the inside of the bridle. Remove the bridle, center punch, and holding it in a hand vise over the open jaws of the drill press vise, drill the clearance hole for the sear screw — first with a No. 29, then a No. 19 drill. Re-install the bridle with both screws.

With the pan side of the lock up in the jig, ream the tumbler hole in the lockplate with a 5/16 straight reamer running at slow spindle speed, using plenty of "juice." The center for the small tumbler axle hole in the bridle may now be marked. The best method is to turn a .3120 center punch to shove in from the outside of the tumbler hole. Rest the bridle on something flat and give the punch a little swat with the hammer. If you prefer to save time, you can simply run a 5/16 drill bit into the hole from the outside; the bit will be .0005 smaller than the reamed hole, and shouldn't hurt the good finish of the hole if you're careful. With the drill press running, lightly bear down on the drill, just enough to mark the inside face of the bridle. Without removing the lock from the jig, drill through the bridle with a No. 29 drill, and then follow up with the 11/64 straight reamer. Remove the parts from the lock, and very lightly chamfer the edges of the holes on the inside of the lockplate, using a countersink held in your hand. Now reassemble with the tumbler, and if either tumbler axles bind to a significant degree, put the tumbler back in the lathe and polish lightly until you achieve a firm slip-fit in both lockplate and bridle. You should have to twist the tumbler back and forth to remove it from either hole.

Clamp the sear in your hand vise, the vise holding the perpendicular beam of the sear, and rest the side of the sear flat against the top of the drill press vise, the latter with its jaws slightly open. Drill the sear screw hole first with a No. 29, then a No. 19 drill. For a more efficient operation, you can add a holding clamp to your jig by the means of a toggle clamp and two studs; the screw hole may then be drilled even more precisely.

To fit the cock to the tumbler square, open up the cock tumbler mortise slightly from the rear, giving a slight taper to the hole. The cock should be a drive fit onto the square, and the end face of the tumbler square should be below the outside face of the cock to prevent the cock screw from bottoming out. Drill and tap (1/4-20) the cock for the top jaw screw, holding the cock in the drill press vise; in fitting the top jaw, file only enough off the back of the jaw for the jaw to be pulled all the way down to its rest by the jaw screw without binding. The top jaw should not be so loose that it can be turned from side to side to any extent.

The Siler cock and top jaw are cast with ridges to provide a firm grip on the flint leather. This works, but isn't exactly traditional. If you prefer the 18th Century usage, file off the ridges and upset a number of rows of teeth using a round-bottom die sinker's chisel or a small cape chisel.

Install the sear and check for good bearing on the tumbler notches. With the sear spring in place, the sear should snap audibly into the notches; if it doesn't, the notches probably need a further bit of cleaning up, though this is rare on a Siler. Don't be concerned with sear angles and bearing at this point.

Dissassemble the lock, and with the small axle of the tumbler held in the "V" of the drill press vise jaws, drill the fly hole with a 5/64 drill, setting the drill press stop to avoid drilling through the tumbler. Install the fly and rotate it all the way to its rearmost position, clamp the tumbler in a bench vise, and file off the front facet of the fly flush with the fullcock "table" — the tumbler flat between the halfcock and fullcock notches. The fly will keep the sear out of halfcock if this isn't done. Then file off the side of the fly flush with the tumbler side. Polish the fly with 280 and 400 — if you can manage to hang onto the blasted thing!

Install the mainspring and check the bearing of the spring hook on the tumbler foot. If the hook isn't bearing on the tumbler evenly, it will either torque the spring against the lockplate or push it away. File the nose of the spring hook until the bearing is even, and polish the nose with 280, 400, and 600. Now the inside edge of the spring may be ground away slightly to reduce the amount of spring bearing against the plate, as I mentioned above.

Strip the lock, and with the lockplate clamped in the jig with the pan down, set the frizzen in place in its closed position and clamp it down hard on the pan with a small C-clamp or parallel machinist's clamp. Tap drill the frizzen with a No. 29 drill, and then run in the 1/4-inch counterbore, leaving the cut a little shallow. After setting the drill press stop, clearance drill the lockplate lug and frizzen with a No. 19 drill, just barely cutting into the pan bridle from the inside. With all the parts still in the jig, tap the pan bridle 8-32. Install the frizzen screw and belt sand off the excess head, holding the frizzen closed so that any excess pan cover is ground off at the same time. After fitting the lock to a stock, you may find that the inside edge of the pan cover may need to be further relieved to avoid scraping the barrel flat; it should clear the barrel by no more than .003-inch.

A close frizzen-to-pan fit is essential. Coat the underside of the pan cover with inletting black or a similar agent and close the frizzen hard. File down the bearing points on the pan until the frizzen has full bearing. No light should show between the pan and frizzen, if the job is done right.

With the lock in the jig, insert the frizzen spring pivot stud in its hole and swivel the frizzen spring up until you have 1/8-inch of spring compression with the frizzen *open*, using the tip of the spring finial as a "pointer." Clamp the spring in this position, run in a No. 19 drill to mark the center, tap drill with a No. 29 drill, and tap the hole. In doing this, you are ignoring the screw index mark cast onto the plate. This should be done since frizzen springs vary, some of them being less "open" than others after heat-treating.

