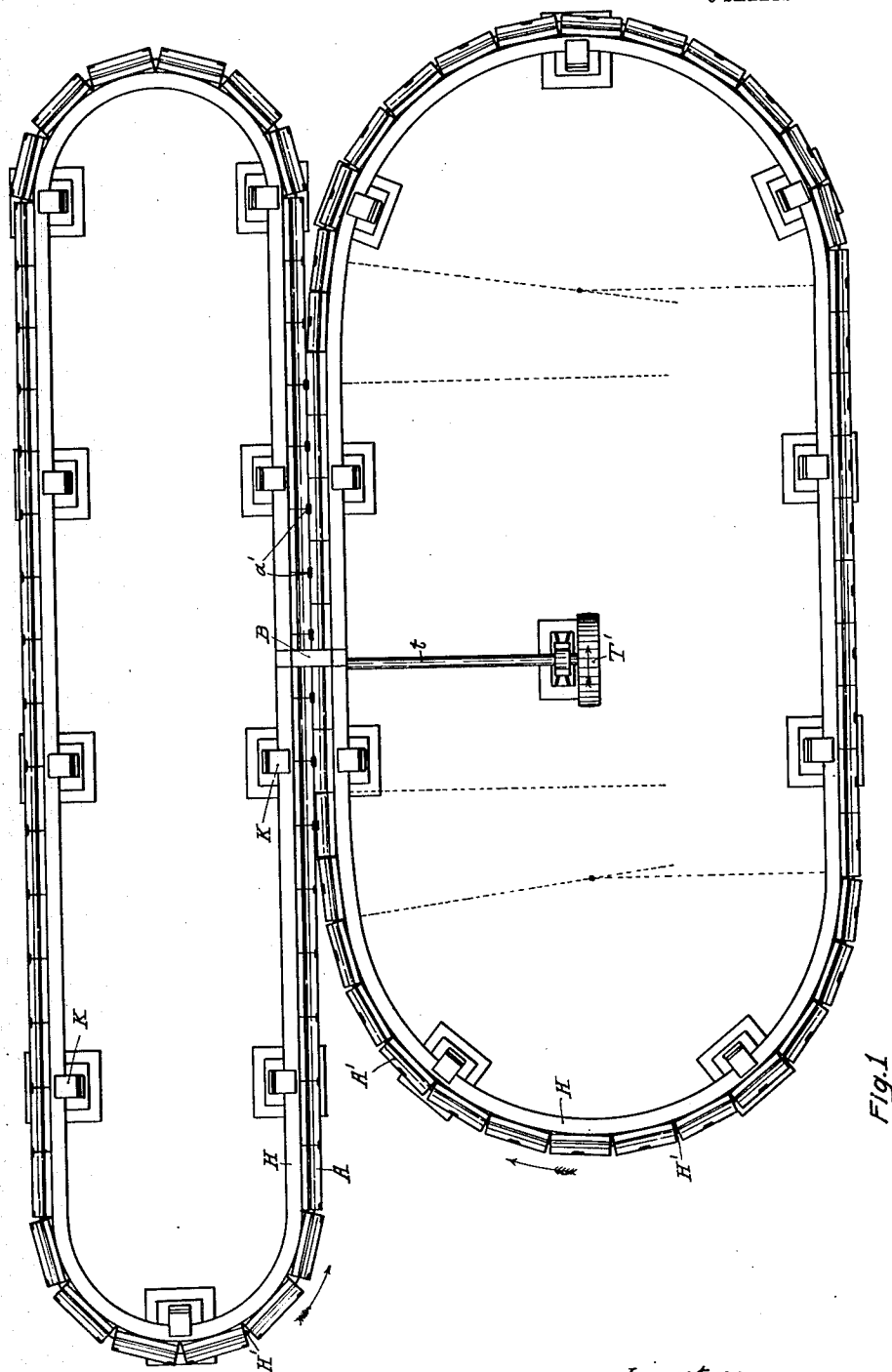


No. 891,891.

PATENTED JUNE 30, 1908.

