Feb. 24, 1953 W. R. SCOTT 2,629,150

AUTOMATIC LEAD SEAL CASTING MACHINE

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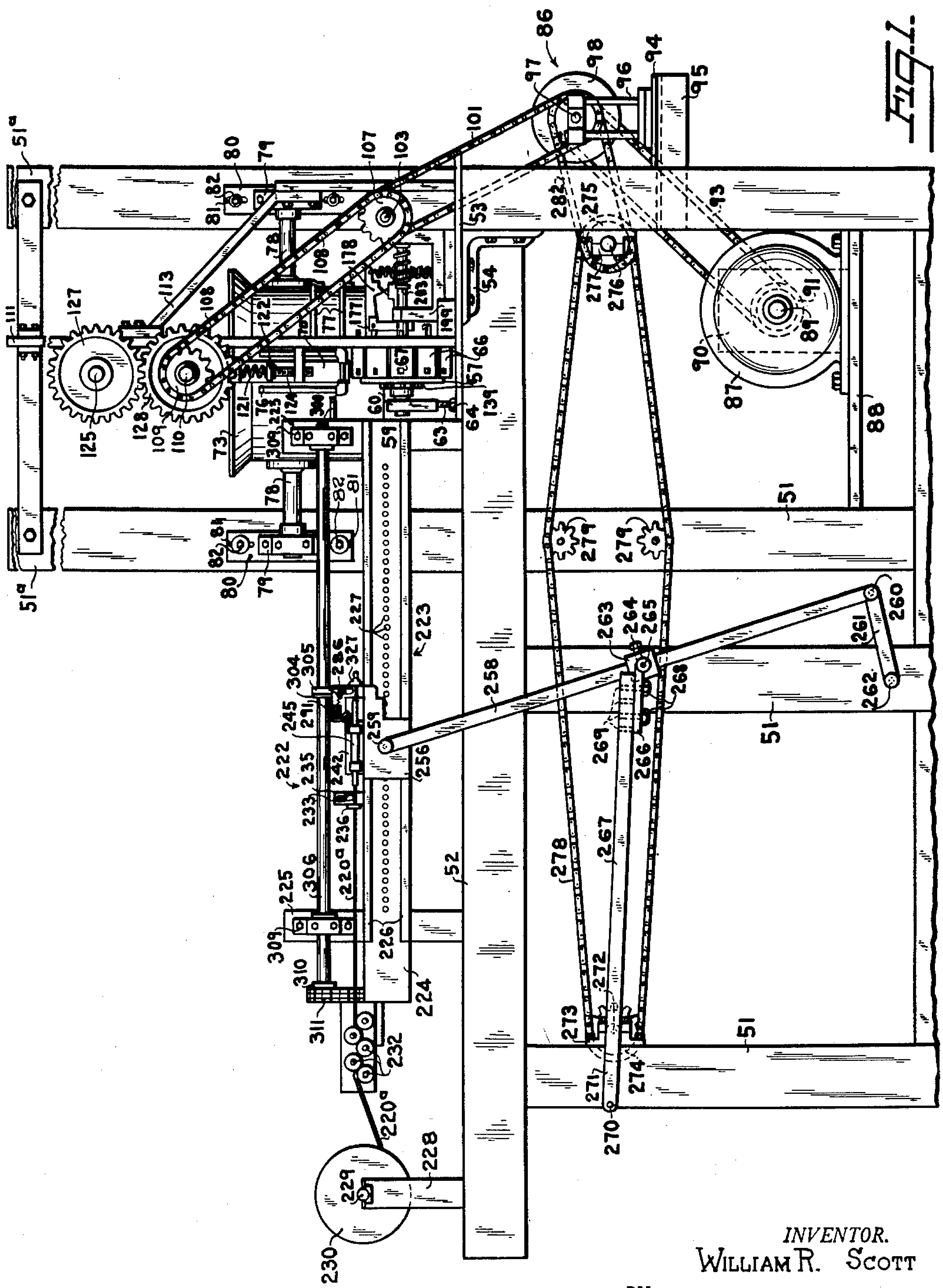

Fig. 1

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AUTOMATIC LEAD SEAL CASTING MACHINE

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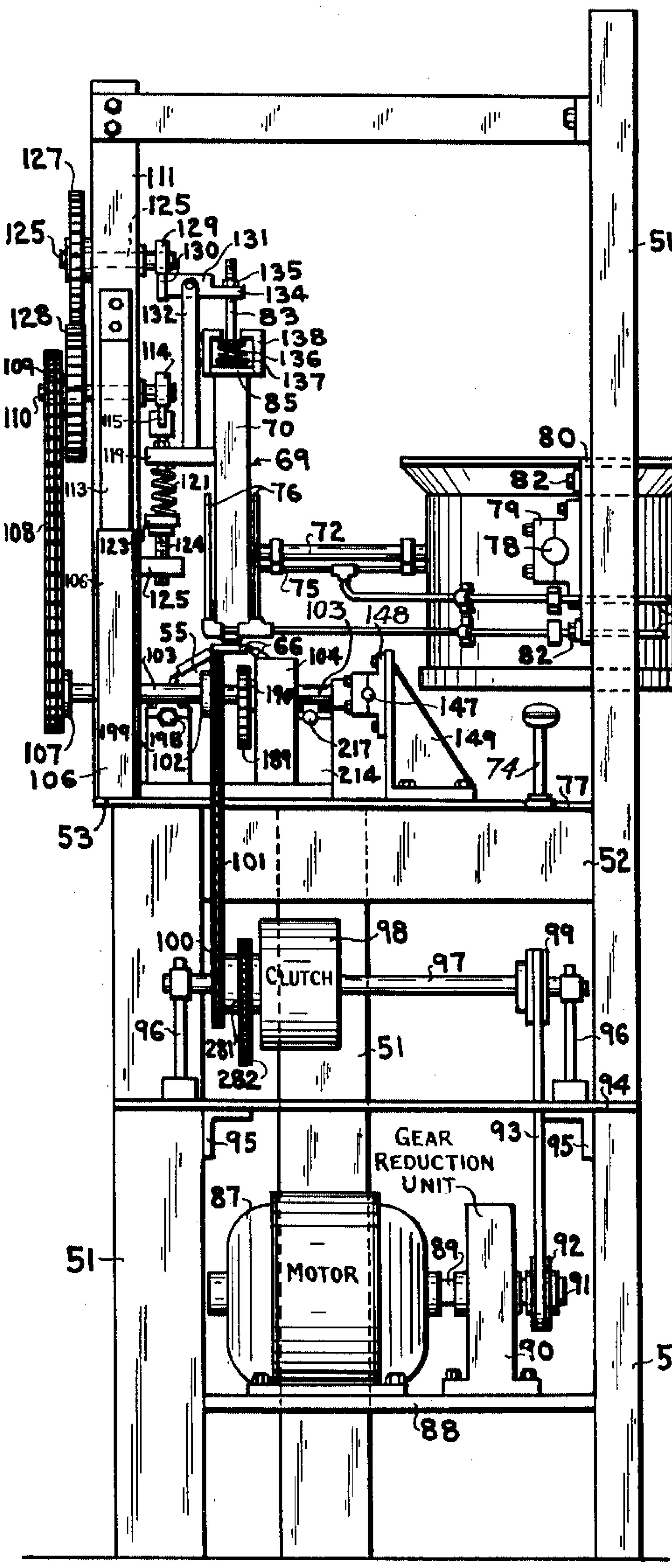

Fig. 2.

