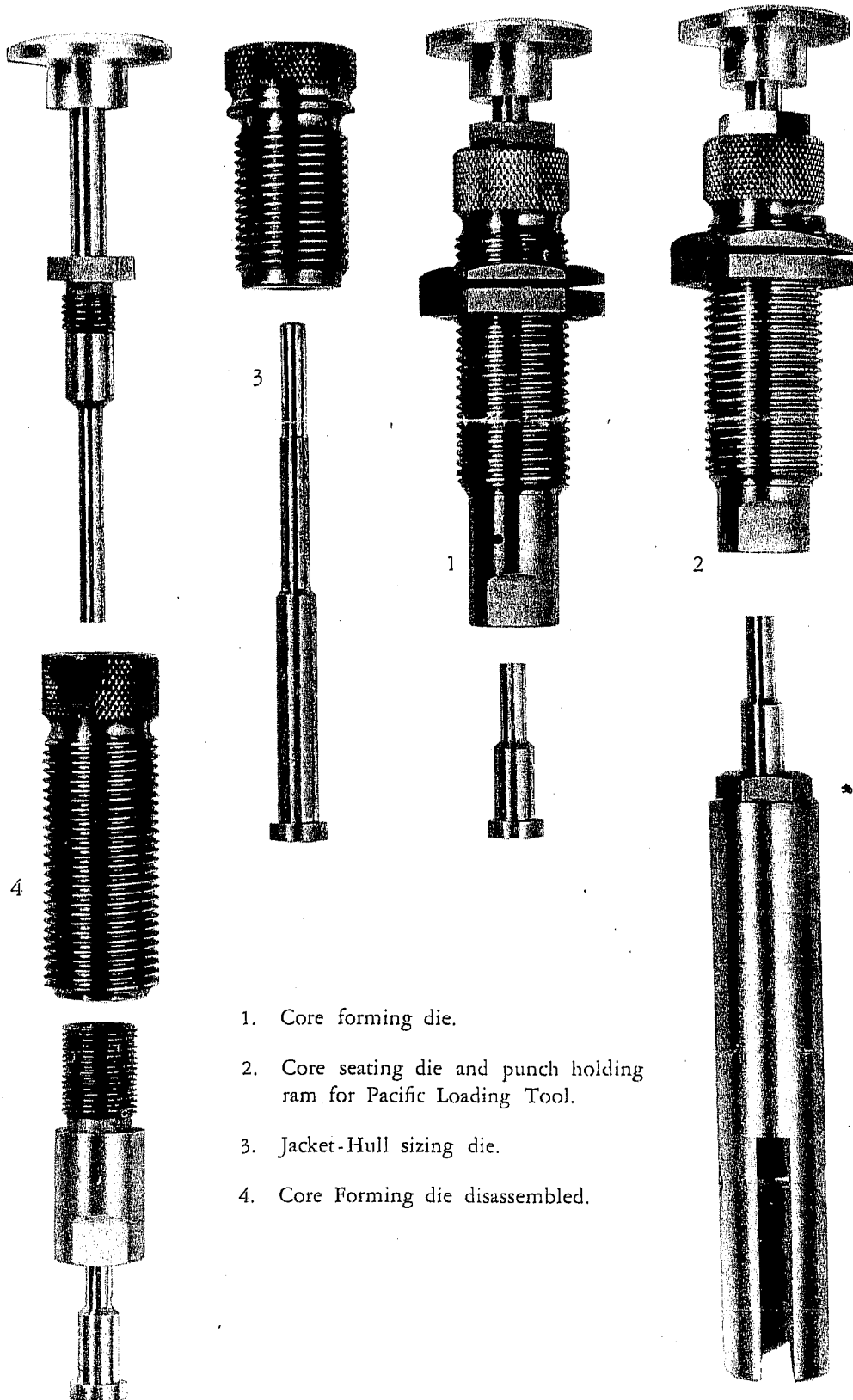


BIEHLER & ASTLES DIES



1. Core forming die.
2. Core seating die and punch holding ram for Pacific Loading Tool.
3. Jacket-Hull sizing die.
4. Core Forming die disassembled.

