No. 698,592. Patented Apr. 29, 1902.

C. H. VEEDER.

MOLD MECHANISM.

(Application filed May 19, 1900.)

(No Model.)

3 Sheets—Sheet 1.

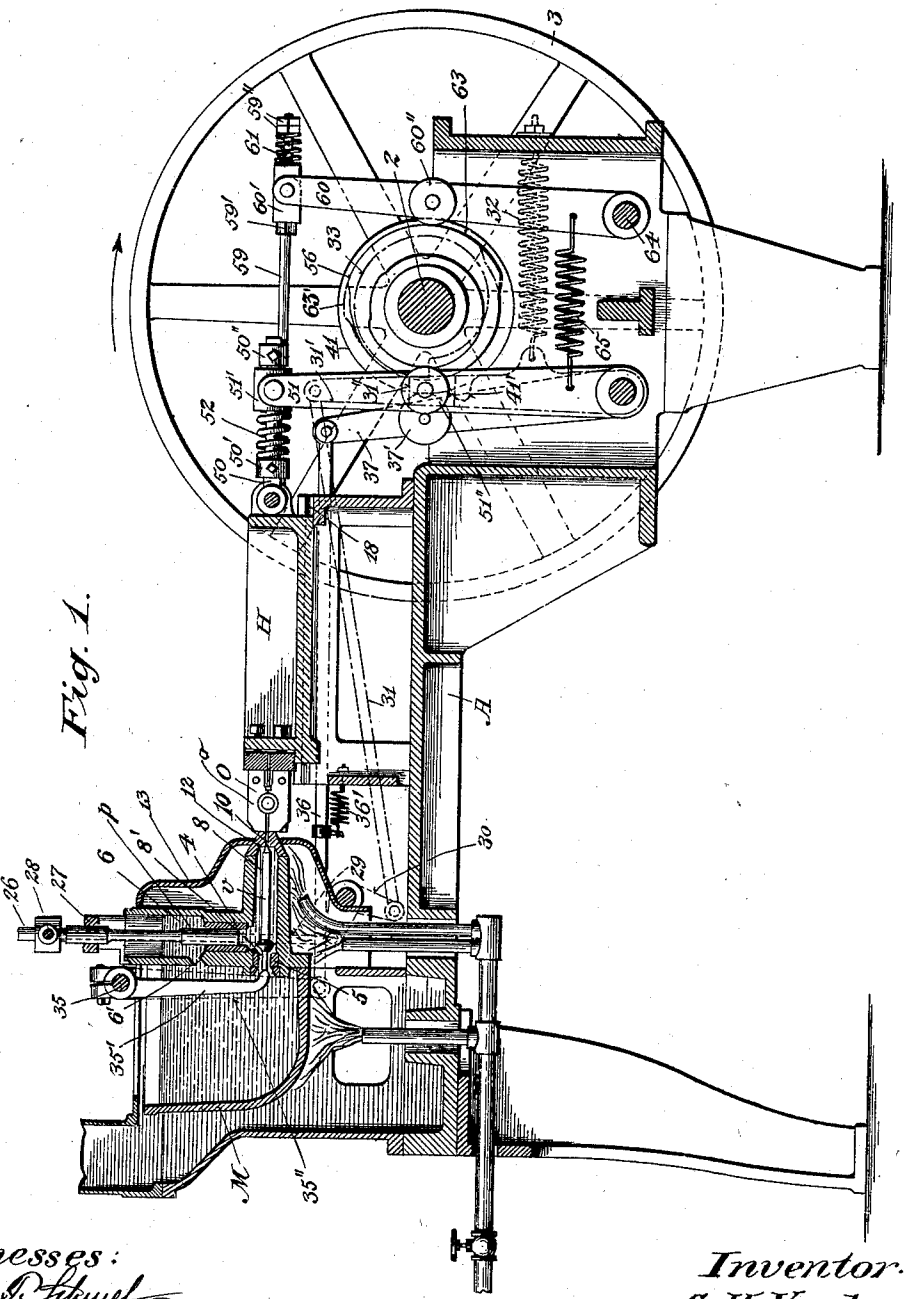


Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

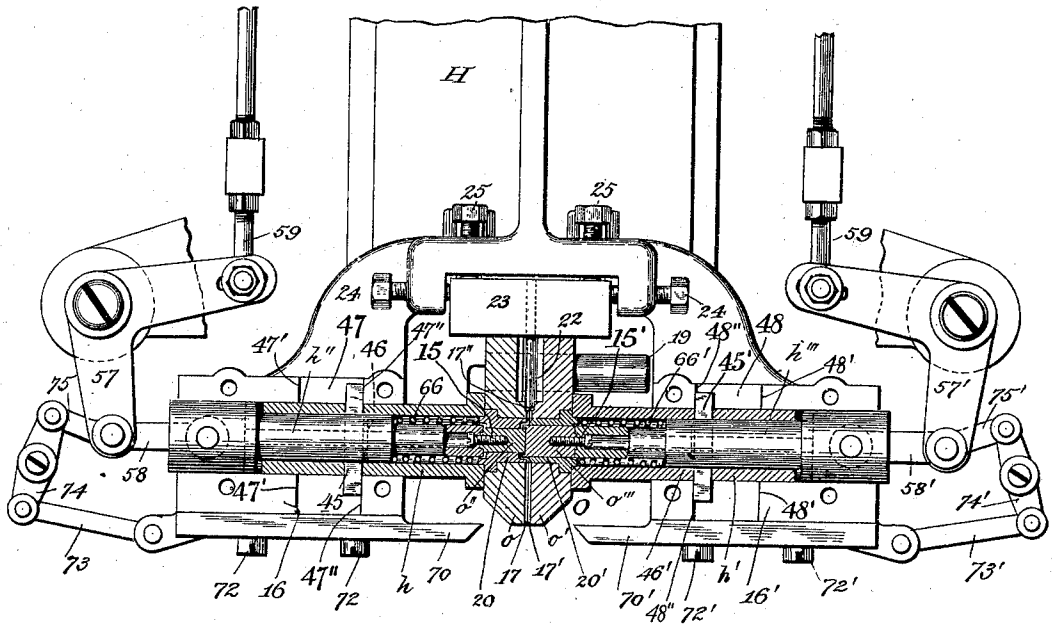
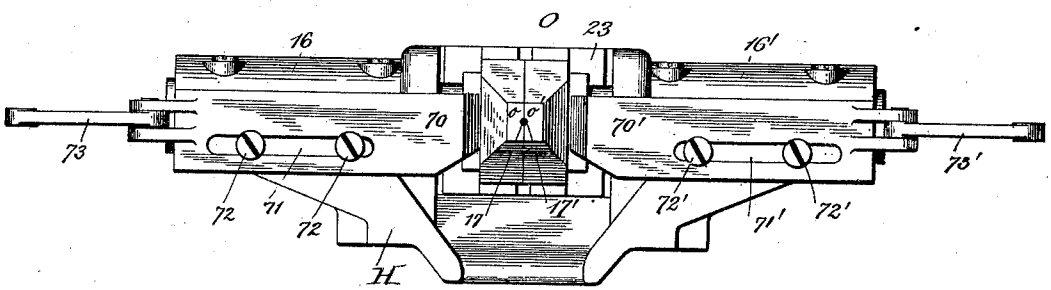


Fig. 3.



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No. 698,592. Patented Apr. 29, 1902.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 4.

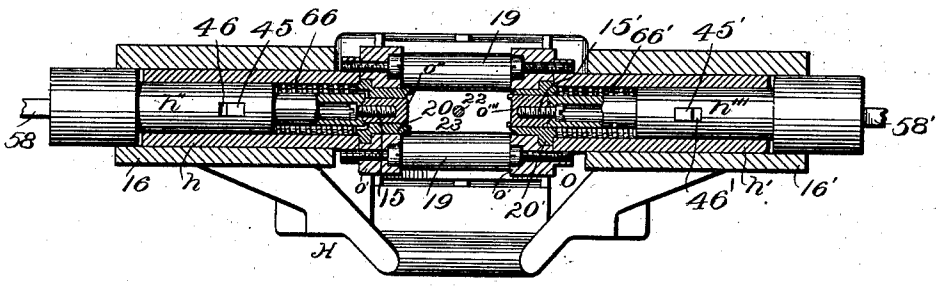
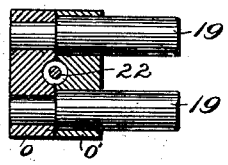


Fig. 5.



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UNITED STATES PATENT OFFICE.

CURTIS H. VEEDER, OF HARTFORD, CONNECTICUT.

MOLD MECHANISM.

SPECIFICATION forming part of Letters Patent No. 698,592, dated April 29, 1902.

Application filed May 19, 1900. Serial No. 17,219. (No model.)

To all whom it may concern:

Be it known that I, CURTIS H. VEEDER, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Mold Mechanism, of which the following is a specification.

