

March 7, 1933.

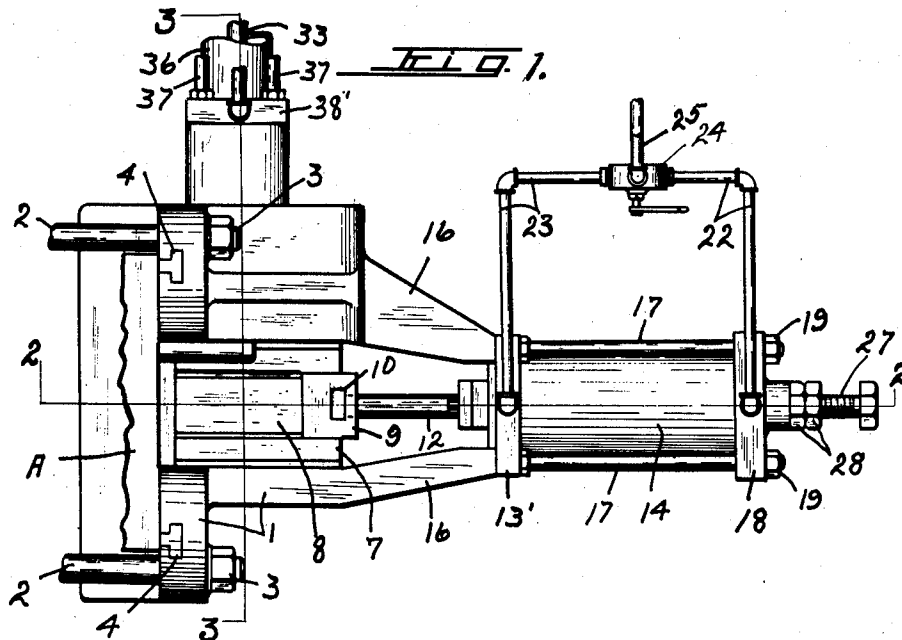
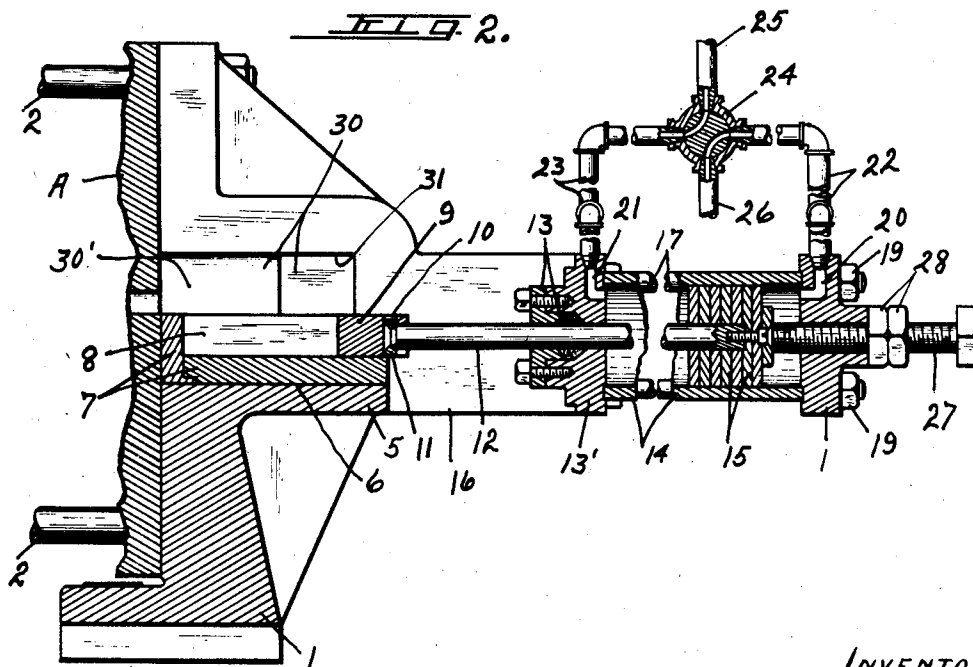
N. LESTER