## BIEHLER & ASTLES DIES

**INTRODUCTION.** -- The B & A line of core making, core seating, and jacket hull sizing dies arose out of an extended study of hand bullet making methods which was made several years ago by Jonas Hallgrimsson, Sam Clark and myself. We believed that the superior accuracy of carefully hand made bullets could be still further improved, and as a result I made up a number of experimental dies designed to add certain refinements to the precision and convenience of the hand methods then available. Trial of these dies, and of bullets made with them, were extremely gratifying. With the aid of these dies we were able to make bullets which were superior to anything previously tested.

As a result of our success with them, I decided to put these new dies on the market. In doing so, I further decided that while prices would be kept as low as possible, quality would be my first consideration, and every die would be made fully as well as I knew how. From the way my work has been received, and the reputation my dies have won during the three years they now have been on the market, this decision clearly seems to have been a wise one.

I am now much pleased to announce that my good friend Walter Astles, fellow shooter, clever designer, and thoroughly competent tool maker, has become associated with me in the production of the present line of dies, and in plans for future new items. Walt has been a consultant and constant source of help to me during the past three years, and has finally agreed to join me in full partnership. Walt is fully as familiar with the work as I am, and has exactly the same attitudes towards quality and completely honest dealing. Accordingly, Biehler & Astles dies will continue to be aimed towards those shooters who are interested in the "Ultimate in Precision", and hence in tools and equipment of the highest possible quality.

RAY BIEHLER

### B & A UNIFORM WEIGHT, CORE FORMING DIE

**PURPOSE AND FEATURES.** - The B & A core making die is used for making precision bullet cores for jacketed bullets. Thru two operations performed at the same time, it provides two highly desirable refinements that are not available when slugs cut from lead core wire are used directly for cores:

- (1) By means of a simple, but very effective extrusion principle, it controls core weight to a very high degree of uniformity.
- (2) It pre-forms the cores, previous to the core seating operation, into a shape which is a very close match for the inner shape, or contour of the jacket hulls they are to be used in.

**PRINCIPLE.** - The principle of the die is very simple. The die contains a core forming cavity to exactly correspond to the inside of the hulls the die is to be used for, and leading into this cavity are three very small bleed, or extrusion holes. After adjusting the die for the core weight desired, core slugs, cut off slightly heavier than the finished cores are to be, are fed into the die and pressed with a base punch. While the cores are being formed by this pressure, the excess weight is accurately extruded off thru the bleed holes at the same time. The cores are then ejected by an ejection plunger, and as they are ejected, the extrusions are cleanly sheared off.

**THE WEIGHT CONTROL FEATURE.** - The object in controlling core weight by an extrusion method is to obtain a much higher degree of uniformity than is possible by the "cutting off to length" method. Due to combined cutting tool error, and the lack of closely uniform diameter in much of the available core wire, this method usually leaves quite a bit to be desired. For example, it is seldom possible to hold cores for .22 cal, 55 gr. bullets to a variation of less than 0.4 gr. by this method, and in cores for larger calibers the variation is usually still greater. In comparison, our dies are guaranteed to hold cores for any weight or caliber to a total variation of 0.1 gr. or less with neither special efforts or precautions.

**THE PRE-FORMING FEATURE.** - This feature of our core making dies is a direct result of one of the investigations alluded to in the introduction. This was an investigation into the closeness of contact between the cores and jackets of bullets which had been made with various degrees of pressure in the core seating, and in the point swaging operations. Cores were obtained, both from completed bullets, and from "core seated" hulls just as they came from the seater, by a method of stripping away the jackets which left the cores undamaged. Examination of these cores (all of which had been made directly from core wire slugs) showed that the core seating operation was a much more critical one than had been suspected. Unless objectionably high seating pressures were used, there always were some cores, from completed bullets as well as from seated hulls, which showed very noticeable contact imperfections down around their extreme bottoms, and the lower 1/4 to 1/3 of their lengths. Perfectly contacting areas had a smooth, glossy appearance, while areas which had not made good contact were revealed by the presence of dull patches, voids, and wrinkles, due either to trapped air pockets, or surface defects which did not get fully expanded out.

At any rate, the fact remained that wherever a surface defect was left, there also had existed a film, or pocket of trapped air between the core and the jacket. Finally, the presence of imperfections on cores from completed bullets as well as from seated hulls showed that at least some of the imperfections left by the seating operation carried right on through the point swaging operation, and hence that this latter operation could not be depended upon to eliminate them.

