J. S. GOLDBERG.

DIE CASTING MACHINE.

APPLICATION FILED SEPT. 2, 1914.

1,257,478.

Patented Feb. 26, 1918.

8 SHEETS—SHEET 1.

Fig. 23

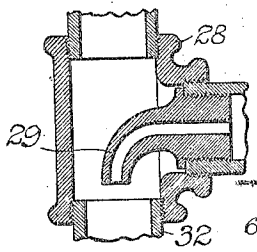


Fig. 1

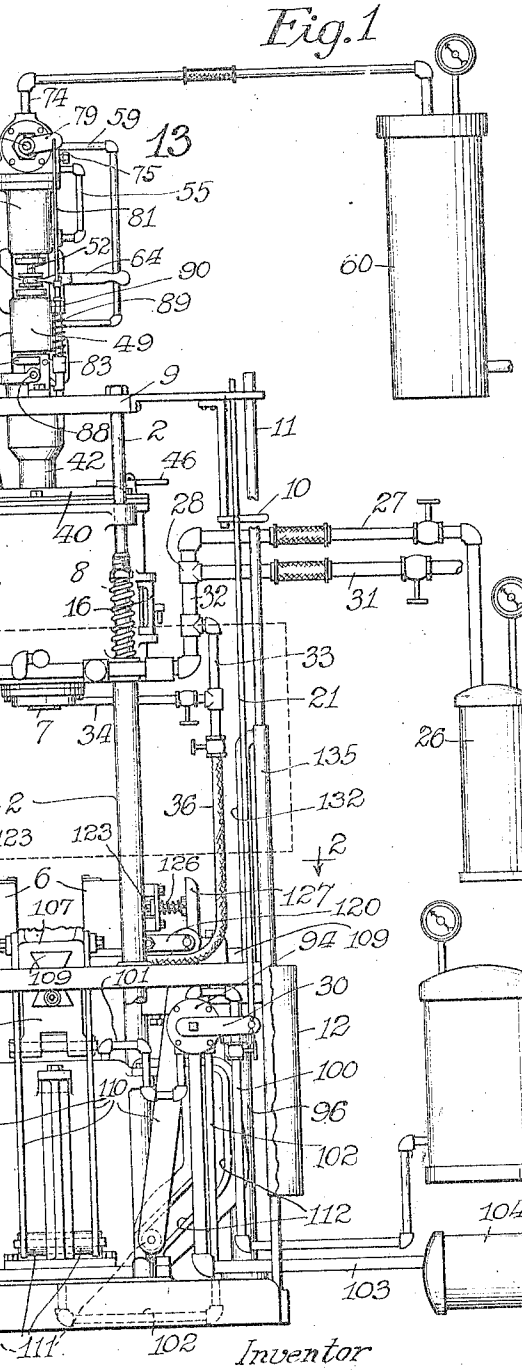
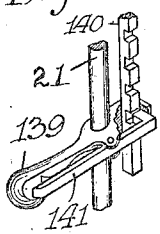


Fig. 22



Witnesses:

Cameron A. Whitsett

John A. Dinner

Inventor

John S. Goldberg

By Brown, Hanson & Bostelier

Attorneys

J. S. GOLDBERG.

DIE CASTING MACHINE.

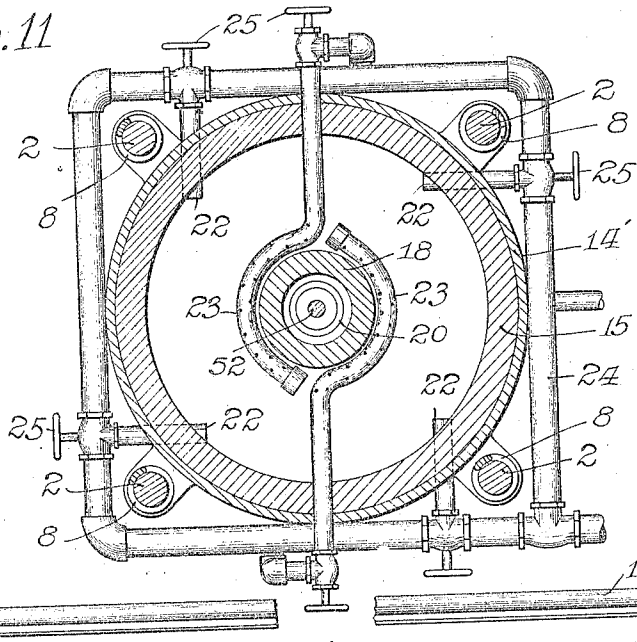
APPLICATION FILED SEPT. 2, 1914.

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Patented Feb. 26, 1918.

8 SHEETS—SHEET 2.

Fig. 11



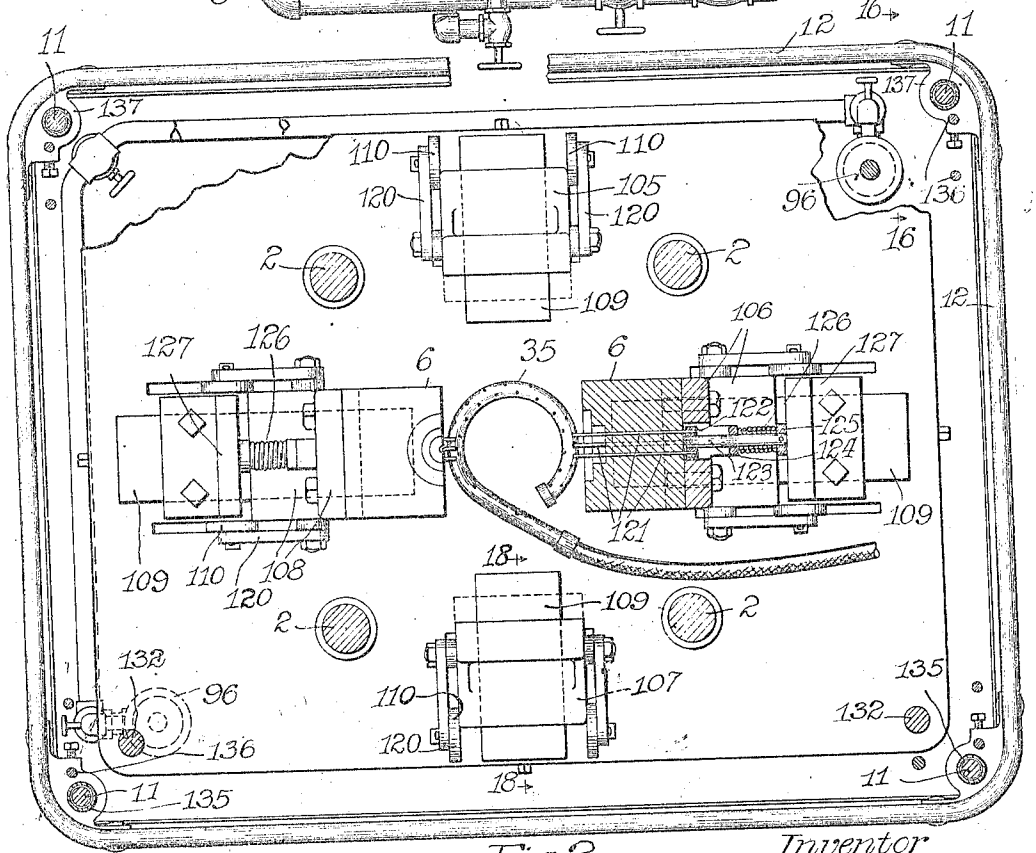


Fig. 2

Witnesses:

Leslie W. Fricke

Robert F. Bracke

Inventor

John S. Goldberg

By Brown, Hanson & Boettcher

Attorneys.

J. S. GOLDBERG.

DIE CASTING MACHINE.

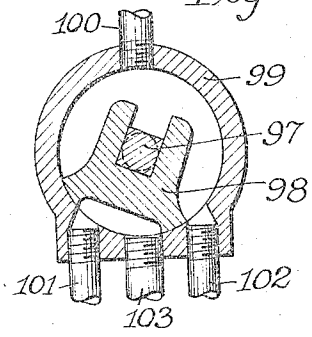
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8 SHEETS—SHEET 3.

