

Altering Enfield Actions to .416 Rugby and .505 Gibbs

Information by James Wisner
as told to Steve Nelson

(Editor's note: This is the first installment of two on this specific topic.)

I prefer 1914 (.303 British) bolts when going to the .505 Gibbs cartridge. The additional metal on the split lug leaves more material when opened up for the larger casehead. The 1917 bolts leave very little metal at this point.

I also hand select the receivers. Specifically look for any cracks or flaws in the receiver ring. Check the thumb relief on the top of the left-hand raceway. Some of these extend to the very corner of the raceway which often causes the bolt to bind as it passes this area. Avoid these actions, if possible.

Finally, check the bottom sides of the receiver. Some actions have lumps milled on the sides of the receiver. Choose actions which are straight and parallel here. They will be easier to hold in the vise during the ensuing machining steps.

Select receivers that are as wide as possible across this bottom flat.

Many alterations may be done to the trigger unit, the bolt stop and the rear section of the bridge and many different contours can be given to the rear bridge. I will cover those areas one at a time and discuss the styles and techniques which I have found to be cosmetically and structurally best.

I normally use a Timney sportsman trigger unit (Timney #E1-5-SP). This is a simple, lightweight trigger which is fully adjustable and safe.

The best modification I have found for the bolt stop is to weld the rear portion as illustrated. Then the bolt stop spring can be cut off flush with the back of the mounting boss and it will function like a Mauser 98 bolt stop.

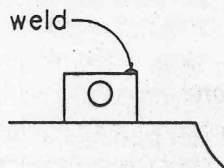


Diagram #1

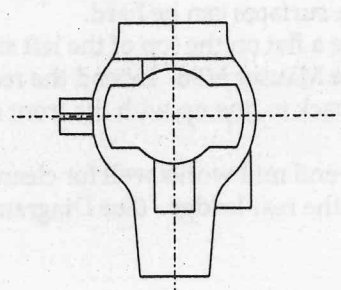
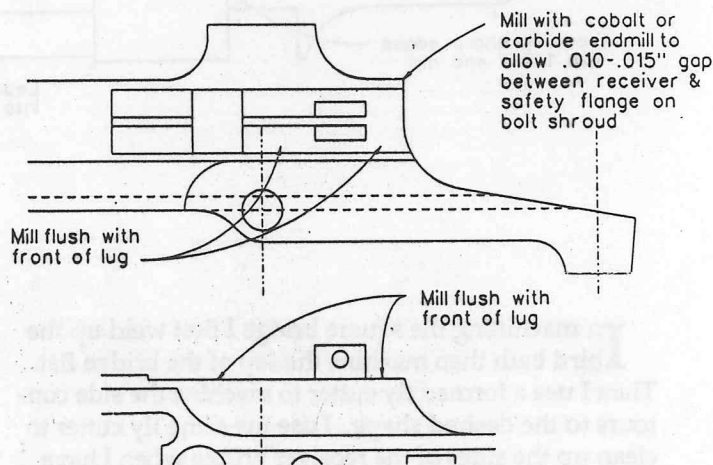


Diagram #2

To dress up the receiver, mill the flats in front and back of the bolt stop mounting boss so that the bolt stop lays flat against the receiver. (See Diagram #1)

Normally I cut off the rear sight ears with a metal bandsaw or mill them off with a cobalt roughing end mill. Then sandblast the bird bath recess in the top of the rear receiver bridge. Make a steel plug to fit this recess and wire-feed weld it solid. Afterwards, the rear bridge can be turned to Remington Model 700 contours or machined to a square bridge reminiscent of the Oberndorf sporters. It may be necessary to normalize the rear bridge by heating with the torch to 1000-1100 degrees F and allowing it to air cool. Mill the area around the bolt stop as shown. The dimension from the bolt stop lug to the rear of the receiver should be between 1/8" and 3/16" or .010-.015" from the rear of the receiver to the gas flange on a new bolt shroud, if one is to be used. (See Diagram #2)

