

Dec. 3, 1940.

J. J. PLESSMAN

2,223,385

MULTIPLE UNIT CASTING MACHINE

Filed Nov. 8, 1938

3 Sheets-Sheet 1

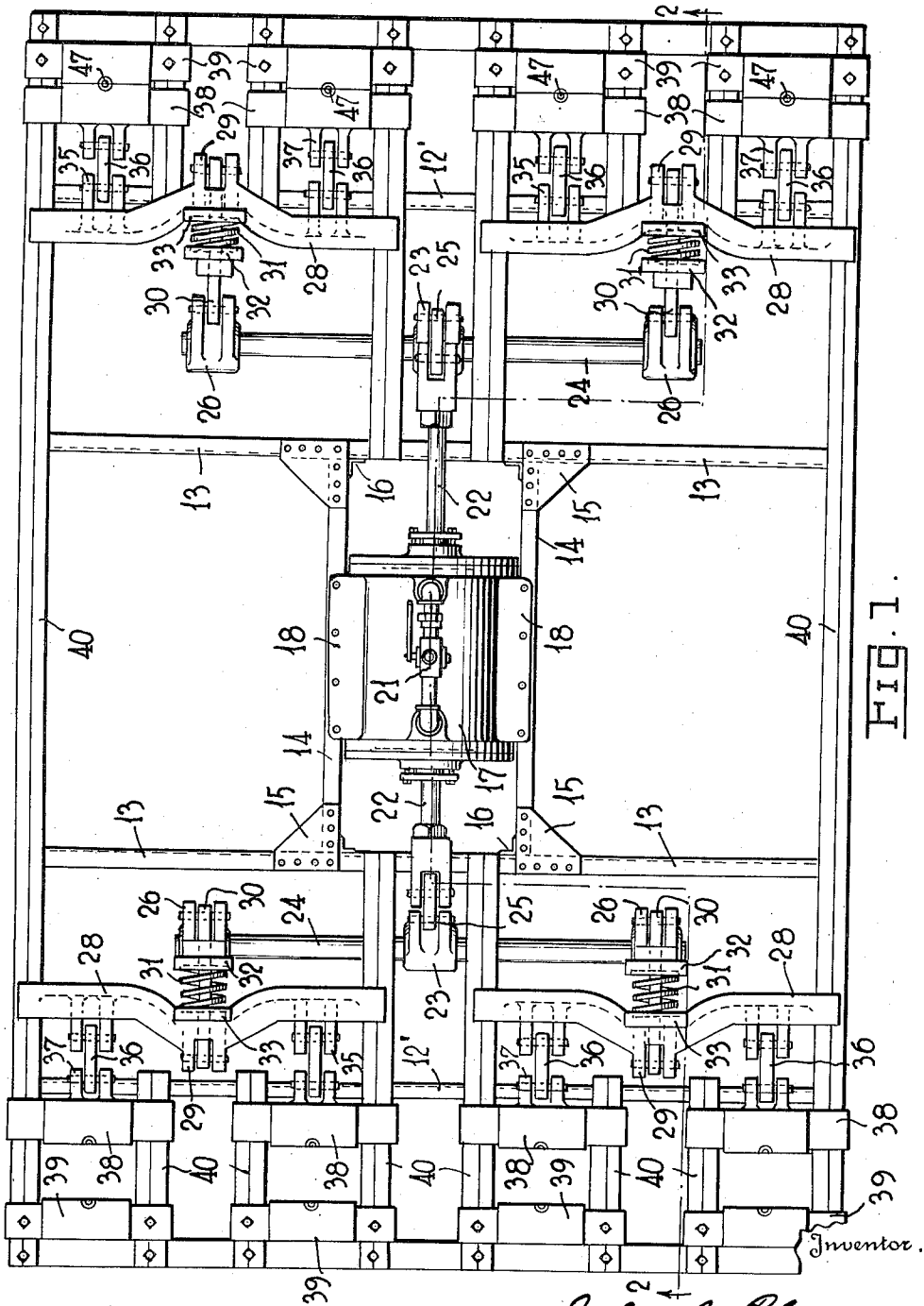


FIG. 1.