This invention relates principally to mold mechanism; and it has for one of its main objects the provision of an improved separable mold in which articles may be shaped into form, and especially a mold in which castings may be formed from molten metal delivered into the mold under high pressure. As to this feature thereof the present invention is in the nature of an improvement upon the inventions shown, described, and claimed in my prior applications, Serial No. 2,435, filed January 23, 1900, and Serial No. 5,296, filed February 15, 1900, in which I have shown mold mechanism embodying separable molds, in the former of which cases the sections of the mold are movable differentially in the same direction, while in the latter of said cases the mold has a pair of side sections capable of movement in different and opposite directions.

The mold mechanism illustrated in the present case is distinguished from the corresponding mechanisms shown in my prior applications in that it embodies not only a pair of side sections movable in different and opposite directions, but also an additional side section movable in the path of one of the first-mentioned pair. Preferably there will be not only a first pair of side sections or main mold-sections, but also an additional pair of side sections or auxiliary mold-sections, the auxiliary side sections being movable in this case one in the path of one of the main sections and the other in the path of the other main section. Usually each main mold-section will have an auxiliary core-section coöperative therewith, and when properly operated each core-section may be stripped from the casting before its main section operates. Any means that is suitable for the purpose may of course be employed for operating such main and auxiliary sections relatively to each other; but here I have illustrated an improved organization of devices for this purpose, and such operating means constitutes another important feature of the invention.

In my prior applications hereinbefore mentioned I have illustrated mold mechanisms in which the several sections of the mold when in their closed positions are held in place by spring-pressure; but in said constructions each such section is held in place by a spring located at a distance from the mold, and there has been no direct coaction between two parts of the mold, one mounted on the other and one a main and the other an auxiliary member, having a spring interposed between them for operating one of said parts. In the present mold mechanism the main mold-section, with its carrier, incloses the auxiliary mold-section and its carrier, and a spring is interposed between the parts in such a manner that there is a direct coaction between these parts, and one of the movements of said main section is controlled directly by such spring. This, however, is not the only feature of difference between the mold mechanisms illustrated in said prior applications and that shown herein, as in this case the springs controlling the main and auxiliary casting-forming sections coact with one another and are so controlled that one of them when put under tension operates to tension the other also, and hence one of the springs is dependent upon the other.

In the construction shown in the present case the mold mechanism and the operating devices therefor are intended to coöperate with other elements, and one of these is a scraper or scrapers for cleaning one or more cheeks of the mold. In my prior application, Serial No. 5,296, filed February 15, 1900, I have shown in connection with the mold mechanism a pair of fixed scrapers; but in the present construction I prefer to employ one or more scrapers each movable relatively to its support, said scrapers being movable in this case toward each other while the sprue-forming mold-sections are opening.

In the drawings accompanying this specification and forming part of the present application, Figure 1 is a substantially central vertical longitudinal section of a casting-machine embodying mold mechanism and mold-scraping means constructed in accord-

ance with my present invention. Fig. 2 is n enlarged sectional plan of said mold mechnism and scrapers with their operating means, and Fig. 3 is a front elevation of the same. Fig. 4 is a section taken on a plane transverse to the plane of Fig. 2 and through the center of the mold, the latter being shown open. Fig. 5 is a similar section through a pair of guide-pins extending from one mold-section and fitted to slide through openings in the other section.

Similar characters designate like parts in the different figures of the drawings.

My improved mold mechanism and mold-scraping means are embodied in the construction shown herein in a complete automatic casting-machine by means of which castings may be formed and ejected from the machine regularly and at a high rate of speed without requiring any considerable amount of attention from an operator.

The several operative parts of the machine may be mounted on a suitable framework or bed, such as A, supported on legs in the usual manner and having a main shaft 2, which may be driven by a band-wheel 3 from any suitable source of power, and from this shaft the movements of all of the automatically-operating parts of the machine may be derived.

The metal to be supplied to the mold may be contained in a melting-pot, such as M, at one end of the framework, the contents of this pot being kept hot in any suitable manner, ordinarily by a gas-jet. In the construction shown this melting-pot has a well 6, opening directly into a chamber 8, having an inlet-opening 8′ and an outlet-opening 10. The chamber 8 and the lower part of the well 6 are kept filled by metal entering the opening 8′, while the upper part of the well is filled by metal entering through an opening 6′. This chamber 8 in the present case is formed partly within and partly without the melting-pot M and has a nozzle 12, which contains a portion of the valve-chamber 8 and also contains the discharge-opening 10.

