This invention relates to a machine for casting ingots or the like and more particularly to a machine for continuously casting elongated ingots in a sequence of automatic operations.

It is a primary object of this invention to provide apparatus for automatically casting ingots or the like. Although the embodiment of the invention shown and described herein is designed specifically for casting tin anodes used in an electrolytic process, it is by no means limited thereto and may be employed in an obvious manner for casting other and different devices of metal or plastic. In accordance with one embodiment of the invention, the casting machine comprises an endless turret conveyor having a series of vertical ingot molds attached thereto such that they are transported by the conveyor and can tilt relatively thereto. The turret conveyor is moved step-by-step so that each mold is stopped at a succession of stations. At one station the mold is tilted out of vertical position and charged with molten metal. The mold is then advanced around the conveyor to an unloading station where the mold is opened and the solidified ingot is ejected.

Another object of the invention lies in the provision of a mold arrangement, for use in a casting machine of the type described above, which comprises two separable mold sections together with means for automatically separating the mold sections at an unloading station to permit ejection of an ingot or the like. A still further object of the invention is to provide apparatus for automatically unloading a newly-cast ingot or the like and placing it on a conveyor means.

The above and other objects and features of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings which form a part of this specification and in which:

Fig. 1 is a plain view of the general arrangement of the casting machine of the present invention;
Fig. 2 is a sectional view of the loading station of the casting machine taken along line II—II of Figure 1;
Fig. 3 is a sectional view of the unloading station of the casting machine taken along line III—III of Figure 1;
Fig. 4 is a front view of the unloading station of the machine;
Fig. 5 is a sectional view of the mold opening and closing mechanism of the invention taken along line V—V of Figure 4;
Fig. 6 is a sectional view of the mold opening and closing mechanism and mold lock and unlock mechanism taken along line VI—VI of Figure 4;
Fig. 7 is a sectional view of the mold lock and unlock mechanism taken along line VII—VII of Figure 4;
Fig. 8 is an end view of the ingot unloading mechanism of the invention;
Fig. 9 is a side view of a portion of the mechanism shown in Figure 8;
Fig. 10 is a side view of an alternate embodiment of the ingot unloading mechanism; and
Fig. 11 is a plain view of the mechanism shown in Figure 10.

Referring to Figs. 1 and 2, a flat annular turret member 10 is shown supported for rotation about a circular operator's platform 12. Beneath annular member 10 are a pair of downwardly extending flanges 14 and 16 which carry a series of spaced rollers 18 and 20, rotating about horizontal and vertical axes respectively. Rollers 18 and 20 travel on an annular track structure 22 which is supported above ground level by a plurality of circumferentially spaced columns 24. As shown in Fig. 2, the track structure 22 also supports the operator's platform 12. Around the outer periphery of the annular member 10 are carried a plurality of upright molds 26. In the illustrated embodiment of the invention, the molds 26 are elongated and each is pivotally mounted at its upper extremity to a clevis 28 which is welded or otherwise securely fastened to an annular flange 29 on member 10.

A prime mover, not shown, is provided for rotating member 10 and the molds 26 about track structure 22. As will be understood, the arrangement is such that the molds 26 are moved step-by-step around the platform 12 in a closed cycle of operations.

As will hereinafter be more fully described, each of the molds 26 comprises a pair of elongated separable mold sections 30 and 32 each having a L-shaped cross-section. When the mold sections are closed, they form a rectangular cavity into which molten metal is poured at a pouring station, shown in detail in Fig. 2 and generally indicated at 34 in Fig. 1. After the pouring operation, each mold is moved step-by-step by member 10 around track structure 22, while successive molds are charged at the pouring station, until the mold reaches an unloading station, generally indicated at 36. As each mold travels around the track structure 22, the molten metal which it carries cools so that by the time the mold reaches station 36 its charge is entirely solidified.

At unloading station 36, the L-shaped mold sections 30 and 32 are separated as shown, and the solidified ingot is forced into an upright channel member 38 which is carried by a rotatable shaft 40, the shaft 40 being supported on a structure 42. A suitable piston carried within a hydraulic cylinder 44 is adapted to clamp the ingot within channel member 38 after it is ejected from the separated mold sections 30 and 32. Thereafter, the loaded channel member 38 is rotated about shaft 40 into a horizontal position by a fluid motor 46. While in the horizontal position, pressure in the cylinder 44 is released and the ingot is ejected out of channel member 38 and onto a conveyor 48 by a push rod 50 which is operated by another fluid motor 52.

