

How to build Your own wheellock- rifle or pistol

Edited by Georg Lauber

The wheellock rifle or pistol ranks among the most coveted of collector's prizes because it represents one of the oldest of firearms systems and because the few specimens that have survived three centuries or more are generally the highly ornate pieces originally possessed by nobility. Conditioned as we are to the image of such decorated versions we must realize that, by far, the bulk of the wheellock guns produced were simple, plain and functional weapons, just as most of the firearms sold today are regarded as "field models." We are therefore concerned here only with clean lines and basic construction of the "field model" wheellock - the unadorned version that has a unique and simple beauty of its own. Those skilled with the carver's or engraver's chisel may, of course, wish to elaborate on our plan, and should be encouraged to do so, but we leave the form and pattern of such artistic pursuits to the individual's taste and judgement.

By way of background information, the wheellock was invented by Kiefuss in 1517. Historians disagree on where he was at the time: some claim he was in Vienna, others state that Nuernberg, Germany, was his base of operations. In view of the fact that most wheellocks were produced with components from Nuernberg, Augsburg, and Suhl, Germany, Nuernberg appears to be correct.

Produced in great numbers, the wheellock survived for more than 250 years in the German language area and, if the flintlock were not so much easier to produce, it may have lasted even longer because many shared the opinion that its ignition system was superior to that of the flintlock. Though a bit slower, it was considerably surer. (The flintlock failing to fire on the first attempt was obviously slower still.)

In contrast to the flintlock, whose frizzen remains stationary until struck by the flint-loaded hammer, the wheellock is made with a hinged hammer that is positioned by hand to contact the spark producing wheel. This is accomplished by sliding the pan cover forward and lowering the hammer into the powder-charged pan. The wheel is operated via a spring which must be "wound" for each shot (a small wrench is provided for this purpose).

Because the wheel is cut into the lower wall of the pan, to meet the hammer that descends from above, the sparking action takes place inside the pan and within the priming charge. With the flintlock, by comparison, sparks occur as the flint makes contact with the frizzen and are thrown down into the pan.

The mainspring of the wheellock is linked by means of a small chain (page 27) to the squared spindle that accepts the winding wrench. An ingenious locking device (page 28) provides for a safe catch which, surprisingly, is more easily operated than the sears or pawls of other systems.

Incidentally, flint is not employed in the hammer jaws of a wheellock as it is in the flintlock. Instead, the wheellock is sparked by means of a piece of pyrites (sulphide of iron).

Except for the differences above noted, the loading and firing of the wheellock is comparable to that of any other muzzle-loading firearm, the charge consisting of an appropriate powder charge and a patched ball.

This text was prepared to answer the demand of wheellock enthusiasts who could not afford the inflated five-digit figures that original specimens invariably command as well as to provide a shootable wheellock for those who would not be inclined to use an original piece if it were available. The models we have selected are two that best typify the field model guns of the 17th century. These are easily produced, plain of line and somewhat simple in construction. Their beauty stems only from their purely functional appearance.

It was felt, too, that the successful construction of such a piece would yield greater satisfaction than could be derived from a more ambitious attempt with an elaborate model - one that would be highly likely of falling short of the goal. It is the execution of detail that makes or destroys a handcrafted product; this thought also influenced our decision to choose models that would stand up to critical examination.

Realizing that there would exist considerable latitude in the knowledge and skills of our readers we likewise had to consider methods of presentation that would be within the comprehension of the least trained craftsman: for this reason we show only basic dimensional values. Tolerances and allowances have been omitted, and angles are included only where handily measurable. It is therefore important that one works in proper sequence, i. e. creating one component and fitting it to those that preceded it before going on to the next. In this fashion small adjustments can be made as the work progresses and cumulative errors are prevented.

With respect to precision, it must be remembered that in original antiques only the firing or functional components evidenced any real standard of uniformity. Consequently, our tolerances will generally fan within .007" to .012" a range easily compensated for in the fitting of the subsequent assembly. Nevertheless, the patience, care and precision you employ will do

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much to circumvent late-stage assembly headaches.

Basically, the production of a working wheellock is not unusually difficult, nor does it require a great deal of sophisticated machine tools, though a drill press, lathe, grinding wheel and welding or acetylene outfit would simplify and speed up some processes. Three hundred years ago wheellocks were made only with handtools. Those who have some skill with chisels, files, etc., can do a creditable job by the same means today. We cannot, however go so far as to suggest that the work be attempted on the kitchen table.

One component, the barrel, is best purchased in finished form and cut, shaped and polished to the dimensions given. Those equipped with barrel-making machinery however, can work from a blank if they so desire, again, following the dimensions given. We'll discuss the barrel in greater detail a bit further on.

PART I

LOCK PLATE ASSEMBLY

The material for this component should be a soft grade of band steel or a comparable piece of sheet metal measuring about 3/16" in thickness.

Brass can be substituted but supplementary fittings should then be of the same material.

Soft steel is stressed simply because this part requires considerable contouring. If the material you select proves too hard it can usually be softened by heating to about 700°, letting it cool naturally.

Contouring can be accomplished by tracing the pattern of the lock plate from our drawing. Machinists would coat the surface of the metal with masking color, however, it is easier to cut a template from the traced pattern, glueing same to the work surface. In this way, the locations of the screw holes are also correctly indicated. Protect the face of the template throughout the shaping process, especially when clamping the work in a vise. The finished sizes of the holes are shown on page 19 and their positions can be confirmed from the drawing on page 18. It is not a good idea to drill to finished size and tap the holes in two steps. Instead, drill smaller pilot holes first, and bring them to size with subsequent drilling. This will not only give you a chance to double check the accuracy of your hole positions, it will also result in cleaner holes and perfectly formed threads.

Incidentally, after contouring and drilling, the plate can be used as a jig for shaping additional plates.

In filing the outer contour of the plate, most gunsmiths would introduce a slight face to back taper to facilitate inletting into the stock and to prevent any sloppy gaps that would result from an unintentional reverse of this taper.

To complete the lock plate parts 1.1, 1.2, 1.3 and 1.4 are required; construction in this sequence is desirable.

PART I.1

LOCK COVER

This is also shaped from soft sheet metal and fastened to the side of the lock plate, per drawing on page 22. The joint can be welded or brazed though copper-brazing is most representative of the technique employed by medieval wheellock builders.

PARTS 1.2 and 1.3

MAINSRING BRACKET AND BEARING BOX

These are likewise made from soft flat stock in accordance with the drawings, though experience has shown that it is best to postpone the drilling of the holes until that particular stage of assembly is encountered. Both parts should be bored simultaneously when fitting them to the lock plate. The tenons provided are inserted into their respective holes in the lock plate and riveted in place (by hammering) before subsequent soldering. The same procedure would apply when joining part 1.4.1 to part 1.4 rivet and solder. (See page 21.) After cleaning the soldered joints, the lock plate lacks only the holes for completion and may be prepared for finishing.

For a professional finish take pains to maintain sharp edges and straight lines during polishing operations. Use a very light touch when taking off razor edges.

While some will undoubtedly wish to blue or brown metal components, many prefer the clean look of simple polished steel. Do not attempt to create a roughened or "antiqued" appearance because this invariably results in an amateurish effect.

PART 2 *BRIDLE ASSEMBLY*

This sub-assembly is comprised of parts 2.1, 2.2 and 2.3 which are joined by welding or soldering, according to the drawings shown on pages 23 and 24. It is best to postpone the drilling of the hole in part 2.1 until one reaches that particular stage of assembly. In this way any misalignment is easily corrected.

When ready to fit part 2 to the lock plate, drill and tap for the anchoring screw with a # 29 drill (.136" dia.) and tap for NF# 8 - 36.

Next, drill the lock plate with a pilot hole for the spindle. The pilot should measure about 11/64" and be subsequently enlarged to .394" (25/64" and filed to fit.)

PART 3

SPINDLE

This component requires a temperable material since repeated use can result in damage to a nonhardened square configuration. A material such as Brown & Sharp's AISI Type-01 "Ready Mark" ground flat stock would be a good choice and this could be heated to approximately 850' C (after shaping) and tempered by rapid quenching in oil. At 850' C, incidentally, such a steel would acquire a bright cherry red color in subdued artificial light. So, if you lack the means to measure the temperature, work by color.

A lathe is most helpful for shaping the spindle because the two spindle bearings should be exactly dimensioned and concentrically aligned. Careful work here greatly smoothens the action. It is possible, however, to produce this part in a drill press if one is a competent craftsman.

Original spindles - from antique guns - have a slotted recess to accept the winding chain, per diagram at the top of plate 9. This arrangement, however, requires a great deal of skill and a lot of careful hand work. It is far easier to produce a simple passage bezel as shown in cross-section B-B (scale 2: 1) at the lower half of plate 9.

With a passagebezel, drill a .157" hole and file to finished size with a small, square file.

PART 4

MAINSRING

(NOTE: The cock spring and mainspring are best made simultaneously. See Plate 19.)

One of the most difficult components to make for the wheellock is the mainspring because proper tempering requires some care and knowhow. Shaping the spring (from suitable stock) should not pose a problem if one takes care to select a material having appropriate spring qualities. This is best accomplished by visiting your local auto junkyard, looking for a single leaf of an automotive flat spring. So little of this material is required for your project that it is unlikely that you'd find it economically feasible to buy a small portion from a metals dealer.

Cut your leaf spring to rough length (7") and width (.725") in accordance with the drawing on page 26. Then file to finished width by stroking longitudinally. Don't cut to finished length until you've completed the bend. This is accomplished by heating the stock to a bright glow and forcing it around a rod or bar of about .200" diameter until both wings are properly angled. After slow cooling, cut the upper shank to finished length. Now push the raw spring over the spring bracket of the lock plate, against the stop, and mark and drill the mounting hole.

The lower shank is also formed by heating and forging around an appropriately dimensioned rod. (An easily made sheet metal stencil would help here.)

In the assembled state, when the spring and bridle are installed, the slightly tensioned spring should contact the bracket of the bridle.

Tempering is accomplished next by heating the shaped component to 800-830' C, corresponding to a bright cherry-red graining color, and rapid quenching in oil or water.

After tempering the spring is still not ready for installation because it would break quickly when stressed. It has to be annealed to gain durability. Annealing is accomplished by re-heating the spring to 470' C and quenching it in oil or water. This particular temperature is difficult for the untrained technician to detect so we strongly recommend the employment of annealing colors which are supplied by machinist's supply houses. (Bob Brownell's Main & Third Streets, Montezuma, Iowa, 50171, can probably supply these colors if you are unable to find them locally.)

At 470' C the material will start to glow in dark surroundings, if you are inclined to try the by-guess and by-gosh method.

Those hobbyists who regularly attempt springmaking generally attempt several at one time; if one breaks they can try another. It is a good idea, too, to have a few spares handy.

When the spring (or springs) are properly annealed they require only some edge polishing for completion. Wrap a strip of medium grit emery around a flat file and treat the edges lightly.

These spring-making procedures should also be followed when producing the cock spring shown on page 35.

PART5

CHAIN

The chain provides the link between the spindle and the mainspring and is diagramed in plate 11 on page 27.

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This component is best shaped from a temperable material although it can be formed from a cheaper grade of soft steel. Comprised of six links and four pins, the chain has four outer links and two differing inner segments. Make up five pieces per figure 5.1 and one piece per figure 5.2. One piece (5.1) is used to join the other four together and part 5.2 is fastened to one end.

There are two important considerations in making the chain; first, the pin holes of the inner links should be approximately .002 " larger than the holes in the outer segments to facilitate easy coiling and free travel. The second, is that the length of the chain must be adjusted carefully so that it is fully released when the mainspring is backed against its stop.

After shaping the segments, chamfer the exterior edges of the pin holes in the four outer units to allow for the head-spread of the pins.

For pins one can use spring steel wire, steel nails, the needles of an old needle bearing or the cylindrical split pins commonly stocked by supply houses. To form rivet-heads on the pins, heat them first and peen them lightly after inserting them thru the links.

When adjustments for length are required, make them in the last anchor bar of the chain. Select pin and hole diameters carefully to avoid binding.

We're now ready to progress to parts 6, 7, 8, 9 and 10 - the sears, arm and springs of the firing device.

PART6

SMALLSEAR

Almost any form of flat stock can be used here and surface hardened after shaping and fitting. See plate 12, page 28. All dimensions can be taken from the drawing.

PART7

FLASH PAN COVER ARM

Plate 12, page 28; the arm can be made from a soft flat stock, shaped as indicated. The larger hole, in the heaviest segment of the arm should be drilled to permit passage of an 8-36 screw; hole diameter approx. 9/64" or 28 drill. The , smaller hole, in the long extension is drilled to 1/16" as is the hole in the pan cover (fig. 13) . No hardening is required for this part.

PART8

MAINSEAR

This part is operated by the small sear (part 6) and should be surface hardened after shaping. Original wheellocks were made with a detent engaging a corresponding latch hole in the wheel when locked. We've omitted the detent here and replaced it with a hardened steel ball of .220" to .230" diameter. This was done not only to simplify production but to smoothen and strengthen the action. Experience has taught that a detent on part 8 is not only extremely difficult to fit properly but also highly vulnerable to breakage. Since using the ball method we've had no trouble in this area. In assembly operations, after all other parts have been fitted to the plate, the ball is simply dropped into the second largest hole in the plate and the nose of the sear (part 8) is laid over it.

If you should have difficulty getting a steel ball of correct size (from an old ball bearing) get a slightly larger ball and simply enlarge the lock plate hole. When doing this, however, it may be necessary to remove some material from the nose of the sear.

For the pivot of part 8 use an # 8 - 36 screw and make sure the sear pivots freely around it. If you thread this screw yourself (the best method) only thread the lower engaging surfaces and leave a smooth shank in contact with the sear.

PARTS 9 and 10

SEAR SPRINGS

These are light springs made from common watch-maker's stock. Select a thin material and work for a soft action because too much tension can interfere with functioning. Both springs are to be bent into a leaf pattern as shown in plate 13, page 29.

PART11

WHEEL

This is the key part of the wheellock, the ignition device that quickly spins against the pyrites to produce a spark in the flashpan. Obviously, the wheel gets a lot of rugged use so it must be made well, accurately dimensioned, and meticulously hardened. Follow the plan shown on plate 14, page 30, and use a good grade of temperable steel.

A lathe is recommended for shaping this piece although a skilled craftsman should be able to do a creditable job with a drill press if he employs a good cutting tool in an appropriate tool holder providing a slow feed.

The small round hole, near the outer periphery of the wheel (see top of plate 14) is designed to receive the ball detent we spoke of earlier under part 8. This is a blind hole cut into the inner or hidden surface of the wheel and should be the same diameter as the second largest hole in the lock plate. For this reason it is a good idea to finish the unhardened wheel, fasten it to its spindle and the lock plate, set the wheel in the cocked position and drill the detent-ball-hole thru the plate and into the wheel at one time; correct alignment would then be assured.

The cross slots cut into the perimeter of the wheel, at right angles to the V-grooves, are almost insignificant in the drawing but are highly important to functioning. These should be cut deeper than the radial grooves by at least .005".

To find the cocked position of the wheel, install the mainspring and chain, wind the wheel until the spring is fully compressed, and mark the position of the wheel against the lock plate.

The fully shaped wheel should then be hardened by heating to 850° C and oil quenching.

PART12

POWDER PAN

Plate 15, page 31; this component may be made from steel or brass - the latter has more corrosion resistance and is easier to shape.

The inner bottom wall of the pan is hollowed to hold the priming charge of powder adjacent to the flash hole in the barrel. This hollow is best created by drilling a 3/8" or 25/64" hole in the center of a piece of flat stock and subsequently cutting the stock almost in half before going on from there. (Good hand files come into their own in shaping the pan.)

The most critical phase of shaping the pan is encountered when slotting the lower wall to accept the wheel. Save this job for last.

When ready, mount the wheel and spindle to the plate and take the finished but unslotted pan and rest it against its bearing surfaces on the lock plate. By spinning the wheel counterclockwise against the lower face of the pan you can score the pan in such a way that a precision cut is easily accomplished. Work slowly and carefully when doing this because you must get a very close fit between the wheel and the pan to prevent the spillage of powder. When the pan has been scored it is possible to mike the width of the wheel and drill a couple of pilot holes in the pan that are slightly smaller than the wheel dimension. For the best possible mating of these two parts, the pan should be cut to match the Vgrooves of the wheel.

When the wheel is sufficiently hardened, it is possible to use it as a cutting tool by spinning it counterclockwise with a reversible drill. (A good cutting lubricant would also be required and some preliminary channelling is recommended.)

The finished pan, when installed, should not restrict the motion of the wheel - check this carefully.

PART 13

SLIDING PAN COVER

Plate 16, page 32; this consists of parts 13.1 and 13.2. At first glance this component appears to be rather complicated. Actually, it consists only of a rather flat plate which is shaped and joined to the knob-like upper appendage that serves as a finger gripping surface.

Use a soft steel miking about 1/4-inch in thickness. Cut and shape as indicated. Join the two parts by welding or brazing. Because this unit is not subjected to any heavy pressure, it is also possible to silversolder the two segments.

When the pan cover has been completed, arrange it over the pan and check to see that it does not bear against the side wall of the barrel. Then drill it to accept the pin that will join it to the pan cover arm, part 7.

If you used a 1/16th inch hole in the upper extension of part 7, it would be best to drill the pin hole in part 13.1 a bit smaller. However, drills of .058" or .059" are not readily available so you may be forced to drill this hole to the same size (.0625"). In this case, polish a 1/16" diameter pin so that it is a bit undersize at the opposite end. The important thing to look for here, is the free swiveling travel of the arm within the slotted recess of the pan cover. Yet, the pin has to be sufficiently large at one end to anchor tightly in the cover plate.

Be sure to use a good quality smooth pin for this assembly.

PART14

COCK ASSEMBLY

This consists of parts 14.1, 14.2, 14.3 and 14.4, per plates 17 and 18 on pages 33 and 34.

Use a soft, workable steel stock for each component; shape as indicated, and join by welding. Roughen the inner surfaces of the cock jaws to hold the leatherwrapped pyrites.

Though not essential, it would be desirable to harden the lower spur of the completed cock when assembly is completed. This can be done by wrapping the upper portion in wet rags, heating the spur quickly and quenching it in oil or water. Heating the entire cock may distort the alignment of the bolt holes and threading.

Bear in mind that your 1/4 x 20 inch bolt must pass freely through the upper segment of the cock jaw and that it is threaded only into the lower jaw. The channel cut in the lower jaw will serve to guide it on the upright arm (14.3) that supports the upper jaw.

Further instructions on this assembly will be found on plate 17, page 33.

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PART 15

COCK SPRING

This can be made in the same manner as part 4 which was described earlier and which is diagramed in plate 10, page 26. Only the dimensions differ and these can be taken from plate 19, Page 35.

PART 16

COVER PLATE

This unit anchors the base of the cock spur and the eye of the cock spring to the lock plate. The two #8x36 NF screws should pass freely through the cover to anchor solidly in the pretapped holes of the lock plate. For this reason drill both holes in the cover plate with an 11/64" drill and use round-headed screws for the job. Bear in mind that the cock spur should rotate freely around the shank of the cover plate screw, so it is best to use a screw that is threaded only at the end where it fits into the lock plate, the balance- - - to the head- - - should be smoothshanked. If necessary, polish the shank slightly to bring it under the 11/64" diameter of the cock spur hole. See plate 19, page 35.

PART 17

LOWER WHEEL GUIDE

This is simply a guide that prevents any cambering action of the wheel in motion. Follow the drawing in plate 19, page 35. Shape from a soft steel and rivet to the appropriate hole in the lock plate (after mounting the wheel in position.)

With the completion of the lock assembly there remains only the stock, trigger and barrel to complete the project. Therefore, we'll interrupt the parts number sequence of the text to discuss the final phases as they should be completed. For example: the barrel should be finished before any work is attempted on the stock. Upon finishing the barrel we'll go on to discuss the stock and stock fittings.

PART 22

BARREL

See plate 29, page 45. The barrel we have selected is a 14 mm (about 55 caliber) but caliber or bore size is really not important. You can use most any bore size that interests you. Nevertheless, you should realize that our breech plug is dimensioned for the 14 mm bore and that any change in caliber will necessitate an appropriate change in the breech plug. It also should be noted that original wheellocks were smooth-bored firearms but, unless you're attempting to produce an authentic reproduction, there's no reason why you cannot or should not use a rifled barrel. Certainly, from a performance point of

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view, the rifled barrel would have to be superior.

There are some sources that will supply octagonal muzzle-loading barrels and you would probably find it convenient to simply order a finished barrel from such a supplier. In most instances these would come with a fitted breech plug.

Write to any of the following listed distributors:

The Armoury, Inc.
Route 202
New Preston, Ct. 06777

Centennial Arms Corp.
3318 W. Devon
Chicago, 1111. 60645

Dixie Gun Works
Union City, Tenn. 38261

Numrich Arms Co.
West Hurley, N. Y. 12491

Gun & Machine Shop
Route 1
Ironton, Ohio 45638

Sharon Rifle Barrel CO. Box 106

Kalispell, Mt. 59901

At this point, too, you'll have to decide whether you want a wheellock pistol or rifle.

For the rifle model you'd need a finished barrel measuring 26-inches. For the pistol, the barrel measures 15 3/4".

The barrel design we offer on page 45 describes an octagonal barrel measuring .866" in width and our stock drawings have barrel channels designed to accept this dimension. If you change barrel sizes, for whatever reason, be sure to make appropriate changes in the barrel recess of the stock.

With thinner barrels you'll have to be sure you have sufficient wall thickness to allow for the dovetails we've planned for mounting. (See parts 22.2 on plate 29.) Safety is the prime consideration here, therefore you may have to eliminate the dovetails and simply braze the lugs in place at right angles to the lower wall and in line with the axis of the bore.

Proper fit of the breech plug is of paramount importance because this little component resists the rearward pressure generated by the charge. Undersized plugs, poor threads or a sloppy fit can quickly turn it into a missile. Make sure you use a thread size that gives you plenty of engagement and that the barrel walls are adequately heavy after threading, to eliminate the possibility of a rupture. Our own formula for this is a thread offering 14 to 18 threads per inch and at least a half-inch of depth engagement.

When installing the breech plug, sock it down tightly with a heavy wrench. It's a good idea, too, to measure the depth of the breech plug before final installation so that you'll know where it ends when later attempting to drill the flash hole. It may be necessary to angle the flash hole towards the muzzle in order to clear the plug and gain access to the bore.

The breech plug we've designed for our .55 caliber is shown on plate 23, page 39, and consists of plug (23.2) and tang extension (23.1) commonly referred to as a "breech plate." We show a simple sleeve with a screw connection but a squarish lug would be more desirable to join the plug to the plate.

Because the flash hole must be exactly located no attempt should be made to drill it until after the barrel and lock are fitted to the stock. In effect, this is the very last operation of the project.

Finally, as regards the barrel, rifles should be made with gently tapered octagonal barrels measuring .866" at the breech and .710" at the muzzle. Such a taper results in better balance, a more authentic replica and a decidedly more attractive appearance.

PART 18

The stock for a pistol is shown on plate 30 page 46. The rifle stock is illustrated on plate 32 page 48.

Having decided whether you want a rifle or pistol, examine the appropriate stock drawing carefully to ascertain which fittings you'll need because they're not the same for both models. The same trigger is common to both but you'll find a butt cap on the pistol stock that is not employed on the rifle.

The beauty of the stock will greatly influence the overall appearance of the finished model. A suitable and, perhaps, decorative hardwood blank is much to be desired. Look for a blank of maple or walnut. Many original wheellocks were also made with stocks of cherry or beech wood.

The blank you elect to use should be kiln dried to contain no more than 8 or 9% moisture. Some figuring in the grain will add to eye appeal but there should be no checks or cracks indicating too-rapid drying. The rough planed blank for the pistol should measure at least 2"x5 1/4"x24" and the rifle blank, 2 " x 8 " x 41 ".

