INLETTING the SIDELOCK

Whether antique or modern, the principles are the same

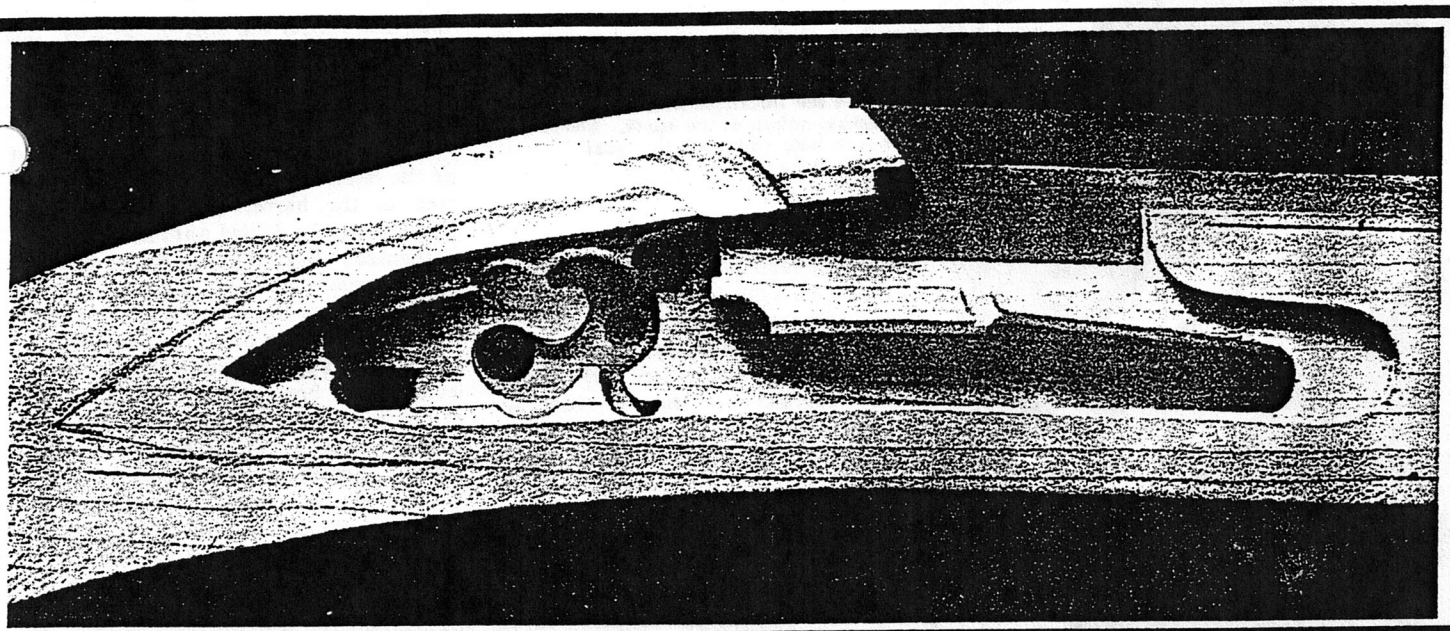
By JOHN BIVINS

UNTIL A LITTLE over a century ago, most hand-held guns of any description were fitted with side locks, beginning in the Fifteenth Century with matchlocks and ending with side lock breechloaders such as the Sharps, Peabody, and Springfield. The side lock was an efficient means of housing an ignition or striking mechanism in one compact unit, easily removed for inspection or repair. However, the advent of the breechloader quite naturally brought about the use of more efficient systems of concealed, self-cocking strikers, most of which could be suspended inside the frame or breechblock. Since 1900, side locks have been seen for the most part only on shotguns, the better grade of which have concealed hammers. Today, side locks are common enough again with the renewed interest in muzzleloading guns. A certain nostalgia, in addition to a strong push from the 1968 Gun Control Act, has caused many guns of the side lock type to again become popular among shooters. Such guns include a host of types from mid-eighteenth century military muskets to third quarter Nineteenth Century breechloaders, all burning black powder, and many requiring side locks for ignition. Those who contemplate stocking a Brown Bess musket or a Hawken rifle, sporterizing a "trap-door," or even building a .45-3¼ rifle on a salvaged 1858 Sharps action might well give consideration to how a side lock should be properly fitted in a stock blank.

