Sept. 13, 1949. G. W. FULLER 2,481,654

MOLD CLAMPING AND POURING SYSTEM

Filed June 29, 1944 2 Sheets-Sheet 1

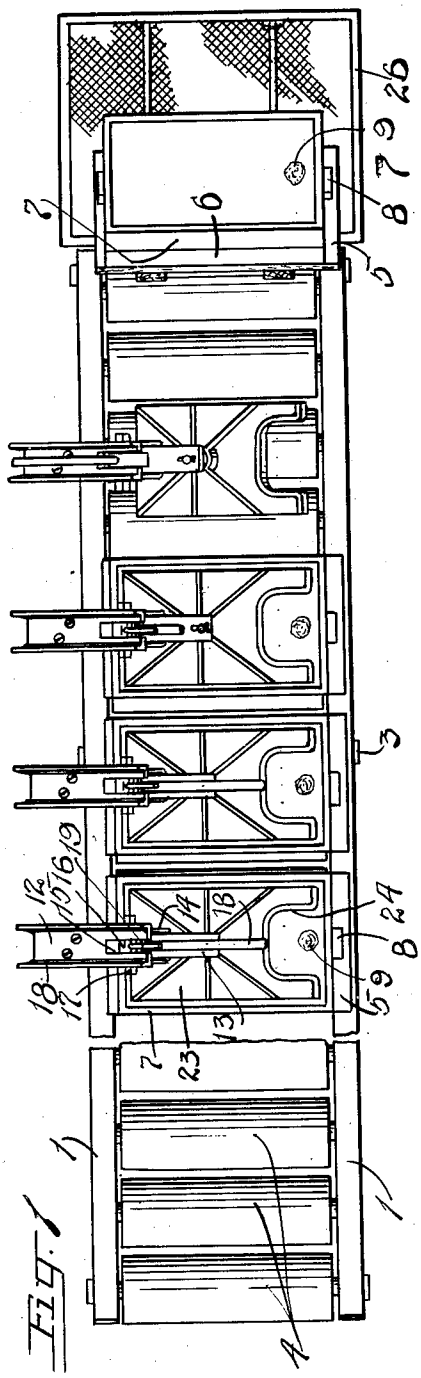


Fig. 1

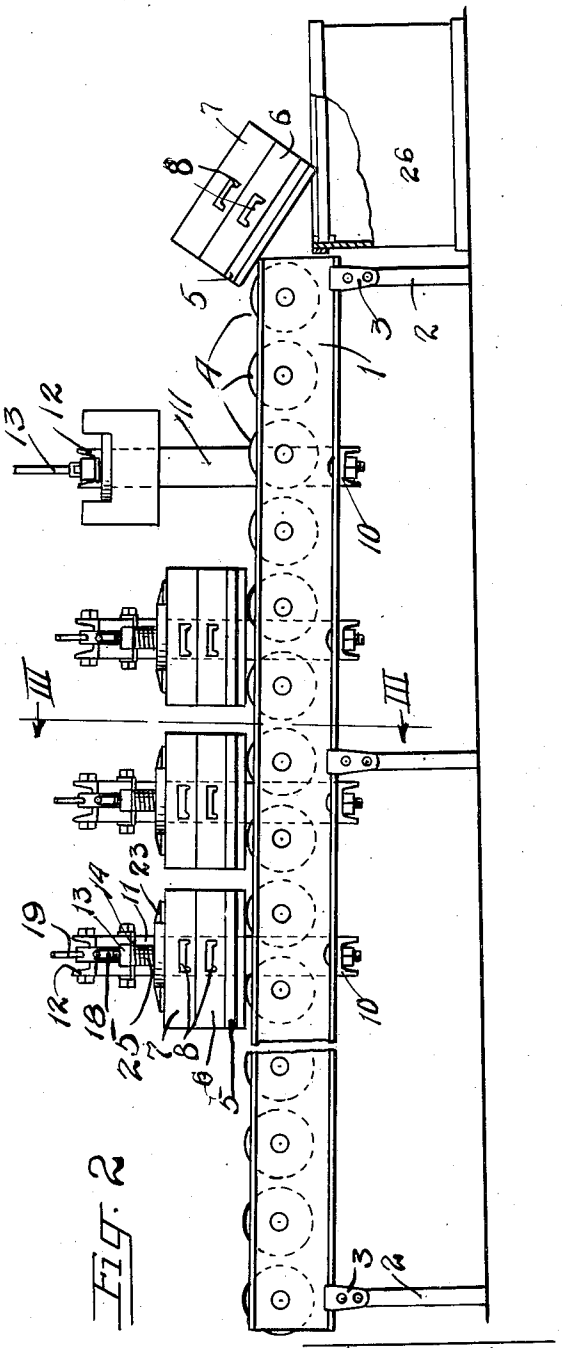


Fig. 2

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Fig. 3

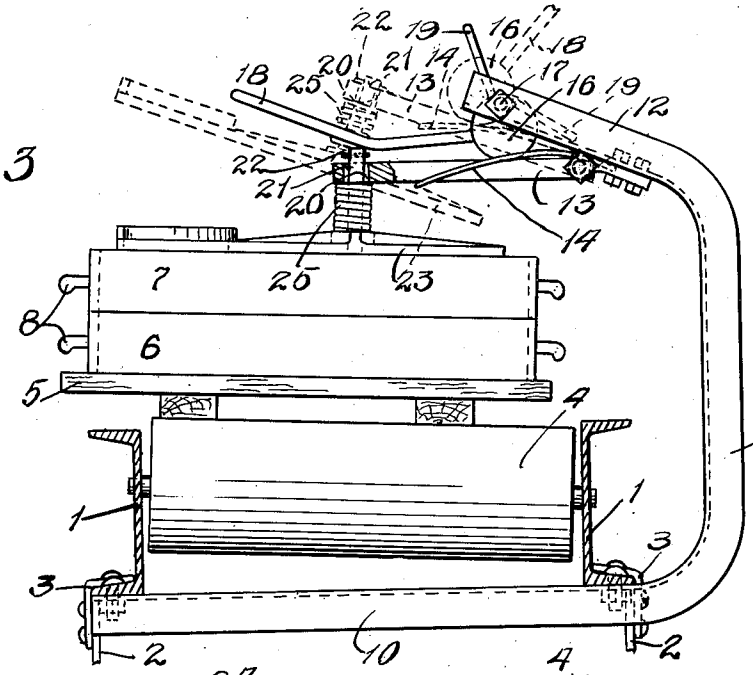


Fig. 4

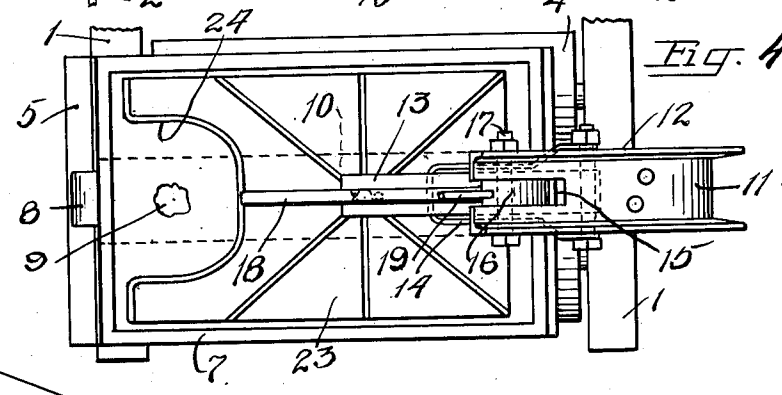
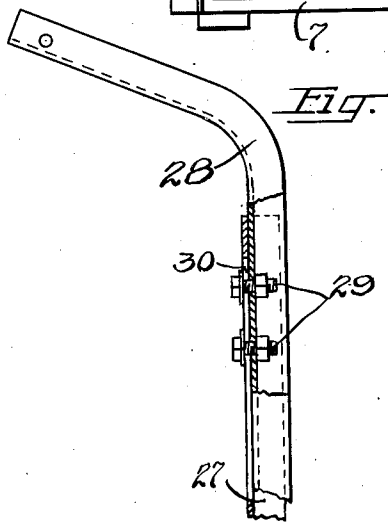


Fig. 5



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MOLD CLAMPING AND POURING SYSTEM

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2 Claims. (Cl. 22—112)

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This invention relates to a foundry gravity roller mold conveyor unit provided with mold clamps of simplified and improved construction arranged in selected spaced relationship on the conveyor frame and including spring controlled clamping means beneath which molds are moved at a pouring station to permit the clamping means to exert a desired pressure upon the mold flasks except the sprues, or the pressure means may be made smaller to engage upon the sand in the mold flasks to provide an improved method of mold pouring wherein the mold sand is subjected to predetermined pressures to hold the same in place against disruption during the pouring of the molten metal into the sprues to enter the mold cavities.

