

PERFORMANCE ANALYSIS OF THE NO. 4 - 7.62 RIFLE
 AT THE D.C.R.A. 1964 PRIZE MEETING
 By S/L Dave Reynolds

After the 1964 D.C.R.A. prize meeting, questions in the minds of the shooters were:

How did the new 7.62 No. 4 rifle perform?

How did those using the 7.62 place in the Bisley Aggregate?

How was the rifle stocked, to place the 7.62 high in the Aggregate?

The object of this analysis report is to answer these questions and give the shooter the full advantage of the knowledge gained.

This analysis was prepared from the scores made by the top 30 shooters in the 1964 Bisley Aggregate. All of the top 30 used 7.62 rifles with the exception of three who used .303's for 200 and 300 yards.

This report was prepared so that a Bisley Aggregate shooting standard could be put on a graph and used as a MEAN to be used as a guide to find out if the rifles used were better or worse than this standard MEAN. This mean standard was calculated in the following manner:-

The scores made by the top 20 shooters were added together for each range and divided by the number of rounds fired by all 20 at that range.

e.g. the total points made by all 20 shooters at 200 yards was 2,582.
 the number of rounds fired to get this score was 540.

$$\text{value per shot for 20 men} = \frac{2,582}{540} = 4.78 = \text{MEAN}$$

The MEAN value of each shot fired at each range by the top 20 was

200 yds	300 yds	500 yds	600 yds	900 yds	Bisley team MEAN
4.78	4.76	4.79	4.59	4.40	

With these MEAN'S plotted on the graph (figure 1) the performance of rifles can be judged and compared. The scores of each different stocked group of rifles have been worked out for a mean value at each range also.

To work out this analysis of the rifle performance against the Bisley Mean the rifles were grouped into classes based on what was known about their method of stocking up. The top 30 shooters were asked by the D.C.R.A. to send in details of their method of stocking. Half of the members sent in a fair amount of data, but the other half sent in only two or three words of no value for analysis purposes. However, the writer of this report is fully familiar with all the technical details for the method of stocking Group "B" rifles, which gave the best all-round performance. These stocking details will be given in the last half of this report.

Rifles were GROUPED as shown in the Table below, according to their known method of stocking.

RIFLE STOCKING GROUPS

Group	Agg. Position	Stocking details
A	1	Stocked at 5" with bearing at center band (no other details given.)
B	2	Stocked at center band. Pressure at bearing-11 lbs.
	3	" " " Pressure at bearing-12 to 14 lbs
	5	" " " Pressure at bearing-10 lbs.
	6	" " " Pressure at bearing-16 lbs.
	10	" " " Pressure at bearing-13 lbs.
	11	" " " Pressure at bearing-12 lbs.
C	15	Stocked at center band Pressure light-6 to 8 lbs.
	27	" " " Pressure light-8 lbs.
D	16	Stocked at 8 $\frac{1}{2}$ " Pressure 15 lbs.
	18	" " " Pressure 15 lbs.
	21	" " " Pressure 15 lbs.
E	4	Stocked at 8" Pressure Heavy. (no data)
	7	" " " " " " "
	12	" " " " " " "
	22	" " 5" to 8" No Data
	30	" " 8" Pressure at bearing 14 lbs.
F	13	Stocked at 8", Cork over CB and at muzzle.
	28	" " 5" or 8" Cork over CB and at muzzle.
G	24	Stocked at center band. Cork at CB and at muzzle.
H	20	Stocked at 5". No other data.
	23	" " 5" " " "
I	9	Stocked at 8" Light pressure.
J	14	Muzzle bearing only. DCRA rules for stocking.

NOTE: The column showing Agg position is the place in the Bisley Agg. the shooter made. Rifles with no data at all were left out.

The following table shows the result of the analysis of rifle stocking performance, at the various ranges, when compared to the Bisley Agg. MEAN average, and were taken from the graph. SEE FIGURE 1.

RIFLE ANALYSIS TABLE

Rifle Group	No. of Rifles in Group	Performance
A	1	Below average at.....900 yds.
B	6	Below average at.....500 yds.
C	2	Below average at....300, 500, 600, and.....900 yds.
D	3	Below average at....200, and 500 yds.
E	5	Below average at....300, 500, 600, and.....900 yds.
F	2	Below average at 200, 300, 500, 600 and.....900 yds.
G	1	Below average at 200, 300, 500, 600 and.....900 yds.
H	2	Below average at 200, 300,600 and.....900 yds.
I	1	Below average at.....600 and.....900 yds.
J	1	Below average at 200, 300, 500, and 600 yds.

To analyse the above performance, one rifle is not considered too reliable and should not be taken too seriously. Where more than one rifle is in a GROUP, the results are more reliable.

It is the opinion of the writer, that the rifles in Group B gave the best shooting at all ranges. It should also be noted the Group B rifles took places 2,3,5,6,10,11, in the Bisley Agg.

With the conclusion that Group B rifles gave the best results, the rest of this report will give the stocking up of Group B rifles.