The lockplate lug is inletted first. A sharp scribe is used to scribe a line along the top and rear edges of the lockplate for a reference point. The inward-projecting lug is then painted with inletting black and its position marked while held in alignment with the scribed lines. Bivins uses a 3/8 flat chisel, driving straight down along the lug lines keeping the bevel of the chisel facing toward the inlet in cutting the lug profile.

A stockmaker's reputation is made on the quality of every aspect of his work, not simply on external appearances. It hardly seems appropriate, for instance, to stock a fine relief-carved longrifle, paying considerable attention to detail of finish and decoration, and yet inlet the lock in a manner that makes the lock mortise appear as if it had been chewed out by a trained rat. There are considerations other than those merely cosmetic. For instance, a longrifle, fowler, or musket stock is weakest at the area of the wrist where the tail of the lock is inletted; the same is true of a double shotgun. Failure to leave all the wood possible in a lock mortise is to invite possible fracture at that point. If a lock is properly inletted, no more wood is removed than is necessary for the action parts to have working clearance. Further, a lock should fit its mortise tightly, so that it cannot move under tension of the springs. It should fit tightly enough so that with the lock bolts removed, and the gun turned to the right, the lock will not fall out of the mortise when the stock is rapped smartly with the heel of the hand. Needless to say, if a lock is fitted this well, there will be no perceptible gaps between the lockplate and surrounding wood, and all non-working interior parts of the lock will have full bearing for good support.

A side lock can be tightly inletted with a router or vertical mill. In fact, precision

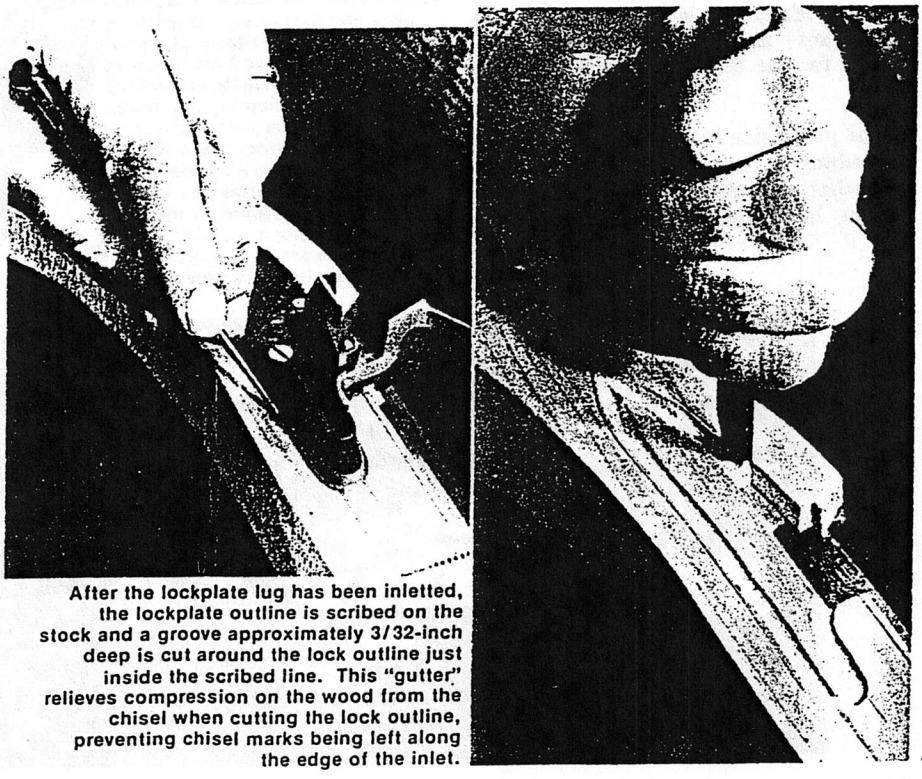


inletting with machines had been carried out in this country well before 1850, as any military musket of the period can attest. However, hand inletting is the usual method unless a great quantity of production is considered. Some stockers find good assistance in lock inletting through the use of high-speed hand grinders, such as those made by Dumore, Rockwell, or Dremel. These grinders can save time with some procedures, but a word of caution is in order. These small grinders operate at speeds of 15-20,000 rpm, and tend to fill the work area with fine sawdust, making it difficult to see where the tool is cutting. It is easy to make a slip with such a tool that will remove a considerable piece of wood just where you don't want to. I prefer hand tools for this reason, and also because I have never become used to working around the high-pitched shriek of such machines. My nerves aren't up to it, but more power to you if you can make use of a hand grinder. I would suggest the use of a flexible shaft if you do use one, to attain better control.