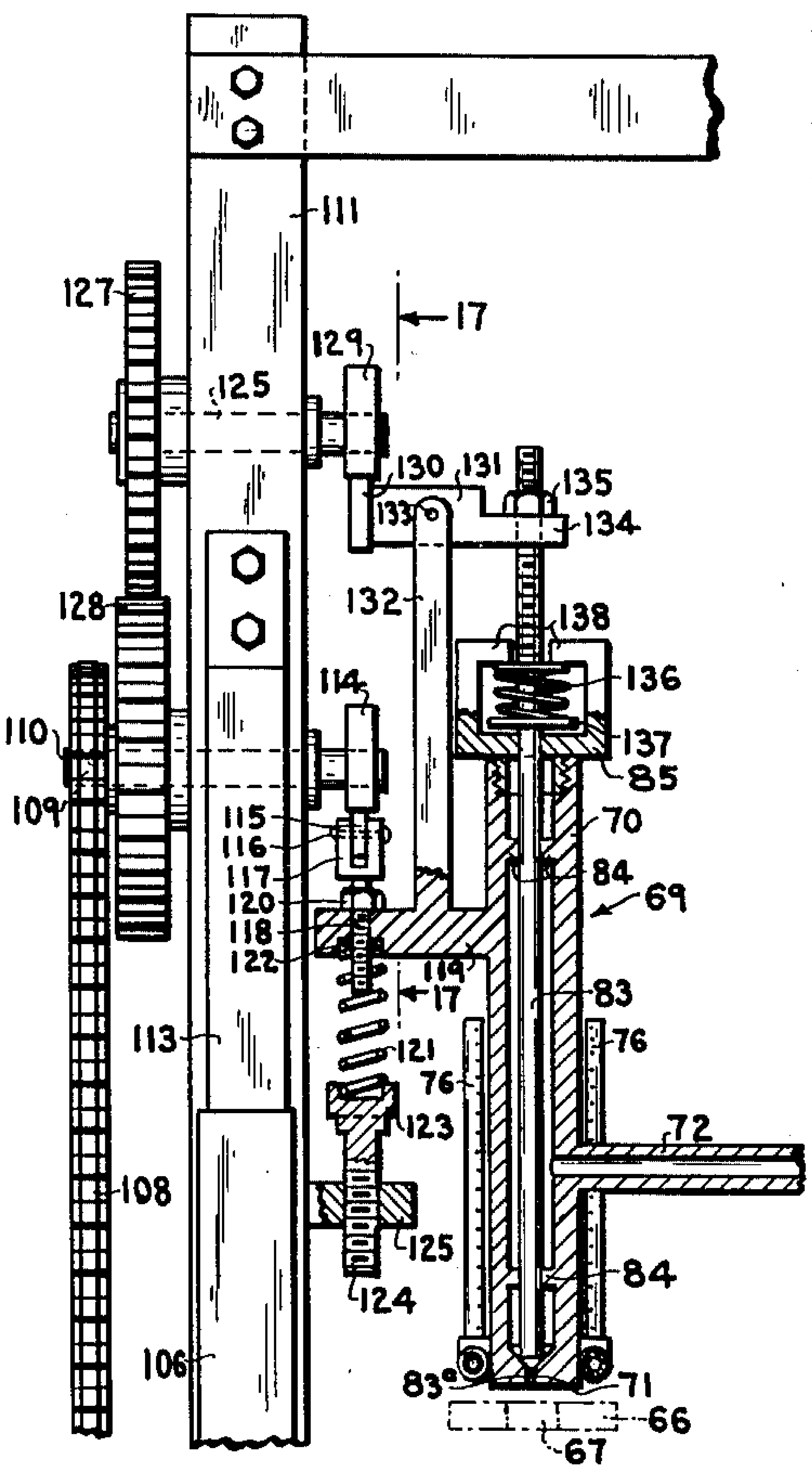

Fig. 14.

