J. W. SCHATZ.

PROCESS OF MAKING HOLLOW METALLIC BALLS.

APPLICATION FILED MAY 25, 1909.

955,698. **Patented Apr. 19, 1910.**

Fig: 1,

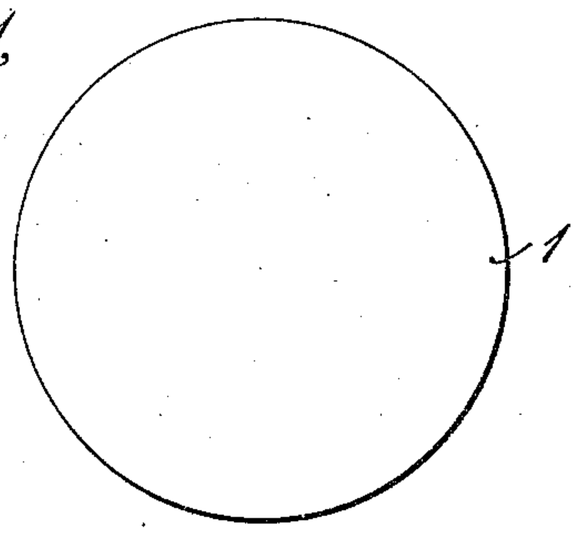


Fig: 3,

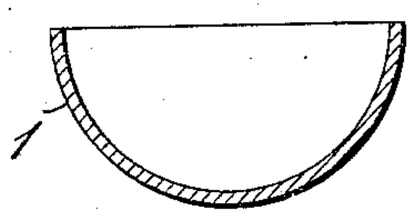
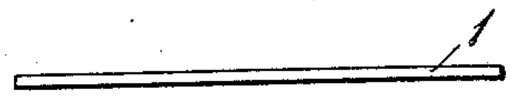


Fig: 2,



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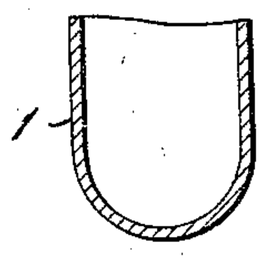

Fig: 5,

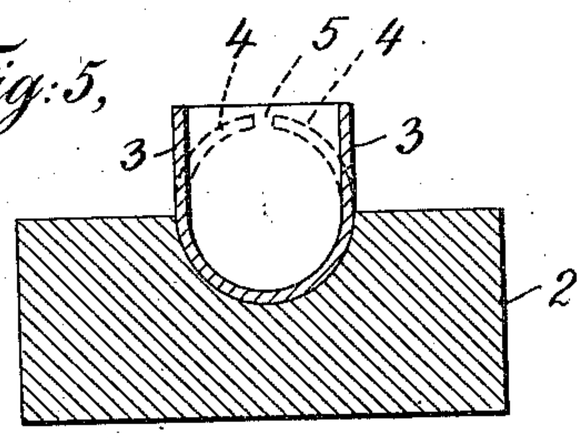

Fig: 6,

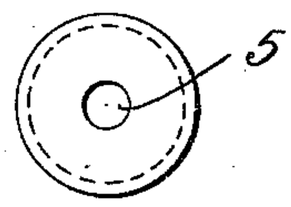

Fig: 10.

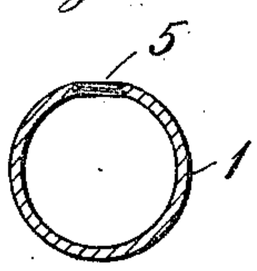

Fig: 7,

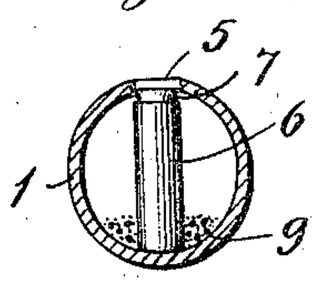

Fig: 8,

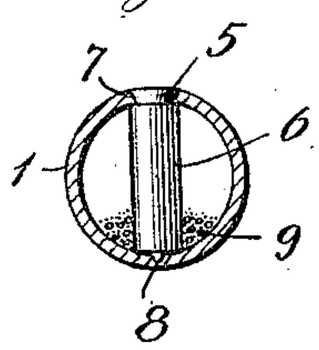

Fig: 9,

Witnesses:
Max B. A. Doring
F. M. Dorsbach

John W. Schatz Inventor
By his Attorney Phillips Abbott

UNITED STATES PATENT OFFICE.