Lift the contours of the stock from our drawings with tracing paper or draw them directly on the smoothed surface of the wood with carbon paper. It would also be a good idea to make up some cross-section templates from the patterns we've included below each stock drawing.

The blank can be profiled on a band saw; with this completed go on to straighten the top line (where the barrel is to be set in) and sand it smooth to facilitate outlining of the barrel contour. Position the barrel carefully, scribe the lines - - - taking care to mark the channel a bit narrower than barrel width. Make sure, too, that the barrel is positioned at the breech end to leave adequate room for the lock assembly. Check dimensions carefully at this point. A routing tool will greatly simplify the cutting of the barrel channel but one skilled with hand chisels can also do the job well if he works carefully.

With the barrel in place, mark the locations of the mounting holes and cross pins. Stock fastening pins should be made from round stock.

Next, inset the lock plate so that the flash pan is in contact with the barrel. The flash pan cover, however, should have the freedom to slide back and forth. The lock plate should rest on the four support lugs provided in the lock recess.

Total inletting depth, for the lock, is dependent upon the size of the internal lock components so it's a good idea to measure the various width dimensions of the assembled lock before starting work; then put some spotting color on the inner surfaces and mark its location in the wood by simply pressing the lock and stock together. Only in the area of the trigger will you have to make a special allowance for the thickness of the trigger lever itself.

With the lock plate mounted, drill the holes for the lock anchoring screws.

A tang screw, passing through the breech plug plate must be angled to bypass the lock mechanism. This, then, requires a vertical hole angled towards the left as you sight the firearm. Sight this angle carefully because the head of the screw should appear only slightly off-center in the area to the left of the trigger. After the hole is completed, through the breech plate and stock, clamp the barrel to the stock and thread the hole in the breech plate by inserting the tap from the direction of the screw head.

PART 23

RAMRODS

This is shown on plate 31 page 47. The pistol ramrod measures from 15 1/2 to 15 5/8ths inches, when finished. It is also fitted with a brass cap on one end which is glued and pinned securely to the turned-down tip of the wooden rod. Wood and brass in the ramrod is preferred over a steel rod because the latter has been known to cause sparks at inopportune times.

The rifle ramrod is made by similar means though it no doubt requires an especially durable piece of doweling. Cut to 26-inches in length and adjust the length after assembly so that the ramrod does not protrude beyond the muzzle of the barrel. (NOTE: Finished ramrods are readily purchased from some of the suppliers mentioned earlier.)

PART 20

TRIGGER LEVER

This is also made from soft steel and fitted with a thin piece of watchmaker's spring material. (See plate 22 page 38.) Drill the upper extreme of the trigger as indicated and be careful to locate the trigger carefully in the stock to accept a simple wood screw pivot. .

The spring segment should be snugly riveted to the opposite end of the trigger and soft-soldered securely in place.

PART 21

THIMBLE

This is a guide and holder for the ramrod and can be made from a piece of brass tubing. A small hole drilled into the center (Through one wall only) can be cut with a # 43 drill (.089") and tapped for a # 4-48 screw. See plate 21 page 37.

After profiling and iriletting the barrel and lock, the stock may be contoured with chisels, a draw-knife, rasp and files. After shaping scrape the wood with a piece of glass before final sanding.

The fully shaped and sanded stock can now be fitted with the trigger lever, trigger guard and ramrod. See plates 21 and 22 (pages 37 and 38) for the guard and trigger lever. Ramrod specifications will be found on the plates showing the stocks.

PART 19

TRIGGER GUARD

This can be made from common soft steel or from a piece of brass (which is more decorative.) Simply bend to the contour shown in plate 21 and drill for the two wood screws.

PART 18.2

PISTOL STOCK BUTT-CAP

This is a decorative butt cap typical of the type found on original wheellocks. It can be made from thin sheet brass, silver, or steel. Shaped somewhat smaller than butt size, the stock should be inletted a bit to receive it. After fitting, the stock can be filed and sanded to create a smooth stepless joint between the two.

Before starting work on the butt cap examine the butt view of the stock as it is shown on plate 30, page 46. This view also serves to outline the shape of the cap. Immediately above this drawing, mounted on the butt of the stock, is a side view of the butt cap.

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When using thin sheet metal it is necessary to draw the metal or, form it in a reverse-countoured home-made die, or, fashion it by peening it to the contoured butt. If any of these methods are employed, a pin should be brazed to the inner wall of the cap to pin it securely to the wood. Glue, too, must be employed to fasten it securely. An easier process, by far, is the shaping of the cap from a solid block of metal, cutting the butt flat, and simply fastening the flat surface of the cap to the flattened butt. When doing this, cut the cap a bit smaller. Proper wood shaping will then result in a professional union.

PART 18.3

MUZZLE CAP

This, described in plate 20, page 35, is a comparatively simple component.

The material used for the butt cap should also be employed here for appearance purposes. Model as shown and fasten it to the stock by means of a small wood screw. Some slight inletting is required to set it into the wood.

Now that you've completed work on all of the components there remains only to finish the stock, drill the flash hole and assemble the completed wheellock.

STOCK FINISHING

Sand the finished stock with a fine grit of garnet paper. Be sure to sand with the grain and work to achieve a glass smooth surface.

Next, paint the entire stock with a thin mix of water and alcohol, mixed about half and half, and force dry over the flame of the stove. This will cause "whiskering" ...raised small fibers of wood. Sand them off with extra fine garnet and repeat the process until the wood refuses to whisker any further.

Now, color the stock with a pure oil stain (no sealers or varnish-mixed stains.) Let the stain soak in for at least twelve hours and buff it down with a dry, clean cloth. If the color doesn't please you repeat the staining process.

Mix a small quantity of spar varnish with an equal amount of turpentine to get a very thin solution. Paint this on all exposed surfaces to seal the wood. Coat the inner lock recess as well as the barrel channel lightly. Let it dry for at least 24 hours.

When dry, sand lightly and examine the grain of the wood to see if the open pores in the grain have been filled. If not, you may have to apply a coating of wood filler though, at times, a second coat of sealer will suffice.

Sand again and wipe off all sand - dust with a clean cloth.

For the final finish a satin gloss is best and this can be achieved with either paste wax or repeated coatings of boiled linseed oil. (You might try GB's Linspeed Oil.) If you elect to use wax, one or two extra coatings of thinned varnish would be desirable as a base. Coat only the exterior surfaces, however, because any build-up of finish will compromise your inletting.

With linseed oil, coat the wood generously, let it dry for two or three days, rub it down with a coarse cloth, buff with the heel of your hand and repeat the process as often as necessary until you get a satisfactory finish.

ASSEMBLY

Equip the stock with the butt cap, trigger and trigger guard. Leave the muzzle cap off at this point and install it only when fitting the barrel.

Next, equip the barrel with its breech plug and plate, taking care to anchor the breech plug solidly.

Install the barrel in the stock and secure it in place with the tang bolt.

If you assembled the lock during the course of making lock components, as we recommended at the beginning, it should be ready to install at this point. Set it into the stock and fasten it by means of the # 8 x 36 cross bolts.

Now check to see that the flash pan cover slides freely without interference from the barrel.

With a small sharp punch or awl, mark the location of the flash hole against the side wall of the barrel. This should be located just above the base of the powder pan. Determine if the breech plug will interfere with its placement and decide how it will have to be angled to gain access to the breech.

Remove the barrel, punch the flash hole site firmly to give your drill a start and drill the flash hole at the predetermined angle.

Reinstall the barrel, and check your flash hole alignment with that of the flash pan.

Install your muzzle cap. Check cock, wheel and trigger action.

When everything is functioning smoothly you can go on to install a piece of leather-wrapped Pyrites in the jaws of the cock and prepare for test firing.

PROOF TESTING

If you purchased a factory-made barrel for this project it may have come through with proof marks indicating successful proof testing. However, if you fitted the breech plug, or altered the breech in any way, the original test is no longer valid: the barrel will have to be tested again, just as you would test a home-made barrel.

Take the gun to a safe outdoor site. With rags and cord, tie it to an old tire by inserting the butt end between the rim-embracing walls of the tire. Wrap the wheellock in the rags first to prevent damage to the finish.

Lash it down securely.

Make up a test load that exceeds by 25% the hottest recommended load for the bore you have selected. Use 3Fg powder and a tightly fitted patched ball. If the charge table, for example, calls for a maximum load of 60 grains of 3Fg powder, load your wheellock with 75 grains of this powder.

Tie a string to the trigger so that you can effect firing from behind a protective barrier at least twenty five feet away. Be sure, too, that your projectile will terminate its flight in a suitable backstop. *Under no circumstances should you attempt this test with the firearm hand-held!*

Load the flash pan with a priming charge, lower the cock into the pan, check for curious onlookers, take shelter behind your barricade and fire the first test shot.

Now you can examine the wheellock to see how it came through the test. Remove the barrel from the stock and go over it carefully looking for bulges, cracks etc. Also, check the breech plug to see if it has been loosened. Assuming it passes the first test, try a second and third shot with the same load.

If it will take three such proof charges satisfactorily, it will be safe to use with normal loads. When hand-held, however, don't ever exceed the recommended maximum loads for your bore.

In Europe, incidentally, only firearms proofed by a government proof house are permitted on public ranges. Proof houses will perform these tests for individuals at modest cost.

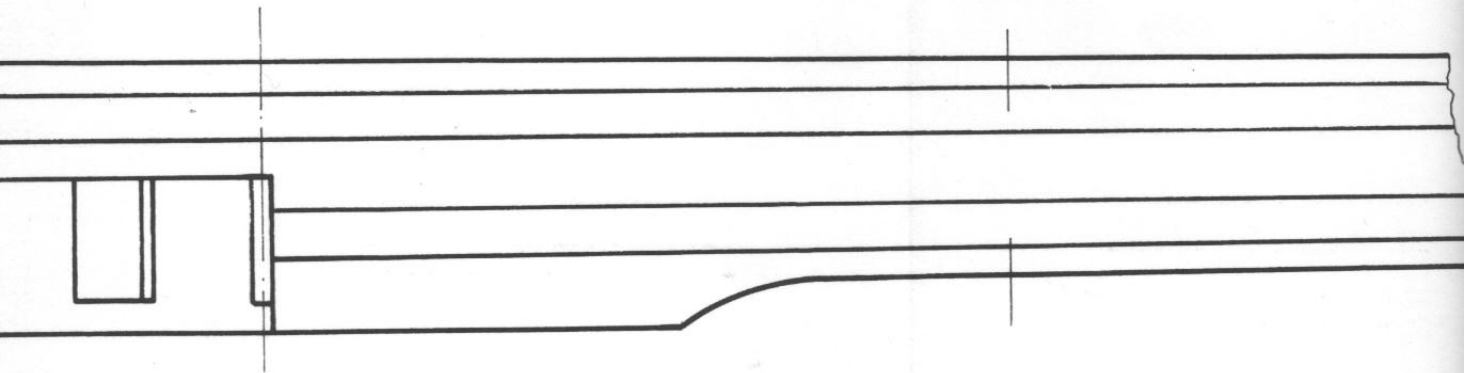
A NOTE ON WHEELLOCK SCREWS: all of the screws, with the exception of the small flat head types used to secure the thimble and muzzle cap, are round headed steel screws. Any other type would detract from authenticity.

That does it!..... now that you have a shootable authentic wheellock replica, you may want to go on to build your own flintlock or percussion gun. My books on these two types are nearing completion at this writing so you should have no trouble obtaining them from your local fire-arms dealer.

Good luck and good shooting!

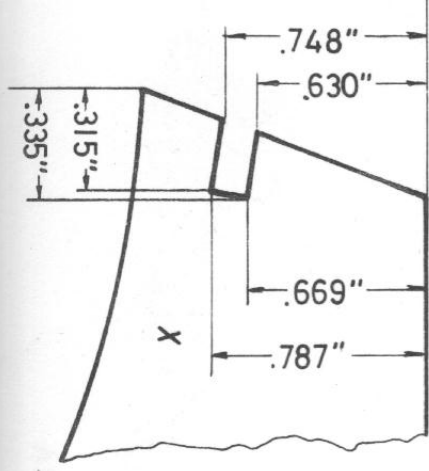
Georg Lauber

Part Number	Part Name	Part Number	Part Name
1	Lock-plate assembly	13.1	Top plate
		13.2	Sliding cam
1.1	Lock cover	14	Cock assembly
1.2	Mainspring bracket	14.1	Cock screw
1.3	Bearing box	14.2	Cockjaws
1.4	Spring guide	14.3	Connecting rod
1.4.1	Spring guide cover plate	14.4	Dog rod
2	Bridle assembly	15	Cock spring
2.1	Bearing bracket	16	Cock cover plate
2.2	Fixing lug	17	Lower wheel guide
2.3	Brace	18	Stock assembly
3	Spindle	18.1	Wooden stock
4	Mainspring	18.2	Butt cap
5	Chain assembly	18.3	Muzzle cap
5.1	Inner and outer bar	19	Trigger guard
5.2	Suspension bar	20	Trigger
6	Small sear	21	Thimble (for ramrod)
7	Flash pan cover arm	22	Barrel assembly
8	Main sear	22.1	Barrel
9	Spring	22.2	Barrel lugs
10	Spring	23.1	Breech plate
11	Wheel	23.2	Breech plug screw
12	Pan		
13	Sliding pan cover assembly		



It was originally our intention to produce the drawings found in this volume with both inch and metric dimensions. However, upon putting the two together we found they resulted in a hopeless tangle of numbers, particularly with the smaller and more complex components. *For this reason this volume has been published with inch dimensions only!* Nevertheless, we also have a number of books available with metric drawings. If you would prefer to work in the metric system simply write the John Olson Co., Box 767, Paramus, New Jersey 07652, requesting instructions for arranging a free exchange.





Stock thickness: 1.575"

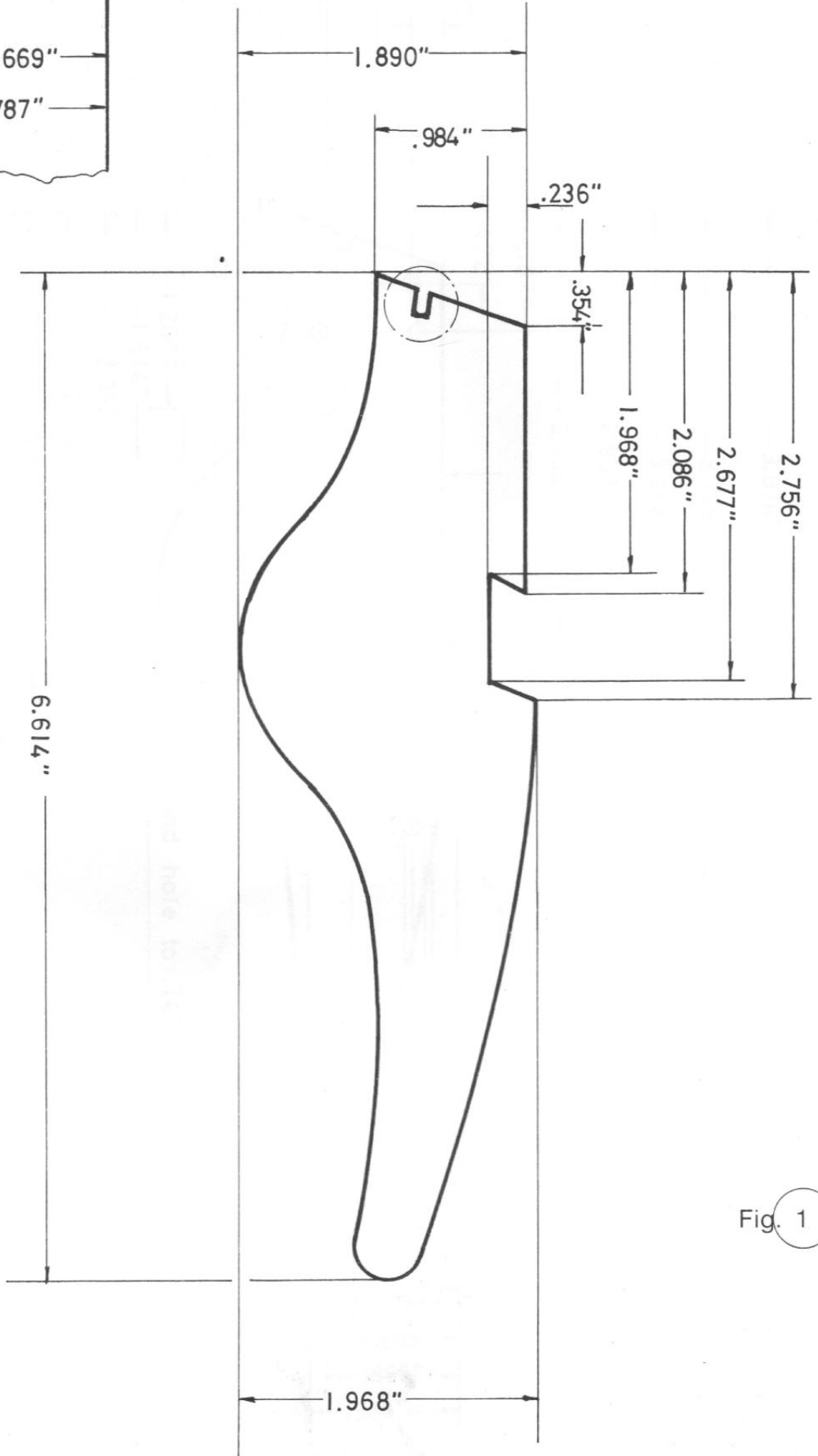


Fig. 1

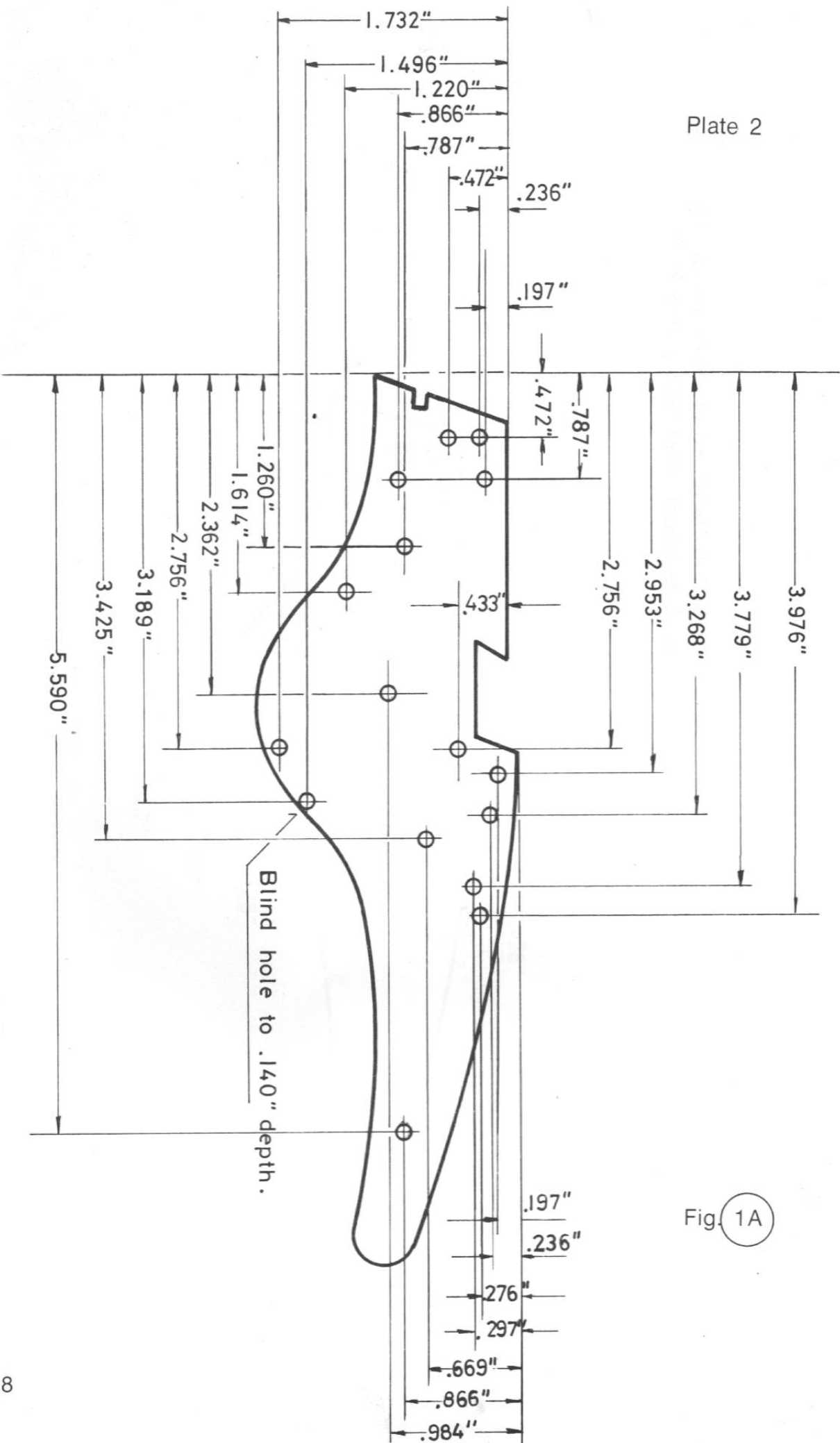


Fig. 1A

All pilot holes drilled 9/64" dia.

All screw holes to be final drilled with
a # 29 drill (.136") and tapped with # 8-36.

