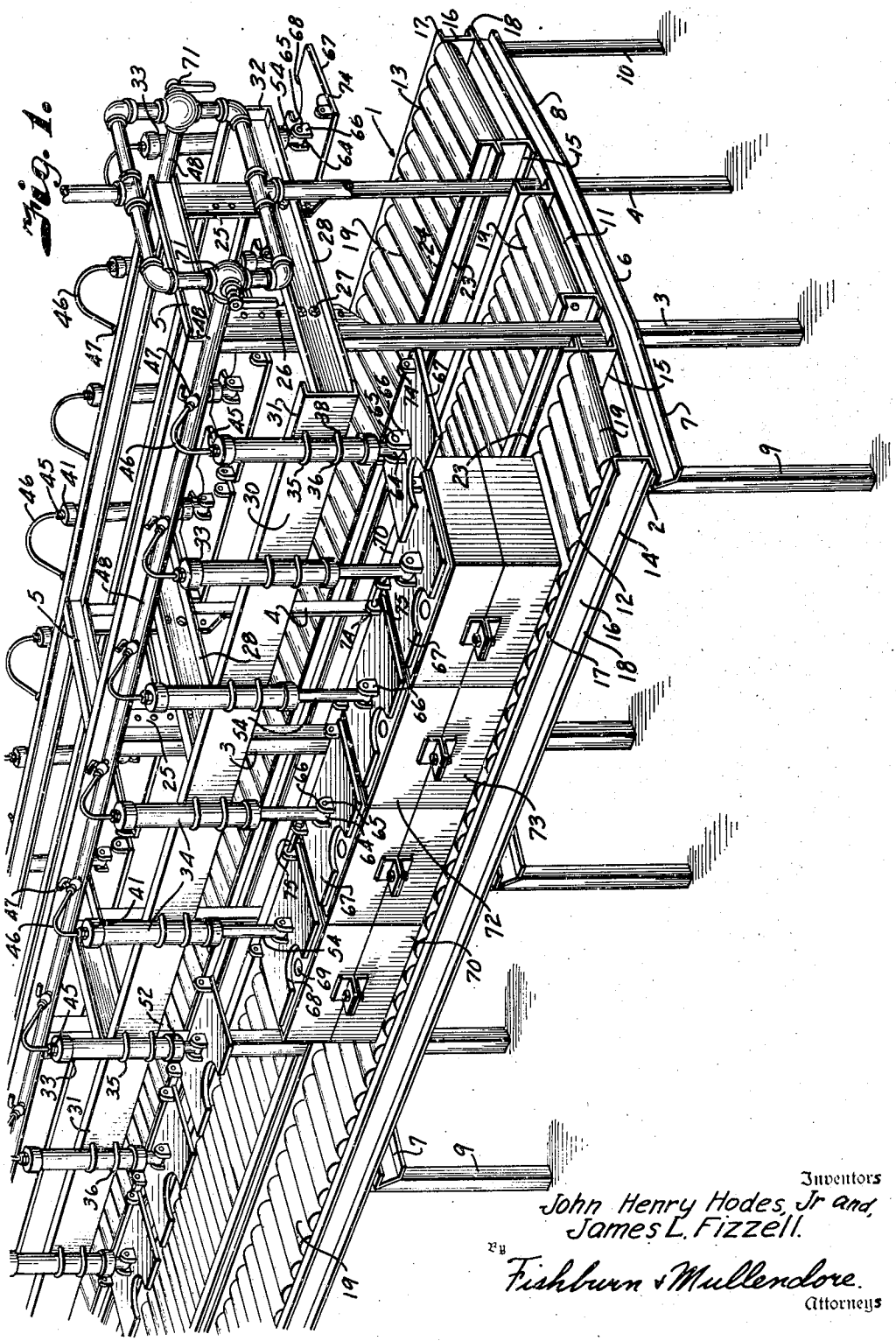
July 19, 1949. J. H. HODES, JR., ET AL 2,476,374

APPARATUS FOR APPLYING MOLD WEIGHTS

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Fig. 1.