The fact that contact imperfections left by the seating operation were always found down around the lower parts of the cores, readily explained the factors involved in trying to fully seat a sloppy fitting core slug into perfect contact. Because of its poor fit, the core must undergo considerable upsetting and buckling in being seated, with consequent formation of various voids and deep wrinkles. Due also to the poor fit, the core must move appreciably downward as it is seated, and as it does so, it will be expanding outward, making contact here and there with the hull. As it does so,

frictional resistance will be developed. Since the total amount of this resistance will increase from the top of the core on down, part of the seating punch pressure will be neutralized in passing from the top to the lower part of the core. Thus, considerably more pressure must be used to be sure the lower parts of such a core are fully expanded out than would be required to expand the rest of it out to perfect contact.

Hence the idea of pre-forming the cores previous to the seating operation. Being already smooth, and a very close fit for the hulls, they would squeeze out all but the faintest film of air between themselves and the hulls upon insertion, and hence should largely eliminate any possibility of surface defects and trapped air being left by the seating operation. Numerous tests of such cores fully supported our beliefs. Not only did they completely eliminate all contact difficulties, but in addition they required only very mild seating pressure to expel the slight film of air and establish perfect contact. As will be seen from the paragraph below, it was obvious that the incorporation of a pre-forming feature in our dies would be a rather complicated business, but as was equally obvious, the results would be well worth the effort.

**INNER CONTOURS OF JACKET HULLS.** -With but two exceptions, the inner contours of the hulls we have examined have all been quite different, and hence it has been necessary to make up special dies for each one of them. Being convinced that all bullet makers should have a knowledge of these contour differences, we are including a series of graphs (last page) showing the inner contours of all the hulls we have so far made dies for. These graphs show the inside diameters vs distances up from the bottom of the hulls, all graphs being plotted to a highly exaggerated scale to more clearly bring out their differences. Each graph represents an average of careful measurements made on numerous batches of each kind of hull. Measurements were made with a special gage designed to permit accurate measurement of both diameter and depth at all points within the hulls. From the graphs it will be seen that the inner contours so far encountered fall into three general classes: (1) Straight cylinders running all the way from the mouth down to the corner radius at the bottom; (2) Tapers, running from the mouth all the way down to the corner radius; (3) Contours which begin with a cylinder section at the bottom, then farther up the hull change to a taper which runs on out to the mouth. It will be noted that the shapes of the extreme bottoms of the hulls also vary; some are almost flat across, while others are quite rounded.

**DESIGN AND OPERATION.** -The design and operation of the B & A core forming dies will be largely obvious from the sketch shown in Fig. 2. These dies are specially designed to operate in the Pacific, the Hollywood, and the RCBS loading tools, but they can also be made to work in most of the other makes of loading tools adapted to dies having a 7/8 by 14 thread. The core cavity of each die is made to exactly match the inner contour of the hull it is to be used for, If this contour is a cylinder, then the bore of the die will also be a cylinder from end to end. On the other hand, for a hull whose inner contour contains a taper, the cavity in which the core is formed will be tapered to correspond to the taper in the hull. (The die shown represents one made for the class 3 type hulls whose inner contours contains both a cylinder and a taper section).

All parts of the bore are hand lapped to exact size and a very high finish. The punch and plunger are lapped to very close fits in the die to prevent the formation of any "fins" on the ends of the cores. The cupped end of the plunger is shaped with the same care to match the bottoms of the hulls as is used in shaping the side walls of the core cavity.

All dies are accompanied by a special punch holding ram, or adaptor, suited to the make of loading tool that is to be used. These rams and adaptors incorporate a much im-

proved punch holding feature which allows the punch to be accurately aligned with the die, and then locked in the ram or adaptor in this aligned position. Considerable wear on the punch and mouth of the die is thus avoided, since the punch does not have to be left partially loose in order to center itself in the die each time it enters.