Most of the job is now done. Critical to a long-lasting and good-working lock, however, is heat-treating. Most people who heat-treat lock components do the job with an acetylene torch, or perhaps a Mapp-gas torch (Propane is too cool), but I dislike such a hit-or-miss method. At very least, you should be able to find access to a small electric heat-treating furnace with an accurate pyrometer, perhaps at a dental lab. Or you can send the parts out to be heat-treated in an atmospheric or salt-bath furnace, which is the best method, but heat-treating firms usually have a minimum charge of $15-20, and for that price you could heat-treat 100 tumblers for the same amount you pay to have one done. If you use an electric furnace, you will need to

purchase a can of anti-scale compound to prevent scale on critical areas such as tumbler notches. Holding the parts with needle-nose pliers, heat them with a propane torch to about 500 degrees F. (this isn't too great on the pliers!) and scrub them around in the anti-scale powder until the surface is completely covered. Pop the parts in the furnace, take them up to 1,550 F., and using small tongs or an old set of needle-nose pliers, snatch the parts out one at a time and swirl them around in 10W oil. Check each part with a file to make sure that they are hard; a file should not cut them at all. The anti-scale compound, which has now fused into a ceramic state, can simply be boiled off in water. You will find that you will have a few small spots of scale here and there, with the rest of the surfaces a frosty silver. The anti-scale compound has a tendency to flow a bit under high heat, allowing the oxidizing atmosphere of the furnace to reach bare steel in places. This can be polished off with 280 and 400 paper easily enough.

The frizzen, tumbler, and sear are hardened in this manner. The fly, due to its small size, is best hardened "by the seat of the pants" so that it will not lose heat before reaching the quench. Heat it in the carburizing flame of an acetylene torch, if you have one, holding it by its axle, and keep the part close to the oil while heating.

After hardening the parts, belt-sand off the face of the frizzen a bit, since heat-treating tends to decarburize the surface to a depth of .001 or more, which means that you would get lousy sparking until the soft upper layer is worn away.

Draw (temper) the parts as the lock-kit maker specifies. In the case of a Siler, all parts are heated to 375 F.; the frizzen is removed after one hour and the heat is increased to 425 F.; the tumbler and fly are removed after a half-hour at that temperature and the heat increased to 590; the sear is removed after 1/2 hour at that level. A kitchen oven is all right for this use, but I'd suggest that you verify the calibration of the dial before using the wife's pride and joy, since some ovens can be off 25-50 degrees from the dial setting, which can be disastrous.

Though Bud doesn't suggest it, both his lockplate and bridle, which are 4140 steel, may be hardened; old ones invariably were. The 4140 will harden to approximately RC 58 by heating to 1,550 and quenching in water, though I much prefer casehardening. If you choose the latter, you run a risk of warping the lockplate, though it can be straightened. If you do harden the lock, be certain to drill and tap the lock bolt holes first, and this should be done with the lock in your stock, drilled from both sides between centers, and the lock also tapped while clamped in the lock mortise. Drilling and tapping for lock bolts before inletting a lock is surely inviting a red-eyed monster to sit on the foot of your bed at night while you lie awake wondering how in hell you're going to make screw holes in the stock line up with the lock without boring half-inch caverns through your masterpiece.

Frizzens do warp sometimes during heat-treating. Check fit with the pan, and re-fit the frizzen bearing again if necessary; this is usually minor.

I prefer to case-harden both the frizzen and sear screws. This can be done easily enough by swiping a stainless teaspoon from the kitchen (preferably the one that went down the disposal last New Year's) and clamping the spoon by its handle in a vise. Drop in the screws, fill the spoon bowl with Kasenit, and heat the whole mess up from below until the Kasenit is well melted. Soak it with the torch for a minute or two, and then dump the thing, spoon and all, into cold water.

Assemble the lock, and check for sparking. Silers invariably work best with the bevel of the flint facing up. Stone the full-cock notch with a fine India stone at this point if a lighter pull is needed, though it's best to wait until the lock is mounted in a stock so that you can get the feel on the trigger. If you are using single-lever double-set triggers, leave the pull rather heavy for safety, since you don't need it light anyway. The set triggers will kick it out.

If you find that you have a flint-breaker of a mainspring, now is the time to judiciously grind a bit off the bottom of the spring on the belt sander. Go *slowly* with this, for you want neither to burn the spring nor lighten it too much. The mainspring must be balanced in weight with the frizzen spring. Grind, cock, and snap the lock until everything feels right. I suppose pull weight could be measured for accurate spring regulation, but I don't know what the weight should be. Joe Scorsone, Bud Siler's spring expert and Asheville's resident stockmaker, could probably answer that one.

If you intended to fully polish the lock, exterior and all, now is the time to begin that tedious little chore. Many old locks were left bright by gunstockers originally since they were casehardened, but most have long since acquired a brown patina, of course. Many early locks were also fire-blued, but modern 4140 steel cannot be fire-blued, though a rust blue works very nicely. I have one sitting in the damp box as I type this article.

Most all lock kits, from the lowliest to the grandest, can benefit from customizing and reshaping with the file, if only to give a lock its own personality. Such things as blind-screw frizzen springs, fancy filework on frizzen springs and mainsprings, reshaping of plate, cock, and frizzen, and other goodies can be drawn from fine sources such as Merrill Lindsay's *Master French Gunsmith Designs*, or other such tomes. Customizing, however, is another bedtime tale best reserved for later.

There you have it — a precision-fitted lock certainly equal in quality to most 18th Century originals, and one which will give you long service. If you do as fine a job on the rest of the gun, then you can sit down with a bottle of Jack Daniels Black Label and grin at the wall for an hour.

John Binns