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PRECISE POURING APPARATUS

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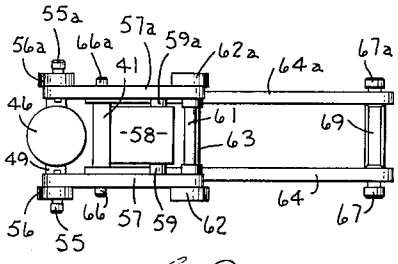


Fig. 3

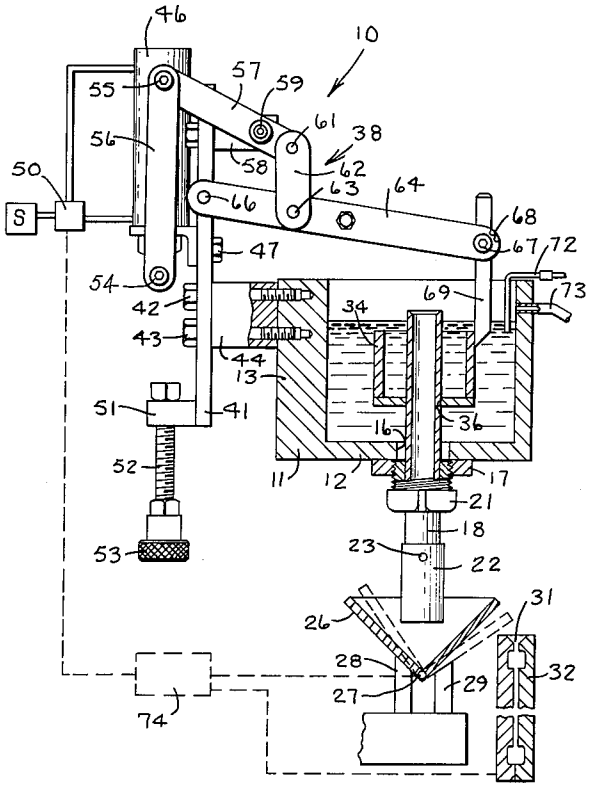


Fig. 2

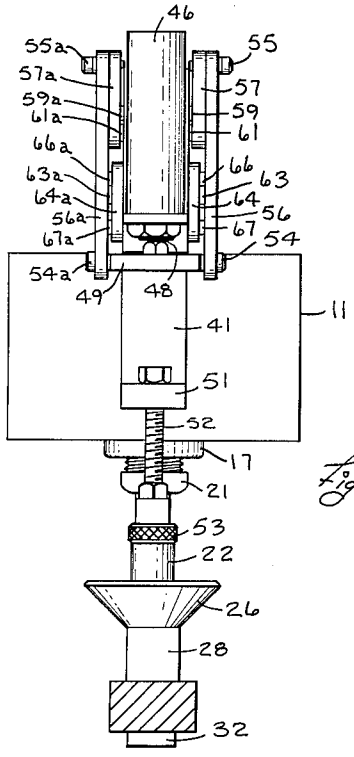


Fig. 1

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PRECISE POURING APPARATUS

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3 Claims. (Cl. 22—79)

This invention relates to a dispenser for liquids and more specifically relates to a device including a dipping trap chamber for dispensing a precisely adjustable volume of molten metal to a mold.

The device embodying the invention was developed for charging a battery plate mold with an adjustable and precisely predetermined amount of molten lead. The device further was developed for operation with an automatic battery grid casting such as a machine of the general type shown in Winkel Patent No. 2,763,039. Accordingly, the invention will be described in terms of a device for such a use but it will be understood that the invention is applicable to other uses also and that such specific reference will be for convenience in description and not limiting.

A number of prior liquid dispensing devices are known, but are generally unsatisfactory for the purposes of the present invention for a variety of reasons. For example, previous devices incorporating a dipping trap chamber have been unsatisfactory in that they require means for driving the dipping trap chamber which are either expensive to manufacture or not readily adaptable to both manual operation and incorporation in and control by an automatic machine. Further, such devices have often had imprecise means, or no means, for adjusting the amount of material delivered from the trap chamber. Also, previously known devices have often been unsatisfactory in their provision of means for delivering molten metal to a mold because of splashing, wave, etc.

