

## BUILDING A BUTTON RIFLING MACHINE



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# Zaibatsu Release

I am the alpha, the omega,  
the beginning and the end

# BUILDING A BUTTON RIFLING MACHINE



## ABOUT THE AUTHOR

Harold Hoffman has through his 30 plus years of experience as a Gunsmith, Toolmaker and Custom Knife maker has passed on to you through his books information that soon may be lost or forgotten. His books are not intended for the person wanting to make a complete firearm, but for learning basic shop tool making.

The information found within his books is for instructional purpose only. -- The titles DO NOT actual cover gun repair on firearms, but how to make needed parts for firearms which is about 40% of all gun repair. Without this information you will be severely limited in gun repair. He first started gun repair when he was 18 years old doing minor repair for the farmers and local hunters in the Bucklin, Kansas area. His main interest was how to make rifle barrels, as he was an avid hunter. Moving into a bigger shop he bought a lathe and proceeded to learn how to use it. He wanted to find out how to make rifling buttons to rifle barrels, tool making, and learn everything about making barrels. Over the years he became an expert toolmaker and how to build most everything that was needed in the shop.

The information found in his books will show you how to make most of the equipment and tools needed in most shops. After an eye accident he quit Gunsmithing and started writing books on everything that he knew. He had so much difficulty finding any information that he wanted all this information that he had learned in over 30 years to be available to everyone otherwise it would be lost. His books are now about the only books available on Gunsmithing/Tool making, as most publishers do not publish Gun or Gunsmithing books anymore.

# BUILDING A BUTTON RIFLING MACHINE

## BUILDING THE MACHINE

The rifling machines shown below are for information on the construction. It can be made smaller or larger for whatever you intend it for. This is the design that I used and yours will probably be different.

This machine is very simple in construction, easy to build, and has given years of trouble free service. I will give you dimensions for two different types, one a vertical type and the other a horizontal machine. You will first need to get a few items to build this machine. The main item is a good low volume hydraulic pump, with at least 1000 pounds of pressure.

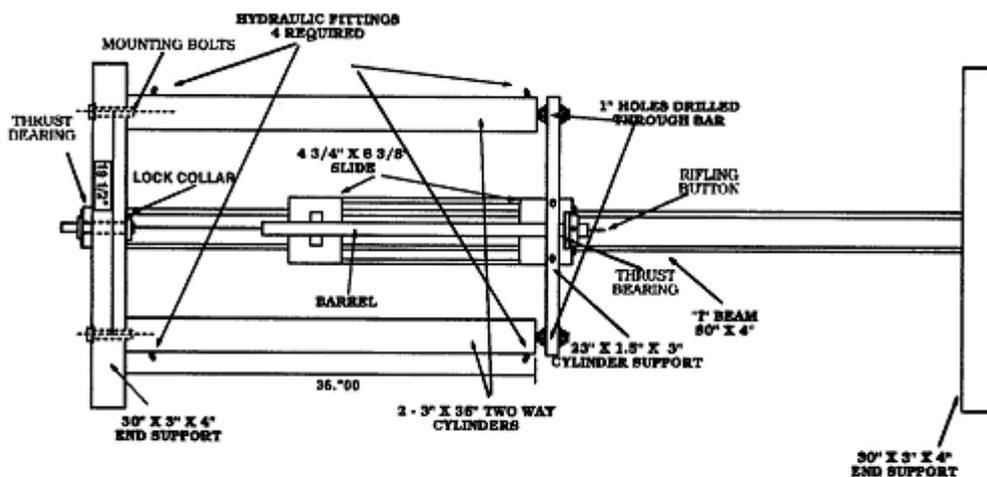


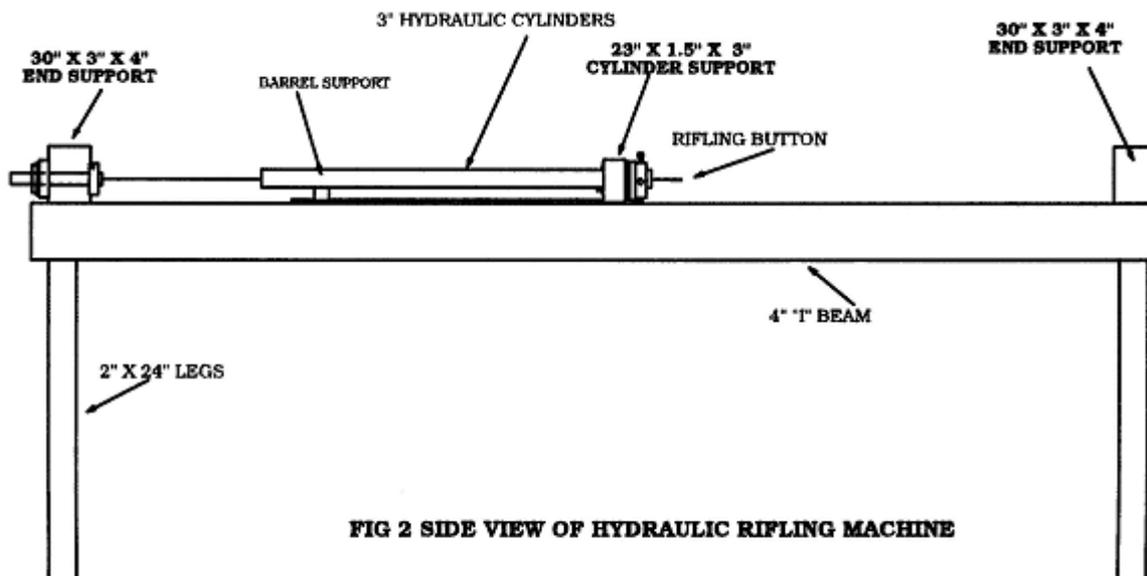
FIG. 1 TOP VIEW OF HYDRAULIC RIFLING MACHINE