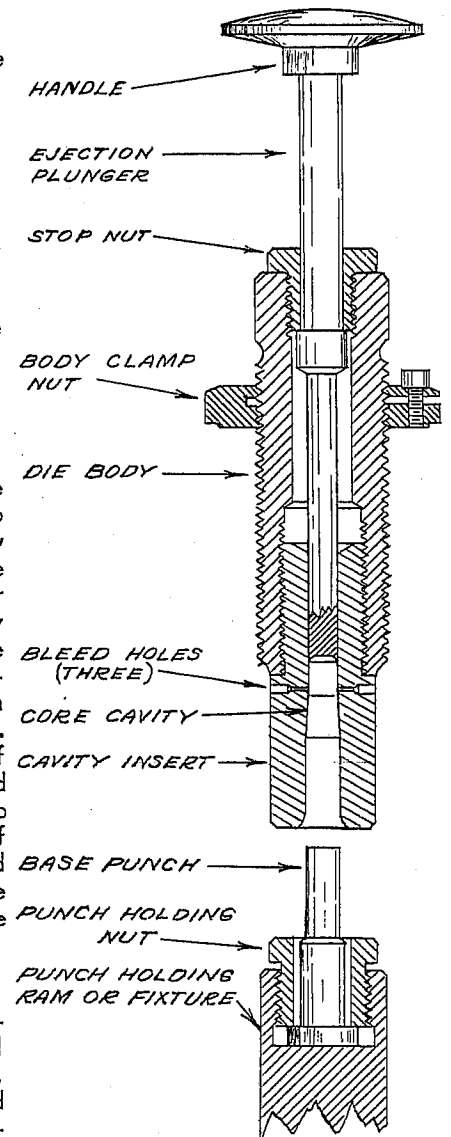


FIG. 2

A particularly special feature of design is that the forming cavity of the die is contained in a separate piece which screws into the die body. Hence our dies are highly versatile, in that any given die can be very readily converted over to another make or caliber hull at much less cost than a complete, new die, by simply exchanging the set of insert parts (insert, plus the matching punch and plunger).

**WEIGHT ADJUSTABILITY.** -All of our dies are adjustable for different weight cores by screwing them up or down in the loading tool, then screwing down and clamping the body lock nut to preserve the setting. The body lock nut uses a much improved locking feature which provides very positive locking, yet does not continue to stick at the "set screw" type often do when released. The nut is deeply pack hardened to a spring temper.

The weight adjustability of a die made for a hull whose inner contour contains a taper may deserve a few special remarks. Fig. 3 represents a die of this kind, adjusted for the minimum weight core that can be made in it. Since the base punch of the die must have a cylindrical bore section to move in, it will be obvious that this minimum weight core is the only one such a die can make which will fit over the entire length of the core. As shown in Fig. 4, any heavier core made in the die

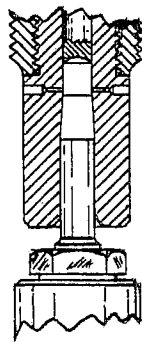


FIG. 3

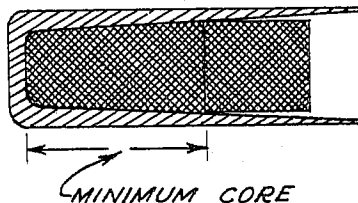


FIG. 4

will have a cylindrical section on its front end, and so will not fit the hull beyond the length of a minimum core. Fortunately however, this does not matter. In the earlier mentioned tests on core

contact, we found that it was only necessary for a core, before seating, to fit over the lower 1/3 of its length in order to eliminate all contact difficulties. While making cores fit over a longer length did no harm, of course, neither did it give any measurable advantage. The minimum weight core that can be made in any B & A die is as small as is ever likely to be wanted, and it so happens that in all calibers these minimum cores are at least half as long as the heaviest cores that are ever likely to be wanted. Hence in all calibers, and for all weight cores, the close fit required of all cores over the lower 1/3 of their lengths is fully provided for.

At the present time, we are making cavity inserts, plus the necessary punches and plungers to fit them, in .22, .25,

.270, and .30 cal, for all makes of hulls on the market, and on special order, but at no extra charge, will make up inserts for any other caliber. All sets of insert parts use the same die body, and any set of parts desired for converting any die over to another make, and/or caliber of hull can be purchased separately.

**EXCHANGE OF INSERT PARTS.** -As a special service to customers who like to do a lot of experimenting, we also maintain an exchange, or trade in service on insert parts. With the exceptions of made to order, non-standard sets of insert parts, and others which may have become obsolete, we will exchange any set of insert parts, at any time after purchase, for a modest service charge provided that the customer's set is not damaged thru careless use. (There need be no concern about wear, since with proper use these dies will last almost indefinitely.)