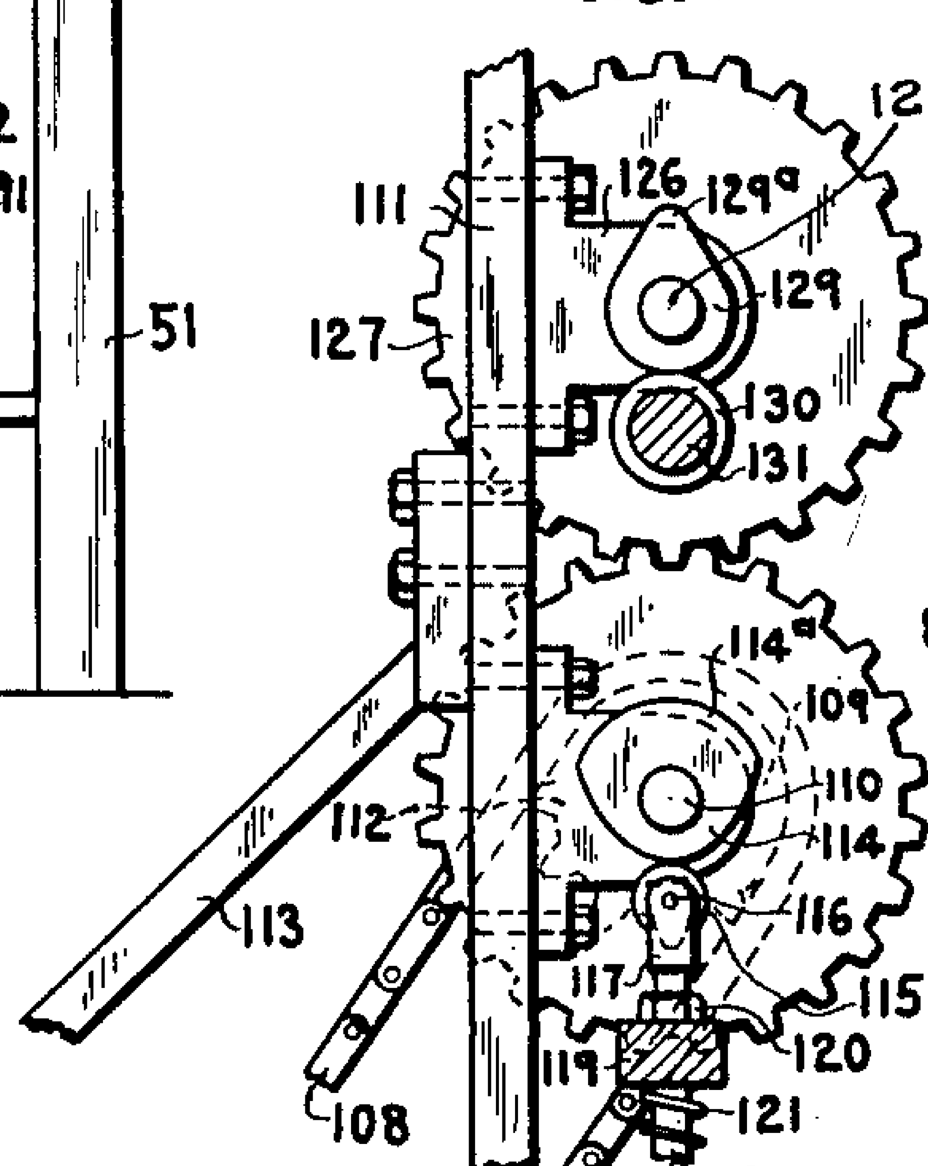

Fig. 17.

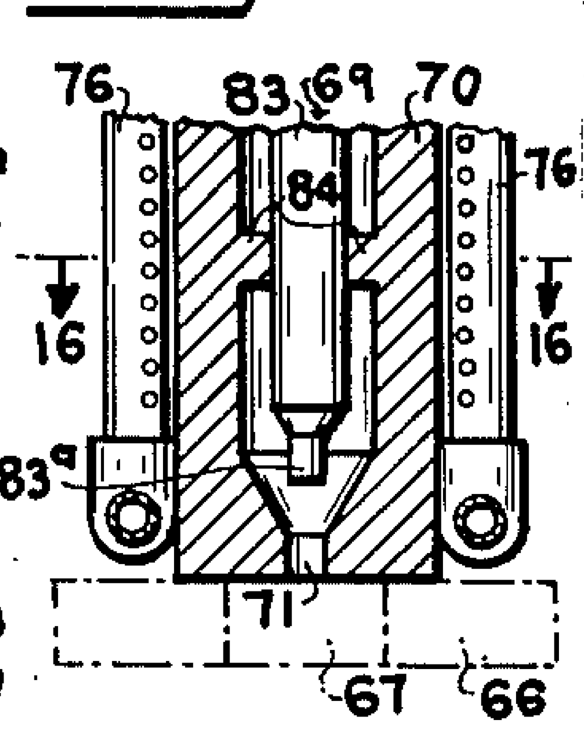

Fig. 15.

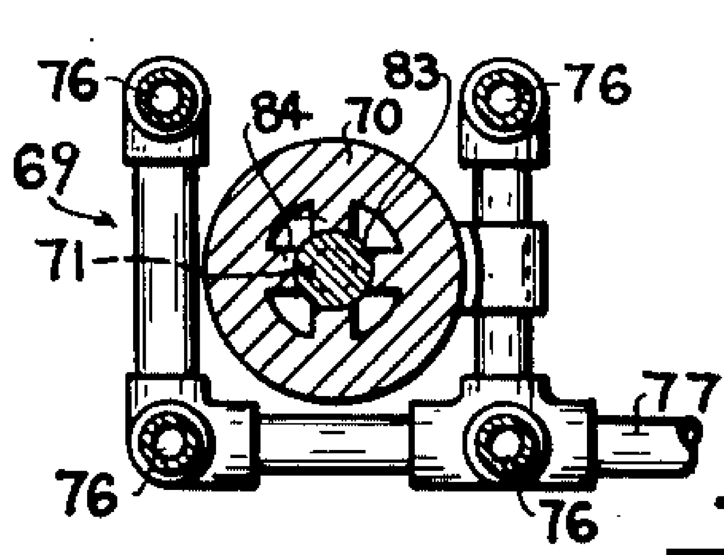

Fig. 16.

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AUTOMATIC LEAD SEAL CASTING MACHINE