This is a supplement book to the Barrels & Actions book that goes into the making of rifle barrels, and will go into more detail of the building of the machine. Also the drawings included will make it easy to cut out all the individual items, and assemble the machine.

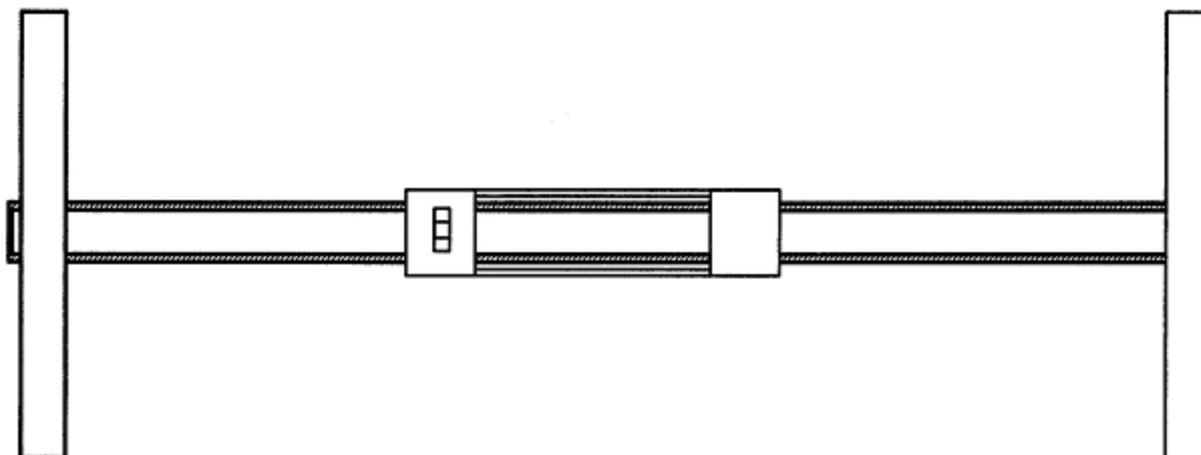
Also, you will need two hydraulic cylinders 2 to 3" diameter, each with a stroke of at least 30 inches. Also find at an automotive parts house, two heavy duty thrust bearings, with a 1 1/4" bore diameter and with an O.D. of not over 3". See Drawing. **Thrust Bearings**

The thrust bearings are used to take care of the torque when rifling, and does a good a job as the more expensive rifling head. When you rifle with a rifling button, the twist that is on the button will cause that twist to be formed in the barrel, regardless if you use a rifling head. You need to buy a 2-way hydraulic control valve, which is used to raise and lower the hydraulic cylinders. If you have a farm supply store, you can find most of the equipment needed to build a rifling machine.

## BUILDING A BUTTON RIFLING MACHINE

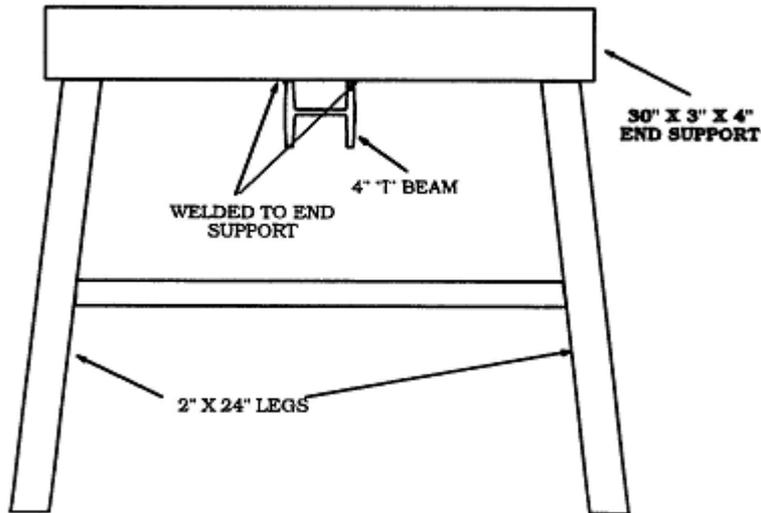


The metal that you use to make the frame is heavy as it takes lots of pressure to rifle a 45 caliber barrel so I do not recommend going much lighter, so two inch material is a good start, 3" is better. All the holes, and alignment should be drilled very carefully, or the cylinders will pull crooked, and bind up in use.