**GUARANTEE AND STATEMENT OF POLICY.** -While there are few things, including us and our work that could not be better, it has been our policy to make every effort to produce a line of dies as nearly perfect as possible; to render every possible service; and to conduct our business on a basis of complete honesty and fairness.

Accordingly, all B & A dies are offered as quality items in every respect, and all are sold on an unconditionally guaranteed, plus a six weeks, free trial before acceptance basis. We request that each die purchased be thoroughly examined and tested, with the understanding that the workmanship and performance must be completely satisfactory, and that the die must be something the customer definitely wants to keep. If not, his purchase may be returned any time during the trial period for his choice of either correction, or full, immediate refund.

**PRICES.** - The price of complete dies, and of various separate parts are as follows:

Complete core forming die for any make and cal. hull, including special punch holding ram or adaptor,....	\$24.50
Extra sets of cavity insert parts for any make and cal. hull (insert, punch, and plunger), per set,.....	12.50
Extra Die Bodies,.....	7.50
Extra punch holding rams or adaptors,.....	3.50
Extra body lock nuts (many shooters like to use these with other dies they have), each,.....	.50

**DIRECTIONS FOR ORDERING.**

(1) State the make of your loading tool so that the proper punch holder can be sent. Write for further information if your tool is other than a Pacific, a Hollywood, or RCBS.

(2) Specify make and caliber of the hulls the die is to be used for. To avoid mistakes, and be sure of a perfect fit, we also strongly urge that you send along two or three samples.

**EXCHANGE OF INSERT PARTS.** - The service charge

for the exchange of insert parts (see paragraph 4, pa. 5 for conditions) is \$2.00. Simply return the set to be exchanged, and specify the make and caliber hull the new set is desired for. Also, please send two or three samples if possible.

## THE B & A CORE SEATING DIES

**DESCRIPTION.** - Like certain other core seaters on the market, the B & A core seating dies are based on a highly successful design originally due to Sam Clark. Hence they are similar in general appearance to other versions of the Clark design, and except for their shorter length and the absence of bleedholes, (see Fig. 1), they also look very similar to our core forming dies. However our seaters differ from other versions of the Clark design in three outstanding respects, the value of which we believe will be obvious from the description below:

### (1) CONFORMS TO THE "EXPANDING UP" PRINCIPLE.

First, and foremost, our core seaters are made to correspond to a principle often overlooked in the past, but now regarded by most experienced bullet makers as a definite necessity in making bullets of the highest precision. This is the "expanding up" principle, the purpose of which is to eliminate all possibility of any bullets coming out with loose cores due to "springback" of the jacket material. Following this method simply means that in each of the core-seating, and point swaging operations of forming a bullet, the jacket is expanded outward by the core to a slightly larger diameter. In other words, the bore of the seater is made so that it will be slightly larger than the diameter of the jacket hulls, and so that the bore of the swage, in turn, will be slightly larger than that of the seater; a difference of from .0003 to .0005" for both cases in .22 caliber, and from .0005 to .0010" in larger calibers being generally regarded as sufficient.

In connection with the "EU" principle, the point to be remembered is that while lead is a relatively "dead" metal which will stay just about completely "put" when bent or deformed, jacket materials in general do not. Jacket hulls containing a proper amount of temper for bullet making will always undergo a certain amount of "spring-back" towards their former shape and size after being deformed in any way. Hence in either of the core seating, or point swaging operations, if the jacket is at all larger than the die it is pushed into, then more or less loose cores can be expected, regardless of how much seating, or swaging pressure is used.

On the other hand, if the jacket is expanded outward in each operation, then tight cores are a certainty. Under these conditions springback becomes an advantage, rather than a disadvantage. The jacket, being under constant tension, is forced to grip the core with positive firmness.

Two very desirable additional advantages of the EU principle are the facts that hulls eject very much easier from the core seater, and very appreciably less force is required in the point swaging operation than is the case where they are equal to, or larger than the bore diameter of either die. In the swaging operation, the milder force required not only makes the job easier, but also helps preserve a better corner radius on the bases of the bullets, which is one of, if indeed not "the" reason for the excellent performance of the so called "soft swaged" bullets.

The one disadvantage of the EU principle is the fact that the "as they come" diameter of many jacket hulls is too large to allow the principle to be followed directly. In such cases the hulls must be drawn, or sized down a sufficient amount in a hull sizing die, thereby requiring an extra operation, and an additional die. However, the operation is a very easy and rapid one, and the cost of the die (which we can supply) is moderate enough so that the advantages of EU far outweigh this disadvantage.