THE STOCKING OF THE No. 4 7.62 RIFLE

The stocking details for the group B rifles are divided into 2 stages being the limits of the amount of work done on these rifles. An additional stage has been added for those wishing to get smaller groups at the shorter ranges.

FIRST STAGE OF STOCKING

It is important that you start the stocking in the correct order of sequence so that the finished job will have the correct pressure at the center bearing.

To do this: fit the action and the fore-end as for the standard muzzle bearing job, as given in the DCRA rules on gun stocking. The muzzle pressure should be from 4 to 5 lbs, with the front muzzle bearing rasped out down to the rivets.

SEE SKETCH No. 2.

To get this muzzle pressure, the rear surface of the fore-end has to be shimmed up with arborite; use shim stock of .025" thickness, or any similar hard fibre material of this thickness.

With this shim stock in place, fitting of the reinforce and under the body is necessary to get the body level and muzzle pressure correct.

SEE SKETCH No. 3.

When the above stage is completed, body and action tight, the barrel true in the center of the fore-end, your first stage is completed.

SECOND STAGE OF STOCKING

The second stage is the fitting of the center bearing at the middle band.

SEE SKETCH No. 4.

This center bearing can be fitted, either with a wood block or with fibre glass.

The hardwood block is difficult to make without the proper equipment, but it can be attempted by hand-cutting. For the shape and size,-

SEE SKETCH No. 5.

The groove in the block is hand-fitted to the barrel, at the $10\frac{1}{2}$ " point, it will be bearing. Get this fit by putting sand paper on the barrel, towards the muzzle, where the barrel will be a bit smaller. By selecting the correct point, the block will get a good radius fit at the CB bearing point. Check your fit with lamp black and oil and keep sanding until you get a 100% fit at its center bearing point on the barrel.

With the fore-end, a one-eighth inch recess is cut into the fore-end at the center band.

SEE SKETCH No. 6.

Adjust the CB block until it fits freely into the recess you have cut into the fore-end, but do not worry about its height yet. Put lamp black at the barrel bearing point, assemble the rifle with the block in its bearing recess (unglued).

With the main action screw tight, check the height of the barrel and its alignment in the center of the fore-end. To get the barrel lower, and level,

take the wood from the base of the block; do not touch the radius fit of the groove. You may have to take a shaving off the side of the block to get the barrel to fit in the center of the fore-end.

With the barrel at the correct height; and true in the fore-end; the block 100% in contact with the barrel; glue the block in place and assemble the rifle and tighten up the main body screw.

The center bearing can also be put in with fibre glass, with excellent results. With this method, the barrel must be held up from the fore-end for the required barrel clearance. Place a shim ahead of the center bearing point, to raise the barrel about one eighth of an inch, free of the fore-end, and hold the barrel true in the center of the fore-end. With this in place, the required amount of plastic fibre glass is put at the centerband. When the glass is set, the temporary shim is removed.

With both type of bearings, the pressure on the bearing should be from 12 to 14 lbs. This can be checked by putting a thin metal test shim under the barrel at the bearing point (shim about .003 thick). Raise the muzzle with a spring scale and note its reading, when the shim can be slid out, with a gentle pull.

With the above work completed, your rifle will be stocked up as rifles in GROUP B were done. It should be test fired to see how it performs before proceeding to the additional stocking in the next stage.

THIRD STAGE OF STOCKING

This stage of stocking introduced by this article is new and has been tried by the writer and found to be very successful. We have all made comments on how the 7.62 did not seem to group too well at the short ranges. This additional shimming may be the answer.

A rifle stocked by the writer gave scores as follows,-

97/100 at 200 and 500 yds, 101/105 at 200 500 600 yds. 70/75 at 900 yds
One half inch groups have been made at 25 yds with other rifles tested.

MUZZLE SHIMMING

This method requires that the muzzle be shimmed up with cork, about .010" higher than its free position.

To do this, remove both the front and rear handguards only, and measure the free position of the barrel muzzle.

SEE SKETCH No. 7

The measurements given on the sketch are for an example only, as the readings on all rifles differ.

To calculate how much shimming is needed to raise the muzzle .010", press the barrel down to the wood, and take a second measurement.

As an example - if the free muzzle reading was 1.350" and when pressed down to the wood it was 1.290", you know that the space under the barrel muzzle is 060". To this is added the .010" lift needed, so you know that you will need a front shim .070" thick.

When the space is excessive under the muzzle, it is a good idea to build up the front with fibre glass. This can be done by putting a metal

shim about .012" thinner than the cork shim around the barrel muzzle, at the bearing point, before filling up the muzzle bearing with fibre glass. When the tin shim is removed you will have the correct clearance, for the cork shim.
SEE SKETCH No. 8

When the muzzle shimming is completed, and the rifle is assembled, with main body screw tight, the muzzle will read about .010" higher than it was in the free position. In our example it would be now 1.360".

With the rifle assembled, the muzzle pressure is checked, it should be about 4 to 6 lbs to lift it from the front bearing.

This pressure is not sufficient to change the pressure at the center bearing, which was set at 12 to 14 lbs.

