Aug. 28, 1923.

1,466,490

O. L. W. SWENSON

DIE CASTING MACHINE

Filed Aug. 4, 1921

4 Sheets-Sheet 1

FIG. 1.

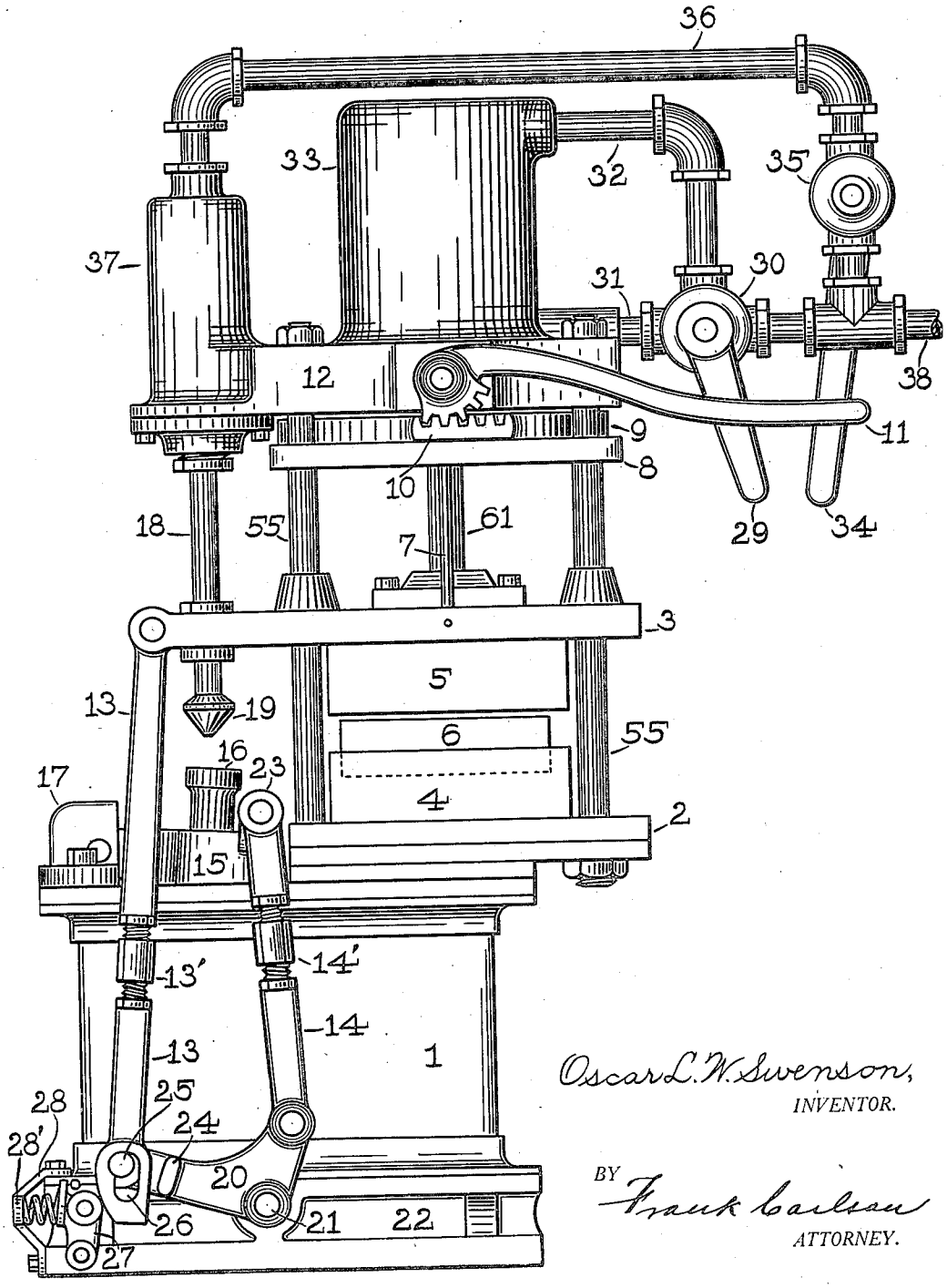

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FIG. 2.

