Oct. 27, 1936. W. E. BIBLE 2,058,762

CONTINUOUS CASTING MACHINE

Filed Sept. 24, 1934 2 Sheets-Sheet 1

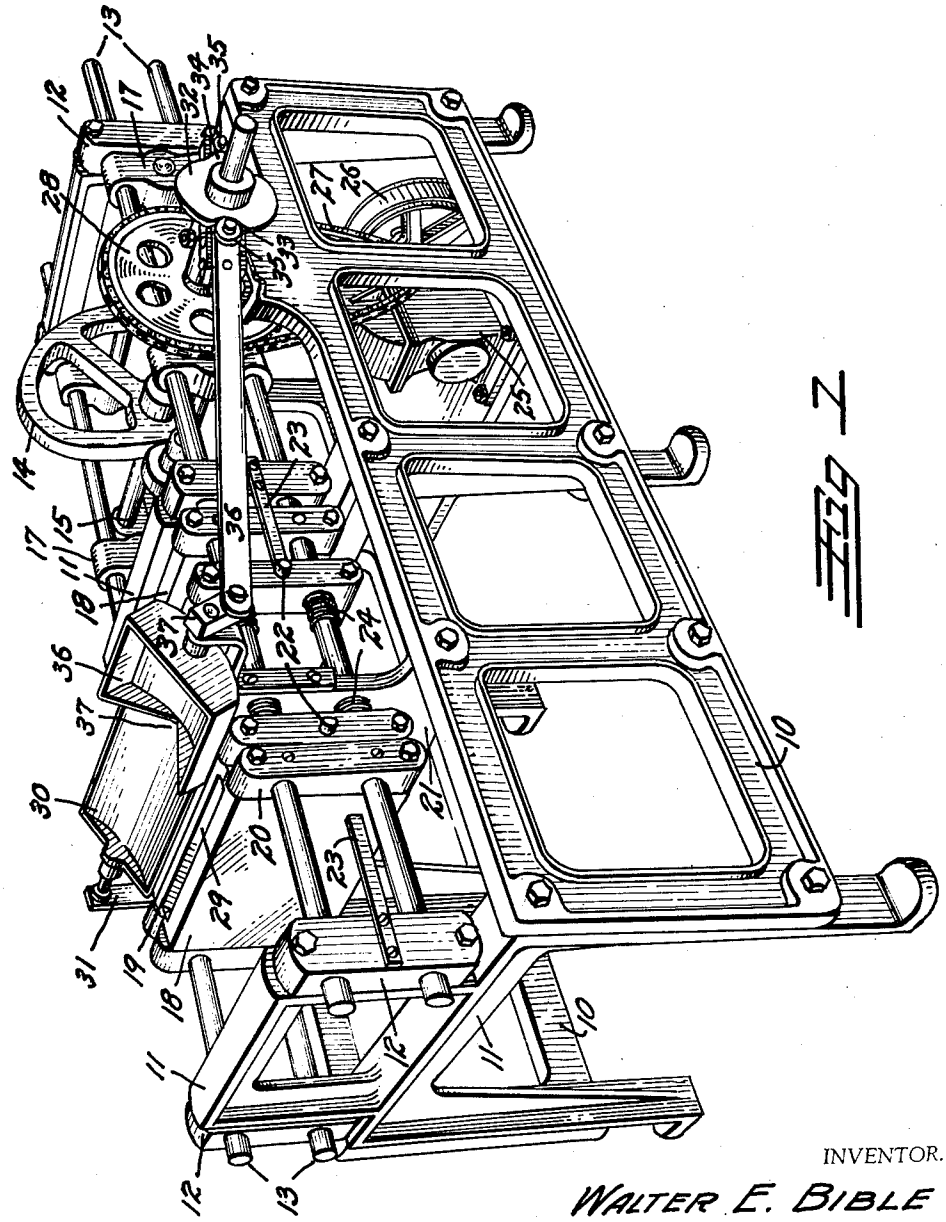


Fig. 1

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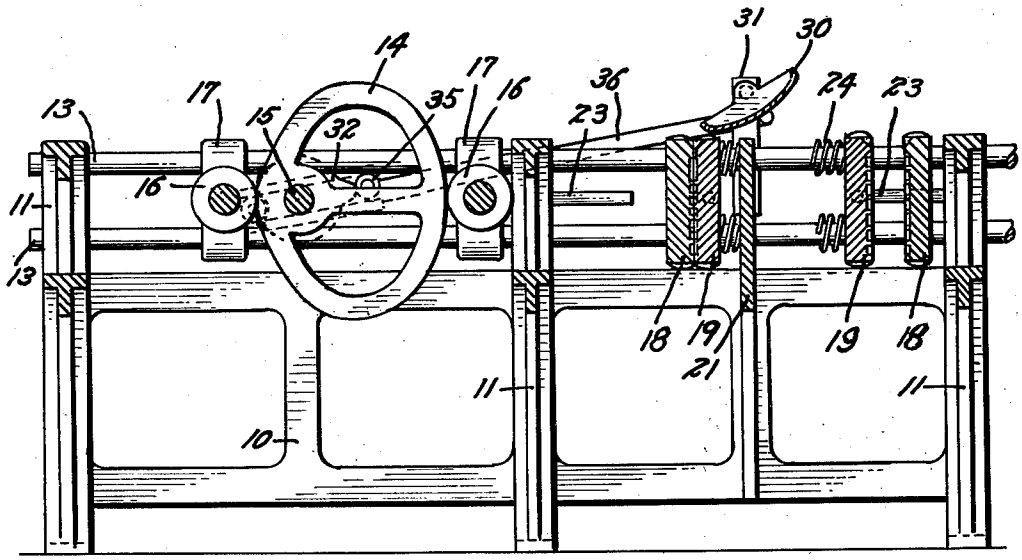



Fig 2

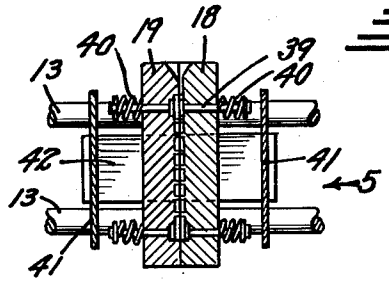



Fig 3

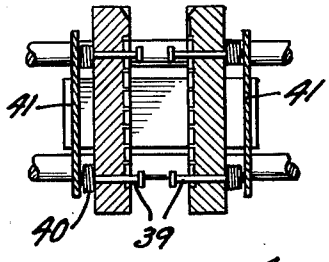



Fig 4

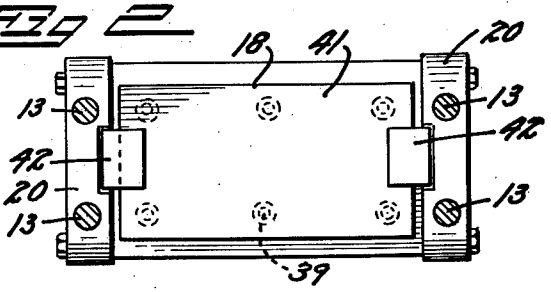



Fig 5

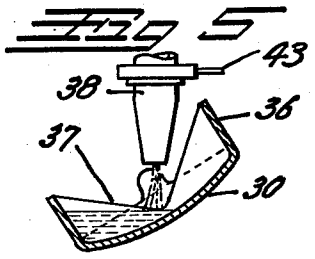



Fig 6

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Patented Oct. 27, 1936 2,058,762

# UNITED STATES PATENT OFFICE

2,058,762

## CONTINUOUS CASTING MACHINE

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Application September 24, 1934, Serial No. 745,255

6 Claims. (Cl. 22—57)

This invention relates to a machine for continuously casting articles from metal. It is more particularly designed for casting grids, connecting straps, posts, etc., for storage batteries, but is not, of course, limited to this particular use.

The principal object of the invention is to provide a device of this character which will operate continuously to close a mold, fill the same with moulten metal, open the mold, and discharge the casting therefrom.

Another object of the invention is to so construct the machine that while the metal in one mold is chilling, another mold will be filling so that the metal flow will be substantially continuous.

