

Sept. 23 , 1924.

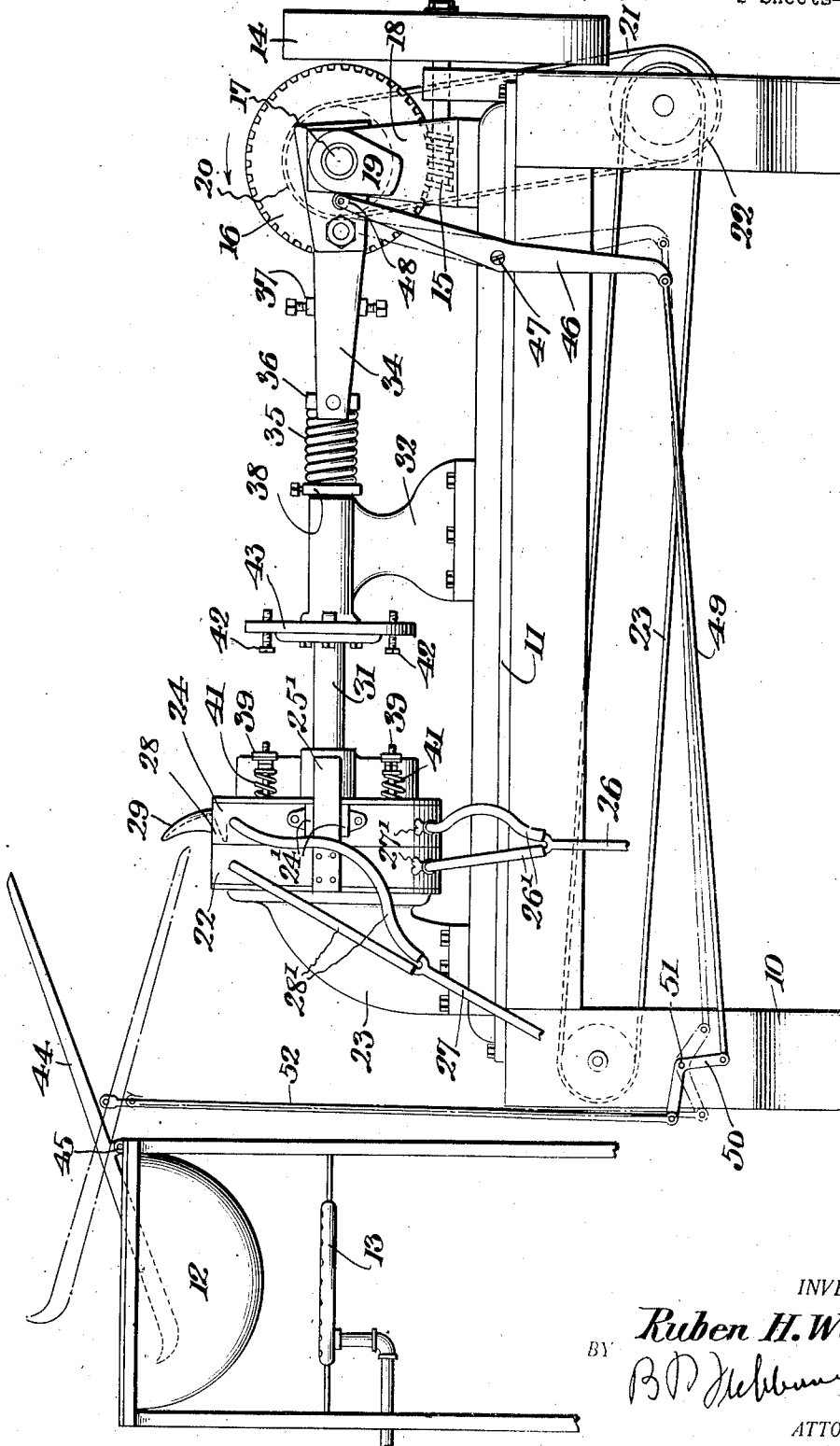
1,509,458

R. H. WILLIAMS

DIE CASTING MACHINE

Filed March 7, 1923

2 Sheets-Sheet 1



INVENTOR.