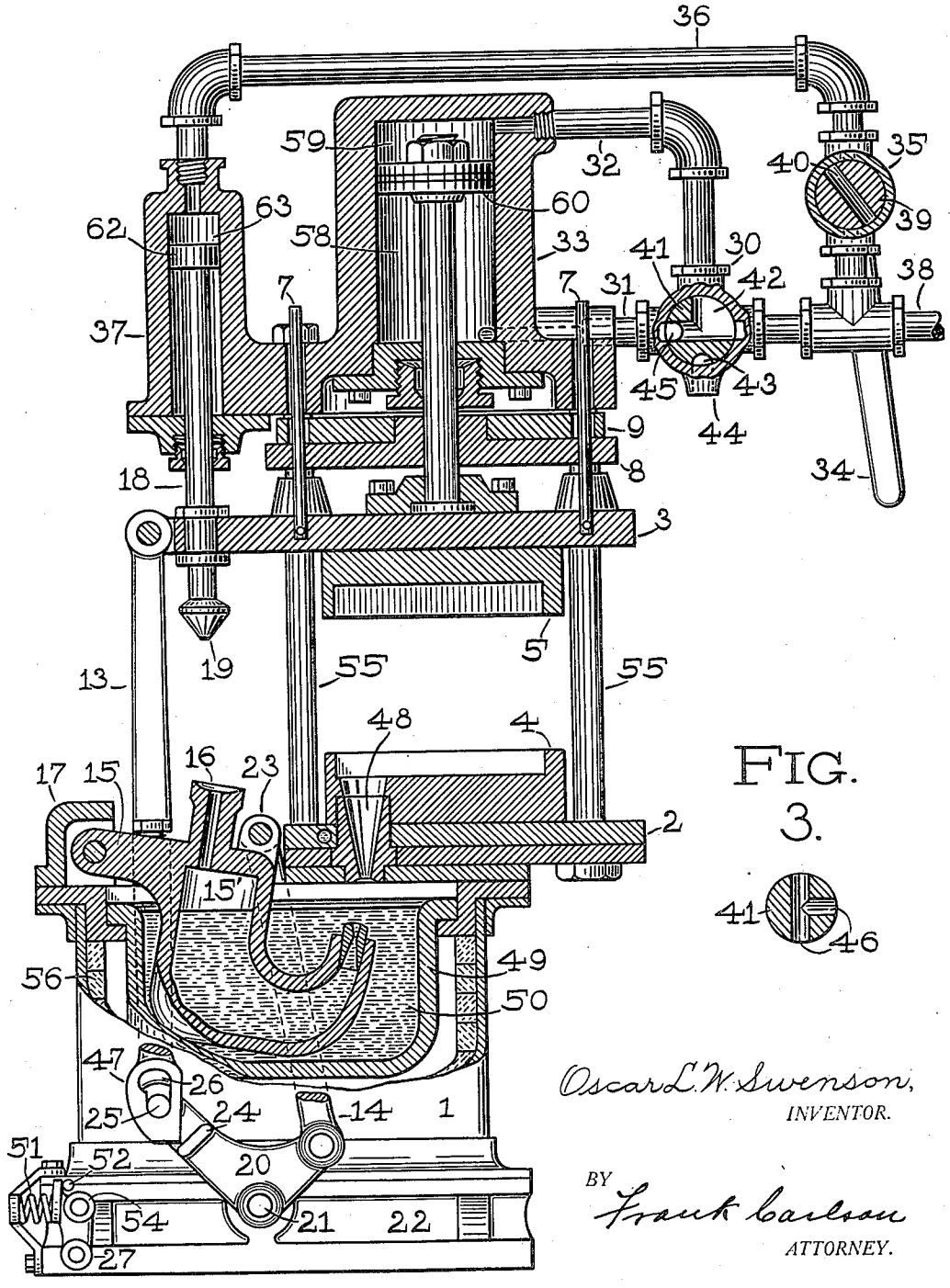

FIG. 3.

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FIG. 4.