John J. Plessman.

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Stone, Gayden & Pash
Attorneys.

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FIG. 2.

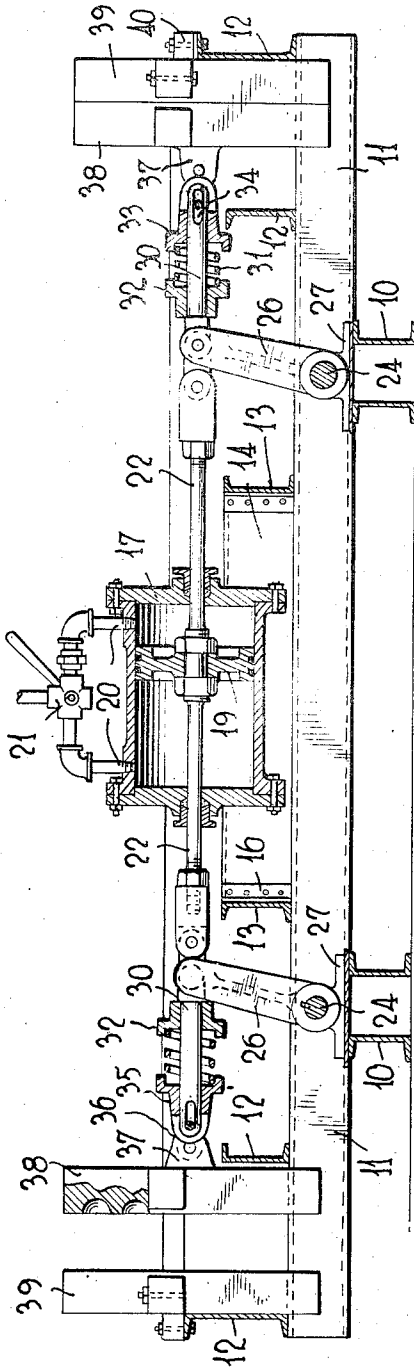


FIG. 3.

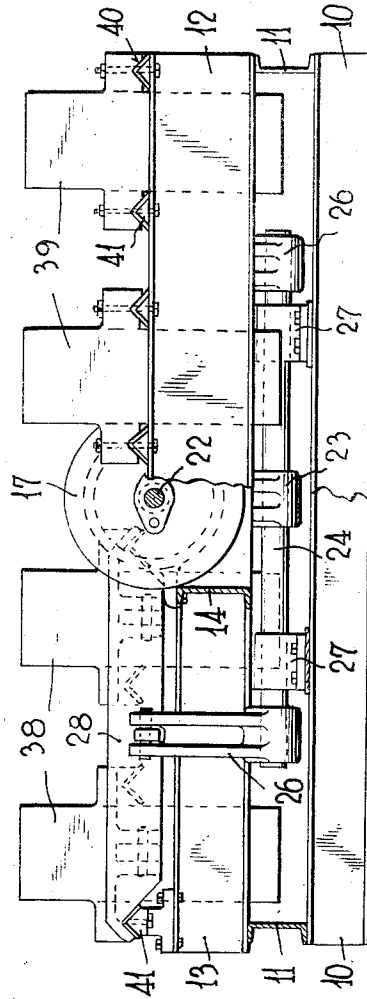
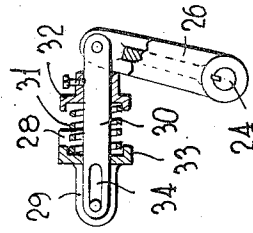


FIG. 4.



Inventor.

John J. Plessman.

By

Stone, Royden & Mack,
Attorneys

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FIG. 5.