REAR HAND GUARD FITTING

A piece of plumber's gasket rubber size 1" x 1" is placed in the hand guard just over the center bearing. Its thickness is adjusted so that there will be about .010" gap between the hand guard and the fore-end to be pressed down, by the outer metal center band. If there is too much packing the outer band will not close, or the band screw meet.

SEE SKETCH No. 9

FRONT HAND GUARD FITTING

In the front hand guard, a piece of cork or rubber is placed, in line with the lower bearing. Have about .005 to .008" space between the hand guard and fore-end before the front metal band is screwed in place. Here again if too much packing is used, the front metal band is hard to fit.

HAND GUARD FINAL FIT

When the handguards are assembled, make sure that the metal band grooves at the center are even, otherwise, when the band is tightened it will pull the hand guards to one side.

SEE SKETCH No. 10

MATERIALS

Materials mentioned in this report may give the shooter some difficulty to obtain. To help you, materials may be obtained from the following,-

CORK ANTI/VIBRATION

Supplier's address -

HANSLER (Ottawa) Ltd.,
827 CHURCHILL AVE.,
OTTAWA 3 ONT.

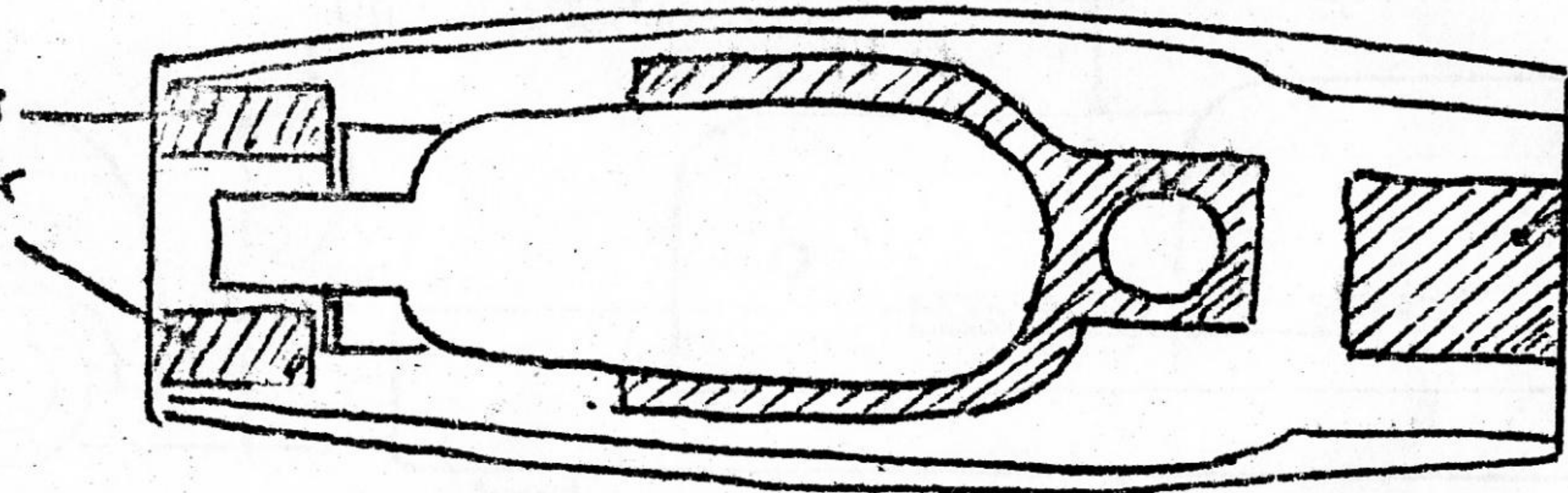
They supply a fine grade of cork gasket in the following thickness:

.025" .035" .080"

The material costs from 80¢ to \$1.00 sq/ft.
min. orders to be 1 sq/ft sizes.

SKETCH No 2

HARD SHIMS
.025" THICK



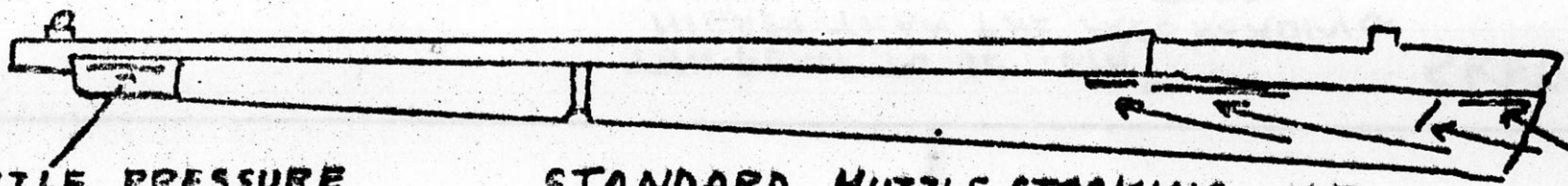
REINFORCE 1" LONG, $\frac{3}{4}$ " WIDE.

SHADED AREAS IS WHERE
BODY SHOULD CONTACT

MUZZLE PRESSURE
4 TO 5 lbs.