Filed Nov. 27, 1948 10 Sheets-Sheet 3

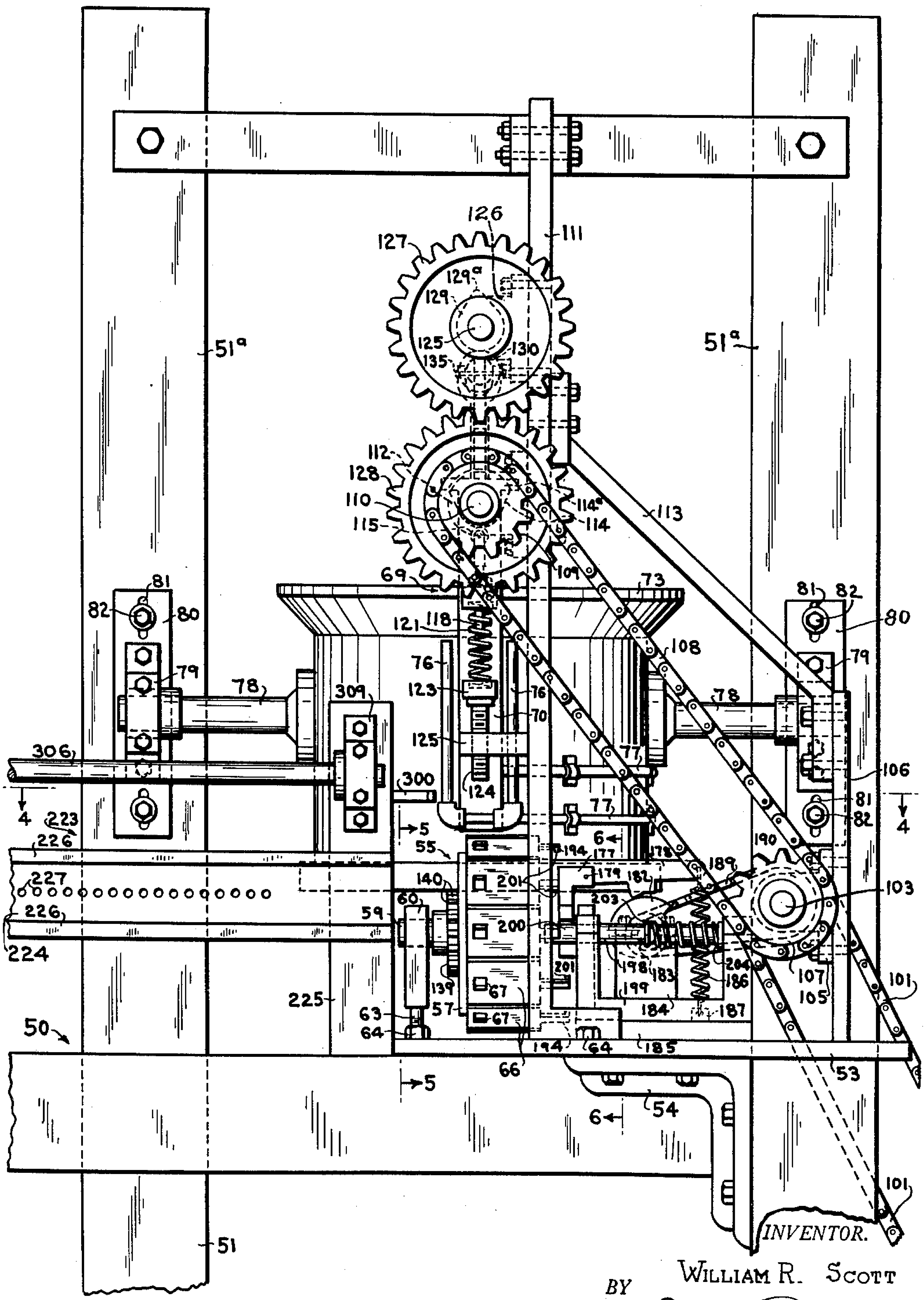

FIG. 3.

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AUTOMATIC LEAD SEAL CASTING MACHINE

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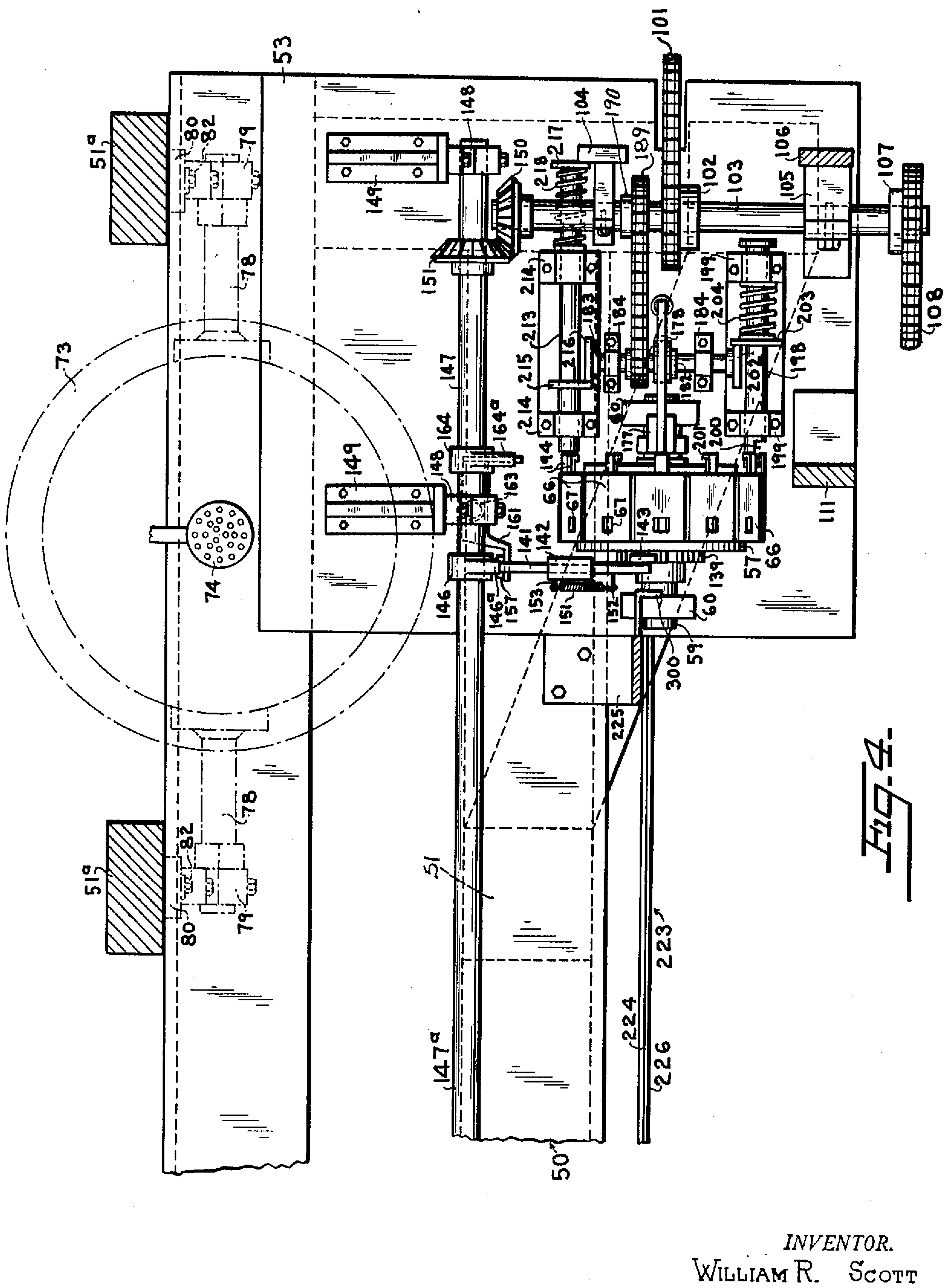

Fig. 4

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AUTOMATIC LEAD SEAL CASTING MACHINE