1,900,863

DIE CASTING MACHINE

Filed Sept. 23, 1929

2 Sheets-Sheet 1



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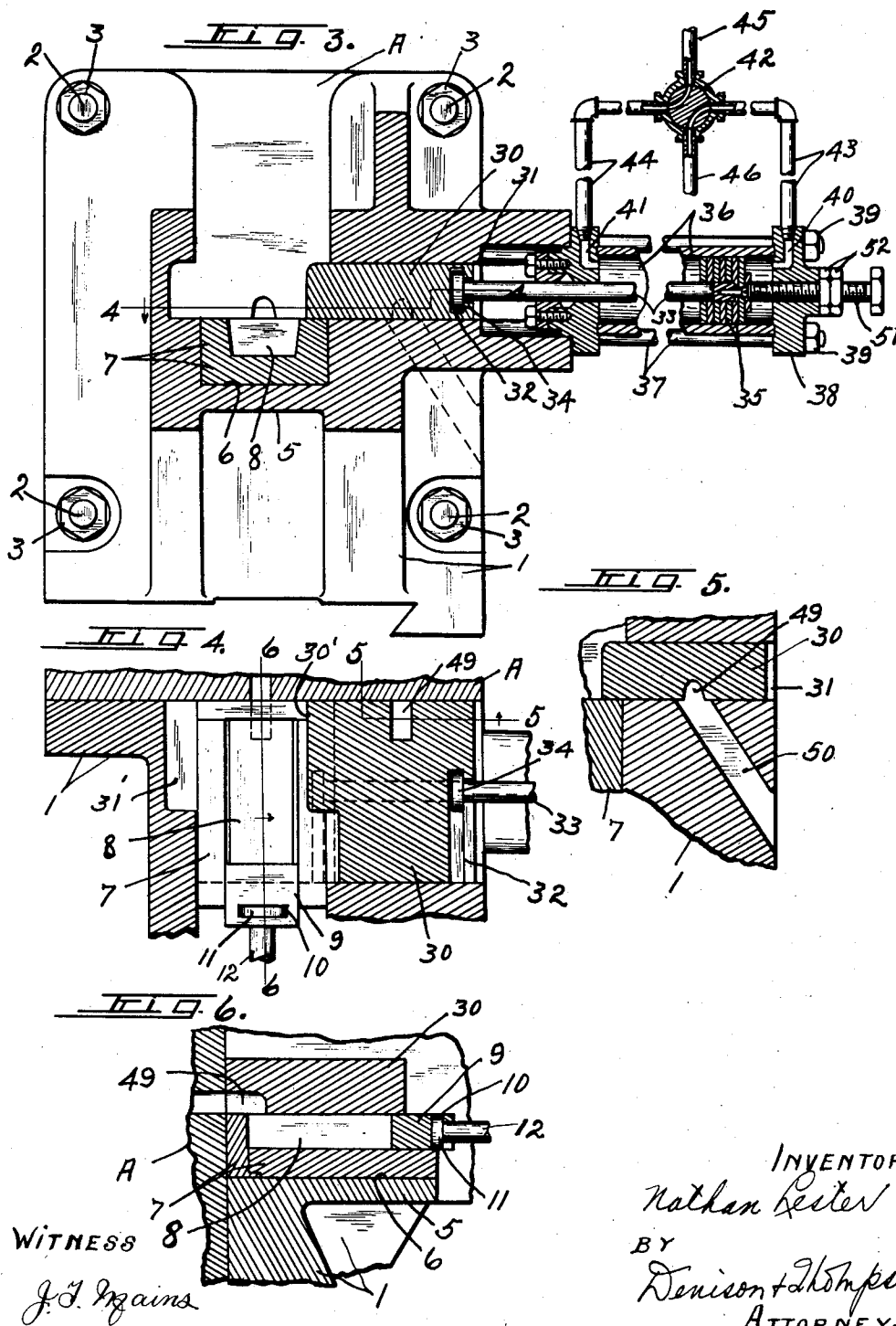
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UNITED STATES PATENT OFFICE

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DIE CASTING MACHINE

Application filed September 23, 1929. Serial No. 394,717.