In Fig. 2 it can be seen that at the loading station 34 there is provided an angularly positioned fluid motor 54 which is carried on one of the supporting columns 24 by a yoke member 56. The piston rod 58 of the fluid motor is equipped with a fitting, generally spherical in shape, which is adapted to engage a cooperating receptacle 60 on the back of each of the molds 26. As will be understood, the arrangement is such that when each mold reaches the loading station, the spherical fitting of piston rod 58 will engage the receptacle on the back of the mold; and the fluid motor 54 will then force the mold into the angular position shown in solid lines. While in this angular position, molten metal or the like is poured into an opening 62 provided in the top of the mold. When the mold is completely charged, piston rod 58 of fluid motor 54 will retract to permit the mold to assume the vertical position shown in dotted lines. The member
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10 is then rotated until the next successive mold reaches the loading station, and the process is repeated. At the unloading station shown in Figs. 3-7 there is provided between two of the supporting columns 24 a vertical plate member 64 fastened to the columns by any suitable means, such as bolts 66 (Figure 5). At the top and bottom of plate member 64 are fastened two mounting blocks 68 and 70. On the outer face of each of the blocks 68 and 70, as best shown in Fig. 5 are bolted three journal bearings 72, 74 and 76 which, in turn, support for rotation three shafts 78, 80 and 82. Between each set of bearings 72, 72 and 76, 76 is a tubular member 84 or 86 (Fig. 4) which is adapted to rotate about its associated inner shaft 78 or 82, as the case may be.

The inner L-shaped mold section 30 of mold 26 is connected to flange 29 on annular turret member 10 by a clevis arrangement 28 as was explained above. Extending laterally to the right from the top and bottom of the mold section 30 are a pair of shafts 88 and 90 (Figs. 5 and 6) which carry a pair of sleeves 92 and 94. The sleeves, in turn, carry the other L-shaped mold section 32 so that this section may move laterally with respect to the other and open or close the mold. Circular caps 96 on the ends of shafts 88 and 90 provide a positive stop for the sleeves 92 and 94.

As shown in Figs. 4, 6 and 7, there are provided three C-shaped clamp members 98, 99 and 100, pivotally connected to flanges 102 on the outer face of section 32 for clamping the mold sections 30 and 32 in closed position. On the free end of each of the C-shaped members is a roller cam follower 104 which is adapted to be forced over a latch block 106 and into a curved groove 108. The C-shaped members 98-100 are made from spring steel so that after follower 104 is forced over the leading edge 110 of the latch block and the mold section 32 and its associated clamps are forced to the extreme left position shown in Figs. 6 and 7, the follower can snap into curved groove 108 and hold the mold sections in closed position.

When section 32 is moved laterally to the right on shafts 88 and 90 and the mold is open, an ingot cast within the mold may be ejected by a pair of ejector pins 112 and 114 (Figs. 3 and 5) which extend through openings in the back wall of mold section 30. The pins are normally urged to retracted position by coil springs 116 interposed between section 30 and a washer 118 at the end of the pin. As will be understood, movement of the pins 112 and 114 against the force of springs 116 will force the ingot out of the mold and into channel member 38 shown in Fig. 1.

Indipendent rotary motion is imparted to each of the shafts 78-80-82 and tubular members 84 and 86 by a series of five fluid motors 120, 122, 124, 126 and 128, best shown in Figs. 3 and 4. Each of the fluid motors is pivotally supported on a clevis 130 carried by a backing plate 132. Each of the plates 132 is, in turn, carried on plate member 64 by two spaced supporting members 134 and 136.

As shown in Figs. 3, 4 and 7, the piston rod of fluid motor 120 is connected by means of a clevis 138 to a linkage 140 welded or otherwise securely fastened to the tubular member 84 which is carried between the journal bearings 72. Also fastened to tubular member 84 are three sets of cams 142 which are adapted to engage circular cam followers 144 on each of the C-shaped clamp members 98-100. When fluid pressure is introduced into motor 120, its piston rod will advance toward the mold, thereby causing the tubular member 84 and cams 142 to rotate in a counter-clockwise direction until they engage cam followers 144. Further rotation of motor 120 and member 84 and cams 142 will force cam follower 104 out of circular groove 108, thereby unlocking the mold sections 30 and 32 and permitting section 32 to move laterally to the right on shafts 88 and 90.