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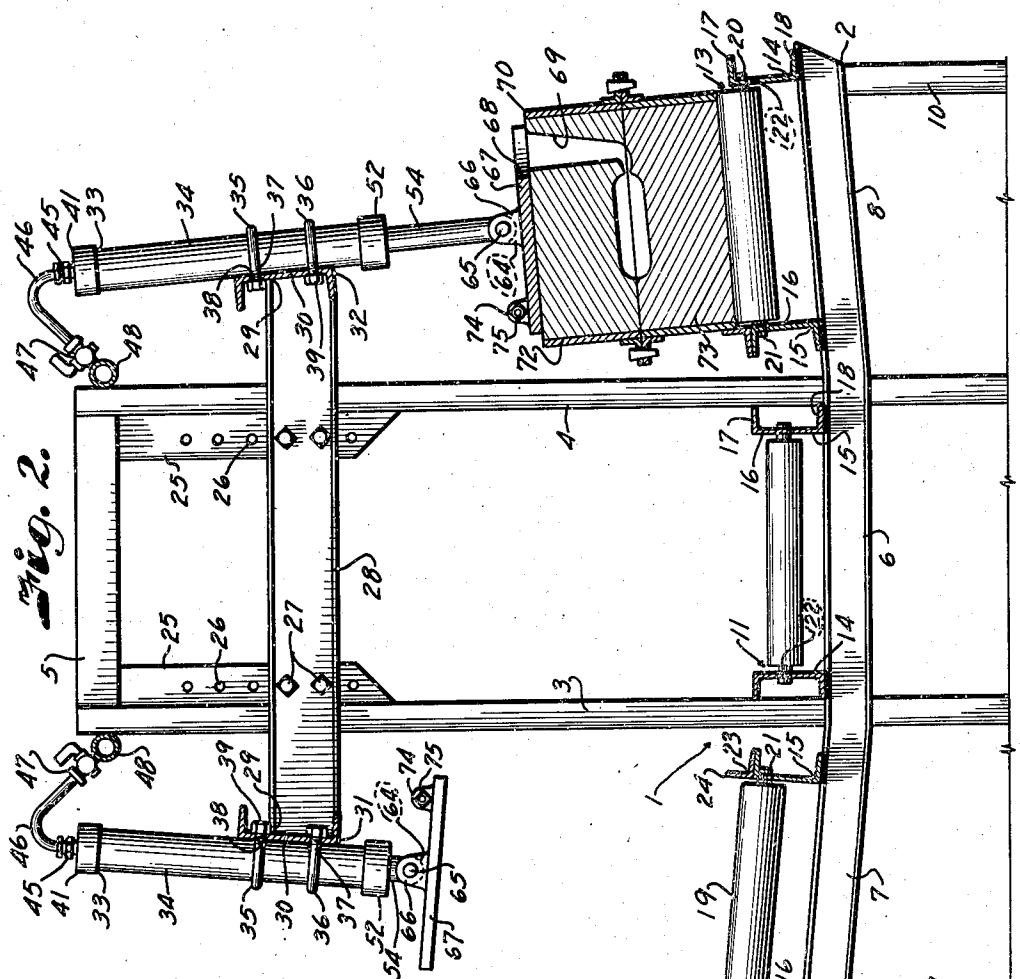


Fig. 2.