Ruben H. Williams

BY

BD Heblman

ATTORNEY.

Sept. 23, 1924.

1,509,458

R. H. WILLIAMS
DIE CASTING MACHINE

Filed March 7, 1923

2 Sheets-Sheet 2

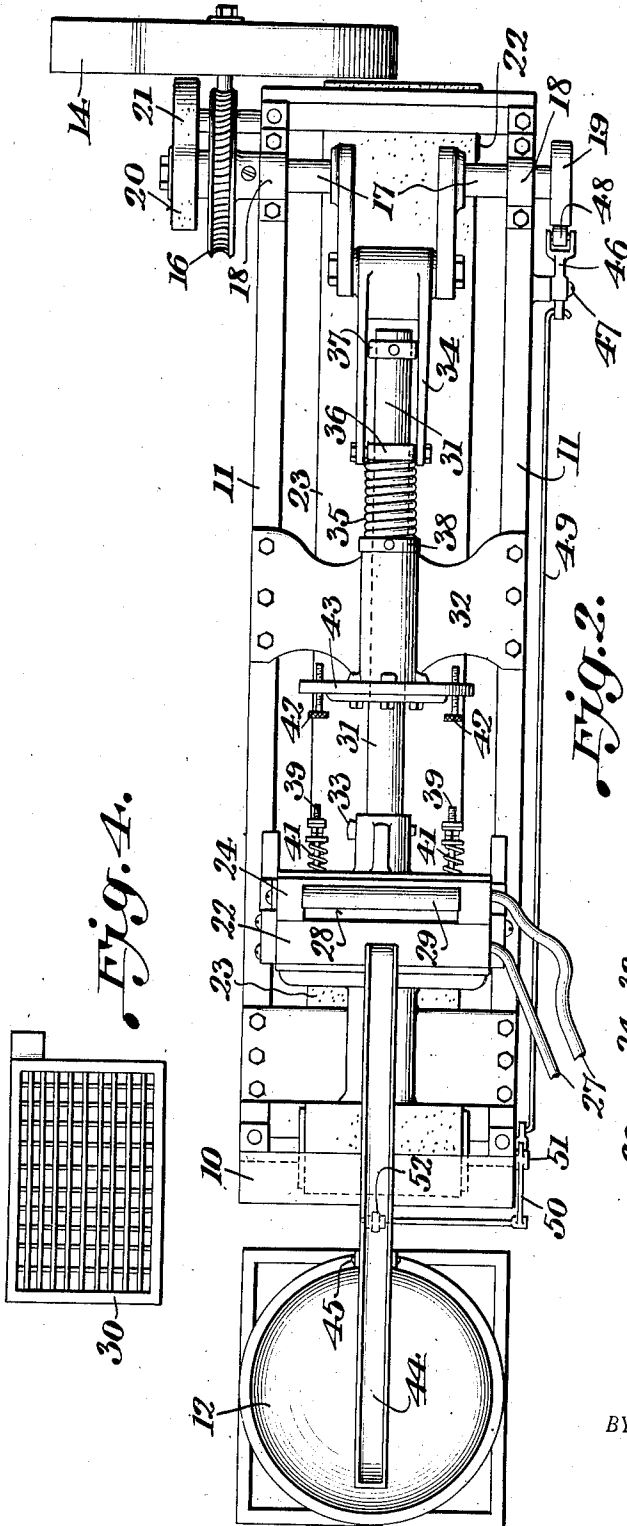


Fig. 2.