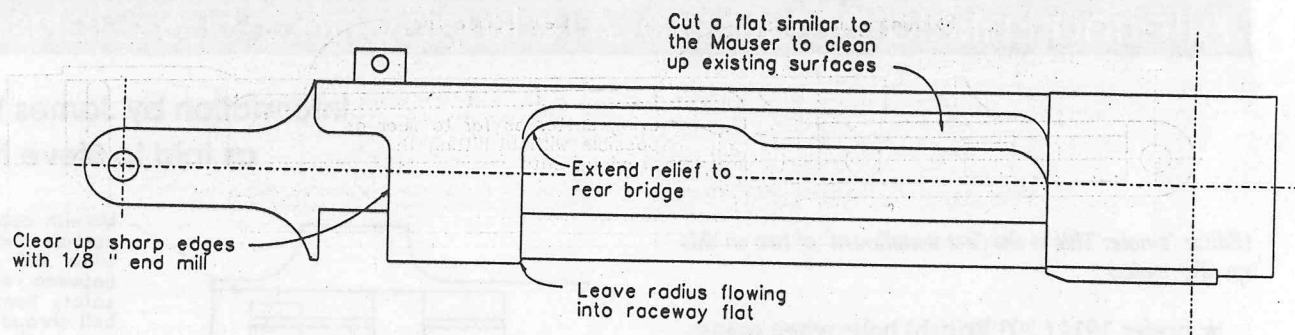


Diagram #3

In machining the square bridge I first weld up the bird bath then machine the top of the bridge flat. Then I use a formed fly cutter to machine the side contours to the desired shape. I use the same fly cutter to clean up the sides of the receiver bridge when I have contoured it to match the Model 700 dimensions.

Most of the ejection port machining can be done with a 1/2" or 3/8" diameter end mill, preferably carbide as these surfaces can be hard.

I machine a flat on the top of the left side rail similar to the Mauser M98. Extend the rear relief cut all the way back to line up with the front edge of the rear bridge.

The 1/8" end mill works well for cleaning up the rear edge of the rear bridge. (See Diagram #3 above)

Now it's time to machine the feed rails. Turn a steel plug for the old trigger spring recess and silver solder it in place. This is necessary since the new magazine box recess will cut into this old recess.

Clean up the plug with the end mill so that the new trigger will function properly. For holding the action, I screw 1/4" square key stock to the top edge of the jaws on a 5" or 6" Kurt type anglelock mill vise. This allows me to turn the action upside down, reach around the body of the action and grip the sides of the bottom flat. This is the reason I suggested avoiding actions which are not parallel on the sides of the bottom flat. (See Diagram #4 below)

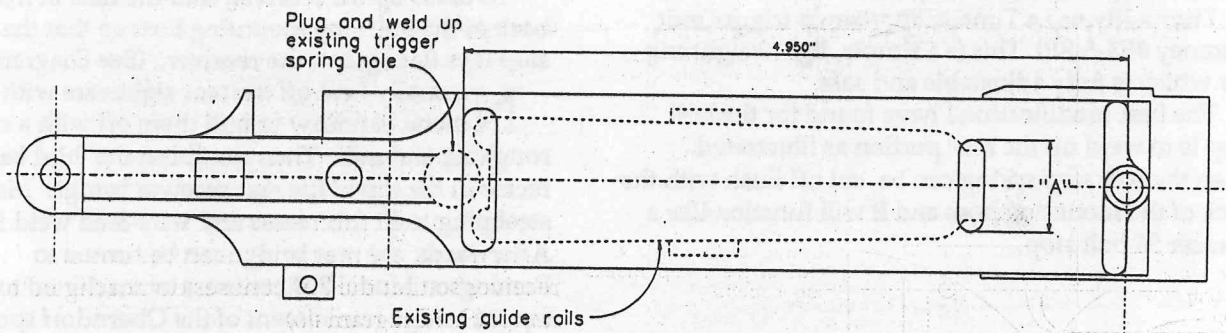
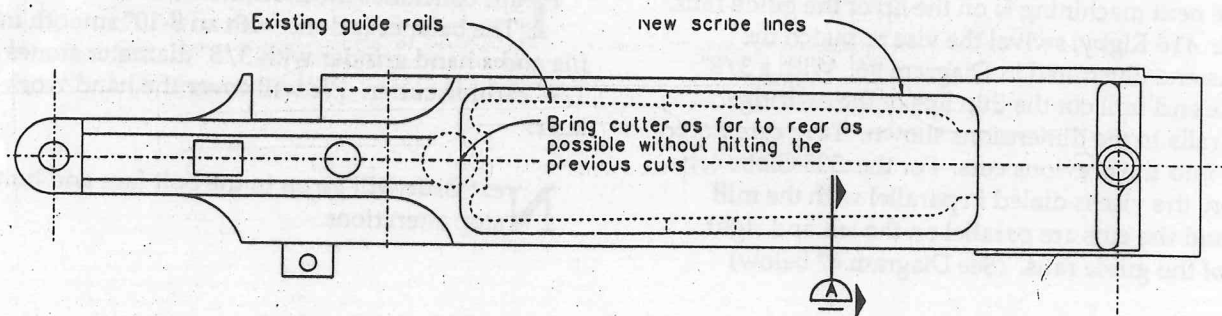