STANDARD MUZZLE STOCKING UP

HAVE GOOD CONTACT
AT THESE POINTS.

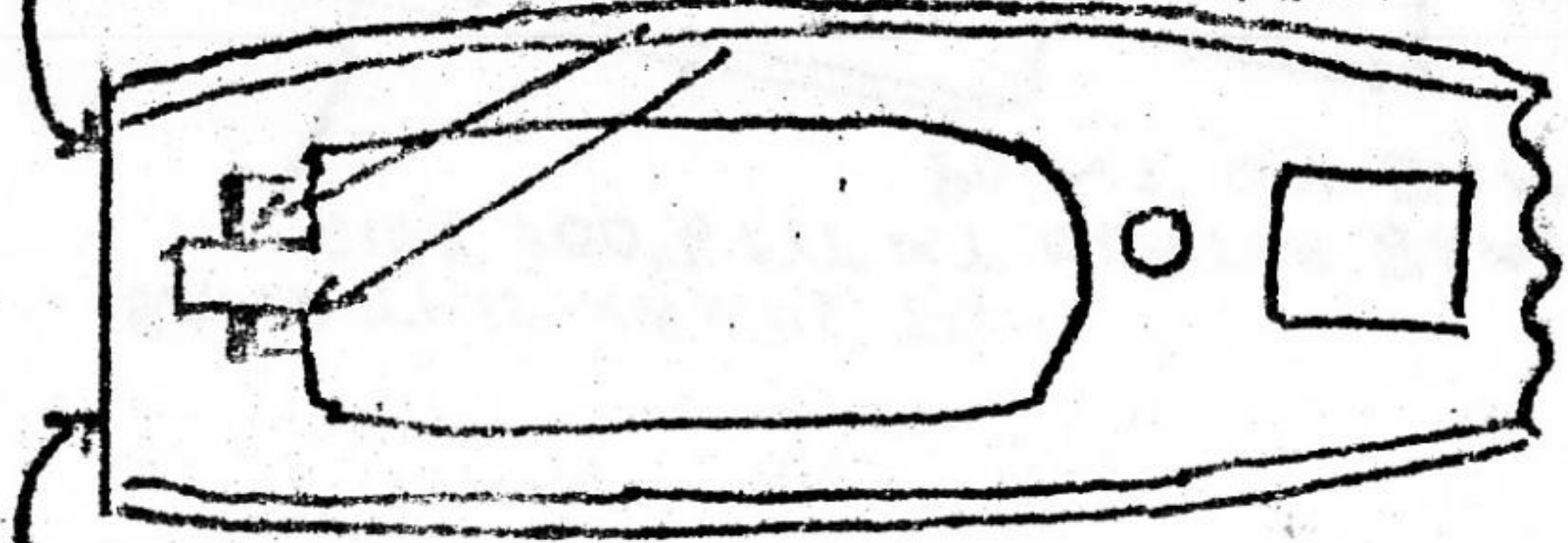


SKETCH No. 3

FILE HERE IF
MUZZLE IS TO
LEFT

SHIM DRAWS HERE IF
Muzzle END IS NOT TIGHT

MUZZLE TO
LEFT



FILE HERE IF
MUZZLE IS TO
RIGHT

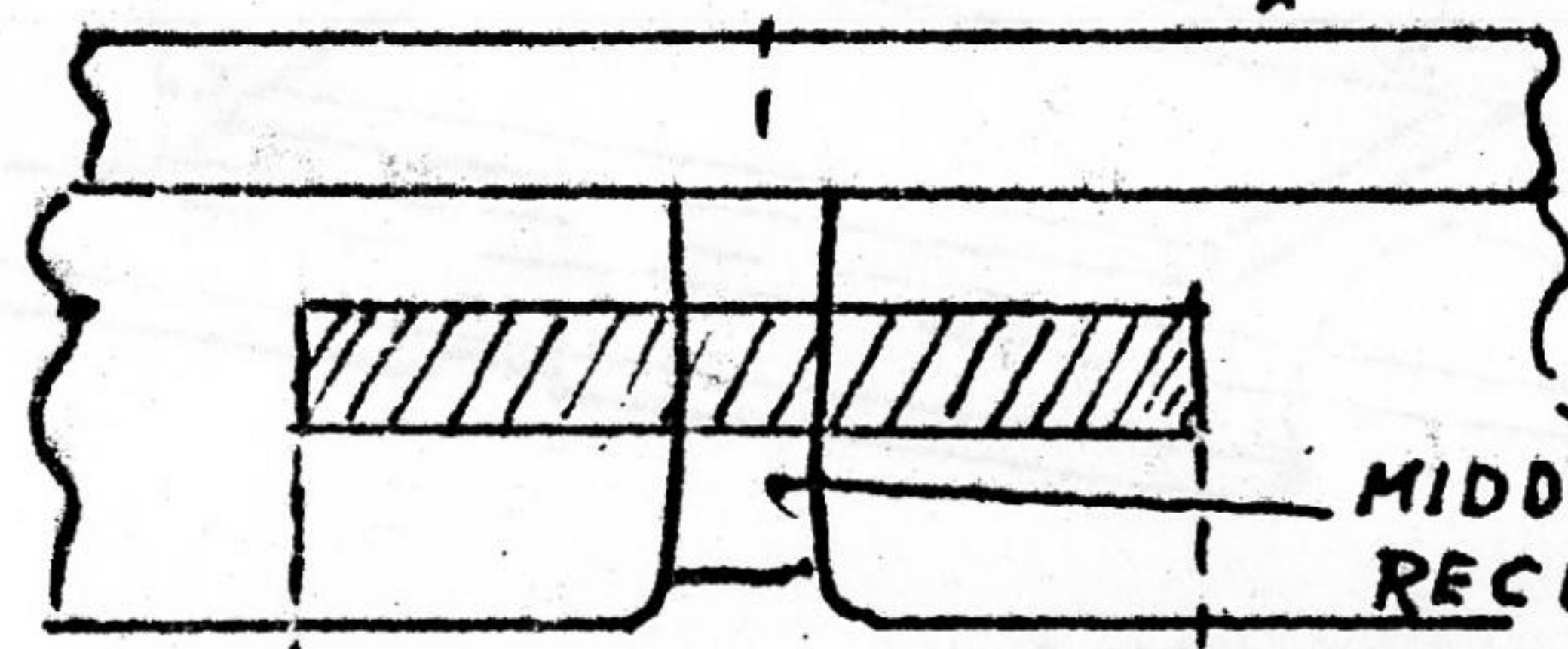
BARREL CENTERING.