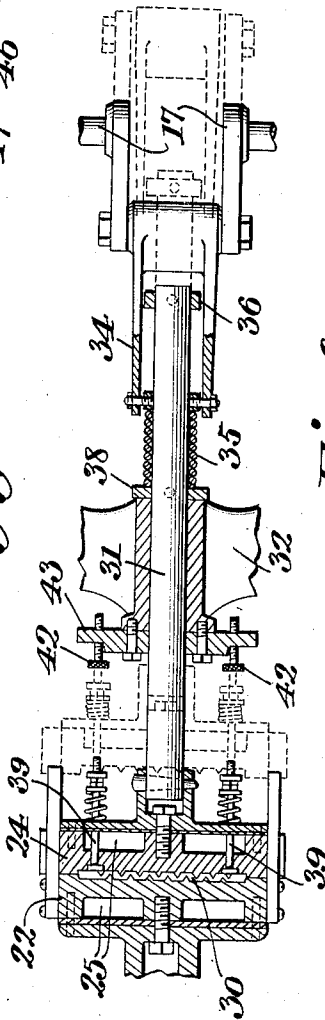


Fig. 3.

INVENTOR.
Ruben H. Williams
BY *R. H. Williams*
ATTORNEY.

UNITED STATES PATENT OFFICE.

RUBEN H. WILLIAMS, OF FLINT, MICHIGAN.

DIE-CASTING MACHINE.

Application filed March 7, 1923. Serial No. 623,423.

To all whom it may concern:

Be it known that I, RUBEN H. WILLIAMS, a citizen of the United States, residing at Flint, in the county of Genesee and State of Michigan, have invented certain new and useful Improvements in Die-Casting Machines, of which the following is a specification.

My invention relates to improvements in die casting machines.

The object of my invention is to provide an improved power operated die casting machine having a sequence of timed co-ordinated movements in which the mold is filled with molten metal, the casting is cooled in the mold, the mold is opened, the casting is ejected therefrom, the mold is closed, and the operation is repeated.

The construction of my improved machine is such that in connection with the timed rotation of a power driven member my casting mold, the opening of which is controlled therefrom, is opened at successive timed intervals to discharge a formed casting, the casting is ejected from the mold and the mold is closed and held closed during a portion of the rotation of the driven member, and feed mechanism operated and controlled from the power driven member in a timed sequence co-ordinated with the closing of the mold. It is actuated to fill the mold succeeding each closing thereof.

I have provided an improved driving connection between the power operated member driven at a uniform rate of rotation and the casting mold to open the mold during a determined period of each rotation of the power driven member so the formed casting may be discharged from the mold and hold the mold closed during the remainder of the period of each rotation to form the casting, and the feeding device controlled from the same power driven member adapted to remove a measured portion of molten metal in a vat and deposit the same in a mold at timed intervals succeeding each closing of the mold.

In the specific embodiment of my invention illustrated in the drawings,—

Figure 1 is a side elevation of my improved machine,

Figure 2 is a plan of my improved machine,

Figure 3 is a fragmentary horizontal section through my machine,

Figure 4 is an elevation of the casting formed by my machine.

In the embodiment of my machine illustrated in the drawings, and herein described, I have shown a mold adapted to form a battery grid. The specific casting shown forms no part of my invention though the machine is particularly intended to be used in the formation of small castings such as battery grids.

In the drawings, the framework of the machine is indicated at 10 and supports a bed 11 upon which is mounted the herein-after described operating mechanism of the machine. Adjacent one end of the machine is supported a vat or receptacle 12 for molten metal, and the burner 13 is provided to maintain the vat at a suitable temperature. At the opposite end of the machine is mounted a drive wheel 14 which drives a worm 15. This worm in turn drives a gear 16 which gear is carried by the extended end of a crankshaft 17. This crankshaft is suitably journaled between supporting standards 18 and is provided at the end opposite the wheel 16 with a cam 19. This shaft carries a pulley 20 over which travels a pulley belt 21 which drives a second pulley 22 to cooperate an endless carrier 23. This carrier receives the formed castings discharged from the mold and transports them to a convenient place for removal.

