May 3, 1932. A. GASSAN ET AL 1,856,382

CASTING MOLD FOR MANUFACTURING ZINC CONTAINERS FOR GALVANIC ELEMENTS, BATTERIES, OR THE LIKE

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Fig. 1.

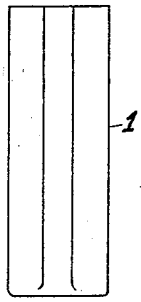


Fig. 1a.

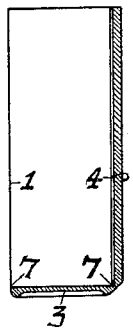


Fig. 2.

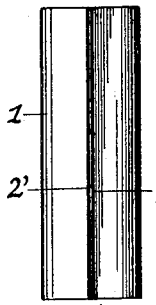


Fig. 3.

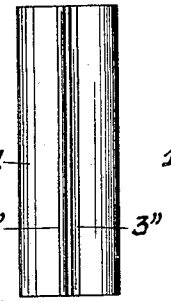


Fig. 4.

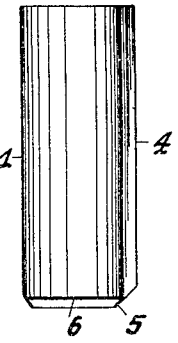


Fig. 1b.

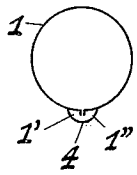


Fig. 2a.

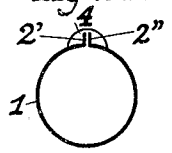


Fig. 3a.

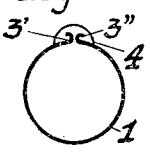


Fig. 4a.

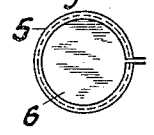


Fig. 5.

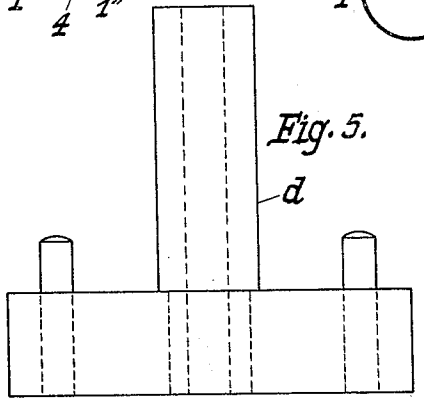


Fig. 5b.

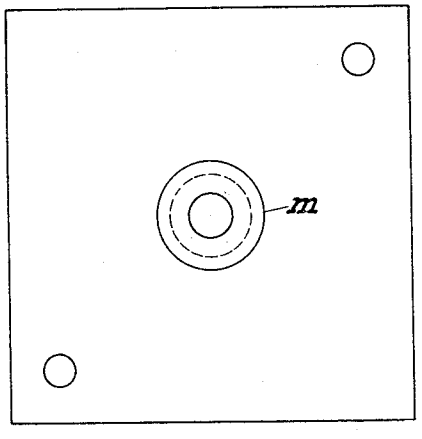
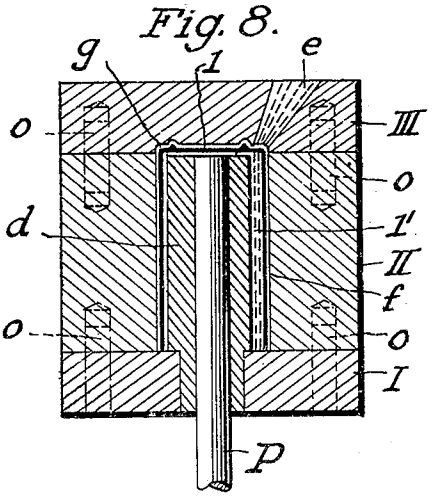


Fig. 8.



Inventors:
A. Gassan &
P. Ruck

By: Marks & Clerk
Attys.

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Fig. 6.

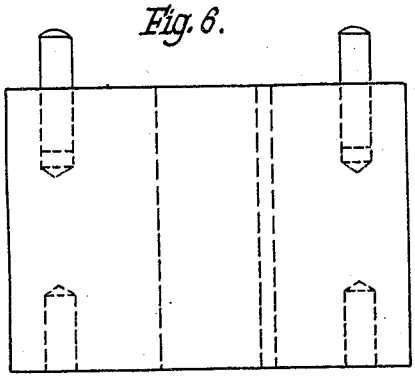


Fig. 6a.