Fig. 15



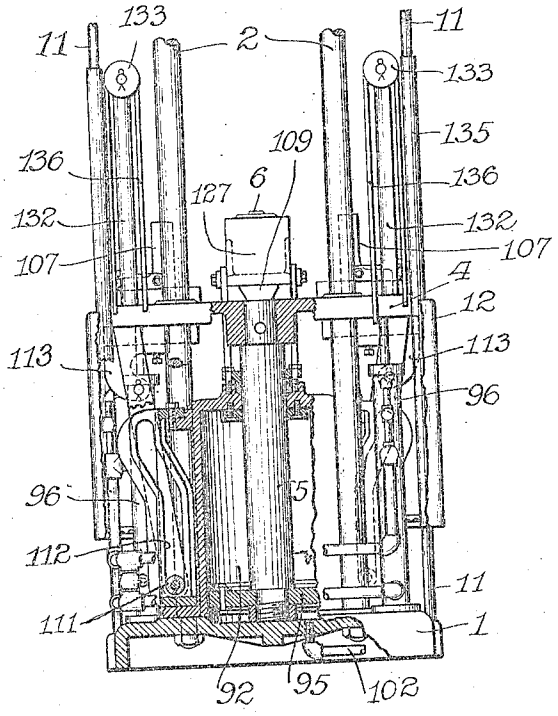


Fig. 3

Witnesses:
Cameron A. Whitsett
Leonard W. Novander

Inventor
John S. Goldberg
By Brown, Hanson & Boettcher
Att'ys

J. S. GOLDBERG.

DIE CASTING MACHINE.

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8 SHEETS—SHEET 4.

1,257,478.

Fig. 4

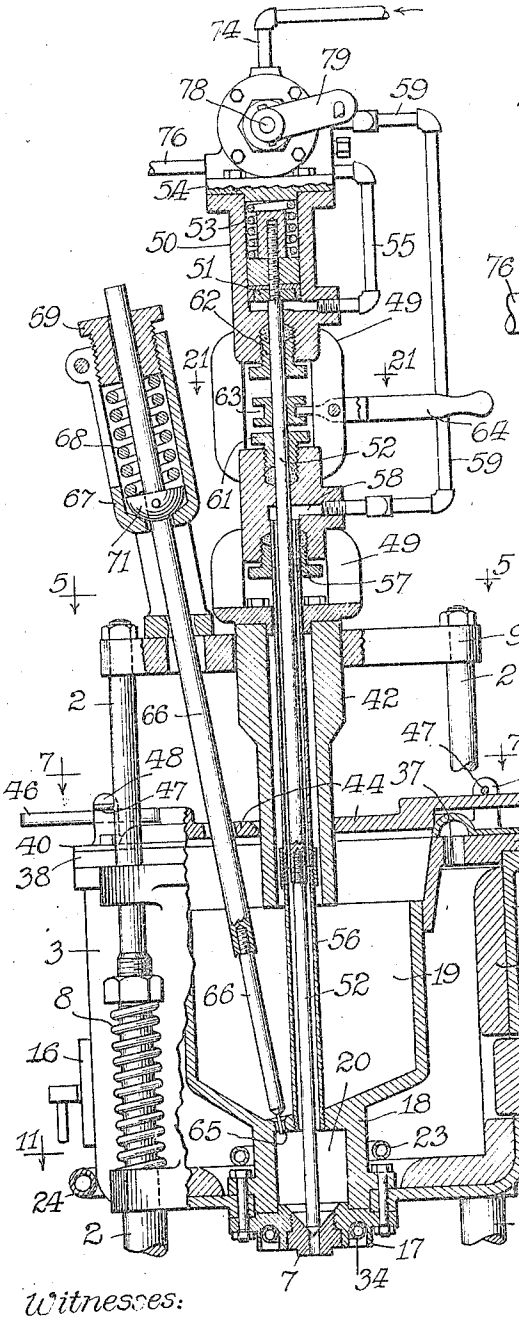


Fig. 6

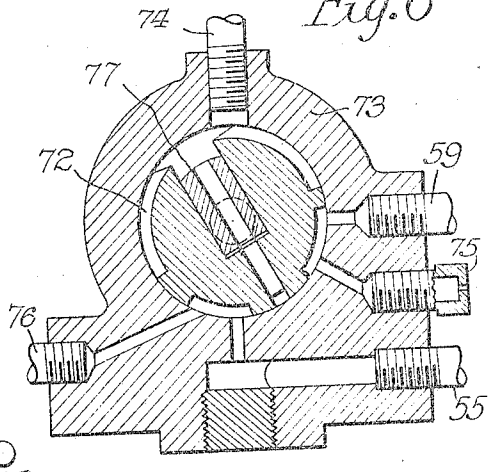
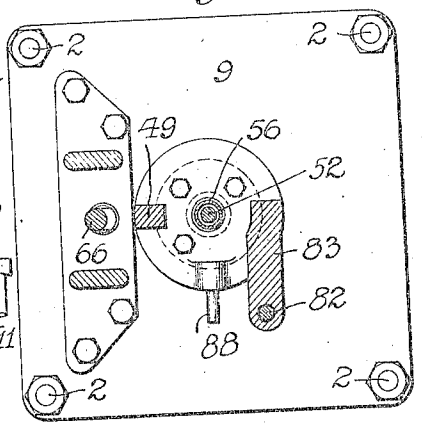


Fig. 5



Witnesses:

Leslie W. Frick

Robert F. Brack

Inventor

John S. Goldberg

By Brown, Hanson & Boettcher

Attorneys.

J. S. GOLDBERG.

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8 SHEETS—SHEET 5.

Fig. 7

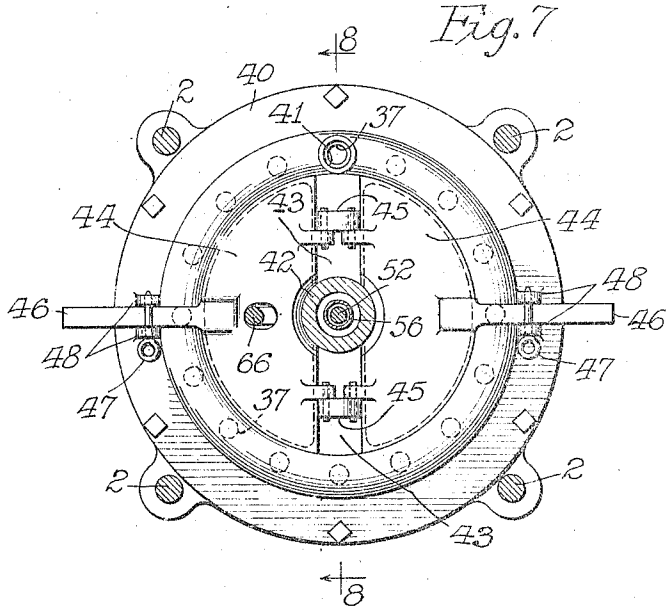
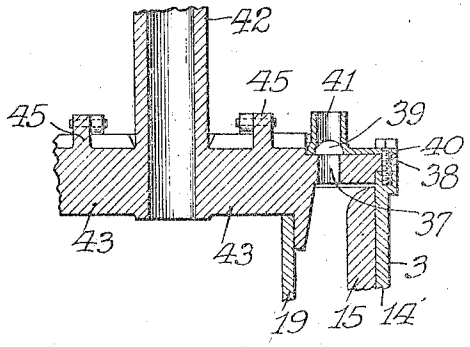


Fig. 8



Witnesses:

Leonard W. Novander

Cameron A. Whitsett

Inventor

John S. Goldberg

By Brown, Vinson & Wheelcher

Att'ys

J. S. GOLDBERG.

DIE CASTING MACHINE.

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1,257,478.