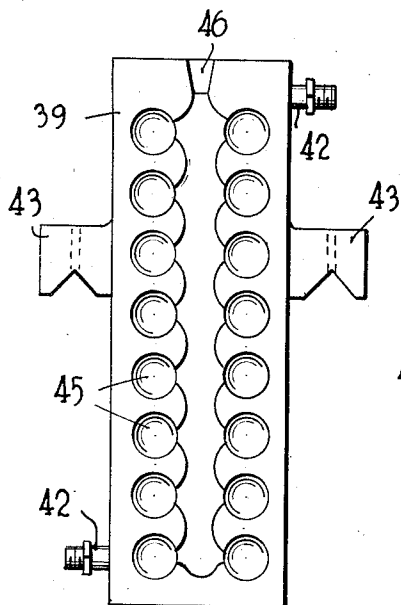


FIG. 6.

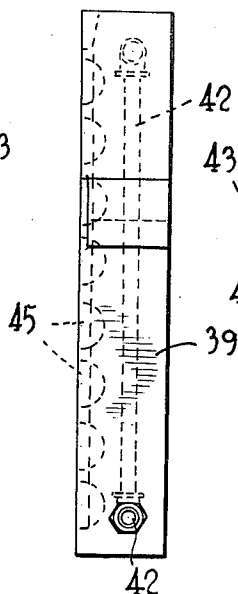


FIG. 7.

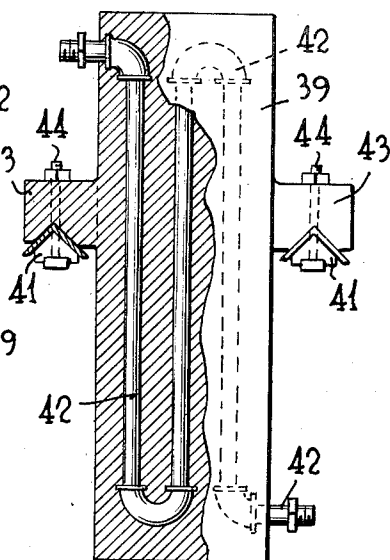


FIG. 8.

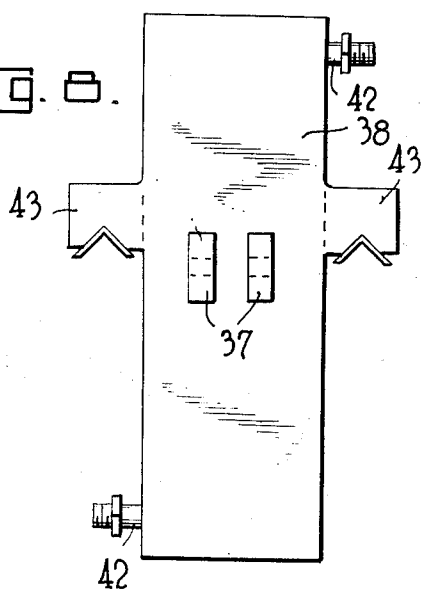
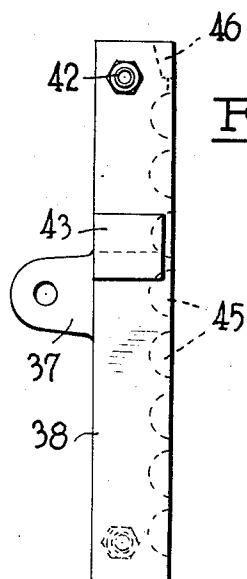


FIG. 9.



Inventor.

John J. Plessman

By

Stone, Boyan & Mack
Attorneys

UNITED STATES PATENT OFFICE

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MULTIPLE UNIT CASTING MACHINE

John J. Plessman, Port Chicago, Calif., assignor to
George T. Franck, Los Angeles, Calif.

Application November 8, 1938, Serial No. 239,545

6 Claims. (Cl. 22—57)

The present invention relates generically to molding machines of the so-called "duplex" or multi-sectional type wherein the parts are arranged for continuous operation, castings being alternately poured and discharged in each section of the machine, the pouring operation of one section being substantially simultaneous with the discharging operation of the other section, the several sections being actuated from a common source of power.

More specifically, the invention has especial relation to that form of duplex molding machine which comprises essentially a central actuating means, a series of stationary half-molds or mold sections on each side of said central means, and a complementary series of movable half-molds or sections interposed between each series of stationary half-molds and the actuating means and alternately movable by the latter to and from the corresponding stationary sections, so that the cast products may thus be alternately poured and discharged in continuous manner.