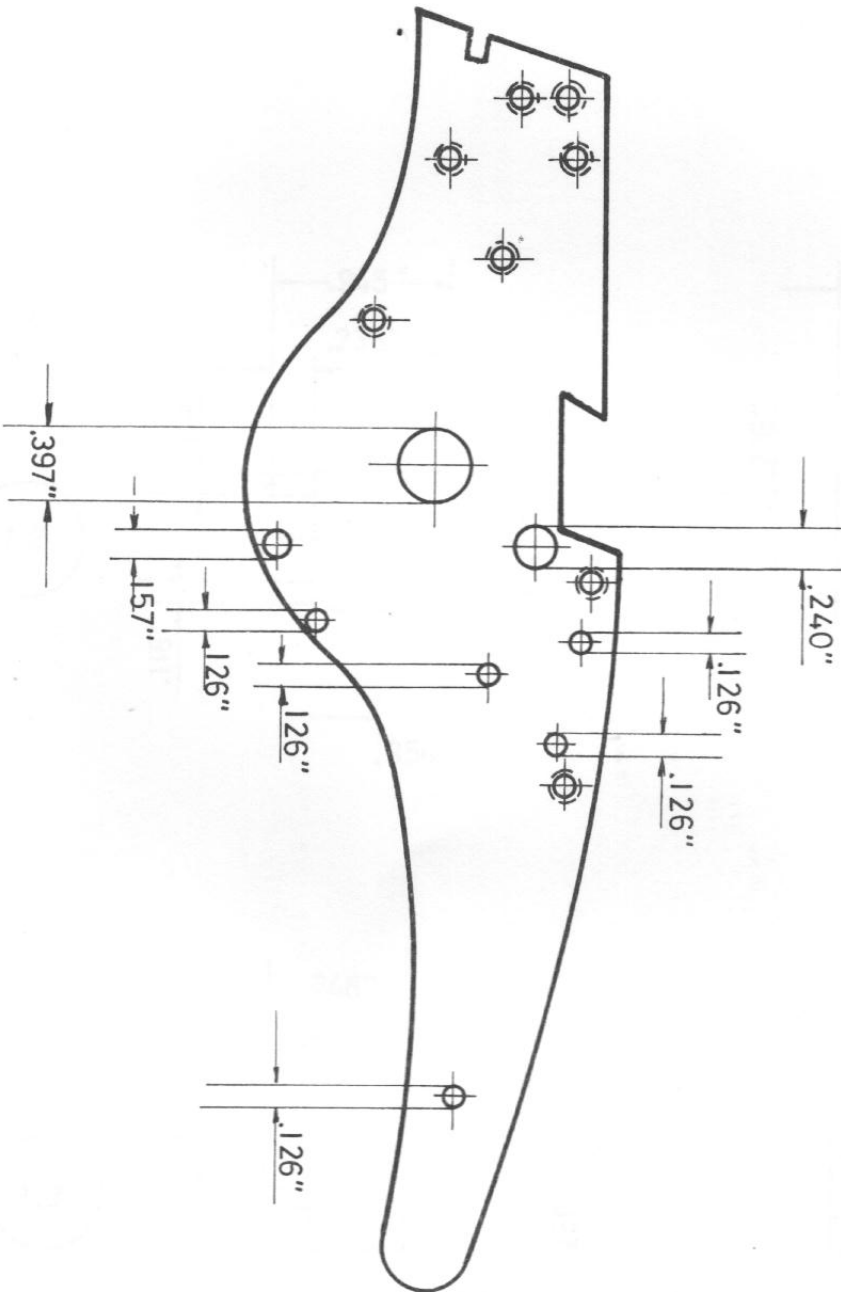


Fig. 1B

Fig. 1.1

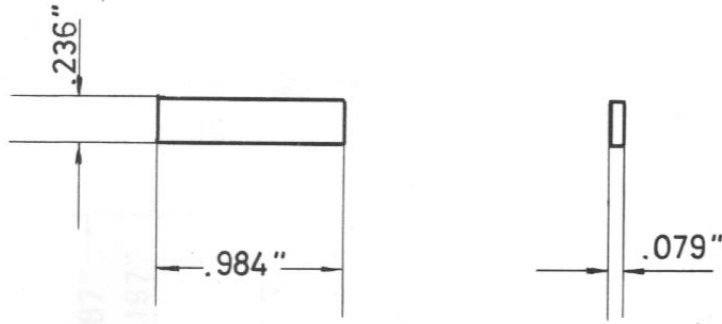


Fig. 1.2

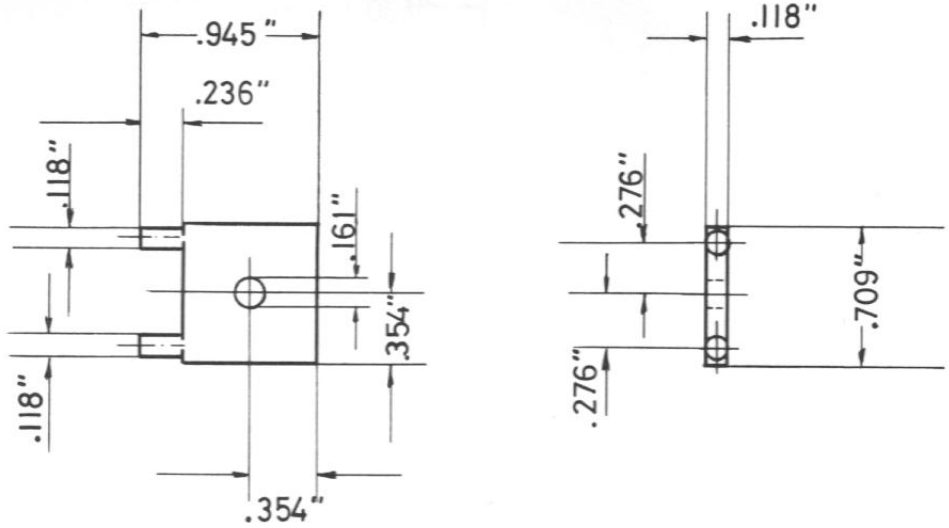


Fig. 1.3

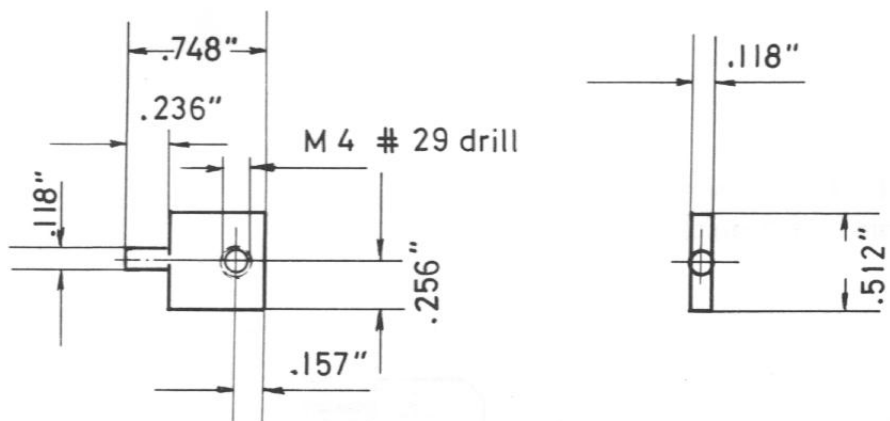


Fig.

1.4

Plate 5

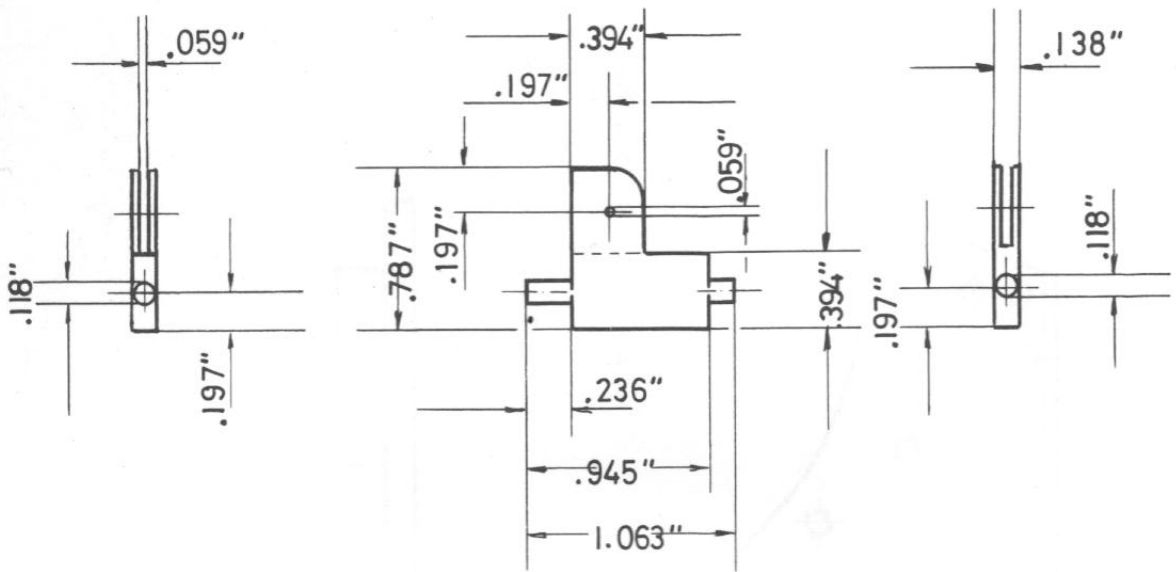
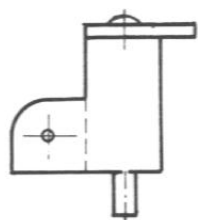
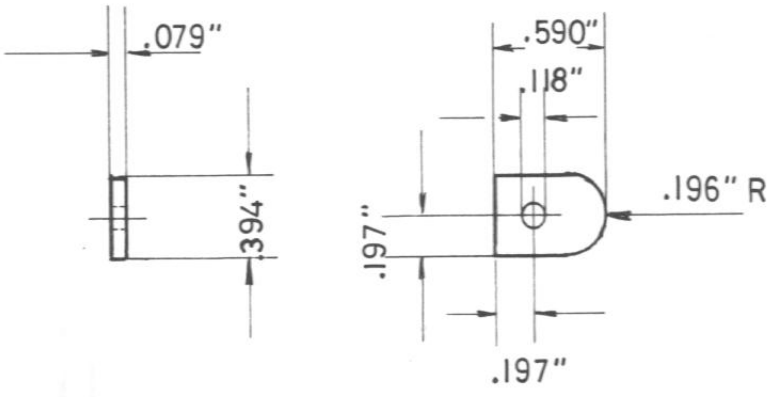
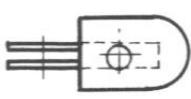


Fig.

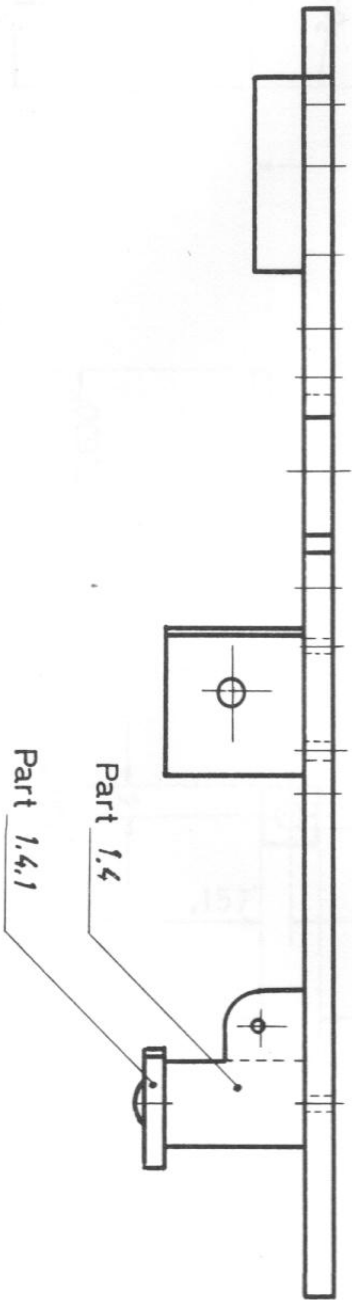
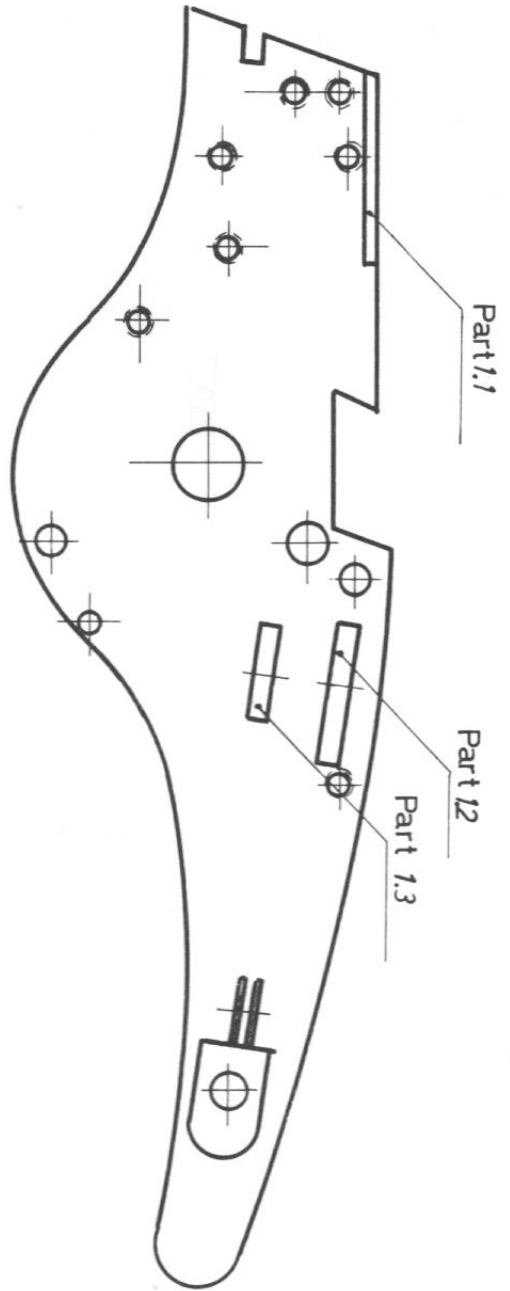
1.4.1



Completed Part 1.4 with soldered joint



Completed part 1



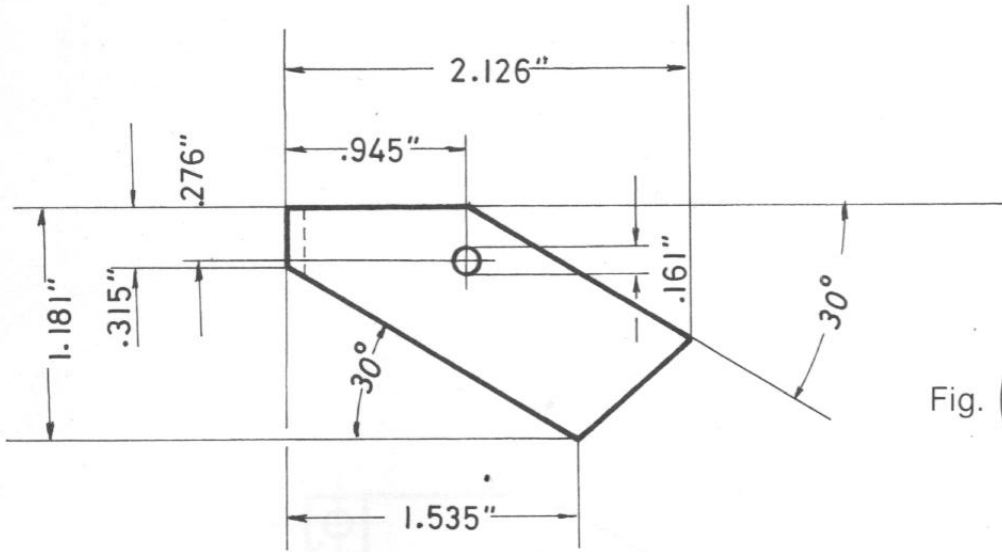


Fig.

2.1

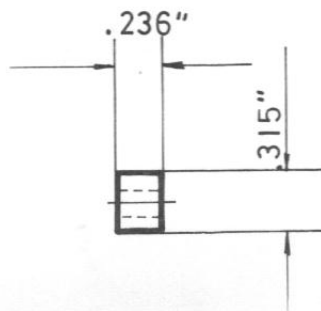
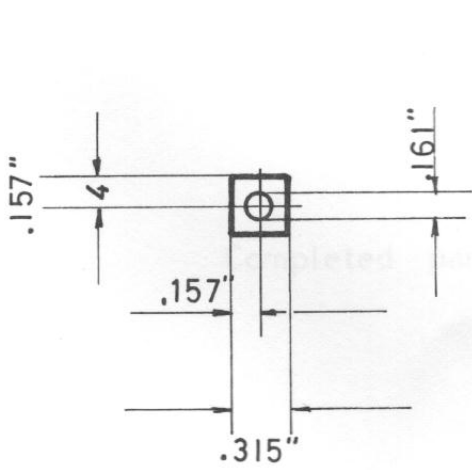
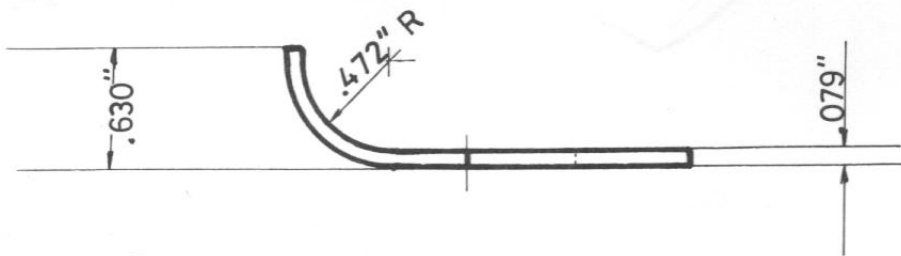


Fig.

2.2

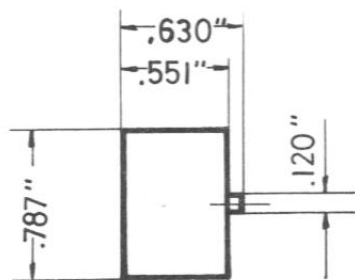
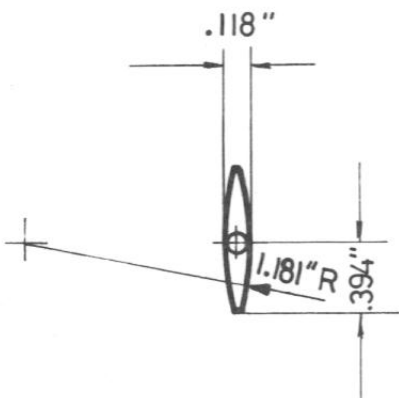


Fig.

2.3

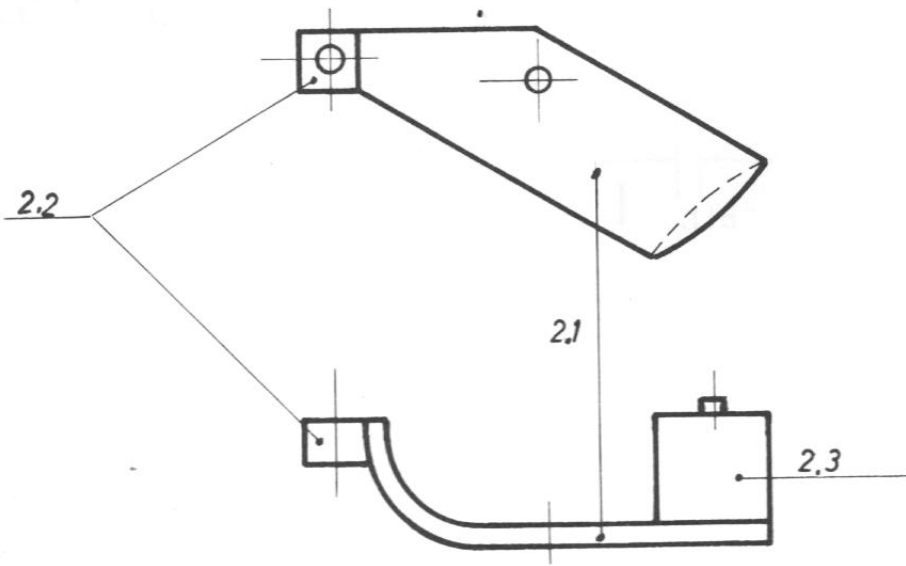


Fig. 2

Completed part 2

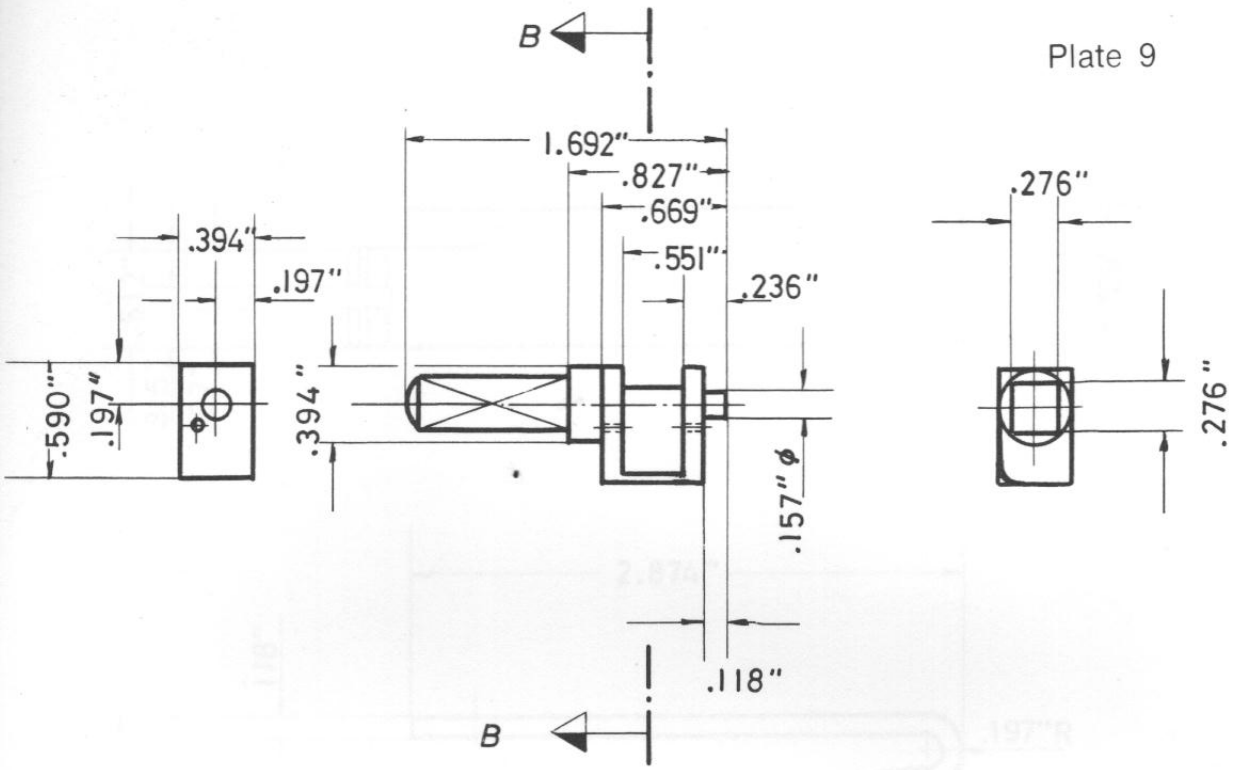
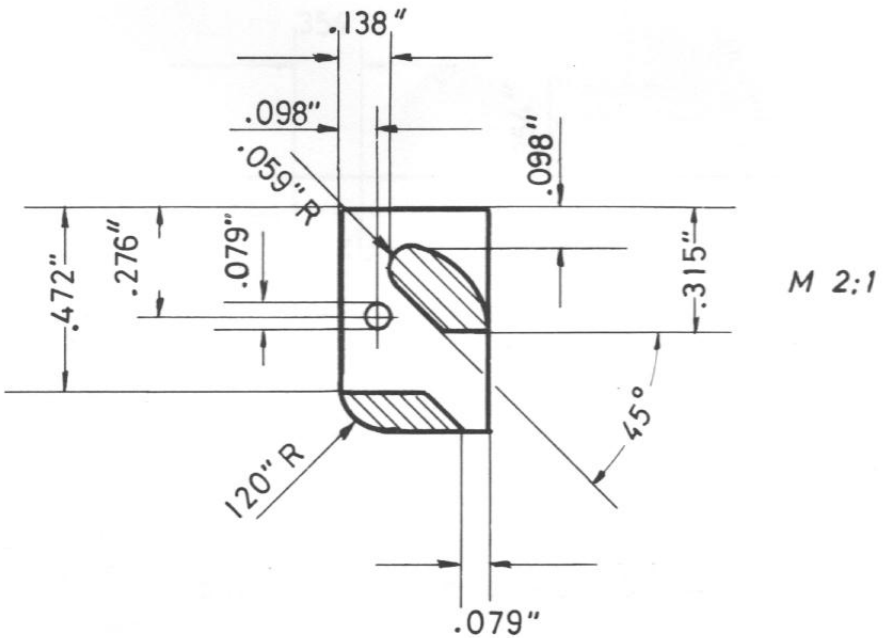