At the end of the machine adjacent to vat 12 is a die casting mold. This die casting mold consists of a stationary section 22 which is supported by a bracket 23 and a movable or reciprocatory section 24. The movable mold section 24 is provided with pairs of carriages or guides 24' upon its opposite sides, rigidly secured thereto, to slidably receive therebetween guide tracks 25', which are rigidly secured to the opposite sides of the stationary mold section 22. This guiding means is provided for affording accurate registration of the mold sections. For the purpose of this invention I have preferred to show a water cooled die casting mold, and separate mold sections are here shown as hollowed out as at 25 and water is supplied thereto through a conduit 26, forked for connection with flexible

branches 26', one branch extending to the movable section in the mold and the other branch to the stationary section in the mold. The branch leading to the movable section 24 has sufficient slack to permit of the movement of said section. The branches 26' are equipped with valves 27', for regulating the flow of water therethrough, to control the temperature of the mold. The water may be exhausted from the mold sections through flexible branches 28', connected with a forked conduit 27. The branch 28' leading to the movable section 24 has sufficient slack to permit of the movement of the same. It will be understood that water may be kept constantly running through the mold to cool the casting formed in the mold. The mold is provided at the top with a sprue hole 28 and a guard 29 extends upwardly from this sprue opening to guide the molten metal as it is discharged into the mold. In the sectional view of Figure 3 a metal casting 30 is shown between the separate mold sections.

I provide a driving connection between the crank 17 and the movable section 24 of the mold to withdraw the section 24 from the stationary section 22 to permit the discharge of the formed casting from the mold. This driving connection is shown as composed of relatively movable sections. A section 31 is supported by a bracket 32 for reciprocal movement. This section 31 is shown as connected at 33 to the movable section of the mold and at the opposite end it is engaged with the crank 17 by means of a forked connecting arm 34. The connection at 33 between the section 31 and the mold section 24 is preferably such that slight lateral play may be had between the parts, thus assuring accurate seating of the movable mold section upon the stationary mold section.

Interposed between the forked connecting rod 34 and the member 31 is a strong spiral spring 35 which encircles the member 31. This member 31 is slidably engaged within the forked member 34 by being extended through a collar 36 which collar is pivotally carried by the forked connection 34. Mounted upon the end of the member 31 is an adjustable collar stop 37. The spring 35 is disposed between the collar 36 and the adjustable collar 38 carried by the section 31. It will be seen, therefore, that in the rotation of the crank 17 the connecting arm 34 traveling with the crank will engage and pick up the member 31 to be withdrawn with the crank when the collar 36 engages the adjustable collar 37. This may preferably be so arranged that the connecting rod 31 will be picked up and withdrawn to open the mold during a period corresponding to a third of the complete rotation of the crank. Obviously this timed order of mold opening would be regulated to

meet the requirement of the particular casting being formed so that a sufficient timed interval would be allowed to cool the casting and to discharge the casting from the mold. In the operation of the machine after the mold has been fully opened, and the rotation of the crank moves the connecting rod to close the mold, the collar 36 engages the end of the spring 35 and moves the movable mold section 24 into engagement with the stationary mold section 22 and the further rotation of the crank is taken up in the travel of the forked arm 34 over the rod 31 and against the resistance of the spring 35. The spring 35 therefore, holds the mold in the closed position during a determined portion of the rotation of the crank so as to permit the cooling of the metal in the mold.

To assist in the discharge of the formed casting the movable section of the mold is provided with a series of ejector pins 39, four being here shown, in a rectangular group to engage the corners of the formed casting. These ejector pins are held outwardly by springs 41. Adjustable stationary stops 42 are disposed in a supporting plate 43 which is carried by the brackets 32 so as to engage the ejector pins 39 and the movable section of the mold is withdrawn away from the stationary section and forces such ejector pins inwardly against the resistance of the springs 41 to eject the formed casting 30 from the mold. This operation is shown in Figure 3 in which the movable section of the mold is shown in dotted outline as withdrawn from the stationary section and the ejectors 39 as being engaged by the stops 42.