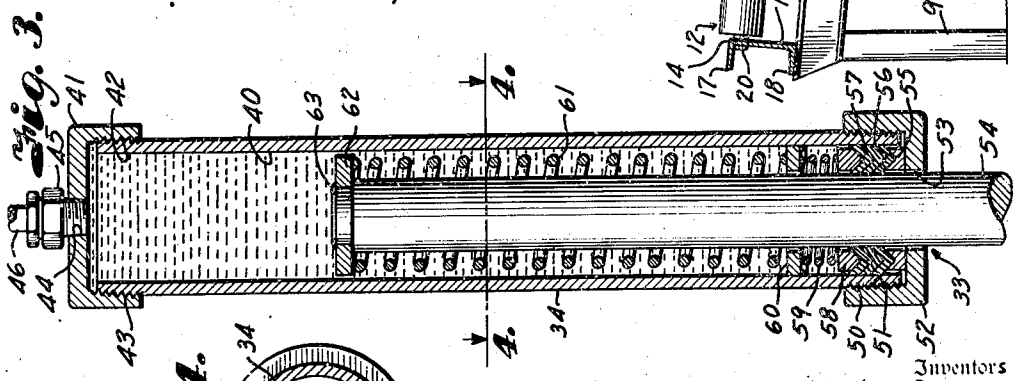


Fig. 3.

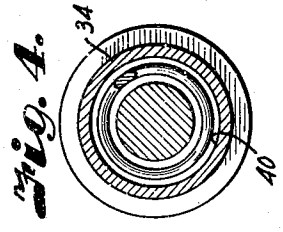


Fig. 4.

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APPARATUS FOR APPLYING MOLD WEIGHTS

John Henry Hodes, Jr., and James L. Fizzell, Kansas City, Mo.

Application January 23, 1947, Serial No. 723,870

1 Claim. (Cl. 22—112)

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This invention relates to hydraulic loading apparatus and more particularly to an hydraulic ram and its adaptation to loading or weighting of molds or the like carried by a conveyor for handling casting molds in a foundry during pouring and cooling of the castings.

Foundry operators have found that by using conveyors and/or other mechanical equipment labor of the foundrymen is lessened considerably. Conveyors are used for moving completed molds to a pouring area but weighting or loading of the molds during pouring is usually done by hand because past attempts to perform the operation mechanically have not been successful. In modern foundries a roll type conveyor is usually arranged adjacent molding machines on the molding floor of the foundry whereby the molder may ram up molds in flasks and after completion of said molds place same on the conveyor for movement along the conveyor toward the pouring section of the foundry. Before metal is poured into the cavity of the molds it is necessary that a weight be placed on the cope portion thereof to prevent the cope from lifting from the drag or the drag and cope being forced apart due to pressure of the metal in the molds and runners. The weight must be of such size as to offset the lifting force otherwise the casting will be thicker than desired and have fins at the parting line of the mold. Since substantial pressure is required on the molds there is considerable labor involved in lifting weights and placing same on each mold and removing same after the casting has cooled.

The principal objects of the present invention are therefore to provide weighting apparatus associated with a mold conveyor for application of weight to the molds thereon; to provide for hydraulically weighting a mo'd during the pouring thereof; to provide an hydraulic loading device in which the force applied thereby is determined by differential areas of a plunger therein; to provide an hydraulic loading device having a pressure seal between the plunger and cylinder thereof; to provide an hydraulic loading device in which the only contact between the plunger and the cylinder is the pressure seal therefor; to provide resilient means for raising the weighting plunger when no hydraulic pressure is applied to the device; to provide an adjustable mounting for a plurality of weighting devices for accommodating different sized molds; to provide for selectively activating the weight devices; to provide for holding the weight devices in alignment; and to provide an hydraulic weighting device which is simple and economical to manufacture, sturdy in structure and efficient in operation in the presence of dust and sand such as encountered in foundries.

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In accomplishing these and other objects of the present invention, we have provided improved details of structure, the preferred form of which is shown in the accompanying drawings, wherein:

Fig. 1 is a persective view of an hydraulic loading apparatus and mold conveyor embodying the features of the present invention.

Fig. 2 is a transverse sectional view through the mold conveyor, particularly illustrating the application of a weight to a mold.

Fig. 3 is a longitudinal sectional view through the hydraulic ram of the hydraulic loading apparatus.