### (2) CAN BE READILY CONVERTED TO MEET ALL CONDITIONS.

- Like our core forming dies, our core seaters are also made with removable inserts, and they use the same die bodies and punch holders as the forming dies. As a result, not only can our seaters be converted from one caliber to another, or to a slightly different size in the same caliber just as readily as the other dies, but combination dies are both possible and practical. To the experimenter, in particular, who may be working with more than one caliber, various makes of hulls, and possibly more than one exact diameter bullets in the same caliber, the economy involved in the versatility of our dies will be obvious. A complete, separate die for each purpose is very nice of course, and many of our customers have

them. However, conversion of our dies is so simple that we strongly recommend the combination idea where total expenditure must be limited. A single die body and punch holder can be used with as many different sets of forming and seating insert parts as desired. We also maintain the same kind of exchange service on seater insert parts as on our other dies.

**(3) BASE PUNCHES IN ANY DIAMETER REQUIRED TO PROPERLY FIT HULLS.** - In order to do a clean neat job of seating cores, the base punch must be a proper fit for the hull to avoid extrusion of lead down around the sides of the punch. Hence, we make punches in any diameter required to exactly match the hull to be used, and where necessary, also the weight bullet to be made. For a hull with a cylindrical inner contour, a single, close fitting punch is sufficient for all bullet weights. Where the inner contour is tapered however, the weight (and hence the length) of the core to be seated must be considered as well as the make of the hull. As shown in Fig. 5, a punch of proper diameter for a core of length A in

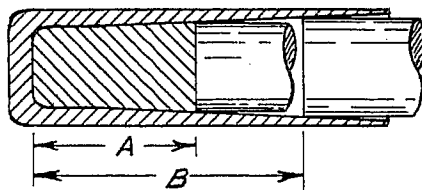


FIG. 5

such a hull, will be too small for a core of any appreciably greater length B. We can supply punches of proper size for any make of hull, and any weight bullet.

**CALIBERS AND SIZES.** - Due to difference of opinion in regards to just what the exact size of a bullet should be in any given caliber, various sizes exist. Hence in meeting EU requirements, it is necessary for us to make our core seaters available in a variety of sizes in each caliber also. Our seaters are available in all calibers, and for those who wish to follow the EU principle (which we strongly recommend), we can supply inserts in any

exact diameter required to match whatever bullet swage the customer may have.

**PRICES. -**

- Complete core seating die, but without punch holder (seaters use same holder as core making dies), ..... \$18.25 (S)
- Separate sets of insert parts for any make and caliber hull (insert, plunger and one base punch), ..... 10.00
- Extra base punches for different makes of hulls, or for different weight bullets in hulls with a tapered inner contour, ..... 2.25
- Combination core forming, and core seating die, complete with punch holder, and all necessary insert parts for any one make an cal. hull, ..... 34.50

**DIRECTIONS FOR ORDERING.**

- (1) Give make and caliber of hulls to be used, and send two or three samples if possible.
- (2) Give weight, or weights of bullets to be made, so that if your hulls have a tapered inner contour we can send proper base punches.
- (3) State whether you wish to follow the EU principle or not. If not, then we will lap your insert to accept your hulls "as they are", (without sizing down).
- (4) If you do wish to follow EU, then we will need to know the exact diameter of your bullet swage. A very precise method for determining this which avoids any possible jacket spring back error, is to make a lead impression of the swage by forming a bullet from a piece of lead core wire in it. Then either measure this impression, or send it on to us.

**EXCHANGE OF INSERT PARTS.** - Same conditions and charge as for core making parts.

**GUARANTEE.** - Same as for core making dies.

**THE B & A JACKET HULL SIZING DIES**

**PURPOSE AND DESCRIPTION.** - Unfortunately, as mentioned earlier, some makes and batches of hulls must be sized down a bit beforehand, in order to follow the EU principle, since in some cases the "as they come" diameter of the hulls is very nearly equal to, or even larger than the diameter of the bullet swage to be used. Under these conditions the EU principle cannot work of course, and hence the only remedy is to size the hulls down a bit. Our Jacket Hull Sizing Dies are made for this purpose.