This invention relates to a new and useful improvement in die casting machines and has to do more particularly with the delivery pot for feeding the molten metal into the die or mould.

The main objects of this invention are to produce an apparatus for feeding molten metal to a suitable die or mould which is durable in construction, efficient and positive in operation and which may be easily operated.

The invention relates to the provision of a delivery pot adapted to contain molten metal, means for quickly, easily varying the capacity of the pot, means for sealing the pot, means within the pot for discharging the metal therefrom and to a suitable mechanism to operate in proper relation with the pot, to safely and positively deliver the molten metal from said pot to the die or mould.

These and other objects and advantages pertaining to the detail of the structure and relation of the parts thereof will more fully appear from the following description taken in connection with the accompanying drawings, in which:—

Figure 1 is a plan view of an apparatus embodying the various features of this invention.

Figure 2 is an enlarged vertical section through the delivery pot and piston and cylinder connected therewith taken on line 2—2, Figure 1.

Figure 3 is a transverse vertical section through the gate and actuating means therefor, taken on line 3—3, Figure 1.

Figure 4 is a detail horizontal section taken in the plane of line 4—4, Figure 3.

Figure 5 is a detail vertical section taken in the plane of the line 5—5, Figure 4.

Figure 6 is a detail vertical section similar to that shown in Figure 3 with the gate shown in the closed position with the outlet shown therein in registration with the sprue die section.

This invention as illustrated in the drawings comprises a vertically disposed frame —1— adapted to be mounted upon any suitable support as the base of a die casting machine, not shown.

The frame —1— in this instance is constructed to form one end of a die supporting carriage and may be connected with the remaining portion of the die carriage by a plurality of, in this instance four, suitably spaced stay-rods —2— which are spaced longitudinally of each other and arranged in any convenient manner, preferably one at each corner of a rectangle with one end of the rods passing through suitable holes provided in the frame —1—, and secured therein by nuts —3— screw threaded on the outer ends of the rods.

One of the vertical sides of the frame —1— is provided with a pair of spaced vertically disposed T-slots —4— for the purpose of supporting a suitable die section as —A— of a sectional die or mould.

The opposite side of the vertical frame —1— is provided with an outwardly extending horizontally disposed arm —5— having its upper surface provided with a channel —6— which extends from the rear end of the arm —5— to the front die supporting side of the frame —1— for the purpose of supporting therein a suitable delivery pot —7—.

The pot —7— is substantially rectangular in plan view and is provided with a suitable rectangular chamber —8— which has the upper side and rear end thereof open while the opposite longitudinal sides of the chamber —8— are slightly tapered downwardly and towards each other to facilitate the removal of the molten metal contained therein.

The upper open side of the chamber is for the convenience of filling said chamber with molten metal while a plunger as —9— is normally positioned in the rear open end thereof to form an adjustable end wall for the chamber —8— and operate to act as a plunger to force the metal from the chamber into the die.

The plunger —9— is of the same vertical width as the depth of the chamber and is constructed with a close sliding fit for longitudinal reciprocative movement therein.

The plunger —9— is relatively short longitudinally and is provided with a vertical slot —10— near the rear end thereof, adapted to

receive therein a suitable head —11— which is secured to the outer end of a horizontally disposed piston rod —12—.

The lower portion of the plunger —9— between the slot —10— and rear end thereof is cut away to permit the piston rod —12— and head —11— to be inserted in the slot —10—.

The piston rod —12— extends rearwardly from the plunger —9— through a suitable gland —13— provided in the front wall of a cylinder —14— and has a piston —15— connected to the opposite end thereof and positioned within the cylinder —14— for longitudinal movement therein.

The cylinder —14— in this instance is secured to rearwardly extending brackets —16— provided on the rear face of the frame piece —1— by means of a plurality of, in this instance four, horizontally disposed space rods —17— which have one end secured to the bracket —16— and extend rearwardly therefrom through suitable holes provided in a cylinder head —13'— and —18— and are provided with nuts —19— screw threaded on the outer end thereof for clamping the head —18— and cylinder to the brackets —16—.