Accordingly, the objects of this invention include:

(1) To provide a device for dispensing molten lead into a mold;

(2) To provide a device, as aforesaid, particularly adaptable for use with a battery plate mold;

(3) To provide a device, as aforesaid, capable of delivering a precisely controlled and adjustable charge of molten metal to a mold;

(4) To provide a device, as aforesaid, incorporating a dipping trap chamber having simplified and precisely controlled drive means actuating same;

(5) To provide a device, as aforesaid, including means preventing the splashing of molten material during loading of the mold;

(6) To provide a device, as aforesaid, which together with its controls may be easily incorporated into an automatic machine;

(7) To provide a device, as aforesaid, having a small number of simple and inexpensive parts and which is quickly and inexpensively manufacturable; and

(8) To provide a device, as aforesaid, which is sturdily constructed, easily maintained and which will require little maintenance over a longer operating life.

Other objects and purposes of the invention may become apparent to persons acquainted with devices of this general type upon reading the following specification and examining the accompanying drawings.

In the drawings:

FIGURE 1 is a front elevational view of a device embodying the invention.

FIGURE 2 is a partially broken right side elevational view of the device.

FIGURE 3 is a top elevational view of the linkage supporting and moving the dipping trap chamber of the device.

General description

In general, the objects and purposes of this invention are met by providing a dipping trap chamber, or cup, supported for and carried through a vertical path with respect to a well containing molten metal by linkage means actuated by a pressure fluid cylinder. Means are provided to adjust the uppermost position reached by the cup and thereby to adjust the effective volume thereof. An outlet tube having an open upper end passes downwardly through a hole in the bottom of the cup and then through an opening in the bottom of the well and terminates between the sides of a trough which is tiltable to discharge the contents thereof into a battery plate mold.

Detailed description

In the following description certain terminology will be used for convenience in reference only and not as limiting. For example, the terms "rightwardly" and "leftwardly" will refer to directions as appearing in the drawings. The terms "inwardly" and "outwardly" will refer to the geometric center of the apparatus or parts thereof. Said terminology includes the words above-mentioned, derivatives thereof, and terms of similar import.

The device **10** embodying the invention includes an upwardly opening well **11** having a bottom **12** and peripheral wall **13**. The bottom **12** has an opening **16** therethrough spaced from the wall **13**. A nut **17** is secured to the underside of the bottom **12** by any convenient means, such as welding, and has an externally threaded internal opening coaxial with and somewhat larger than the opening **16**. An upstanding tube **18** having open upper and lower ends extends upwardly through the nut **17** and opening **16** and into the well **11** for purposes appearing hereinafter. The tube **18** has secured thereto by any convenient means, not shown, an externally threaded sleeve **21** which is threadedly received into the nut **17** and against the underside of the well **11** whereby to fix the tube **18** with respect to the well **11** and to prevent leakage of molten metal from within the well **11** outwardly therefrom through the opening **16**. A protective sleeve **22** is coaxial with and closely surrounds the lower end of the tube **18** and is secured thereto by a set screw **23**.

An upwardly opening trough **26** is pivotally mounted, preferably near its lower end as indicated at **27**, for tilting movement about a horizontal axis. Stop means of any convenient type such as the blocks **28** and **29** are provided to control the range through which the trough **26** may be tilted about its pivot axis. Hence, the trough **26** may be tilted from its solid line position of FIGURE 2 to its dotted line position whereby a portion of the contents thereof flow out therefrom and into an inlet opening **31** of a mold **32**.

An upwardly opening dipping trap chamber or cup **34** is slidably disposed upon and preferably coaxial with the tube **18**. The cup **34** has an opening **36** through the bottom thereof through which the tube **18** passes and which closely surrounds said tube to minimize leakage through said opening. Linkage means generally indicated at **38** and hereinafter described are provided for supporting the cup **34** and for moving same axially of the tube **18**.

An upstanding support plate **41** is secured by means of the screws **42** and **43** and spacer block **44** to the peripheral wall **13** of the well **11**. Suitable power means, in this embodiment a pressure fluid cylinder **46**, is secured to the upper portion of the support plate **41** by means such as screws, one of which is indicated at **47**, so that the rod **48** of said cylinder extends downwardly therefrom. The lower end of the rod **48** is fixed to a horizontal bar **49** which is preferably parallel to the support plate **41**. Said

cylinder is operated from any suitable pressure source S through valve means **50**.