Diagram #4



With the action held upside down in the vise, use a 3/16" carbide to end mill open up the rear of the magazine mortise for the rear lip of the new magazine box.

With the same setup and cutter, mill the rear top of the cartridge rails as indicated at A. This dimension is 0.670" wide and centered for the .416 Rigby and 0.710" for the .505 Gibbs.

Put *Dykem* on the bottom flat of the receiver. When the *Dykem* is dry and being careful not to scratch the dye, place the new trigger guard on the bottom flat and index it with the old rear guard screw through the front guard screw hole into the receiver.

Line up the trigger guard on the receiver flat and hold it firmly in place. Reach inside with a scribe and mark along the inside edge of the magazine opening. This will give a scribe line for machining the bottom of the cartridge guide rails. (See Diagram #5 above)

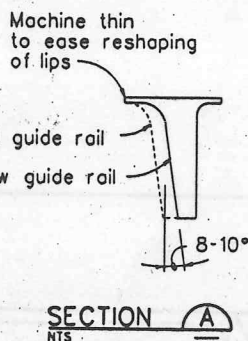


Diagram #5

Use a 3/8" or 7/16" carbide ball end mill for the .416 Rigby, and a 1/2" carbide ball end mill for the .505 Gibbs.

Tip the head of the mill to give a 8-10 degree relief to the side rails. The angle of this relief is critical. Steeper or shallower angles will cause feeding problems. Alternatively, you could grind up a special end mill with this relief angle built in

and thus avoid having to tip the mill head. Swivel the vise to match the taper of the magazine box side front to back.

Running the mill at 650 rpm and using a moderate feed rate, mill the feed rails up to the scribe line and to a depth as indicated in the diagram. Mill one side then tip the head, swivel the vise and mill the other side.

In order to mill the feed ramp, position the receiver in the vise with the bottom flat at a 45 degree angle (plus or minus 5 degrees) and machine with a 1/2" carbide end mill run at 650 rpm. Again, be sure the vise is parallel to the table! Also, be sure to leave a 1/32" wide flat at the top of the feed ramp and a slight flat where the ramp meets the bottom of the receiver so that the bullet noses do not dig in to the ramp. (See Diagram #6)