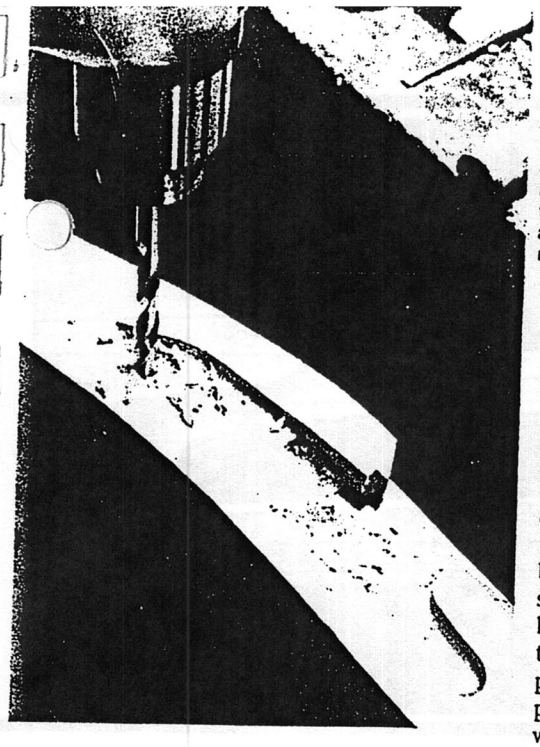
In starting the inlet, take care that your working surface on the stock blank is smooth and square. Leave little more wood on the stock blank than is necessary to fully inlet the thickest part of the lockplate; 1/16-inch of extra wood is more than enough.

In inletting a shotgun lock, or the back-action lock of a Sharps rifle, the position of the lock on the stock blank is determined by the frame cuts which receive the lock. On a muzzleloader, however, there is no totally fixed reference point to work from, with the exception of the fact that the lock must have the proper relationship to the vent on a flintlock, or the drum or bolster on a caplock. Here we will discuss the inletting of a muzzleloader lock, which presents additional problems, but the techniques used are otherwise identical to those used for a breechloader, once the frame has been inletted.

Briefly, the frame of a breechloader, such as a double-barrel shotgun, is inletted in the same manner as will be discussed for the lockplate, scribing the tang outline and working downward and rearward. The initial cut of the tang mortise will be to the width of the tang, with a slightly long rough cut at the rear adequate to allow for setting back the frame as the forward edges of the buttstock are inletted. Care must be taken in alignment of the frame to avoid undesired cast-off or cast-on, and the recoil-bearing surfaces must be fitted as closely as possible. In most cases it is best to provide a few thousandths relief at the rear of the tang, carefully matching the rear radius to make it unnoticeable, for otherwise the slight normal setback of the wood due to recoil is likely to result in a



After the lockplate lug has been inletted, the lockplate outline is scribed on the stock and a groove approximately 3/32-inch deep is cut around the lock outline just inside the scribed line. This "gutter" relieves compression on the wood from the chisel when cutting the lock outline, preventing chisel marks being left along the edge of the inlet.



After the lockplate has been inletted to full depth, the sear hole should be drilled as small as possible since it penetrates nearly 3/4 the thickness of the wrist, one of the weakest points of the stock. Bivins says a 1/4-inch hole will work for most rifle-sized locks.