A further object of the invention is to provide a continuous pouring device for a casting machine which will allow the metal to flow continuously from the melter or metal reservoir even though the individual molds are poured intermittently.

A still further object is to so construct the machine that any desired number of molds may be applied thereto to increase the capacity without, materially increasing the power required, and so that a variety of different kinds of castings may be made simultaneously.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:—

Fig. 1 is a perspective view of a machine in which the invention is embodied.

Fig. 2 is a longitudinal section therethrough.

Fig. 3 is a detail section through a pair of mold sections illustrating an ejecting device applied thereto.

Fig. 4 is a similar view with the mold sections in the open position.

Fig. 5 is a detail view of the mold sections of Fig. 4, looking in the direction of the arrow 5, Fig. 3.

Fig. 6 is a diagrammatic view illustrating the action of the metal-pouring tray.

The invention comprises: a supporting frame, preferably formed of two side frames 10 connected by a series of lateral frames 11. The lateral frames 11 extend downwardly to form supporting feet and extend upwardly above the frames 10 to support pairs of bearing boxes 12. Each of the bearing boxes 12 slidably supports a pair of slide rods 13, there being a pair of slide rods 13 at each side of the machine extending longitudinally thereof. The slide rods are reciprocated from a cam 14 mounted on a cam shaft 15 which extends laterally of the machine.