Molten metal may be forced into the mold by means of a plunger, such as p, working in the well 6, which latter may have a removable sleeve or bushing, such as 4, while the opening 8′, through which the metal passes into the valve-chamber 8, may be formed in an annular seat or bushing 5, which may be removable from the melting-pot. Here the melting-pot is divided into two main parts, one being the melting-tank proper, while the other includes the well and the valve-chamber just described. All of the parts of the melting-pot may be surrounded by a casing, such as 13, in order that the heat may be utilized to the best advantage.

For the purpose of controlling the flow of molten metal to the mold I prefer to employ a valve, such as v, so constructed as to close the opening 10 when a casting is not being made. This valve may also serve to open communication through the passage 8′ with the main body of metal in the melting-tank and when so constructed as to accomplish both of these results constitutes a double-action valve.

The plunger p may be carried at the lower end of a plunger-rod 26, which may be mounted for vertical reciprocation in a support or bracket 27, fastened to the upper side of the melting-pot, said plunger-rod being operated in this case by a cross-piece 28, having a connecting-rod 29 pivoted thereon, the lower end of this rod being pivoted in turn to an angle-lever 30, from which a connecting-rod 31 extends toward the opposite end of the machine and in turn is pivoted to the upper end of a lever 31′, suitably pivoted on the framework and having a block with a let-off face 31″, adapted to coact with a corresponding quick-let-off face of a cam 33 on the shaft 2. Said lever has secured thereto one end of a coiled spring 32, the other end of which is fastened to a fixed point and serves to force the plunger p down rapidly when the let-off face 31″ rides down that of the cam 33.

The valve v is intended to reciprocate in the chamber 8 and in the openings 8′ and 10 and during a portion of a complete cycle of operations will be controlled in its movements by the molten metal in the valve-chamber and in the main portion of the melting-pot M and will move back and forth in accordance with the flow of the metal in the one direction or the other; but during another portion of the cycle of operations it is intended that the valve shall be held positively shut. The parts may be so organized that the valve will close the opening 8′ immediately after the plunger p begins to descend and will open the passage 10 to permit the molten metal to enter the mold, whereupon the valve v should be shifted immediately to close said passage and shut off the flow of metal therefrom.

The operating connections to the valve v comprise in this case a rock-arm 35′, a rock-shaft 35, to which said rock-arm is secured, a rock-arm 35″, and a connecting-rod 36, pivoted to the lower end of said rock-arm 35″ and also pivoted near the opposite end of the machine to the upper end of a lever 37, having an antifriction-roll 37′ coöperating with a cam 41 on the shaft 2, said cam having a small wiper 41′ projecting therefrom for shifting the rock-arm 35′ away from the valve momentarily when a casting is to be made. A suitable spring 36′, connected to the rod 36 and to a fixed point, may serve to hold the antifriction-roll 37′ in contact with the cam 41 and to operate said rock-arm quickly to close the valve v and cut off the supply of metal to the mold.

An important feature of my present invention is the employment in connection with mold-filling means of a separable mold having sprue-forming and casting-forming side sections capable of movement in different direc-

tions, so as to open or close the mold and facilitate the stripping of the sprue and the main portion of the casting from the mold when the latter is opened. In practice the walls of the sprue-hole become roughened and coated at the point where the metal first enters, and it is very difficult to withdraw the sprue from a solid mold at this point. Hence I prefer to make use of a mold embodying a pair of side sections in which the sprue will be formed and which may be separated to strip the sprue from such sections. I also make use of casting-forming side sections in connection with such sprue-forming sections, and in the present construction the mold is divided into two main parts, each of which is a combined sprue-forming and casting-forming section.

Many different styles of molds may be employed which will embody my present invention, provided that the molds differ only in the shapes of the mold-spaces; but in the present case I have illustrated a mold embodying a pair of main sections and a pair of auxiliary sections, each of the main sections constituting a combined sprue-forming and casting-forming mold-section. The mold is designated in a general way by O, and the main sections thereof are designated, respectively, by *o* and *o'*. These main sections are combined sprue-forming and casting-forming sections and may be in two or more parts, the main portion of each mold-section or die containing in this case the sprue-forming channel, such as 17 or 17', while the mold-space proper is formed in a separate mold-section or die, such as 20 or 20'. A die constitutes, therefore, a mold-section, and if the mold-sections are made in the form of removable dies it will be evident that the removable mold-sections or dies 20 and 20' may be removed and other sections having similar exteriors, but dissimilar mold-spaces, substituted in order to permit the formation of a casting of a different shape.