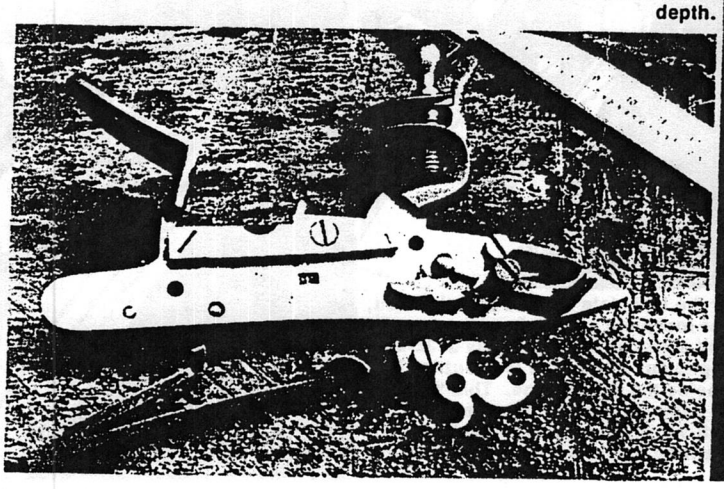
chip or split at the rear of the tang. Depending upon the design, it may also be necessary to allow *slight* relief along the forward radii of the tang where it flares outward behind the breech; this area is also prone to chipping due to recoil setback since the grain of the wood usually flows roughly parallel to the barrel, while the wrist turns downward, resulting in short, therefore weak, grain at the upper edges of the wrist. Once the stripped frame is properly inletted, clearance can be provided for internal parts, taking care to remove no more wood than essential; some prefer not to make the internal cuts until the plates are inletted. With the frame inletted, inletting of the sideplates follows the same techniques as for the muzzleloader, except for the additional problems they entail.

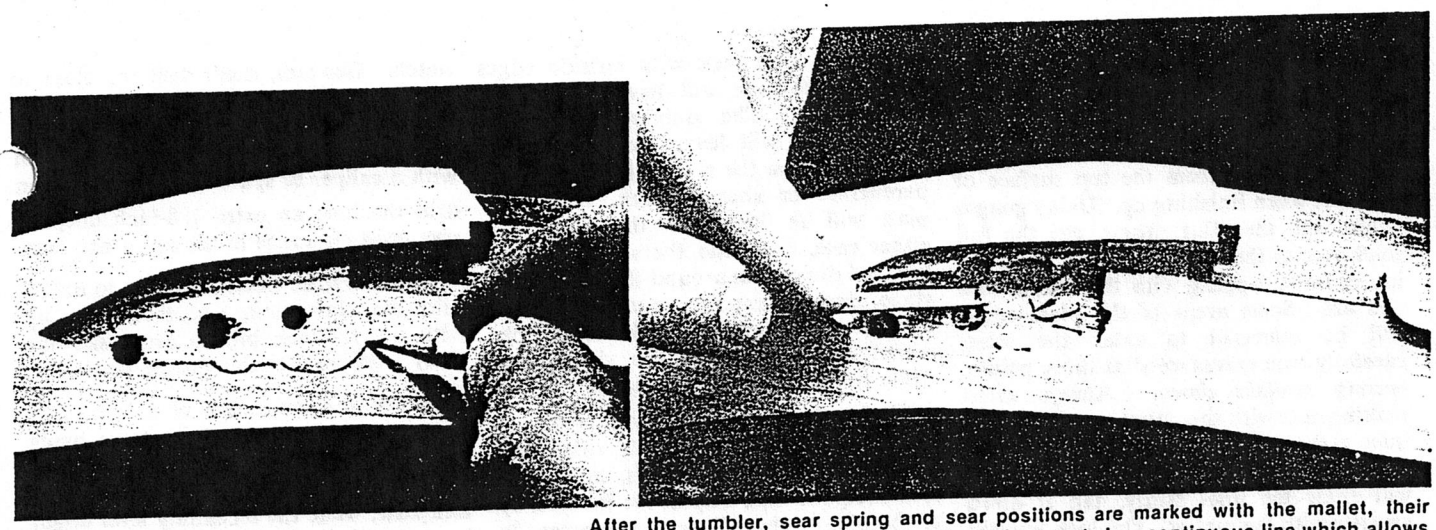
The percussion lock, with its attendant "plumbing" fixed to the barrel, is somewhat more difficult to position than a flint lock, since the lock must be oriented in such a way that the hammer falls on the nipple correctly and not at an angle. Generally speaking, the throw of the hammer — the distance between the center of the tumbler square and the nose of the hammer — should equal the distance between the center of the tumbler and the center of the drum or bolster. Inletting a percussion lock is simplified a bit if the upper edge of the lock has been left blank, without a cut for the drum, as most are. The lock can be positioned fore and aft with the drum in place; when the hammer appears to be visually in line with the nipple, make several pencil marks on the stock blank to indicate the primary location of the plate. The lock is then more easily inletted with the drum removed from the barrel. The half-round notch for the drum can be filed in the plate after the lock has been fully inletted. Where a bolster is used rather than a drum, however, as on a "patent" breech, the lock must be cut in the beginning to fit the underside of the bolster. In either case, it may be necessary after fitting the lock to bend the hammer nose to one degree or another so that it will meet the nipple correctly; this is best done with the hammer red-hot, since cold-working a steel casting is likely to result in a fracture.