JOHN W. SCHATZ, OF CHAPPAQUA, NEW YORK, ASSIGNOR OF ONE-HALF TO HERMAN A. SCHATZ, OF CHAPPAQUA, NEW YORK.

PROCESS OF MAKING HOLLOW METALLIC BALLS.

955,698. Specification of Letters Patent. **Patented Apr. 19, 1910.**

Application filed May 25, 1909. Serial No. 498,351.

To all whom it may concern:

Be it known that I, JOHN W. SCHATZ, a citizen of the United States, and a resident of Chappaqua, county of Westchester, State of New York, have invented a new and useful Method or Process of Making Hollow Metallic Balls, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a plan view of the metallic disk or blank from which the ball is made; Fig. 2 illustrates an edgewise view of that which is shown in Fig. 1; Fig. 3 illustrates a sectional view of the blank at the end of the first forming operation; Fig. 4 illustrates a sectional view of the blank at the end of the second forming operation; Fig. 5 illustrates a sectional view of the blank after it has been trimmed to dimension, showing the third operation; Fig. 6 illustrates a plan view of the blank after it has been given the general form of a sphere, the hole therein having been reamed out to dimension; Fig. 7 illustrates a sectional view of the blank taken through the center of the hole seen in Fig. 6 and showing the reinforcing and hole-closing plug and also the soldering and galvanizing material. Fig. 8 illustrates that which is shown in Fig. 7, the final swaging operation having taken place and the galvanizing material in place ready to be melted; Fig. 9 illustrates a completed ball; Fig. 10 illustrates a detail of special construction.

My new method or process is as follows:—1 represents a disk of metal from which the ball is to be made and of the desired thickness. It may be steel, brass, copper, aluminum, or any other suitable metal. It is first put upon a suitable forming die with which a half round punch or former coöperates, and is pressed into the shape shown in Fig. 3. It is then taken from that die and subjected to the operation of another die and plunger, by which it is given the form shown in Fig. 4; that is to say, its lower part is made substantially semi-spherical and its sides are drawn upwardly into substantial parallelism with each other. After this the upper edges of the blank are cut off to the size required for the subsequent operations, leaving the blank in the form shown in Fig. 5. It is then put upon a die, represented at 2 in Fig. 5, which has a semi-spherical cavity in its upper surface, coinciding with the semi-spherical shape and size of the bottom of the blank shown in Fig. 4. Thereupon a closing die is brought down upon the upwardly presented edges 3, 3, of the trimmed blank, whereby they are upset inwardly as indicated by dotted lines 4, 4, whereby the blank is caused to assume an elongated spherical shape there being also an irregularly shaped hole 5, left in it because the edges of the metal have not quite met. Thereupon the blank, now in the shape of a somewhat elongated ball, is subjected to the action of a reaming tool of suitable construction, whereby the hole 5 is cut out smoothly to the desired size, as shown in Fig. 6.

A metallic plug, shown at 6 in Fig. 7, which may be made of the same metal as that composing the blank, or of other metal if preferred, and which has the desired length and is of such diameter as to fit the hole 5 somewhat snugly, is then introduced through the hole, occupying substantially the position shown in Fig. 7, with its upper edge resting in the lower part of the hole 5, but before introducing the plug, I pass through the hole into the interior of the ball the desired amount of some suitable soldering and galvanizing or metal-coating material, 9, (see Figs. 7 and 8) such as zinc, spelter, or the like, together with a suitable flux, such as borax. Thereupon the ball is placed between suitable swaging dies in such position that they will swage the ball into more accurate spherical form and will also forcibly impress the metal at the edges of the hole 5 upon and into the shoulder 7, as shown in Fig. 8, thus firmly and rigidly holding the plug in position. I sometimes make a slightly projecting point on the lower edge of the plug, as shown at 8, (see Fig. 8) which under the pressure of the swaging dies will be forced into the metal of the ball against which the point rests, thus aiding in securely holding it in position. This, however, will not ordinarily be necessary, because the galvanizing about to be described will usually rigidly solder the plug in position. After these operations have been performed the ball is put into a suitable furnace and is heated so as to melt the galvanizing and soldering material, the ball being rotated while heated, so that its entire interior surface, including the surface of the plug, shall become thoroughly galvanized. Thereafter the heating may be regulated so as to properly temper the ball,

if it be made of such metal as will permit such result. Thereupon it is ground or otherwise finished on its outer surface in any of the usual ways.

In the manufacture of balls for certain uses, as for example when used as ornaments on furniture, or otherwise, instead of inserting the plug as described, I sometimes thread the hole 5 after it has been duly reamed, as shown in Fig. 10, so that the ball may be screwed upon a suitably threaded spindle forming part of the structure to be ornamented. Also a plug to close the hole may be threaded or riveted therein, without extending across the interior of the ball.

It will be obvious to those who are familiar with such matters that it will not in all cases be necessary to submit the metal to the number of forming or swaging operations described by me and in some instances it may be necessary to submit them to more such operations; this will depend upon the size of the ball and the thickness and character of the metal employed. It is also obvious that it will not be necessary in all cases that the plug 6 be provided with the shoulder 7 as shown. The plug may be of any preferred shape; its outer end may be merely beveled off or made in the form of a truncated cone, or left in cylindrical shape. Also it will not always be necessary to galvanize the interior of the ball, but I much prefer so to do, in order that the plug may be more rigidly held in place, and all joints between it and the ball be sealed and also as a preservative against rust or corrosion.

The invention secures a series of important advantages, among them the following: reduction in cost as compared with solid balls. The strength is increased, yet the weight reduced. These advantages especially apply to balls of expensive material, such as brass or bronze. The reduction in weight is especially desirable when the balls are used as valves. The plug 6 extending across the interior of the ball materially increases its strength, acting as a post to take the strain if it be applied on or near the ends thereof, and as a stay bolt if otherwise applied, because the ends of the plug are rigidly connected at its ends to the interior sides of the ball.

Under my process I can make hollow balls in practically all sizes from a diameter of a quarter of an inch or less, up to several inches. Indeed theoretically the size may be anything desired, although as a practical matter there are limits within which the invention is useful. The balls are adapted to a great variety of uses in various arts, such as anti-friction balls, casters, balls for valves, balls for ornaments, and many other uses.

I claim:

1. The method described consisting in pressing a disk of metal by successive forming operations into the general shape of a sphere having a hole in one side, introducing suitable soldering material into the interior of the sphere, inserting a plug in the hole and subjecting the article to the action of heat.

2. The method described consisting in pressing a disk of metal by successive forming operations into the general shape of a sphere having a hole in one side, introducing suitable soldering material into the interior of the sphere, inserting a plug in the hole, then additionally pressing the article into more accurate spherical shape and upon and about the plug and then subjecting the article to the action of heat.

3. The method described consisting in pressing a disk of metal by successive forming operations into the general shape of a sphere having a hole in one side, introducing suitable soldering material into the interior of the sphere, inserting a plug of such length as to extend across the interior of the sphere in the hole, then additionally pressing the article into more accurate spherical shape and upon and about the plug and then subjecting the article to the action of heat.

4. The method described consisting in pressing a disk of metal by successive forming operations into the general shape of a sphere having a hole in one side, reaming the hole to dimension, then introducing suitable soldering material into the sphere, then inserting a shouldered plug having sufficient length to reach across the interior of the sphere in the hole, then additionally pressing the article into more accurate spherical shape and upon and about the shoulder on the plug and then subjecting the article to the action of heat.

5. The method described consisting in pressing a disk of metal by successive forming operations into the form of a sphere having a hole in one side, then introducing suitable soldering material, then plugging the hole and then submitting the article to the action of heat.

6. The method described consisting in pressing metal by successive forming operations into a general spherical form leaving a hole in one side, inserting a plug in the hole long enough to extend across the interior of the sphere and then additionally pressing the article into more accurate spherical form and closing the hole over and upon the end of the plug.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. SCHATZ.

Witnesses:
GEO. W. HAIGHT, Jr.,
ADOLF SCHATZ.