If you plan to rifle barrels over 30 caliber, I would suggest using a rifling head. My rifling machine had a variable speed heavy duty, gear reduction DC electric motor. With this we could reduce, or increase the rate of twist in seconds by use of a speed switch such as used by a light dimmer switch sold at any hardware store. The switch was calibrated for each of the different twists that we used. In most of the smaller caliber's and up to 30 caliber, the pull was not great enough to use the rifling head, and the thrust bearings would take care of the thrust.

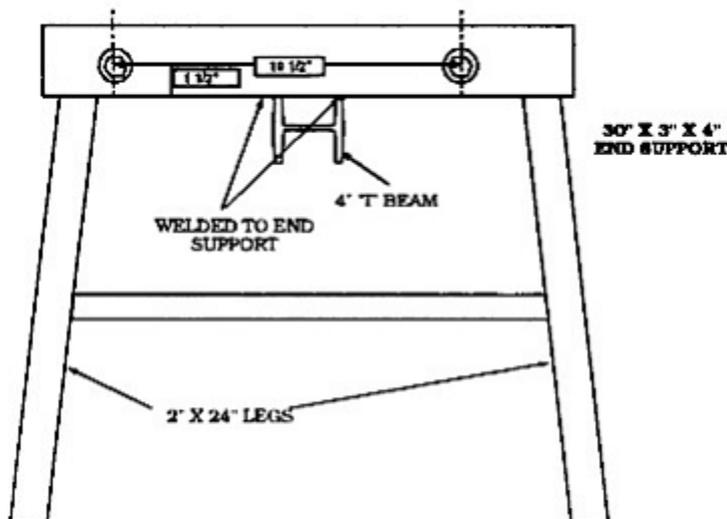
## BUILDING A BUTTON RIFLING MACHINE



**FIGURE 5 END VIEW**

### Hydraulic Pump

The hydraulic pump should be a high pressure, low volume pump, otherwise you will have to have a relief valve in the line to bypass the oil, or the pump will stop the electric motor. A needle valve in the line on a high volume pump will allow you to bypass some oil, and this is the reason for using a low volume pump.

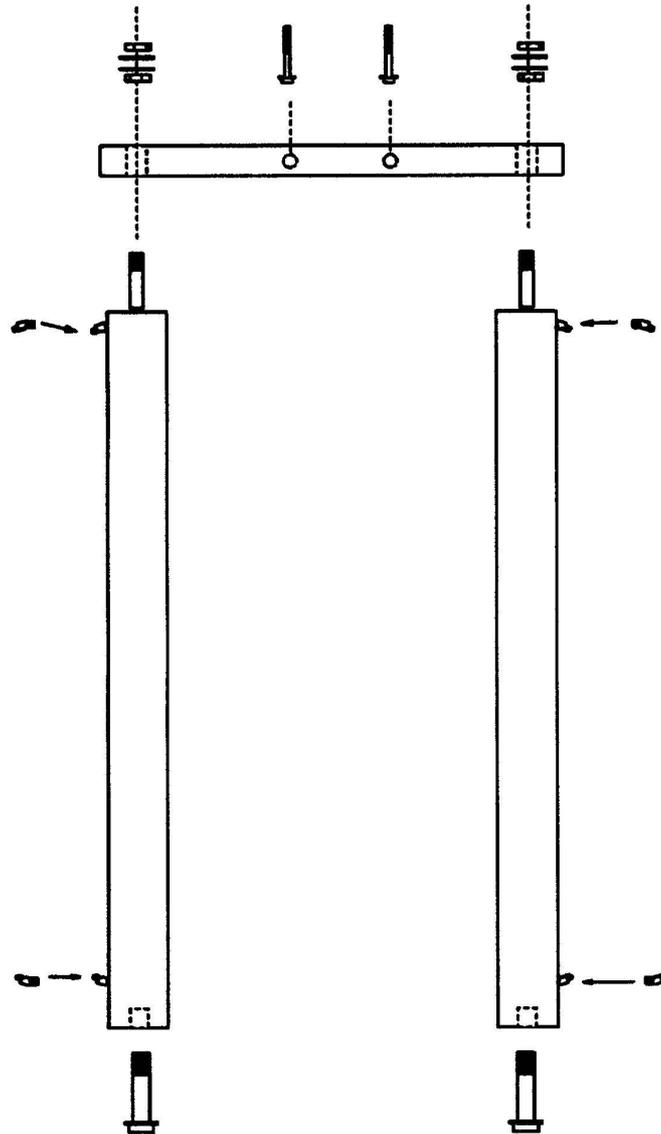


**FIG. 4 CYLINDER END VIEW  
OF FRAME**

You will need at least a 3-horse power electric motor to drive the hydraulic pump, and a 5 horse would be better if you plan to rifle the large bores. It takes a lot of power to pull the rifling button through the barrel.