Alignment of a flint lock is determined by the relationship of the pan to the vent area of the barrel breech. The vent should never be drilled until after the lock is inletted. Basically, the upper edge of the lug area of the lock plate should fall in the center of the side flat of the barrel, and the center line of the flashpan should be placed approximately 1/16-inch in front of the breechplug face. The lock can be set further to the rear if you wish to use gunstocker Don King's modified "Nock" system of coned breeching (see "Improved Breeching for Flintlocks," *Buckskin Report*, April, 1974, p. 23). Early stockers usually set the flint lock with the rear of the fence aligned with the rear edge of the barrel, but for quick ignition, it is more important to be certain that the pan is positioned in such a manner with the depth of the breechplug that the plug itself does not have to be grooved out to clear the vent, with the exception of the King breeching, where the breechplug face is opened up with a milled half-round cavity. In either case, and also with percussion locks, the lockplate should more or less parallel the barrel, rather than having the tail of the lock up or down, which will lend an awkward appearance to the finished gun.

After penciling position marks on the

To remove a minimum of wood, the internal parts of the lock should be inletted one level at a time, considering the inside of the lockplate the first level, the tumbler, sear spring and the forward arm of the sear as another, and the bridle as the third. This partially assembled lock with the mainspring and bridle removed is ready for second level inletting. Bivins uses a leather mallet to mark the position of the parts to be inletted; he is here marking the positions of the sear screw and tumbler axle. Bits of the proper size are then used to drill screw head clearance holes to full depth.





After the tumbler, sear spring and sear positions are marked with the mallet, their outlines are penciled in, combining these three parts in a continuous line which allows working clearance. These parts are then inletted to full depth.

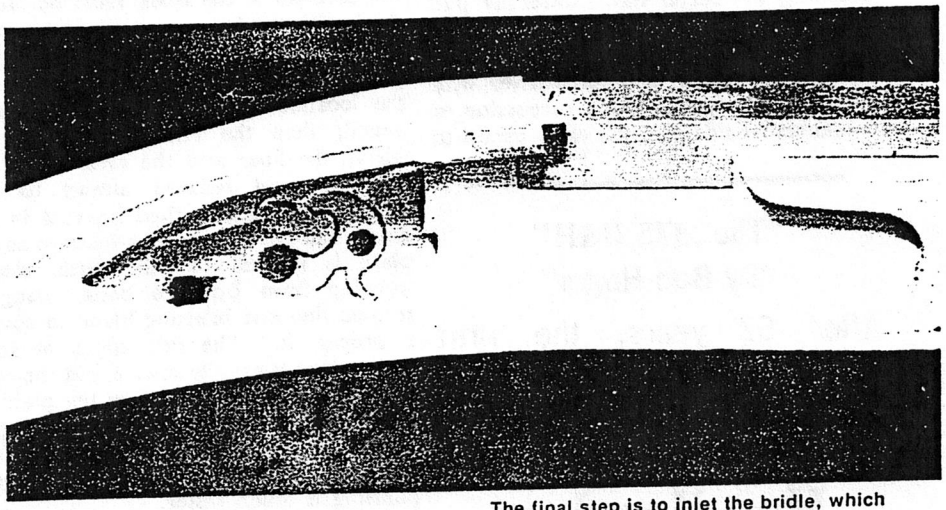
stock blank, the lockplate should be stripped for inletting. The frizzen may be left on a flintlock to provide a "handle" for levering the lock out of the mortise while inletting. I know one gunsmith who inlets the entire lock without removing a single screw, and does the job well, but I have found it safer to inlet in stages.