The piston —15—, and therefore plunger —9—, may be reciprocated by any suitable means as by a non-compressible fluid as oil under pressure and for this purpose I have provided ports as —20— and —21— in the heads —18— and —13'— respectively in communication with the cylinder —15—, the ports being connected by respective pipe lines —22— and —23— to a suitable control valve —24—.

The valve —24— is provided with an inlet pipe —25— which may be connected to any suitable source of fluid supply as a pump or pressure tank, not shown.

The valve —24— is also provided with an outlet pipe —26— which may lead to the source of supply or any suitable drain system.

The plunger —9— is not only used for the purpose of forcing the metal from the chamber —8— but, as hereinbefore stated, serves as an adjustable end operating to vary the capacity of said chamber by the positioning of said plunger relatively to the forward end of the chamber —8— and for this purpose I have provided a screw —27— which is screw threaded in the central portion of the head —18— and extends inwardly in the inner chamber of the cylinder —14— with the inner end thereof in the path of movement of the piston —15— so that by manipulating the screw —27— the rearward movement of the piston —15— may be governed to a greater or less degree and thereby govern the rear position of the plunger —9— in relation to the chamber —8—.

The screw —27— may be secured in the ad-

jacent position by means of lock nuts —28—.

After the metal has been poured into the chamber —8— and before the plunger —9— can be moved forwardly to force the metal from the chamber into the die it is necessary to cover the upper open face of the chamber —8— and for this purpose I have provided a gate member as —30— which is slidably mounted for longitudinal movement in a suitable horizontally disposed guide slot —31— formed in the rearward portion of the frame —1— at one side of the delivery pot —7—.

The gate —30— is substantially of the same horizontal length as the delivery pot —7— and has a portion —30'— of the forward outer side thereof extended a short distance beyond the remaining rear portion and adapted when in the closed position to register in a suitable recess —31'— provided in the adjacent side wall of the frame —1— so as to lock the gate —30— when in the closed position against being forced rearwardly by the action of the metal when being forced from the chamber —8—.

The gate —30— is provided on the opposite longitudinal edge with a suitable T-shaped groove —32— adapted to receive therein the outer end of a piston rod —33— which is provided with an enlarged head portion —34— adapted to register in the slot —32— for moving the gate —30— from the open position at one side of the delivery pot —7— to the closed position of said pot and return.

The gate —30— may be actuated in any suitable manner as by a piston —35— secured to the end of the rod —33— and reciprocally mounted in a suitable cylinder —36— which is secured to the adjacent end wall of the frame —1— by means of a plurality of, in this instance four, suitably spaced stay-rods —37— which have their outer ends passing through suitable holes in the head —38— of the cylinder —36— and provided with nuts —39— screw threaded on the outer end thereof and holding said head —38— and cylinder —36— to the frame —1—.

The piston —35— may be removed to close or open the gate —30— by any suitable non-compressible fluid as oil under pressure which may be admitted to one or the other end of the cylinder —36— through suitable ports —40— and —41— provided in the head —38— and —38'— respectively.

The ports —40— and —41— are connected with a suitable control valve —42— by respective pipes —43— and —44— which lead from the ports —40— and —41— to opposite sides of the valve —42—.

The valve —42— is also provided with an inlet pipe —45— which may be connected with any suitable source of fluid supply such as a pressure pump or tank, not shown.

An outlet pipe —46— is also provided for the valve —42— which may lead to the source

of supply or suitable drain system as desired.

The gate —30— is provided with an outlet port —49— in the under side of the front edge thereof and substantially midway the end walls of said gate so that when the gate is in the closed position the port —49— will have one end in registration with the chamber —8— and the other with the inlet to the die section —A—.

An aperture as —50— is provided in the front vertical face of the frame —1— with the upper end thereof in registration with the port —49— of the gate —30— when the said gate is in the open position.

The aperture —50— extends downwardly from the guide opening —31— at an angle thereto to the outer face of the frame —1— for the purpose of permitting the dross which remains in the port —49— at the close of the casting operation to pass from said port —49— when the gate is in its open position.