W. S. WESTON.
CASTING APPARATUS.
APPLICATION FILED DEC. 15, 1906.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

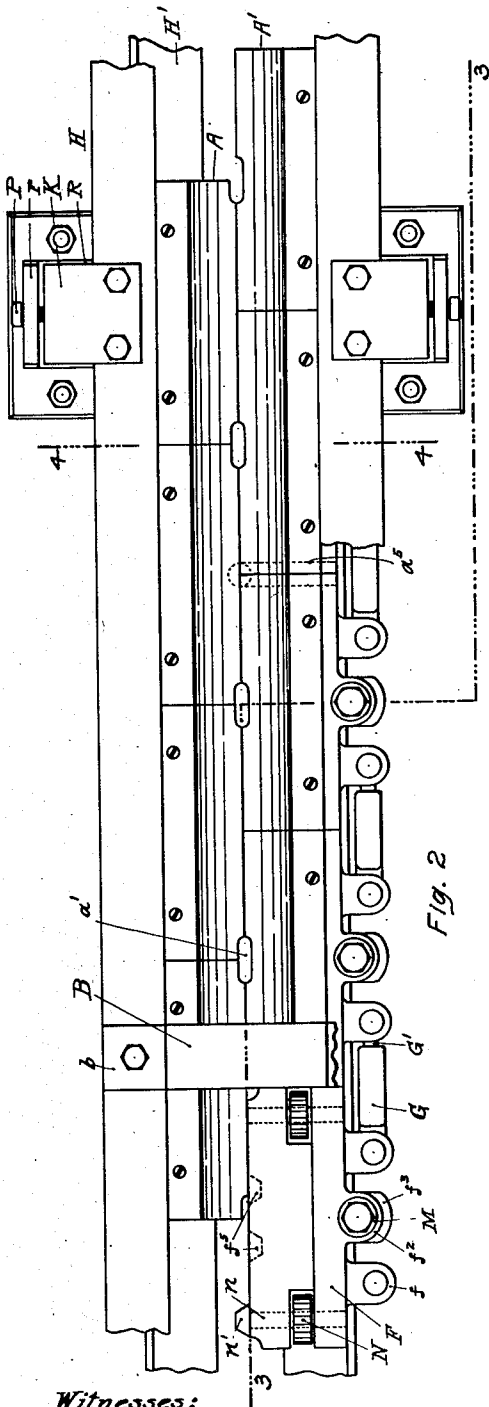


Fig. 2

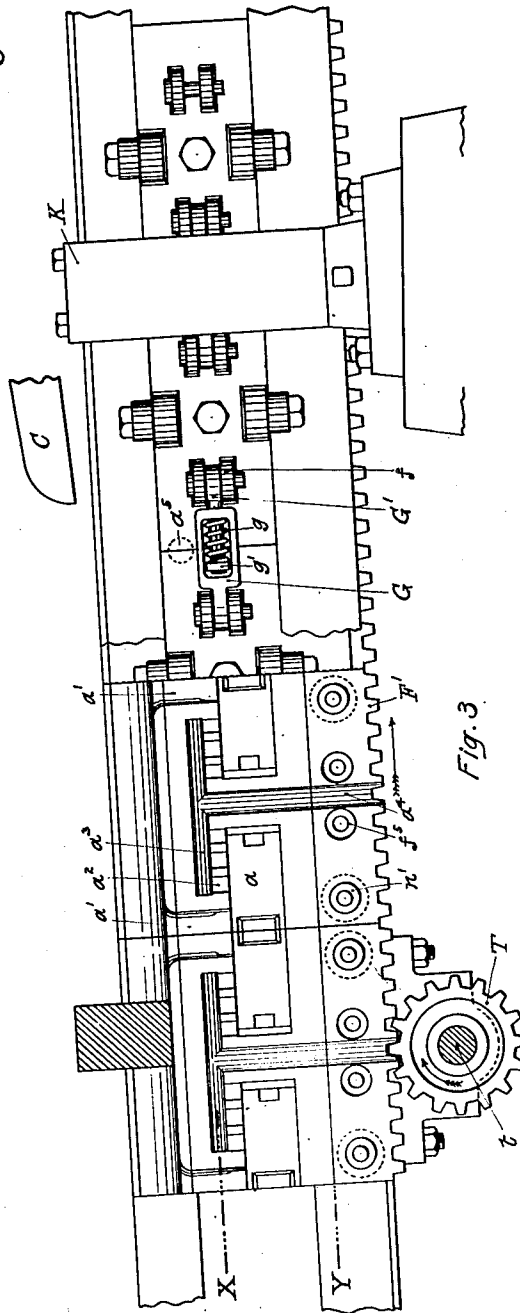


Fig. 3

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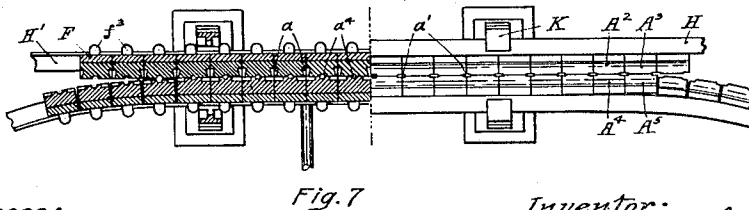
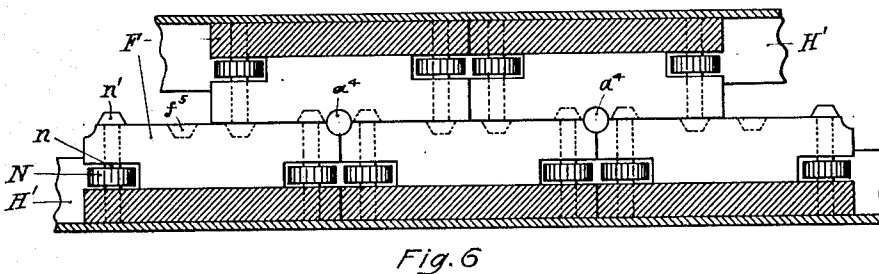
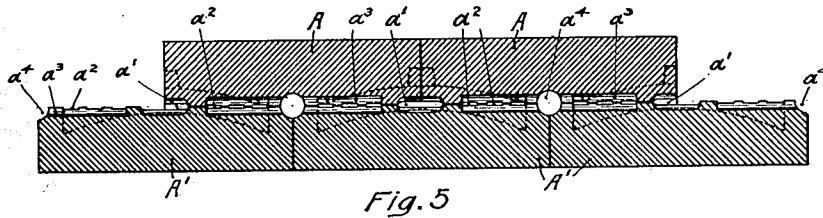
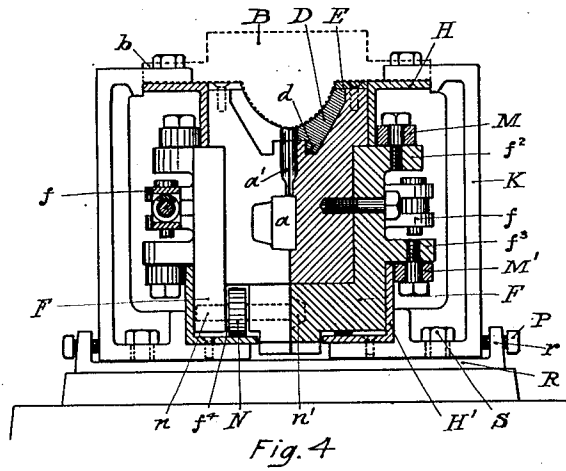
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM S. WESTON, OF CHICAGO, ILLINOIS.

CASTING APPARATUS.

No. 891,891.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed December 15, 1906. Serial No. 347,948.

To all whom it may concern:

Be it known that I, WILLIAM S. WESTON, a citizen of the United States, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Casting Apparatus, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The present invention has relation more particularly to that class of casting apparatus in which the casting is effected by means of a plurality of movable molds that are formed of separable sections, these sections being arranged to be brought together to receive the material from which the casting is to be made, and being adapted to be separated at the proper time in order to discharge the finished casting. An example of this type of casting apparatus is illustrated in Letters Patent No. 790,544 and No. 790,545, granted to me May 23, 1905.

The invention consists in the features of improvement hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the claims at the end of this specification.

Figure 1 is a plan view of an apparatus embodying my invention. Fig. 2 is an enlarged plan view showing certain of the mold sections in position to receive their charge, parts being broken away for better illustration. Fig. 3 is a view in side elevation of the apparatus shown in Fig. 2, certain portions being broken away for better illustration. Fig. 4 is a view in vertical cross-section on lines 4—4 of Fig. 2. Fig. 5 is a view in horizontal section through the mold sections, this section being taken immediately above the tops of the vent channels a^2 on the line x of Fig. 3. Fig. 6 is a horizontal section on the line Y of Fig. 3. Fig. 7 shows a modified arrangement of the mold sections.