The lockplate lug, which projects deeper than the plate, must be inletted first. With a sharp scribe, scribe a line along the top and rear edges of the lug for a reference point, and then coat the lug with inletting black. Carefully setting the lug on the reference lines, "print" an image of the lug surface by rocking the lockplate back and forth slightly. If a sharp impression does not result at every edge of the lug from this process, you can hold the lockplate carefully in position and strike it sharply with a leather mallet; the resulting slight dent made by the lug leaves a readable impression.

Drive straight down along the lug lines, using a 3/8 flat chisel and leather mallet, keeping the bevel of the chisel always facing in toward the inlet. Don't attempt to drive much more than 1/16-inch deep in such outlining work, since the chisel causes a wedging effect and could cause a split along the grain of the stock blank. Make a series of angling cuts in toward the outline of the lug, and then remove wood between the lines with a small gouge and the flat chisel. Generally, the gouge is safest for removing a quantity of wood in a hurry. Where possible, make such "hogging" cuts across the grain.

Continue this process of driving down along the lug inlet with a chisel and relieving wood inside until the side flat of the barrel is reached, taking care not to drive the chisel into the barrel. Inletting chisels should have a bevel of twenty degrees, and it is relatively easy to chip the working edge. For this reason, carving tools should never be used as a lever to break away pieces of wood in the inlet, unless they are quite small.

With the lug mortise cut to depth, place the lockplate in position and tap it down with a mallet. The mallet plays an important role in inletting; if a part is to fit tightly in the wood, it must be lightly driven in place. If resistance is felt, pull the plate and lightly chisel away areas of the inlet where the sharp edge of the lug is pushing up wood. While the lock should fit snugly, it should not be forced in place.



The final step is to inlet the bridle, which has already been marked in and the impression clarified with a pencil. The completely inletted stock is shown on the previous page.

The lockplate now lies flush with the side of the stock blank. Using a sharp scribe — needle-sharp — strike a line carefully around the lockplate. If your lock is beveled inward at the inletting edge, try to strike a median between the inside and outside of the bevel. Flint locks usually don't have this inside bevel, though it is often used on percussion locks to facilitate close inletting.

Using a small gouge, cut a groove approximately 3/32-inch deep all the way around the inside of the scribed lines, keeping perhaps 1/16-inch from the lines. This "gutter" will assist in making the straight cuts around the lock outline, relieving the compression of the wood caused by the bevel of the chisel inside the plate line. The chisel's bevel tends to drive the chisel *away* from the inlet area, compressing the wood along the inletting line. The sharp corners of the back of the chisel can leave dents in the inlet which are unsightly, to say the least.

After cutting straight down with the flat chisel around the lockplate line — use a very narrow chisel or gouge of proper radius to cut in the "nose" of the lock — relieve approximately half the thickness of the lockplate, using gouges. Since most of your cuts will run parallel with the lock inlet, take care that the gouge does not pick up a particularly hard portion of the grain and lift too large a curl. With fiddleback-grained hardwoods, it's often better to push the gouge with both hands rather than using a mallet, since it's easier to control the depth of cut with the hands.

After relieving a half-thickness of the plate, use the chisel again to drive straight down along the inlet line. Take care not to undercut at this point, since you will have as much as 1/16-3/32-inch extra

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Lock Inletting

(Continued from Page 31)

wood to remove from the top surface of the inlet when finishing up. Using gouges again, and then flat chisels, cut the full thickness of the lockplate. Try the plate in the inlet, tapping with the mallet fore and aft. Some areas of the plate edges will be reluctant to enter the inlet; carefully trim excess wood at those points, *cutting straight down.* Always avoid making cuts with the chisel parallel to the inlet rather than at right angles. That invites trouble in a hurry. When the plate will enter the inlet stiffly, tap it down smartly with the mallet. The lock lug will now be within 1/16-inch or so of touching the barrel flat. Carefully pull the lock out of the inlet, using the frizzen as a lever, or levering between the lock lug and barrel with a thin screwdriver with file-rounded edges. With a percussion or breechloader sideplate it's often useful to screw the bridle screw into the lockplate from the outside to provide a handle, since a tightly-inletted lockplate should not pull out easily. With double-barrel sideplates, the mounting screw hole should be drilled through the stock to allow tapping out the plate from the opposite side.