Fig. 4 is a transverse sectional view through the hydraulic ram on the line 4—4, Fig. 3.

Referring more in detail to the drawings:

1 designates a roll type conveyor apparatus which may consist of a single conveyor, however, in the illustrated instance the structure is designed to carry a plurality of conveyors arranged in such a manner to add to the convenience and efficiency of the apparatus. It is to be understood that various conveyor arrangements may be had, depending upon the layout of the foundry in which the apparatus is to be used. The conveyor structure preferably consists of a framework 2 formed of structural members secured together to form a rigid structure by suitable means such as by welding. The framework preferably consists of spaced vertical posts 3 and 4 of suitable height to carry roll conveyors and hydraulic loading apparatus above said conveyors as later described.

The posts 3 and 4 preferably are spaced laterally sufficiently to locate a roll type conveyor therebetween of a size adapted to carry flasks of the largest size used on the molding floor the conveyor is adapted to serve. The upper ends of the posts 3 and 4 are connected by cross members 5 to form a rigid central structure for the apparatus. Mounted on the posts 3 and 4 and spaced from the floor are transverse sills 6 secured to the posts 3 and 4 to form a rigid connection adjacent the lower ends of said posts and to provide conveyor supporting structure whereby conveyors mounted thereon will be substantially the same height as a molding machine table which the conveyor is adapted to serve. The sills 6 are provided with outwardly extending portions 7 and 8 preferably sloped upwardly

to provide a transverse slope to the conveyor mounted thereon. The outer ends of the portions 7 and 8 are supported by vertically arranged posts 9 and 10 respectively. Mounted on the transverse sills 6 and the portions 7 and 8 are roll type conveyors 11, 12 and 13 respectively. Each of said conveyors consists of spaced channels 14 and 15 having substantially vertically arranged webs 16 and outwardly extending upper and lower flanges 17 and 18, spacing of each set of channels 14 and 15 being such as to provide for mounting of a plurality of rolls 19 between said channels, the rolls 19 having concentric trunnions 20 and 21 suitably mounted in apertures 22 in the webs of said channels to rotatably mount the respective rolls.

In the described arrangement of the roll type conveyors, the conveyors 12 and 13 are adapted to carry completed molds from a molding floor and machines thereon to the pouring floor and after the molds have been poured they are carried by the respective conveyors to a shake-out floor where said molds are moved over a shaker adapted to shake the sand out of the flask and away from the castings in the respective molds. The flasks are then placed on the conveyor 11 for movement back to the molding floor. In order to support the molds on the rolls 19 of the conveyors 12 and 13 and to prevent the molds from moving downwardly of the slope of said conveyors rail members 23 are placed on the upper flange 17 of the inner channel, said rails preferably consisting of an angle having an upwardly extending flange 24.

Secured to the posts 3 and 4 and the cross member 5, and extending inwardly between said posts, are plate members 25 having a plurality of vertically aligned apertures 26 therein for receiving fastening devices 27 adjustably supporting cross members 28 on the frame 2. The members 28 extend outwardly relative to the posts 3 and 4 and have their ends 29 secured to the inner faces of webs 30 of channels 31 and 32. The flanges of the channels 31 and 32 are directed inwardly and the channels extend longitudinally of the conveyor apparatus to present flat faces of the webs 30 of said channels to the sides of the apparatus for mounting a plurality of hydraulic loading apparatus or rams 33 whereby the axes of the loading apparatus are substantially in a plane mid-perpendicular to the rolls 19 of the conveyors 12 and 13 and spaced on the channels substantially the length of the molds being carried on the conveyors.

The loading apparatus or rams preferably consist of tubular members 34 adapted to be secured to the channels 31 and 32 by means of U-bolts 35 and 36, the ends 37 of which extend through apertures 38 in the web of the channel for receiving nuts 39 on the threaded ends thereof, whereby tightening of the nuts 39 will draw the tubular member 34 into engagement with the flat face of the channel to anchor said tube thereto. It is believed obvious that the tubular member may be adjusted vertically relative to the channels 31 and 32 by loosening of the U-bolts, sliding the tubular member therethrough and retightening the U-bolts.