Fig. 3

B-B



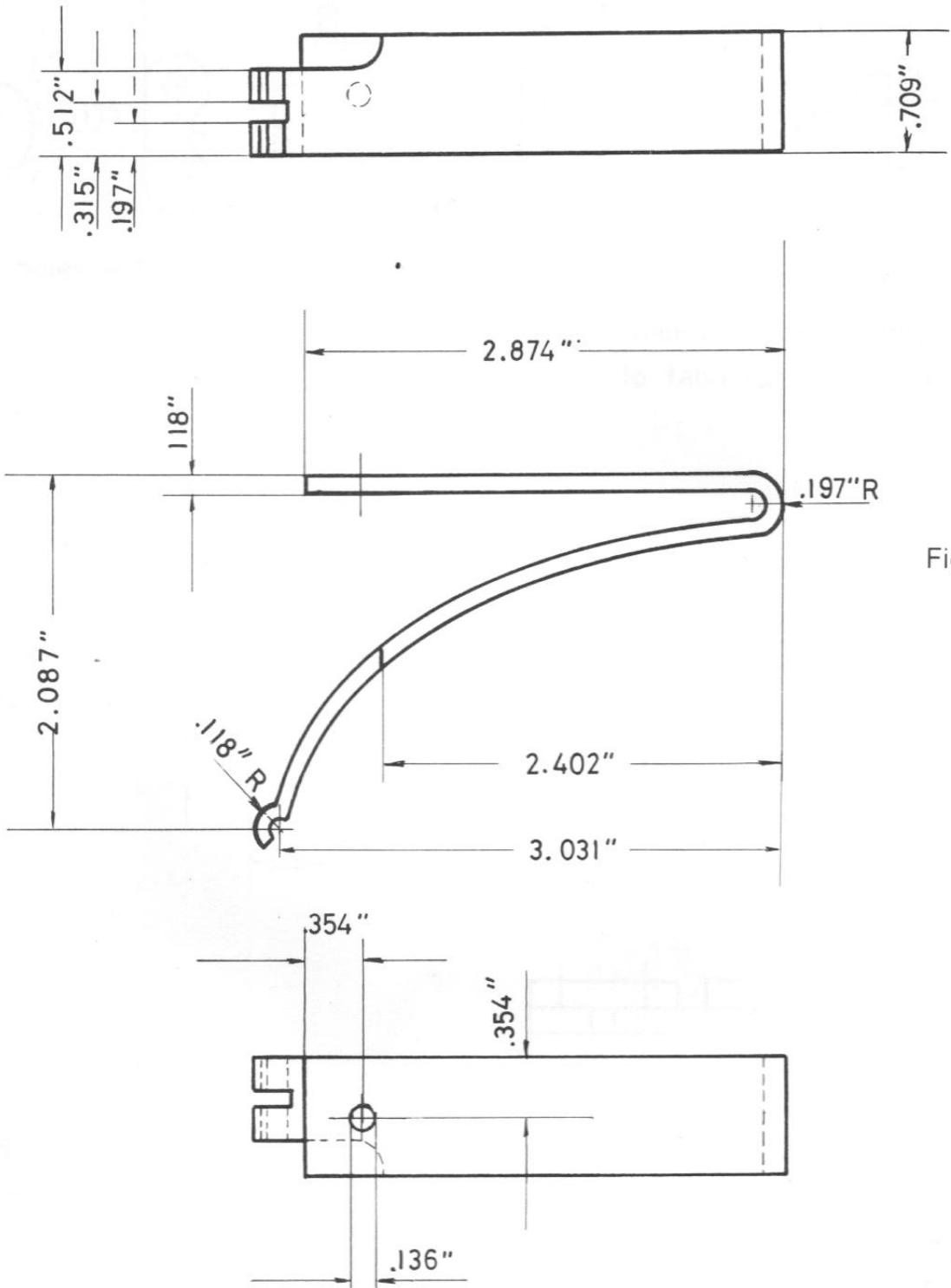
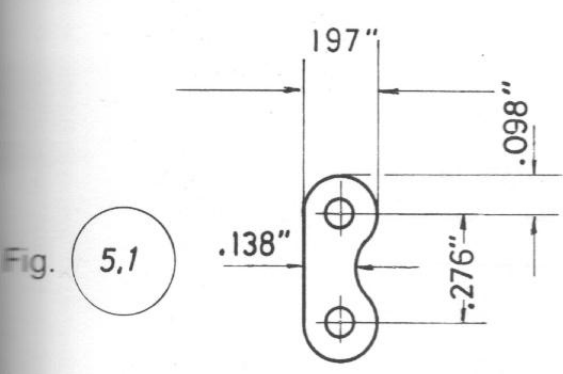


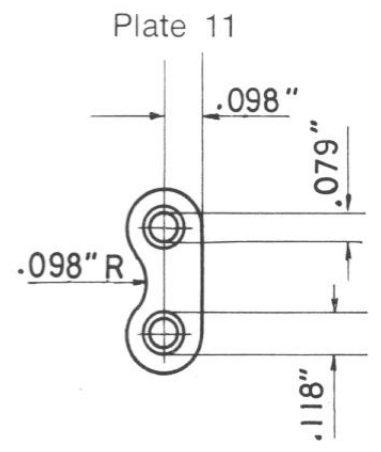
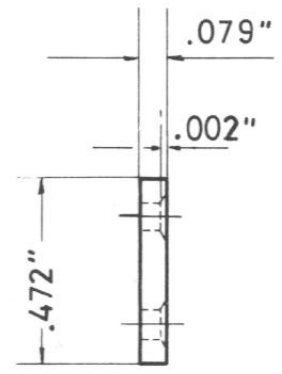
Fig. 4

straight length, approx. $6 \frac{1}{4}$

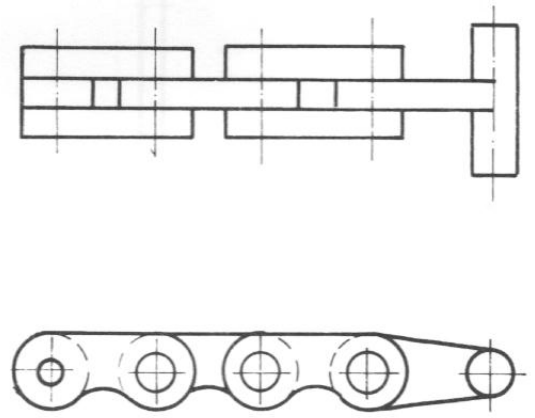
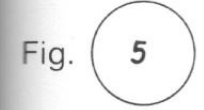
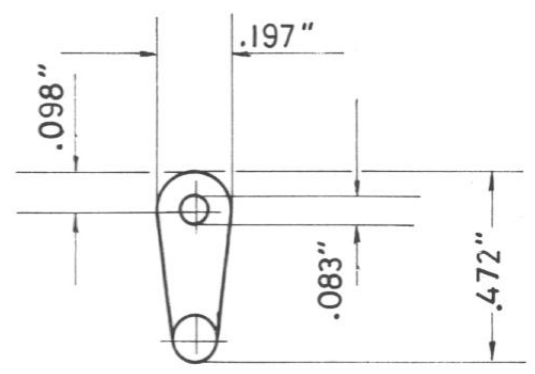
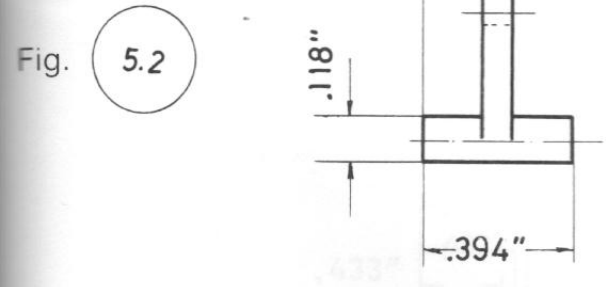


holes without chamfer

M 2:1



chamfer holes slightly to facilitate riveting



completed part 5

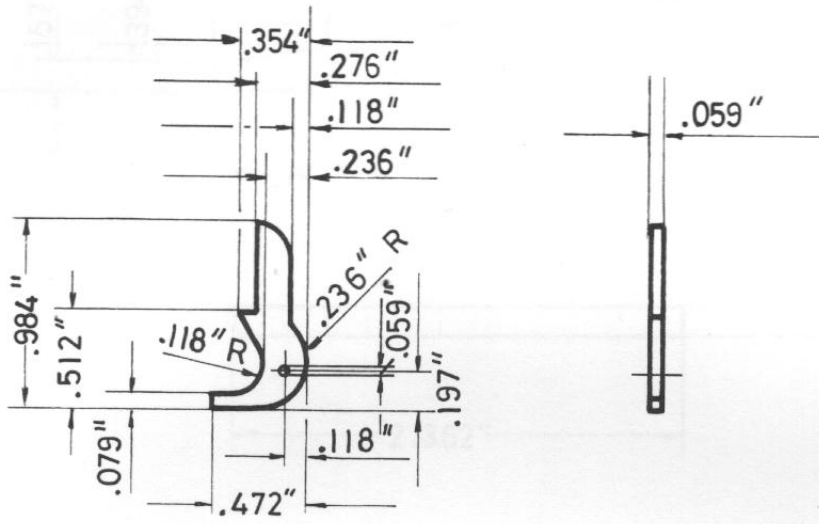


Fig. 6

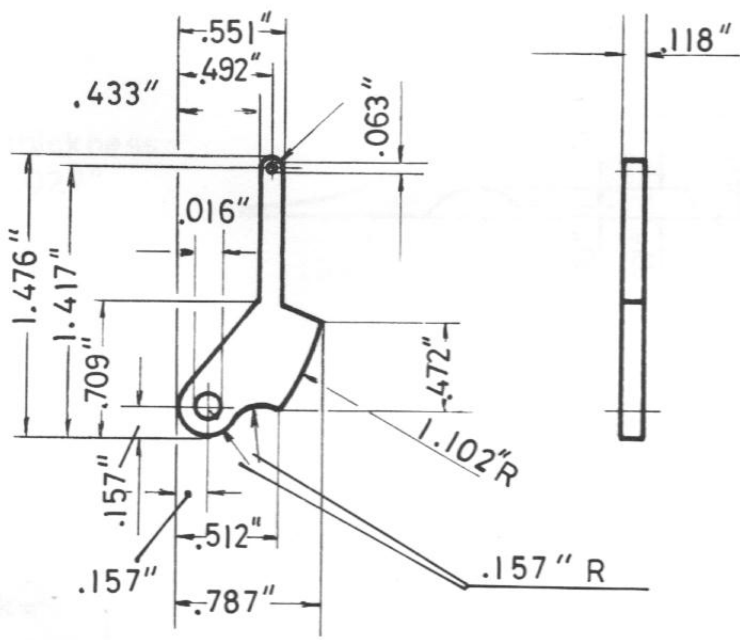


Fig. 7

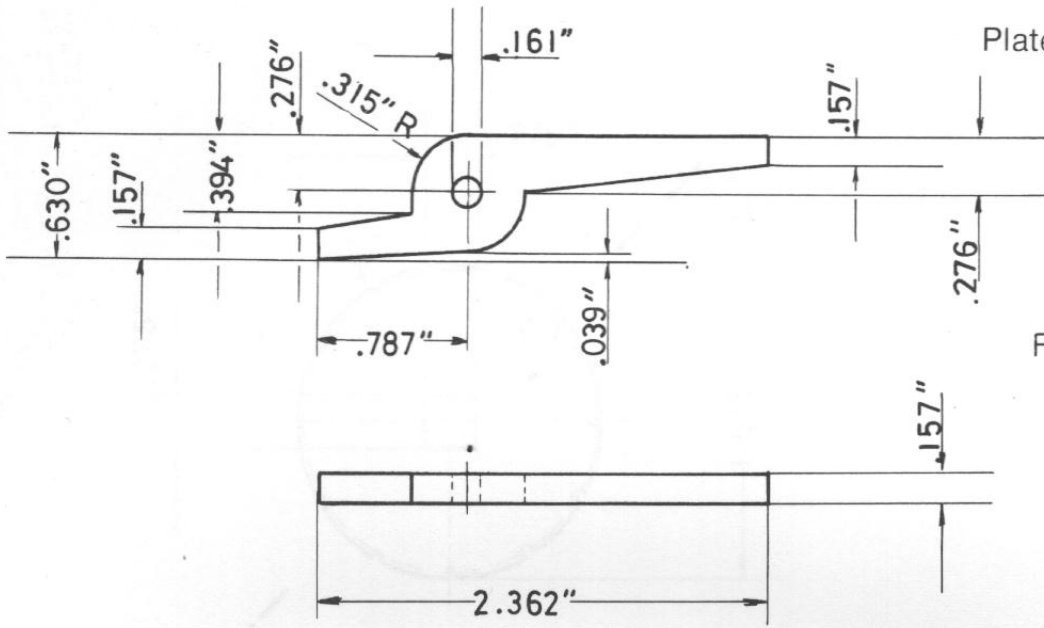


Fig. 8

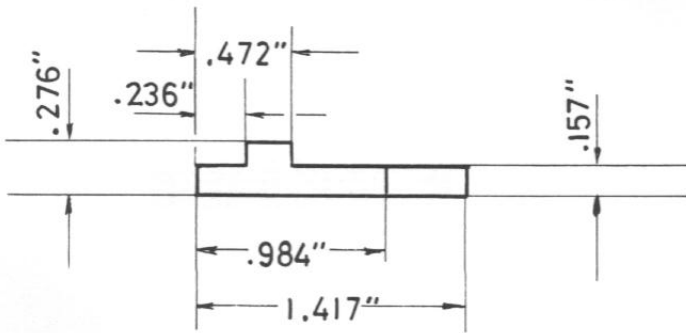
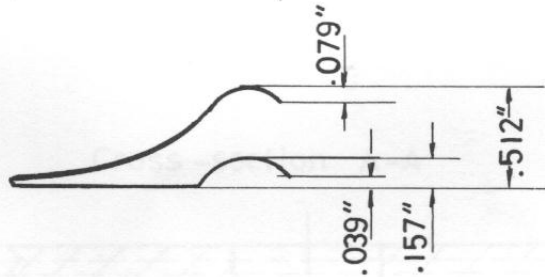


Fig. 9

Material thickness :
approx. .027"



Spring stock =
.039"

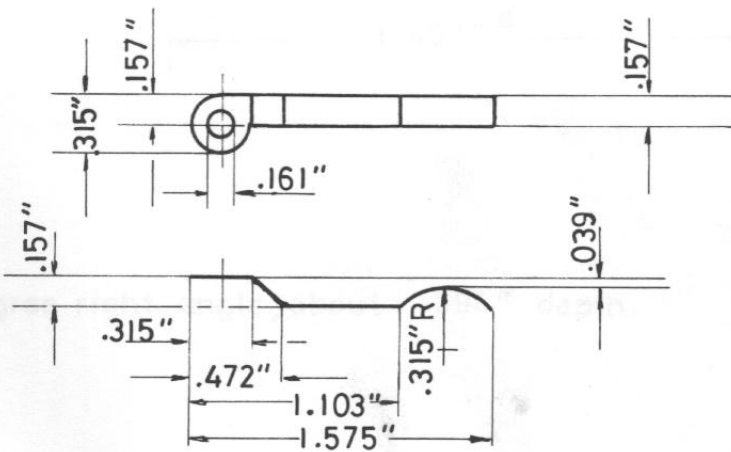


Fig. 10

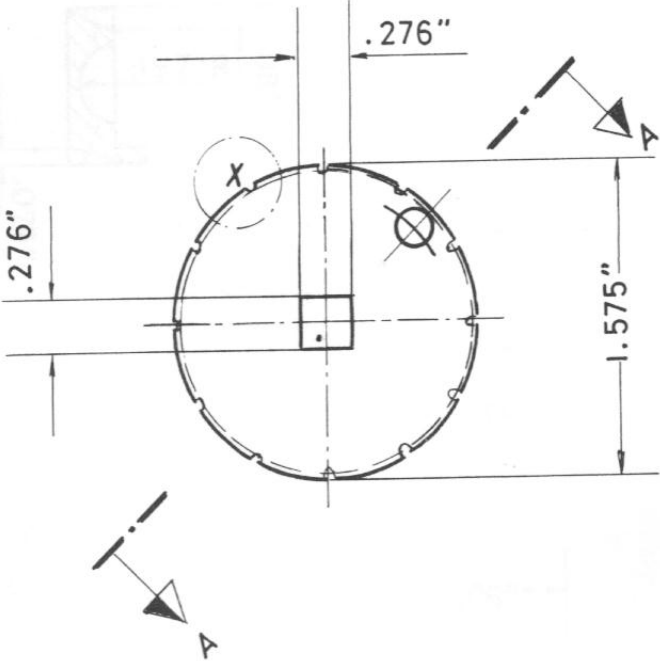
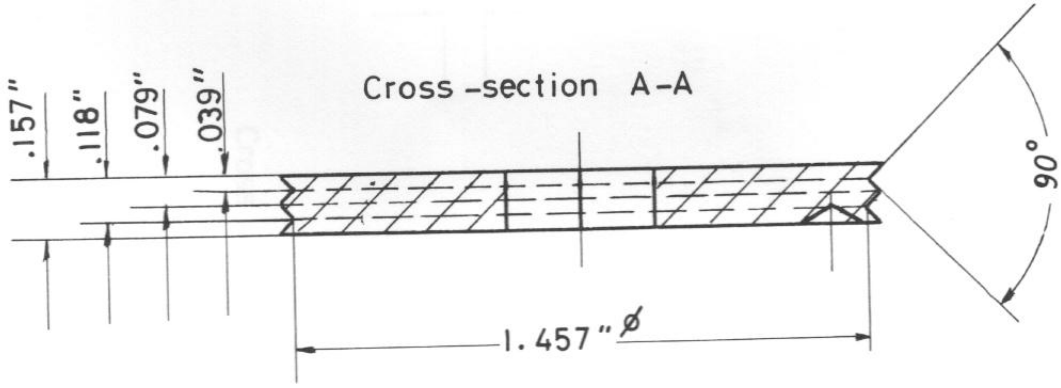
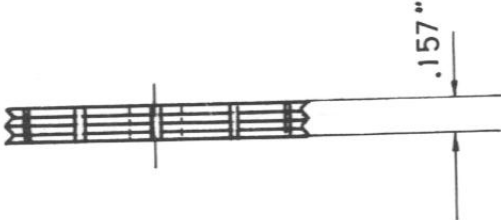


Fig. 11



90° degree right angle, about .394" depth

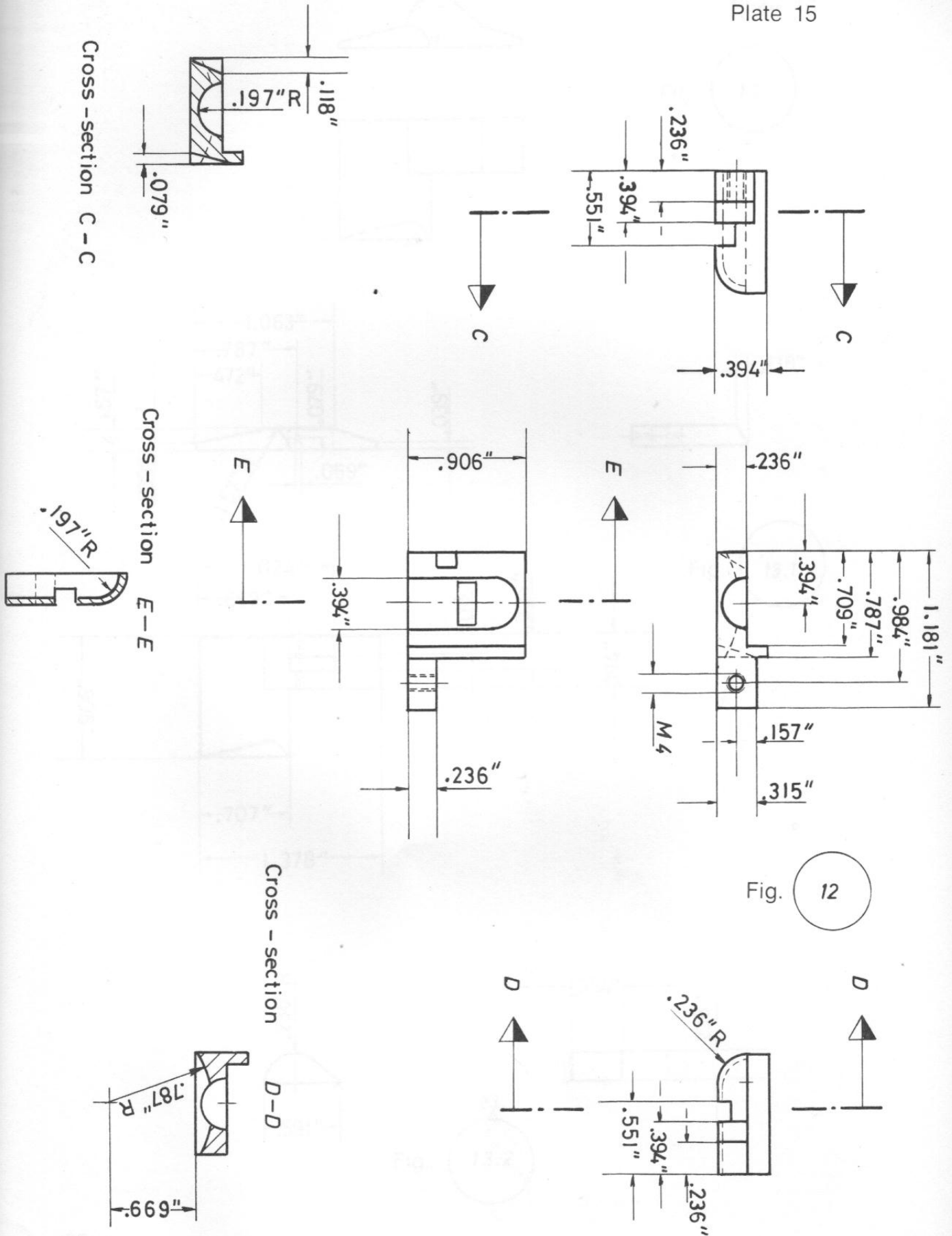


Fig. 12

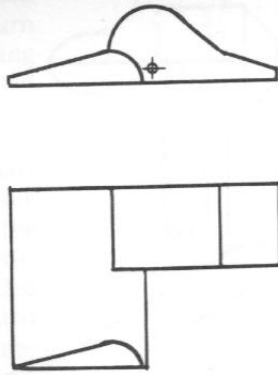


Fig. 13

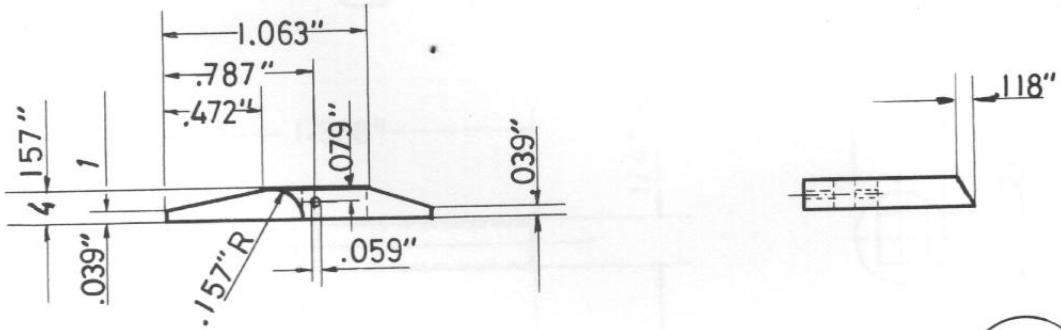


Fig. 13.1

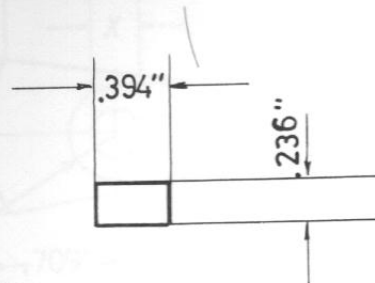
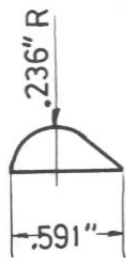
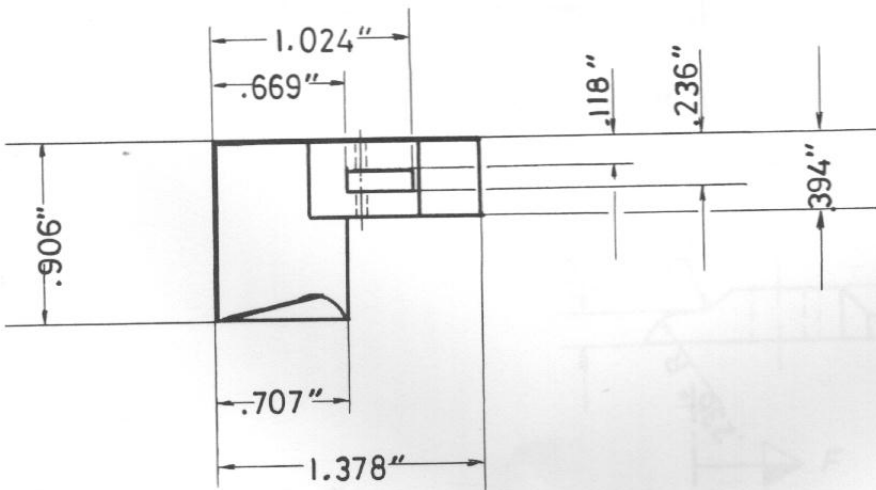
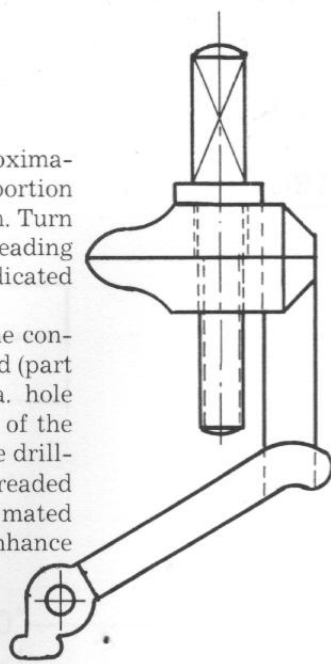


Fig. 13.2

Fig. 14



Complete cock assembly

Notes on cock jaws and thumbscrew:
 Thumbscrew stock should measure approximately 1/2-inch in diameter. Shape upper portion in a square (.276") for finger manipulation. Turn down lower portion to .245" dia. for threading in a 1/4" x 20 dia. Thread only to point indicated and shape stop-collar.
 Upper jaw of cock is rigidly welded to the connecting rod (part 14.3) as is the cocking rod (part 14.4). Drill a smooth, straight .250" dia. hole thru the upper jaw to allow free passage of the thumbscrew. Lower jaw of cock should be drilled thru with a # 9 drill (.196" dia.) and threaded for the 1/4" x 20 thumbscrew. Roughen mated surfaces of both cock jaws sharply to enhance stone-holding ability.