For moving mold section 32 laterally to the right on the shafts, the fluid motor 126 (Fig. 6) is provided having a clevis 146 connected to shaft 82 through a linkage 148. As shown in Fig. 4, the linkage 148 has a sleeve portion 150 which are fastened to the shafts 82 are a pair of linkages 152 and 154 (Figs. 4 and 5) having cam followers 156 which are adapted to engage projections 158 and 160 on the sleeves 92 and 94, respectively. In operation, when the fluid motor 126 is pressurized and its piston rod is forced outwardly toward the mold, shafts 82 and linkages 152 and 154 key on shafts 82 and rotate in a counter-clockwise direction. Thus, the cam followers 156 on linkages 152 and 154 will engage projections 158 and 160 on the sleeves 92 and 94, thereby forcing the sleeves and section 32 to the right on shafts 88 and 90.

The section 32 is moved to the left on shafts 88 and 90, and into closed position with respect to section 30 by means of the fluid motor 128 (Fig. 6) which is operatively connected to the tubular member 86 around shaft 82 by means of clevis 162 and linkage 164. Also fastened to member 86 are a pair of linkages 166 and 168 (Figs. 4 and 6) which carry cam followers 170 and 172, respectively, on their outer extremities. When fluid motor 128 is energized and its piston rod moves outwardly, tubular member 86 will be forced to rotate in a clockwise direction around shaft 82. Assuming that the mold is open and that sections 30 and 32 are separated, the cam followers 170 and 172 will engage projections 174 and 176 (Fig. 4) on section 32 as the tubular member 86 moves in a clockwise direction, thereby forcing section 32 to the left and into closed position.

Fluid motor 122 is provided in order to force the roller cam followers 104 of clamp members 98, 99 and 100 over the associated latch blocks 106 and into grooves 108 to lock the mold sections in closed position. The piston rod of the fluid motor 122 is operatively connected to the center shaft 80 (Figs. 4 and 7) by means of clevis 178 and linkage 180. When fluid motor 122 is energized, shaft 80 will turn in a clockwise direction; and the roller cam followers 182 on linkages 184 will engage projections 186 on the clamp members 98, 99 and 100 thereby forcing followers 104 over latch blocks 106 and into grooves 108.

The remaining fluid motor 124 is provided for pushing the cast ingot out of the mold when sections 30 and 32 are separated. As shown in Figs. 3 and 6 the piston rod of fluid motor 124 is connected through clevis 188 and linkage 190 to the shaft 78. Keyed to the upper and lower extremities of shaft 78 are two linkages 192 and 194 which carry cam followers 196 and 198 on their outer extremities. When fluid motor 124 is pressurized, it will force shaft 78 to rotate in a clockwise direction. Cam followers 196 and 198 will thus engage the ends of ejector pins 112 to thereby force the ejector pins into the mold and eject the ingot into the channel member 38 shown in Fig. 1.

In order to positively index each mold at the unloading station 36, a fluid motor 200 is provided (Fig. 3) which has a tapered pin 202 on the end of its piston rod which is adapted to extend through a cooperating hole 204 located at the lower portion of mold section 30 and into a bore provided in a backing plate 206.

As each mold reaches unloading station 36, fluid motor 200 is pressurized to force pin 202 through hole 204 and into the bore provided in backing plate 206. When the mold is thus indexed at the unloading station, fluid motor 120 is pressurized and tubular member 84 is forced to rotate in a counter-clockwise direction, whereupon cam 142 engage cam followers 144 to force followers 104 out of follower 102 of fluid motor 126 forces shaft 82 and linkages 152 and 154 to rotate in a counter-clockwise direction so that cam followers 156 engage projections 158 and 160 on sleeves 92 and 94 to move mold section 32 to the left on shafts 88 and 90 and open the mold.
When the mold is open, fluid motor 124 is pressurized and linkages 192 and 194 move in a clockwise direction to force the ejector pins 112 and 114 into the mold and eject the ingot into channel 38. Thereafter, the fluid pressure in motor 124 is released and springs 116 force the pins 112 and 114 into retracted position. At the same time linkages 192 and 194 and shaft 78 are forced to rotate in a counterclockwise direction. The mold is closed by pressurizing fluid motor 128 to rotate tubular member 86 and cam followers 170 and 172 which engage projections 174 and 176 on mold section 32. Finally, fluid motor 122 is pressurized to rotate shaft 80 in a clockwise direction so that cam followers 182 will engage projections 186 and force followers 104 over latch block 106 and into grooves 108. After the unloading operation, tapered pin 202 is retracted and the member 10 is free to rotate the next mold into registry with pin 202, whereupon the process just described is repeated.

