

F. MOSSBERG.
PROCESS FOR MANUFACTURING METAL RINGS.
APPLICATION FILED AUG. 5, 1918.

1,377,266.

Patented May 10, 1921.

Fig. 1.

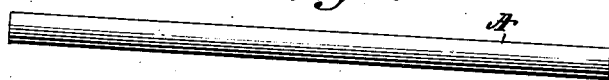


Fig. 2.

Fig. 2^a.



2^a

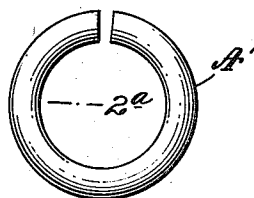


Fig. 2^b.



Fig. 3^a.

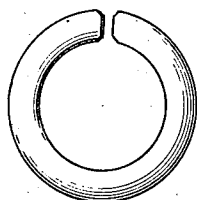


Fig. 3.

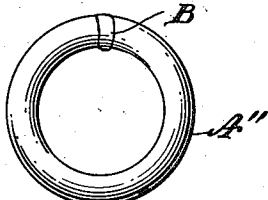


Fig. 3^b.

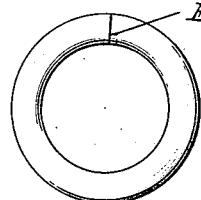


Fig. 4.

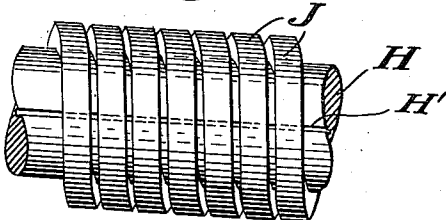


Fig. 5.

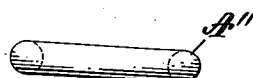


Fig. 6.

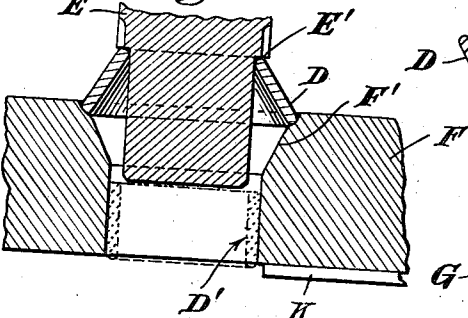


Fig. 5^b.



Fig. 5^a.

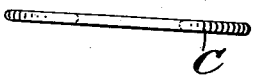


Fig. 7.



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PROCESS FOR MANUFACTURING METAL RINGS.

1,377,266.

Specification of Letters Patent.

Patented May 10, 1921.

Application filed August 5, 1918. Serial No. 248,256.

To all whom it may concern:

Be it known that I, FRANK MOSSBERG, a citizen of the United States, residing in the city of Attleboro, county of Bristol, State of Massachusetts, have invented certain new and useful Improvements in Processes for Manufacturing Metal Rings, of which the following is a specification, reference being had to the accompanying drawings, illustrative of one particular embodiment of my invention.

This invention relates to processes for manufacture of metal articles such as rings, out of metal, and in particular the production of finished rings from ductile material in a manner involving an original form most economically provided, and the effect of such process with maximum saving in the cost of manufacture. In particular, one application of my process is the production of copper bands, such as the rotating or rifling bands which are applied to shells and serve to engage the rifling of the gun barrel. These rings must be accurate as finally produced ready for attachment to the shells, although they are used but once, and therefore the saving of cost in their production is of greatest importance.

In the practice of my invention the scrap or amount of material separated from the original metal from the starting of the process to the completion of the article, is minimized and is far less than other processes heretofore used. This is a further development of my process disclosed in my U. S. Letters Patent No. 1,263,271, granted April 16, 1918. This saving of scrap represents a very material saving in cost of production, while in addition the further steps of the process contribute to economy and also produce a finished article of advantageous physical qualities most satisfactorily meeting all the requirements of strength, ductility and uniformity of structure of metal.

In the particular application of my process which is herein described in detail, I produce a blank which is worked into the finished article, the blank being made in a manner affording very distinctive advantages, and in particular this process as distinguished from my patent above cited, affords a most economical basis for my process when manufacturing what are generally known as small bands. When the process is used for the production of rotating bands, the bands ranging from those suitable for

one-pounder shells to ten and twelve inch shells, or more, it becomes a question of most economically providing the blanks. In the larger sizes cast blanks are readily produced and afford a large basis for economy of the process, while it is difficult to produce small castings, and this invention therefore aims to produce the small blanks economically and in a manner suitable for the process, and in some other respects involves advantageous steps in the course of production.