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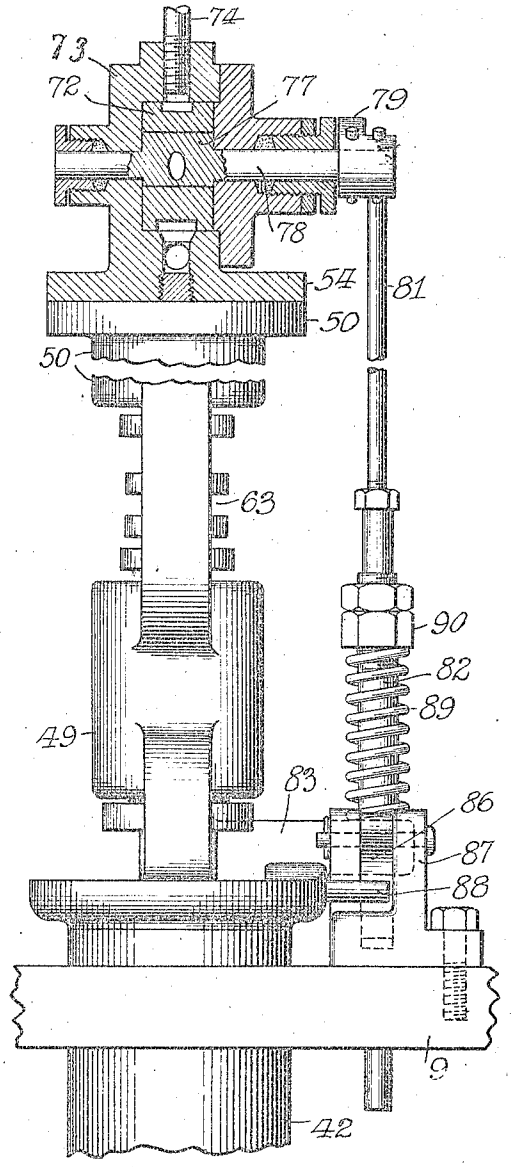


Fig. 10

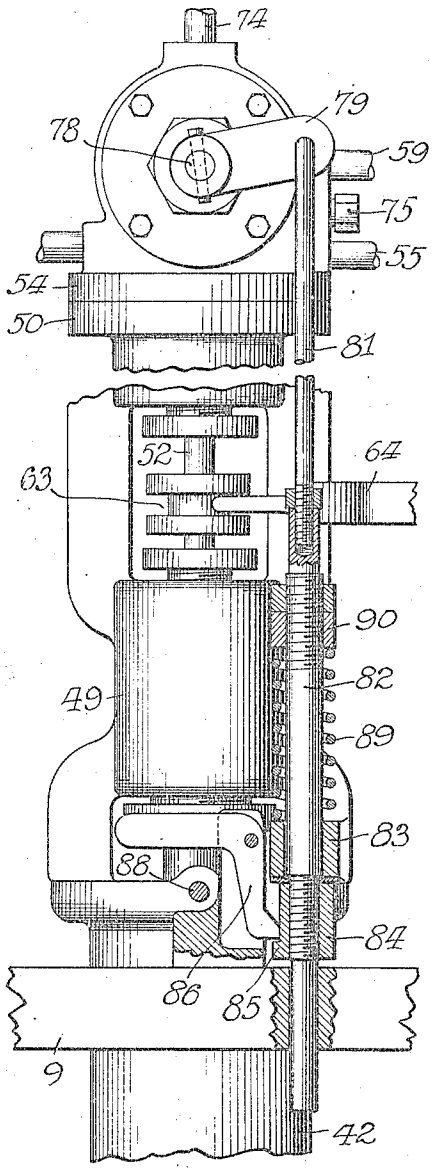


Fig. 9

Witnesses:
Leonard W. Novander.
Cameron A. Whitlatt

Inventor
John S. Goldberg
By Brown, Hanson & Boettcher
Att'ys

J. S. GOLDBERG.

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APPLICATION FILED SEPT. 2, 1914.

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Fig. 12

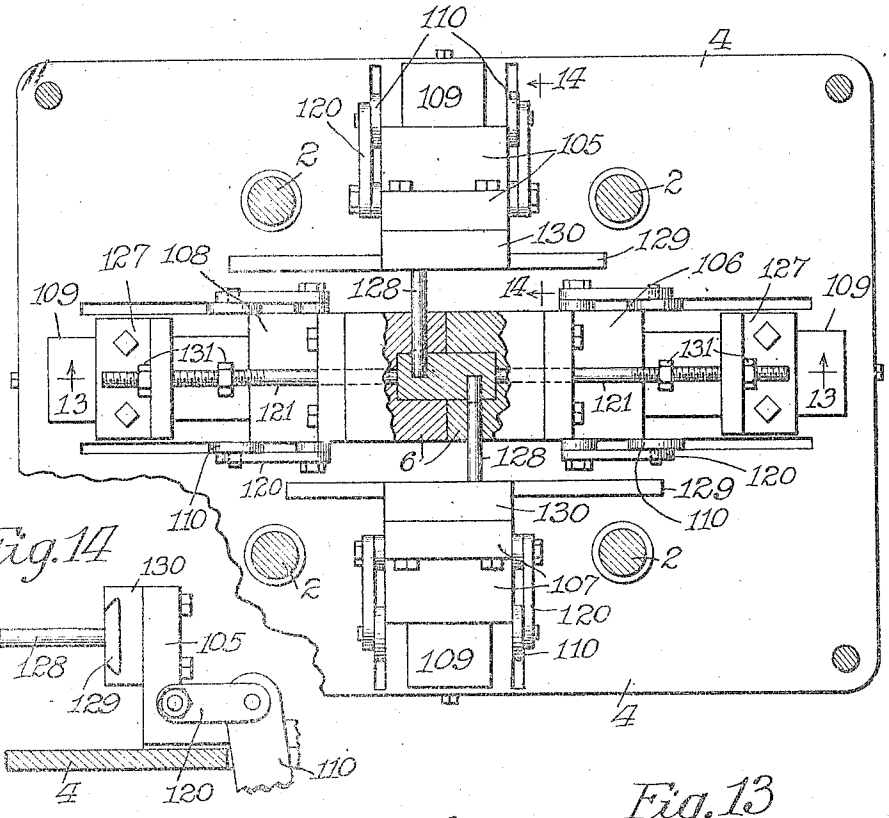
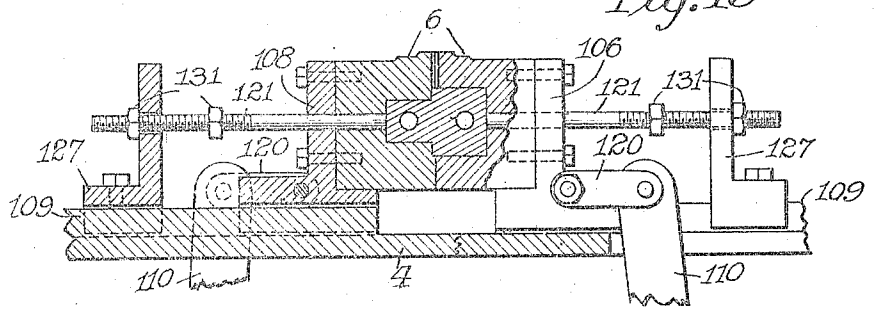


Fig. 14

Fig. 13



Witnesses:

Leonard W. Novander

Cameron A. Whitsett

Inventor

John S. Goldberg

By Brown, Hamon & Boettcher

Att'ys

J. S. GOLDBERG.

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Fig. 16

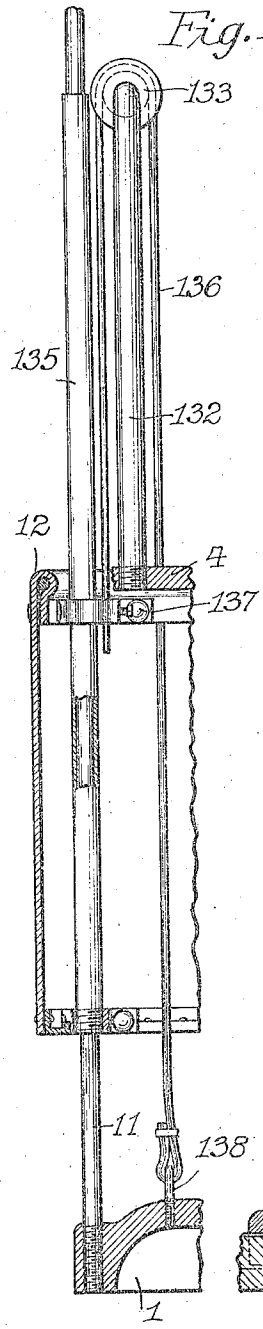


Fig. 20

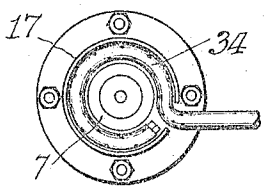


Fig. 21

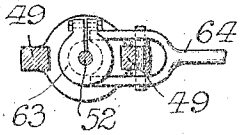


Fig. 19

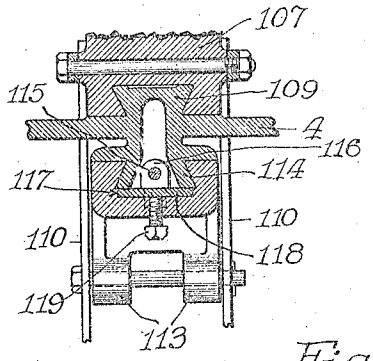


Fig. 18

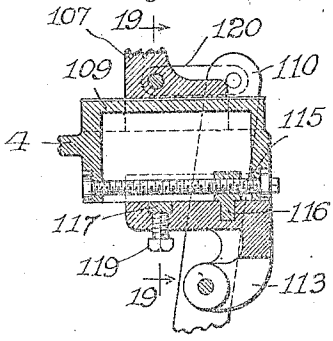
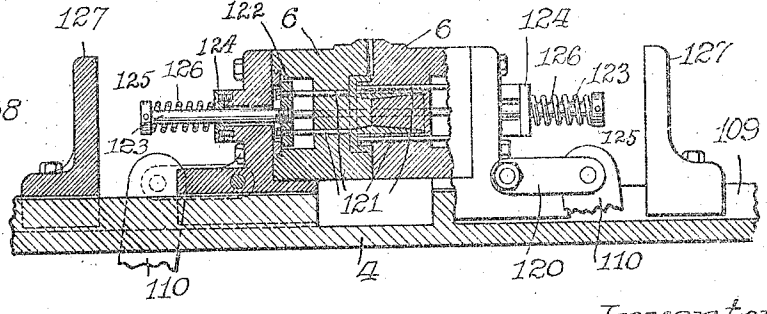


Fig. 17



Witnesses:

Cameron A. Whitsett

Leonard W. Novander

Inventor

John S. Goldberg

By Brown, Hanson & Rochtchen

Attys

UNITED STATES PATENT OFFICE.

JOHN S. GOLDBERG, OF CHICAGO, ILLINOIS, ASSIGNOR TO ALEMITE METALS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DIE-CASTING MACHINE.

1,257,478. Specification of Letters Patent. Patented Feb. 26, 1918.

Application filed September 2, 1914. Serial No. 859,737.

To all whom it may concern:

Be it known that I, JOHN S. GOLDBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Die-Casting Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The subject matter of this invention is a die casting machine.

Die castings, as is well known, are formed by squirting liquid metal into a mold under pressure. The mold is usually in the form of a number of separable dies clamped together during pouring and opened up to strip the casting.

To insure good sharp castings the metal must be shot into the dies in the least possible space of time. This is done to prevent solidification due to cooling, and also to make the metal fill all the lines and curves of the mold.

In die casting machinery heretofore constructed, it has been customary to apply pressure to all of the molten metal in the melting pot, in order to force the metal into the dies. This places an excessive strain upon the pot, due both to the high temperature and high pressure to which it is subjected. There is constant danger of the pot giving way under the severe strain and the consequences of the breaking of a pot full of hot metal are very grave indeed.

Difficulty in replenishing the supply of hot metal is also encountered in this type of machine.

Briefly stated, the chief object of the present invention is to provide a die casting machine which will produce high grade castings expeditiously and safely.

It is also an object of this invention to provide a structure which will be automatic in action, thereby performing the various operations uniformly and in proper sequence.

In accordance with my invention, the melting pot is not subjected to pressure at all, and performs only the function of holding and heating the metal for the castings. A smaller chamber, which will hold only a relatively small quantity of metal sufficient in each case to form a casting is filled from the melting pot for each operation. The hot metal in the chamber, which I term the "pouring pot" is discharged under pressure into the mold, while connection with the melting pot is cut off. Thereafter the connection between the pouring pot and the mold is shut off, and the pouring pot is filled from the melting pot and the operations are repeated.

The various parts are operated by compressed air and are automatic in their action. Each operation must be completed before the succeeding one can be performed. This insures uniform and correct action, and, consequently, safe and rapid production of castings.

In the accompanying drawings which show an operative embodiment of my invention—

Figure 1 is a front elevation with the shield and other parts broken away to reveal the important working parts;

Fig. 2 is a horizontal cross sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detail view of the die and plunger mechanism;

Fig. 4 is a vertical section on a larger scale through the melting and pouring pot and the control mechanism therefor;

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4;

Fig. 6 is an enlarged section of the automatic valve and casing for controlling the act of pouring;

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 4;

Fig. 8 is a fragmentary cross sectional view on the line 8—8 of Fig. 7;

Fig. 9 is an enlarged fragmentary elevation partly in section of the automatic pouring control mechanism;

Fig. 10 is a view partly in section taken at right angles to Fig. 9 from the left hand side thereof;

Fig. 11 is a horizontal cross section taken on the line 11—11 of Fig. 4;

Fig. 12 is a view similar to Fig. 2 of the die platform and slides showing a casting in the dies ready to be stripped therefrom;

Fig. 13 is a fragmentary sectional view taken on substantially the line 13—13 of Fig. 12 showing the dies and stripping mechanism;

Fig. 14 is a fragmentary elevation of one of the movable core plungers;

Fig. 15 is a cross sectional view of the manual valve for controlling the movement of the plunger and platform;

Fig. 16 is a fragmentary sectional elevation of the shield operating mechanism;

Fig. 17 is a view similar to Fig. 13 of a modified form of striping mechanism;

Fig. 18 is a view of the adjusting mechanism for setting the fulcrum point of the slide throwing levers;

Fig. 19 is a cross sectional view of the same mechanism taken on the line 19—19 of Fig. 18;

Fig. 20 is a plan view of the discharge nozzle showing the heater for warming said nozzle;

Fig. 21 is a cross sectional view on the line 21—21 of Fig. 4, showing the manual releasing means for opening the pouring pot;

Fig. 22 is a fragmentary view of a form of control handle for the plunger operating valve; and

Fig. 23 is a section of the mixing nozzle for the burners.

The main framework of the machine consists of the base 1, from which rises four pillars 2 forming a support for the furnace 3 of the machine in which is inclosed the mechanism for handling the hot metal. The die platform 4 is slidably mounted on the columns 2, and may be moved toward or away from the furnace 3 by means of a plunger 5, shown in Fig. 3.

The dies 6 are slidably mounted on the die platform 4 in a manner to be described later, and these dies are closed together when the platform 4 rises. In their closed condition they are brought into contact with the nozzle 7 from which the hot metal is discharged automatically in a manner to be described later.

The furnace 3 is slidably mounted on the columns 2 and held in place by springs 8, which allow the entire mechanism to be moved upward. A platform 9 is connected to the upper ends of the columns 2 and is also connected to the base 1 by means of the rods 11, which form guides for a movable shield 12 to guard the operator against injury.

An automatic pouring controlling mechanism 13 is connected to the top of the furnace 3 and movement of the furnace and controlling mechanism caused by pressing the dies 6 against the nozzle 7 operates valve mechanism, which will be described later, to discharge the metal into the dies.

I shall now describe the furnace with its control mechanism in connection with Figs. 1, 4, 5, 6, 9 and 10. The furnace 3 comprises a cast iron shell 14′ which is lined with fire brick, or other refractory material 15. This shell may be provided with suitable hand holes 16 to allow access to the interior thereof. The shell 14′ is open at its top and is provided at the bottom with a perforation, to the edges of which are clamped a head 17 carrying the nozzle 7 and a cylindrical shell 18, which forms the melting pot 19 and the pouring pot 20.

The furnace is heated by burners 22 and 23 (see Fig. 11) connected to a common supply pipe 24 which encircles the furnace. Suitable valves 25 are connected between the burners and the supply pipe in order to regulate the flow of fuel, which is preferably gas. Air is supplied under pressure from a tank 26, through the main 27 to a T connection 28 (see Fig. 23) at which point the fuel gas is admitted through a nozzle 29 supplied from a pipe 31. From the main 32, which carries the mixture of air and gas to the furnace, taps may be taken, as by way of pipe 33, to supply burners 34 (see Fig. 20) for heating the nozzle 7, and burner 35 (see Fig. 2) for heating the dies. The burner 35 is connected by means of a flexible tube 36 to allow the burner to be moved up and down with the die platform 4.