## BUILDING A BUTTON RIFLING MACHINE

The drawing for the vertical rifling machine shows the machine with the guide pipe, and the horizontal uses a 4" I beam to guide the head.



**FIG. 6 CYLINDER SETUP**

In some drawings on the vertical machine, the guide pipe has been omitted so as not to confuse the reader in reading the drawing. You will see a side view of the drawing showing the rifling machine with the guide pipe. The guide pipe when in use should be well greased so it will not bind or chatter as it is being raised. The top brace that connects the 2 hydraulic cylinders should be level and parallel with the bottom support.

This is very important as when you are rifling a barrel the rod is pulling straight, instead of an

## BUILDING A BUTTON RIFLING MACHINE

angle. This is very important when rifling 22 liners, as they have a tendency to warp anyway when rifled due to the extreme swaging operation.

When the machine is assembled, make sure all the air is bled out of the cylinders and lines. If not, they will pull crooked if air is in the lines. **Rifling Head**

About the only other item that will have to be made and installed is the rifling head. The simplest one is the use of thrust bearings. This head will hold the rifling or pull rod, and the rod holder.

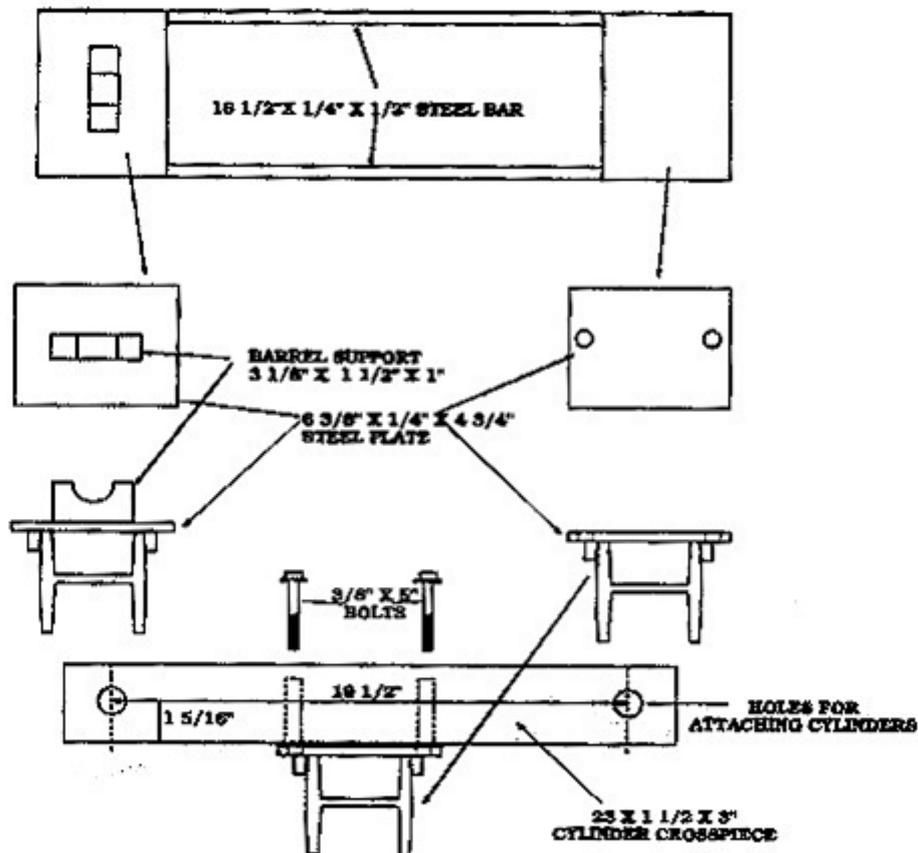


FIG. 7 CYLINDER AND SLIDES

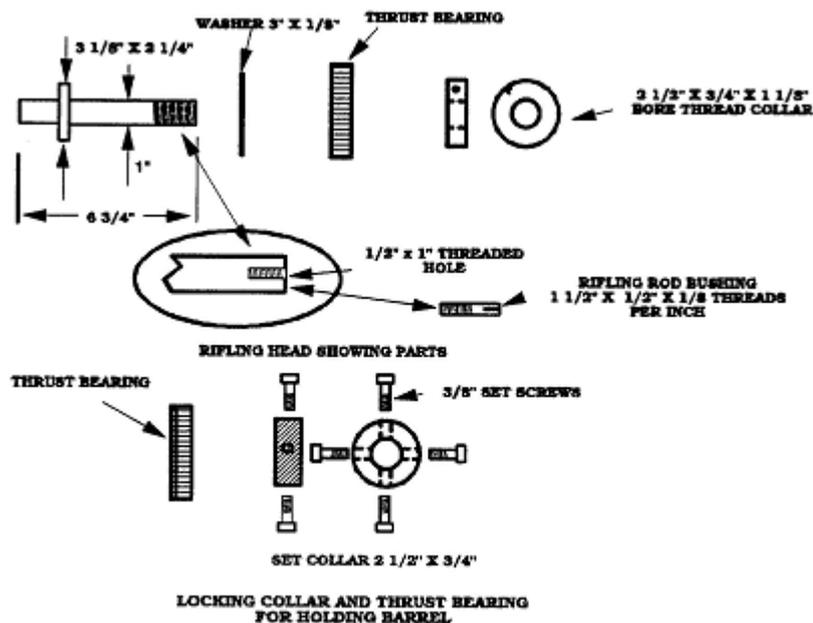
### RIFLING ROD BUSHING Pull Rods

You will need one for each size rod or caliber, such as 1/8" for 17 caliber, .187 for .224-.244-.257, and on up on the sizes. A heavy-duty bearing clamp with at least 3 3/8" set screws to hold the barrel when rifling.

This is shown as a collar in the drawings. When rifling, the setscrew has to be **VERY TIGHT**.

There is a tremendous pull on the machine when the barrel is rifled, as you are pulling an oversize button through a hardened piece of steel. The Button rifling process swages the rifling in the steel, rather than cuts out the grooves.

## BUILDING A BUTTON RIFLING MACHINE



**FIG. 8 RIFLING HEAD BREAKDOWN**

If you plan to rifle barrels over 30 caliber, I would suggest using a rifling head. My rifling machine had a variable speed heavy duty, gear reduction DC electric motor. With this we could reduce, or increase the rate of twist in seconds by use of a calibrated speed switch such as used by a light dimmer switch sold at any hardware store. A small chain, such as a bicycle chain or pulleys is used to drive the rifling head at the proper rotation. Slight changes in the construction of the head will be needed to adapt to the Rifling Head, and a sprocket on the head can be used to rotate the head. The thrust bearings are still used when using the Rifling Head in case the setting is not exactly right. **BUILDING IT**

The first machine is a horizontal rifling machine. This is a good choice if you have the space in the shop. The 4" "I" Beam is 80" long and should be straight as possible as the slides follow it. You will need to get a 30" piece of solid steel 3" X 4" bar. This is for the Hydraulic Cylinder end of the machine. See Figures 1 through 5.

There will be three holes drilled through this bar, two are for attaching the Hydraulic Cylinder, and the third hole is a 1" hole in the center for the rifling head. You need a piece of three or four inch square tubing 30" long for the other end of the rifling machine. See Figure 1 for more details.