In a particular embodiment of my invention, I will now specifically describe the process with reference to the accompanying drawings, in which:

Figure 1 is a side view of a metal rod blank.

Fig. 2 shows the rod bent in a circle,— Fig. 2^a is a section of the rod, and Fig. 2^b is a section of a modified form.

Fig. 3 shows the bent rod welded at abutting ends forming a ring.

Fig. 3^a is a bent blank with modified ends.

Fig. 3^b is a ring, as Fig. 3^a, welded, avoiding excrescence at the joint.

Fig. 4 shows a rod spirally wound on a mandrel, arranged so that it may be cut into rings.

Fig. 5 is a side view of the blank Fig. 3,— Fig. 5^a is the blank pressed or flattened,— Fig. 5^b shows the blank in section in a further step, cupped with its sides inclined.

Fig. 6 shows a die and punch of a press in section, and a blank such as Fig. 5^b, in position for the finishing operation, and in dotted lines the finished position of the article in the die.

Fig. 7 shows the finished ring.

The blank A is a length cut from a rod with a section, as shown in Fig. 2^a, the length being just sufficient to bend around to the necessary size, as shown A', Fig. 2. The right section and length are selected to provide just sufficient material for the finished ring with the very small surplus necessary to allow for the material removed during the steps of the process.

A'' shows the ring with the weld B which has consolidated the abutting ends. This welding is effected electrically or may be done by other methods. Such a joint if made in a finished band would cause a weakened structure locally and would not be satisfactory, but in my process the welding of the abutting joints is made in the blank, and thereafter the blank is worked and

treated effecting the advantages of my process. Essentially, by my process the band with its welded joint is pressed to the point of flow of the metal, and the material at the joint is changed in its structure to such an extent that the joint is equal to, and in fact has shown greater strength than the rest of the ring.

Any surplus material at the weld B may be removed to any extent found desirable, or the weld so made that no excrescence results by suitably reducing the size of the abutting ends before welding. The blank A'', as shown in Fig. 5, is then subjected to pressure to an extent that when between the dies the metal in the blank will flow throughout, so that the structure of the metal will be changed simultaneously throughout the ring, resulting in a flattened annular disk C. In producing the flattened disk C, inner or outer sizing dies may be used, as set forth in my patent above recited. Thereafter the blank is cupped to the form D, and in this condition is inserted preferably as shown in the press, Fig. 6, by being reversed to a position so that the narrow part of the blank D engages shoulders E' on the punch E, while the larger end of the blank engages an inclined portion F' of the die F, so that with the movement of the punch E the entire blank is pressed uniformly throughout so that it is self-centering, and moves until the larger diameter is reduced to the same diameter as the smaller end throughout the length and into the final position D', thereby producing the up-ended ring or band when pressed through the die. Any slight inequalities of edges are removed in the usual manner, or as set forth in my patent heretofore referred to, producing the finished ring G. When pressed through the die a stripper K as shown, may engage the top edge of the ring to hold it while the punch recedes.

Instead of starting the production from round rods, square bars may be used as shown in section Fig. 2^b. Such square rods or round rods may be wound about a mandrel H, as shown in Fig. 4, with a slot H'. The convolutions J—J so wound around the mandrel afford the facilities for cutting along one side of the mandrel, so that each convolution J—J as severed produces a split ring, which is pressed flat to cause the ends to abut which are welded to produce a finished ring, as in Fig. 3. The bur at the weld is preferably machined off so that all scale or surface effect of the structure of the metal at the weld is removed. Thus the next step in the process is effected by the dies engaging the ring blank uniformly throughout its circumference and insuring the pressure causing uniform and simultaneous flow of metal throughout the ring.

In the various steps of the process, the heating and annealing are effected as neces-

sary to insure proper action of the metal under treatment.

It will be noted that in the step shown in Fig. 6 the conversion from the cupped disk in the up-ended or cylindrical ring, is accomplished with the metal under compression and not tension. This step also insures the centering of the blank for the operation with certainty and simplicity, therefore producing without question the uniformity of every finished ring.