It will be noticed that the sprue-opening formed by the sprue-channels in the respective mold-sections *o* and *o'* is a substantially circular one surrounding the mold-space for the body of the casting and that this circular sprue-opening has extending from opposite sides thereof alined channels, the result being that when molten metal is injected into the mold there will be formed a casting having a sprue surrounding the same, with alined arms projecting from opposite sides thereof. One end of this sprue-opening—viz., that through which the metal enters the mold—will of course connect with the opening 10 of the mold-filling means, while the other straight portion of the sprue-opening, which is designated by 17'', is intended to be closed by a casting-centering device, such as the pin 22, it being evident that by providing a support which is clear of the dies the mold-sections may be separated from the casting while the latter is supported at some fixed point, and thus a very perfect stripping action may be secured and the release of every section from the casting assured. This pin 22 is carried in the present case by a block 23, which may be adjusted laterally by means of screws, such as 24, for the purpose of alining said centering device or pin with the opening 10, while adjusting and holding screws, such as 25, may be employed for the purpose of locating said pin in the opposite direction by shifting it toward or from the discharge-opening 10. In order that the mold-sections *o* and *o'* may be located accurately lengthwise thereof, I prefer to guide them positively as they approach or recede from each other, and in this case the mold-section *o* has guide-pins 19 projecting transversely therefrom and passing through corresponding guide-openings in the section *o'*.

In addition to the main sprue-forming or casting-forming mold-sections I have illustrated herein a pair of auxiliary sections, which are in the nature of core-sections and are designated herein by *o''* and *o'''*, and each of them works in a central longitudinal opening or bore in its corresponding main casting-forming section, such as the bushing or die 20 or 20'.

All of the sections of the mold may be supported by movable mold-carriers, each mold-section in this case having a separate carrier on which it is supported and by means of which its movements are controlled. Preferably the entire mold will be mounted on a mold-carriage movable toward and from the discharge-opening 10, and hence in this case said carriage will move horizontally. This mold-carriage is designated in a general way by H and is movable in parallel guideways, such as 18, on the framework. Said carriage supports the block 23 and the centering-pin 22 and also has in this case guideways in which the mold-carriers may be mounted for reciprocation. Of course this carriage may be made up of a number of parts, and, in fact, it has been found advantageous to mount the mold-carriers in guideways in divided collars or bearings, such as 16 and 16'.

The combined sprue-forming and casting-forming sections *o* and *o'* may be supported by cylindrical mold-carriers mounted for reciprocation on the main slide or carriage, crosswise of the latter. One of the other mold-carriers, such as *h''*, supports in this case the core-section *o''*, while the other carrier, *h'''*, supports the core-section *o'''*, said mold-carriers being preferably tubular and the core-sections being secured thereto, in this case by suitable screws, such as 15 and 15'. Each of the mold-carriers *h''* and *h'''* is in this construction of three diameters, that portion which is of largest diameter being supported in the openings of the divided collars 16 and 16', while the portion which is of medium diameter is intended to receive the mold-carriers for the corresponding combined sprue-forming and casting-forming mold-section.

In this case the mold-section *o* (including the section 20) is secured to a mold-carrier in the form of a sleeve *h*, mounted on the mold-carrier *h''* and having a key 45, adapted to work in a key-slot 46 in said mold-carrier *h''* and in a corresponding key-slot 47 in the collar 16, while the mold-section *o'* (including the mold-section 20') is secured to a mold-carrier in the form of a sleeve *h'*, mounted on the mold-carrier *h'''* and having a similar key 45', working in a key-slot 46' in the mold-carrier *h'''* and in a key-slot 48 in the collar 16'. The manner in which the carriers *h* and *h'* are operated will hereinafter appear.

The mold-carriage H and the mold-carriers *h''* and *h'''* may be operated in any suitable manner; but I prefer to actuate them by means of direct mechanical connections from the shaft 2. In the construction shown said mold-carriage has secured thereto a rod 50, carrying a pair of stops 50' and 50'', and also a sleeve 51', which is swiveled to the upper end of a lever 51, pivoted at a suitable fixed point and having an antifriction-roll 51'', which coöperates with a cam 56, secured to the shaft 2. The connection between the rod 50 and the lever 51 is a yielding one, and in this case a spring 52 is interposed between the stop 50' and the sleeve 51', it being evident that said spring will serve to hold the mold firmly against the discharge-nozzle of the mold-filling means when the carriage is in its forward position. The mold-carriers *h''* and *h'''* may be operated by substantially similar connections from the shaft 2. Here angle-levers, such as 57 and 57', are pivoted at suitable fixed points and connected to said respective mold-carriers by means of links 58 and 58', the other arms of the angle-levers being adjustably pivoted in this case to a pair of adjustable connecting-rods, such as 59, these connecting-rods being pivoted at their rear ends to a pair of levers, such as 60, by connections of substantially the same type as the connection between the rod 50 and the lever 51—that is to say, sleeves, such as 60', are mounted on the rods 59 and are swiveled to the levers 60, while springs, such as 61, interposed between said sleeves and a pair of stops, such as 59'', may serve to hold the core-sections *o''* and *o'''* tightly together. Stops, such as 59', may limit the movements of the sleeves 60' in the opposite direction. The levers 60 have antifriction-rolls, such as 60'', which coöperate with cams, such as 63 and 63', secured to the main shaft, said cams being so positioned that cam 63 will permit the mold-sections *o''* and *o* to withdraw from the casting before the sections *o'''* and *o'* begin to move. It will be understood that the levers or rock-arms 60 will preferably be secured to a rock-shaft 64, and although only one of these levers is shown and only one set of operating connections from the mold-carriers the connections from the two mold-carriers *h''* and *h'''* are substantially identical. In order to keep the antifriction-rolls 60'' and 51'' in contact with their cams, I may make use of a spring, such as 65, connecting the lever 51 with one of the levers or rock-arms 60.