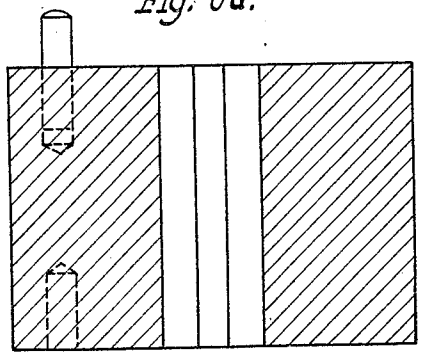


Fig. 6b

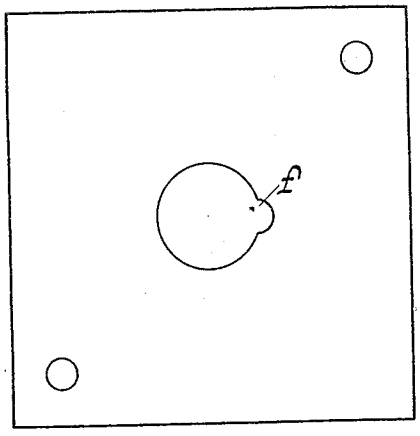


Fig. 7b.

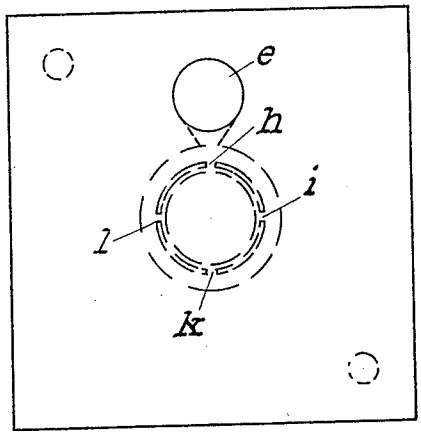


Fig. 7.

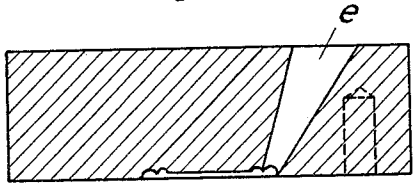
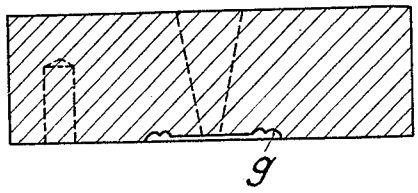


Fig. 7a.



Inventors:
A. Gassan &
P. Ruck
By: Marks & Clerk
Attys.

Patented May 3, 1932

1,856,382

UNITED STATES PATENT OFFICE

ARTHUR GASSAN, OF BERLIN-FROHNAU, AND PAUL RUCK, OF BERLIN, GERMANY; SAID RUCK ASSIGNOR TO SAID GASSAN

CASTING MOLD FOR MANUFACTURING ZINC CONTAINERS FOR GALVANIC ELEMENTS, BATTERIES, OR THE LIKE

Application filed June 5, 1929, Serial No. 368,571, and in Germany July 18, 1928.

The present invention relates to casting molds for manufacturing zinc containers for galvanic elements, batteries or the like.

The purpose of the present invention is to produce by these new casting molds zinc containers, which are formed from metal having a close texture, in which the joining seam is not soldered or welded as hitherto customary, but, which in contradistinction thereto, are held together by this, that this joining seam is formed by die casting. Zinc, with or without additions, or another metal or material equivalent to zinc or inactive electrically towards the zinc in the element, may be used as the joining medium. The said joining medium is injected under pressure in the liquid state into this permanent mold, and it causes the parts to close together to a joined seam along the length of the container, the bottom of the container being cast on simultaneously or subsequently.

The new mold for the purpose specified comprises a middle portion having a molding cavity therein, said portion having a longitudinal channel formed therein and opening into the cavity, a core insertible in the cavity adapted to have fitted thereon a metal container, said container having longitudinal flanged edges which extend into said channel, a head fitted on the middle portion, and means for conducting a sealing medium through the head into the channel for uniting said edges.

In a further form the new mold comprises a middle portion having a longitudinal mold cavity therein, said portion having a channel therein opening into the mold cavity, an upper and lower portion detachably engaged with the respective ends of the middle portion, a core carried by the lower portion and insertible in said cavity and annularly spaced from the wall thereof to provide an annular chamber, a metal container adapted to fit on the core and occupy the annular chamber, said container having longitudinal flanged edges extending into the chamber, and means for introducing a sealing medium through the upper portion into the channel for uniting said flanged edges.

An additional form of the new mold may comprise upper and lower portions and a middle portion, said middle portion having a mold cavity therein, and being provided with a longitudinal channel which opens into the cavity, a core carried by the lower portion and insertible in the cavity, a metal container adapted to fit on the core, said container having longitudinal flanged edges adapted to extend into the channel, the upper portion being shaped to receive the bottom of the container, means for conducting a sealing medium through the upper portion into the chanel to unite the flanged edges of the container, and an ejector slidably axially within the core for engaging the bottom of the mold to dislodge the same from the core when the mold portions are separated.