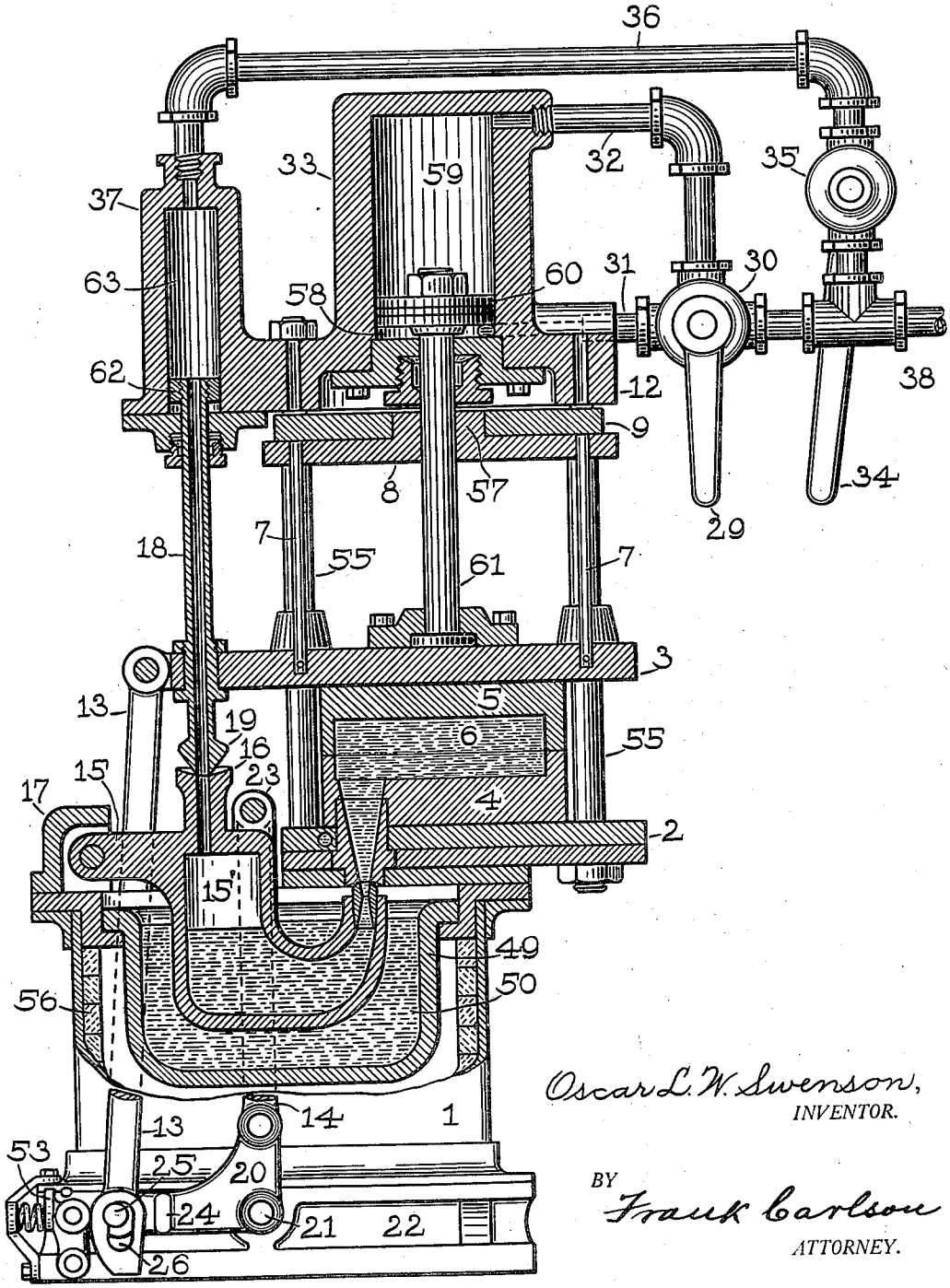

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FIG. 5.