I have provided feed mechanism in the form of a dipper 44 pivotally supported as at 45 with the weighted end overhanging the vat so that the normal position of the dipper is within the vat. This dipper is in the form of a trough, as shown in Figure 2. A system of linkage is provided comprising a rocker arm 46 pivoted to the bed of the machine as at 47 which carries at its upper end a roller 48 that is so held as to be engaged by the cam 19 carried by the crankshaft to pivot the rocker arm about its support 47. A link 49 connects the opposite end of the rocker arm with the bell crank lever 50 which lever is pivoted to the frame of the machine at 51. The opposite end of this bell crank lever is connected by a link 52 with the dipper 44, as shown in Figure 1.

In the operation of the machine the cam 19 is adapted to actuate the rocker arm 46 to tilt the dipper to deposit a portion of molten metal removed from the vat 12 through the sprue hole 28 into the mold immediately following the closing of the mold. Continued rotation of the cam releases the

rocker arm so that the dipper tilts back into the vat and the mold remains closed as hereinbefore described, until the casting is cooled, and the connection 31 withdrawn to open the mold, and the casting ejected from the mold to the carrier 23, when the operation is repeated.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a casting machine, a supporting frame, a stationary mold section arranged thereon, a reciprocatory mold section mounted for movement toward and away from the stationary mold section, a stationary guide mounted upon the bracket, a reciprocatory rod having sliding engagement with the stationary guide, and connected with the reciprocatory mold section to move it, a stop element mounted upon the reciprocatory rod, a compressible coil spring surrounding a portion of the reciprocatory rod and arranged in advance of the stop element, a collar slidably mounted upon the reciprocatory rod in advance of the compressible coil spring and engaging therewith, a stop element mounted upon the reciprocatory rod in advance of and spaced from the slidable collar, a rotatable shaft arranged transversely upon the supporting frame and embodying a crank, a pitman pivotally connected with the crank and pivotally connected with the slidable collar, means for introducing molten metal into the mold sections, and means automatically operated by the transverse shaft for operating the molten metal feeding means.

2. In a casting machine, a support frame, a stationary mold section mounted thereon, a reciprocatory mold section mounted for arrangement toward and away from the stationary mold section, a stationary guide mounted upon the supporting frame, a reciprocatory rod slidably engaging the guide and connected with the reciprocatory mold section, a stop element mounted upon the reciprocatory rod, a compressible coil spring surrounding a portion of the rod and engaging the stop element, a collar slidably mounted upon the rod in advance of the spring, a second stop element mounted upon the rod at a point in advance of the spring and spaced therefrom, a transverse driving shaft having a crank, a pitman pivotally connected with the crank and with the slidable collar, a receptacle for holding molten metal arranged near the mold sections, a pivoted dipper for withdrawing the metal from the

receptacle and introducing it into the mold sections, a cam mounted upon the transverse shaft, a pivoted lever arranged to be moved by the cam, and connections between the lever and the pivoted dipper.

3. In a casting machine, a supporting frame, a stationary mold section mounted thereon, guide bars secured to the stationary mold section and projecting forwardly thereof, a reciprocatory mold section having guide elements for engagement with the guide bars, a stationary guide mounted upon the supporting frame in advance of the mold sections, a rod slidable within the stationary guide and having connection with the reciprocatory mold section, a stop element mounted upon the reciprocatory rod in advance of the stationary guide, a compressible coil spring surrounding the rod and engaging the stop element, a collar slidably mounted upon the rod in advance of the spring, a second stop element mounted upon the rod in advance of the spring and spaced from the slidable collar when the same is in the inner position, a transverse shaft mounted upon the supporting frame and having cranks, a forked pitman pivotally connected with the cranks and straddling the reciprocatory rod and pivotally connected with the sleeve upon opposite sides thereof, a cam mounted upon the transverse shaft, and mechanism for introducing molten metal into the mold sections, such mechanism being actuated by the cam.