Coat the backside of the lock with inletting black or linseed oil, tap the plate back in place for a "reading," and begin removing high spots in the inlet. After several sessions with this spotting-in, the lockplate lug should bottom out firmly against the barrel flat. Full contact between the lug and barrel is paramount, if the lock is not to leak fouling from priming or percussion caps inside the lock mortise and speed deterioration of the wood at that point.

If you started with a thickness of wood on the lock side of the stock blank slightly deeper than the thickness of the lock lug, the lockplate should now be slightly below the surface of the stock blank. With an early style flint lock with outside edges beveled, the lock will have a "buried" appearance. The finished inlet of a beveled lock will leave the entire bevel standing *above* the stock blank. With a percussion or shotgun lock, the entire plate will be flush with the stock. In either case, don't file the stock wood to finished dimension around the lock at this stage, since the extra wood may be needed to take subsequent minor dents or nicks which may appear on the sharp edge while inletting the lock's action.

While this technique will work as described for most sidelock rifles and some double-barrel shotguns, many side lock shotguns have a lip at the forward tip of the plate which slides into a recess in the frame. To properly inlet these plates, the surfaces of the stock must be almost flush with the frame — with just enough wood to take minor dents and dings. The plate can be eyeballed into position and the location marked with a soft, sharp pencil; then the relief channel is cut within the lines and the area inside the relief channel relieved almost to full depth. The plate is then inserted in the frame and the lip used as a fulcrum as the plate is inletted to full depth, slowly working from front to back, using a scribed line and inletting black to assure a proper fit. The side edges of such lockplates are usually square, but the rear is invariably beveled to allow the plate to be rocked into position without leaving a gap. By initially removing all but an eighth-inch or so around the edges, inletting is much faster.

With the sideplate, or plates, inletted to full depth, reassemble the lock, leaving off the mainspring. Before further inletting, the sear hole must be drilled. Stockmakers often make the sear hole twice the diameter it needs to be, but consider the fact that the sear hole penetrates nearly three-quarters the thickness of the stock at the wrist. Obviously, a small hole is desirable. Virtually all rifle-sized locks can be fitted with a 1/4-inch sear hole diameter, although muskets may require a slightly larger size. Holding the lock above the inlet, tap the tail of the lock with your mallet, leaving an impression of the tip of the sear in the lock inlet. Center punch this mark, and holding a 1/4-inch twist bit on the mark, see that the drill will cut almost to the bottom edge of the lockplate inlet, since the sear must drop considerably to engage the half-cock notch. However, don't drill *too* close to the edge of the inlet. Drill the entire depth of the sear, taking care to drill as straight as possible. Check your depth with a caliper or spare drill bit, and then drill the hole an extra 1/8-inch deep to give good clearance to the tip of the sear.

In softer stock woods, it's best to drill a pilot sear hole first, and then open up with the 1/4-inch bit, to avoid skewing away from your center punch mark.

In inletting the action of a lock, it is best to visualize the lock parts as being assembled on three levels. The primary level is, of course, the inside of the lockplate, while the secondary level might be considered the tumbler, sear spring, and the forward arm of the sear. A third level might be the bridle.

An easy way to inlet the action is to inlet these different levels separately. Remove the bridle, but replace the sear with its attendant sear screw. Placing the lock in the inlet, give the outside of the lock a solid smack with the mallet, leaving a good impression of the sear screw in the wood. Selecting a twist bit of a diameter very slightly larger than the head of the sear screw, first center punch the impression of the screw head, and then drill to the complete depth of the screw — the distance between the head of the screw and the inside of the lockplate. Similarly, set the lock back in the mortise, and tap in a mark for the tumbler axle, and then drill it to depth. A vernier caliper is helpful as a depth gauge. Placing the lock in the mortise once again, give the plate another solid thump, but take care now that the lock is level in the mortise, or the sharp edge of the plate may strike the plate inlet at some point and break the wood. By a few judicious

blows, and perhaps a bit of spotting oil, you should have now an impression of the tumbler, sear spring and spring screw, and sear. Using a pencil, connect the outer edges of the impressions of these components together in a continuous line, and inlet them to their full depth, inletting closely above and behind the sear spring and below the sear. Then set the hammer or cock at full-cock, and holding the lock in the mortise, tap the lock again to indicate in the stock wood the full travel of both the tumbler and sear. Remove wood from your initial cuts so that these parts will just clear during movement. Working the hammer should result in positive clicks as the sear falls into the notches.