In order to be able to carry out the described purpose in the form of a continuous operation also, the casting mold may be so constructed that the filling openings for the supply channels are arranged adjacent to one another, so as in this way to modify the casting mold into a multiple or compound permanent mold.

In order to carry out the purpose specified a so-called permanent mold is used, the parts of which are formed of chills, and in which the material producing the joining seam is injected under pressure, whereby the zinc cylinder is joined up by means of a homogenous, bubble-free joint with the production of a smooth surface at the place of the joint both on the interior and exterior surfaces of the container, the material injected into the permanent mold under pressure simultaneously forming the bottom of the container.

Examples of the constructional forms of the new mold and of the zinc containers to be joined together by die-casting in this new mold are shown in the accompanying drawings.

Figure 1 shows in general view a zinc cylinder which is to be provided with a joining seam;

Figure 1*a* shows in vertical section the zinc cylinder of Figure 1 provided with the joining seam;

Figure 1*b* shows a cross sectional view of Figure 1;

Figure 2 shows, in general view, a further constructional form of the zinc cylinder to be provided with an almost jointless joining seam along its length;

Figure 2*a*, shows a section across the cylinder of Figure 2 with the lipped edges angularly bent with respect to the surface of the cylinder for making an almost jointless joining seam;

Figure 3 shows, in general view, a further constructional form of the zinc cylinder to be provided with an almost jointless joining seam;

Figure 3*a* shows a cross-sectional view of the zinc cylinder shown in Figure 3 with arcuate flanged portions on the lipped edges for the production of the almost jointless joining seam;

Figure 4 shows a side view, partly in section, of a zinc cylinder provided with an almost jointless joining seam along the length of the cylinder and having at the bottom, by way of example, a projecting flange for the bottom, whilst

Figure 4*a* shows a section through the projecting flange for the bottom whereby a bottom is arranged in the same.

Figures 5 and 5*b* show the lower mold portion I, of the casting-mold, which is preferably in three parts, for accommodating the zinc cylinder;

Figures 6, 6*a* and 6*b* show the middle mold portion, II, of this three-part casting-mold with the recess running in the direction of the joining seam of the zinc cylinder, whilst

Figures 7, 7*a* and 7*b* show the third portion, III, of this three-part casting-mold, with the bottom and the annular duct for supplying the material as well as the apertures and the supply duct; it is emphasized that this arrangement of ducts embodies only one constructional form by way of example, since variations in the construction of the casting mold may be made without departing from the scope of the present invention.

Figure 8 is a vertical sectional view through the assembled mold.

As is apparent from the drawings (Figures 1, 1*a* and 1*b*), the zinc cylinder 1 is provided with two lips or the like 1′, 1″, preferably directed outwardly, which lips project to about the middle of the lateral recess *f* provided in the part of the casting mold constructed therefor (Figure 6*b*), so that when this recess *f* (Figure 6*b*) is filled with the liquid metal or with another material, that is when the exterior connecting part 4 is die-cast on an intimate join forms between the lipped edges and with the bottom seam 7 of the cylinder, since simultaneously a bottom 3 is cast on to the bottom of the zinc cylinder 1.

In contradistinction to this form the modification shown in Figures 2 and 2*a* is such that the zinc cylinder 1 is provided with two angularly bent, outwardly directed lips or the like 2′, 2″, which lips, in consequence of their shape and that of the cylinder abut evenly and tightly against each other, and also retain this position in the above mentioned special chill *f* or in the mold part *f* during the injection process, so that by the casting on of the outer joining part 4 a cylinder is formed provided with an almost jointless seam, in the interior of which cylinder no die-casting metal or material penetrates even when the liquid material is injected into the permanent mold under considerable pressure. The angular shaped lips 2′, 2″, on the contrary, are pressed against each other still more tightly by the sealing material injected under pressure, so that in this way a hollow body is formed with an almost seamless joining seam.

The procedure for the third modification (Figures 3 and 3*a*) is similar. The edges of the zinc cylinder 1 are here provided with arcuate flanges 3′, 3″, which likewise, in consequence of their shape and that of the cylinder, abut against one another evenly and tightly and also maintain this position in the part *f* of the casting mold or in the special chill during the injection process, so that the die-casting on of the outer joining part 4 produces an almost joint-free cylinder into the interior of which no casting material is able to penetrate during the process. This is particularly the case since the die-casting material injected under considerable pressure into the permanent mold presses against or behind the arcuate beadings 3′ and 3″, which latter in consequence of this pressure, are pressed still more tightly on to one another or against each other so that in this manner also an almost joint-free hollow body is formed.

If desired, such a hollow body (Figures 4 and 4*a*) may advantageously have at the bottom a flanged edge 5. This edge enables either the bottom of the cylinder to be easily cast on with die-casting metal, or else a bottom cover 6 of zinc or any other suitable material to be arranged, which bottom is then joined to the bottom 6 by a suitable insulating material.