My improved casting apparatus comprises a plurality of molds formed of separable sections A and A' , arranged to travel in two series, so that during a portion of their travel the mold sections A and A' shall be brought together to form complete molds at the time the casting of the metal is to be effected, and shall be separated or moved apart when the castings are to be discharged from the molds. A distinctive feature of my

invention is that each of the traveling molds is formed of more than two sections. The advantages obtained by this construction are first, an easier discharge of simple castings and second, the possibility of making and discharging castings of an irregular shape which, if made in a two section mold would interlock with the mold. These advantages arise from the fact that with a three part permanent mold, for example, the draft of the sections away from the castings can be had in three directions, while the draft of the two part mold can be had in two directions only.

In the construction I have illustrated, the two series of mold sections A and A' are so arranged that as they come together the parting lines between the mold sections A shall "break joint" with the mold sections A' , and the mold cavities are each formed between one section A' and the ends of two sections A .

The mold sections illustrated in the accompanying drawings, and particularly in Fig. 5 thereof, have cavities adapted to form brake shoes for railway car wheels, as clearly indicated by dotted lines in said figure of the drawings. To the cavities a of the mold sections, lead the gates a' and from the cavities a lead the contracted vent channels a^2 that communicate with channels a^3 from which lead the vents a^4 . These vents a^4 open from the mold sections at some point below the upper pouring surface thereof, so that danger of filling the vents before the cavity is filled shall be avoided; and, preferably, the vents a^4 lead downwardly through the bottoms of the mold sections and their carriers, as clearly shown in Fig. 3 of the drawings. Manifestly, however, the vents a^4 may lead through the sides of the mold sections and carriers, as indicated by dotted lines a^5 in Fig. 2 of the drawings.

The upper portion of each of the mold sections A and A' is flared outwardly so that when the mold sections are brought to position to receive their charge of metal, the upper portions of the mold sections shall form a trough into which the metal may be poured and from which it will pass by the gates a' to the cavities of the several mold sections. By this means a number of molds may be filled simultaneously. Preferably, although not necessarily, a dam or gate B is extended across the tops of the mold sections so as to

limit the flow of fluid metal along the trough at the top of the molds and this dam or gate B will be arranged at a distance from the delivery spout C, whereby the fluid metal will be poured into the trough above the molds, sufficient to enable several of the molds to be filled at the same time.

The mold sections are formed of cast iron and the flared top of each mold section is provided with a lining D of refractory, non-chilling and non-corrosive material such, for example, as a mixture of clay and plumbago, like that commonly used in the manufacture of crucibles. The lining D extends from end to end of its mold section and is preferably held in place by forming the lining D with a depending rib d that enters a corresponding longitudinal groove formed in the upper portion of the mold section A or A'. To better hold the lining D in position, I prefer to employ a retaining plate E that may be attached to the top of the mold section by screws or in any other convenient manner, and this retaining plate E overlaps the top edge of the lining D, as clearly shown in Fig. 4 of the drawings. Each mold section is mounted upon a suitable mold carrier F that is provided with a bottom portion extending underneath the mold section, and with an upper portion that extends along the outer side of the mold section. These mold carriers are arranged in two series, and the carriers of each series are connected together preferably by means of links G and rods G', the links and rods being pivotally united at their outer ends to lugs f formed at the back of the mold carriers F. The inner end of each of the links G is formed with a hole to receive a corresponding inner end of rod G' and within the open portion of the link is placed a coil spring g that encircles the rod G and is held in place thereon by a nut g' that bears against one end of the spring g , while the opposite end of the spring bears against the perforated end of the link G. The springs g thus tend to hold the mold carriers and sections closely together, while allowing sufficient flexibility between the parts.