A suitable source of fluid pressure and appropriate valves, not shown, are provided to automatically actuate the fluid motors in the sequence of operations outlined above as each mold reaches the unloading station 36.

Details of the actuating mechanism for the unloading channel member 38 are shown in Figs. 1, 8 and 9. The shaft 40 is mounted on a pair of spaced journal bearings 210 and 212. On one end of shaft 40 is keyed a plate 214 such that the shaft may slide through the plate. The shaft 40 is free to slide axially between plate 214 and one flange 216 of a pair of flanges 216 and 218. Below the flanges 216 and 218 on structure 42 is a clevis 220. A linkage 222 pivotally connected between the prongs of clevis 220 has a pair of spaced supports 224 and 226 on its upper end, each of which supports a cam follower. The cam followers are carried between flanges 216 and 218 so that rotation of linkages 222 about a pivotal axis will cause shaft 40 to move to the right or left. To rotate the linkage 222 there is provided a fluid motor 232 pivotally connected to structure 42 and 224, the piston rod of the fluid motor being operatively connected to linkage 222 through clevis 236.

Double acting fluid motor 46, pivotally connected to one leg of the structure 42 is connected to plate 214 whereby the channel member 38 will be rotated in a counterclockwise direction into a horizontal position when the fluid motor is pressurized in one sense, and rotated in a counterclockwise direction into a vertical position when the fluid motor is pressurized in the other sense. In operation, when the mold sections 30 and 32 are separated, at the unloading station, fluid motor 232 is pressurized in one sense to move shaft 40 and channel member 38 toward the mold. After the ingot into channel member 38, the hydraulic cylinder 44 is pressurized to clamp the ingot within the channel and fluid motor 232 is pressurized in the opposite sense to retract the channel member and shaft 40. Thereafter, fluid motor 46 is pressurized to rotate the shaft and channel member into a horizontal position, whereupon, the fluid motor 44 is pressurized in the opposite sense releasing the clamping pressure and fluid motor 52 and push rod 40 force the ingot out of the mold and onto conveyor 48. The fluid motor 46 then rotates the channel into vertical position to complete the cycle which occurs as each mold reaches the unloading station.

In the modification of the invention shown in Figs. 10 and 11, there is provided a tapered core pin 300 projecting from the inside surface of mold section 30' and across the channels of the mold to the inside surface of section 32'. As will be understood, an ingot cast in the mold will have an opening cored in its upper portion.

Adjacent the unloading station 36' is an anode unloading mechanism, generally indicated at 302. It comprises a table 304 which supports a guideway 306 on its top running tangentially with respect to annular turret number 19'. A sliding block 308, keyed to guideway 306, is operatively connected through piston rod 310 to a fluid motor 312 which serves to move the block 308 along its associated guideway. Mounted on block 308 is a fluid motor 314 which has an anode unloading pin 316 mounted on the extreme forward end of its piston rod. The unloading pin extends through an opening in a block 318 also mounted on sliding block 308. Extending parallel to guideway 306 is a conveyor, generally indicated at 320. A pair of rollers 322 and 324 are spaced at an angle, one above the other, in front of conveyor 320.