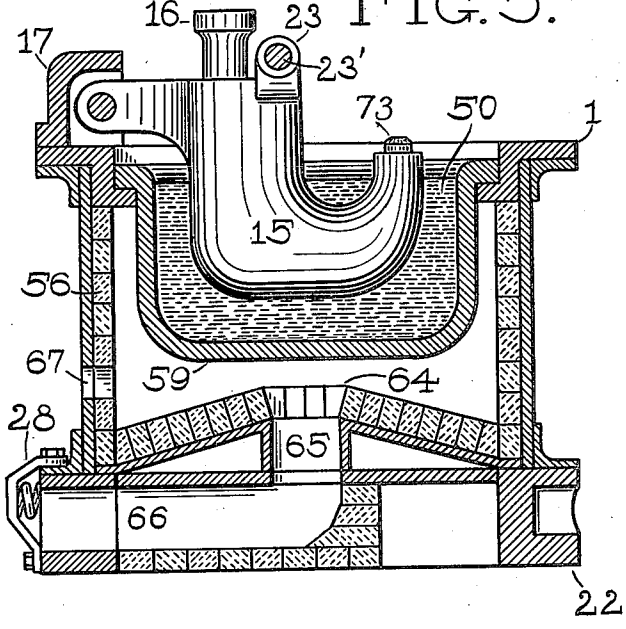


FIG. 7.

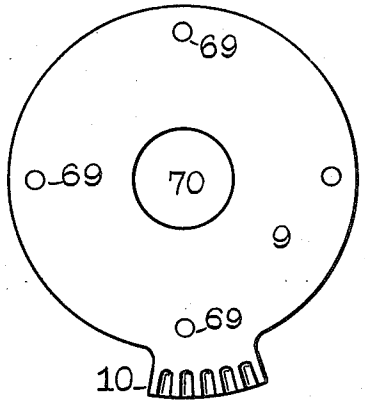


FIG. 6.

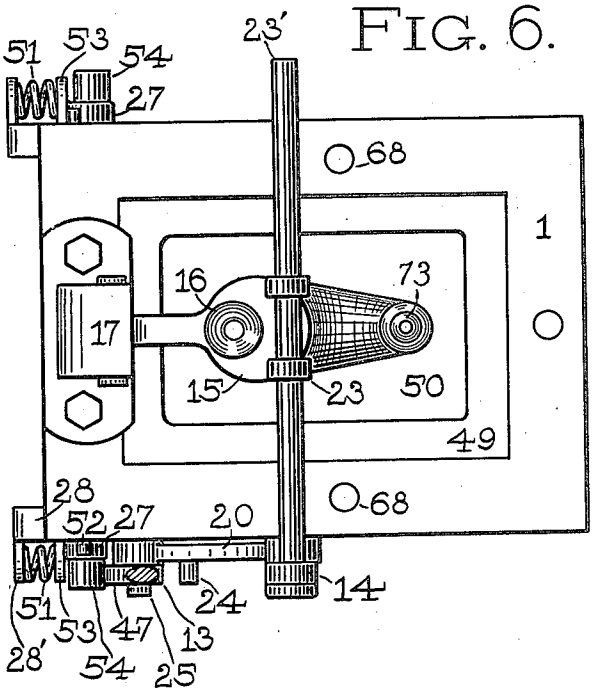
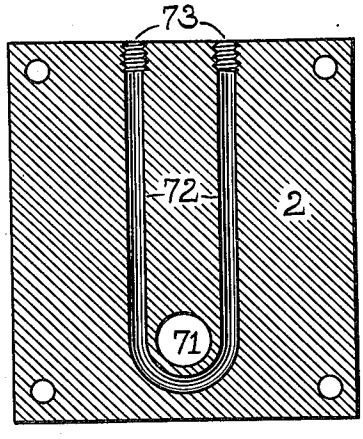


FIG. 8.



Oscar L. W. Swenson,
INVENTOR.

BY Frank Carlson
ATTORNEY.

Patented Aug. 28, 1923. 1,466,490

UNITED STATES PATENT OFFICE.

OSCAR L. W. SWENSON, OF BROOKLYN, NEW YORK.

DIE-CASTING MACHINE.

Application filed August 4, 1921. Serial No. 489,769.

To all whom it may concern:

Be it known that I, OSCAR L. W. SWENSON, a subject of the King of Sweden, and a resident of No. 774 57th Street, borough of Brooklyn, county of Kings, city and State of New York, have invented a certain Die-Casting Machine, of which the following is a specification.