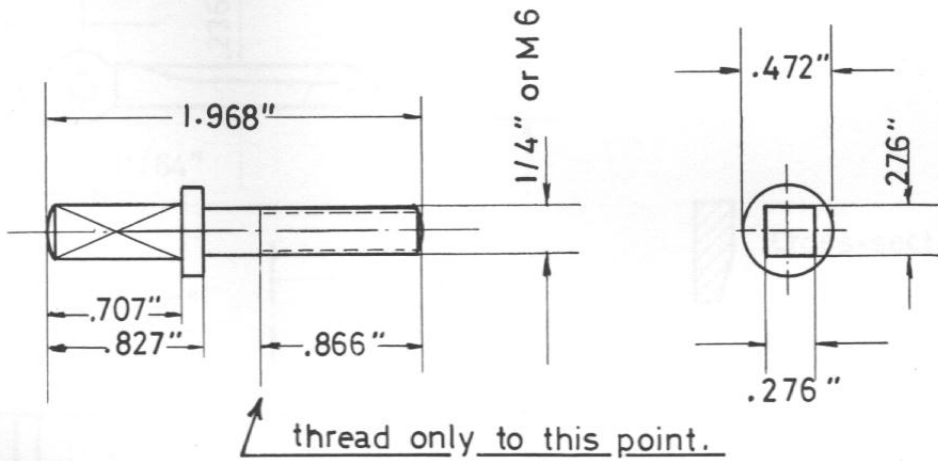


Fig. 14.1

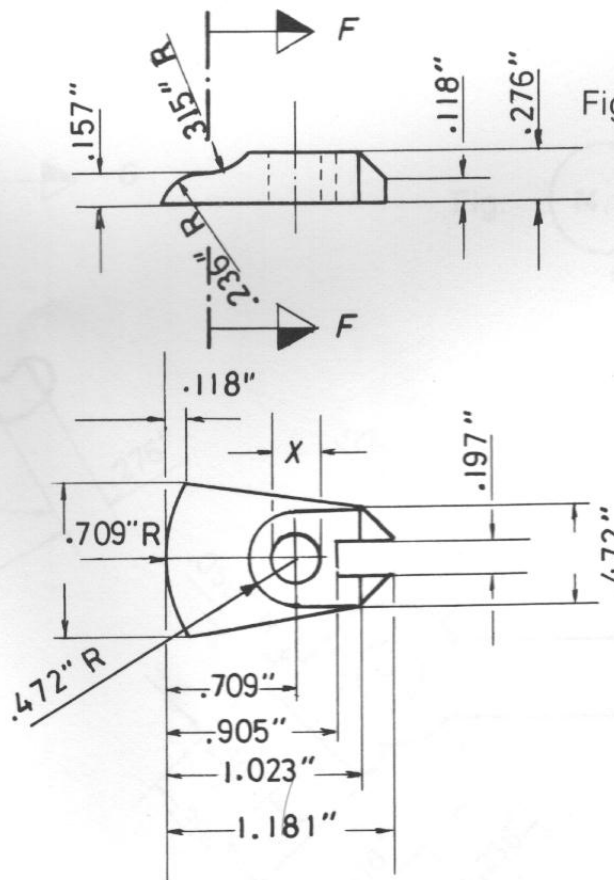


Fig. 14.2

Cross-section F - F

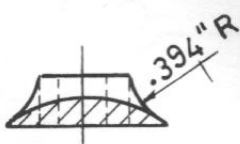
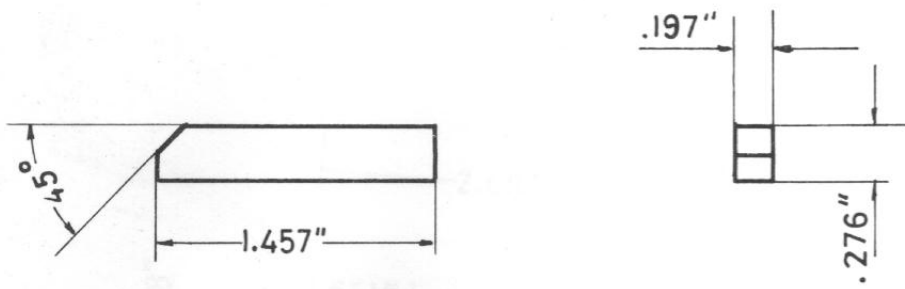
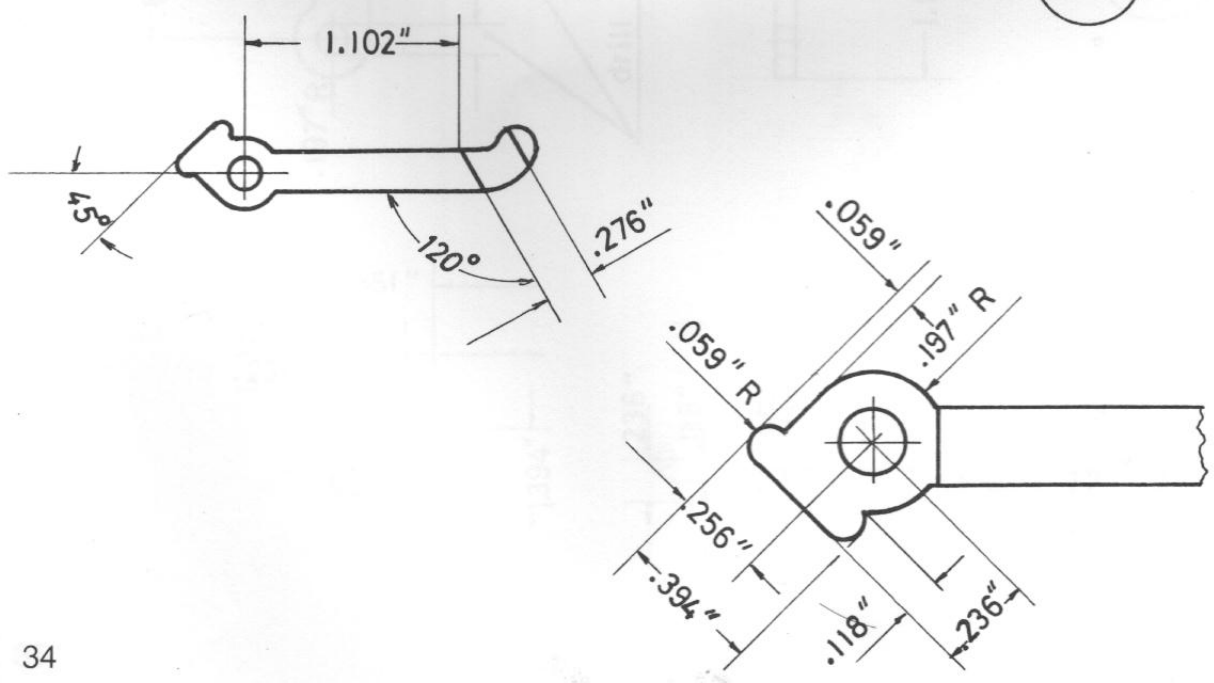
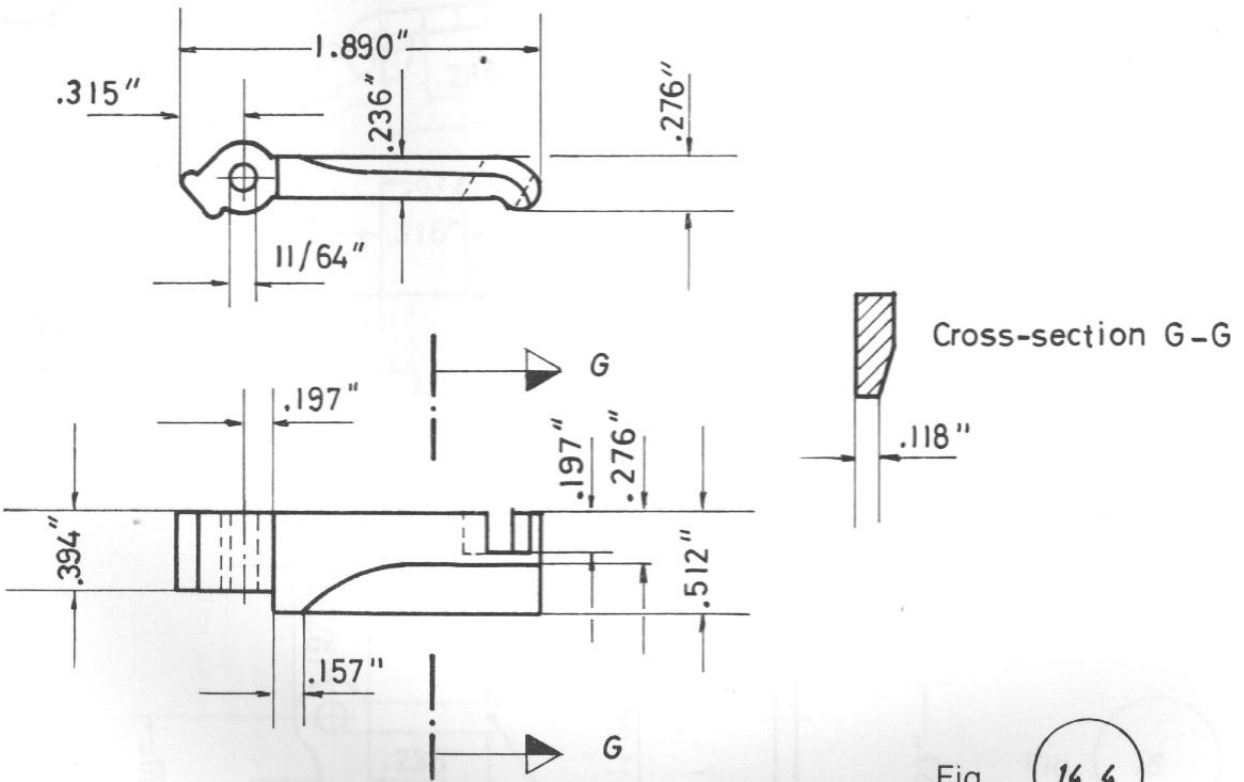


Fig. 14.3



Cross-section G-G

Fig. 14.4



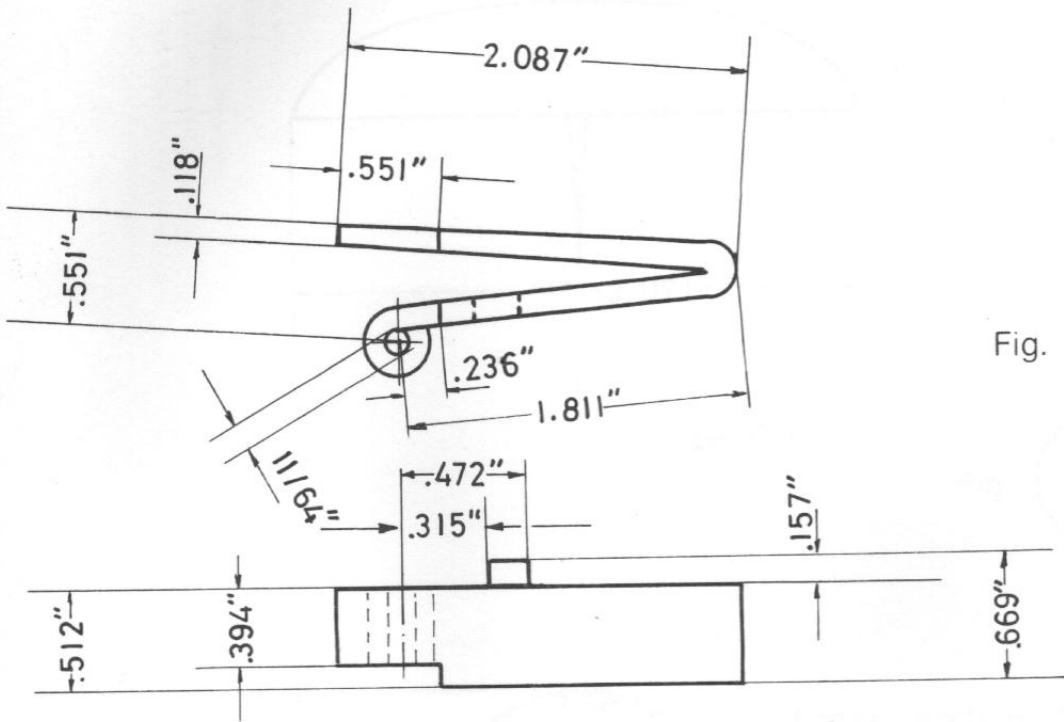


Fig.

15

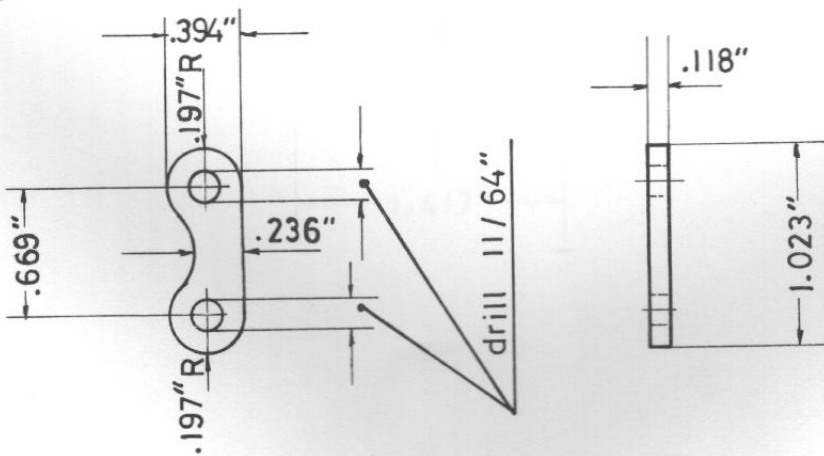


Fig.

16

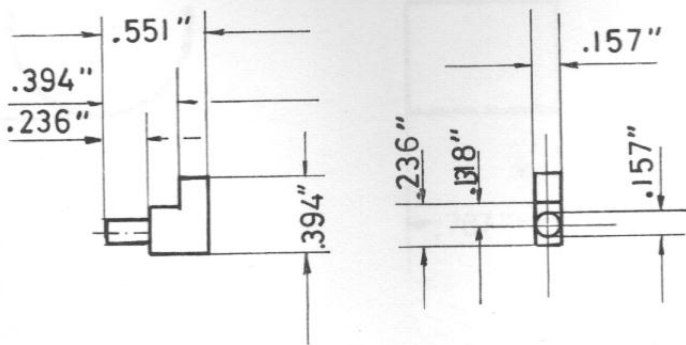


Fig.

17

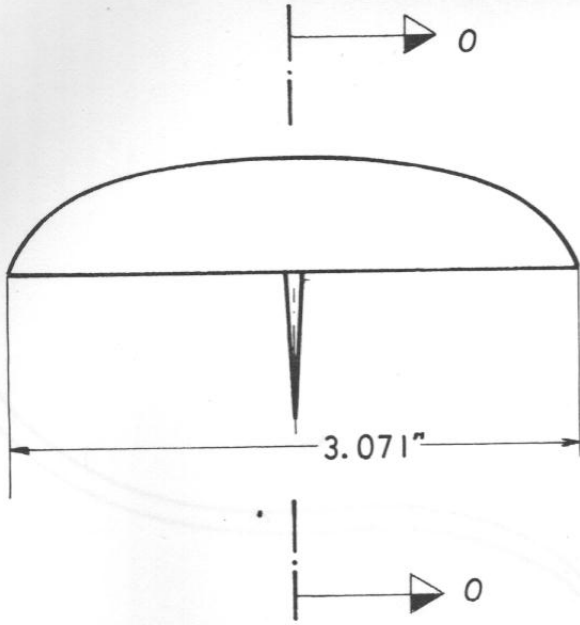
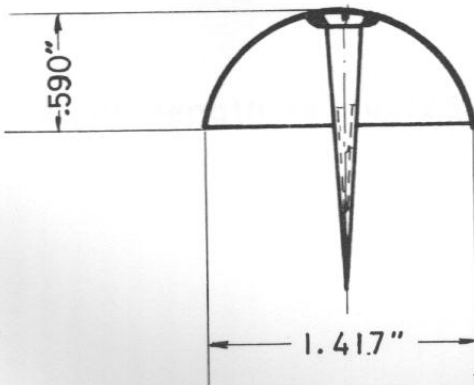


Fig. 18.2



Cross - section 0 - 0

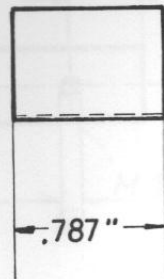
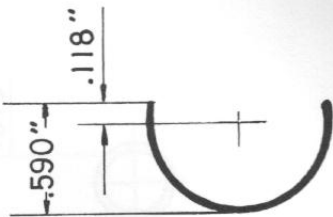


Fig. 18.3

Bend stock to radius shown and size exactly to butt of stock

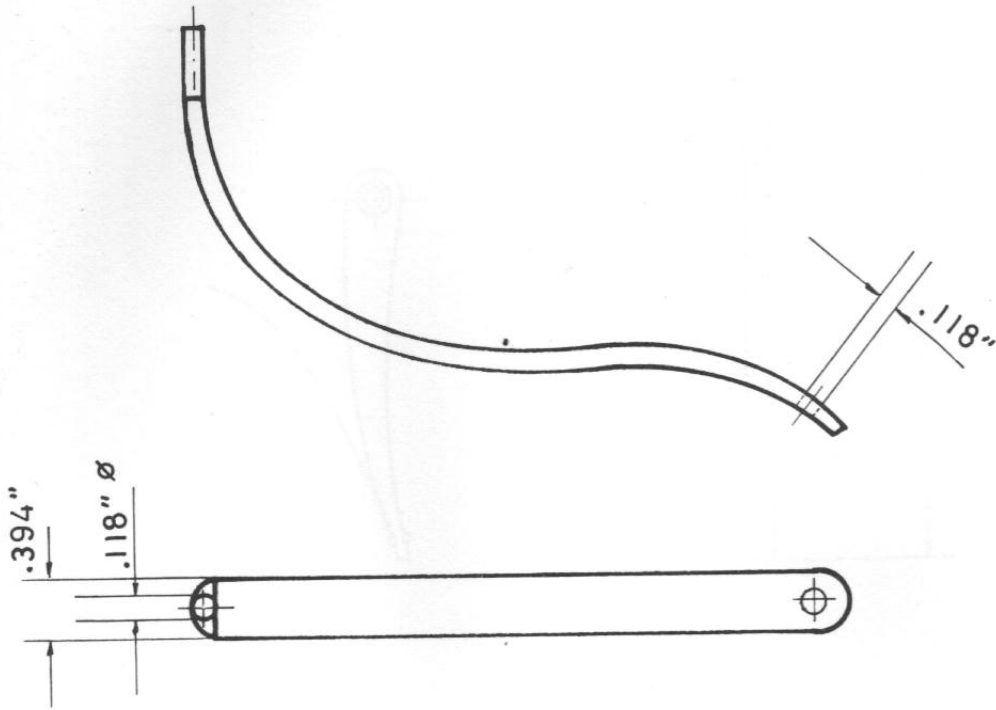


Fig.

19

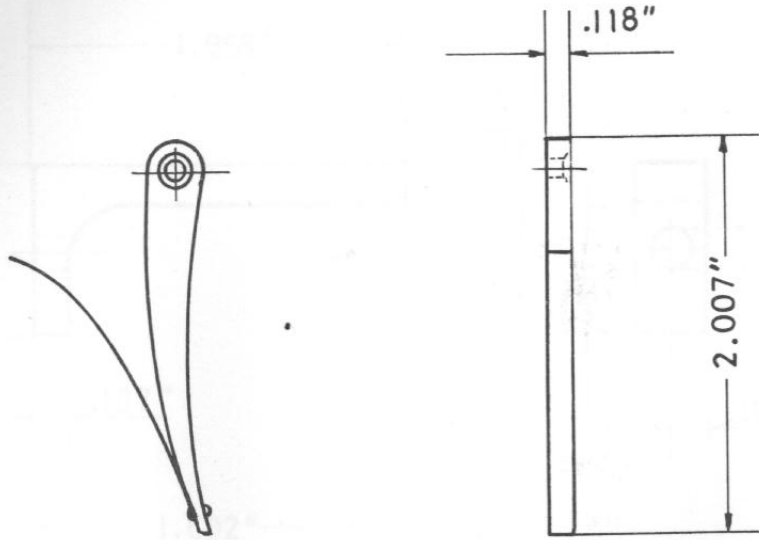
straight length is 4.725"



Fig.