The devices for operating the mold-carriers *h''* and *h'''* have just been described. For the purpose of operating the mold-carriers *h* and *h'* I make use of these devices and also of a pair of springs for shifting the carriers *h* and *h'* relatively to the carriers *h''* and *h'''*, on which they are mounted. In this case these springs are designated by 66 and 66' and are interposed between the outer ends of the mold-sections 20 and 20' and the ends of those portions of the carriers *h''* and *h'''* which are of medium diameter. By so organizing the parts not only will these springs be inclosed, but they will coöperate directly and most effectively with the parts which they are intended to operate, and while the latter will be actuated principally by the connections for operating the carriers *h''* and *h'''* said carriers *h* and *h'* will also have additional movements relative to those of the carriers *h''* and *h'''*, and these additional movements will be controlled by said springs. The parts are so organized that the springs 66 and 66' tend to force the carriers *h''* and *h'''* outward to strip the core-sections from the casting before the main sections of the mold begin to move.

Some means for scraping off the metal which adheres to the mold is an important element of a casting-machine of this type, especially for scraping those cheeks which come in contact with the discharge-nozzle of the mold-filling means, as metal sometimes adheres very firmly to these faces of the mold. In order to remove this metal and assure a tight joint and prevent clogging of the mechanism, I prefer to employ one or more scrapers movable relatively to the mold or the mold-filling means for scraping a cheek or cheeks of such part. Usually I will employ a scraper or scrapers movable with and relatively to the mold, and in the present case I have shown a pair of scrapers, such as 70 and 70', mounted, respectively, on the collars 16 and 16' and suitably held in place thereon, so as to be capable of sliding relatively thereto. In this case said scrapers are slotted, as shown at 71 and 71', and are guided by the smooth shanks or screws, such as 72 and 72', two of which are secured to each collar or bearing. Said scrapers may be operated by means of links, such as 73 and 73', connected to short levers, such as 74 and 74', which in turn are connected by links 75 and 75' to the angle-levers 57 and 57'. By means of these connections each mold-section is moved inward toward the line of separation of the mold-section, while the corresponding mold-carrier, with which the scraper coacts, is moved away from such line of separation to open the mold, and hence as the mold-sections separate the scrapers move toward each other and across the cheeks of the sprue-forming mold-sections.

It should be noted here that while the cen-

tering-pin 22 coöperates with the mold-sections to support the casting and release the same from said sections this pin does not fit tightly in the mold. Hence a small opening is left around the end of the pin, through which opening any air and gas left in the mold after the closing of the sections will escape, together with a portion of the molten metal, which will form around the tapering point of the centering-pin a fin that will oppose sufficient resistance to the pull of the last mold-section to be separated to assure the release of the casting from the latter.