This invention relates to die casting machines, and especially to that class wherein a rearwardly pivoted ladle is adapted to move in opposed synchronism with the movable parts of a superposed pneumatic ram, and it is one object of this invention to simplify the operation of die casting machines in order to eliminate labor and speed up production of die castings.

Another object is to provide a pair of rocker arms upon the sides of a casting fire box which at one extremity are connected to ladle supporting and controlling links, and at their other extremities to a similar pair of links pendant from a vertically movable die-plate above said fire box.

A further object is to provide an air pressure nozzle attached to a vertically movable die-plate and adapted to meet the receiving cup of a ladle when the latter is in raised position.

Further objects and attained advantages will become apparent as this specification proceeds.

Referring to the drawings, Fig. 1 is a view of an apparatus embodying the present invention.

Fig. 2 is another view of the same with the principal parts in section.

Fig. 3 is another section of valve spindle 41 of Fig. 2.

Fig. 4 is a similar view to Fig. 2.

Fig. 5 is a sectional view of the lower portions of Figs. 1, 2 and 4.

Fig. 6 is a plan view of the same parts.

Fig. 7 is a plan view of disk 9 of the Figs. 1, 2 and 4.

Fig. 8 is a horizontal section of die-plate 2 of the same views.

Throughout the drawings, the same numerals refer to the same or identical parts.

In the practice of my invention a fire-box 1 is mounted on a base plate 22 and supports the superstructure including a die-plate 2 through which pass several vertical tie rods 55, 55, two of the latter being secured in holes 68, 68 of the fire box top.

A cylinder block 12 is secured to these rods and is formed above into a ram cylinder 33, and at the side into a smaller cylinder 37. A piston 60 is adapted to rise and fall in the large cylinder and is provided with a rod 61 which is secured to the movable die-plate 3, the latter in movement riding upon the mentioned vertical tie-rods. In the air chamber 63 of the smaller cylinder a small piston 62 is adapted to slide, the piston being hollow and having pipe extension 18 which is secured to die-plate 3 and passes through the latter terminating in a nozzle 19.

At the left corners of the same side of the die plate are connected a pair of pendant links 13, 13 each of which is in turn connected to a rocker arm, as seen at 20.

The rocker arm is pivoted to a stud 21 on the base 22, and a shorter link 14 connects the short arm of the rocker with a ladle 15, a shaft 23′ passing through the short links and the ladle bearings, one of which is noted 23. The ladle itself is pivoted at 17 on the fire-box or furnace 1, and is provided with an air cup 16 which communicates with the interior of the ladle.

The ladle is, of course, partly immersed in the molten metal 50 contained in the pot 49. The fire-box is lined interiorly with fire brick noted 56, 56, an aperture 67 permitting the insertion of a fuel pipe and burner beneath the melting pot. The floor of the box is arched as at 64 to throw the flames against the pot, while a central outlet 65 and passage 66 are adapted to carry off the exhausted gases.

As the form of gas burner used is no actual part of my invention, the burner has been omitted, especially as the common apparatus for the purpose is well known.

The dies 4 and 5 are opened and closed by air pressure exerted upon piston 60, air also being used to force metal from the ladle into the dies at 6, the supply pipe 38 connecting with valves 30 and 35 to accomplish these operations.

To operate the machine, the lever 29 of

valve 30 is pushed so that the valve piston 41 occupies the position shown in Fig. 2, when the air may pass through channel 42 from the pipe 38 into cylinder 58 through pipe 31. The piston 60 is raised by the incoming air, and will raise the die plate 3 and its die 5 to the position shown in the mentioned view.

However, the links 13, 13 will also be drawn up to a raised position, rocking arm 20 so that links 14 will permit the ladle 15 to submerge its nozzle 53 in the molten metal in order to fill the ladle with a charge.

If the same lever is now drawn momentarily from the retracted position of Figs. 2 and 4 to that shown in Fig. 1, the piston will be forced down by air entering chamber 59 from pipe 32. The vertical position of this pipe and the exhaust nozzle 44 are set back a little to escape lying in the same plane with pipes 31 and 38, necessitating a channel 45 in the valve piston 41 to connect the channel 42 with said vertical pipe when moved into the mentioned position. In Fig. 3 another section of the valve piston is shown along the deeper plane of pipe 32 and nozzle 44.