The members 34 are preferably cylindrical and provided with bores 40, the upper ends of which are preferably closed by cap members 41 having internal threads 42 engaging external threads 43 on the upper ends of the members 34. The caps 41 are provided with threaded apertures 44 and threaded therein are coupling members 45 for securing tubes 46 to said cap members 41. Each of the tubes 46 is provided with valves 47 for controlling flow of liquid therethrough, said tubes 46 preferably being secured to and having communication with manifolds 48 mounted on and extending longitudinally of the apparatus on the outside of the posts 3 and 4. The connections between the tubes 46, the caps 43 and the manifolds 48 provide communication through the tubes with the bores 40 of the members 34, whereby flow of liquid to and from the bores 40 is controlled by the respective valves 47. The lower ends of the members 34 are preferably provided with external threads 50 adapted to be threadedly engaged in internal threads 51 of cap members 52 forming the bottom members of the hydraulic loading apparatus. The caps 52 are each provided with a bore 53 through which extends a plunger 54 into the respective bores 40. In order to provide seals for the bores 53 around the plungers 54, packing adapter rings 55 are sleeved over the plungers 54 and rest on the cap members 52, the upper surface of the adapter rings 55 preferably being provided with V-shaped grooves 56 adapted to receive a plurality of packing elements 57 of such size that the outer edges of said elements engage the bore 40 and the inner edges engage the surface of the plungers 54. A ring 58 preferably rests in the V-shaped recess of the upper packing element and is adapted to be engaged by the lower end of a packing loading spring 59, the upper end of said spring bearing on a stop 60 secured to the wall of the member 34 in spaced relation to the packing ring 58 whereby the spring 59 applies pressure to said packing to seal the lower end of the hydraulic member.

Sleeved over the upper ends of the plungers 54 and having engagement with the stops 60 are springs 61, the upper ends of which bear on the lower face of annular spring retainers 62 secured to the upper ends of the plungers as at 63. The retainer rings 62 do not have contact with the walls of the members 34 and any liquid in the bores 40 may pass freely around said retainers. The springs 61 should be of such strength as to lift any weight on the lower ends of the plungers 54. With this arrangement hydraulic pressure applied to the bores 40 is applied both above and below the retainer rings 62 and the force applied to the plungers is the pressure multiplied by the differential area between the upper and lower faces of the retainers 62, or in other words substantially the cross sectional area of the plungers 54. The lower ends of the plungers 54 are provided with bosses 64 adapted to receive pins 65 extending through ears 66 of plates 67 to pivotally mount the plate on the lower ends of the respective plungers 54. The plates are preferably provided with cutout portions 68 adapted to align with a runner 69 of a conventional mold 70.

When molds are moved along the conveyor to the pouring floor of the foundry and the flask of each mold engages the adjacent flask, the spacing of the hydraulic rams substantially corresponds to the spacing of the molds. A master valve 71 may be opened to direct liquid under pressure through the manifold through the tubes 46 in which the valves 47 are opened and into the respective bores 40 of the hydraulic rams to apply pressure to the upper ends of the plungers 54 to force the plates 67 downwardly against the pressure of the springs 61, the plates being forced downwardly on the upper surface of the copes 72 of the mold and any misalignment between the mold and the plate 67 will be compensated

by the pivoting of the plate on the pin **65**. The pressure applied to the manifold and to the bores **40** will determine the force applied to the copes of the molds to hold the copes downwardly on the drags **13** during the pouring of the molds, thereby holding the parts of the molds together and preventing the pressure of the metal therein from forcing them apart or lifting the copes. After the metal in the molds has solidified, the master valve is opened to relieve the pressure on the manifold and permit the springs **61** to raise the plates **67** out of engagement with the cope of the respective molds. The molds may then be moved on the conveyor to the shakeout portion of the foundry.