The head —38— of the cylinder —36— may also be provided with a suitable screw member —51— screw threaded therein with its inner end in the path of movement of the piston —35— so that by manipulating the screw —51— the outer position of the gate —30— may be determined relatively to the chamber —8— of the pressure pot —7— to bring the outlet port —49— into registration with the aperture —50— when said gate is in the open position. The screw —51— may be secured in the adjusted position by means of lock nuts —52— screw threaded on said screw and normally positioned against the outer portion of the head —38—.

Operation

In operation with the device in a position as shown in the drawings, that is, with the gate —30— in the open position, the screw —27— may be adjusted to bring the plunger —9— in the proper position in the chamber —8— so that said chamber will contain the exact amount of molten metal required to form the casting about to be made, after which the screw —27— may be locked in the adjusted position by the lock nuts —28—.

The chamber —8— is then filled by any convenient means as by hand ladle with molten metal after which the valve —42— will be manipulated to permit the fluid under pressure to enter the outer end of the cylinder —36— thereby forcing the piston and gate —30— connected therewith inwardly to move the gate to the closed position over the delivery pot —7—.

Then by manipulating the valve —24— to permit fluid under pressure to enter the outer end of the cylinder —14— the piston —15— and plunger —9— connected therewith will then be moved forwardly to force the molten metal from the chamber —8— through the port —49— of the gate —30— into the die cavity after which the valve —42— may be

moved in the opposite direction to relieve the pressure from the outer end of the cylinder —36— by connecting it with the drain —46— and at the same time connect the inner end of the cylinder —36— with the fluid feed —45— which will cause the gate —30— to return to the open position and permit any dross remaining in the port —49— to pass from said port out through the aperture —50—.

Then by moving the valve —24— to bring the outer end of the cylinder —14— into communication with the discharge pipe —26— thereby relieving the fluid pressure on the outer end of the piston —15— and at the same time connecting the fluid supply pipe —25— with the inner end of the cylinder —14— thereby causing the piston —15— to move outwardly until it comes in contact with the screw —27— which will position the plunger —9— in its outer position in the chamber —8— and be ready for another charge of molten metal.

Although I have shown and particularly described the preferred form of this invention, various changes, both in the construction of the parts and the arrangement thereof, may readily be made without departing from the spirit of this invention and I therefore do not wish to be limited to the exact structure shown, but what I do claim is:—

1. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, means for varying the capacity of the chamber, a closure for said chamber having an outlet port for the metal and means for discharging the metal from the chamber through said port.

2. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, means for varying the size of the chamber to determine the capacity thereof, a closure for said chamber, an outlet port for the chamber and means for discharging the metal from the chamber through said port.

3. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal and having one end thereof mounted for reciprocative movement in said chamber, a closure for said chamber having an outlet port for the metal and operating means connected with said movable end for discharging the metal from the chamber through said port.

4. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in the chamber and normally positioned

to form one end thereof, a closure for said chamber having an outlet port for the metal and operating means connected with said plunger for discharging the metal from the chamber through said port.

5. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in the chamber and normally positioned to form one end thereof, means for positioning the plunger in the charging position within the chamber to determine the capacity of said chamber, a closure for said chamber having an outlet port for the metal and operating means connected with said plunger for discharging the metal from the chamber through said port.

6. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in the chamber to form one end thereof, a closure for said chamber having an outlet port for the metal, operating means connected with said plunger comprising a cylinder and a piston mounted for longitudinal movement therein for discharging the metal from the chamber through said port and means for operating said piston.

7. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in the chamber to form one end thereof, a closure for said chamber having an outlet port for the metal, a cylinder, a piston mounted for longitudinal movement in said cylinder operatively connected with the plunger, means adjustably mounted within the cylinder for limiting the movement of the piston and plunger in one direction to determine the capacity of the chamber and means for operating said piston.

8. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally opened at one side for receiving the metal, a gate adapted to be moved across the delivery pot to close the open side of the chamber having an outlet port therein adapted when said gate is in the closed position to register with said chamber, actuating means operatively connected with the gate for moving said gate to and from the closed position and means for discharging the metal from the chamber through said port.