The improved easily operated mold clamps obviate the use and manual handling of mold weights and permit the easy replacement of the pressure control springs whereby selected desired pressures may be applied to the molds when in registering positions with the respective clamping units forming part of the mold pouring system.

It is an object of this invention to provide an improved and simplified form of foundry mold conveyor mechanism for a foundry pouring station, said mechanism being equipped with improved, pressure adjustable, mold clamping means which are economical, easily operable and effective.

It is also an object of this invention to provide an improved foundry mold clamping mechanism wherein a predetermined pressure on a mold may be effected by the novel application of a pressure exerting means on a mold or on the contents of a mold to obviate disruption of the mold sand during a mold pouring operation.

It is furthermore an object of the invention to provide a gravity roller mold conveying mechanism with manually operable spring controlled pressure applying clamping mechanisms for application on molds, when properly positioned on the conveyor mechanism, to hold the mold sand in position during pouring operations without requiring an operator to manually handle heavy weights.

Still another object of the invention is the provision of an improved mold pouring conveyor mechanism provided with improved clamping units so constructed as to permit self-adjustment to the top of a mold and including compressible means designed to have a compression strength equal to the amount of pressure desired to be exerted against the top of a mold.

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A further object of the invention is the provision of a mold pouring system wherein molds advanced upon a roller carrier are adapted to be moved into predetermined positions to register with clamping units having cam operated clamping plates equipped with spring mechanisms designed to compress at predetermined pressures to indicate to an operator when the correct pressures are applied to the molds.

Another object of the invention is the provision of a mold clamping mechanism wherein predetermined pressures may be applied, to the top of the mold or upon the top of the sand in the mold, by cam-operated means coacting with a resilient member designed to compress at a predetermined pressure to inform an operator when the proper pressure has been applied to the mold or the mold sand to prevent disruption thereof when molten metal is poured into the sprue of the mold.

Still another object of the invention is the provision of an improved foundry mold clamping unit wherein a cam controlled mold clamping plate is equipped with a pressure spring and is mounted in such a way that the clamping plate may adjust itself as it is moved into clamping position to prevent disruption of the mold sand during a mold pouring operation.

It is an important object of this invention to provide a foundry mold pouring system including a gravity roller conveyor mechanism for advancing molds into mold clamping stations having cam operated clamping plates equipped to apply predetermined pressures to the molds to facilitate the pouring of molten metal into the mold sprues without any danger of disrupting the mold formations within the copes and drags of the mold flasks.

Other objects and features of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

On the drawings:

Figure 1 is a fragmentary top plan view of a foundry roller mold conveyor system equipped with improved mold clamp mechanisms embodying the principles of this invention, and showing one of the molds released and advanced into a position over the shake-out box to permit emptying of the mold.

Figure 2 is a fragmentary front side elevation of the roller mold conveyor system shown in Figure 1.

Figure 3 is an enlarged vertical transverse sectional view taken on line III—III of Figure 2, showing one of the molds in place with the clamp-

ing mechanism shown in full lines in mold clamping positions and with said mechanisms illustrated by dotted lines in release positions to indicate the operation for releasing a mold after a pouring operation.

Figure 4 is a fragmentary top plan view of the mechanisms shown in Figure 3.

Figure 5 is a fragmentary side elevational view of a modified form of mold clamping bracket having vertically adjustable features for accommodating molds of different sizes.