The operation of a machine embodying mold mechanism and scrapers constructed and organized in the manner hereinbefore stated is as follows: The parts being in the positions shown in the drawings, with the mold closed and the band-wheel 3 turning in the direction of the arrow, the let-off face 31″ of the lever 31′ will first ride down the corresponding let-off face of the cam 33 and the plunger will begin to descend under the influence of the spring 32. Immediately thereafter the nose 41′ of the cam 41 will shift the lever 37 to the left, and the rock-arm 35′ will be shifted away from the valve *v* to permit the latter to open, the pressure in the valve-chamber 8 being sufficient to accomplish this result. The continued descent of the plunger *p* will thereupon force a stream of molten metal into the mold to fill the latter, whereupon the nose 41′ will move away from the roll 37′ and the spring 65 will operate the rock-arm 35′ to close the valve *v* again. Thereafter the spring 65 will become effective to withdraw the carriage H from the nozzle 12 as the antifriction-roll 51″ on the lever 51 rides down the cam 56. On the withdrawal of the sprue from the discharge-opening 10 the spring 65 will become effective to shift the levers 60 to the left successively as the antifriction-rolls 60″ ride down the cams 63 and 63′. The carrier *h*″ will first withdraw the core-section *o*″ from the casting owing to the expansion of the spring 66, and as soon as the inner end wall of the key-slot 46 strikes the key 45 the latter will withdraw from the stop-face 47″ and the carriers *h* and *h*″ will move together toward the stop-face 47′. After the stripping of the mold-section 20 from the casting the cam 63′ permits the carrier *h*‴ to withdraw the core *o*‴, and when the inner end wall of the key-slot 46′ strikes the key 45′ the latter will withdraw from the stop-face 48″ and the carriers *h*′ and *h*‴ will move together toward the stop-face 48′, this movement serving to strip the section 20′ from the casting, which after the stripping of the section 20′ will fall away from the centering-pin 22. As the carriers *h*″ and *h*‴ move away from each other of course the scrapers 70 and 70′ will move toward each other and scrape the cheeks of the sprue-forming sections of the mold. After the closing of the valve the plunger *p* will rise gradually until it reaches the limit of its upward movement. The carriage will begin to move forward again after the stripping of the casting has been completed, and will continue its movement until it reaches its extreme forward position. The cams 63 and 63′ will also shift the levers 60 and the connecting-rods 59 to the rear and the carriers *h*″ and *h*‴ will be moved toward each other again, carrying with them the main sections of the mold. Each main section *o* or *o*′ will be stopped by the striking of its key 45 or 45′ against the corresponding stop-face 47″ or 48″, and the respective carriers *h*″ and *h*‴ will continue their movements toward each other and put the springs 66 and 66′ under compression again, said carriers *h*″ and *h*‴ being stopped when the outer walls of the key-slots therein strike their respective keys, when the core-sections *o*″ and *o*‴ will be in contact. During the advance of these mold-sections toward each other of course the scrapers 70 and 70′ will withdraw from the cheeks of the mold-sections and move away from each other.

Having described my invention, I claim—

1. In a casting-machine, the combination with a separable mold, embodying a pair of main dies movable in different directions, and an auxiliary die movable relatively to and in the path of one of said main dies, of a driving-shaft and cam-face actuators operable therefrom, and operatively connected with the dies whereby the main dies and the auxiliary die are caused to move in proper sequence during the running of the machine.

2. The combination, with a separable mold embodying a pair of main dies movable in different directions and a pair of auxiliary dies movable relatively to and in the paths of said main dies, of mold-filling means and means for shifting first one of said auxiliary dies and then the corresponding main die, and afterward the other auxiliary die and its corresponding main die.

3. In a casting-machine, the combination with a separable and shiftable mold embodying a pair of main casting-forming dies movable in different directions and also embodying an auxiliary die movable relatively to one of said main dies, of mold-filling means for supplying molten metal to the mold, a carriage movable toward and from the mold-filling means, a pair of main die-carriers mounted on and movable relatively to said carriage and respectively supporting said main dies, an auxiliary die-carrier assembled with one of said main die-carriers and supporting the auxiliary die, a driving-shaft, and cam-face actuators operable therefrom for actuating the mold-carriage to advance the same to its casting position and withdraw it therefrom, and independent cam-face actuators for actuating said die-carriers when said carriage has been withdrawn from its casting position and thereby separate the main casting-forming dies and withdraw the auxiliary die.

4. A separable mold embodying a pair of complementary sprue-forming dies at least

one of which has a sprue-forming opening therein, said dies also having registering die-receiving openings therein and complementary casting-forming dies seated respectively in said openings, at least one of said casting-forming dies having a die-space therein, and automatic mechanism for opening said mold by withdrawing first one casting-forming die, then its companion sprue-forming die, and afterward the other casting-forming die, and finally the other sprue-forming die.

5. In a casting-machine, the combination with a separable mold, embodying a pair of main dies and an auxiliary die carried by one of said main dies and movable relatively thereto, of a spring and stop-faces for controlling the relative movements of said auxiliary die and the main die upon which it is carried, a driving-shaft, and cam-face actuators operable therefrom for shifting the position of the auxiliary die and thereby effect the movement of the main die by which the auxiliary die is carried.