If desired, the joining of the differently shaped lips, 1′, and 1″, or 2′ and 2″, as well as 3′ and 3″, may be effected by means of fusible filling material or insulating or sealing material or the like instead of by means of metal, since these parts press against each other tightly in such a manner that in this way also a simple, efficacious and tight joint is obtained. For certain purposes the arrangement of the bottom 6 of the cylinder may likewise be effected by means of, or out of, fusible filling material.

In the production of the zinc element cylinders or of the zinc element containers, the previously mentioned shaping and formation

of the lips or of the flanges on the end parts of the cylinder is worthy of notice, which secure a closing or sealing together of the seam along the length of the cylinder, as well as of the seam of the bottom, which closing or sealing is as efficacious as possible, i. e. almost free from joints, so that practically none of the die-casting material, etc., is able to penetrate into the interior of the element container. This tight sealing of the seam portions, etc., finally ensures the considerable advantages that by means of the die-casting process, besides zinc, also other suitable metal alloys may be used, and that with the aid of tight-sealing media, insulating material or insulating and sealing material the effecting of the union of the seam along the length of the cylinder and the production of the bottom in a rapid and economical manner are rendered possible on rational large scale working.

The casting mold shown in Figures 5 to 7 works as follows:

The zinc cylinder 1 with the bent out lips 1′ and 1″, 2′ and 2″, or 3′ and 3″, is placed on the core *d* of the lower portion I of the mold so that the surfaces of the side seam point in a definite direction. Then the middle portion II of the mold is placed over the lower portion, and of course over the zinc cylinder as well, and the seam along the side of the zinc cylinder is arranged so as to be exactly in the middle of the recess *f*. The upper portion III of the mold is then placed on the middle portion and the whole arrangement is held together by suitable tensioning devices. The mold parts are retained in proper alignment by pins *o*.

The permanent mold is now ready for the casting. The injection of the joining medium is effected in the manner of the die-casting process with the aid of a pump.

The special peculiarity of the permanent mold lies in the particularly advantageous arrangement of the inlets. The liquid metal, or another suitable material, as mentioned above enters by way of the pouring head *e* (Figures 7 and 8) into the recess or the channel *f* along the length of the cylinder and simultaneously into the annular supply duct *g*. From the latter it passes through the apertures *h*, *i*, *k*, *l* into the hollow space *m* of the bottom cavity of the casting mold. Here as well as in the recess or the channel *f* along the length of the cylinder, the liquid metal or the like combines with the seam surfaces or with the lips 1′ and 1″, 2′ and 2″ or 3′ and 3″ of the zinc cylinder 1, and after cooling, forms a rigid joint with the same. The casting mold is then opened, and the finished zinc container is removed by means of an ejector *p* which is passed through the core of the lower portion of the mold. The positions of the apertures *h*, *i*, *k*, *l* are such that when the zinc container is ejected the material of the apertures still adhering to the said container is shaved off.

It is clear that variations may be made in the shape and in the disposition of the mold, e. g. in the construction of the new molds or multiple casting molds for producing said zinc containers in a continuous automatic operation more particularly in the arrangement of the supply ducts for the material to be injected into this or these casting molds, and so on without departing from the scope of the present invention.

What we claim is:

1. A mold for the purpose specified comprising a middle portion having a molding cavity therein, said portion having a longitudinal channel formed therein and opening into the cavity, a core insertible in the cavity adapted to have fitted thereon a metal container, said container having longitudinal flanged edges which extend into said channel, a head fitted on the middle portion, and means for conducting a sealing medium through the head into the channel for uniting said edges.

2. A mold for the purpose specified comprising a middle portion having a longitudinal mold cavity therein, said portion having a channel therein opening into the mold cavity, an upper and lower portion detachably engaged with the respective ends of the middle portion, a core carried by the lower portion and insertible in said cavity and annularly spaced from the wall thereof to provide an annular chamber, a metal container adapted to fit on the core and occupy the annular chamber, said container having longitudinal flanged edges extending into the chamber, and means for introducing a sealing medium through the upper portion into the channel for uniting said flanged edges.

3. A mold for the purpose specified comprising upper and lower portions and a middle portion, said middle portion having a mold cavity therein, and being provided with a longitudinal channel which opens into the cavity, a core carried by the lower portion and insertible in the cavity, a metal container adapted to fit on the core, said container having longitudinal flanged edges adapted to extend into the channel, the upper portion being shaped to receive the bottom of the container, means for conducting a sealing medium through the upper portion in the channel to unite the flanged edges of the container, and an ejector slidably axially within the core for engaging the bottom of the mold to dislodge the same from the core when the mold portions are separated.

In testimony whereof we have signed our names to this specification.

ARTHUR GASSAN.
PAUL RUCK.