An important consideration in the construction of molding machines of the character in question is flexibility of the parts, particularly for the purpose of enabling the machine to take care of or compensate for stresses or forces due to the expansion of parts, primarily mold sections, as a result of the high thermal conditions involved in the pouring or casting operation. Accordingly, a main object of the present invention is to provide a novel and improved relationship of parts assuring the requisite flexibility to compensate for or equalize expansive forces or stresses.

Another desideratum for duplex molding machines is independence of molding divisions, or sections, thereby minimizing possibility of unfavorable conditions in one section prejudicially influencing another section or sections. A further object of the present invention, therefore, is the realization of this desideratum. To this end, the relationship of parts according to this invention involves subdivision of molding parts into independent series, and the provision of means whereby unfavorable conditions in one series cannot prejudice another series of the machine.

Molding machines of the character here involved, including movable molding sections, generally comprise means in the nature of guides or the like for these sections. A difficulty often encountered in this regard is that freedom of movement on the guides is obstructed by the lodging of hot metal drip or spray thereon. An object

of the present invention is to obviate this defect by the provision of guide or track means so constructed and arranged as to present a minimum opportunity for the depositing of obstructions of the character outlined. This is accomplished, briefly, by the use of inverted V-shaped tracks, described in greater detail in the description which follows.

A further object of the invention is to provide novel and improved cooling means in association with the several mold sections of the machine.

The foregoing and other objects and advantages of the construction and relationship of parts according to the present invention will be apparent to those skilled in the art from the following detailed description thereof, reference being had to the accompanying sheets of drawings, wherein an exemplary embodiment of the invention is illustrated.

On the said drawings:

Fig. 1 is a top plan view of a molding machine according to the present invention;

Fig. 2 is a side view, partly in section and partly in elevation, of the machine of Fig. 1;

Fig. 3 is an end view of the machine, parts being broken away for the sake of clearness;

Fig. 4 is a view, partly in section and partly in elevation, of a detail of the machine;

Fig. 5 is a front or face view of a stationary mold half, according to the invention;

Fig. 6 is a side elevation of the mold half of Fig. 5;

Fig. 7 is a rear view of the said mold half showing its manner of association with the remainder of the machine, a portion of the mold half being broken away to expose the embedded cooling means;

Fig. 8 is a rear elevation of a movable mold half, according to the invention; and

Fig. 9 is a side elevation corresponding to Fig. 8.

Corresponding parts are designated by the same reference characters throughout the several figures of drawings.

As shown in Figs. 1, 2 and 3 of the drawings, the molding machine according to the present invention preferably comprises a suitable supporting frame which may conveniently be constituted by base members 10, upon which are mounted longitudinal frame channel beams 11 and cross channel beams 12. Additional cross beams 13 and longitudinal beams 14, associated through the medium of plates 15 and angle irons 16, are provided to constitute a support proper for the

actuating mechanism of the machine herein-after described.

The mold actuating mechanism of the machine, according to the disclosed embodiment thereof, comprises a cylinder 17 provided with lateral flange extension 18 whereby the cylinder may be secured to supporting beams 14. Arranged for movement within cylinder 17 is piston head 19. The cylinder is provided, as shown more particularly in Fig. 2 of the drawings, with ports 20, 20 for the introduction therein of steam, water, oil, compressed air or any other suitable and available pressure medium through the multiple port control valve 21, movement of which in conventional manner provides for the alternating travel under pressure and release of piston head 19 within cylinder 17. Piston rods 22 extend from each side of head 19 through the suitably-packed end walls of cylinder 17.

As shown in Figs. 1 and 2, piston rods 22 interconnect the actuating piston 19 with rocker arms 23 mounted, respectively, centrally on rocker shaft 24, one of which is arranged on each side of cylinder 17. The connection between rods 22 and arms 23 may be effected by means of links 25 pivotally associated with the forked ends of the rods and rocker arms. Similar rocker arms 25 are also provided at each terminal or end of rocker shaft 24, which preferably is journaled in bearings 27 mounted on base members 10 (Figs. 2 and 3).

