

(No Model.)

S. J. ADAMS.
Tube Welding Ball.

No. 235,482.

Patented Dec. 14, 1880.

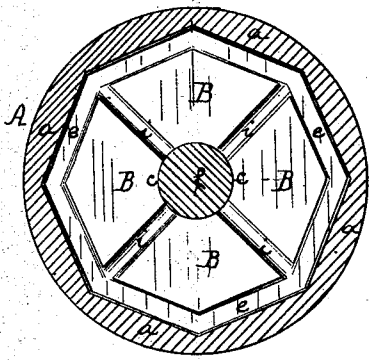


Fig. 2.

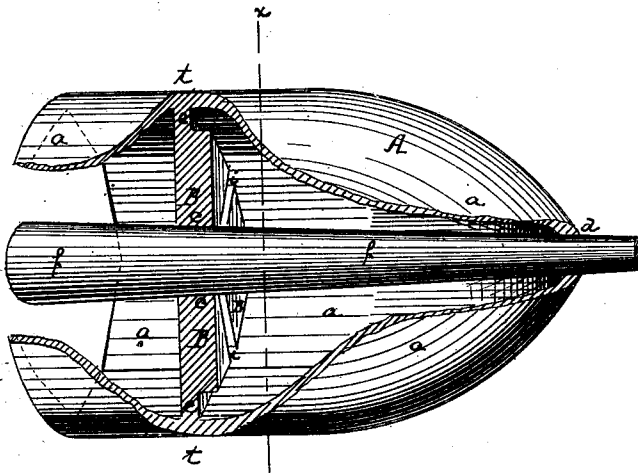


Fig. 1.

Witnesses

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TUBE-WELDING BALL.

SPECIFICATION forming part of Letters Patent No. 235,482, dated December 14, 1880.

Application filed July 26, 1880. (No model.)

To all whom it may concern:

Be it known that I, S. JARVIS ADAMS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tube-Welding Balls; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective view, partly broken away, of my improved ball. Fig. 2 is a vertical cross-section of the same on line *xx*, Fig. 1.

Like letters of reference indicate like parts in each.

My invention relates to the balls used in the manufacture of tubing, to form a surface against which the rolls press the skelp in welding it into a tube. These balls are suspended on a long rod or mandrel between the welding-rolls, and after the welding of the tube the rod is withdrawn therefrom. The manufacture of these balls is difficult, as they must be made of the exact size, the variation of one-fiftieth of an inch being fatal, and if they are not cast perfect in shape they must be ground or turned true before use. It is necessary that these balls possess great strength at the point of weld, as the pressure of the rolls would break them unless sufficiently strong to sustain such pressure. When cast with a shell thick enough to stand this pressure another objection is encountered in the difficulty of breaking the ball if it becomes stuck in the pipe, it being sometimes necessary to cut the skelp or pipe to remove the ball, and thus spoil a length of tubing.

The object of my invention is to form a welding-ball which possesses the requisite strength at the point of welding, but can easily be broken out if it becomes lodged in the pipe.

My invention consists in a welding-ball formed of a thin or frangible shell provided on the interior with a support or bracing at the point of weld, so that it cannot be broken by the pressure of the rolls in welding, and yet is capable of being easily broken upon the removal of the support or bracing.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation.

In the drawings referred to, A represents my improved welding-ball, which is formed of cast metal, the front end of the ball being drawn to a point to direct the skelp into the welding-rolls. The welding-ball A is formed of a thin shell, *a*, which, when supported as hereinafter described, is sufficiently strong to bear the pressure of the welding-rolls, but when unsupported is weak and easily broken. The exterior of the shell is cylindrical, being either cast to shape or cast and then turned. The interior of the shell is preferably made angular, to provide points or lines where the metal is thinned, so that it will break easily when necessary. I find that a hexagonal or octagonal interior gives good results, and while at the same time it bears the pressure when braced, it presents a sufficient number of weak points to break easily by a blow from the outside when the bracing is removed. The interior of the shell may, however, be cylindrical in form. As there is no great strain on the ball at the point or in a large part of the body of the ball, no bracing is considered necessary; but in the interior of the ball below the point where the welding-rolls have the greatest pressure on the skelp, as at *t*, (known as the point of welding,) I form the support or bracing B, which extends down to the rod or mandrel *f*, on which the ball is supported. This support or bracing is formed of a solid diaphragm, connected to and integral with the shell, extending entirely around its interior and down to the mandrel, as shown in Figs. 1 and 2. It is provided with an opening or bearing, *c*, for the rod or mandrel, and if necessary, with a seat, *d*, for the rod in the point of the ball. This bearing *c* through the arch is formed tapering in such manner that when the mandrel *f* is placed in the opening it will wedge therein and form a solid support for the arch or bracing to bear against.