MUZZLE TO
RIGHT



SKETCH No 4.

10 1/2" TO BODY FACE



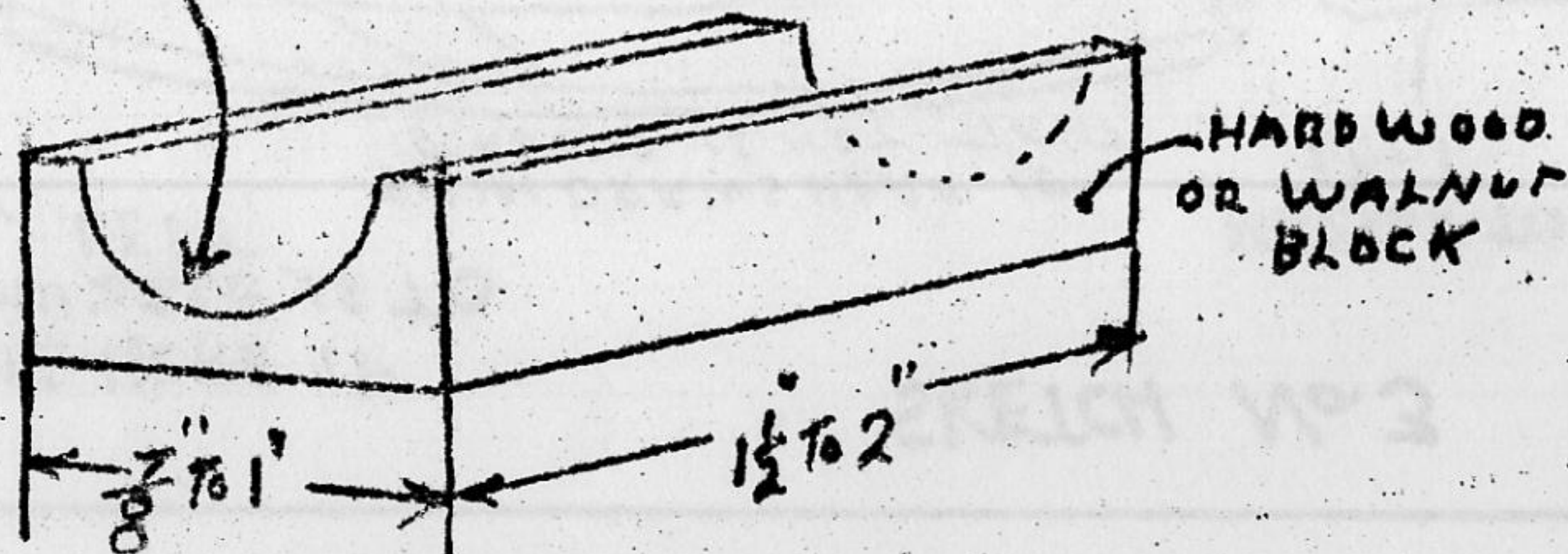
1 1/2" TO 2"

CENTER BEDDING POSITION.

Handwritten signature or initials.