The products of combustion from the furnace escape through vents 37 in the top casting 38 which is mounted on the shell 14′. An annular flue space 39, formed in a cast ring 40, connects with a discharge opening 41 (see Fig. 8). A hollow tubular stem 42 is cast integral with the top casting 38 being attached thereto by means of the integral ribs 43, shown in section in Fig. 8, but concealed in Fig. 4 by the stem 42 itself. This stem moves with the furnace 3, and aids in operating the control mechanism 13. The space between the ribs 43 and the outer edge of the casting 38 is closed by means of semi-circular iron doors 44 hinged on the brackets 45 which are cast integral with the ribs 43. The covers 44 may be held in closed position by means of handles 46 and pins 47 projecting through lugs 48 formed on the casting 40. Upon the stem 42 is mounted the plunger supporting casting 49. This casting has an axial bore through its entire length as will be described later. The top of the casting 49 is formed in the shape of a cylinder 50, in which a plunger 51 is arranged to slide.

The rod 52, which projects through the melting pot 19 and the pouring pot 20 and forms a valve in conjunction with the seat in the nozzle 7, is attached to the plunger 51. The rod 52 is normally held in depressed condition to close the opening in the nozzle 7 by means of the spring 53 held between the end of the piston 51 and a cylinder head 54.

A pipe 55 is connected to the lower end of the cylinder and compressed air is supplied to this end of the cylinder to raise the rod 52 to open the nozzle 7 when the

metal is to be discharged from the pouring pot 20 into the die mold 6. Compressed air is admitted to the pouring pot 20 to expel the metal therefrom into the die mold. The compressed air is admitted through the pipe 56 which surrounds the stem 52 and is connected at its lower end with the pouring port 20. At its upper end the pipe 56 is connected by means of a gland 57 to the casting 49 which contains at this point a port 58 for the admission of compressed air through the pipe 59. A gland 61 prevents the escape of the compressed air upward along the stem 52. In a similar manner, the gland 62 forms a packing for the rod 52 where it enters the cylinder 50. The rod 52 and the pipe 56 may be each separately jointed in order to facilitate their removal.

It can now be seen that on the admission of compressed air through the pipes 55 and 59, any metal that is contained in the pouring pot 20 will be expelled through the nozzle 7, the same being opened by the movement of rod 52. Collar 63 (see Figs. 4 and 21) is clamped to the rod 52 and connected to the lever 64 to allow of manual opening of the nozzle 7, as for the purpose of emptying the pot of metal.

A communicating passage 65 is arranged to be closed by the valve stem 66 in order to prevent escape of the metal in the pouring pot 20 when the compressed air is admitted to the pouring pot 20.

The closing of this port 65 is accomplished by the act of raising the furnace 3 when the dies 6 are pressed against the nozzle 7. The stem 66, which may be jointed as shown, to facilitate removal, is supported on the platform 9 by means of bracket 67 which is bolted to the platform 9. This bracket contains a pocket for inclosing a spring 68 and a guide 69 forming a bearing for the rod 66. A collar 71 is connected to the rod 66 and is held against the bracket 67 by means of the spring 68. The stem 66 is thus held with sufficient pressure against the seat 65 to close the passage between the melting pot and the pouring pot when the act of pouring is to be accomplished.

This can readily be seen from the fact that the furnace 3 is pushed upward by engagement of the dies 6 with the nozzle 7, bringing the seat 65 against the valve stem 66 which is held stationary on the platform 9 by means of the bracket 67. It is not desirable that the air pressure should remain upon the metal in the pouring pot for any considerable length of time greater than the time necessary to fill the dies. The air is, therefore, admitted quickly to cause an instantaneous movement of the metal and is thereafter exhausted before the dies are disconnected from the pouring pot, otherwise any surplus metal above what would be necessary to form the casting would be expelled from the nozzle 7 as soon as the dies and the nozzle are separated.

The means for admitting the air is shown in Fig. 6 as a rotary valve 72 mounted in the casing 73 on top of the cylinder head 54.

The casing 73 has a port for the pipe 74 which supplies the compressed air for operating the piston 51 and expelling the metal from the pouring pot 20. It also has ports for the pipe 59 which is connected to the pouring pot, for the vent 75 which has a restricted opening to the atmosphere, for the pipe 55 which is connected to the cylinder 50, and for the pipe 76 which is open to the atmosphere.

In the position of the valve shown in Fig. 6, the act of pouring has been accomplished, and the compressed air in the pouring pot 20 has been exhausted to the atmosphere through the pipe 59 and the vent 75. The cylinder 50 has been exhausted through the pipe 55, and the pipe 76. The compressed air admitted through the pipe 74 is cut off from communication with any of the other pipes. A slight rotation of the valve 72 in a clockwise direction will connect the said pipe 74 with the pipes 59 and 55 for the purpose of operating the piston 51 and expelling the metal from the pouring pot 20.

At this time the exhaust ports communicating with the vent 75 and the pipe 76 are shut off. The valve 72 is formed of a rotary cylindrical slotted part, and a central flattened part 77, which is fastened to the shaft for operating the valve. This allows of a closer fit of the valve with the casing and also allows replacement of the rotary part in case of wear.

The stem 78 of the valve 72 is connected by means of a lever 79 to an operating rod 81 which is given the proper motion for controlling the valve 72. The rod 81 is joined to an enlarged plunger portion 82 which has a bearing in the bracket 83 formed on the casting 49. The lower end of the plunger projects through the platform 9. A collar 84 is attached to the plunger 82 below the bracket 83 and is provided with a shoulder 85 for engagement with the detent 86 which is pivoted on the bracket 87 bolted to the platform 9. The detent 86 is provided with an enlarged tail bent horizontally in order to cause engagement of the nose of the detent with the shoulder 85.

A pin 88 is mounted on the casting 49 and moves upward with the stem 42 when the dies 6 engage the nozzle 7 and force the furnace and attached parts, including the rod 52, bodily upward. This upward movement of the stem 42, to which the bracket 83 is attached, causes a compression of the spring 89 mounted between the bracket 83 and the collar 90 attached to the plunger 82 and the relative motion of the parts causes a clockwise rotation of the lever 79 and at-

tached valve 72 with respect to the casing 73.

The clockwise motion of the lever 79 and valve 72 relative to the valve casing 73 is produced by moving the valve casing upward while holding the end of the valve lever 79 relatively stationary. As the stem 42, which bears the valve body 73, moves upwardly, the rod 81 does not at first move with it. This rod 81 bears a collar 84 having a shoulder 85. The shoulder 85 is engaged by the detent 86 so that the rod 81 is thereby prevented from rising during the first part of the upward movement of the stem 42 and attached parts. The valve is thus opened by the difference in movement between the valve casing and the operating rod 81. After the valve has been brought to the open position by movement of the stem 42 and attached parts, further movement of these parts causes the valve to close automatically. This is accomplished by the pin 88 (see Figs. 9 and 10) which engages the tail of the detent or dog 86 and trips it out of engagement with the shoulder 85. The spring 89 then restores the valve to closed position.

At the same time that the stem 42 is moving upward, the melting pot 19 moves upward and brings the rod 66 in engagement with its seat to close communication between the pouring pot and the melting pot. This occurs before the valve 72 is sufficiently rotated to admit air to the cylinder 50 and to the pouring pot 20. Hence, during the upward movement of the furnace 3 and attached parts, the metal is shot into the dies by the action above described. As the stem 42 is raised a trifle farther the pin 88 engages the tail of the detent 86 and trips the detent, allowing the spring 89 to close the valve 72 by rotation of the arm 79 in a counter-clockwise direction.

At the same time that the air supply is shut of by the valve 72, the exhaust ports connected with the cylinder 50 and the pouring pot 20 are opened to the atmosphere. The cylinder 50 is immediately exhausted in order to close the nozzle 7 quickly. The pressure in the pouring pot 20 is released more slowly, in order to give the rod 52 time to set against the nozzle 7 and to prevent any quick release of the pressure upon the metal which may, at this time, contain some bubbles of entrained air or other gas.

The mechanism for bringing the die 6 into engagement with the nozzle 7 and thereby raising the furnace 3 and attached parts, as above described, is shown more clearly in Figs. 1, 3 and 15. A cylinder 92 is mounted on the base 1, and is supplied with compressed air from a tank 93 under the control of a valve 94 for raising and lowering the die platform 4. A piston 95 connected to the plunger 5 is closely fitted in the cylinder 92 and under the pressure of air, which can be admitted to either side, the platform 4 may be moved up or down, as desired.