When a mold reaches the unloading station in the modification of the invention shown in Figs. 10 and 11, mold sections 30' and 32' will be separated to thereby expose the forward end of tapered core pin 300. Then, fluid motor 314 will be pressurized to move anode unloading pin 316 to the left until it abuts the core pin 300. Next, fluid motors 326 and 328 are pressurized, and the ejector pins 112' and 114' force the ingot over the pin 316 so that the lower end of the ingot is free to swing in a wide arc around the pin. In the following step, the fluid motor 314 is pressurized in the opposite direction to partially retract the pin 316; and fluid motor 312 is pressurized to move block 308 and the ingot forward conveyor 320. As the block 308 moves, the bottom portion of the ingot will strike roller 324. This has the effect of rotating the ingot about the pin. When the ingot strikes roller 322, the ingot will be further rotated until finally it is in a horizontal position on conveyor 320. After the ingot is positioned on conveyor 320, the fluid motor 312 pulls the pin 316 out of the opening cored in the ingot and the slide block 308 is moved to its position in front of the unloading station where the cycle is repeated.

Although the invention has been described in connection with certain specific embodiments, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts can be made to suit requirements without departing from the spirit and scope of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a casting machine, the combination of a conveyor, a plurality of upright molds mounted upon the conveyor, means for advancing the conveyor step by step whereby each mold is stopped at a succession of stations, means at one of said stations for charging a mold with molten material, means located at a subsequent station for ejecting a casting from its mold, and a clamping device located at said subsequent station for receiving and retaining a casting when it is ejected from its associated mold.

2. In a casting machine, the combination of a conveyor, a plurality of upright molds mounted upon the conveyor, means for advancing the conveyor step by step whereby each mold is stopped at a succession of stations, means at one of said stations for charging the mold with molten material, means located at a subsequent station for ejecting a casting from its mold, a normally upright channel member located at said subsequent station for receiving a casting when it is ejected from its associated mold, means for clamping a casting in said channel member after eje-
tion from its associated mold, means for rotating said normally upright channel member into a substantially horizontal position, conveyor means, and means for forcing the casting from said channel member onto said conveyor means where the channel member is in a substantially horizontal position.

4. In a casting machine, the combination of a conveyor a plurality of upright molds mounted upon the conveyor, each of said molds comprising a pair of separable vertical mold sections of L-shaped cross section, means to advance the conveyor step by step whereby each mold is stopped at a succession of stations, means at one station for charging each mold with molten material, means at a subsequent station for separating said L-shaped mold sections in a manner such that when the sections are separated the contents of the mold may be ejected therefrom, an upright channel member located at said subsequent station for receiving castings when they are ejected from their associated molds, means for moving said channel member into a casting-receiving position adjacent said one mold section when the mold sections are separated, means for ejecting a casting from said one mold section at said subsequent station and for forcing the same into said channel member, and means for clamping a casting within said channel member.

5. In a casting machine, the combination of an endless conveyor, a series of upright molds mounted upon the conveyor, each of said molds comprising a pair of separable vertical mold sections of L-shaped cross section, a substantially horizontal core pin for each mold having one end fastened to the upper portion of the inner surface of one of said mold sections, said core pin extending across the width of the mold, means to advance the conveyor step by step whereby each mold is stopped at a succession of stations, means at one station for charging each mold arriving at that station with molten material, means for separating said L-shaped mold sections at a subsequent station after the molten metal has solidified, a horizontally disposed unloading pin at said subsequent station adapted to be placed in axial alignment with each core pin when the mold sections are separated, means located at said subsequent station for ejecting a casting from the mold while the core pin and unloading pin are in axial alignment whereby the unloading pin passes through the opening in the casting formed by said core pin, and means for rotating the ejected casting about said unloading pin into a horizontal position.

6. In an ingot casting machine, the combination of an endless conveyor, a series of upright ingot molds mounted upon the conveyor, each of said molds comprising a pair of complementary separable mold sections, means located in the upper inside portion of each of said molds for coring an opening in an ingot cast therein, means to advance the conveyor step by step whereby each mold is stopped at a succession of stations, means at one station for charging each mold with molten material upon arriving at that station, means at a subsequent station for separating said complementary mold sections and for ejecting an ingot therefrom, an unloading pin located at said subsequent station and arranged to pass through the opening cored in said ingot when the same is ejected from its mold, and means for rotating the ejected ingot about said unloading pin into a horizontal position.