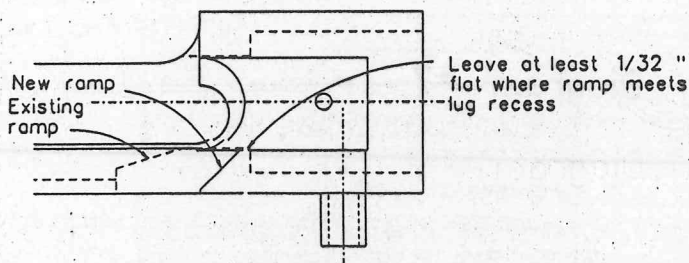
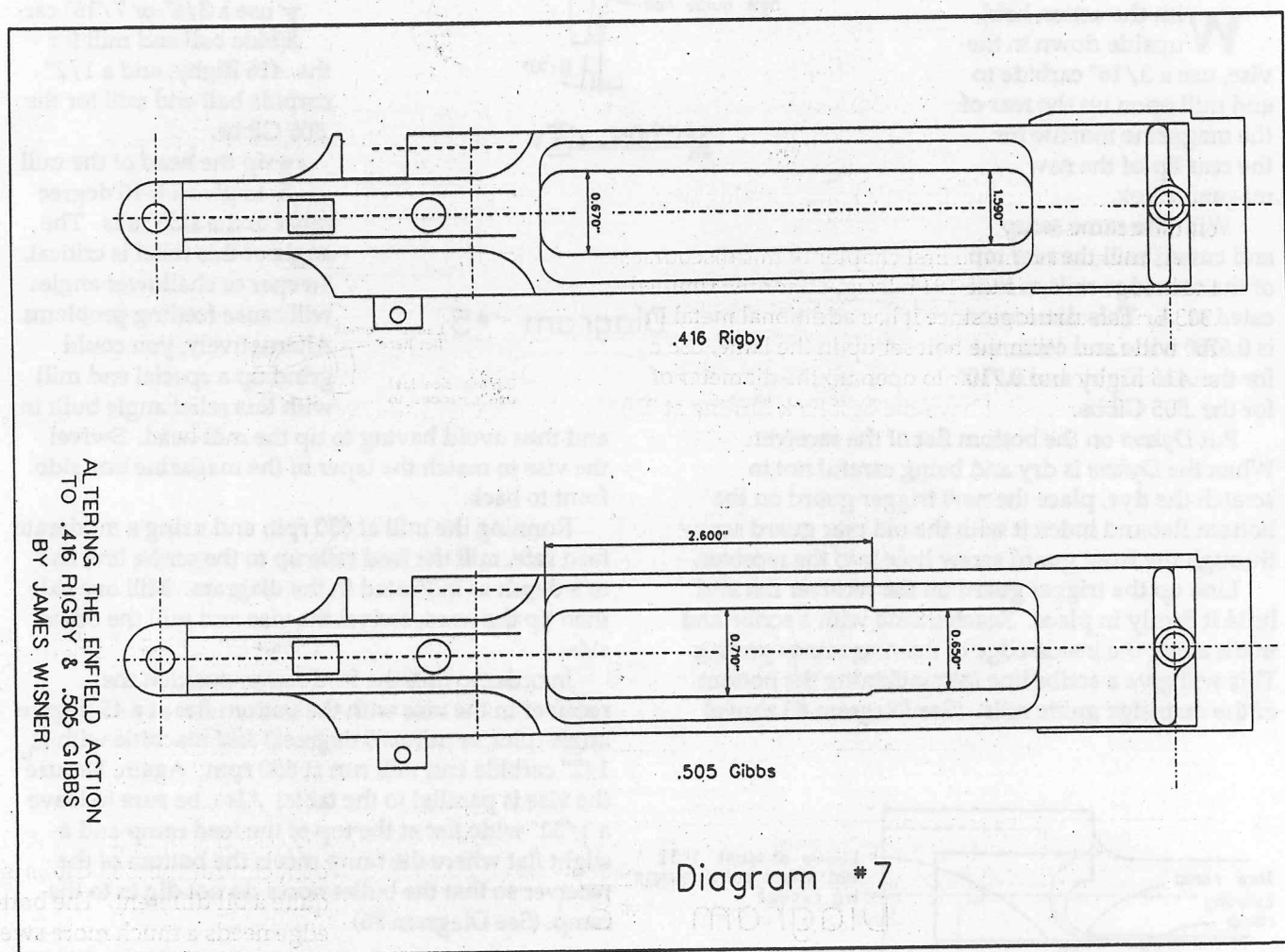


Diagram #6

The next machining is on the lip of the guide rails. For the .416 Rigby, swivel the vise to match the dimensions illustrated in Diagram #6. With a 3/8" carbide end mill cut the thin lips of the cartridge guide rails to the dimensions shown. Take care not to bump into the previous cuts. For the .505 Gibbs conversion, the vise is dialed in parallel with the mill table and the cuts are parallel on the left and right sides of the guide rails. (See Diagram #7 below)

This concludes the machine work on the rails. The balance is done with an 8-10" smooth mill file and a hand grinder with 3/8" diameter stones and 1/4" carbide cutter. We will cover the hand work later.