While some of the steps in my process are described in my patent above referred to, it will be seen that the production of the blank is the particular subject of this application, and the importance of this is appreciated by those skilled in the art as an all-important element in effecting economy in the manufacture of rings such as rotating bands or anything similar. The casting of very small blanks is relatively more expensive pound for pound, than the casting of large blanks, in view of which the economies due to my process, while very material when using cast blanks for large bands, may be still further augmented by the use of blanks made as above set forth for the production of small bands. It is known that the production of rods or bars of small sizes, entails a very slight increase in cost over ingot copper, whereas the production of sheets or tubing involves rolling or drawing operations which very materially add to the cost of the metal when it is necessary to have it in sheet or tubular form for the manufacture of bands by other methods now practised. Furthermore, the use of bar stock permits the production of a ring blank with exactly the proper amount of metal necessary for the finished article, allowing, of course, for predetermined known, but very slight loss, in the steps of the process. This loss or scrap is extremely small as compared with the loss and scrap incident to the practice of processes other than mine.

Many other forms of bands may be made by my process or the use of some steps in my process, as set forth in my claims. Thus gaskets or washers of finished forms other than cylindrical may be economically produced, as well as other finished articles. While rotating bands or rifling bands are now a most important, and in fact an enormous product, in view of which every possible economy in unit production means a great deal in the whole aggregate, in after-war times the process will be equally advantageous in the production of many other articles which are required in quantity. Bushings for bearings would be of other material than copper, and various articles may be made of still different metals, alloy or compounds, with the attendant saving by utilizing my invention.

Variations within the scope of the ap-

pendent claims may be made in details and in material other than shown and described above, but what I claim and desire to secure by Letters Patent is:

- 5 1. Process for making metal bands, comprising the production of a split ring from bar stock, welding the abutting ends, confining the blank between dies having opposed faces disposed to engage the blank
10 throughout its circumference, applying pressure simultaneously throughout the circumference to an extent to cause the flow of metal at the joint to a homogeneous structure with the remainder of the ring and
15 causing flow of the metal simultaneously throughout the ring radially to form an annular disk of uniform molecular structure and up-ending the disk to form a cylindrical ring.
- 20 2. A process for the manufacture of rotating bands for shells, consisting of bending bar stock into a split ring, welding the abutting ends of the ring, applying pressure to the blank so formed by engagement
25 between opposed dies uniformly engaging the blank throughout its circumference and pressing the same simultaneously throughout to an extent to cause flow throughout the structure of the metal simultaneously to
30 a degree to effect a reorganized molecular structure at the joint homogeneous with the balance of the ring, cupping the resultant annular disk, and up-ending the same to form a cylindrical ring.
- 35 3. A process for the manufacture of metal bands, comprising the production of a split ring from bar stock, welding the abutting ends, confining the blank between dies having opposed faces disposed to engage the
40 blank simultaneously throughout the circumference and applying pressure simultaneously throughout the circumference to cause a flow of the metal at the weld uniformly with the rest of the metal to convert the material at and in proximity to the
45 weld into a molecular structure in conformity with the remainder of the band, whereby a blank is formed for further treatment as

a continuous homogeneous metallic structure.

4. A process for making annular metal rings, comprising the bending of a rod to cause the ends to abut, welding the ends in a manner confining the size of the weld to the size of the balance of the bar, pressing the resultant ring from both sides simultaneously throughout its circumference to produce an annular disk of homogeneous molecular structure throughout including the weld, and thereafter pressing the disk in
60 any desired manner to the configuration of the finished article desired.

5. A process for making annular metal rings comprising the bending of bar stock length to bring the ends together, welding
65 the ends together, subjecting the weld to pressure to an extent that will cause a change in molecular structure to a uniformity with the balance of the blank and simultaneously effecting uniform pressure
70 throughout the blank to cause a flow of metal avoiding disruption of the joint, thereafter pressing or bending the blank to the configuration of the prescribed finished article.

6. A process for manufacturing annular metal rings, comprising the bending of the rod to bring the ends in proximity, welding the ends together, subjecting the weld and the remainder of the ring simultaneously to
80 a pressure effective for causing flow of metal to unify the molecular structure in proximity to the joint with the remainder of the metal, but of a degree avoiding disruption of the joint, and providing a ring capable
85 of withstanding throughout the further distortion of press operation of flow of material and bending.

In testimony whereof I have signed my name to this specification, in the presence of
90 two subscribing witnesses, this 26th day of July 1918.

FRANK MOSSBERG.

Witnesses:

HERMANN F. CUNTZ,
H. MUCHMORE.