This view reveals the exhaust channel 46, the part being in exactly the same position as in Fig. 2, wherein the channel or groove 43 is visible which connects with the exhaust channel. By this construction, chamber 58 will exhaust out through its pipe 31 and nozzle 44 while chamber 59 fills from its pipe 32, and vice versa.

When the large piston and its previously mentioned appurtenances have descended into the position shown in Fig. 4, the links 13, 13 being now in low position, the rocker arm 20 is seen in locked or rigid position, while the ladle is in its highest position. In order to assure rigidity of the dies while casting, a plurality of vertical locking bars 7, 7, 7 have been secured to die-plate 3, and a partly rotatable locking plate 9 supported upon a shelf 8 and centered in movement by the hub 57 extending into the hole 70 of the plate. The latter plate is provided with a projecting rack 10, while a lever 11 is mounted upon the block 12 and engages the rack by means of its sector teeth.

Normally, the locking plate occupies a neutral position in which the bars or rods 7, 7 may pass up through corresponding holes 69, 69, 69 in the plate and up through block 12. However, when the lever 11 is drawn down, the plate will be slightly rotated, presenting the unbroken face of the plate immediately above the upper extremities of the rods, thus locking them and simultaneously the whole machine in rigid position.

If at this point the lever 34 of the upper valve 35 is drawn into the position shown in Figs. 1 and 4, air will pass through channel 40 in valve piston 39, through pipe 36, down into chamber 63 of cylinder 37 and thence down pipe 18.

It may be noted that in this position the nozzle 19 meets receiving cup 16, and that the compressed air will proceed from pipe 18 down through the nozzle and cup into chamber 15 in the ladle. When the air presses on the contents of the ladle, molten metal will be forced up through nozzle 74, and into the dies through receiving nozzle 48.

As this operation is but the work of a moment, the lever 34 is immediately returned to original position and likewise the locking lever 11. Then the lever 29 may be pushed to the left to raise the die 5, permitting a casting 6 to be removed, the ladle having meanwhile descended into the melting pot.

In Fig. 1, without regard to the position of the valve levers, the initial rising and opening position may be seen.

The link 13, as is clearly shown has upon its lower leg a cam block 47 provided with a cam slot 26.

At the upper extremity of this slot a little depression is adapted to retain the stud 25 of rocker arm 20 when the cam block is pressed toward the right. In order to perform this feature, whose utility will be presently explained, a spring frame 28 having a flat projection 28′ is mounted on the rear of base 22 and provided with a spring 51. An idler 27 is also pivoted to the base, having a roller 54 adapted to engage the curved edge of block 47, while an extension 53 upon the idler receives the pressure of the spring on one side and is adapted to engage stop stud 52 on the other.

In raised position, the rocker arm, as seen in Fig. 2 is adapted by virtue of the projection 24 to force the cam block toward the left to free the stud 25 and permit the link to pass upward without definite engagement. The result attained is that the initial break between the air nozzle and its cup occurs simultaneously with the break between the ladle nozzle and the die, and immediately thereafter a delay in the movement of the air nozzle while the ladle nozzle increases its distance, the pressure being thus released from the ladle.

During the operation of the machine, the die-plate 2 is very likely to be overheated, and a water channel 72 has therefore been cast into the plate enveloping the nozzle hole 71 and adapted at 73 for connection with circulation pipes. It is, of course obvious, that different sizes of dies may be secured and used in my machine, but while the die-plate 3 and the piston always rise to the same position this difference in dies will cause the down position to be different for each particular pair of dies. In order to attain proper filling and discharging posi-

tions for the ladle under these differing conditions, the links 13 and 14 are provided with adjustment blocks 13′ and 14′, respectively by the turning and setting of which these changes may be compensated.

It is also obvious that by using a small hollow piston on the air pipe for the ladle with a corresponding cylinder, the common troublesome flexible hose is avoided, while the machine as a whole is compact, self contained, very convenient to operate and well nigh automatic in operation.