7. In an ingot casting machine, the combination of an endless conveyor, a series of upright ingot molds mounted upon the conveyor, each of said molds comprising a pair of complementary separable mold sections, means located in the upper inside portion of each of said molds for coring an opening in an ingot cast therein, a hinged connection between the upper portion of each of said molds and said conveyor whereby the lower portion of each mold swings outward and away from the conveyor about its hinged connection, means to advance the conveyor step by step whereby each mold is stopped at a succession of stations, apparatus at one station for rotating each mold about its hinged connection and for charging the mold with molten material while it is in a position other than vertical, means at a subsequent station for separating said complementary mold sections and for ejecting an ingot therefrom, an unloading pin located at said subsequent station and arranged to pass through the opening cored in said ingot when the same is ejected from its mold, and means for rotating the ejected ingot about said unloading pin into a substantially horizontal position.

8. In apparatus of the type described, a stationary frame, turret means carried on said frame for rotation about a defined axis, a series of upright ingot molds mounted upon the turret means, each of said molds comprising a pair of separable vertical mold sections of L-shaped cross section, a core pin for each mold having one end fastened to the inner surface of one of said mold sections, said core pin extending radially outwardly from said defined axis across the width of the mold, means to rotate the turret means step by step whereby each mold is stopped at a succession of stations, means at one station for charging each mold with molten material upon arriving at that station, means at a subsequent station for separating said mold sections after the molten metal has solidified, an unloading pin located at said subsequent station and adapted to be placed in axial alignment with said core pin when the mold sections are separated, and means for ejecting an ingot from said mold whereby the mold sections have been separated whereby the unloading pin will extend through the opening in the ingot formed by said core pin.

9. In an ingot casting machine, the combination of an endless conveyor, a series of upright ingot molds mounted upon the conveyor, means located in the upper portion of each of said molds for coring an opening in an ingot cast therein, means to advance the conveyor step by step whereby each mold is stopped at a succession of stations, means at one station for charging each mold with molten material upon arriving at that station, a substantially horizontal unloading pin located at a subsequent station, means located at said subsequent station for ejecting each ingot from its mold whereby the unloading pin is made to extend through the opening cored in the ingot, and means for rotating the ejected ingot about said unloading pin into a substantially horizontal position.

10. The combination claimed in claim 9 wherein the last-mentioned means comprises a power-actuated mechanism for moving said unloading pin in a direction perpendicular to the longitudinal axis of the unloading pin, a series of rollers spaced along an inclined plane and placed in the path of travel of said ingot as said unloading pin travels in said perpendicular direction, the lowestmost of said rollers being nearest said subsequent station, and a conveyor placed in the path of said ingot following said spaced rollers.

11. In an ingot casting machine, the combination of a moveable conveyor, at least one upright ingot mold mounted upon the conveyor, means located in the upper portion of said mold for coring an opening in an ingot cast therein, means located at a point along said conveyor for charging said mold with molten material, a horizontally disposed unloading pin located at another point along said conveyor, said unloading pin being positioned such that it is in axial alignment with the opening cored in said ingot when the mold reaches said other point, and means for ejecting the ingot from said mold when it reaches said other point along the conveyor whereby the unloading pin is made to extend through the opening cored in said ingot.

12. In an ingot casting machine, the combination of a moveable conveyor, at least one ingot mold mounted upon the conveyor, means located in said mold for coring an opening in an ingot cast therein, an unloading pin located at a point along said conveyor, said unloading pin being positioned such that it is in axial alignment.
with the opening cored in said ingot when the mold reaches said point, and means for ejecting an ingot from the mold when it reaches said point whereby the unloading pin is made to extend into the opening cored in said ingot.

13. In a casting machine, a mold comprising a pair of complementary elongated mold sections of L-shaped cross section, each of said mold sections having a pair of mold sides which intersect at right angles, guideways extending laterally outwardly from the top and bottom of one of said mold sections, the other of said mold sections being reciprocable on said guideways whereby the other mold section may be moved on said guideways from an open position to a closed position wherein the L-shaped sections form a mold cavity, a generally C-shaped clamping device of spring material having one end pivotally connected to the outside of said other mold section at the intersection of its sides, a latch block on the outside of said one mold section at the intersection of its sides, a latch block on the outside of said one mold section at the intersection of its sides, and a cam on the other end of said clamping device for engaging said latch block to hold the mold sections in closed position.