## BUILDING A BUTTON RIFLING MACHINE

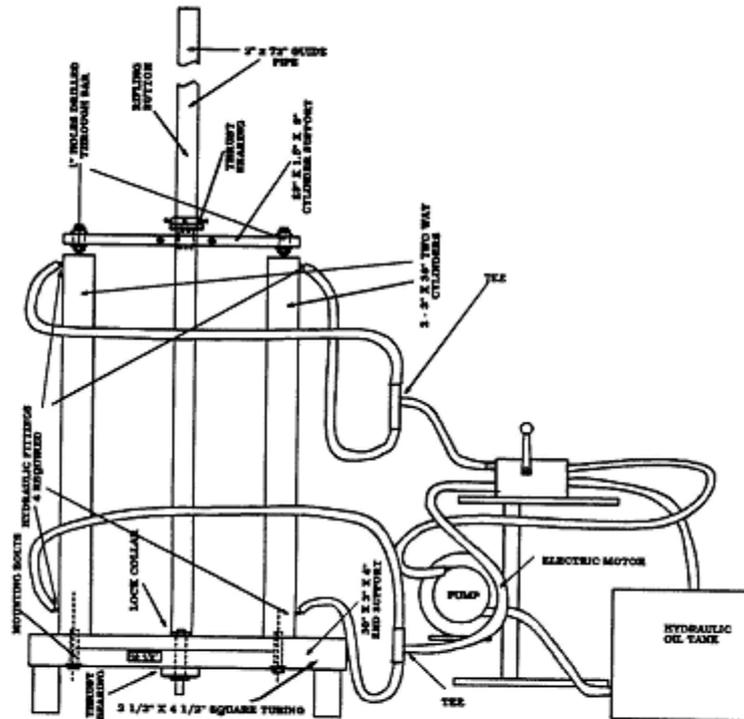


FIG. 8 TOP VIEW OF HYDRAULIC RIFLING MACHINE

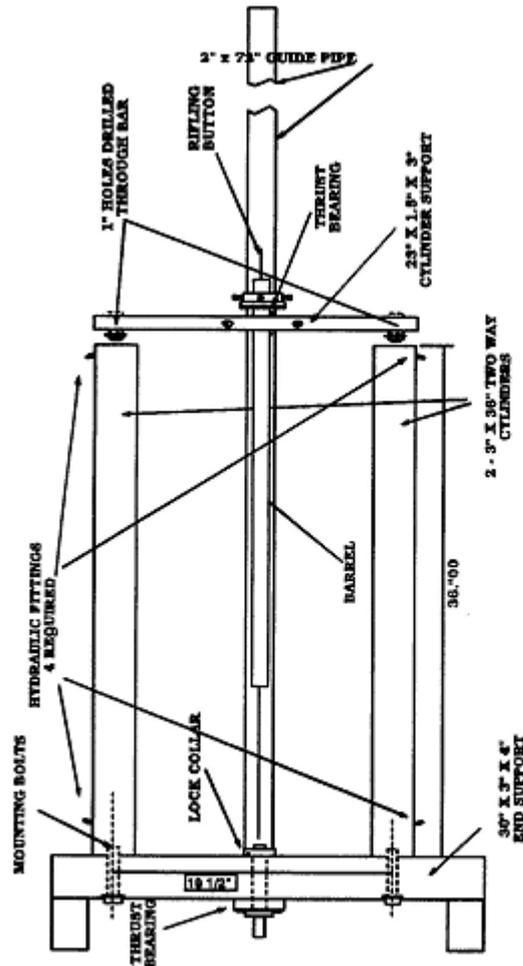
You also will need a length of 2" pipe for the legs of the rifling machine. You need four, 24" long. After getting all the materials, cutting to length, and drilling the holes you are ready to start to assemble the machine. Look at Figure 1,2, and 3 to get an idea on how to put the machine together. The 3" X 4" bar that you mount the Hydraulic to **MUST BE ABSOLUTELY SQUARE** to the "I" Beam, or it will not pull straight. This is the most important step on the machine and great care should be used. See Figure 4 & 5.

Once you have the parts bolted or welded in place, you need a bar of steel 23" X 1 1/2" X 3". This is for mounting the two Hydraulic Cylinder shafts together. See Figure 6. There are three holes drilled on the three-inch side, for the cylinder shafts, and a 1 5/16" hole for the barrel to go through. In the top or 1 1/2" wide, there will be 2 holes drilled for 3/8" bolts that is used for mounting the slide to. These holes can be used as a pilot to spot the slide that travels up and down the "I" Beam. See Figure 7.

The item that you must build is the slide that supports the cylinders and the barrel during rifling. See Figure 7 for the dimensions and construction of the slides. Both slides will have tracks welded or held with screws so they will follow the "I" Beam.