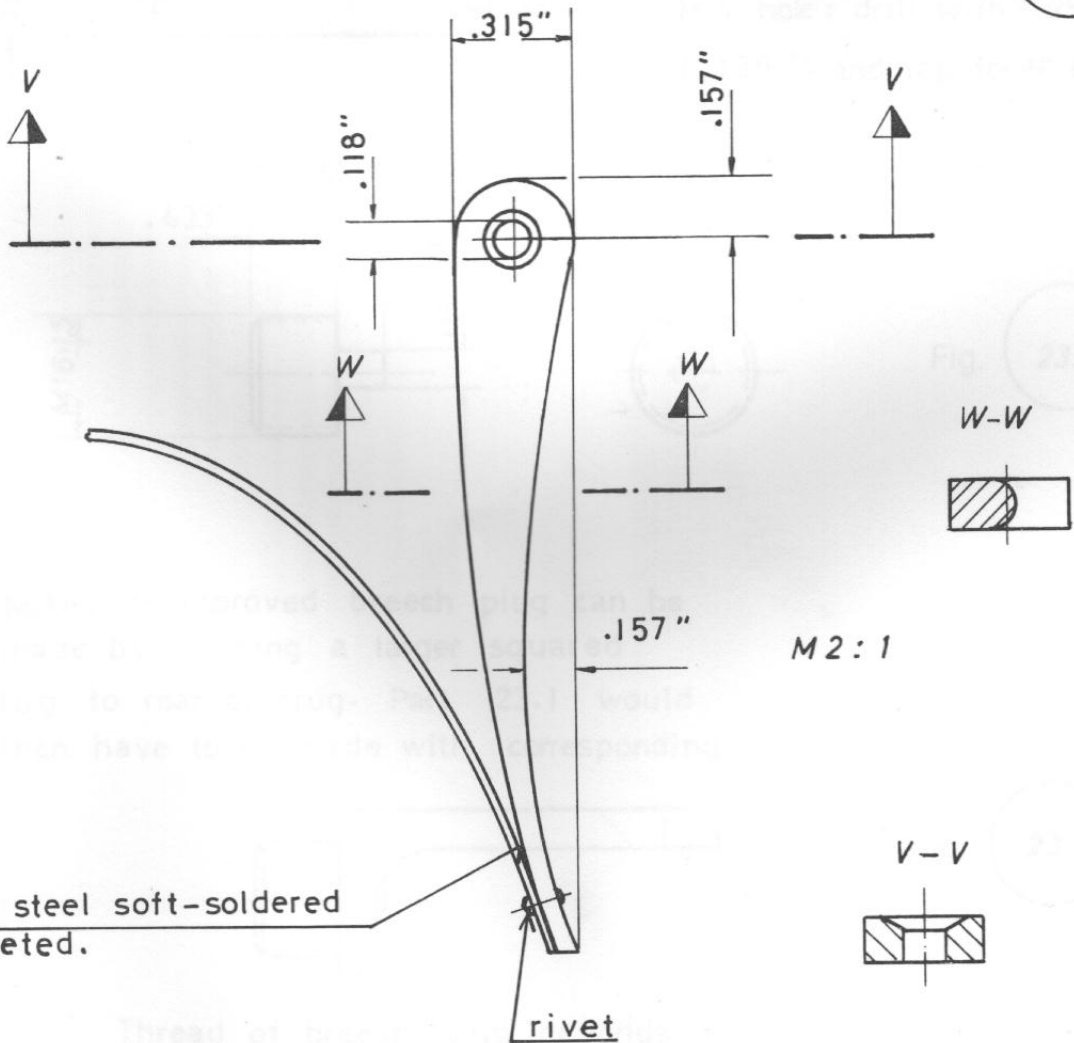
21

drill with # 43 (.089") drill
tap # 4-48



20

Fig. 20



spring steel soft-soldered
an riveted.

rivet

M 2 : 1

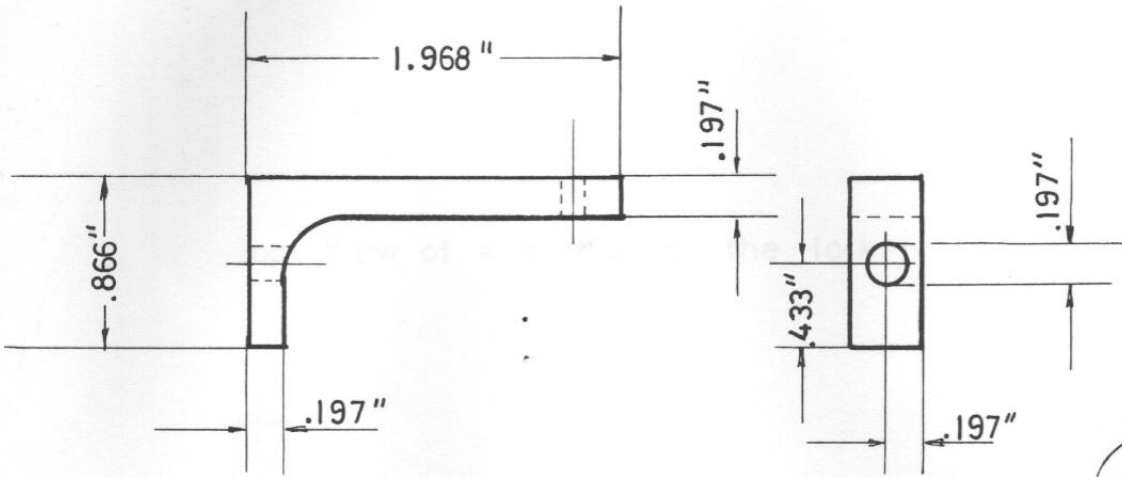
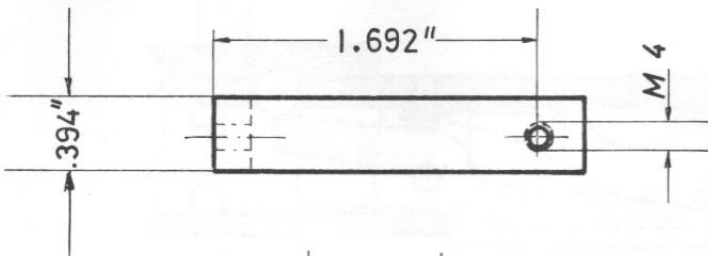


Fig. 23.1



M 4 hole: drill with #29 drill (.136") and tap for # 8 - 36

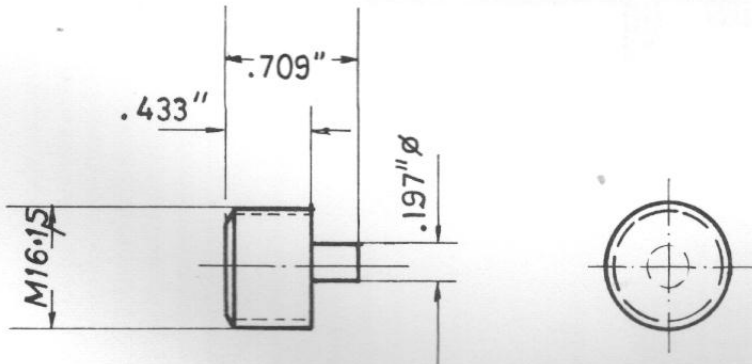


Fig. 23.2

Note: an improved breech plug can be made by shaping a larger squared lug to rear of plug. Part 23.1 would then have to be made with corresponding slot.

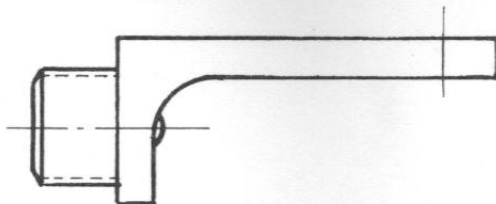
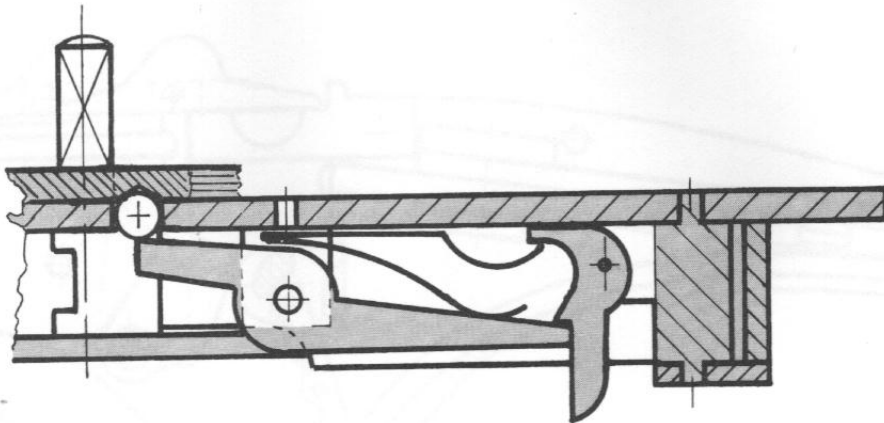
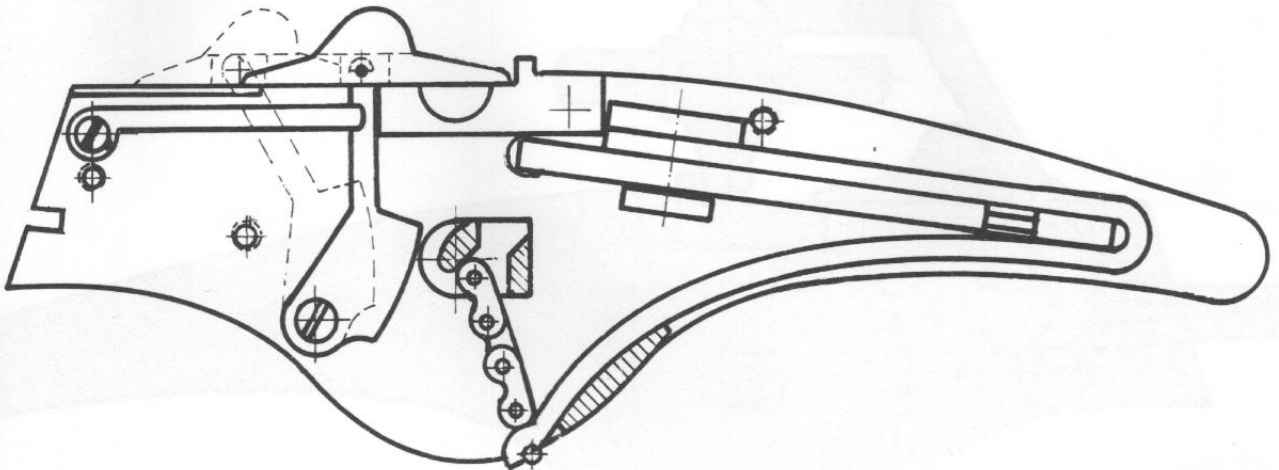


Fig. 23

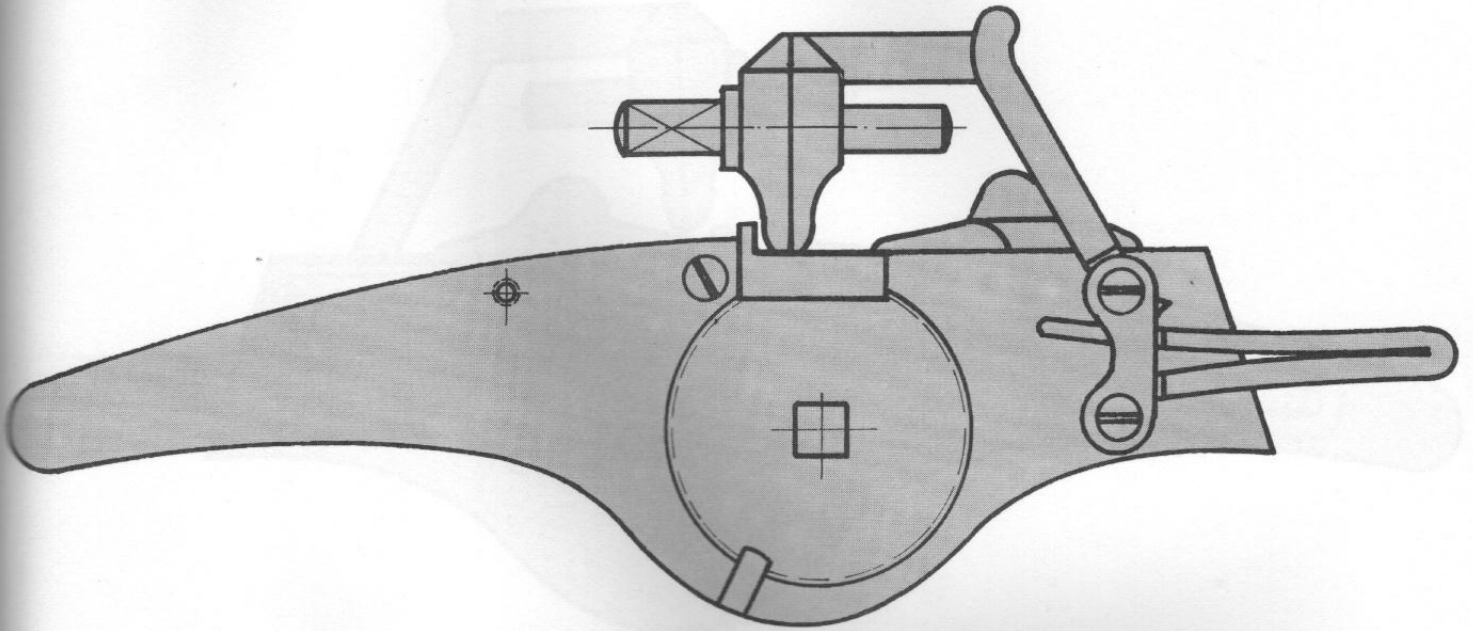
Thread of breech plug depends upon size of bore. Look for 18 to 20 threads per inch and fullest possible thread engagement.

Top View of a portion of the lock

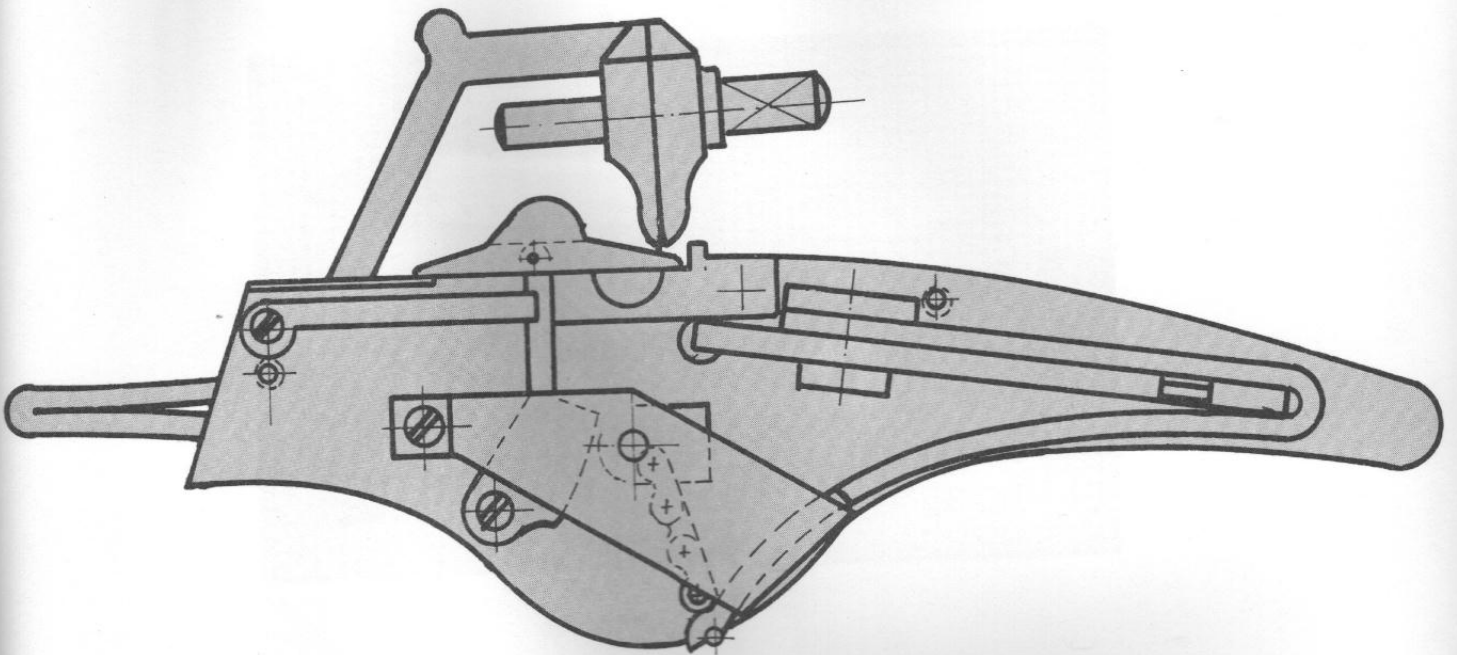




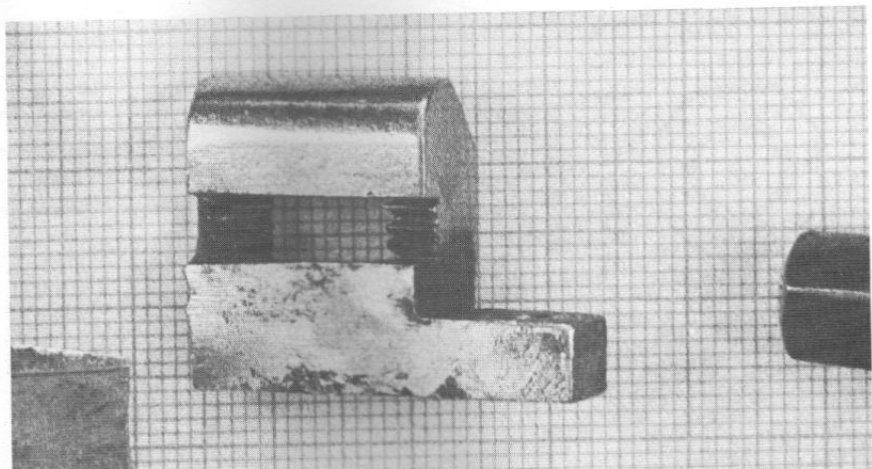
Cock in firing attitude

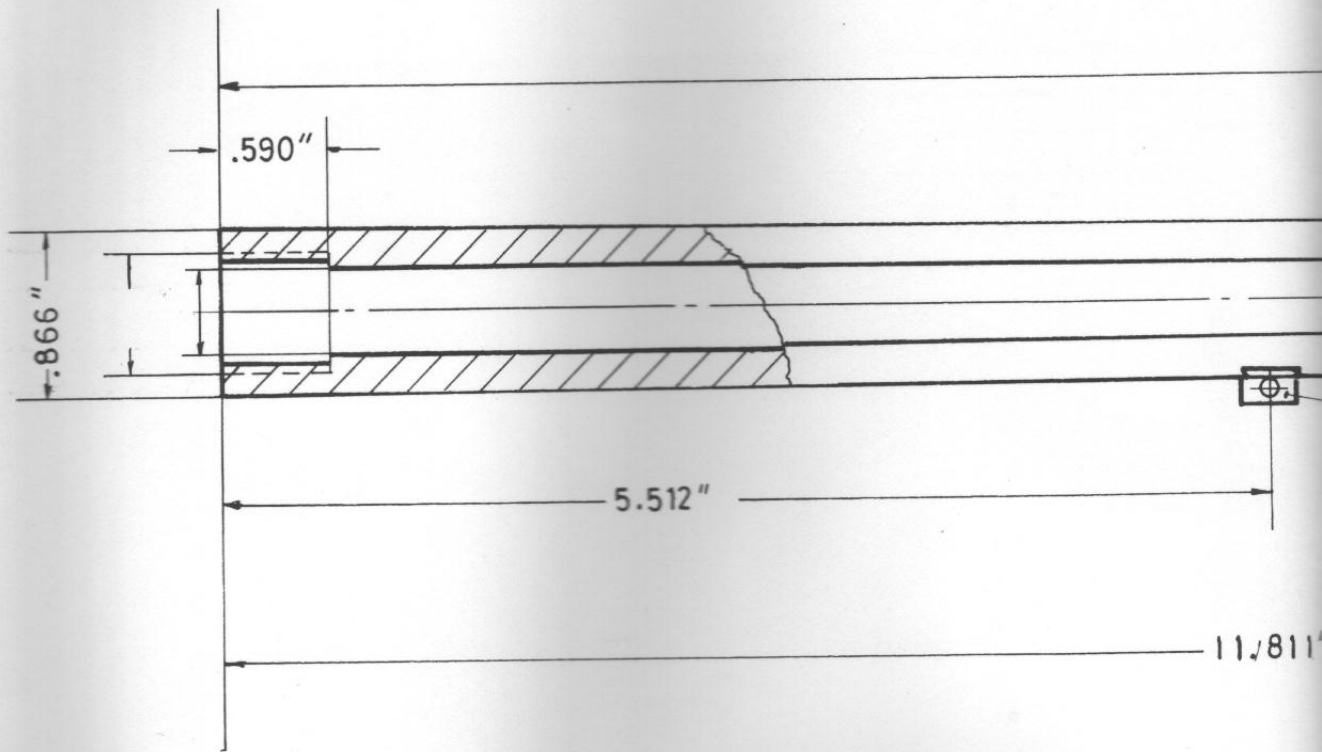


Cock in firing attitude



—055—4





Breech plug threading depends
upon bore size . See page 39,
plate 23 .

Fig.

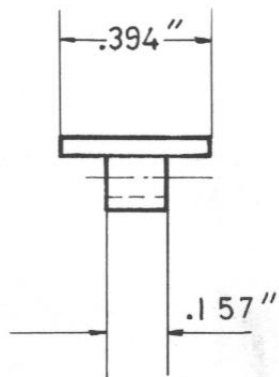
22

15.748"

Fig.

22.2

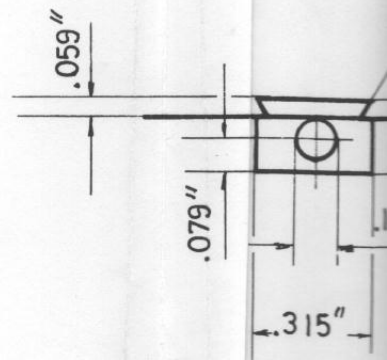
1.811"

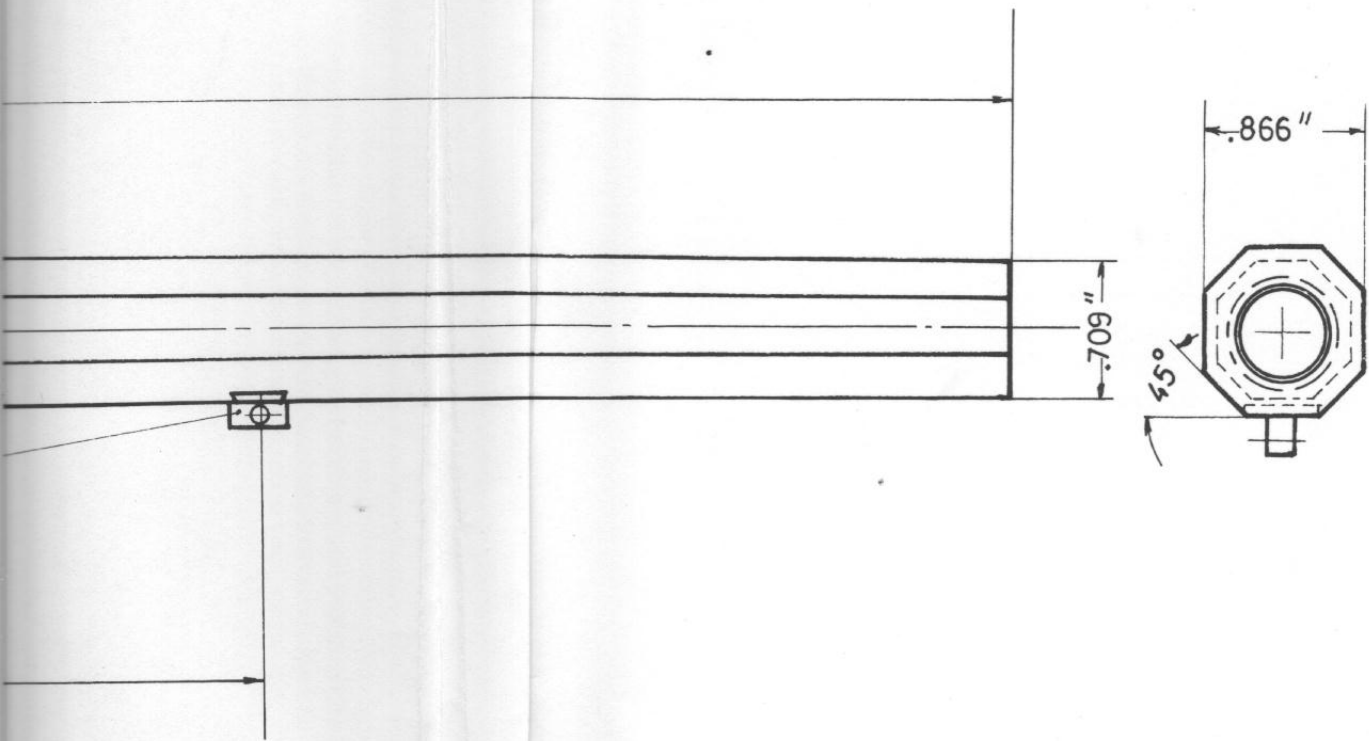


M 2:1

Fig.