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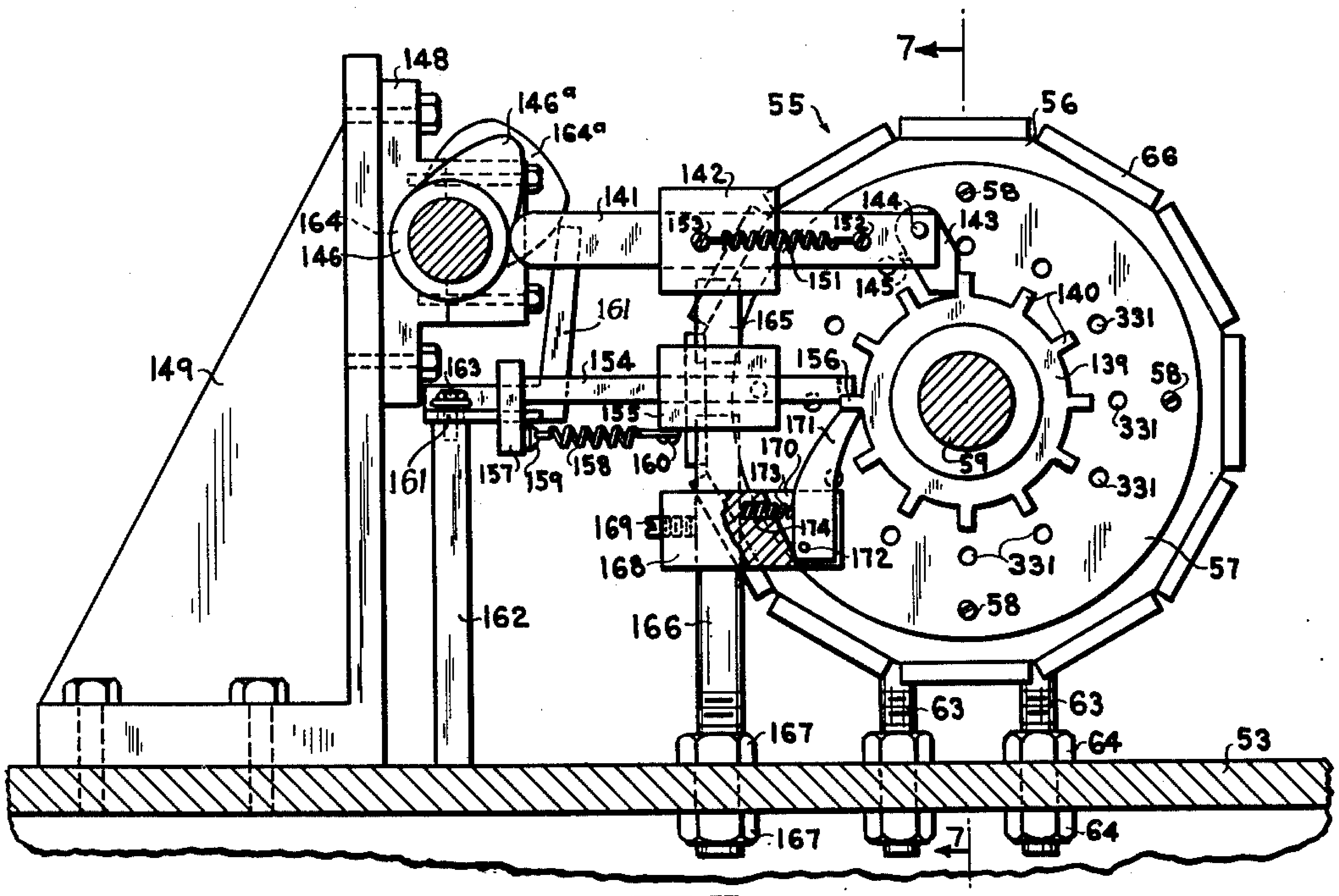

Fig. 5.

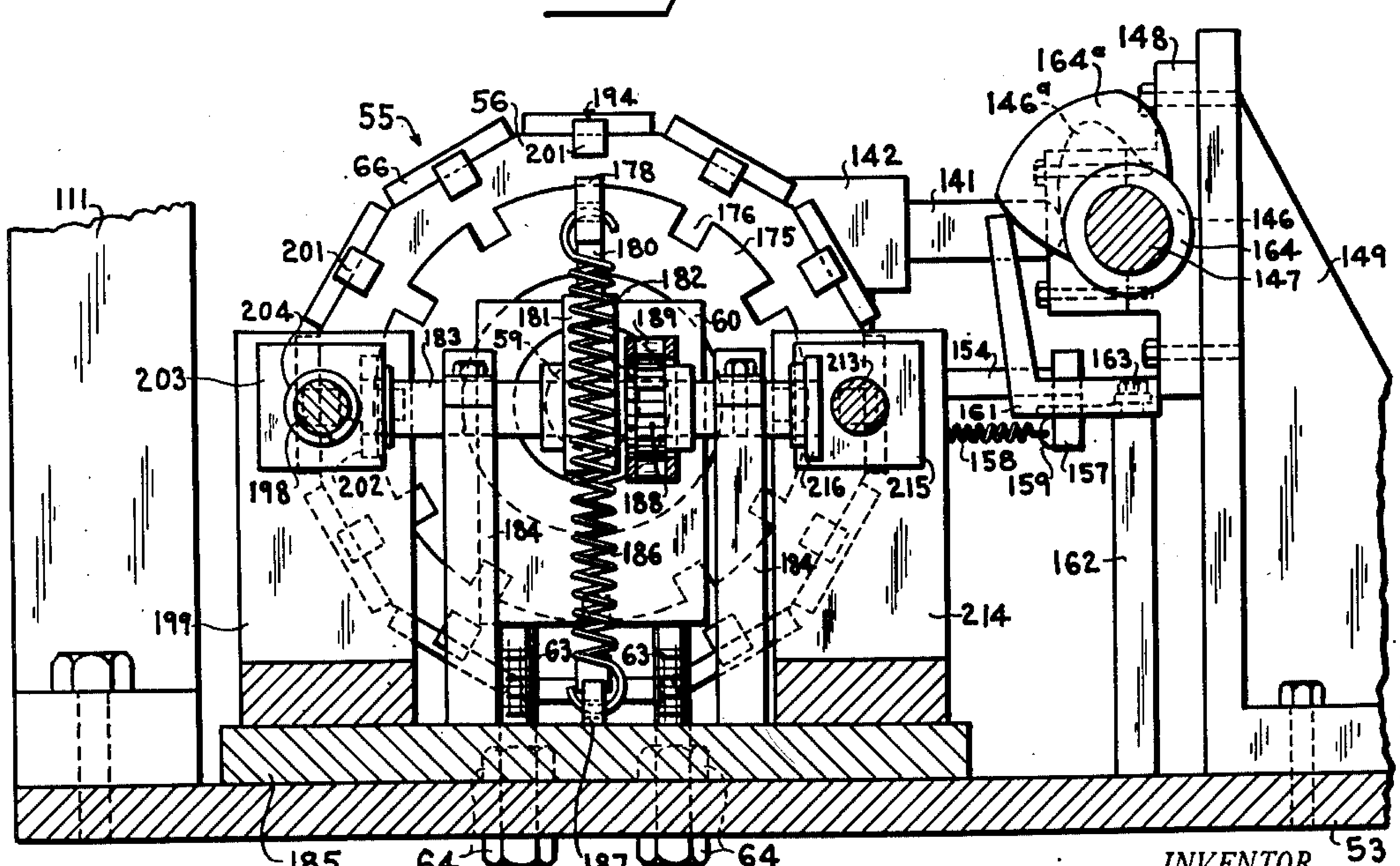

Fig. 6.