The rotary valve 94 is controlled by means of the handle 10 which is placed within convenient reach of the operator. The handle 10 is connected by a rod 21 with the lever 30 of the valve 94.

In Fig. 22 I have illustrated a modified form of controlling handle 139 rigidly mounted on the rod 21. A rack 140 is arranged to be engaged by the latch 141 which is pivoted on the handle 139.

The die platform 4 has bearings on the columns 2 for guiding its movement to bring the die 6 into alinement with the nozzle 7. Suitable dash pots 96 may be provided for controlling both the upward and downward movements of the platform 4 in order to prevent banging of the parts together. These dash pots may be in the form of hydraulic cylinders having regulable ports for governing the speed of the platform. The rotary valve, shown in section in Fig. 15, comprises a stem 97, upon which is mounted the valve proper 98. The casing 99 has connections by the pipe 100 to the air tank 93, to the upper end of the cylinder 92 by means of the pipe 101, and to the bottom of the cylinder by means of the pipe 102 as shown in Fig. 1. When one of the pipes 101, 102, is connected to the air supply, the other is connected to the exhaust pipe 103, which discharges into a muffler 104.

In order to strip the castings from the dies it is necessary to open the dies. This is accomplished in the present machine by mechanism automatically operated by raising and lowering the die platform.

On the platform 4, are mounted a series of four slides arranged at the four sides of a rectangle. These slides 105, 106, 107, and 108 are mounted on dove-tailed ways 109, which guide the slides in the proper direction. Each one of the slides is connected to a pair of levers 110 passing down through slots in the platform to a roller 111, to which the lower ends of each pair are attached. These rollers play in guide brackets 112, which are bolted to lugs on the cylinder 92. Each pair of levers is fulcrumed upon a bracket 113 (see Fig. 18) which brackets are so mounted as to allow an adjustment of the initial and final position of the levers.

Dove-tailed ways 114, similar to the ways 109, are mounted on the bottom of the platform 4. The brackets 113 are slidably mounted on the ways and their position may be adjusted by means of the collar bolt 115, and the nut 116 fastened by the bracket 113. A friction piece 117 controlled by a set screw 119 clamps the bracket 113 in any desired position upon the ways 114 To adjust the

fulcrum of the levers 110, the friction piece 117 is released by releasing the set screw 119 whereupon the bracket may be moved upon the ways 114 in either direction by suitable rotation of the collar bolt 115. After the desired position has been reached, the set screw 119 is tightened up to prevent strain on the collar bolt. The upper ends of the levers 110 are connected by links 120 to the slides 105, 106, 107 and 108.

It can now be seen that upward movement of the platform 4, which carries with it the fulcrums of the levers 110, will cause the slides to move lengthwise in accordance with the guide brackets 112. Thus the dies 6, 6, are closed together by the upward movement of the die platform, and are held in such relation by the levers 110, while the rollers 111 are traveling along the vertical part of the guides.

Upon lowering of the platform, the dies are separated and the casting may be stripped from them.

In Fig. 2 I have shown one manner in which this stripping may be accomplished. The die blocks are perforated, and a number of rods 121 are fitted into these perforations so as to fill them completely. The rods are secured to a head 122 which is fastened to a plunger 123. The plunger 123 projects through a bracket 124, and is provided at its outer end with a collar 125. A spring 126 is held between the bracket 124 and the collar 125 in order to hold the ends of the rods 121 flush with the inner surface of the mold when the dies are closed.

Upon separation of the dies, the plunger 123 strikes the stop bracket 127 which is bolted to the ways 109. The rods are thus held stationary while the die is retracted. As a result, the casting is stripped from the mold.

In Fig. 17 I have shown in cross section the dies 6 for forming a Venturi tube with a collar, such a casting as might be employed in carbureters. The manner of stripping the casting from the die is apparent when taken in connection with the description of Fig. 2.

In Figs. 12, 13 and 14 I have illustrated the manner in which a casting having recesses may be formed. In this case, the slides 106 and 108 carry the dies 6 and the slides 105 and 107 carry the core plungers 128 which fit into openings in the dies 6. The core plungers 128 are mounted upon dove-tailed slides 129 fastened in suitable blocks 130 upon the slides 105, 107 as shown in Fig. 14. Instead of employing a plurality of stripping rods 121, a single stripping rod 121 is employed for each die, and a lost motion connection formed by the nuts 131 fastened upon the threaded part of the rods 121 takes the place of the spring 126.

It can now be seen that it will be necessary for the dies 6 to be moved into place before the core plungers 128 are inserted in the openings in the dies 6. To accomplish this, suitable cam guides 112 must be provided so that the levers 110 governing the slides 106 and 108 will bring these parts together before any motion of the levers 110, governing the slides 105 and 107, takes place.

In Fig. 16 I have illustrated a manner in which the shield 12 is operated. A plurality of standards 132 are mounted on the die platform 4 and are moved therewith. Upon the upper end of these standards, pulleys 133 are mounted. A sliding sleeve 135 is mounted on each one of the rods 11, and the shield 12 is attached to each one of the sleeves. A flexible cable 136 is attached at one end to the shield 12 as by means of the thumb screw 137, and the other end of the cable is attached by means of an eye 138 to the base 1.

It can now be seen that upward movement of the standard 132, bearing the pulley 133 will cause a movement of the shield 12 at twice the speed of that of the pulley 133, whereby the shield will be brought quickly into place when the dies are brought against the nozzle 7 and the shield will quickly be lowered out of the way when the dies are separated from the nozzle.

The operation of the machine may be briefly set forth as follows: The control handle is operated to raise the die platform. This brings the dies together as they are controlled by the levers 110 playing in the guide brackets 112. Continued upward movement of the die platform brings the dies into engagement with the nozzle 7. The entire furnace and control mechanism is moved upward on the columns 2 against the tension of the springs 8.

The communicating port between the melting pot and the pouring pot is then closed by the first movement of the furnace and connected mechanism. Thereafter the valve, shown at the top of Fig. 1, is operated to admit air to the cylinder 50, and to the pouring pot 20. This opens the nozzle 7 and metal is shot into the mold by the action of the compressed air from the tank 60. Further upward movement releases the valve and shuts off the compressed air, allowing the cylinder 50 and the pouring pot 20 to exhaust to the atmosphere. The operator then moves the handle 10 to admit air to the top of the cylinder 92, and the die platform is moved downward.

The nozzle 7 is closed by the rod 52 upon the exhaust of the air from the cylinder 50. As soon as the dies 6 disengage the nozzle 7, the passage between the pouring pot and the melting pot is again opened and the pouring pot is filled with hot metal. Continued downward movement of the die plat-

form withdraws the core plungers from the dies, opens the dies and then strips the casting from the mold. This operation may be repeated continuously and produces castings of a high grade in a minimum space of time. The operator is protected at all times, first by the fact that there is no pressure upon the melting pot, and second, by the fact that when pressure is placed upon the pouring pot the shield is in such a position that no metal can escape from the dies or the nozzle and even if the pouring pot should break no injury would be likely to result as there is only metal for a single casting under pressure and this is entirely inclosed by a fire brick furnace which would prevent the escape of any of the hot metal.

The nozzle may be kept clean after each casting by merely brushing the same either with a scoop or a brush.

There is no danger of an accidental operation of the valve controlling the air pressure, inasmuch as the same is dependent upon the dies being properly in place and raising the furnace and connected apparatus. That is, the valve can be tripped only by the actual operation of the machine, and even the most careless operator is not likely to be injured. The operation of the machine by compressed air gives a smooth and easier operation than would be possible by means of gears.

Instead of moving the dies into engagement with the nozzle, the nozzle may be moved against the dies. I consider that mere reversal of parts or mere reversal of relative movements of parts constitutes in itself no departure from my invention.

While I have described my invention with reference to the details of this particular embodiment, I do not intend thereby to limit my invention, but consider the same to be broadly new, and desire that the appended claims be construed as broadly as possible.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a die casting machine, a melting pot containing hot metal, a pouring pot, a die mold automatically controlled, means to fill said pouring pot from said melting pot, manually controlled means to connect said die mold and said pouring pot, and automatically controlled means for subjecting the metal in said pouring pot to pressure only while the die mold and pouring pot are connected.