The construction of these dies is shown in Fig. 6. Like our core forming, and core seating dies, these sizing dies also have replaceable inserts. Hence any given die can be changed over to a different size, or caliber by simply purchasing a new insert. In some cases a new punch is also desirable, but usually is not absolutely necessary. The die is operated by placing the hull, up side down, over the end of the punch, and then pushing it up thru the die. The force required is very mild.

The punch uses the same punch holder as our other dies. Workmanship is of the same high order as on our other dies, and these dies are sold under the same guarantee and free trial basis. Dies are available in any caliber, and any exact size required.

**PRICES. -**

- Complete sizing die, ..... \$11.00
- Extra inserts, any caliber and size, ..... 3.50
- Extra punches, ..... 2.50

**DIRECTIONS FOR ORDERING. -** First make sure, either by asking us, or by making your own measurements of your swage and hulls whether or not you need a size die. In .22 cal., the hulls should be not less than .0006" (.0010 is preferable) smaller than a lead bullet impression of your swage (see direction 4, pa. 7), and in larger calibers the difference should be from .0010 to .0020". If you make your own measurements, then simply send us about 6 samples of your hulls (which we will use to check the die with), and specify what diameter you want the die to draw them down to.

If you wish us to advise you, then send us 6 samples of your hulls, and either give us the exact diameter of your swage, or send a lead impression of it. If you need a size die we will send you one of the proper diameter to meet EU requirements.

**OTHER ITEMS**

**AUTOMATIC EJECTION FRAMES. -** These frames use the down stroke of the loading tool to obtain automatic ejection of cores and core-seated hulls from our dies. Altho manual ejection from our dies is very easy (only a light blow with the palm of the handle is required), the speed of operation can be further increased by these frames, and hence for those who do a lot of bullet making, they are a very nice extra. Our frames are similar in principle to others on the market, but differ from the others in two improvements of design:

(1) As shown in Fig. 7, the lower cross bar is attached to the punch holder rather than the punch, and can be rigidly clamped in any convenient position. (A right

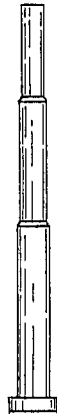
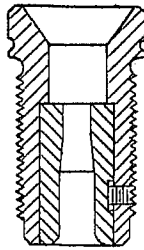


FIG. 6

handed person will find the frames swung around to the left, as shown, the most convenient; a left handed person will want them to the right.)

(2) As a further aid to convenience, the two connecting rods between the crossbars are set slightly behind the centerline of the die to provide more finger room.

Our frames are rugged, and very neatly made. Price per set, \$4.00: 5.00

**SPACING WASHER SETS. -**

These are used to eliminate trial and error setting of the body lock nut when our dies are changed from one adjustment to another. With these washers, the nut is screwed to the top of the die and locked there. Up and down adjustment is then obtained by using the washers as shims under the the nut. Each set consists of seven washers in graduated thicknesses so that adjustments in steps of .005" can be made, which is fine enough for all core forming and seating needs. The range of adjustment is adequate for all needs. Price per set, \$2.50.

**BULLET SWAGE PUNCHES. -** In order to take further advantage of our special punch holders, and to avoid having to change holders when swaging bullets, many shooters have requested us to make up punches for their bullet swages which would work in our holders. We can supply these at \$3.00 each. Please either specify the exact diameter you wish, or send us the body part of your swages so that we can perfectly fit it.

**CORE WIRE CUTTING TOOL. -** (Not illustrated.) We can supply a well made, fast operating tool at a moderate price. Same guarantee as for all our other tools. Price, \$5.00: 2.50

**TERMS. -** Prices on all items described in these sheets include postage. We prefer that orders be accompanied by money order or check. C.O.D. orders will be accepted, but the extra bother with them is rather a nuisance. The customer must pay the extra postal charges on C.O.D. shipments.