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AUTOMATIC LEAD SEAL CASTING MACHINE

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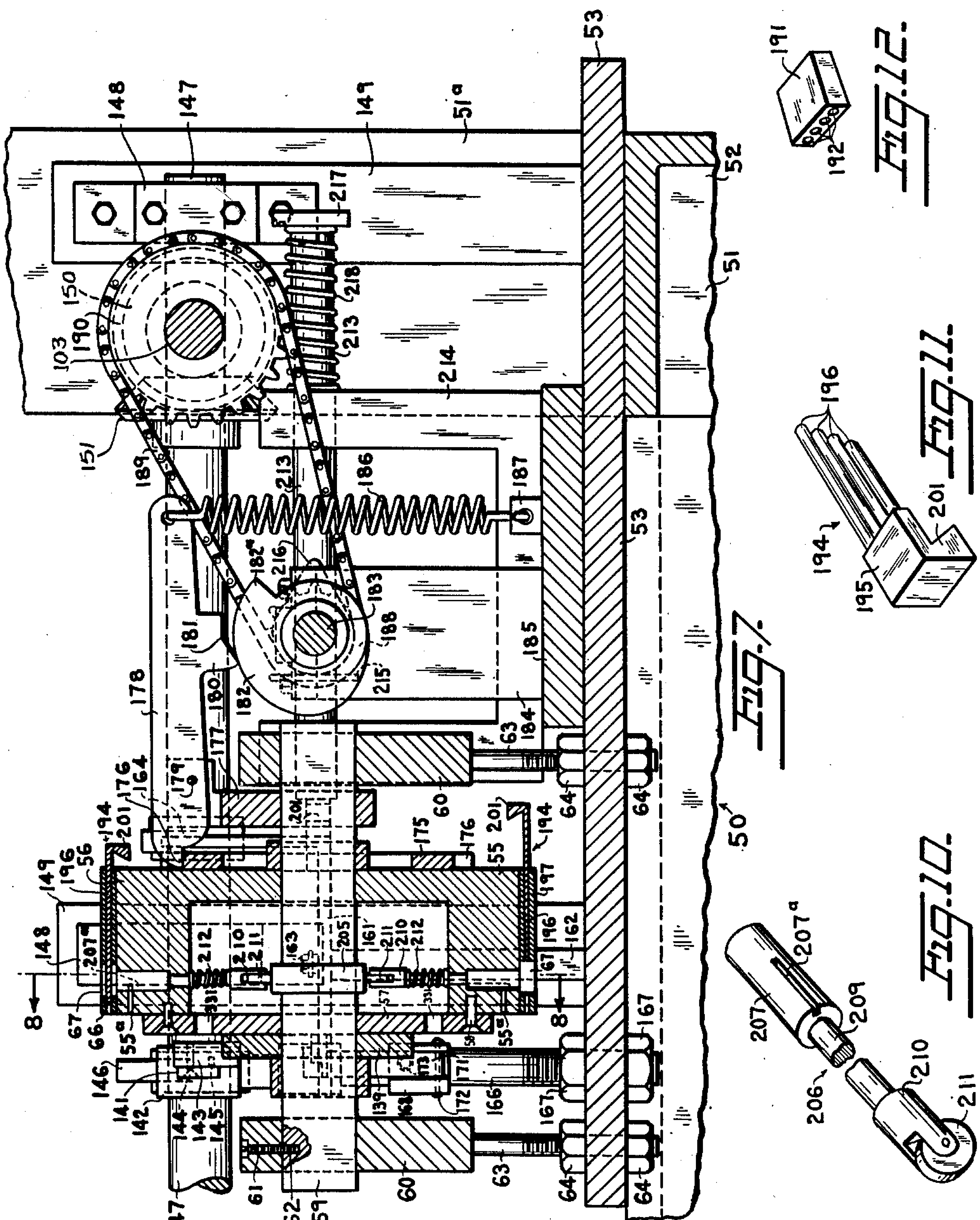

Fig. 7. Fig. 10. Fig. 11. Fig. 12.

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AUTOMATIC LEAD SEAL CASTING MACHINE

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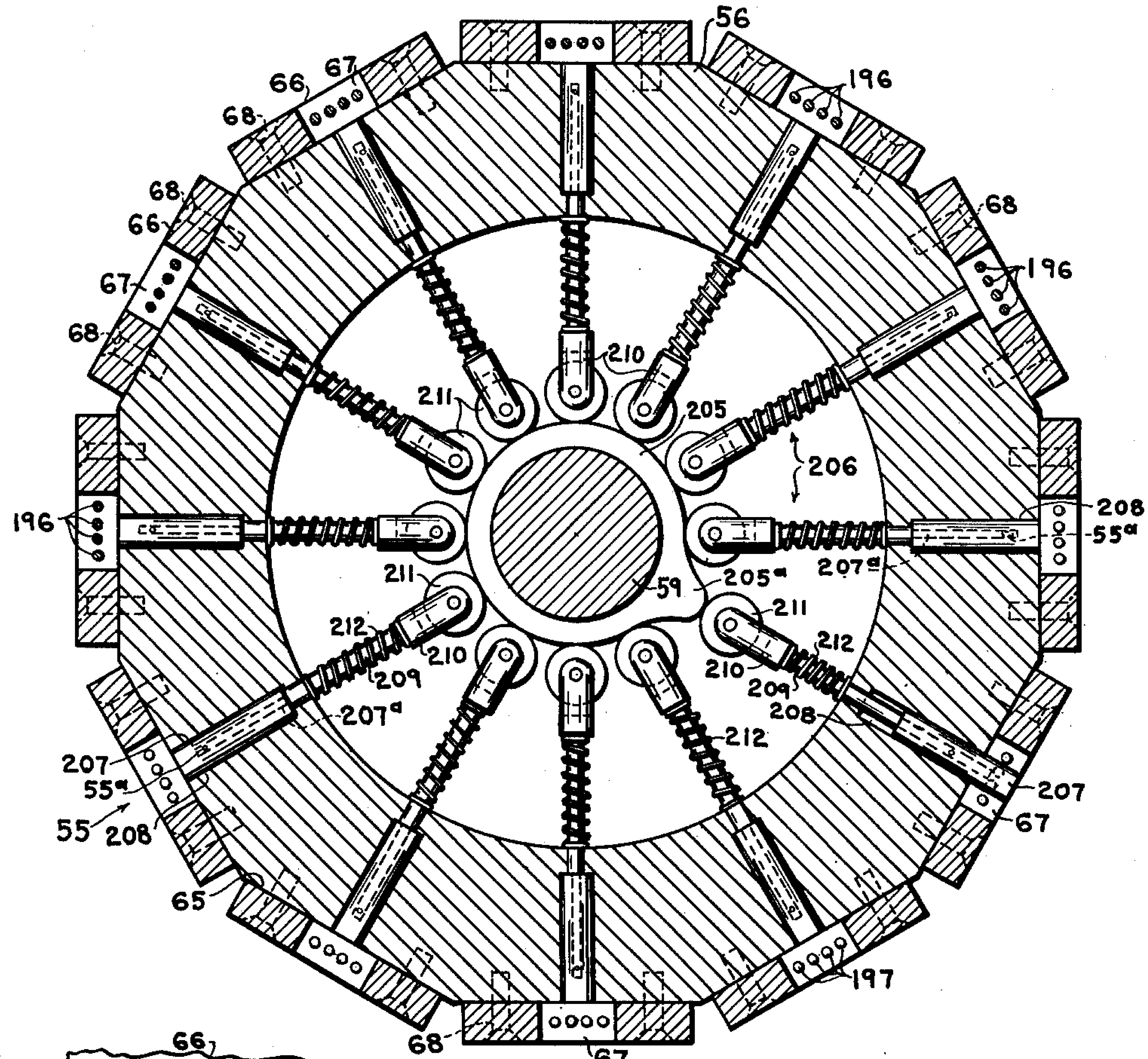