I prefer to make the tapering bearing *c* round, to be used with a correspondingly-tapered round mandrel, as I find that the ball, when wedged on the mandrel, is held firmly

and braces the support or bracing all around the bearing, while at the same time the ball can be turned to present more perfect surfaces for welding than where the opening is angular. The bearing *c* is preferably cast on a chill, so as to obtain a more perfect rest or bearing for the tapering mandrel than where a common sand-core is used.

The solid support or diaphragm *B* is formed with a broad bearing-surface on the rod or mandrel *f*, so that it will obtain a strong hold on the rod, and is thinned at the point of connection with the interior of the shell *a*, as at *e*, so that the connection between the support and shell is so slight that an end blow on the support will break its connection with the shell, thus removing the support. It may also be thinned or increased in lines extending from the opening *c* to the shell, as at *i*, so that on receiving the end blow it will be broken in pieces as well as severed from the shell. The end of the mandrel may either be supported in the point of the ball, or a support or brace may be formed within the ball, beyond the bracing *B*, for this purpose.

When my improved welding-ball is in use it is placed on the end of the rod or mandrel *f*, the tapered opening *c* through the support or bracing *B* fitting around and wedging the ball thereon. The ball is then placed between the welding-rolls and the tube welded thereon in the usual manner. As the thin shell is supported by the bracing *B* at the point of welding, where the heavy strain comes upon the ball, it is enabled to bear the weight without breaking and perform its usual function in welding the tube. The solid support *B* is also strengthened and aided in bearing the pressure of the welding by the mandrel *f*, which fits and is wedged into the opening or bearing *c*, and thus forms a solid brace from one side of the ball to the other. If the ball becomes lodged in the pipe and forms what is termed a "sticker," the rod or mandrel *f* is removed and a bar pushed down the tube until it strikes and breaks away the diaphragm or support *B* from its thin connection with the shell, and by the blow also breaks it into pieces along the thinned radial lines *i*. The frangible shell *a*, being without support, can then be broken by a blow from a hammer on the outside of the tube and removed from it, after which the tube can be again placed in the furnace, reheated, and rewelded, thus saving the length of tube intact. The blow from the hammer breaks the shell along the thinned or weakened lines formed by the angular interior, which lines

render the shell more frangible than if its interior were cylindrical.

By this means I am enabled to form a thin or frangible shell, which is light in weight and therefore less expensive than the heavy balls, yet strong enough to sustain the pressure of the rolls in welding the tube, and can easily be removed if lodged in the pipe.

My invention also enables me to use a round rod or mandrel for carrying the ball, as the ball wedges itself on the mandrel, and so can be held firm in any position placed, thus allowing the use of the ball over and over again until the entire surface is worn out.

It also enables me to use a small mandrel with large balls, which is greatly preferred by pipe-manufacturers, the heavy mandrel being difficult to handle. As the opening in the bracing for the mandrel is small, a perfect fit is obtained more easily than where a large opening to fit a large mandrel is used.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A tube-welding ball formed of a thin or frangible shell provided on the interior with a support or diaphragm integral with the shell at the point of weld, sufficient to sustain the pressure of welding, said shell being capable of easy breakage upon the rupture of the diaphragm, substantially as and for the purposes set forth.

2. In a tube-welding ball, the shell *a* and solid inner support or diaphragm, *B*, integral with the shell at the point of weld, in combination with the mandrel *f*, fitting within the bearing of the support, substantially as and for the purposes set forth.

3. In a tube-welding ball, the shell *a* and inner support or diaphragm, *B*, integral with the shell, and having the tapering opening or bearing *s*, in combination with the tapered mandrel *f*, substantially as and for the purposes set forth.

4. In tube-welding balls, the combination of the shell *a* and the support *B*, having the thinned connection *e*, substantially as and for the purposes set forth.

5. In tube-welding balls, the combination of the shell *a* and the support *B*, having the thinned connection *e* and the radial creasing *i*, substantially as and for the purposes set forth.

In testimony whereof I, the said S. JARVIS ADAMS, have hereunto set my hand.

S. JARVIS ADAMS.

Witnesses:

F. G. KAY,
JAMES I. KAY.