The eccentric movement of the cam 14 is communicated to the slide rods through a pair of cam follower rolls 16. The rolls 16 are carried on lateral shafts which terminate in separating members 17 fixedly secured to the slide rods 13.

The rods 13 carry the molds. Each of the molds consists of a first mold section 18, and a second mold section 19. The mold sections are secured to vertical mold blocks 20 through which the slide rods 13 pass. The machine as illustrated carries two complete molds, there being one pair of mold sections on each side of a partition plate 21 through which the rods 13 pass. The blocks 20 of the first mold sections 18 are fixedly secured to the rods 13, while the blocks 20 of the second mold sections 19 are free to slide along the rods 13. The blocks 20 of the latter sections carry projecting studs 22 which, at certain positions, contact with the extremities of stationary stop members 23 which project from the blocks 12. Coiled springs 24 surround the rods 13 between the blocks 20 and the partition plate 21.

The cam shaft 15 may be rotated in any desired manner. As illustrated, it is rotated from a motor (not shown) which drives a speed reducer 25 through the medium of a suitable belt 26. The speed reducer transmits the power through a suitable chain or belt 27 to a drive sprocket 28 fixed on the cam shaft 15.

It can be readily seen that, as the shaft 15 rotates, it will in turn rotate the cam 14. This cam, owing to its eccentric contour will transmit a reciprocating motion through the rolls 16 to the slide rods 13. The reciprocating motion of the slide rods will be transmitted directly to the first mold sections 18 which are fixedly secured thereto.

The mold sections, when closed, form a hopper-like groove 29 in their top for receiving the molten metal. The metal is poured into the molds from a tilting pouring pan 30. The pouring pan is supported upon suitable brackets 31 above the molds, and is arranged so that it will rock or tilt back and forth as the molds alternately open and close. The rocking or tilting motion is caused by the action of a cam 32 fastened on the cam shaft 15. The cam 32 is provided with

a depression 33 in one edge, and with a projection 34 in the edge directly opposite the depression 33. Cam rollers 35 follow the cam edge and alternately enter the depression 33 and ride over the projection 34. The cam rollers 35 are carried on a connecting rod 36 which connects with a crank 37 on the shaft of the pouring pan 30. The pouring pan is provided at one extremity with a metal-receiving compartment 36 which communicates with the pan through a V-shaped weir 37. The metal is fed to the receiving compartment 36 from any suitable spout 38 from any suitable melting apparatus, the flow being controlled by any suitable valve 43.

*Operation*

In operation, the rods 13 constantly reciprocate with a short pause at each extremity of a reciprocation. In Fig. 2, the rods are shown at their extreme "right" position. When in this position, the second mold section 18 of the "left" mold is forced tightly against its coacting mold section 19, and the springs 24 are compressed against the partition plate 21. This mold is in the closed position ready to receive its metal. At this time, the pouring pan 30 is tilted to the left so that the metal therein will flow into the groove 29, and into the closed mold. The "right" mold is in the open position, that is its fixed mold section 18 has moved to the extreme "right" position while the mold section 19 has been stopped by its studs 22 contacting with the struts 23. Thus, the mold section 18 has moved away from the section 19 to allow the casting to fall therefrom.

It will be noted that while one mold is opening to discharge its casting, the other mold is closing to be filled. The open mold will then move to the closed position while the closed mold will move to the open position. The pouring pan will tilt from mold to mold so that the process will be continuous.

It is desired to call particular attention to the action of the springs 24. These springs allow the mold sections 19 to move after the two mold sections have come into contact with each other, thus insuring a snug contact between the mold sections without requiring extraordinary accuracy in the machining of the various parts.

It is desired to call attention to the action of the pouring pan 30. The metal first enters this pan in the compartment 36. This compartment, as stated, has a V-shaped weir as shown in Fig. 6. The metal flows through this weir only while the pan is in the horizontal or nonpouring position. As the pan tilts to the pouring position, the metal in the compartment runs to one side, as shown in Fig. 6, and cannot flow into the pouring portion of the pan. By this construction, the pouring portion of the pan receives its metal intermittently, and just the proper amount for a single casting, yet the compartment 36 receives its metal continuously.

*Ejector type*

The machine as thus far described, is satisfactory for castings of a type which will fall from the mold by gravity. For castings which have a tendency to adhere to the mold sections, some means must be provided for ejecting the casting from the mold. Such a means is illustrated in Figs. 3, 4, and 5. In this form of the invention, the two mold sections 18 and 19 are provided with ejector pins 39, which extend from the face of the mold section rearwardly through the rear face thereof, and are provided with compression springs 40 which always return them to their proper positions.