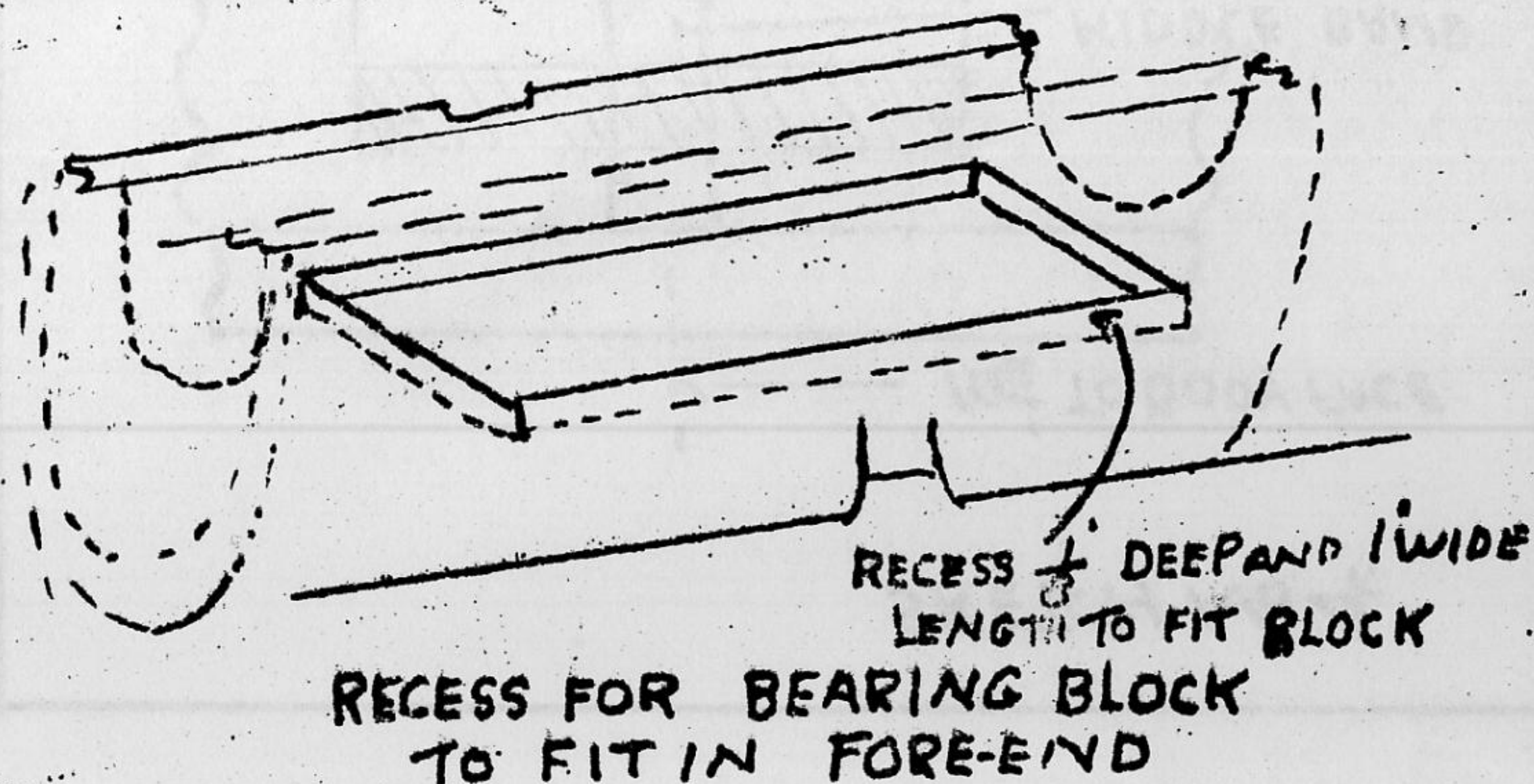
SKETCH No 5

SAND THIS RADIUS TO
GIVE 100% FIT AT CENTER BEARING
POINT ON BARREL.



CENTER BEARING BLOCK.