6. In a casting-machine, the combination with a separable mold, embodying a pair of complementary main dies and a pair of auxiliary dies assembled respectively with said main dies, of main and auxiliary die-carriers for said dies, each pair of die-carriers being movable relatively to each other, springs and stop-faces for controlling the relative movement of the respective pairs of main die-carriers and auxiliary die-carriers, a driving-shaft and cam-face actuators operable therefrom for positively actuating the auxiliary die-carriers.

7. The combination, with a separable mold embodying a pair of complementary main dies and a pair of auxiliary dies carried respectively by said main dies, of main and auxiliary die-carriers for said respective dies; spring-pressed means for automatically operating corresponding die-carriers; each main die-carrier and its auxiliary die-carrier also having a spring interposed between them.

8. In a casting-machine, the combination, with a mold-filling means having a discharge-opening, of a casting-support separate from the mold and located wholly without the mold-space and disposed in the meeting line of the dies; a separable mold embodying a pair of side dies having a mold-space communicating with said discharge-opening and closable by said support; and means for separating said dies by a movement transverse to such casting-support.

9. In a casting-machine, the combination, with mold-filling means having a discharge-opening, of a casting-support opposite said discharge-opening and located wholly without the mold-space and disposed in the meeting line of the dies; a separable mold embodying a pair of side dies having a mold-space communicating with said discharge-opening and closed by said support; and means for separating said dies by a movement transverse to such casting-support.

10. In a casting-machine, the combination, with mold-filling means having a discharge-opening at one end of the sprue-opening, of a support at the other end of the sprue-opening and located wholly without the mold-space; a separable mold embodying a pair of sprue-forming side dies having sprue-channels one communicating with said discharge-opening and the other closable by said support; and means for separating said dies while the casting is sustained by said support.

11. In a casting-machine, the combination, with mold-filling means having a discharge-opening at one end of the sprue-opening, of a pin at the other end of the sprue-opening; a separable mold embodying a pair of sprue-forming side dies having sprue-channels one communicating with said discharge-opening and the other closable by said pin; and means for separating said dies while the casting is sustained by said pin.

12. In a casting-machine, the combination, with mold-filling means having a discharge-opening at one end of the sprue-opening, of an adjustable pin at the other end of the sprue-opening; a separable mold embodying a pair of sprue-forming side dies having sprue-channels one communicating with said discharge-opening and the other closable by said pin; and means for separating said dies while the casting is sustained by said pin.

13. In a casting-machine, the combination, with mold-filling means having a discharge-opening at one end of the sprue-opening, of a centering-pin adjustable transversely to, and into alinement with, said discharge-opening and located at the other end of the sprue-opening; a separable mold embodying a pair of sprue-forming side dies having sprue-channels communicating with opposite sides of the mold-space, one communicating with said discharge-opening and the other closable by said centering-pin; and means for separating said dies while the casting is sustained by said centering-pin.

14. In a casting-machine, the combination, with mold-filling means having a discharge-opening at one end of the sprue-opening, of a mold-carriage movable toward and from said discharge-opening; a pin on said carriage and located at the other end of the sprue-opening; a separable mold on said carriage and embodying a pair of sprue-forming side dies having sprue-channels one communicating with said discharge-opening and the other closable by said pin; and means for separating said dies while the casting is sustained by said pin.

15. In a casting-machine, the combination, with a mold embodying a pair of dies, of mold-filling means; mold-separating means for shifting said dies in different directions; and a pair of mold-scrapers movable relatively to and across the cheeks of said dies.

16. In a casting-machine, the combination, with a mold embodying a pair of dies, of mold-filling means; mold-separating means for

shifting said dies in different directions; a pair of mold-scrapers movable relatively to and across the cheeks of said dies; and scraper-actuating means for advancing said scrapers toward each other while the dies are separated.

17. In a casting-machine, the combination, with a mold embodying a pair of dies, of mold-filling means; mold-separating means for shifting said dies in different directions; a pair of mold-scrapers movable relatively to and across the cheeks of said dies; and scraper-actuating means for advancing said scrapers toward each other during the opening of the dies.

18. In a casting-machine, the combination, with a mold embodying a pair of oppositely-disposed dies, of mold-filling means; mold-separating means for shifting said dies in different directions; a pair of oppositely-disposed mold-scrapers movable relatively to and across the cheeks of said dies; and scraper-actuating means for advancing said scrapers toward each other while the dies are separated.

19. In a casting-machine, the combination, with a mold embodying a pair of sprue-forming dies, of mold-filling means having a discharge-nozzle; mold-separating means for shifting said dies in different directions; and a pair of mold-scrapers movable relatively to and across those cheeks of the dies which coact with the face of said discharge-nozzle.

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Witnesses:
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