As shown on the drawings:

The gravity roller mold conveyor mechanism comprises a frame consisting of two parallel outwardly facing channel rails or sills 1 supported in inclined positions by means of legs 2, having gripping brackets 3 secured thereto and shaped to engage over the lower flanges of the sills 1 to rigidly hold the means in place. Rotatably supported between the inclined frame sills 1 are a plurality of mold supporting and advancing rollers 4 having the axles thereof rotatably journalled in suitable openings arranged in the frame sills to permit the tops of the rollers to project above the top flanges of the frame sills as shown in Figure 2. The roller axle supporting openings in one of the frame sills 1 are lower than those in the opposite sill to hold the rollers transversely inclined as shown in Figure 3.

The gravity mold conveyor machine forms part of a foundry mold pouring system, and one or more of such machines may be installed in a foundry pouring station room. The molds to be poured are first prepared in any of the usual ways. Each of said molds, of the type illustrated in the drawings, is of the two-part flask variety, consisting of a base or bottom board 5 upon which is removably supported a flask comprising a wooden or iron drag 6 and a cope 7 each of which is provided with end handles 8. The mold flask contains the mold sand in which the mold cavity is formed to receive the molten metal which is poured into the mold sprue, or ingate 9 to enter the mold cavity and form the desired casting.

Located adjacent the high or receiving end of the gravity mold conveyor machine, is a mold forming station in which the molds are formed. The formed molds are placed upon the conveyor rollers 4 and are permitted to travel by gravity longitudinally along the pouring machine into a predetermined or selected position to register with one of a plurality of mold clamping units mounted on the machine frame in spaced relationship, depending upon the width of the molds which are to be poured.

The pouring machine unit thus includes a gravity mold conveyor unit equipped with a plurality of mold clamping units to facilitate the rapid and convenient clamping of a plurality of formed molds in spaced position on the conveyor ready to have molten metal poured into the mold sprues or ingates to fill the mold cavities for the formation of castings.

Each of the mold clamping units comprises a channel iron bracket consisting of a mounting base 10 which projects transversely through the machine frame and is rigidly secured by bolts or other suitable fastening means to the bottom flanges of the frame sills 1 as clearly illustrated in Figure 3. The channel iron is bent upwardly to form a supporting arm 11 which has the upper end bent inwardly to form an upwardly inclined clamp supporting arm 12.

The clamp supporting arm 12 has pivotally supported on the under side thereof one end of a clamping arm 13 which normally is held up against the arm 12 by a U-shaped spring 14 the bight portion of which extends beneath the clamping arm to hold the same in a raised position as shown in dotted lines in Figure 3. The top bracket arm 12, at its upper end is cut out to provide a notch or recess 15 in which a control cam 16 is rotatably mounted by means of a pivot bolt 17. The periphery of the control cam 16 is positioned to ride on the top surface of the clamping arm 13, and is operable by means of a lever 18. Projecting radially from the periphery of the control cam 16 is a stop rod 19 which in the raised dotted line position of the clamping arm 13 moves into engagement with the top bracket arm 12 to limit the rotation of the cam 16 and the upward swing of the lever 18.

The outer or free end of the clamping arm 13 is formed with a hole 20 through which a pressure plate pin or stem 21 loosely projects. The upper projecting end portion of the pressure plate stem 21 is formed with a diametric opening for the reception of a cotter pin or key 22. Rigidly secured on the lower end of the stem 21 is a mold pressure plate 23 having reinforcing ribs on the top thereof.

One end of the pressure plate 23 is formed with a notch or opening 24 to afford access to the sprue or ingate 9 to permit molten metal to be poured and enter the mold cavity for the formation of a metal casting. The pressure plate 23 may be large enough to rest upon the top of the mold flask cope 7, to apply pressure thereon and to hold the mold sand in proper place against disruption during a metal pouring operation. If desired, however, the pressure plate 23 may be smaller than the mold cope, as shown in Figure 4, to permit the pressure plate to rest directly upon the top surface of the mold sand to hold the same in place against disruption during a mold pouring operation.

In order to permit a predetermined pressure to be applied to the mold and by the mold clamping mechanism, a coiled compensating spring 25 is engaged around the pressure plate stem 21 between the clamping arm 13 and the pressure plate 23. The hole 20 in the clamping arm 13 is larger than the stem 21 to allow the plate to adjust itself to the top of the mold or the top of the mold sand in the mold, depending upon the size of the pressure plate. The spring 25 is a compression spring and is designed to have a compression strength equal to the amount of pressure desired to be exerted against the top of the mold or on the mold sand.