An ejecting plate 41 is positioned at the rear of each of the mold sections. The two ejecting plates are tied together by means of tie members 42 which, in the present installation, pass through suitable notches formed in the blocks 20. When the molds are in the closed position, the two plates 41 are out of contact with the ejector pins. When the molds are in the open position, the pins are brought against the plates as shown in Fig. 4 so as to protect the heads of the pins beyond the face of the molds to eject the casting therefrom.

The springs 40 in the ejector pins may be omitted in some installations where the molds themselves will force the pins back to place. Although four of the slide rods 13 are shown in the present installation, it is to be understood that more or less rods could be used as conditions warranted. The shape of the cam 14 is such as to hold the mold sections stationary for an interval during the filling and discharging operations.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. A casting machine comprising a supporting frame; a series of parallel slide rods extending longitudinally of said supporting frame; means for fixedly connecting all of said slide rods so that they will move as a unit; a partition plate fixed to said frame and extending laterally of said slide rods; a first mold face secured to and supported by said slide rods so as to move therewith; a second mold face supported by said slide rods between said first mold face and said partition plate, said second mold face being free to move relative to said slide rods; springs separating said second mold face from said partition plate; means for reciprocating said rods so as to force said first mold face against said second mold face to compress said springs, thence to move both mold faces away from said partition plate; and a stationary stop member for limiting the movement of said second mold face to a predetermined distance so that the first mold face may withdraw therefrom.

2. A molding machine comprising: a frame; a series of horizontal, parallel slide rods supported by said frame; a partition plate supported by said frame and extending laterally of said slide rods; a first mold section carried by and secured to said rods at each side of said partition plate and in parallel relation thereto; a second mold section mounted between each of said first mold sections and said partition plate, said second mold sections being supported by but free to move along said slide rods; spring means interposed between each of said second mold sections and said partition plate; a stationary stop member arranged to contact with each of said second mold sections at a predetermined distance from said partition plate; and means for reciprocating said rods so as to move one of said first mold sections toward its adjacent second mold section and said partition, while the other first mold section moves with its second mold section away from said partition plate toward said stop member.

3. In a casting machine having a metal pouring device, a series of parallel, fixed-together slide

rods below said pouring device; a first mold section secured to said rods at each side of said pouring device; a floating mold section free to move on said rods at each side of said pouring device and between the latter and said first mold sections; stop means for limiting the movement of said floating sections; and means for reciprocating said rods and said first mold sections as a unit so that a first and second mold section will contact with each other alternately at each side of said pouring means and alternately separate from each other at a point removed from said pouring means so that one pair of mold sections will remain closed while the other pair of mold sections are closing.

4. A casting machine comprising: a supporting frame; bearing supports extending upwardly from said supporting frame; two pairs of parallel slide bars slidably supported by said bearing supports, there being one pair at each side of said frame; a stationary member extending upwardly from said frame; a first mold face secured to and supported by said slide rods so as to move therewith; a second mold face supported by said slide rods between said first mold face and said stationary member, said second mold face being free to move relative to said slide rods, said stationary member being positioned to contact with and limit the movement of said second mold face; separating members fixed to and extending between each pair of said rods; lateral shafts extending across said frame between said separating members; a cam positioned between said shafts so that the latter will act as followers for said cam to impart reciprocatory movement to said rods so as to force said first mold face against said second mold face when the latter is stopped by said stationary member, thence to move both mold faces away from said stationary member; and a stop member for stopping the movement of said second mold face at a predetermined distance from said stationary member so that the first mold face may withdraw therefrom.

5. In a casting machine: a supporting frame; a pair of horizontally positioned parallel rods slidably supported at each side of said supporting frame; mold faces carried on and actuated to and from each other by the reciprocation of said rods; a pair of spaced-apart separating members secured to and extending between the rods of each pair; a pair of shafts extending between the separating members at the opposite sides of the machine; a cam positioned to rotate between said shafts; and means for rotating said cam, said shafts acting as followers thereon to reciprocate said rods in consequence of the contour of said cam.

6. A casting machine comprising: a supporting frame; a series of parallel slide rods slidably supported by said frame; a stationary plate projecting from said frame between said rods intermediate the extremities of the latter; a first mold plate suspended between and secured to said rods at each side of said stationary plate; a second cooperating floating mold plate supported by said rods at each side of said stationary plate, one of said floating mold plates being positioned on said rods at each side of said stationary plate and between the latter and one of said first mold plates; and means for reciprocating all of said rods simultaneously so as to alternately force said first mold plates against said second mold plates when the latter is stopped by said stationary plate, thence to move the contacting first and second plates both away from said stationary plate; and a stop member at each side of said stationary plate for alternately stopping the movement of said second mold plates at a predetermined distance from said stationary plate so that the movement of said rods may withdraw said first plate therefrom.

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