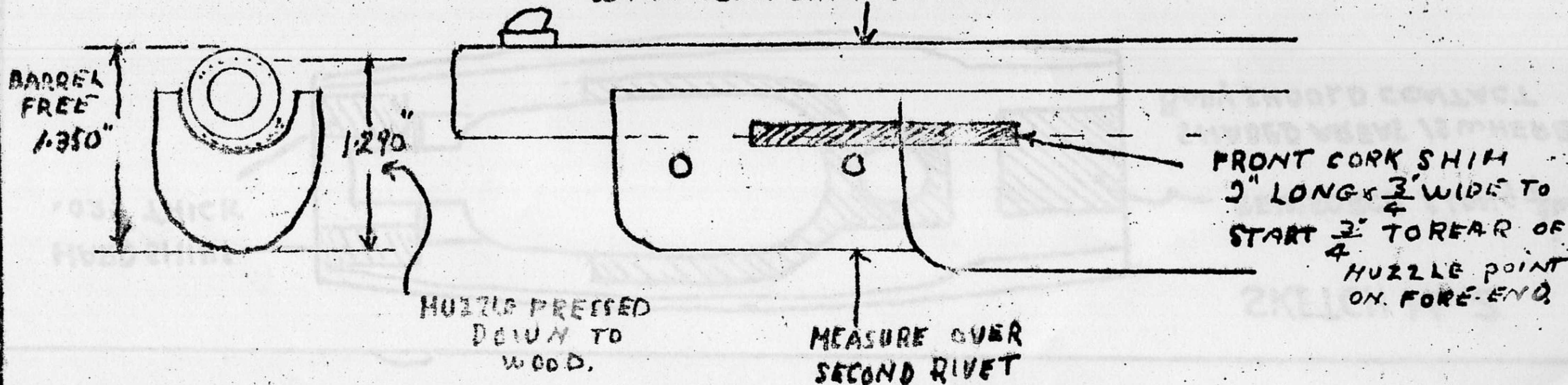
SKETCH No 6



RECESS FOR BEARING BLOCK
TO FIT IN FORE-END

THIS POINT TO BE .010"
HIGHER THAN THE FREE READING
WHEN CORK SHIM IS FITTED

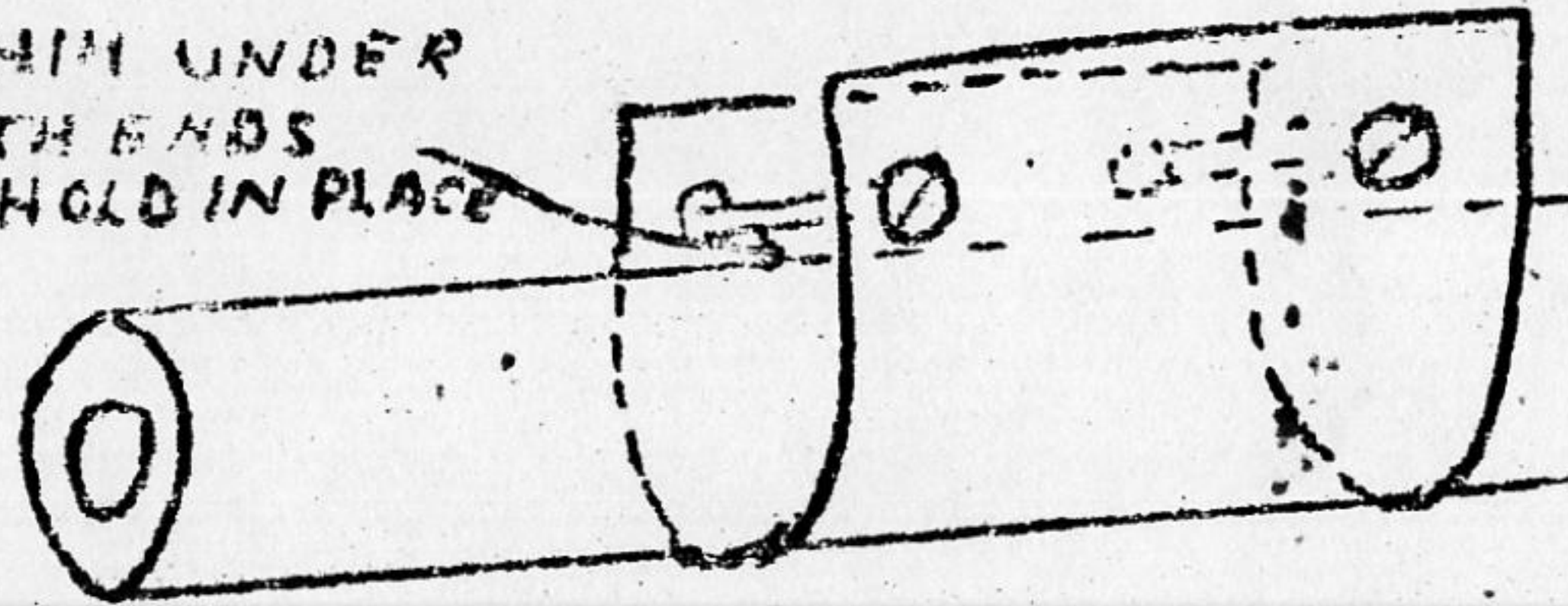
SKETCH No 7



MUZZLE STOCKING.

SKETCH No 8.