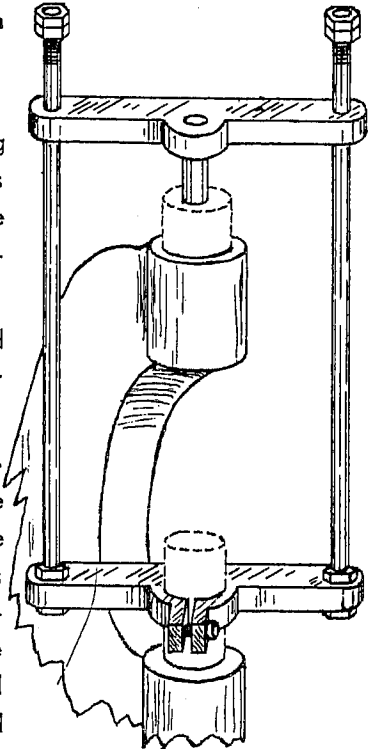
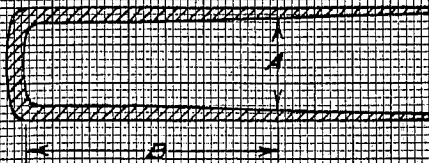
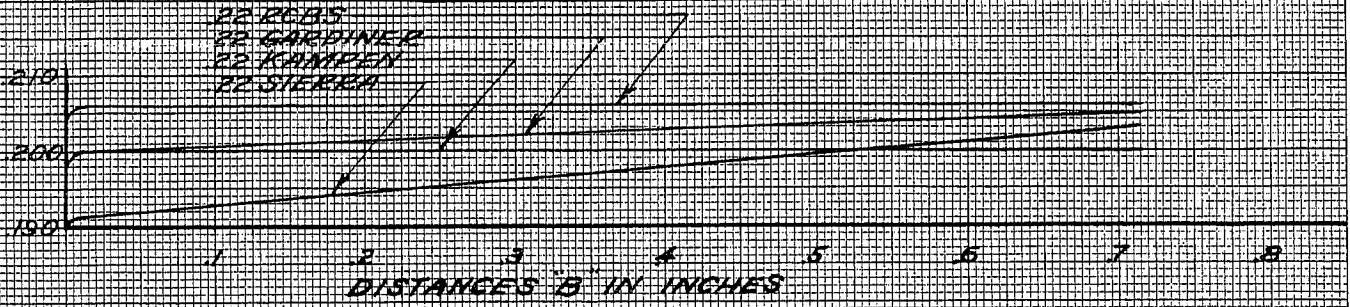


FIG. 7

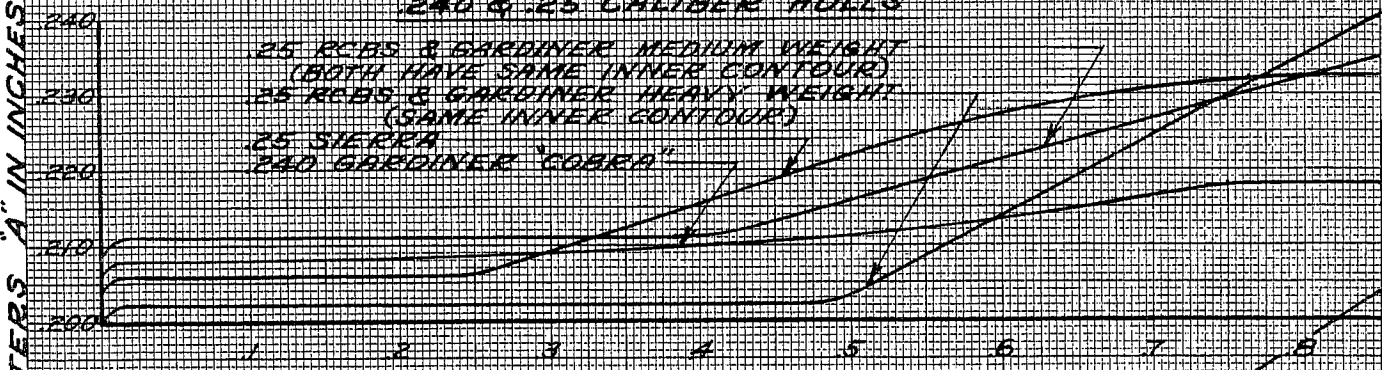
**INNER CONTOURS OF VARIOUS JACKET HULLS**  
 GRAPHS SHOW DIAMETERS "A" PLOTTED AGAINST DISTANCES "B"  
 SEE SKETCH BELOW



**.22 CALIBER HULLS**



**.240 & .25 CALIBER HULLS**



**.270 & .30 CALIBER HULLS**



**BIEHLER & ASTLES**

1597 RIDGE RD. WEST ROCHESTER, N.Y.