The support plate **41** has fixed to its lower end an outwardly extending carrier bar **51** into which is threadedly received a vertically aligned adjustment screw **52** which is in substantial vertical alignment with the pressure fluid cylinder **46**. Vertical adjustment of the adjustment screw **52** by rotation of a knob **53** secured to the lower end thereof determines the maximum amount of extension of the rod **48** from the pressure fluid cylinder **46** by interference of the bar **49** with the abutment defined by the upper end of the screw **52** and hence determines, through the linkage **38**, the uppermost position to which the cup **34** may ascend.

The linkage means **38** constitutes a preferably identical pair of lever sets, said lever sets defining a pair of planes having the pressure fluid cylinder **46**, support plate **41**, and tube **18** centrally located therebetween. Because the lever sets are preferably identical, only elements of the rightward one (FIGURE 1) thereof will be described and the reference numerals applied thereto will, with the suffix "*a*," be applied to corresponding elements of the other (FIGURE 1) lever set. Said rightward set includes an upstanding first link **56** pivotally secured at its lower end by the screw **54** to the rightward end of the bar **49** and pivotally secured at its upper end by the screw **55** to the leftward end (FIGURE 2) of a first lever **57**. The first lever **57** is pivotally supported intermediate the ends thereof upon a horizontal pin **59** extending through a suitable extension **58** of the support plate **41** and pivotally supports at its rightward end by means of a horizontal pin **61** a substantially upstanding second link **62** which at its lower end is pivotally fixed by a horizontal pin **63** to a second lever **64** intermediate the ends thereof. The second lever **64** is pivotally supported at its leftward end upon a pin **66** received in the support plate **41**. Thus, reciprocation of the rod **48** of the pressure fluid cylinder **46** will, through the aforementioned first and second links **56** and **62** and first lever **57**, move said second lever **64** through an arc preferably and approximately centered on a horizontal line through the pivot point **66**.

The above-mentioned pins **59**, **61** and **63** extend toward and pivotably support the first lever **57***a* and second link **62***a* as above described with respect to the elements **57** and **62**. Thus, the pins **61** and **63** assure the alignment of the pair of lever sets. The rightward ends of the second levers **64** and **64***a* extend rightwardly past the tube **18** and have pivotally secured therebetween, by means of screws **67** and **67***a* and the crossbar **68**, a depending final link **69** which is fixed by any convenient means such as welding to the cup **34**. The lever **64** is sufficiently long with respect to the path described by its rightward end that said path approximates a straight line and the tilting of the cup **34** during its vertical movement is minimized.

Suitable means such as the controlled flow input pipe **72** and overflow pipe **73** maintain the level of liquid and the well **11** below the top of the tube **18** and above the top of the cup **34** when said cup is in its lowermost position.

Suitable control means, indicated schematically at **74** and preferably automatic, sequence the reciprocation of the pressure fluid cylinder **46**, tilting of the trough **26** and the operation of the mold **32** in proper relationship to each other, such as in the sequence described hereinbelow.