The tracks can be from 1/2" key stock and must be aligned accurately on the slides so they will run true. Once the tracks are fastened in place, they need to be connected by two pieces of 1/4" X 1/2" cold rolled steel. See Figure 7. The two, 16" strips can be welded on while the slides are in place on the "I" Beam. The slides and "I" Beam should be greased during use to minimize the chance of binding.

## BUILDING A BUTTON RIFLING MACHINE



**FIG. 10 TOP VIEW OF HYDRAULIC RIFLING MACHINE**

The barrel support is next fastened to the rear slide, and it is you must get it aligned very accurately, for when you start pulling the button through the barrel, as it cannot bind the barrel. What I mean by binding is it **HAS TO BE EXACTLY CENTERED** so the barrel is just lying on it, and not on an angle. See Figure 1.

The rifling rod head is made next. You will need a lathe to make this, as it is turned from 3 ½" X 7" bar stock. See Figure 8. The rifling head shown, when used with 30 caliber or smaller will be all that is needed in rifling a barrel. The thrust bearing is nothing more than a heavy-duty throw-out bearing that is used in automotive industry.

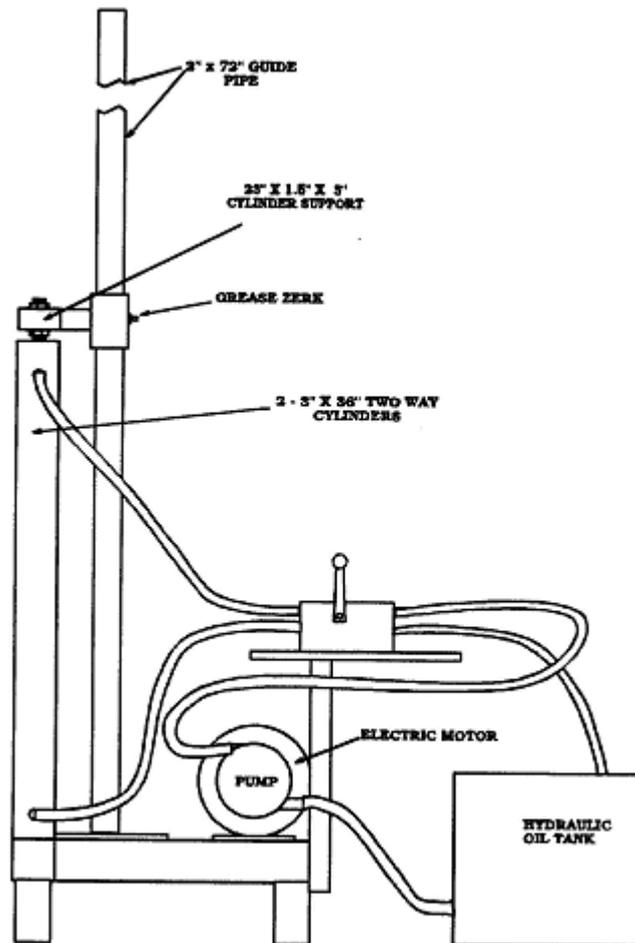
If you mount an adjustable rifling head, it will be connected to this shaft via a sprocket or gear. The threaded end of the shaft is drilled and tapped for a rifling rod bushing. You must make several bushings for the various sizes of rifling rods. The bushing should be made from tool steel and hardened, so the threads are not stripped out under the extreme pull pressure.