Above each series of mold carriers F is placed an upper guide rail H and below each series of mold carriers is arranged a lower guide rail H'. These guide rails H and H' are bolted to suitable supports or brackets K. In order to insure an easy movement of the series of mold carriers, each of the mold carriers is provided with anti-friction rollers M and M' that are journaled upon bolts or studs m and m' that extend from the lugs f^2 and f^3 projecting from the outer face of each of the mold carriers. These anti-friction rollers M and M' bear upon the outer face of the upper and lower guide rails H and H', as shown. In the bottoms of the mold carriers F are formed channels or cut-away spaces f^4 in which are held anti-friction rollers N

that are journaled upon studs n , the lower portions of the anti-friction rollers N extending slightly below the bottoms of the mold carriers so as to rest upon the bottom guide rails H'. Preferably, the studs n supporting the anti-friction rollers N, have headed ends n' projecting beyond the inner faces of the mold carriers and these headed ends n' and studs n are adapted to enter corresponding seats or sockets f^5 formed in the base portions of the opposite mold carriers. The headed ends n' of the bolts n and the seats f^5 in the mold carriers thus serve to insure the accurate positioning of the mold carriers and mold sections when these parts are brought together, as shown in Fig. 2, for receiving the charge of fluid metal.

In order to secure a close union of the mold sections when they are brought together to receive the fluid metal, I provide means for adjusting the guide rails whereby the mold carriers are sustained. Preferably, this adjustment of the guide rails H and H' is effected by means of set screws P that bear against the supporting brackets K, these set screws being mounted in the threaded, upturned ends r of base plates R, whereon the brackets K rest. Preferably, the lower portions of the brackets K are formed with slots through which pass the bolts S, and these bolts S enter threaded holes in the base plates R, so that when the brackets K have been adjusted, they may be set in their proper position by tightening the bolts S.

The dam B is preferably held in position by bolting the extended arms b of the dam to the upper portions of the guide rails H and, if desired, this dam B may be adjusted to different positions along the guide rails.

By reference more particularly to Figs. 3 and 4 of the drawings, it will be seen that the bottoms of the mold carriers F are formed with rack teeth F' adapted to mesh with the teeth of a drive pinion T that is mounted upon a drive shaft t that has revolution imparted thereto from a pulley T' or in any other convenient manner.

Preferably, the guide rails H and H' are supported in an inclined position, as indicated in Fig. 3 of the drawing, and revolution will be given to the drive pinion T so as to cause the mold carriers and mold sections to travel upwardly along the inclined guide rails and, as indicated by the arrow in Fig. 3, in the direction of the delivery spout C by which the fluid metal is delivered to the trough at the top of the mold sections.

In operation, the two series of mold sections A A' are continuously driven in unison by the drive pinion T on the shaft t and travel upon the guide rails H H' in closed circuits or orbital paths so arranged that the sections of the two series contact throughout a portion of their travel to close the mold cavities.

By providing the yielding link connections between the molds or mold carriers of each series, the molds of each series are held securely in contact when in closed position, or when they are between the straight portions of the guide rails H H'. These link connections however, will yield to permit the ready movement of the mold sections about the curved portions of the guide rails. The gates a' opening to the mold cavities a are formed in the parting lines between the two series of traveling mold sections so that the gates are only complete when the mold sections are in contact or in closed position. The upper portions of the molds form a pouring trough extending in the direction of the travel of the molds and parallel with the parting line thereof and extends continuously throughout the series of mold sections in contact or in closed position, so that the molten metal may be poured continuously from spout C into the trough from whence it flows through the gates a into the mold cavities. The position of the two series of mold sections at the slight incline to the horizontal, prevents the escape of the molten metal, and by providing a continuous trough of this sort the metal will, after filling one mold, flow on to the next so that none of the molten metal will be lost. As the mold cavities are filled the air and gases escape from the upper portions thereof through the vents a^2 and through the vent passages a^3 and a^4 . By providing peculiar vent passages described the air and gases readily escape from the upper portions of the mold and it is possible to continuously maintain a body of molten metal upon the upper pouring surface of the molds or in the pouring trough thereof. It is highly desirable to have the gates and vents at the parting line between the two series of traveling mold sections, since all portions of the gates and vents are fully exposed throughout the greater portion of their travel so that they may be readily cleared and cleaned out if they should become filled or partly filled with metal. It is however impractical to have the gates and vents both located at the parting line between the two series and opening upwardly, since then it would be impossible to continuously operate the machine because then the gates and vents would both be filled with the molten metal as it was poured into the molds. By providing the downwardly opening vents leading from the upper parts of the mold cavities, the gates and vents however may be located at the parting line between the two series without interfering with the continuous charging of the closed molds with metal. By having a pouring trough formed partly on one series of mold sections and partly on another, this trough is opened and closed with the molds and when in open position all parts of its walls are fully exposed as well as

the walls of the gates and vents in the parting lines between the two series of mold sections for clearing, cleaning and the like.