2. In a die casting machine, a melting pot, a pouring pot connected to said melting pot, a valve between said melting pot and pouring pot, a die mold, means to connect said die mold with said pouring pot, a valve for said connection, and mechanism operated by the connection of said die mold to said pouring pot for closing said first valve and opening said second valve.

3. In a die casting machine, a melting pot, a pouring pot connected to said melting pot, an opening connecting said melting pot and said pouring pot, a valve for closing said opening, a die mold, means to connect said die mold with said pouring pot, a valve for said connection, mechanism operated by the connection of said die mold to said pouring pot for closing said first valve and opening said second valve, and means for applying pressure to said pouring pot.

4. In a die casting machine, a base, a die platform, dies movably mounted on said platform, a pouring pot having a nozzle for connection with said dies, a valve for controlling said nozzle, supporting means yieldingly supporting said nozzle on said base, a melting pot, an opening between said melting pot and said pouring pot, means to move said die platform to bring said dies and said nozzle into engagement, and means controlled by the engagement of said dies with said nozzle for closing said valve.

5. In a die casting machine, a base, standards mounted on said base, a pouring pot having a nozzle mounted on said standards, a die platform carrying a die mold, means to cause said die mold to engage said nozzle, a melting pot having a connection with said pouring pot, a valve in said connection, said valve closed by the engagement of said mold, with said nozzle, and means controlled by the engagement of said mold with said nozzle for applying pressure to said pouring pot.

6. In combination, a base, guides mounted on said base, a pouring pot having a nozzle mounted on said guides, springs to hold said pouring pot against movement on said guides, a die platform carrying a die mold for engagement with said nozzle to move said pouring pot against the tension of said springs, means controlled by the movement of said pouring pot for applying pressure to the interior thereof to discharge the metal into the die mold.

7. In combination, a base, guides secured to said base, a pouring pot slidably mounted on said guides, springs to restrain movement of said pouring pot, a nozzle connected to said pot, said nozzle having a valve controlled opening therein, a die platform movable on said guides, dies on said platform, means adapted to bring said dies into engagement with said nozzle, and to move said pouring pot, and means set into action by engagement of the dies with said nozzle to subject the metal in said pouring pot to a high pressure.

8. In combination, a base, guides secured to said base, a pouring pot slidably mounted on said guides, springs to restrain movement

of said pouring pot, a nozzle connected to said pot, said nozzle having a valve controlled opening therein, a die platform movable on said guides, dies on said platform, means to bring said dies into engagement with said nozzle and to move said pouring pot, and means set into action by engagement of the dies with said nozzle to subject the metal in said pouring pot to a high pressure, a melting pot, and means to fill said pouring pot therefrom upon the disengagement of said dies and said nozzle.

9. In a die casting machine, a base, guides mounted on said base, a pouring pot having a nozzle slidably mounted on said guides, a melting pot, a valve for admitting metal to said pouring pot from said melting pot, a valve for admitting air pressure to said pouring pot, and a valve for discharging said metal from said pouring pot, a die platform having a die mold thereon, means to bring said die mold and said nozzle into engagement, and means actuated by the engagement of said die molds with said nozzle for controlling said valves.

10. In a die casting machine, a base, a plurality of guides mounted thereon, a pouring pot having a discharge nozzle mounted on said guides, springs for holding said pouring pot against movement, a die platform having a die mold thereon, means to bring said die mold into engagement with said nozzle and to move said pouring pot against the tension of said springs, and means controlled by the movement of said pouring pot for discharging the metal therefrom into the die molds.

11. In combination, a base, a plurality of guides mounted on said base, a die platform carrying a die mold, said platform being movable on said guides, a pouring pot having a nozzle, means to move said die platform on said guides to bring said mold and nozzle into engagement, a shield, and means operated by the movement of said die platform to move said shield into proximity to said nozzle.

12. In combination, a base, guides mounted on said base, a platform on said guides, a die mold on said platform, a shield surrounding said guides, pulleys supported by said platform, cables connected to said shield at one end and to said platform at the other end, and passing over said pulleys for moving said shield to inclose said mold upon the movement of said platform.

13. In combination, a plurality of guides, a pouring pot having a nozzle, a die platform having dies thereon, said platform being movable on said guides, a shield for inclosing said dies, means to move said die platform on said guides to bring said nozzle and said dies into engagement, and means to move said shield at a greater speed than said platform to cause said shield to inclose the dies.

14. In combination, a base, guides supported by said base, a die platform mounted on said base and movable longitudinally with respect to said guides, said platform bearing a die mold, an air cylinder having its axis parallel to said guides and having a piston for moving said platform longitudinally along said guides and cam controlled means for causing said die mold to close up upon movement of said platform along said guides.

15. In combination, a plurality of longitudinal guides, a die platform movable into and out of pouring position along said guides, said platform carrying a separable die mold thereupon, levers for moving said parts together, an air cylinder parallel to said guides for moving said platform along said guides, and cam guides for moving said levers to close said mold, when the platform is moved to bring the mold into pouring position.

16. In combination, a plurality of guides, a die platform carrying a separable die mold thereupon, levers for moving said parts together, an air cylinder for moving said platform, cam guides for moving said levers to close said mold, and a hydraulic plunger for governing the speed of said platform.

17. In combination, a base bearing an air cylinder, a plurality of guides mounted on said base, a die platform having slidable members mounted thereon, said members movable in the same plane, levers for moving said slidable members, dies mounted on said slidable members, and cam guides for said levers for moving said slidable members to close said dies.

18. In a die casting machine, a die platform having a plurality of slides thereon, levers for moving said slides, fulcrums for said levers mounted on said platform, and means to adjust the position of said fulcrums on said platform.

19. In combination, a plurality of guides, a base supporting said guides, die members slidably mounted on said guides, a pouring pot movably mounted on said guides, springs for resisting movement of said pouring pot, a nozzle for said pouring pot adapted to be engaged by said dies, a stationary bracket, a valve rod connected to said bracket, a melting pot, a connection between said melting pot and said pouring pot, said valve being closed by the relative movement of said pouring pot and said valve rod upon the engagement of said dies with said nozzle.

20. In combination, a plurality of guides, a base supporting said guides, die members slidably mounted on said guides, a pouring

pot on said guides, springs for holding said pouring pot, a melting pot connected to said pouring pot, a stationary bracket, a valve rod connected to said bracket, a port between said melting pot and said pouring pot, a valve for closing the nozzle of said pouring pot, an air chamber, a port connecting said pouring pot with said air chamber, a valve for controlling the admission of air, said valves controlled by the movement of said pouring pot, caused by the engagement of the dies with said nozzle for closing the port between said pouring pot and said melting pot, for opening said valve in said nozzle and for opening said air valve to connect said pouring pot with said air chamber.

21. In combination, a pouring pot having a discharge nozzle, a melting pot having a port connected to said pouring pot, valve mechanism for closing said port, a valve normally closing said discharge nozzle, a pressure pipe and an air tank connected to said pouring pot, and means controlled by the connection of a die mold with said nozzle for causing said valve mechanism to close the port between said melting pot and said pouring pot, and thereafter applying pressure to said pouring pot and opening the valve in said discharge nozzle.

22. In combination, a plurality of guides, a die mold movably supported on said guides, a pouring pot mounted on said guides, a melting pot supported on said guides and having a port connected with said pouring pot, a nozzle for said pouring pot for engaging said die mold, a valve for said nozzle, a pressure pipe connected to said pouring pot, means to apply pressure to said pouring pot through said pressure pipe, means to open the valve of said nozzle, said pressure applying means and said nozzle valve opening means being operated by movement of said die mold into engagement with said nozzle, and means for automatically exhausting said pressure from said pouring pot and for closing said nozzle.

23. In combination, a pair of guides, a die mold movably supported by said guides, a pouring pot movably supported on said guides, a melting pot connected to said pouring pot, said pouring pot having a discharge nozzle, means to bring said die mold into engagement with said discharge nozzle, means to apply pressure to said pouring pot and to open the valve of said nozzle for filling said die mold, automatic means operated by the engagement of said die mold with said nozzle for releasing the pressure on said pouring pot and for closing said valve.