# BUILDING A BUTTON RIFLING MACHINE

## Locking Collar

The locking collar is used to hold the barrel when rifling. The collar should have at least 3 - 3/8" set screws (square head) to hold the barrel and 4 if you rifle over 30 caliber barrels. There is a thrust bearing under the collar, the same heavy type that is used on the head. See Figure 2.

**COMPLETING THE MACHINE** After all, the parts are made and assembled (See Figure 1 and 2) the Hydraulics can be set up. The drawings for the Hydraulics are shown for the Vertical machine, but are the same for the Horizontal machines. See Figure 9 through 11.



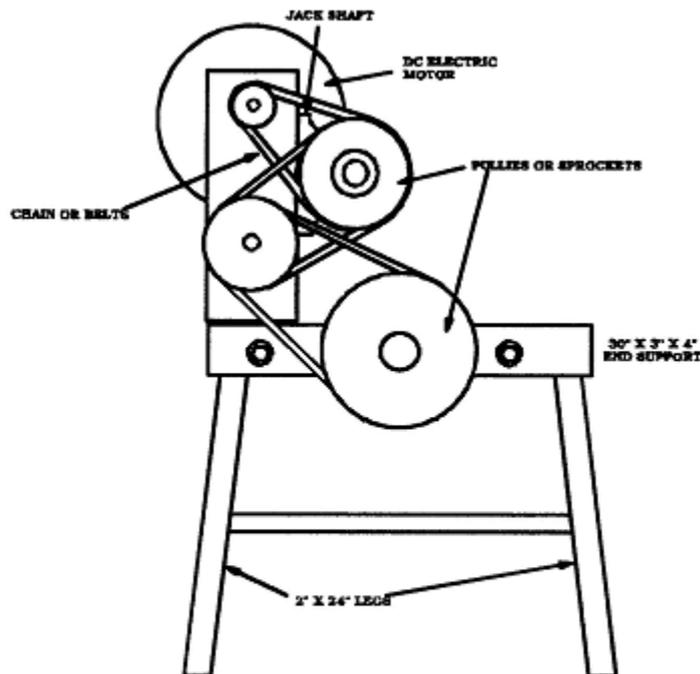
**FIG. 11 VERTICAL RIFLEING MACHINE SIDE VIEW**

The Vertical machine is usually the best choice, especially if you are short on room. The main difference is the guide pipe that serves the same purpose as the "I" Beam. You must get it mounted in perfect alignment so there is no binding or bending when the Cylinders are raised, and it very important to keep it well greased during use.

The easiest type to make and use is the one shown in the drawing. You use a variable speed DC heavy-duty electric motor to regulate the twist that is used when rifling. In most cases once you have set the twist for a 1 - 10", you mark the dial on the switch (light dimmer switch) and you will not have to change it.

## BUILDING A BUTTON RIFLING MACHINE

You can also use an assortment of sprockets of different sizes to get the correct twist for the different twists that you will use. If you do not rifle many barrels this is probably be the best solution. A single or three-speed electric motor can be used, but you will have to use a jackshaft to reduce the speed down to about 500-RPM, and then by using different sizes of sprockets you can get the correct twist.



**FIG. 12 VIEW OF SPEED REDUCER WITH JACK SHAFT**

If you have an old lathe, the quick gear changes can be adopted to regulate the twist. This is probably the best arrangement for the shop that is making many barrels. A stand is made and bolted or welded to the rifling bench so there is no movement or spring when in use. The rifling head shown with the thrust bearings is used as shown, with the sprocket mounted to it. The sprocket in my experience should be 6 to 8 inches in diameter, and the driver sprocket is the size that you use for the correct twist.

After all is hooked up, you have to determine what the twist is. This is the trickiest part, as the twist has to match the speed of the ram as it is being raised. Some of this is a little on guesswork, but if you are not exact, the thrust bearings will correct it. What I do to set the twist is to fasten a 1/8" rod to the rifling head as I normally would if I was rifling.

On the rod I bend over a piece of masking tape with about a 1" edge sticking out. I have it right on the edge of the machine or flat so I have a starting point. I mark the spot where it is at, and then turn on the DC Motor as well as the hydraulic pump motor. The tape will start to rotate, and when it comes to the exact spot where you marked it, pull back the lever that controls the cylinders.