14. In a casting machine, the combination of a stationary frame member, turret means carried on said frame member for rotation about a defined axis, a series of upset molds mounted upon the turret means whereby the turret means may move said molds through a succession of stations from a loading station to an unloading station, each of said molds comprising a pair of complementary elongated mold sections of L-shaped cross section, each of said mold sections having a pair of mold sides which intersect at right angles, guideways extending laterally outwardly from the top and bottom of one of said mold sections, the other of said mold sections being reciprocable on said guideways whereby the other mold section may be moved on said guideways from an open position to a closed position wherein the L-shaped sections form a mold cavity, a generally C-shaped device of spring material having one end pivotally connected to the outside of said other mold section at the intersection of its sides, a latch block on the outside of said one mold section at the intersection of its sides, a cam on the other end of said clamping device for engaging said latch block to hold the mold sections in closed position, a first pair of abutments on the top and bottom of said one mold section, a second pair of abutments on the top and bottom of said other mold section, a second rotary upright shaft carried by said stationary frame member at said unloading station, arms keyed to said first shaft and arranged to engage said first pair of abutments when the first shaft is rotated to thereby move said other mold section along said guideways to separate the mold sections, a second pair of abutments on the top and bottom of said other mold section, a second rotary upright shaft carried by said stationary frame member at said unloading station, arms keyed to said second shaft and arranged to engage said second pair of abutments when the second shaft is rotated to thereby move said other mold section along said guideways to separate the mold sections.

15. In a casting machine, a mold comprising a pair of complementary elongated mold sections of L-shaped cross section, each of said mold sections having a pair of mold sides which intersect at right angles, guideways extending laterally outwardly from the top and bottom of one of said mold sections, the other of said mold sections being reciprocable on said guideways whereby the other mold section may be moved on said guideways from an open position to a closed position wherein the L-shaped sections form a mold cavity, a generally C-shaped clamping device of spring material having one end pivotally connected to the outside of said other mold section at the intersection of its sides, a latch block on the outside of said one mold section at the intersection of its sides, a cam on the other end of said clamping device for engaging said latch block to hold the mold sections in closed position, a first pair of abutments on the top and bottom of said other mold section, a second pair of abutments on the top and bottom of said other mold section, a second rotary upright shaft, and arms keyed to said second shaft and arranged to engage said second pair of abutments when the second shaft is rotated to thereby move said other mold section along said guideways and into engagement with said one mold section.

16. In a casting machine, a mold comprising a pair of complementary elongated mold sections of L-shaped cross section, each of said mold sections having a pair of mold sides which intersect at right angles, guideways extending laterally outwardly from the top and bottom of one of said mold sections, the other of said mold sections being reciprocable on said guideways whereby the other mold section may be moved on said guideways from an open position to a closed position wherein the L-shaped sections form a mold cavity, a generally C-shaped clamping device of spring material having one end pivotally connected to the outside of said other mold section at the intersection of its sides, a latch block on the outside of said one mold section at the intersection of its sides, a cam on the other end of said clamping device for engaging said latch block to hold the mold sections in closed position, a first pair of abutments on the top and bottom of said other mold section, a second rotary upright shaft carried by said stationary frame member at said unloading station, arms keyed to said first shaft and arranged to engage said first pair of abutments when the first shaft is rotated to thereby move said other mold section along said guideways to separate the mold sections, a second pair of abutments on the top and bottom of said other mold section, a second rotary upright shaft carried by said stationary frame member at said unloading station, arms keyed to said second shaft and arranged to engage said second pair of abutments when the second shaft is rotated to thereby move said other mold section along said guideways and into engagement with said one mold section.

References Cited in the file of this patent

UNITED STATES PATENTS

354,741 Sabold .......................... Dec. 21, 1886
451,707 Cline .......................... May 5, 1891
598,190 Custer .......................... Sept. 8, 1908
1,107,904 Craig .......................... Aug. 18, 1915
1,182,252 Dodson .......................... Apr. 27, 1926
1,956,596 Pelce .......................... July 17, 1934
1,996,335 Jones et al. .......................... Apr. 2, 1935
2,278,815 Winkel .......................... Apr. 7, 1942
2,345,493 Mueller .......................... Mar. 28, 1944
2,508,865 Land .......................... Feb. 11, 1943
2,535,335 Thavenin .......................... Dec. 26, 1950
2,635,310 Morgan .......................... Apr. 21, 1953
2,733,490 Yates et al. .......................... Feb. 7, 1956

FOREIGN PATENTS

559,695 Great Britain .......................... Mar. 1, 1944