22.2

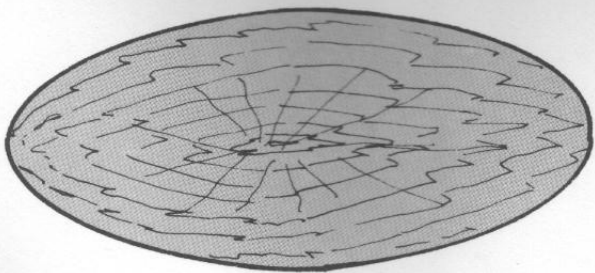
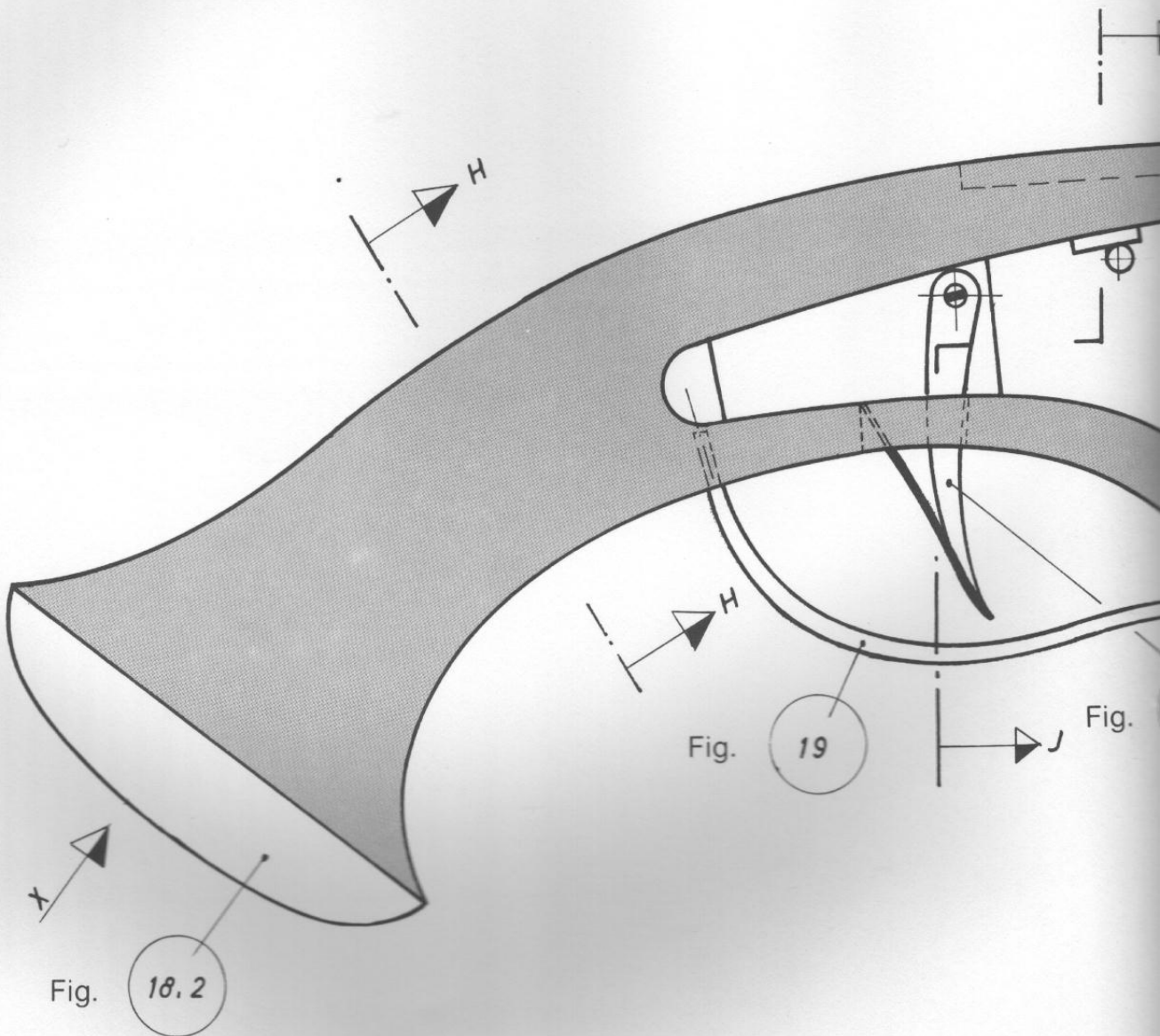




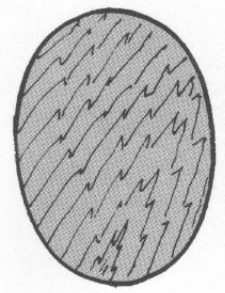
M 2:1

Fig.

22.2



Butt view of grip



H-H

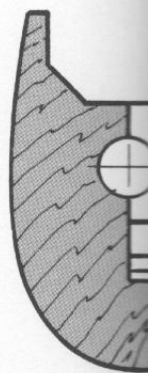
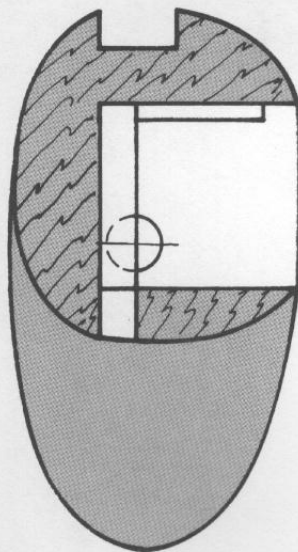
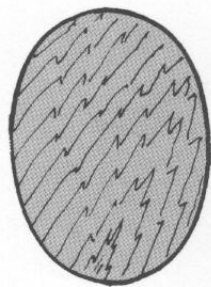
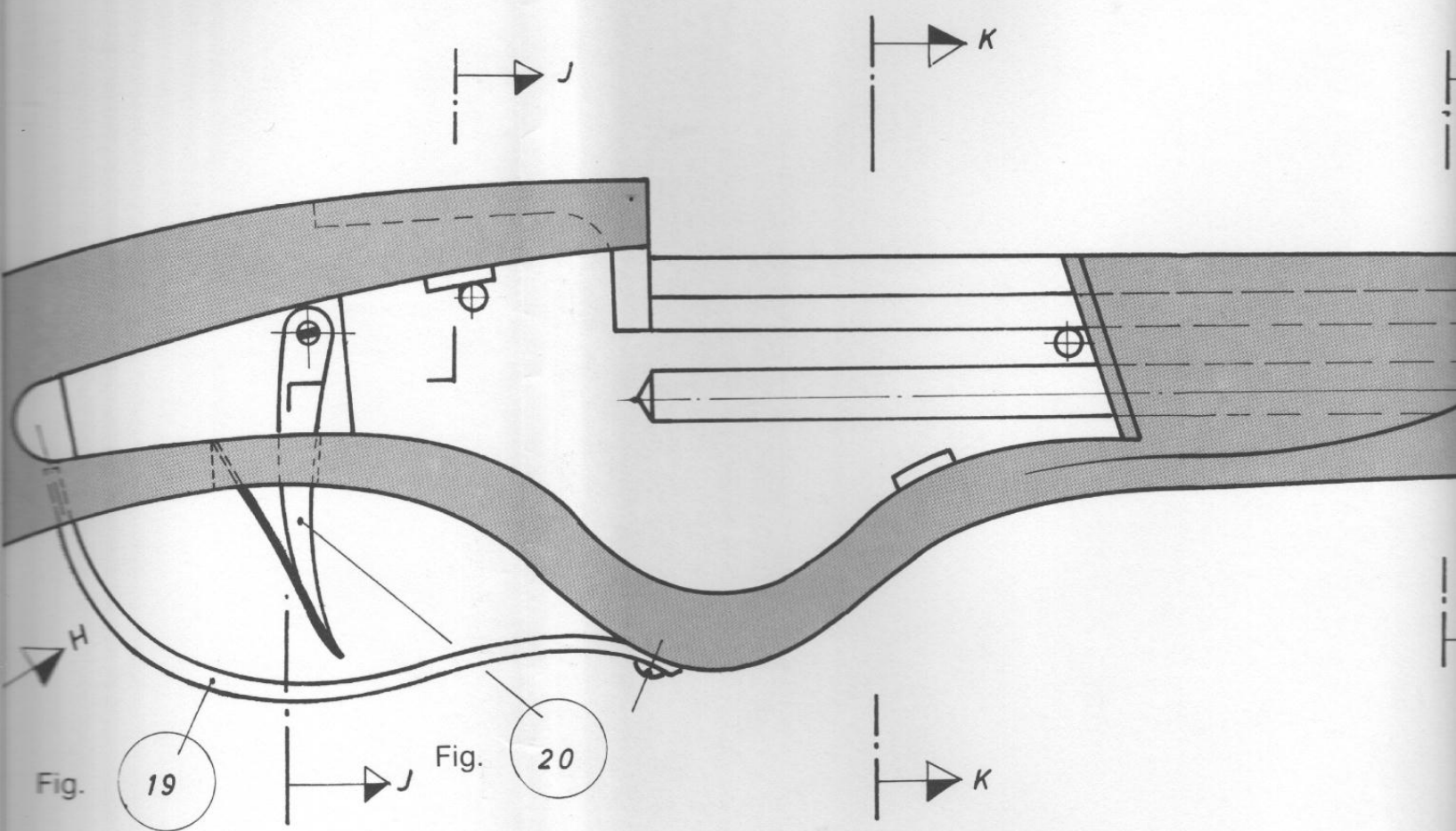


Fig. 18

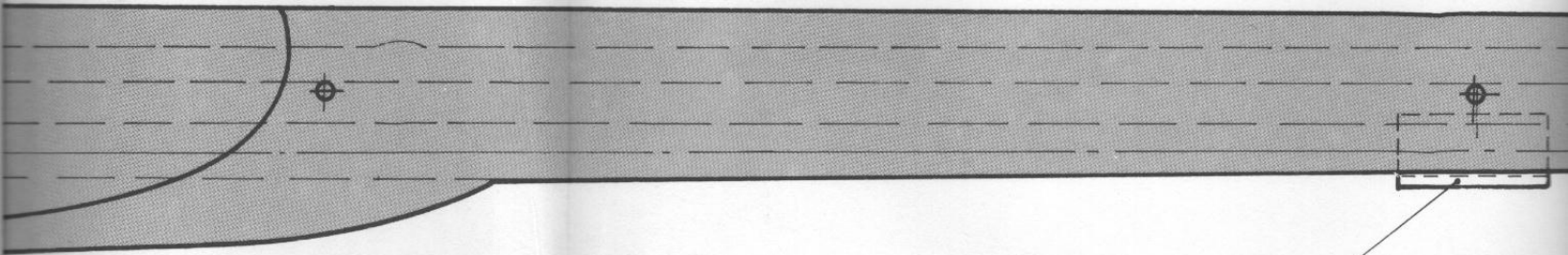
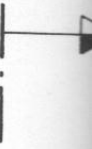
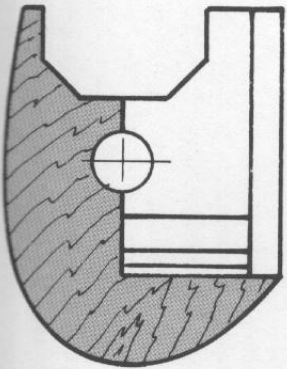
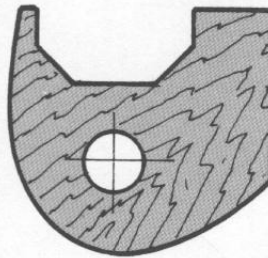


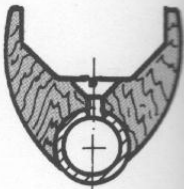
Fig. 21



K-K



L-L



M-M

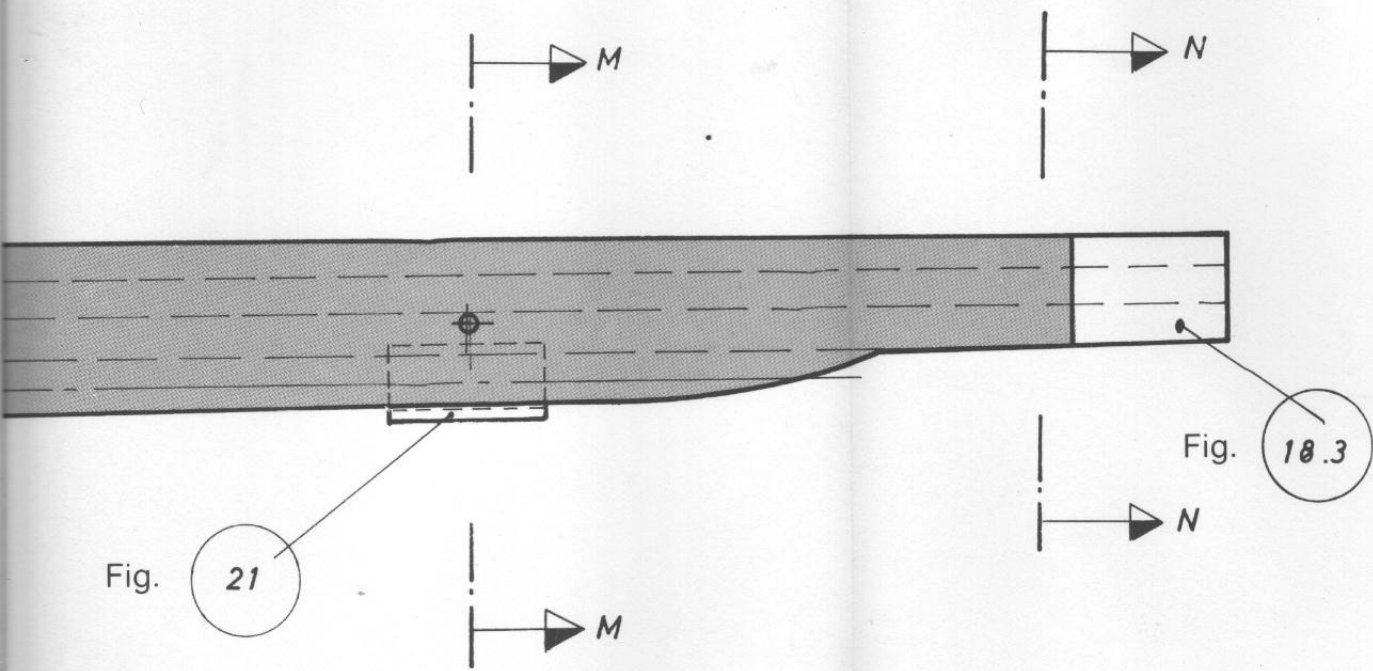
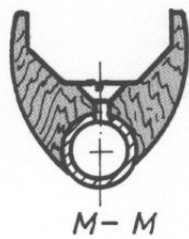


Fig.

21

Fig.

18.3



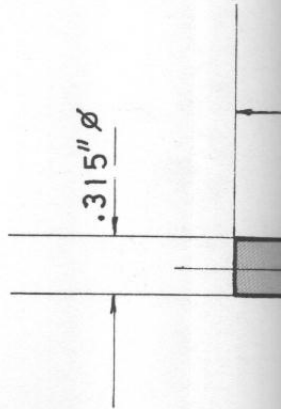
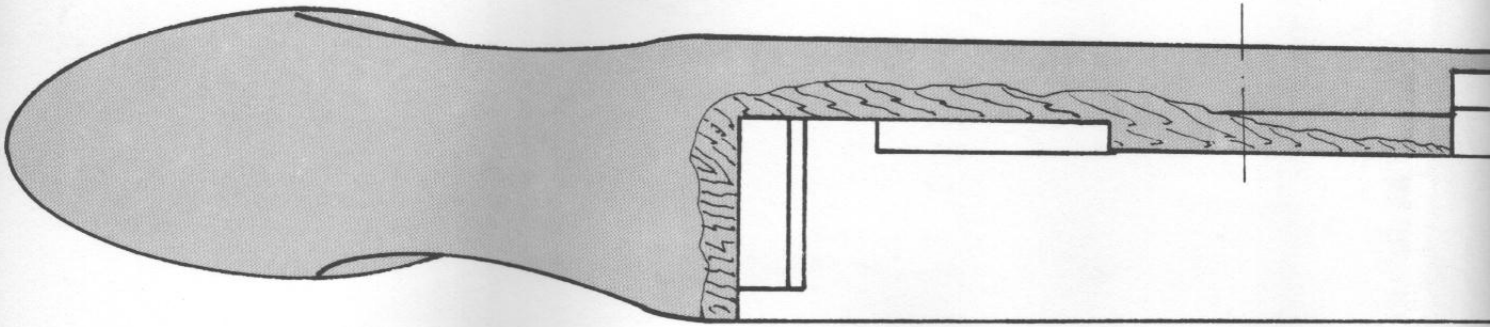
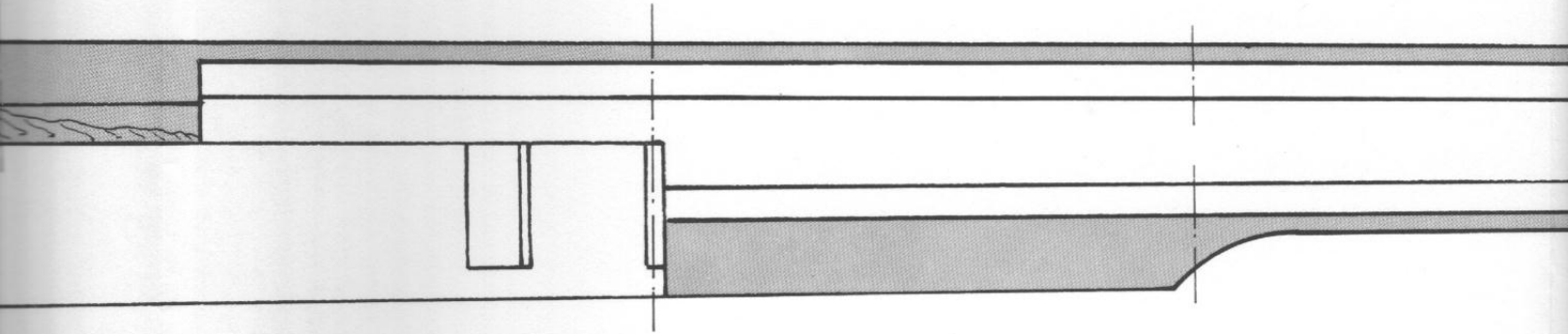


Fig.

18

Part 18, top view showing lock recess in cross-section



.315" \varnothing

15.552"

Fig.

23

cross-section

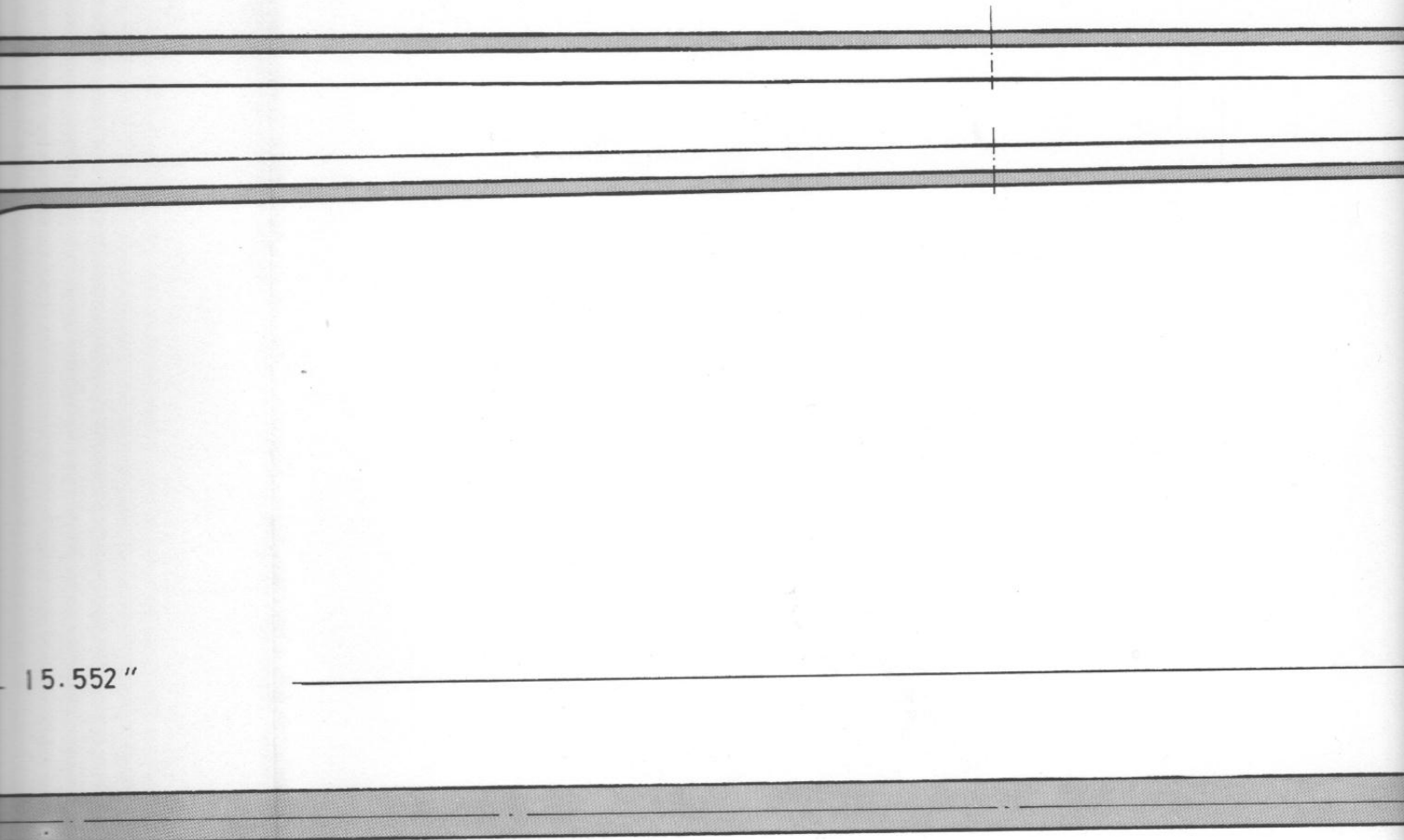
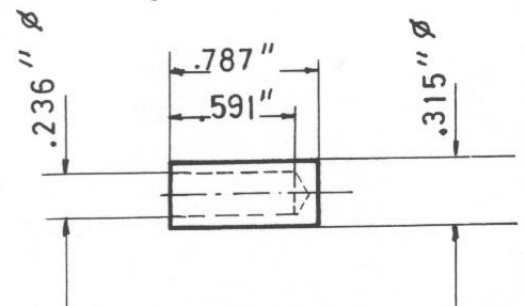


Fig.

23

Fig.