Each rocker arm 26 is connected to a yoke member 28 through the medium of a yieldable connection hereinafter described. As shown in Fig. 2 of the drawings, each yoke member 28 may preferably be of inverted L-shape in cross-section and preferably comprises an offset central portion terminating, on the rear thereof, in perforated lugs 29. Pivotaly connected to the slotted free end of each arm 26 is one end of a plunger rod 30 upon which is mounted compression spring 31 extending between spring pockets 32 and 33. Pockets 33 are preferably arranged in the depression formed by the offset central portion of yoke 28 and may be integral with the latter, if desired. The other end of each plunger rod 30 is pivoted to lugs 29 of a yoke member 28, the pivot pin of the connection extending through elongated slot 34 provided in rod 30 (see Fig. 4).

Each yoke 28 is connected, through the medium of perforated lugs 35 and links 36 to the perforated lugs 37 of movable mold one-half sections 38 of the mold blocks of the machine, the latter being arranged as shown in Fig. 1 of the drawings so that there are two molds associated with each yoke member 28. The other one-half sections 39 of each mold block is stationary.

The movable mold sections 38 are supported on and guided in their movement by inverted V-shaped angle tracks 40 which are held in alignment at their points of support on beams 12 and 12' by inverted V-shaped blocks 41 arranged under the tracks 40, all of which are then bolted to the frame.

The inverted V-shaped character of these tracks 40 provides downwardly inclined exposed surfaces which tend to shed, so to speak, any hot metal spray or drip which may come into contact therewith. In this manner, the tracks are maintained as free as possible of obstructions which might hinder free movement of movable sections 38 or prejudice proper alignment thereof with fixed sections 39.

As shown more particularly in Figs. 5 to 9 of the drawings, the several mold sections 38 and

39 may be provided with conduits 42 cast in the body of the section. Conduits 42 are preferably constituted by a plurality of straight lengths of pipe interconnected at their ends by bends. The termini of conduits 42, extending from the mold sections, may be screw-threaded or provided with other means for association with suitable means for supplying and withdrawing cold water or other cooling medium thereto.

Each mold section 38 and 39 is provided intermediate the ends thereof with lateral extensions 43 which are formed on the underside thereof with inverted V-shaped notches adapted to receive the guiding surfaces of tracks 40. Extensions 43 of mold sections 39 are further provided with suitable bores to receive bolts 44 whereby the sections 39 are affixed to tracks 40 and blocks 41 (see Fig. 7).

Opposed faces of each pair of mold sections 38 and 39 are formed with suitable depressions so configured and arranged as to define an impression of the desired product to be molded when the sections are brought together. By way of example, Figs. 5, 6 and 9 of the drawings show mold sections 38 and 39 constructed for the molding of grinding balls, the several sections being provided with substantially semi-spherical and alignable depressions 45. Each mold section is also provided with an inlet depression 46 which, upon closing of the molds, define a pouring mouth 47.

According to the preferred and illustrated embodiment of the invention, eight molding blocks are provided in duplex, four on each side for the purpose of continuous operation in pouring and discharging castings by the method of alternating. It is to be understood, however, that the number of individual molding blocks may be varied as desired, it being preferable however that the number of units in each division should, for the best practice, be equal.

In operation, piston head 19 is caused to reciprocate within cylinder 17 by the alternate application and release of pressure to the faces thereof through control valve 21. A full stroke of the piston in either direction will simultaneously close four mold blocks on one side so that they are ready for the metal pouring operation, and will simultaneously open the four mold blocks on the opposite side, allowing the castings to be discharged from the parted sectional mold blocks.

In the process of pouring the castings, the necessary liquidity of the metal to be poured requires, in the case of cast iron, for example, an average temperature of approximately 2800° F. in order to produce a high percentage of perfect castings. In this operation, the mold blocks, which may for example be made of cast iron, absorb a considerable quantity of heat, causing expansion of the blocks.