The gravity roller conveyor, forming part of the mold pouring system, is equipped with as many mold clamp units as needed for the number of molds to be poured at one time. The formed molds are placed on the high or receiving end of the conveyor and rest upon the rollers 4. The molds are thus permitted to be easily advanced by gravity downwardly on the conveyor mechanisms until the molds reach stations registering with the mold clamping units. As the molds are advanced into place the clamping plates 23 are all in their raised positions, as illustrated in dotted lines in Figure 3. It is now only necessary to swing the clamping levers 18 forward and downwardly from the dotted line position shown in Figure 3 into the full line position thereby operating or rotating the respective cams 16 to cause lowering of the clamping arms 13 together with the respective clamping plates 23,

The plates, due to their novel mounting, are permitted to adjust themselves to the top surfaces of the mold sand in the respective mold flasks leaving the mold sprues or ingates accessible through the plate openings or recesses **24**. When the clamping levers are pulled down enough pressure is applied to the levers to start the springs **25** compressing. As the springs **25** are designed to compress at selected pressures the operator knows that when the springs start to compress that the corrected pressures are being applied to the molds, making them ready for pouring.

The operator now pours the molten metal into the mold sprues or ingates **9**, permitting the metal to fill the mold cavities to form the desired castings.

With the predetermined pressures applied to the sand in the mold flasks, the sand is held in place and disrupting of the mold sand is thus obviated.

After the pouring of a series of clamped molds on the gravity conveyor the molds are successively released, starting at the lower end of the conveyor mechanism. The lever **18** of the first mold clamping unit as thrown upwardly, thereby releasing the clamping plate **23** and permitting the spring **14** to swing the clamping arm **13** and the plate **23** upwardly to release the mold. The poured mold is thus permitted to travel along by gravity over the rotating rollers to be discharged off of the lower end of the conveyor mechanism as shown in Figures 1 and 2, into the shake-out box **26** upon the grate bars therein. The mold flask cope and drag are removed from the sand mold, which is shaken from the mold bottom board **5** and is broken up. The mold sand is shaken down to pass through screens in the shake-out box **26** leaving the casting which may be easily removed. The poured molds are thus successively released and advanced by gravity into the shake-out zone to permit dismemberment of the mold flasks and shaking out of the sand leaving the formed castings in the shake-out box.

If desired the channel iron mold clamping brackets may be made adjustable to be used with molds of various thickness. Figure 5 illustrates a modified form of adjustable clamping bracket comprising a lower bracket section **27** having slidably engaged therewith an upper bracket section **28** which carries bolts **29** which engage through a slot **30** in the lower bracket section **27**, so that when the bolts are loosened the upper bracket section **28** may be raised or lowered to adjust the clamping unit to a mold of a particular size or height.

It will thus be noted that a convenient and easily operable foundry mold clamping system is provided for the clamping of prepared molds by spring controlled cam operated clamping plates,

thereby eliminating the manual handling and placing of mold weights.

Various details of construction may be varied through a wide range, without departing from the principles of this invention, and it is therefore not the purpose to limit the invention, otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a clamping device for applying pressure to the top of a foundry mold, a clamping member adapted to be positioned on the top of the mold and having an upstanding stem portion, a resilient member disposed around said stem substantially centrally on said clamping member, a clamping arm having an aperture for receiving the stem in universally pivoting relation and having an outer end in operable contact with said resilient member, and a cam means for locking said clamping arm and said clamping member down on the mold against the resistance of said resilient member, said resilient member being removably disposed on said clamping member for adjustment purposes.

2. In a clamping device for applying pressure to the top of a mold, a support member, a clamping arm pivotally mounted on said support member having an aperture therein substantially over the mold, a clamping plate suspended from said clamping arm for positioning on the top of the mold and having a stem portion freely disposed in the aperture of said arm for universal pivoting in relation thereto and a spring positioned about said stem between said clamping arm and said clamping plate for transmitting pressure to the top of said mold, the positioning of the clamping plate on the mold being automatically adjusted by adjusting movement of the stem in the aperture.

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