With this accomplished, re-install the bridle of the lock, and using the mallet treatment, make an impression of that part in the wood. Oil may again be necessary for a clear reading. Inlet the bridle as precisely as possible with a small flat chisel. The smaller tips of the bridle must at times be "worried" out with a rocking motion of the chisel. The bottom of the bridle inlet will be rough, despite your best efforts, but this can be cleaned up with small scrapers and by burnishing the wood with the tip of a pin punch with a slightly rounded nose. The bridle should bottom out against the stock wood, in addition to every possible area of the lockplate, to assure full support.

The mainspring may now be installed, and inletted in the same manner as the action components, using narrow chisels and small gouges. Remove no more wood above the lower arm of the spring than is necessary for full travel of the spring. When inletting a lock in a stock blank that is fitted with a large-breeched barrel, take care not to cut the mainspring mortise through into the barrel inlet. However, when both the mainspring and barrel are quite large, it will be necessary occasionally to actually remove metal from one of the bottom flats of the barrel so that the spring can clear. This is preferable to decreasing the width of the spring, and can be done easily with a cape chisel after marking and removing the barrel.

When inletting a flintlock, you will find that the cock begins to bottom against the upper edge of the plate inlet when the lock action is only half inletted. With the cock at rest, scribe around the cock, and cut a groove in the stock for the upper part of the cock to clear without binding on the wood.

With the components inletted, work the lock to make sure that nothing is binding. Add a slight amount of extra clearance around moving parts to insure that humidity changes don't bind the lock by swelling the wood. If parts do hang up a bit — the sear and mainspring are usually the offenders — spot the parts with oil and remove wood where necessary. The extra wood which you left outside the lockplate inlet may now be taken off, filing flush for a percussion lock, or leaving the bevels standing on a flint lock of Germanic persuasion. Remove this wood with a new and sharp cabinet rasp, and avoid taking strokes at direct right angles to the lock inlet, to avoid crumbling wood on the inside surfaces.

Holes for the lock bolts, or "side nails" as our English cousins call them, are best drilled from the lock side. The safest method is to center punch the screw hole both in the lockplate and on the opposite side of the stock as well. Set a small center point vertically in a drill press vise, and align the point with the tip of a twist bit in the drill press chuck — use a pilot drill half the diameter of your tap drill — clamp the vise solidly to the drill press table, and then set the rifle stock over the table so that the center point rests in the punchmark on the left side of the stock. Proceed with your drilling slowly, and you will be assured that the drill will come out exactly where you want it to. After drilling the pilot holes, drill through with the tap drill, using a hand drill. Then remove the lock and drill the stock with the clearance drill, and you are ready to tap the lockplate for the thread of your lock bolts. In larger locks, a 10-24 thread is preferable to avoid stripping.

It's wise to drill your ramrod hole before drilling for the front lock bolt, if your lock is a flintlock (percussion locks seldom use two lock bolts). If your ramrod hole rises a little high, the front lock bolt can be positioned above the centerline of the plate, and the screw even notched slightly to clear the rod if necessary. If the ramrod hole rises above the centerline of the lock, however, you may have to leave off the front lock bolt, and possibly resort to a steel "hook" riveted inside the nose of the lock, engaging a mortise in the wood. Locks of double-barrel flintlock shotguns were commonly fitted in this manner, and no small number of single barrels were given the same treatment when the ramrod hole ran off too much to clear the front lock bolt.

The final inletting of a breechloader will, of course, differ from the muzzle loader we've described here, but only in detail. The same principles are applicable in all cases; for instance, a detachable trigger plate and lower tang, as found on some double-barreled guns, is inletted in precisely the same manner as the side lock for such guns, angling the piece into wood if it has a lip under the forward edge. The main thing is to study the design, do the inletting work in layers, and at no time remove any wood that doesn't have to be removed — this is most important on any thin-wristed muzzle-loader or modern double, but it can be absolutely critical when inletting a drilling, with its complex and sometimes cumbersome lock mechanism.

Inletting a lock by this meticulous method is far more time-consuming than simply hogging out an open cavity in the side of the stock, but the finished job will give you a feeling of pride from a job well done, even if no one ever sees it but you. And you can be assured that you have left maximum strength in your stock by not having removed a single splinter of wood unnecessarily.

John Bivins