Operation

Assuming the liquid level in the well **11** to be in its proper range as mentioned hereinabove and assuming the rod **48** of the pressure fluid cylinder **46** to be in its retracted position as shown in the drawings, whereby the cup **34** is in its lowermost position below the surface of said liquid, energization of the pressure fluid cylinder **46** to move the rod **48** thereof downwardly results in a corresponding downward movement of the first link **56** whereby the first lever **57** is rotated in a counterclockwise direction (FIGURE 2) and the second link **62** is raised. This in turn causes a counterclockwise rotation of the second lever **64** whereby the rightward end thereof is raised, thereby moving the cup **34** upwardly along the tube **18**. The cup **34** rises until the level of liquid therein is above the top of the tube **18** whereby said liquid flows downwardly through said tube and into the trough **26**. The above-described movement of the rod **48** and the cup **34** continues until the bar **49** contacts the upper end of the screw **52** to stop said movement whereupon the flow of liquid from the cup **34** into the tube **18** ceases. The screw **51** is preferably arranged with respect to the pressure fluid cylinder **46** whereby in its downwardmost position, the cup will rise only high enough that the bottom surface of the bottom of the cup **34** will remain below the top of said tube to prevent the cup **34** from freeing itself from the tube **18**. Subject to this limitation, suitable adjustment of the screw **52** will determine the amount of liquid flowing out of the cup **34**, through the tube **18** and into the trough **26**. The trough **26** has preferably previously been charged with a quantity of liquid equal to that remaining therein after a tilting of said trough. This quantity of liquid is sufficient to cover the lower end of the tube **18** when the trough **26** is returned to its receiving position shown in solid lines in the FIGURE 2. Thus, liquid flowing into the trough **26** from the tube **18** is below the level of the existing liquid in said trough whereby splashing of said entering liquid is prevented. Upon completion of, or during, the filling of the trough **26**, same may be rotated about its pivot axis **27** to its dotted line position shown in FIGURE 2 whereby a portion of the contents thereof is discharged into the opening **31** of the waiting mold **32**. Upon emptying of the cup **34**, the pressure fluid cylinder **46** may be energized to retract the rod **48** thereof to lower the cup **34**. Upon completion of its discharge, the trough **26** may be returned to its solid line position shown in FIGURE 2.

Upon the solidifying of its contents, the mold may be emptied and returned to its original condition whereupon the above-described cycle may be repeated. Suitable control means for directing the mechanism through the above-described sequence will be apparent to persons with average skill in the art and will not be further described. Further, it will be apparent that the above-described operation of the mechanism may easily be made fully automatic and further may be incorporated into a more complex, automatic machine for producing finished battery plates.

Although a particular preferred embodiment of the invention has been disclosed hereinabove for purposes of illustration, it will be understood that modifications or variations of such disclosure which lie within the scope of the appended claims, are fully contemplated.

What is claimed is:

1. A device for transferring a precisely controlled amount of liquid into a mold, comprising the combination:

a well containing liquid to be transferred;

a tube extending upwardly through the bottom of said well:

a dipping trap chamber slidable axially of said tube and located within said well;

transfer means conducting liquid discharged from the lower end of said tube into said mold;

linkage means secured at one end thereof to said dipping trap chamber;

power means secured to the other end of said linkage means;

said linkage means comprising a pair of sets of levers defining parallel planes centered upon said tube and said power means, each of said sets of levers including a first link secured at one end thereof to said power means, a first lever secured at one end thereof to the other end of said first link and pivotally supported intermediate the ends thereof on means fixed with respect to said well, a second link pivotally sup-

ported at one end thereof upon the other end of said first lever, a second lever pivotally supported at one end thereof on means fixed with respect to said well and pivotally supported intermediate the ends thereof upon the other end of said second link and a final link pivotally supported at and depending from the other end of said second lever and fixed at its lower end to said dipping trap chamber;

whereby said dipping trap chamber may be raised or lowered by operation of said power means through said linkage means.

2. The device defined in claim **1**, wherein said other end of said second lever is movable through a path which is relatively short compared to the length of said lever whereby the path followed by said other end is approximately a straight line and tilting of said trap chamber is minimized during movement of said other end through said path.

3. A device for transferring a precisely controlled amount of liquid into a mold, comprising the combination:

a well for containing liquid to be transferred;

a tube extending upwardly through the bottom of said well, said tube extending downwardly below the bottom of said well a selected distance;

a dipping trap chamber slidable axially of said tube and located within said well;

a trough located below the lower end of said tube and means mounting said trough for pivotal movement about a horizontal axis substantially fixed with respect to and located below said tube, said trough having upwardly extending side walls, said lower end of said tube being continuously disposed within said trough;

stop means for limiting pivotal movement of said trough about said horizontal axis;

said stop means, said side walls and said tube being so related to each other that the lower end of said tube is constantly disposed between, and below the upper edges of, said side walls in all positions of said trough whereby said trough does not fully empty its contents upon pivotal movement and the lower end of said tube is constantly below the lowermost level of liquid in the trough whereby liquid flowing through said tube into said trough is prevented from splashing;

and means for raising and lowering said trap chamber within said well.

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