The non-uniformity of cast product which might result due to non-uniformity in heat absorbed by the several molding blocks of a series at the time of molding is obviated, according to the present invention, by the interposition between the actuating means and the several yokes of the yielding connection hereinbefore described. The springs 31 mounted on links or rods 30 constitute flexible or yielding means accommodating the variable expansion of the individual mold blocks while the cylinder pressure applied to all the sectional series remains constant. Slots 34 in rods 30 provide for the retreat or lost motion of the pivot pins extending therethrough.

during the periods of excess pressure on springs 31, as above explained.

The cool means which are embedded in the several mold sections provide a ready means for maintaining a relatively low temperature in the mold blocks, thereby adding to the life of the latter.

While the foregoing description has been set forth in connection with a machine for casting grinding balls, it is obvious that the mold sections may be variously configured to produce sash weights or other products of which quantity production is desired. In this connection, it is an important feature of the present invention that the mold sections may be readily mounted and dismounted for repair, replacement or exchange without altering or removing any other part of the operating mechanism.

Since the invention may be varied in its details without departing from the spirit or scope thereof, the foregoing description is intended to be purely illustrative and not limitative, and the invention is to be limited only by the terms of the claims hereunto appended.

What is claimed is:

1. A duplex casting machine comprising a central actuating means, a series of sectional mold blocks on each side of said actuating means, said mold blocks of each series being subdivided into a plurality of independent groups each of which latter include a plurality of molds, the reaction of the molds of each of which groups under the influence of heat is independent of each other and means interconnecting said actuating means and said groups and constructed and arranged for alternating the opening and closing of the opposite series of the duplex arrangement of sectional mold blocks, said interconnecting means including means for absorbing the expansive forces from each group without transmitting it to another group.

2. A duplex casting machine comprising a central actuating means, a series of sectional mold blocks on each side of said actuating means, said mold blocks being subdivided into a plurality of independent groups each of which latter include a plurality of molds, the reaction of the molds of each of which groups under the influence of heat is independent of each other, each mold block comprising a stationary section and a complementary movable section, means interconnecting said actuating means and said movable block sections for transmitting movement of the actuating means to the latter, said interconnecting means comprising a pressure compensating device associated with each group of mold blocks for absorbing expansive forces in-

cluding those expansive forces arising from the influences of heat from the latter and preventing transmission thereof to adjacent groups or to the actuating means.

3. A duplex casting machine of the character described comprising a central actuating mechanism, sets of sectional molding blocks arranged on each side of said actuating mechanism, each molding block including a fixed section and a complementary movable section, a rocker shaft disposed between said actuating mechanism and the blocks on each side of the latter, rocker arms fixed on said rocker shaft, means interconnecting said actuating mechanism and said rocker shaft, and means interconnecting each set of movable mold sections with one of said rocker arms, said last-named means including a resilient lost-motion device whereby reactive forces originating from the plurality of molding blocks of a given set are absorbed and are not transmitted to said rocker shaft, said sets being independent of each other in that the reaction of one set to the action of heat is independent of that of another set.

4. The construction defined in claim 3, said lost-motion device comprising a yoke member linked to a corresponding set of said mold sections, a plunger rod pivotally connected to a rocker arm and to said yoke member, said plunger rod comprising an elongated slot at one of its pivotal connections, and a spring mounted on said plunger rod between said rocker arm and said yoke member.

5. A duplex casting machine comprising an actuating cylinder, a plurality of sets of molding blocks on each side of said cylinder, a rocker shaft on each side of said cylinder therebetween and the molding blocks, each molding block including a fixed section and a movable section, a yoke member linked to the movable sections of each set of blocks, rocker arms fixed to said rocker shafts, said yoke members being flexibly mounted on said rocker arms, and means for transmitting reciprocatory movement from said cylinder to said rocker shafts, said last-named means comprising a piston reciprocable within said cylinder and piston rods extending from said piston to said rocker shafts, said machine including means for absorbing the expansive force for each set of molding blocks without transmitting it to another group.

6. The construction defined in claim 5, and spring means interposed between said rocker arms and yoke members, centrally of the latter, for modifying the pressure transmitted from said actuating cylinder.

JOHN J. PLESSMAN.