24. In combination, a pouring pot, guides for supporting said pouring pot, springs for holding said pouring pot against movement, a melting pot having a port connecting with said pouring pot, a stationary bracket, a valve for closing said port controlled by the relative movement of said pouring pot, and said bracket, a pressure connection for said pouring pot, a valve in said connection, means operated by relative movement of said pouring pot and said guides for opening said valve, and means controlled by further relative movement of said pot and said guides for closing said valve.

25. In combination, a plurality of guides, a pouring pot having a discharge nozzle movably supported on said guides, a supporting bracket movable with said pouring pot on said guides, a stationary platform, detent means mounted on said platform, a valve rod supported by said movable bracket adapted to engage said detent, said valve rod being operated by relative movement of said movable bracket and said stationary platform, an air pipe connected to said pouring pot, a valve in said air pipe, said valve controlled by said valve rod to admit compressed air to said pouring pot.

26. In combination, a plurality of guides, a pouring pot having a discharge nozzle movably supported on said guides, a supporting bracket movable with said pouring pot on said guides, a stationary platform, detent means mounted on said platform, a valve rod supported by said movable bracket adapted to engage said detent, said valve rod being operated by relative movement of said movable bracket and said stationary platform, an air pipe connected to said pouring pot, a valve in said air pipe, said valve controlled by said valve rod to admit compressed air to said pouring pot, a spring on said valve rod, a pin movable with said bracket to trip said detent, said valve rod being operated by said spring to close the valve.

27. In a die casting machine, a melting pot, a pouring pot having a port connecting with said melting pot, a valve controlling said port, a die mold, a port in said pouring pot for connection with said die mold, a valve controlling said last named port, means to apply pressure to said pouring pot, means controlled by the engagement of said die mold with said pouring pot for closing said first valve, and means for opening said second valve and applying pressure to said pouring pot while said first valve is closed.

28. In a die casting machine, a melting pot, a pouring pot having a port connected therewith, a normally open valve controlling said port, a die mold, a port in said pouring pot for connection with said die mold, a valve controlling said last named port, means for admitting compressed air to said pouring pot, means controlled by the

engagement of said die mold with said pouring pot for closing said first named valve, means for opening said second valve and applying air pressure to said pouring pot while said first valve is closed and automatically acting means for closing said second valve and exhausting the air in said pouring pot.

29. In combination, a pouring pot having a nozzle, die molds for engagement with said nozzle, a valve for said nozzle, a pressure connection to said pouring pot, an air cylinder for operating said valve, a control valve for admitting compressed air to said cylinder and to said pouring pot to discharge the metal from said pouring pot into said dies.

30. In combination, a pouring pot having a nozzle, a die mold for engagement with said nozzle, a valve for said nozzle, a pressure connection to said pouring pot, an air cylinder for operating said valve, a control valve for admitting compressed air to said cylinder, and to said pouring pot to discharge the metal from said pouring pot into said die mold, said valve automatically operated to exhaust the air from said cylinder and from said pouring pot.

31. In combination, a melting pot, a pouring pot, a valve for connecting said melting pot and said pouring pot, a discharge nozzle connected to said pouring pot, a source of compressed air for driving the contents of said pouring pot out of said nozzle, a valve for said nozzle, and common means for supplying fluid under pressure for operating said last named valve, and for driving the contents of said pot to said nozzle.

32. In a die-casting machine a melting pot, a pouring pot in communication with said melting pot, a die mold adapted to be connected to said pouring pot, means controlled by connection of said pouring pot with said die mold to close off the communication between said melting pot and said pouring pot.

33. In a die-casting machine a melting pot, a pouring pot normally in communication with said melting pot, a valve for closing off said communication, said pouring pot having a nozzle, and a die mold adapted to engage said nozzle, said valve being closed by engagement of said pouring pot nozzle with said die molds.

34. In combination a melting pot, a pouring pot below said melting pot and connected therewith, a passage way between said melting pot and said pouring pot, a nozzle forming an outlet for said pouring pot, a die mold, a valve for the passageway between the melting pot and the pouring pot, a valve for said outlet nozzle, means for supplying compressed air to said pouring pot, a valve for said compressed air supplying means, said valves being automatically controlled by engagement of said die mold with said nozzle.

35. In a die-casting machine, a metal containing member comprising a melting pot adapted to receive metal to be melted, a pouring pot formed axially in line with said melting pot and below the same, a wall between said melting pot and said pouring pot, said wall being axially apertured, said wall having a valve passage therein, a pipe having its end fastened in said axial passage, a discharge nozzle for said pouring pot, said discharge nozzle having a passage axially of said pot, a valve controlling the valve passage between said pouring pot and said melting pot, and a valve having a stem projecting through said pipe for closing said discharge nozzle.

36. In a machine of the class described, a pouring pot having a discharge nozzle, a cylinder having a plunger, a valve controlling said discharge nozzle, a connection between said plunger and said valve, and means for admitting a fluid under pressure to said pot for discharging the metal therein and to said cylinder for opening said valve.

37. In combination a pouring pot having a discharge nozzle, a cylinder in line with said discharge nozzle, said cylinder having a plunger, a valve controlling said discharge nozzle, a stem connecting said valve and said plunger, a spring operating on said plunger and tending to hold said valve normally upon its seat and means for admitting compressed air substantially simultaneously to said cylinder and to said pouring pot.

38. In combination, a die mold, a pouring pot having a discharge nozzle, a cylinder having a plunger, a valve controlling said discharge nozzle, a connection between said plunger and said valve, means controlled by engagement of said die mold with said nozzle for admitting fluid under pressure to said pot and to said cylinder.

39. In combination, a frame work, a pouring pot having a discharge nozzle, said pot being supported by said frame work, separable dies for forming a suitable mold, said dies being movable into engagement with said nozzle, a fluid pressure cylinder having a plunger for moving said dies into engagement with each other to form a suitable mold, a valve for said nozzle, means for subjecting the metal in said pouring pot to fluid pressure, valve means controlling said fluid pressure means, manual means controlling the movement of said plunger to cause said dies to close and to engage said nozzle, and automatic means controlled by engagement of said die mold with said nozzle for operating said valve.

40. In combination a pouring pot having a nozzle, means for filling said pouring pot, means for discharging metal from said

pouring pot, a plurality of dies, manually controlled means for closing said dies together and placing them in communication with the nozzle of said pouring pot, and automatic means for operating said filling means and said discharging means controlled by placing said dies in communication with said nozzle.

41. In combination a melting pot, a pouring pot having a nozzle, a plurality of die sections, manually controlled means for closing said die sections together and placing them in communication with the nozzle of said pouring pot, and automatic means for filling said pouring pot from said melting pot and for discharging the metal from said pouring pot into said die sections, said automatic means being controlled by engagement of the die sections with said nozzle.

42. In combination a pouring pot having a nozzle, die sections, a cylinder for closing said die sections together and for moving the same into engagement with said nozzle, a manually operated valve controlling said cylinder, a shield movable by said cylinder for inclosing said die sections and said pouring pot, and automatic means controlled by engagement of said die sections with said nozzle for discharging metal under pressure into the mold.

43. A melting pot, a pouring pot, die sections, manually controlled means for closing said die sections together and for bringing the same into communication with said pouring pot, automatic means controlled by bringing said die sections into communication with said pouring pot for discharging metal from said pouring pot into said die sections, and means controlled by disconnecting said die sections from said pouring pot for automatically filling said pouring pot from said melting pot.

44. In combination, a supporting frame, a pouring pot movable with respect to said frame, a pawl member on said frame, a source of fluid under pressure for driving the metal from said pouring pot, a valve for said pouring pot, said valve being movable with said pouring pot, an operating member for said valve, spring means normally holding said valve in closed position, a catch connected with said valve operating member, said catch being adapted to engage said pawl when said pouring pot is moved, and means movable with said pot for releasing said pawl and catch.

45. In combination a die mold, a supporting frame, a pouring pot, said pot and said die mold being relatively movable with respect to each other, a source of fluid under pressure for discharging metal from said pot into said die mold, a valve, having a movable valve element, for admitting fluid under pressure to said pot, an operating member for controlling movement of said valve element, a detent member adapted to engage and hold said operating member, and means operated during engagement of said die mold and pouring pot to release said detent member to permit said valve to close.

In witness whereof, I hereunto subscribe my name this 20th day of August, A. D. 1914.

JOHN S. GOLDBERG.

Witnesses:
LEONARD W. NOVANDER,
JOHN H. DIENNER.