Fig. 8.

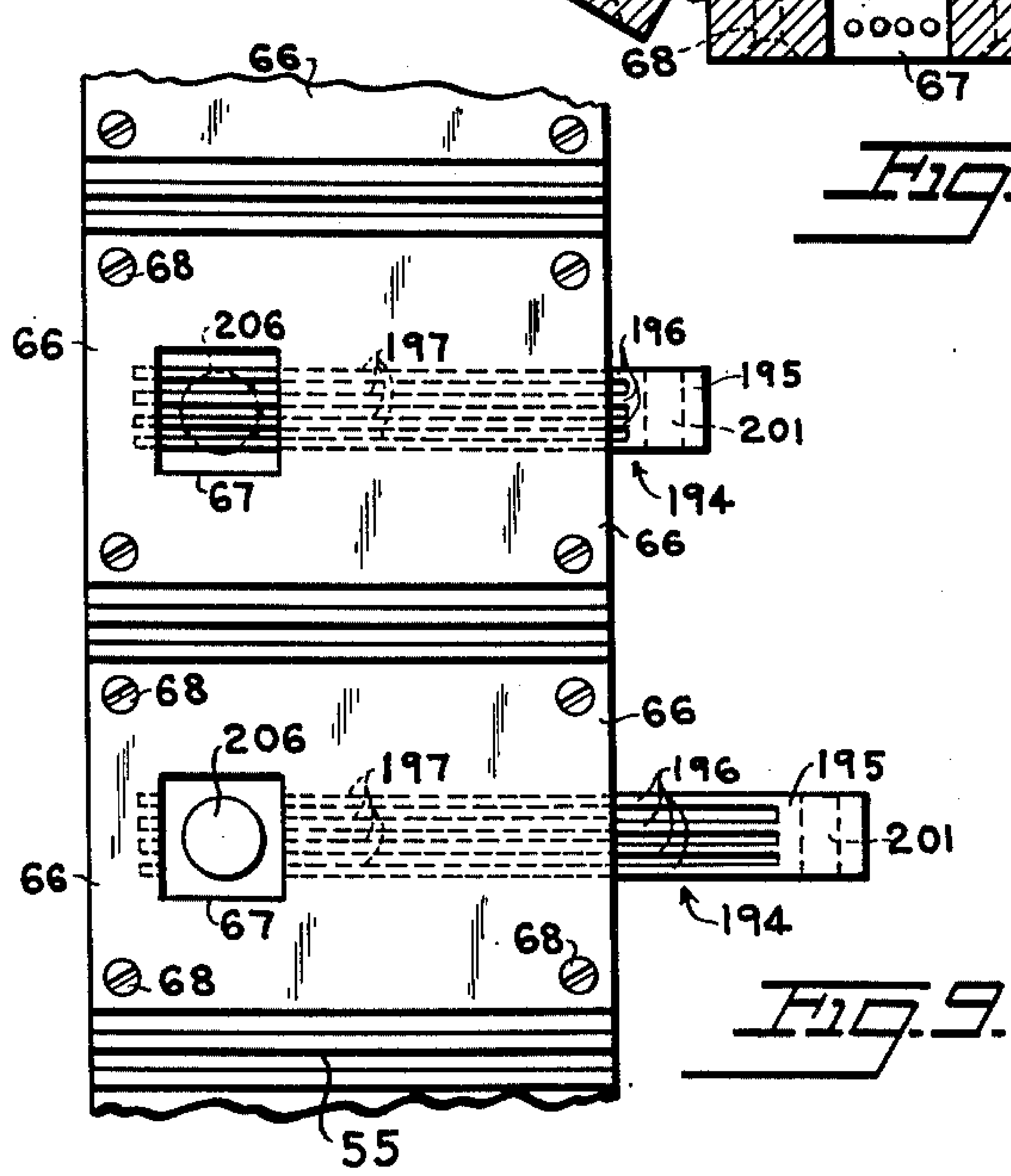

Fig. 9.

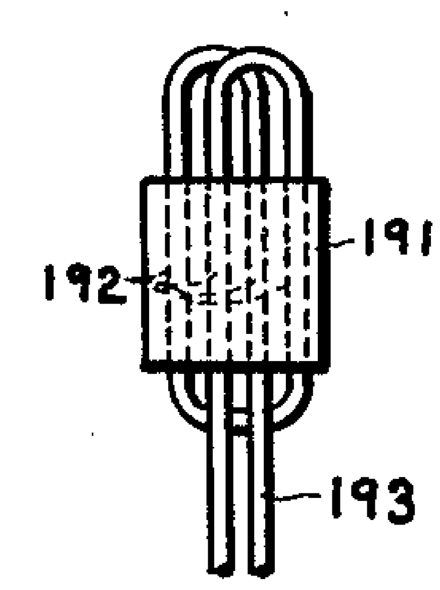

Fig. 13.