23,2



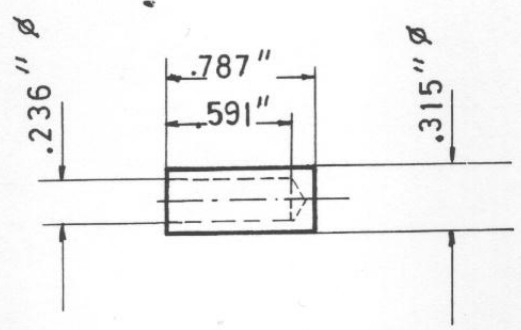
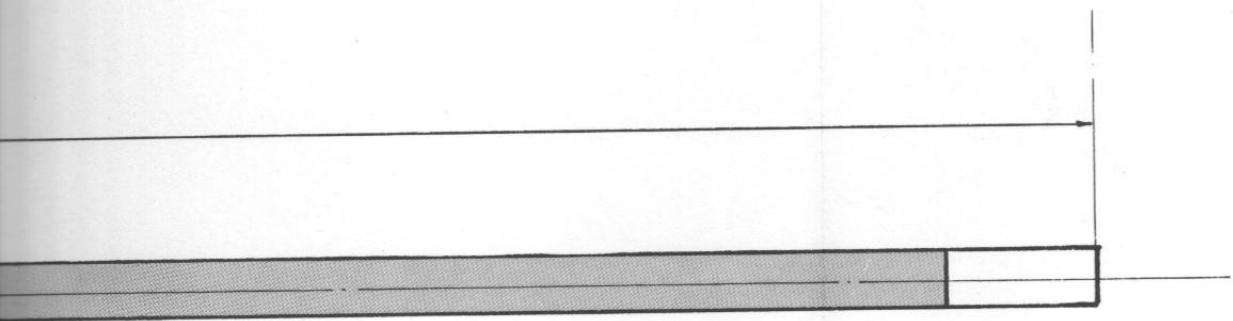
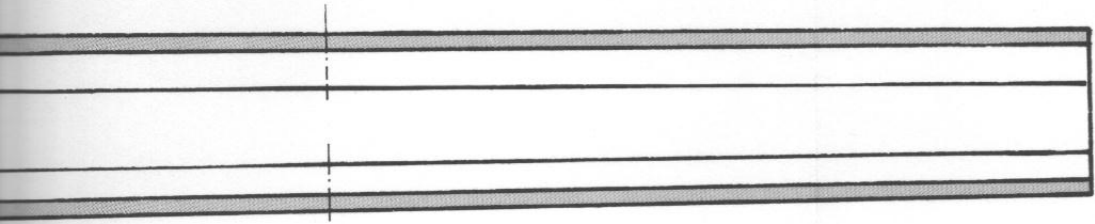
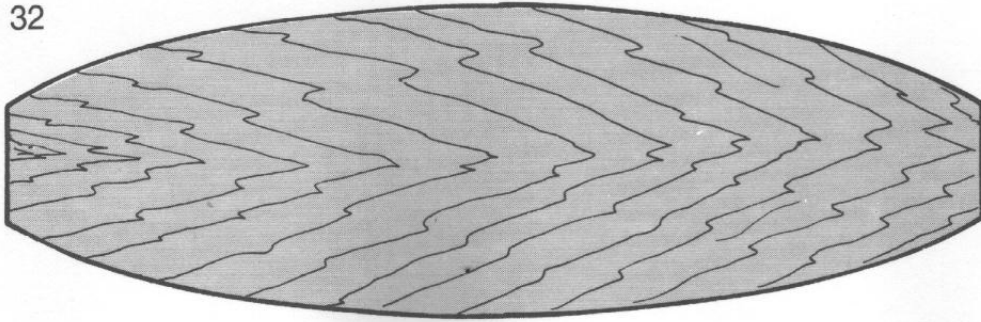


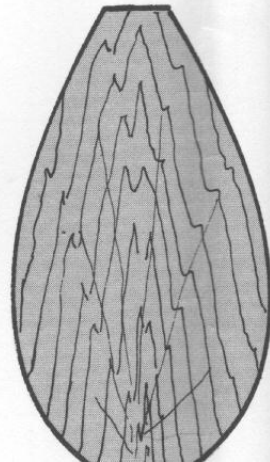
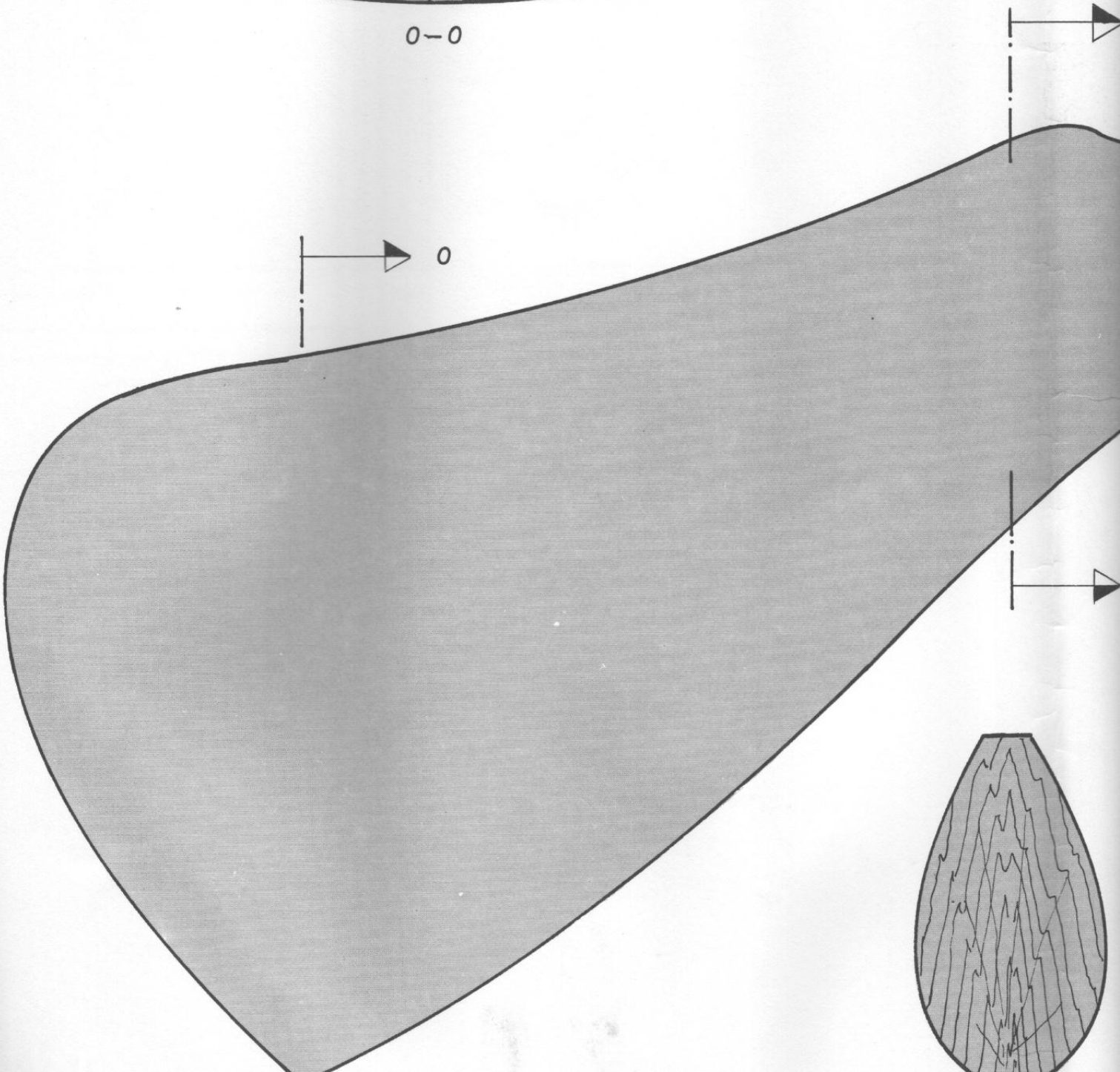
Fig.

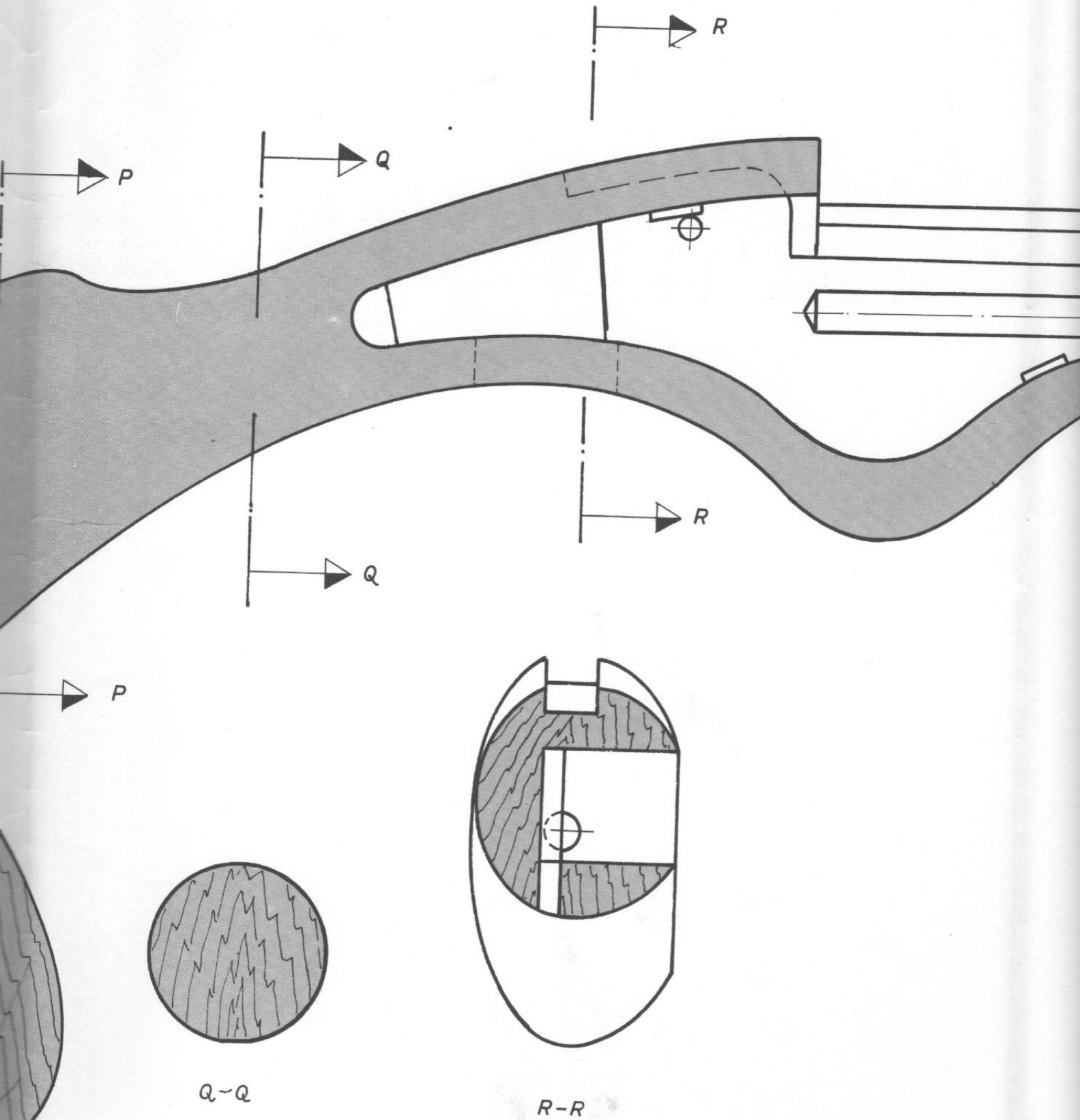
23.2

Plate 32

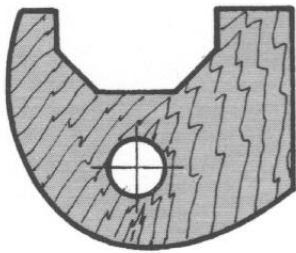
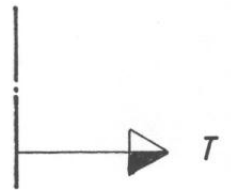
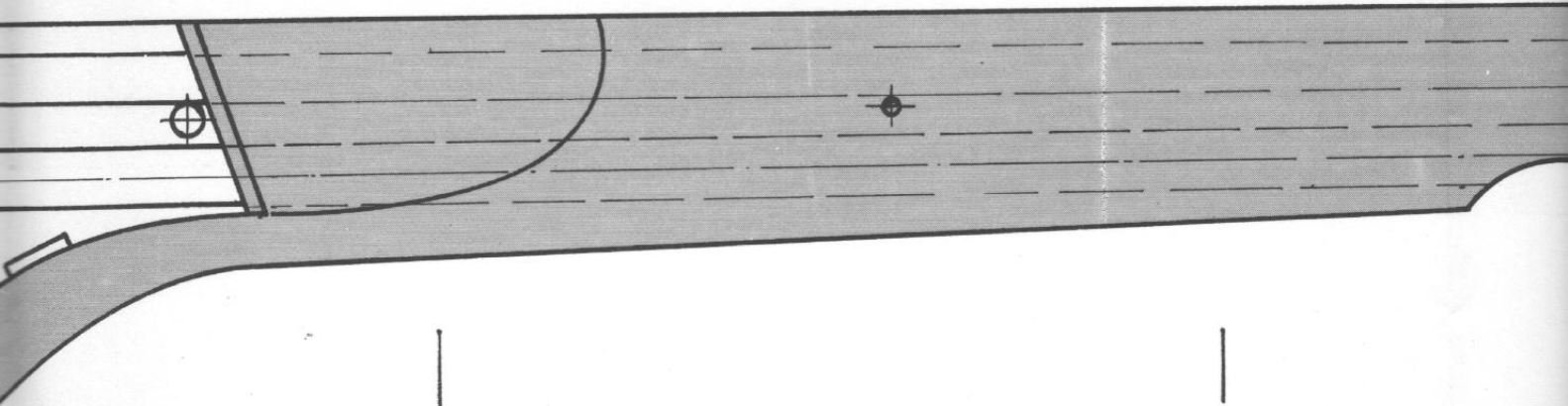
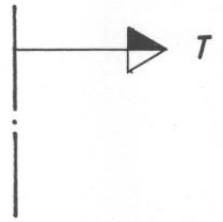
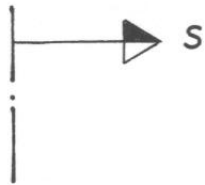


0-0

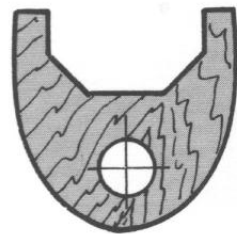




g.

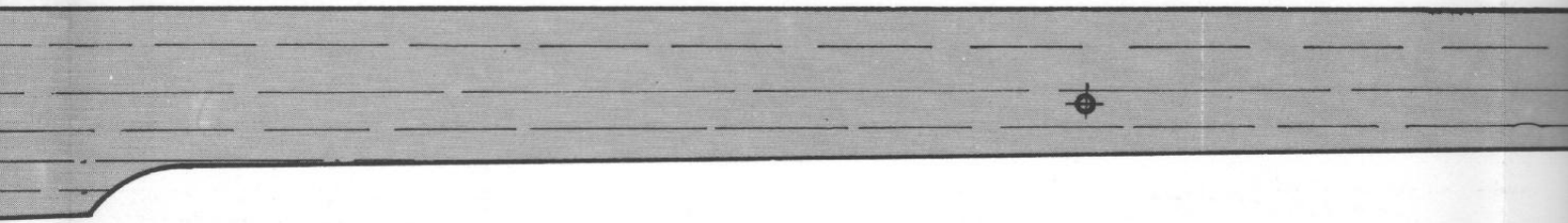
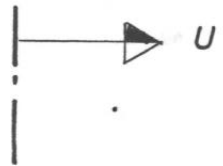


S-S

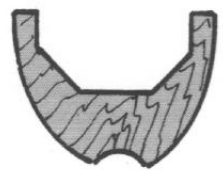
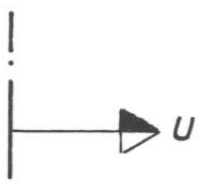


T-T

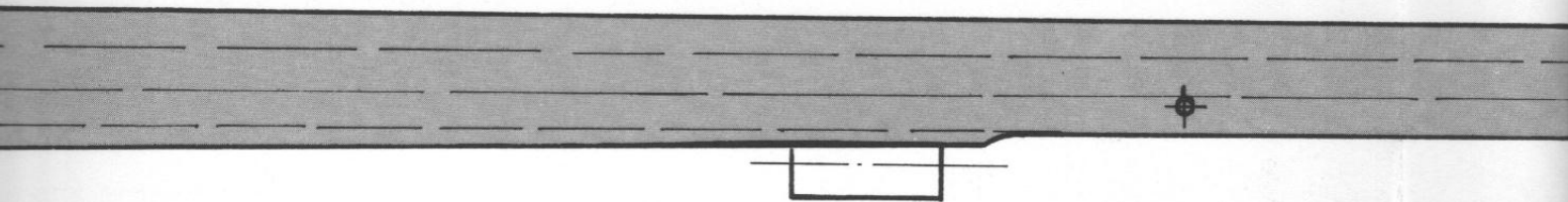
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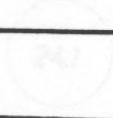
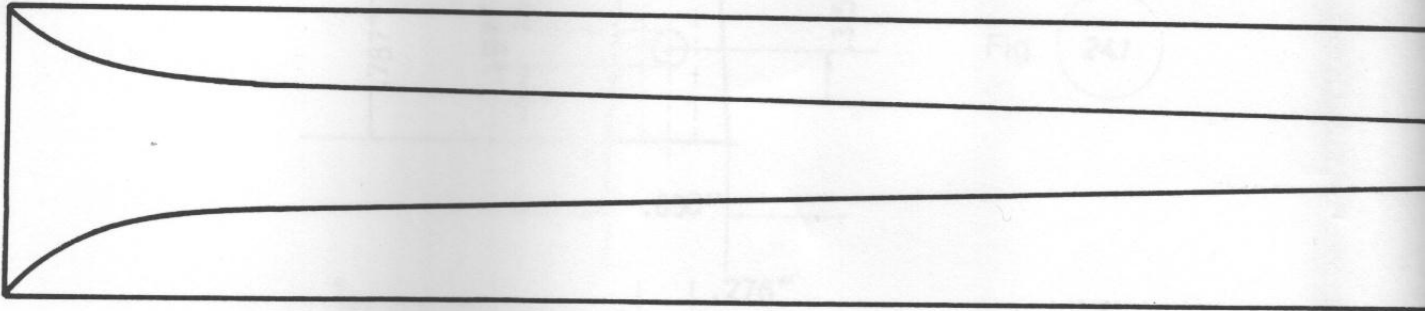


T



U-U





Top View

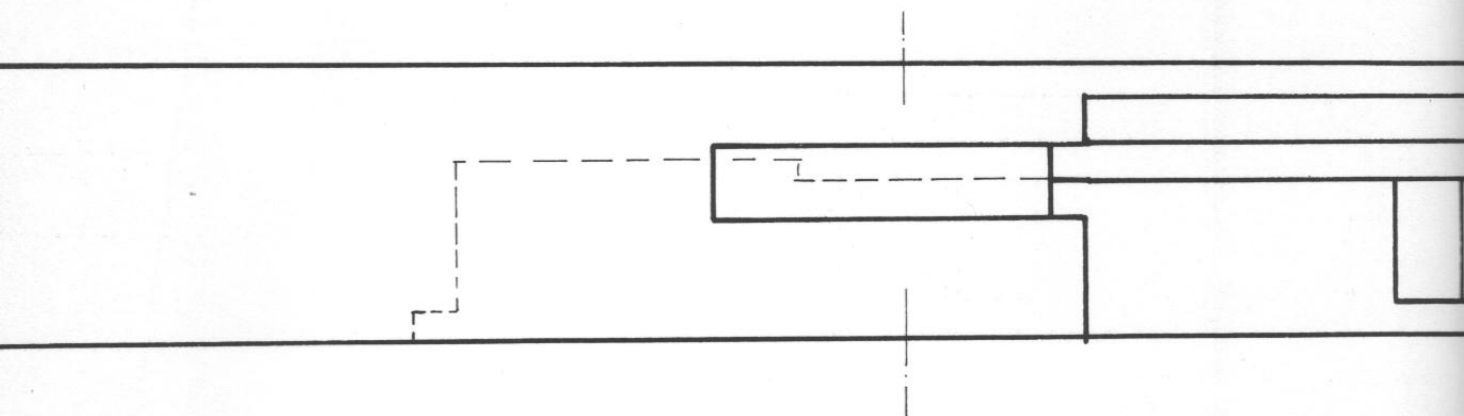


Fig.

24

Plate 34

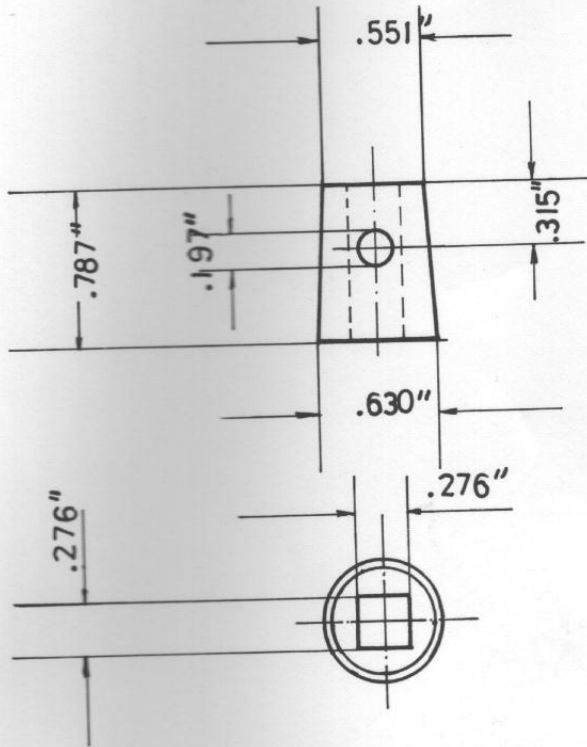
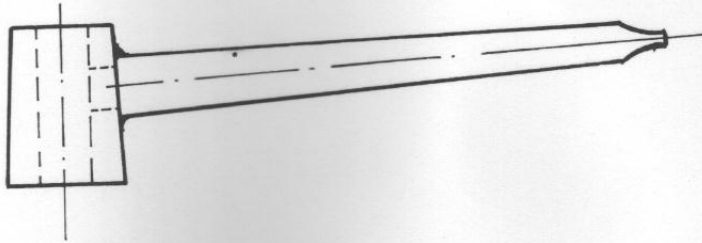


Fig.

24.1

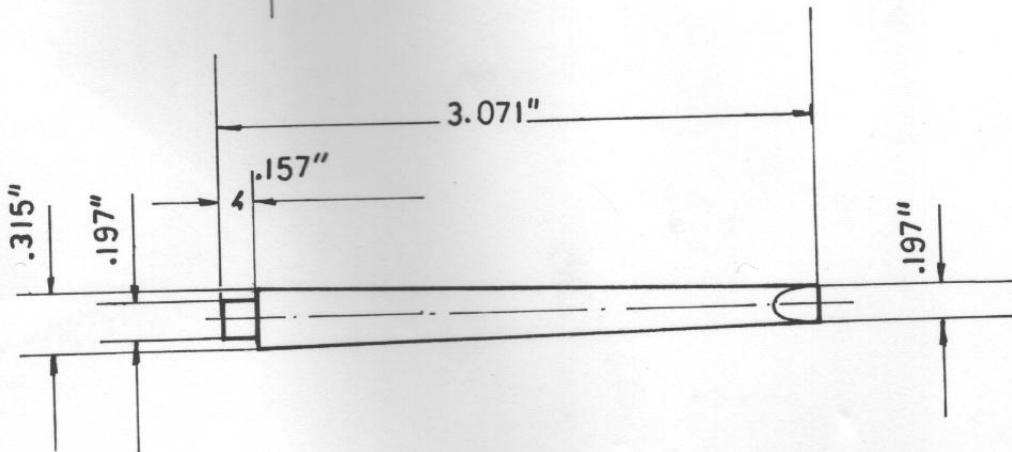


Fig.

24.2