SHIM UNDER
BOTH ENDS
TO HOLD IN PLACE

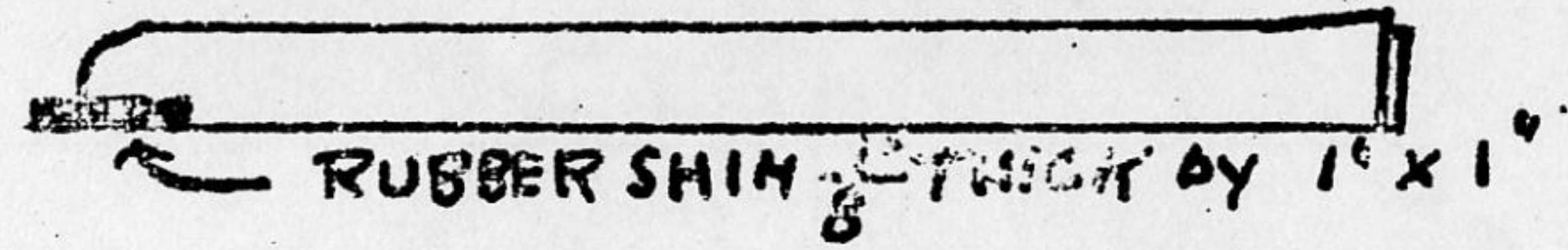


BOLTS TO
HOLD ON
SLEEVE

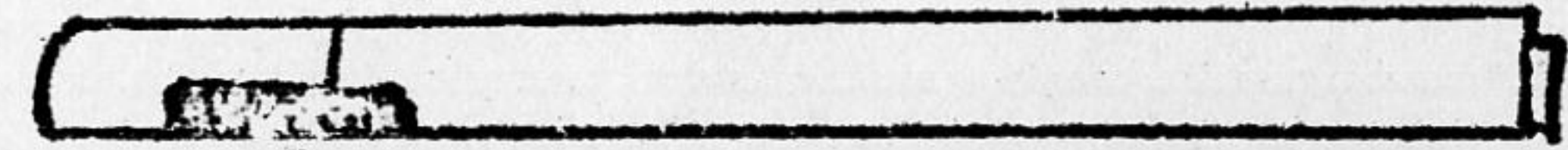
FOR FRONT BEARING BUILD UP
PUT METAL SLEEVE AROUND
BARREL AT POINT OF BEARING,
THICKNESS OF SLEEVE ABOUT
.015" LESS THAN CORK TO BE USED

SKETCH No 9

REAR HAND GUARD



FRONT HAND GUARD

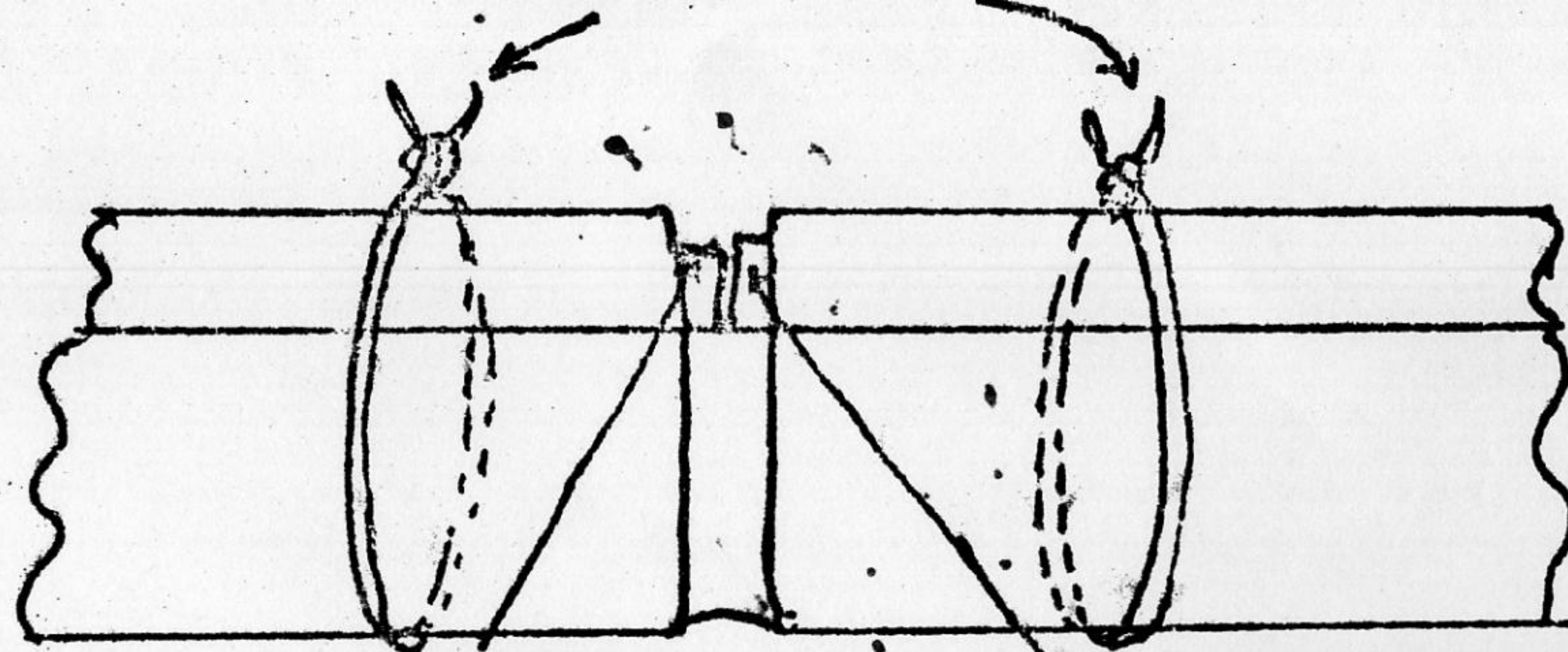


CORK OR RUBBER OVER
LOWER BEARING POSITION.

HAND GUARD SHIMS.

CLAMP ON WITH RUBBER BANDS

SKETCH No 10



IF LOW SHIM UP
TO MEET REAR LEVEL.

CHECK ALIGNMENT OF
ENDS, THEY MUST BE EVEN
OR HAND GUARDS WILL BE
OUT OF ALIGNMENT WHEN THE
OUTER BAND IS FITTED.