The straight portions of the upper and lower guide rails H H' may be of any desired length, but it is desirable that the ends of the guide rails shall have a comparatively short radius so as to take up little floor space. Portions of at least one set of guide rails opposite the points where the mold sections come into contact and are moved away from one another, are formed upon a long radius so that the mold sections will gradually approach and be gradually separated and all danger of breaking or binding of the mold sections and of the castings thus avoided. Dotted lines in Fig. 1 mark off the portions of one set of guide rails which are thus struck on relatively long and short radii. Obviously, if the radius of the guide-way at the initial point of meeting and the initial point of separation of the mold sections were only as long as the radius of the end portions of the guide-way, then the desired gradual bringing together and separation of the mold sections could not be had unless the radius of the end portions of the guide-way were so large as to cause the guide-way to occupy much more space than would be desirable.

It is manifest that without departing from the broad spirit of my invention, each of the molds may be formed of more than three separable sections. Thus, for example, in the modified construction illustrated in Fig. 7 of the drawings, I have shown two series of mold sections in which each complete mold is comprised of four separable sections. That is to say, the intersecting parting lines between each four sections that are necessary with such construction, to form a complete mold, intersect about the center of the mold.

Of course, it is not essential that the transverse parting lines of the molds should come directly opposite each other, but this is a convenient arrangement, particularly where the castings to be formed are of irregular shape, such, for example, as a casting of the shape of the mold cavity indicated in Fig. 7 of the drawing. This feature of forming a mold from two moving series of separable sections, the sections being so arranged that more than two sections are necessary to comprise each complete mold, is particularly advantageous when castings of an irregular shape are to be formed, as the discharge of the castings from the molds is, by such construction, more readily effected.

In Fig. 7, the four mold sections designated as A^2 , A^3 , A^4 and A^5 form not only a complete mold, but the end portions of these sections also form portions of the next succeeding molds of the series.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is:—

1. A casting apparatus comprising two series of mold sections arranged to travel in closed circuits and contacting throughout a portion of their travel, said mold sections having a number of mold cavities, each of which is formed in three or more of said sections and means for moving said series of mold sections.
2. A casting apparatus comprising two series of connected mold sections arranged to travel in closed circuits and contacting throughout a portion of their travel, said sections having a series of mold cavities, each formed in three or more of said sections, means for driving said mold sections in unison to automatically open and close the mold cavities and means for conducting molten metal to said mold cavities.
3. A casting apparatus comprising movable molds each formed of separable sections arranged to travel in two series, the mold sections of one series being arranged to overlap or break joint with the mold sections of the other series to form three-part molds.
4. A casting apparatus comprising movable molds formed of sections arranged to travel in separate series, the mold sections of the separate series being arranged to overlap or break joint to form molds having three or more parts.
5. A casting apparatus comprising separate series of mold sections arranged to travel in closed circuits and contacting throughout a portion of their travel, the sections of one series overlapping or breaking joint with the sections of the other series and each of the mold cavities therein being formed in three or more of said sections and means for operating said mold sections in unison to automatically open and close the molds.
6. A casting apparatus comprising a number of molds formed of two separate series of mold sections, the sections of each mold being arranged respectively in the separate series and movable together and apart and arranged to meet along a parting line to close and open the mold, said mold sections having portions forming a pouring trough parallel to the parting line between the separate series, substantially as described.
7. A casting apparatus comprising two separate series of mold sections, means for moving the mold sections of the separate series together and apart for automatically opening and closing the molds, the mold sections of the separate series being arranged to meet along the parting line to close a number of the molds and said mold sections having portions arranged to form a pouring trough extending in the direction of travel of the closed molds and continuously between two or more of said molds.
8. A casting apparatus comprising movable molds formed of separate series of mold sections, the separate series of sections being arranged to travel in the same plane and in separate closed circuits and to meet along a parting line throughout a portion of their travel to close a number of the molds, and means for moving said separate series of mold sections in unison in their separate closed circuits to automatically close and open the molds, said mold sections having portions forming a pouring trough extending in the direction of travel of the closed molds and continuously between two or more of said molds, substantially as described.
9. A casting apparatus comprising two series of mold sections arranged to travel in separate closed circuits and contacting throughout a portion of their travel, said sections having gates at their parting lines between the separate series and portions arranged to abut in closed position and forming a trough extending parallel to the parting line between the separate series and leading to two or more of said gates and means for moving said separate series of mold sections in unison.
10. A casting apparatus comprising two series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, said sections having pouring gates formed in the parting line between the separate series and having portions on opposite sides of the parting line arranged to abut in closed position and form a trough that extends continuously between two or more of said gates and above the mold cavities of said sections and means for moving said separate series of mold sections in unison.
11. A casting apparatus comprising two series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, said sections having pouring gates formed in the parting line between the separate series and having portions on opposite sides of the parting line arranged to abut in closed position and form a trough that extends continuously between two or more of said gates and above the mold cavities of said sections, said sections having downwardly extending vent passages in the parting line between the separate series and leading from the upper portions of the mold cavities and means for moving the separate series of mold sections in unison.
12. A casting apparatus comprising two series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel to form closed molds, said sections having portions arranged to abut in closed position and form a pouring trough extending continuously between two or more of the molds and having also vents leading from the upper portion of the mold cavities and opening at points outside of the