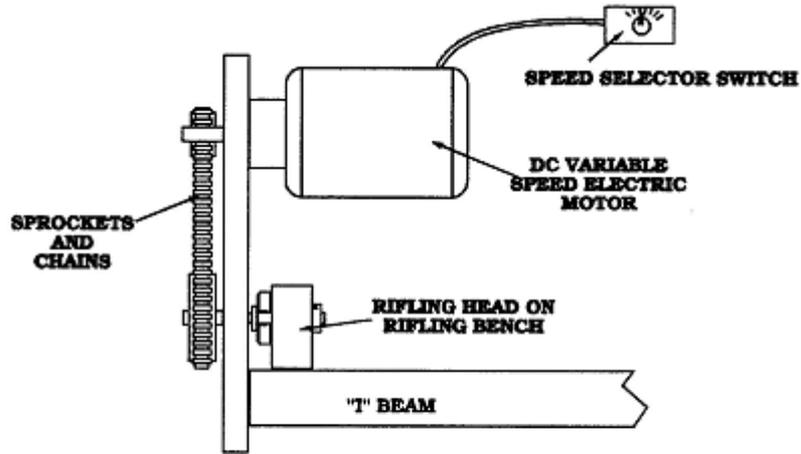
As the cylinders come out, watch the tape so when it comes to the starting place then release the lever. If you measure the distance the cylinders traveled, you will have the amount of twist. You may want to do this a couple times to get an exact reading.

You can now either change the sprockets or pulleys or dial the speed up or down on the DC

## BUILDING A BUTTON RIFLING MACHINE

Motor until you get it right.

The Vertical rifling is set up the same as the horizontal rifle machine, but when you put the legs on it you may want to give it some thought on their length if you mount the rifling head.



**FIG. 13 SPEED REDUCER  
WITHOUT JACKSHAFT**

## BUILDING A BUTTON RIFLING MACHINE

### RIFLING THE BARREL

The rifling of the barrel is the climax of barrel making. In the past this was a very time consuming operation. Not so with button rifling. It should not take over three minutes to do now what it took several hours or days in the past. The important part now is to get proper lubricant for the rifling operation. Without this, when you start to rifle the barrel there will be a loud crack, as the rod pulls into **cant**

The best lubricant that I have found is MolyKote Z, made by Dow Corning Corp, Midland, Mich. This can be purchase in various forms, but the powder is the best, and is what I always used, and with very good results. It looks like graphite but don't let that fool you in think that graphite will work because it won't. It is necessary to mix it with oil and swab the bore.

This is a pressure lubricant, and they say it takes over 50,000 pounds of pressure to break it down. It works great on lathe centers too. If the rod the rod ever pulls off do not think you can get a rod and a big hammer and drive it out.

Don't even tempted to try. If you should be so lucky to drive the button out, it will be shattered. To remove a stuck button stick a short rod down inside the barrel to find where the button is, mark the outside of the barrel, add another 1 ½ inch and saw it off.

Then saw the back end off so you will have a short piece of barrel with the button in it. Next get old hacksaw out and split it length ways on both side, and remove the button. You will notice there will be metal welded on the button, which has to be removed.

When you saw it out be careful that you don't hit the button with the blade, as it will ruin the blade. All that is necessary is to redo the rod and re-sweat the button back on. In button reaming you will not need any special lubricant, just some heavy oil like STP. If you have not left the barrel undersize, you should not have any trouble. It is wise to check each bore with a go-no-go gauge before rifling.

After checking the bore, and lubricating the bore, you are ready to rifle the blank. Set the barrel in the center hole in the rifling machine. Tighten the clamp around the barrel to hold it in place. Make sure the thrust bearing is centered and in place. Turn on the machine, and pull the control lever back and hopefully watch the barrel being rifled.

**DO NOT STOP ONCE YOU STARTED, AS WHEN YOU START UP AGAIN YOU WILL PROBABLY PULL THE BUTTON OR ROD INTO.**

On the smaller calibers you will see the barrel rotating on the thrust bearings as the rifling button makes the proper twist in the barrel, but in button reaming they won't move. When through lift the barrel from the top frame, without removing the clamps unscrew the button and remove from the machine. Then lower the frame back down. The barrel is through with button reaming. If you are using 1350 or Stress proof don't button ream, only on 4150 do you need to do this.

Lubricate the bore with MolyKote Z, put the barrel back in the machine, slide the rifling button back down the bore, and screw it into the head. Be sure the thrust bearing is centered under the clamp. Pull the lever back, and the barrel will rotate by itself as the button passes through the bore. If the barrel doesn't rotate, help it. If you have a rifling head, this won't be

## BUILDING A BUTTON RIFLING MACHINE

necessary. The smaller calibers do not pull that hard, but on 45's, the motor slows down and breathing ceases until the button comes out the barrel.

I would not recommend that you try to rifle any stainless steel at first, as on them you will need to leave the bore slightly oversize. When the button has come out of the barrel, remove the barrel, wipe out and you should have as good a barrel as any produced by a manufacture.

**The graphics for the Making A Button Rifling was not to good.** I have rescanned the graphics and there is a good improvement on them. You will need the Adobe Reader to view the file.