In the illustrated instance the hydraulic devices are applied to a roll type conveyor for applying pressure to molds carried thereon, however, the hydraulic rams may be applied to other devices for example the plate **67** may be utilized as a base and the plunger and cylinder member **34** used as vertical extensible members for lifting devices or apparatus applied to the cylinder member **34**, it being noted that the ram structure is such that the bore **40** does not require machining as the only sliding contact in the ram is between the plunger **54** and the packing member **57**. In the structure as described the plates **67** and plungers **54** may be rotated in the cylinder structure. It is desirable to maintain the plate in alignment with the mold and prevent rotation whereby the cutout portion **68** will align with the runner **69** in the mold. Ears **74** are therefore preferably provided on the upper surface of the plate **67** and the ears of adjacent plates connected by means of bolts or the like **75**. It is believed obvious that any adjacent plates may be connected together and the hydraulic ram therefor operated simultaneously.

The arrangement of the structure as described provides a flexibility of operation. By the manipulation of selective valves **47** only the selected rams will be operated by the opening of the master valve **71**, the remaining rams and plates **67** remaining in their raised condition, thereby not interfering with the operators or pouring of the other molds.

If additional molds are moved down the conveyor to the molding floor after some of the plates have been applied to the molds in that area, the additional molds may be weighted by opening the valve **47** of the rams aligning with said molds to apply the weight to the copes thereof.

In using apparatus constructed and assembled as described, the member **28** is adjusted for vertical height to accommodate the size of molds being prepared on the molding floor serviced by the conveyor. After the proper height has been determined, the bolts **27** are applied to the openings **26** to secure the member **28** in selected position. It is possible that there will be a slight difference between the height of the molds carried on the conveyors **12** and **13** and such difference in height may be accommodated by adjusting the position of the hydraulic rams on the cross member **28**, the position of the rams being adjusted by loosening the U-bolts **35** and **36**, moving the member **34** vertically to the desired height, and refastening the U-bolts **35** and **36**. As the molds are made, they are placed on the respective conveyors and moved therearound to

the pouring floor. When it is desired to pour the molds selected valves **47** are opened and the master valve **71** opened to apply hydraulic pressure to the bores **40** of the respective hydraulic rams, forcing the plate **67** downwardly onto the cope of the mold thereunder. After the molds are poured, the master valve is operated to release pressure on the manifold and permit the springs **61** to raise the plates **67** away from the mold **70**.

What we claim and desire to secure by Letters Patent is:

Apparatus for clamping complementary mold members against each other for the pouring operation including a support, a plurality of rollers rotatably mounted on the support with the roller axes transversely of said support and spaced longitudinally thereof, said rollers being adapted to support a plurality of molds whereby each mold rests on a plurality of rollers, a frame on the support and extending upwardly therefrom, longitudinally spaced arms adjustably mounted on the frame and extending over the rollers in spaced relation thereto, a beam carried by the extending portions of said arms and arranged longitudinally of the support, a plurality of tubular members, U bolts for clamping said tubular members on the beam in longitudinally spaced relation, plungers operable in said tubular members and extending downwardly therefrom substantially perpendicularly of the rollers, means surrounding said plungers and engaging the tubular members for sealing the lower ends thereof, means closing the upper ends of said tubular members, a manifold on the frame, means including valves communicating said manifold with each of said tubular means, a fluid pressure supply line, means including a valve for connecting the manifold with the pressure line for controlling admission of fluid pressure thereto and to selected tubular means, pressure plates pivotally mounted on the lower ends of the plungers for applying pressure to molds on the rollers in response to downward movement of the plungers under fluid pressure from the pressure line, resilient means in the tubular members for effecting upward movement of the plungers upon release of pressure from the tubular members for removing pressure from the molds, and means spaced from the plunger for selectively connecting adjacent pressure plates together for maintaining relative alignment thereof.

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