pouring trough and means for moving said separate series of mold sections in unison.

13. A casting apparatus comprising separate series of mold sections traveling in separate endless circuits and contacting throughout a portion of their travel, said sections having mold cavities and gates leading from said cavities to a pouring surface above the same and said sections having vents leading from the upper portions of the mold cavities and opening from said molds at a point below the pouring surface thereof and means for moving said separate series of mold sections in unison.

14. A casting apparatus comprising separate series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, said mold sections having pouring gates and vents in the parting line between the separate series, said gates opening upwardly and said vents extending downwardly and means for moving said separate series of mold sections in unison.

15. A casting apparatus comprising two series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, said sections having suitable mold cavities and having portions abutting in closed position and arranged to form a pouring trough extending over and between two or more of said mold cavities, said sections having pouring gates and vents in the parting line between the separate series, said gates leading from said trough to the mold cavities and said vents leading from the upper portions of the mold cavities and opening downwardly through the mold sections and means for continuously moving said separate series of mold sections in unison.

16. A casting apparatus comprising separate series of permanent mold sections traveling in separate endless circuits and contacting throughout a portion of their travel and suitable gates and vents leading from said mold cavities, said mold sections having also portions arranged to abut in closed position to form a pouring trough extending continuously between two or more of said gates and means for driving said separate series of mold sections in unison.

17. A casting apparatus comprising separate series of permanent mold sections traveling in separate endless circuits and contacting throughout a portion of their travel and suitable gates and vents leading from said mold cavities, said separate series of mold sections having portions arranged to abut in closed position to form a trough on opposite sides of the parting line between the separate series and communicating with two or more of said gates and means for driving said separate series of mold sections in unison.

18. A casting apparatus comprising separate series of permanent mold sections traveling in separate endless circuits and contacting throughout a portion of their travel, said sections having mold cavities and gates leading from the mold cavities, said separate series of mold sections having outwardly flared, upper portions abutting in closed position to form a pouring trough on opposite sides of the parting line between the separate series and communicating with two or more of said gates and means for driving the series of separate mold sections in unison.

19. A casting apparatus comprising separate series of mold sections traveling in separate closed circuits and in a plane slightly inclined to the horizontal, said separate series of mold sections being arranged to contact throughout a portion of their travel and having portions arranged to abut in closed position to form a pouring trough extending in the direction of travel of the closed mold sections and means for moving said separate series of mold sections in unison.

20. A casting apparatus comprising a separate series of permanent mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, said sections having a series of separate mold cavities and portions arranged to abut in closed position to form a pouring trough extending continuously between two or more of said mold cavities, said trough forming portions having a lining of refractory material embedded in and interlocked in the body of said mold sections and means for moving said separate series of mold sections in unison.

21. A casting apparatus comprising a plurality of movable molds formed of sections having outwardly flared, upper portions to constitute a delivery trough extending in the direction of travel of the mold sections and a dam extending across and into said delivery trough.