Next issue will go on to the bolt face and bolt stop alterations.



Altering Enfield Actions to .416 Rigby and .505 Gibbs

Information by James Wisner
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[Editor's Note: Before starting this month's installment in the ongoing saga of metalwork specialties from James Wisner, let the editor apologize for two very obvious errors in the last issue. Most obvious was the new cartridge designation. No, loyal readers, there is not, to my knowledge, a new wildcat .416 Rugby! This was simply a typographical error which often occurs with printing gremlins. The second error was maybe not so obvious. In the last illustration for this article, "Diagram #7," I mistakenly noted the width of the front guide rail opening as 1.590". That is, of course, too wide by 1.00". The dimensions should have read 0.590". Not that any of you would make such a mistake on the mill but, just to be certain, please change in bright red pen, this dimension.]

In the last issue we discussed the machine modifications to the Enfield action to fit it to the huge .416 Rigby and .505 Gibbs cartridges. Now we'll move on to the necessary modifications to the bolt face and extractor as well as the handfinishing work on the actions body.

As mentioned in the first chapter of this discourse, the bolt of choice is the 1914 designed for the rimmed .303 British cartridge since it has additional metal in the bolt face. With the bolt set up in the lathe, use a short carbide boring bar to open up the diameter of the bolt face recess. I have the best luck turning at 250 rpm and open the recess until the cartridge will just slip into the recess. To deepen the recess return the point of the cutter to the firing pin hole and take a cut of about .003-.005" across the face of the bolt recess to just kiss the edge of the recess.

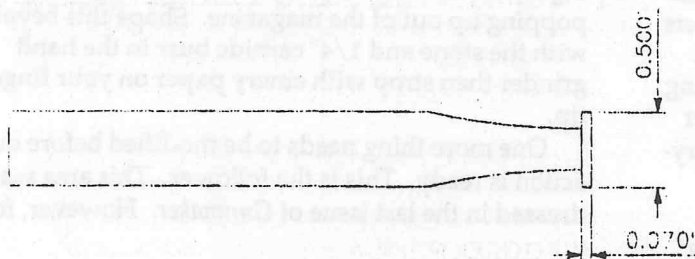


Diagram #8

I have made up a small gauge as illustrated in Diagram #8 to aid in detting the recess just right. With the lathe stopped and your hand holding the extractor in its proper place, try to slip the gauge under the extractor hook. Repeat the light facing cuts until the gauge will just barely slip under the extractor

hook. Then I suggest sharpening the boring bar and take a very light cleanup cut across the face and up the side of the recess to smooth the finish. Opening the bolt face this way insures a thicker extractor hook and better feeding due to more metal around the cartridge head prior to ejection.

Now, using a hand grinder and cutoff stones, carefully remove the ridge of metal left on the bottom of the bolt face to match the recess just cut. Follow up the stones with diamond files and stones until the entire bolt face is smooth as glass.

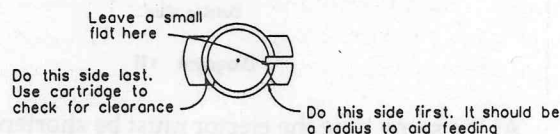
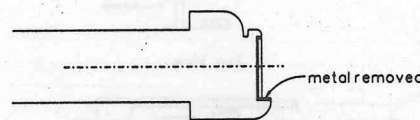


Diagram #9

Next on the agenda is the extractor. The .416 Rigby extractor should be similar to the standard 30/06 shape with a larger radius to fit the larger cartridge head. Ideally the extractor should rise .010-.012" when the case is slipped under it. The extractor for the .505 Gibbs is quite a bit different. The bottom edge needs a much more sweeping radius to clear the cartridge

case in feeding from the right-hand side of the magazine. Otherwise the cases will hand up coming over the rails. However, it still needs a shoulder below the centerline in order to hold the cartridge against the bolt head. The bottom side of both extrac-

tor hooks needs to be relieved for about 1/3 of its width. This is to help the hook clear the case while it is feeding up through the rails. P.M. Enterprises has replacement extractors for the Enfield machined to fit the .416 Rigby cartridge.