Having thus fully described my invention, I claim:—

1. A die casting machine including a fire box and a pneumatic ram surmounting the same, said ram having a movable ram member, a ladle provided with a rearward arm pivoted upon the rear of said fire box, a rocker arm upon the same fire box, a link connecting said movable ram member with one extremity of said rocker arm, a shaft secured to said ladle, and a link connecting said ladle shaft with the other extremity of said rocker arm.

2. A die casting machine including a fire box and a pneumatic ram surmounting the same, a movable die plate in said ram, a rearwardly pivoted ladle adapted to rise to a die nozzle below said ram, a shaft secured to said ladle and a pair of adjustable links connected at their upper extremities to said shaft, and at their other extremities to a pair of similar rocker arms pivoted to said fire box, and a second pair of adjustable links connected at their lower extremities to the other ends of said rocker arms and at their upper extremities to said movable die plate.

3. A die casting machine including a pneumatic ram surmounting a fire box and provided with a movable die plate, a ladle provided with a transverse supporting shaft, a link connected at one extremity to said shaft and at the other to a rocker arm, a stud upon another portion of said rocker arm, a second link connected at one extremity to said movable die plate, a cam block upon the other extremity of said second link, there being a slot for said rocker arm stud in said cam block aligned with the link and a depression to retain said stud in the inner extremity of the slot in the cam side of said cam block, means to retain said stud in said depression including upon said fire box a spring actuated idler having a roller adapted to contact with the said cam block, and means to free and project said rocker arm stud into the main slot of said block including upon said rocker arm a projection adapted to strike said cam block located between said stud and the pivot of said arm.

4. A die casting machine including a fire box surmounted by a pneumatic ram, a movable die plate controlled by the latter, a stationary die plate below said movable die plate, a pivoted ladle adapted to rise and fall in a manner corresponding to the fall and rise of said die plate, an air receiving cup upon said ladle communicating with the interior thereof and an air nozzle secured to said die plate, connected to a source of air pressure supply and adapted upon descent of said die plate to meet said ladle cup and register therewith.

5. A die casting machine including a pneumatic ram surmounting a fire box, a movable die plate in said ram, a ladle adapted to rise and fall and provided with an air cup, an air supply cylinder secured to said ram, parallel therewith, an air nozzle secured to said die plate and adapted upon the descent of the latter to register with and meet said ladle cup, a hollow piston in said air cylinder, and a rigid pipe connecting said nozzle with said hollow piston.

6. A die casting machine including a pneumatic ram having a movable die plate and a stationary ram cylinder plate, a second stationary plate secured in spaced position from said cylinder plate, parallel therewith and between the same and said movable die plate, a plurality of locking rods secured upon said die plate parallel with the axis of the ram cylinder, and adapted upon movement of said die plate to pass up through apertures in both stationary plates and to clear said ram cylinder, a rotatable perforate locking plate between said stationary plates centered upon a hub projecting from one of said plates, and means to rotate said locking plate including a rack upon a portion of the plate and a lever upon said ram cylinder plate having a gear segment engaging said rack and adapted upon movement to partly rotate said locking plate and present imperforate portions thereof above the free extremities of said locking rods to block movement of the latter and lock the die plate in down position.

7. A die casting machine including a ram having a cylinder and beyond it a movable die plate, a second cylinder parallel with said first cylinder, a ladle provided with an open air receiver, an air supply nozzle secured to said die plate and adapted to engage said air receiver in projected position of said die plate, and a pipe connected to said air nozzle extending into said second cylinder and adapted to pass into the same upon retraction of said die plate.

8. In a die casting ladle having a hollow body terminating in a nozzle, a free vertical air receiving cup mounted upon the upper portion of said ladle body communicating with the interior thereof and adapted to make contact with an air nozzle spaced

above said cup, a pair of bearings on either side of said ladle for a transverse shaft and a rearwardly projecting arm beyond said cup aligned with the ladle and forming a rear support therefor.

Signed at 132 Nassau Street, in the borough of Manhattan, county of New York, city and State of New York this 2nd day of August, 1921.

OSCAR L. W. SWENSON.

Witnesses:
EDWARD CHILSTROM,
CLOES BRUNSON.