22. A casting apparatus comprising separate series of mold sections traveling in separate endless circuits, contacting throughout a portion of their travel, said mold sections having a series of separate mold cavities and having also portions arranged to abut in closed position to form a pouring trough extending continuously between two or more of said mold cavities and extending also in the direction of travel of the closed molds, a delivery spout leading to said pouring trough, said mold sections being supported to move in a plane slightly inclined to the horizontal and means for moving said separate series of mold sections in unison and upwardly and toward said delivery spout.

23. A casting apparatus comprising separate series of mold sections traveling in separate closed circuits and contacting throughout a portion of their travel, guides for said separate series of mold sections, spring con-

nections between the adjacent mold sections of each series and means for driving said separate series of mold sections in unison.

24. A casting apparatus comprising two series of mold sections, guides whereon said mold sections are arranged to travel in separate endless circuits but contacting with each other throughout a portion of their travel, yielding hinged connections between the adjacent sections of each series and means for driving said separate series of connected mold sections in unison.

25. A casting apparatus comprising a plurality of molds formed of sections arranged in two series, means for causing said mold sections to travel with their faces together and to be separated, carriers for said mold sections, yielding hinged connections between said mold carriers and suitable supports for said mold carriers.

26. A casting apparatus comprising a plurality of molds formed of separable sections arranged in two series, means for causing said mold sections to travel with their working faces together and to be separated, carriers for said mold sections, links pivotally connecting said mold carriers, springs interposed between said links and suitable supports for said mold carriers.

27. A casting apparatus comprising separate series of connected carriers, separate, fixed, endless guide-rails arranged in the same plane whereon said carriers are mounted to travel in separate closed circuits, a number of molds formed of separate series of mold sections fixed respectively to said separate series of carriers, the sections of each mold being arranged respectively in the separate series, and said mold sections being arranged to meet along a parting line throughout a portion of their travel to close the molds and means for driving the separate series of mold carriers in unison, substantially as described.

28. A casting apparatus comprising two separate series of carriers, guides whereon said carriers are mounted to travel in separate closed circuits, mold sections removably secured to said carriers and arranged to contact throughout a portion of their travel, said mold sections having a series of separate mold cavities and having gates and vents leading to said mold cavities and means for driving said separate series of mold carriers in unison.

29. A casting apparatus comprising two series of separate mold sections, carriers for said mold sections, guide rails whereon said mold carriers are mounted to move in separate endless circuits with said mold sections contacting throughout a portion of their travel, said mold sections having a series of

separate mold cavities and a series of gates and vents leading to said mold cavities and means for driving said separate series of mold sections in unison.

30. A casting apparatus comprising separate series of mold sections, carriers for said mold sections, guide rails whereon said carriers are mounted to move in separate closed circuits with said mold sections contacting throughout a portion of their travel, screws for adjusting said guide rails, said mold sections having a series of separate mold cavities and a series of gates and vents leading to said mold cavities, means for continuously driving said separate series of mold carriers in unison and means for continuously supplying molten metal to the gates of the closed molds.

31. A casting apparatus comprising separate series of mold sections, carriers for said mold sections, guide rails whereon said carriers are mounted to move in separate closed circuits with said mold sections contacting throughout a portion of their travel, anti-friction rollers arranged between said carriers and said guide rails, said mold sections having a series of separate mold cavities and a series of gates and vents leading to said mold cavities, means for continuously driving the separate series of mold carriers in unison and means for continuously supplying molten metal to the gates of the closed molds.

32. A casting apparatus comprising two series of mold sections, carriers whereon said mold sections are removably mounted, guide rails whereon said series of mold carriers are mounted to move in separate endless circuits with said mold sections contacting throughout a portion of their travel, said mold sections having a series of separate mold cavities and a series of gates and vents leading to said mold cavities, means for continuously driving said separate series of mold carriers in unison and means for continuously supplying molten metal to the gates of the closed molds.

33. A casting apparatus comprising a plurality of molds formed of separable sections, said mold sections being arranged to travel in two endless series and curved guide-ways for each series of mold sections having straight parallel sides for bringing said mold sections into contact and curved ends, one at least of said guide-ways having curved portions at the points of meeting and separation of said mold sections of greater radius than the curved ends thereof, substantially as described.

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Witnesses:

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KATHARINE GERLACH.