9. In a die casting machine in combination a delivery pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a gate adapted to be moved across the delivery

pot to close the open side of the chamber having an outlet port therein adapted when said gate is in the closed position to register with said chamber, an aperture adapted to register with the outlet port when the gate is in the open position for receiving the dross from said port, actuating means operably connected with the gate for moving it to and from the closed position and means for discharging the metal from the chamber through said port.

10. In a die casting machine in combination a die supporting plate, a delivery pot mounted on said plate, said pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a gate mounted for longitudinal reciprocative movement in the die supporting plate and adapted to be moved across the delivery pot to close the open side of the chamber, an outlet port in said gate adapted when the gate is in the closed position to connect said chamber with the inlet port of a die, gate operating means comprising a cylinder, a piston operably connected with the gate mounted for longitudinal movement in said cylinder and means for operating the piston to move the gate from the open position to the closed position and return.

11. In a die casting machine in combination a die supporting plate, a delivery pot mounted on said plate, said pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a gate mounted for longitudinal reciprocative movement in the die supporting plate and adapted to be moved across the delivery pot to close the open side of the chamber, an outlet port in said gate adapted when the gate is in the closed position to connect said chamber with the inlet port of a die, a dross receiving aperture provided in said plate in registration with the outlet port when the gate is in the open position, gate operating means comprising a cylinder, a piston operably connected with the gate mounted for longitudinal movement in said cylinder, means adjustably mounted in the cylinder for controlling the movement of the piston in one direction to bring the outlet port in registration with said aperture when the gate is in the open position and means for operating the piston to move the gate from the open position to the closed position and return and means for discharging the metal from the chamber through said outlet port.

12. In a die casting machine in combination a die supporting plate, a delivery pot mounted on said plate, said pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in said chamber, operating means for said plunger comprising a cyl-

- inder, a piston operably connected with the plunger mounted for longitudinal movement in said cylinder, a gate mounted for longitudinal reciprocative movement in the die supporting plate and adapted to be moved across the delivery pot to close the open side of the chamber, an outlet port in said gate adapted when the gate is in the closed position to connect said chamber with the inlet port of a die, gate operating means comprising a cylinder, a piston operably connected with the gate mounted for longitudinal movement in the cylinder, means connected with the second mentioned cylinder to operate the corresponding piston to move the gate to close said chamber and separate means connected with the first mentioned cylinder for operating the corresponding piston to actuate the plunger for discharging the metal from said chamber through the outlet port. 70
13. In a die casting machine in combination a die supporting plate, a delivery pot mounted on said plate, said pot having a chamber therein adapted to contain molten metal normally open at one side for receiving the metal, a plunger mounted for reciprocative movement in said chamber, operating means for said plunger comprising a cylinder, a piston operably connected with the plunger mounted for longitudinal movement in said cylinder, means adjustably mounted within the cylinder for limiting the movement of the piston and plunger in one direction to determine the capacity of the chamber, a gate mounted for longitudinal reciprocative movement in the die supporting plate and adapted to be moved across the delivery pot to close the open side of the chamber, an outlet port in said gate adapted when the gate is in the closed position to connect said chamber with the inlet port of a die, a dross receiving aperture provided in said plate in registration with the outlet port when the gate is in the open position, gate operating means comprising a cylinder, a piston operably connected with the gate mounted for longitudinal movement in said cylinder, means adjustably mounted in the cylinder for controlling the movement of the piston in one direction to bring the outlet port in registration with said aperture, means connected with the second mentioned cylinder for operating the corresponding piston and gate connected therewith to move the gate from the open position to the closed position and return and separate means connected with the first mentioned cylinder for actuating the respective piston and plunger connected therewith to discharge the metal from the chamber through the outlet port. 80
14. In a die casting machine in combination a delivery pot provided with a chamber therein adapted to contain a predetermined quantity of molten metal normally open at one side for receiving the metal, a closure for said chamber adapted when in the closed position to limit the contents of said chamber to the predetermined amount of metal, an outlet port for the chamber connecting said chamber with the inlet port of the die and means for discharging a metal from the chamber through said outlet port. 85
- In witness whereof I have hereunto set my hand this 7 day of September 1929.
- NATHAN LESTER. 90
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