Because both of these cartridges are longer than the Enfield bolt travel was designed for, it is necessary to lengthen the bolt travel by shortening the bolt stop. Using a 1/2" diameter carbide end mill with a 1/64" radius on the corners, set the bolt stop vertically in the vise and mill off .065" from the face of the bolt stop. If you are using a 1914 bolt stop, it will be necessary to mill a clearance slot for the coil spring on the ejector. Use a 1/4" carbide end mill for this operation.

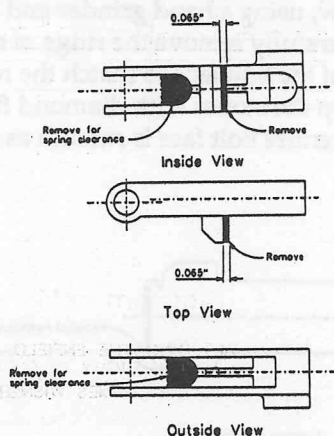


Diagram *11

At the same time the ejector must be shortened to clear the cartridges while loading the magazine. Remove the extended lip of the ejector and break the sharp edges.

Now we start the hand work on the feed rails and feed ramp. I use a 3/8" stone in the hand grinder to blend out the sharp edges from the ramp to the rail cuts. These should be a smooth, gradual blend. Take care not to open the top of the ramp too much. It acts as a funnel to direct the bullet toward the chamber. Removing too much material will lead to chambering problems. Once done with the stone, I go back over the area with the 1/4" carbide cutter to smooth everything up. This also helps with feeding and later polishing.

One other tool I have made to help me in testing the feed on actions is a short 4-5" section of old barrel which has been threaded and chambered about .020" deeper than normal. This is screwed onto the action to be used as a dummy barrel. The extractor slot is wide enough to fit many different actions without recutting. Otherwise it will be necessary to thread, fit, chamber, and headspace the final barrel at this point.

The tools needed for the final hand work on the

feed rails will consist of an 8-10" smooth mill file, 3/8" stones and 1/4" carbide burr for the hand grinder. The follower, follower spring, trigger guard, bolt body with extractor and extractor collar, and bolt stop should now be assembled to the action. You will also need several rounds of try ammo. [EDITOR'S NOTE: Be sure this is dummy ammo with no powder and no primer but of a weight similar to loaded ammo.]

Load a couple rounds of dummy ammo into the magazine and slowly feed a round into the chamber. It will bind on the guide rails. Note the spot where the case binds. Remove the trigger guard assembly and **CAREFULLY** file the guide rail a little wider. Remember to keep the sides symmetrical. To control the amount of metal removed, I recommend following the sequence diagramed here.

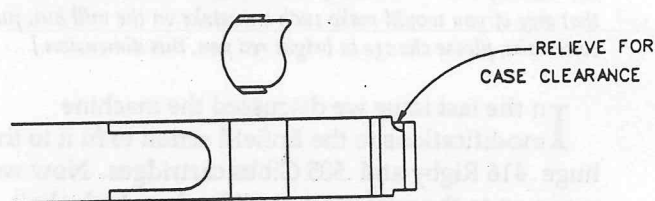


Diagram *10

Most of the rails will have a "belly" to them when viewed from the bottom. This allows the shoulder and the body of the case to rise up and out of the rails while the rim is still under the rear section. This keeps the cartridges from popping out of the magazine. Working on the rails is simply a try and file proposition. Test function with the dummy cartridges and mark with a fine point felt tip pen where the cartridge binds. Disassemble the magazine and file a small amount of material from the rail. Only experience will tell you when to stop filing. One more trick to help feeding is to add another bevel under the rail. This will help feeding while still keeping the rail narrow to prevent the cartridges from popping up out of the magazine. Shape this bevel with the stone and 1/4" carbide burr in the hand grinder then strop with emery paper on your finger tip.

One more thing needs to be modified before our action is ready. This is the follower. This area was addressed in the last issue of *Gunmaker*. However, for

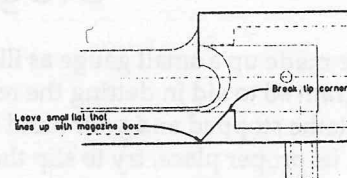


Diagram *12

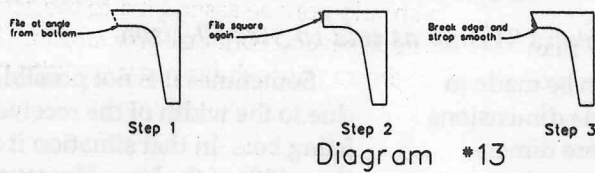


Diagram #13

the .505 Gibbs cartridge another modification to the follower will improve feeding of the last round from the magazine. Breaking the edge of the top shoulder of the follower will give this last round a better angle to the feed rails and allow it to rise up properly under the bolt.

A couple of additional notes are in order here. The .460 Weatherby cartridge can use the same dimensions as the .505 Gibbs if you keep to the minimum side in machining the feed rails. I believe you will find the .416 Rigby easiest to modify since it is simply an overgrown 30/06 with good proportions of bullet versus shoulder and a good body taper.

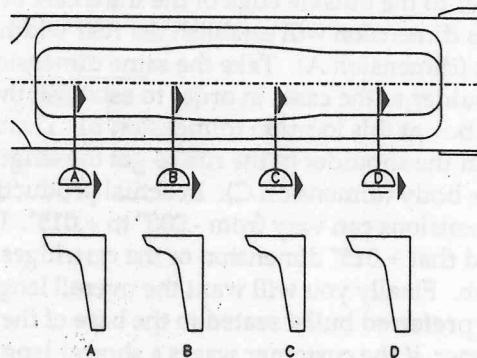


Diagram #14

ALTERING THE ENFIELD ACTION
TO .416 RIGBY & .505 GIBBS
BY JAMES WISNER

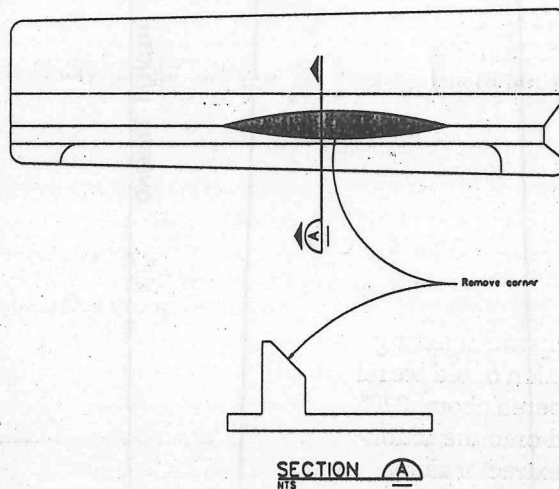


Diagram #15

Trigger Guard Boxes

by James Wisner as told to Steve Nelson

Although most magazine boxes can be made to work, there are always ideal inside dimensions for any given cartridge. To establish these dimensions rubber band three cartridge cases together. Measure across the two cases stacked above each other to the outside edge of the third case at the rim. This dimension will establish the rear width of the box (dimension A). Take the same dimension at the shoulder of the cases in order to establish the width of the box at this location (dimension B). Then measure from the shoulder to the rim to get the length of the case body (dimension C). In actual production, these dimensions can vary from $-.000"$ to $+.015"$. Do not exceed that $+.015"$ dimension or the cartridges may jamb. Finally you will want the overall length using the preferred bullet seated to the base of the neck or deeper, if the customer wants a shorter length.

Sometimes it is not possible to use the ideal width due to the width of the receiver or the limits of an existing box. In that situation it is acceptable to narrow the width of the box. However, the rim to shoulder taper must be maintained, i.e., if the rim is narrowed $.040"$, the shoulder must be narrowed by $.040"$. Now the cartridges will stack with a gap between the top and bottom cartridges.

The follower should bear on the bottom cartridge both on the bottom flat and on the 60 degree slope and, ideally the second cartridge should bear on the top flat of the follower. The follower should match the taper of the inside of the box and have a side clearance of $.020$ -. $.025"$ per side.

If you follow these angles and clearances, you should have no problems within the magazine box of any bolt action rifle.