4. In a casting machine, in combination, a power driven member, a die casting mold adapted to be opened to discharge the formed casting, a reciprocating connection between said power driven member and said mold to open and close the mold at timed successive intervals determined by the movement of said driven member, ejectors controlled by the movement of said reciprocating connection to eject the formed casting from the mold, feed mechanism controlled by said driven member operable to fill the mold with molten metal in a determined timed order of succession relative the closing of the mold.

5. In a casting machine, in combination, a power driven member, a die casting mold adapted to be opened to discharge the formed casting, a reciprocating connection between said power driven member and said mold to open and close the mold at timed successive intervals determined by the movement of said driven member, said connection consisting of relatively movable parts between which is interposed a spring to maintain pressure on said mold to hold the same in closed position while permitting one part of the connection to move relative the other.

6. In a casting machine, in combination, a rotatably driven member, a mold adapted

to be opened to discharge the formed casting, an operating connection between said driven member, and the mold to open the mold in a timed order of succession determined by the rotation of said driven member, said operation connection consisting of relatively movable parts one of which is held under yielding strain during a part of each rotation of the rotatably driven member to maintain the mold in the closed position.

7. In a casting machine, in combination, a rotatably driven crank, a casting mold capable of being opened to discharge the formed casting, a reciprocating driving connection between said crank and mold to open the mold, said driving connection comprising relatively movable parts, a part of said connection adjacent the mold held under yielding pressure to maintain the mold in the closed position during a portion of a complete reciprocation of the connection.

8. In a casting machine, in combination, a power driven member supported for rotation, a die-cast mold in the stationary section and the cooperating relatively movable section, a reciprocating driving connection between said power driven member and the movable section of said mold to move said movable section toward and away from the stationary section of the mold, a yielding portion in said reciprocating connection tensioned to exert pressure on said movable section of the mold to hold the mold closed during a portion of its complete reciprocation of the connection.

9. In a casting machine, in combination, a power driven member supported for rotation, a die-cast mold in the stationary section and the cooperating relatively movable section, a reciprocating driving connection between said power driven member and the movable section of said mold to move said movable section toward and away from the stationary section of the mold, said connection consisting of relatively movable portions between which is interposed a spring tensioned to exert pressure on the portion connected with the mold to maintain the mold in the closed position and permit the other portion of the connection to travel relatively the portion held under spring tension.

10. In a casting machine, in combination,

a power driven member supported for rotation, a die-cast mold in the stationary section and the cooperating relatively movable section, a reciprocating driving connection between said power driven member and the movable section of said mold to move said movable section toward and away from the stationary section of the mold, said connection consisting of relatively movable portions between which is interposed a spring tensioned to exert pressure on the portion connected with the mold to maintain the mold in the closed position and permit the other portion of the connection to travel relatively the portion held under spring tension, said movable section of the mold provided with ejectors held outwardly under spring tension, and stops adapted to engage said ejectors to force the same inwardly to eject the formed casting from the mold when the movable mold section is drawn away from the stationary section.

11. In a casting machine, a supporting frame, a stationary mold section mounted thereon, a reciprocatory mold section arranged in cooperative relation to the stationary mold section, reciprocating ejectors carried by the reciprocatory mold section, springs to hold the ejectors in the inner position, a stationary guide arranged in advance of the reciprocatory mold section and having parts arranged in the path of travel of the ejectors to move them when the reciprocatory mold section approaches the stationary guide, a rod slidable within the stationary guide and connected with the reciprocatory mold section, a stop mounted upon the rod in advance of the stationary guide, a yielding element mounted upon the rod in advance of the stop element, a collar slidable upon the rod in advance of the yielding element, a second stop mounted upon the rod at a point spaced from the collar when the collar is in the advanced position, a rotatable crank mounted upon the supporting frame, a pitman pivotally connected with the crank and with the collar, mechanism for introducing molten metal into the mold sections, and a cam connected with the crank for rotation therewith and adapted to actuate said mechanism.

In testimony whereof I affix my signature.

RUBEN H. WILLIAMS: