METHOD OF MAKING SEALED METALLIC CONTAINERS

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This invention relates to a hollow metallic container, more particularly designed for use as a semi-buoyant fishing sinker and to a method for manufacturing such container. The principal object of the invention is to provide a hollow metallic sinker in which sufficient air will be hermetically sealed to give the sinker a specific gravity only slightly exceeding that of water, so that when placed on a fish line and allowed to sink to the bottom of a body of water it will tend to rise when the line is drawn upon, in order to reduce the possibility of entanglement with debris on the bottom.

Another object of the invention is to provide a method for manufacturing a hollow tubular metallic container with cast-in metallic sealing plugs sealing its extremities.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a diagrammatic view illustrating a preliminary step in the method of manufacturing the improved hollow metallic container;

Fig. 2 is a similar diagrammatic view illustrating a succeeding step in the method of manufacture;

Fig. 3 is a longitudinal sectional view illustrating the work piece formed by the step in Fig. 1;

Fig. 4 is a similar longitudinal sectional view of the work piece formed as by the step of Fig. 2;

Fig. 5 illustrates another successive step in the method of manufacture;

Fig. 6 illustrates the final step in the method;

Fig. 7 is a fragmentary side view of a centrifugal casting mold employed in the improved method;

Fig. 8 is a fragmentary longitudinal horizontal section through the casting mold looking upward on the line 8—8, Fig. 7; and

Fig. 9 illustrates the completed container, as formed by the improved method, ready for use as a semi-buoyant fishing sinker.

The improved container comprises a hollow, metallic, cylindrical barrel 10 having sealed rounded extremities 11 through and from each of which an attachment ear 12, provided with a line perforation 13, projects. The barrel 10 is formed from relatively thin-walled aluminum tubing, and the attachment ears 12 are cast from a metal having a relatively low melting point, such as solder consisting of fifty percent tin and fifty percent lead.

The ears are cast on internal plugs 31 which completely and hermetically seal the extremities of the barrel 10. Since it is exceedingly difficult, if not impossible to attach solder to aluminum, the manufacture of the container presented many problems which have been solved by the following method.

A length of thin-walled aluminum tubing 14 having a diameter equal to the external diameter of the finished container is intermittently fed against a length gauge 15 and rapidly rotated. While the tube is in rotation, an indexing wheel 16, having two spaced-apart raised flanges 17, is brought to bear against the rapidly rotating tubing. The flanges 17 roll two spaced-apart, indented grooves 18 into the tubing. The indexing wheel 16 is now withdrawn and a cutting wheel 19 is brought to bear against the tubing accurately intermediate the pair of indented grooves 18, as shown in Fig. 1, so as to form a V-shaped notch in the tube and sever a work piece of predetermined length therefrom to form the barrel 10. The tube 14 is then again advanced against the gauge 15 and the step is successively repeated throughout the entire length of the tubing 14.

The distance between the cutting wheel 19 and the gauge 15 is accurately preset and determines the length of the final container and the distance between the flanges 17 determines the distance between each groove 18 and the adjacent extremity of the work piece.

The work piece formed by the step of Fig. 1 is illustrated in Fig. 3. This work piece is now placed upon any suitable supporting holder, such as diagrammatically indicated at 20, and two axially-aligned rotating shafts 21 are advanced toward the extremities of the piece as shown in Fig. 2. Each shaft 21 carries a plurality of angularly positioned forming rollers 22 which contact the conical extremities of the piece and roll them inwardly to form the smooth, rounded, arcuate extremities 11 of the final container, as shown in Fig. 4. A central opening 23 is left in each extremity of the piece. The mechanism for the step of Fig. 2 is so arranged that the rollers 22 of one shaft 21 can only approach the rollers 22 of the other shaft 21 a predetermined spaced distance so that the final length of each of the formed pieces is accurately uniform.

An accurately weighed fragment 24 of fusible metal is now inserted through each of the openings 23, and the fragments 24 are maintained longitudinally separated in the work piece. The latter, with its separated, fusible fragments, is then placed in a suitable holder or table. The mold is rapidly rotated about its medial transverse axis to centrifugally force the two fragments 24 away from each other and into the extremities of the work piece. The rotating work piece is now heated to fuse the fragments 24 and the fused metal is centrifugally forced into both extremities of the work piece to form the plugs 31. The rotating work piece is now cooled to solidify the plugs 31.

In the manufacture of the sinker of Fig. 9, an elongated lower mold bar 26, provided with parallel, spaced-apart, semi-cylindrical receiving sockets 25, and an upper mold bar 27 provided with similar sockets 28 is employed to receive a plurality of the work pieces simultaneously.

Each of the sockets 25 in the mold bar 26 is provided at each of its extremities with an ear-forming pocket 29 and a core pin 30 extends from the mold bar 26 into each of the pockets 29 to form the perforation 13 in the final ear 12.

In use, the upper and lower mold bars are securely clamped together on the work pieces by means of suitable clamp bolts 36, as shown in Fig. 7. The lower mold bar 26 is formed with a concentric axle stud 32 at each of its extremities which are adapted to be received in suitable supporting journals so as to allow free rotation of the assembled mold bars. The axle studs 32 terminate in concentric bosses 33 to which any suitable rotating device may be connected.

Either or both the mold bars may be provided with ejector plates 34 mounted in the sockets thereof on ejection pins 35 to facilitate the removal of the completed work pieces from the sockets. Suitable locating pins
37 may be provided to accurately register the two mold bars together before the bolts 36 are tightened.

It is not essential that the diameter of the sockets 25 and 28 correspond exactly to the diameter of the work piece; but it is essential that the length of the work piece corresponds to the length of the sockets so that when the two mold bars are together a perfect seal will be obtained at each extremity of each work piece to prevent leakage of the molten metal.

In use the work pieces with their separated fragments 24 of fusible metal are carefully placed in the sockets 25, care being taken to maintain each fragment in its individual extremity of the work piece. The upper mold bar 27 is now bolted into position and the combined mold bars are instantly and rapidly rotated, as indicated by the arrows "A" in Fig. 6, about the axis of the axle studs 32 indicated as "B" in Fig. 6, so that centrifugal force will force each individual fragment 24 into the adjacent extremity of its work piece.

Heat is now applied, by means of an elongated gas burner or in any other desired manner, to the rotating mold bars to fuse the fragments 24. Each molten fragment will be forced centrifugally outward into the extremity of the work piece, through the opening 23 therein, and into the pocket 29 about the core pin 30. The heat is now removed and the mold bars are allowed to continue to rotate until the fused metal solidifies, as shown in Fig. 6. The mold bars 26 and 27 are then separated and the completed article of Fig. 9 is removed therefrom.

Attention is called to the fact that since the metal solidifies under the influence of centrifugal force a tight seal is obtained at each extremity of the work piece. It will also be noted that the indented grooves 18 form annular internal ridges in the work piece and that the plugs 31 completely fill the extremities and are securely locked in place by the internal ridges.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A method for forming hollow tubular sealed containers comprising: cutting a length of metal tubing into work pieces of uniform lengths; rolling each end of each work piece inwardly to form a restricted terminal opening; placing a fragment of fusible metal in each extremity of said work piece; placing the work piece in an enclosing mold while maintaining the fragments of fusible metal in each extremity of said work piece; placing the work piece in an enclosing mold while maintaining the fragments of fusible metal separated; rotating said mold on a medial axis at right angles to its length to force the fragments oppositely outward into their respective extremities; applying heat to the rotating mold to fuse the fragments so that the fused metal will be forced into the extremities of the work piece to seal the latter; cooling said mold while maintaining the fused metal to solidify while under the influence of centrifugal force to form a sealed container.

2. A method of forming hollow, sealed containers as described in claim 1 including forming sockets in said mold at each extremity of said work piece so that a pair of spaced indenters will come into contact with said rotating tubing at uniformly spaced intervals therealong to indent spaced apart circumferential grooves in said tubing; bringing a cutting disc into contact with said rotating tubing intermediate the grooves of each pair of grooves to indent and sever said tubing intermediate the grooves of each pair of grooves to form work pieces of uniform length, each work piece having inwardly rolled extremities formed by the indenting and severing step and having an indented groove adjacent each extremity, each groove comprising one of a pair of grooves forming an internal protuberance adjacent each extremity of each work piece; placing a fragment of fusible metal within said work piece at each extremity thereof; rapidly rotating said work pieces in a longitudinal plane about a medial transverse axis to centrifugally urge said fragments into the opposite extremities of said work pieces; heating the rotating work pieces to fuse said fragments; thence removing the heat and allowing rotating work pieces to cool to solidify the fused metal in the extremities of the work pieces between the internal protuberances formed by said grooves and the extremities of said work pieces to seal the latter.

3. A method of forming hollow tubular sealed containers as described in claim 3 in which each work piece, after being severed by the cutting disc and before the fragments of fusible metal are placed therein, is placed in a holder and in which angularly-molded rotating rollers are brought against the opposite extremities of said work piece to roll the extremities accurately inward about the axially positioned terminal openings.

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