Sept. 4, 1923. 1,467,166

L. W. JONES

METHOD OF FORMING PIPE BALLS

Filed Sept. 28, 1921

FIG. 1

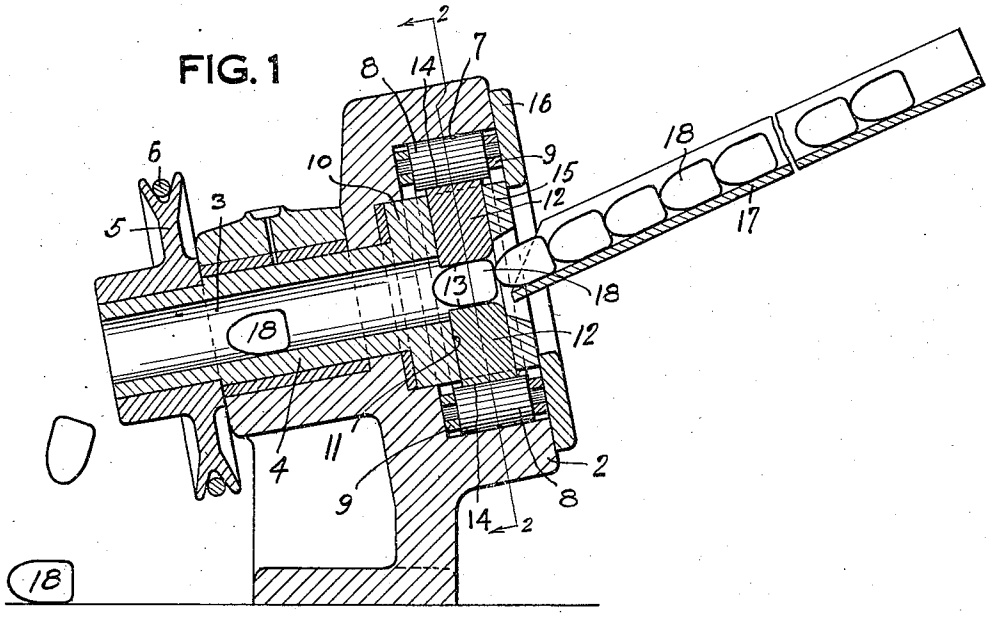


FIG. 3

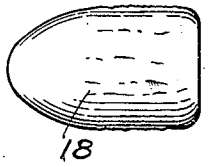


FIG. 2

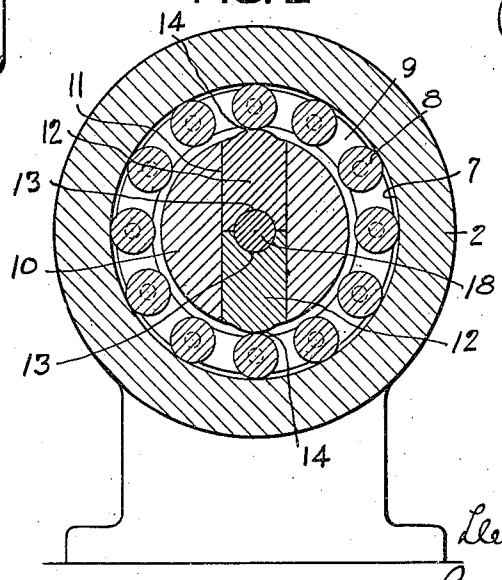
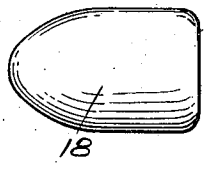


FIG. 4



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UNITED STATES PATENT OFFICE.

LLEWELLYN W. JONES, OF WYNNEWOOD, PENNSYLVANIA.

METHOD OF FORMING PIPE BALLS.

Application filed September 28, 1921. Serial No. 503,808.

To all whom it may concern:

Be it known that I, LLEWELLYN W. JONES, a citizen of the United States, and resident of Wynnewood, in the county of Montgomery and State of Pennsylvania, have invented a new and useful Improvement in Methods of Forming Pipe Balls; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to pipe-balls and the method of forming same.

These pipe-balls are employed in connection with the manufacture of lapweld tubing and in recent years have usually been made of cast high manganese steel, but such balls have proven very unsatisfactory on account of the fact that steel of this character is not machinable with an edged tool and the balls had to be swung on a grinding lathe and ground with an emery or carborundum wheel to remove the lumps and bring them down to the correct size. This operation not only removes the original skin on the casting, but causes scoring or scratches around the surface of the ball where the outer skin had been removed, making a rough surface which gathers up metal, slag and scale from the inside of the pipe when being welded, and soon makes a lump which it is difficult to remove without grinding again, and consequently the ball has to be thrown away. Furthermore, owing to the low physical strength of cast high manganese steel and high expansion and contraction, many of the balls crack and are rendered useless from this cause before being worn out.

In fact, the use of the cast high manganese steel ball ground to size has proved so unsatisfactory that many of the tube companies are looking about for something better, and are even considering going back to the old cast iron ball as used some 10 years ago extensively and to some extent still.

I propose to make pipe-balls of forged metal and prefer to use high manganese and carbon-steel, but, as the forging like the casting is not machinable with an edged tool, I propose to swage the forged high manganese steel ball cold after the forging has been heat treated. Forged manganese, when heat treated, has a very high tensile strength and when cold swaged or drawn will have a still higher tensile, which is very much higher than the tensile strength of cast manganese steel, and I consequently overcome the breakage to a great extent, and by cold swaging after it is hot forged I maintain the original skin and can get pipe balls without scratches, tool marks, pits or knots to collect metal from the inside of the pipe which adheres to and spoils the ball.

In the accompanying drawing I have illustrated a simple form of apparatus for carrying out my improved method, in which Fig. 1 is a sectional elevation of such apparatus; Fig. 2 is a cross section on the line 2—2, Fig. 1; Fig. 3 is a view of a pipe ball in the rough; and Fig. 4 is a view of the pipe ball after having been treated by my improved machine.

In the drawing, the numeral 2 designates a suitable frame or casting which has the cylindrical bore 3 to receive the hollow shaft 4. The bore 3 is arranged at a slight inclination for the purposes hereinafter set forth. A pulley 5 is mounted on the shaft 4, which may be driven by a suitable belt 6. The casting 2 has the cylindrical recess 7 and arranged within said recess are the rollers 8 which are supported in the ring bearings 9. The head 10 of the hollow shaft 4 has a groove or mortise 11 formed therein to receive the dies 12. These dies 12 have the semicircular grooves 13, and these combined grooves form an opening to receive the pipe-ball to be treated as hereinafter set forth. The outer ends of the dies are slightly rounded as at 14 and as the hollow shaft 4 rotates, these rounded portions 14 of the dies come in contact with the rollers 8 in quick succession and a percussive action is imparted to the pipe-ball contained within the dies. A cap-plate 15 is secured to the end of the shaft 4 to retain the dies in position, and the ring-plate 16 is secured to the casting 2. A chute 17 may be arranged in suitable position with reference to the dies so that the pipe-balls fed to such chute will slide down the same and enter the dies by the action of gravity, or fed in by suitable mechanical mechanism.

In practicing my invention, I first take a suitable sized bar of high manganese steel, form it in a suitable upsetting or forging machine to shape, and punch it to form the central hole. In this manner I make up the blank approximating the size desired. The blank with the hole formed in it is then heat treated, as all high manganese

and high carbon-steel is brittle before heat treatment. This heat treatment consists in heating the blank up to a temperature of over 1700° F. and then rapidly cooling the same by quenching. The steel which was brittle before this treatment is now as ductile as soft carbon steel or wrought iron, while its tensile strength is greatly increased. It is so hard, however, that it is not machinable with an edged tool, and in order to finish it and give a smooth surface as well as bring it to the proper gauge I subject the ball, while cold, to a swaging action.

This is done in the apparatus illustrated, and the pipe-ball, being substantially in the shape of a projectile with a conical end, is readily guided into the dies and the exterior or anvil portion of the pipe-ball in the rear of the conical portion is subjected to the action of the dies.

The shaft 4 is rotated at a high rate of speed and a blow is administered to the pipe ball each time it comes in contact with one of the rollers 8. As a consequence the blows are administered in quick succession to the pipe ball in its passage through the dies, and all irregularities or excrescences are removed by this hammering action, while at the same time the original skin is preserved and a hard, smooth, compact surface is given to the ball, which is at the same time trued up to accurate size and dimensions. The percussive action or blows harden the steel for a considerable distance under the skin, which gives a smooth surface and true cylindrical form, while at the same time the surface of the ball is also hardened and toughened.

The idea of cold swaging the forged manganese ball is not only to retain the original smooth surface after heat treatment, but also to do away with the grinding which is undesirable for various reasons named above, and it also compacts or hardens the surface for some distance in on the forging, giving it a higher tensile strength, smoother finish, and greater abrasive resistance, and at the same time reduces the ball to a more perfect circular shape when cold, and as all the balls are gauged or measured cold, this is also very desirable.

What I claim is:

1. The method of forming pipe-balls consisting in forging a blank to approximately the size desired, and then swaging the blank cold to form the finished pipe-ball.

2. The method of forming pipe balls consisting in forging a blank from a piece of high manganese steel approximating the size desired, heat treating the blank, and then swaging the blank cold.

In testimony whereof I the said LLEWELLYN W. JONES have hereunto set my hand.

LLEWELLYN W. JONES.

Witnesses:

FLETCHER W. STILES,
CHARLES S. EDMUNDS.