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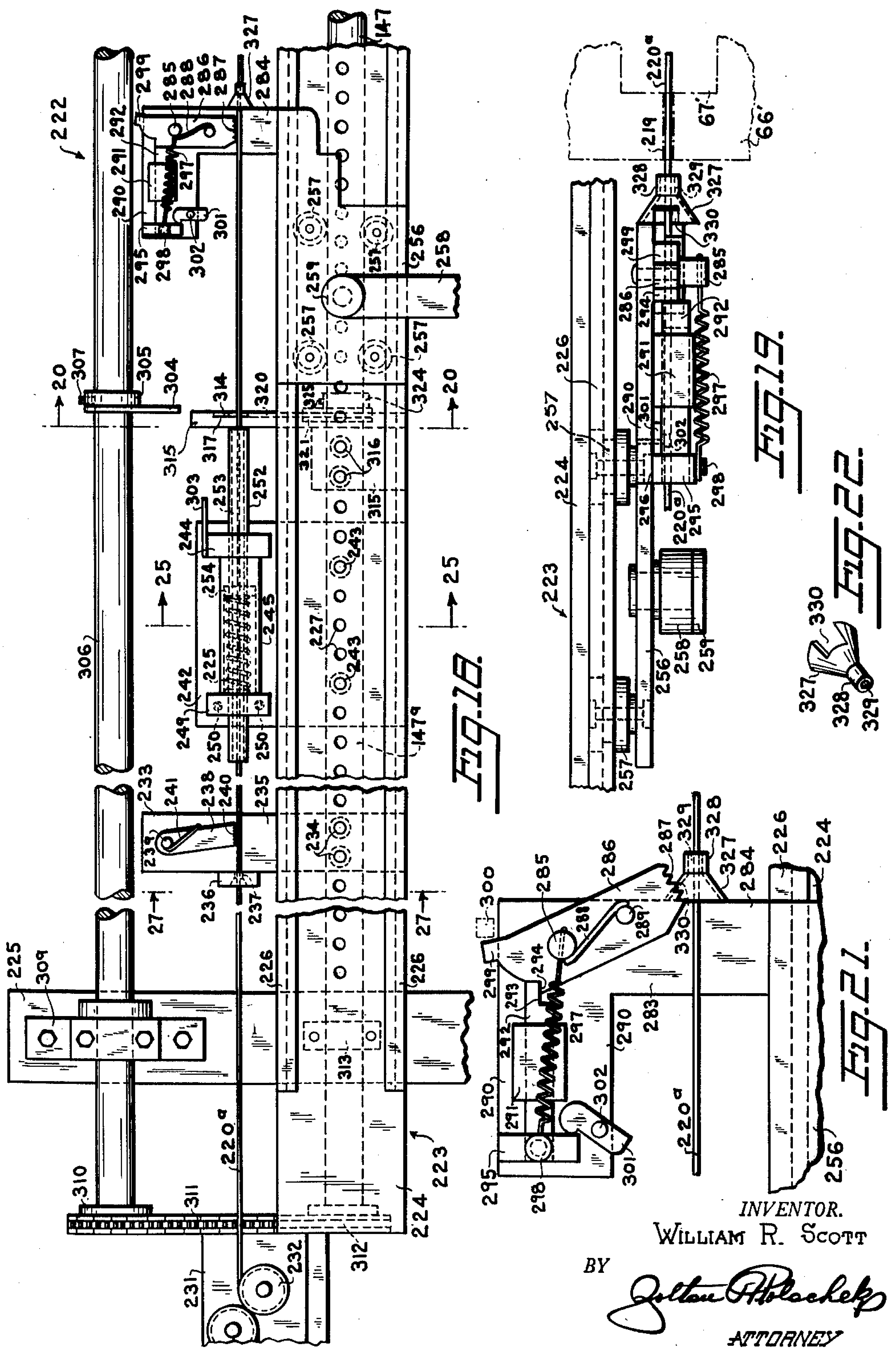

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AUTOMATIC LEAD SEAL CASTING MACHINE

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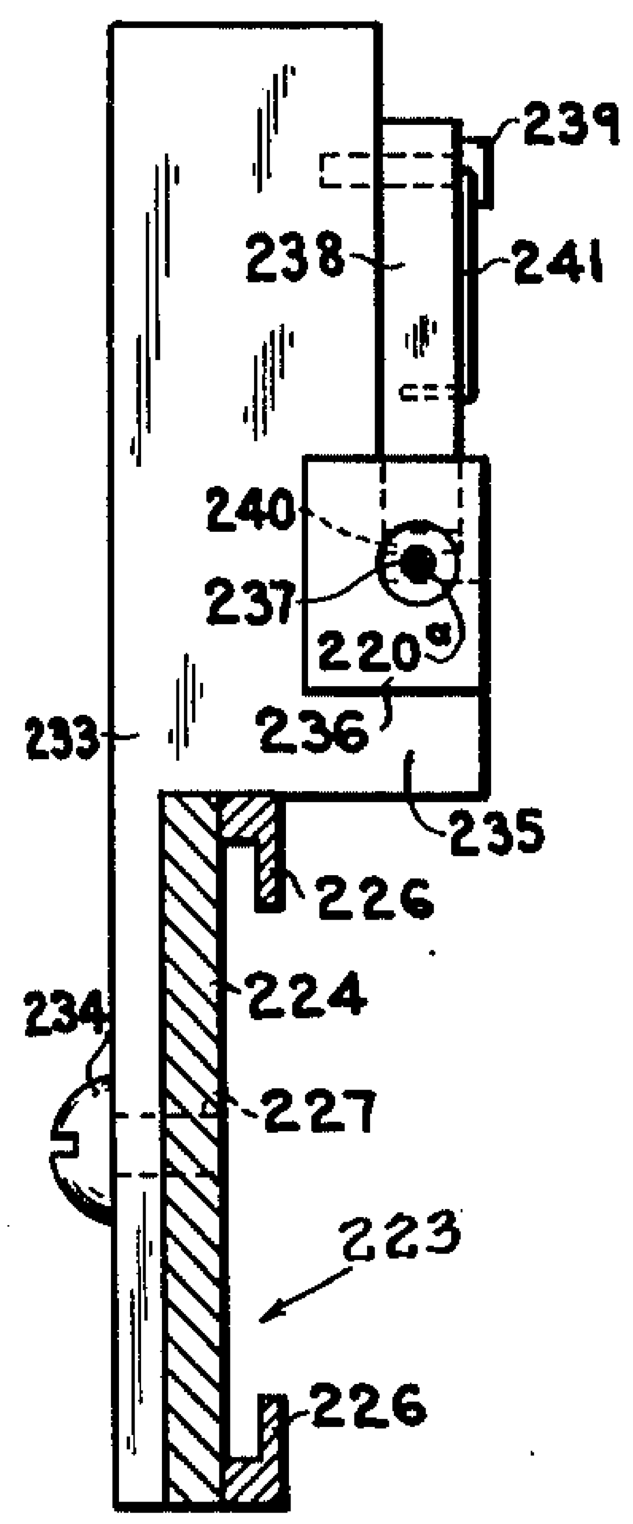

Fig. 27.

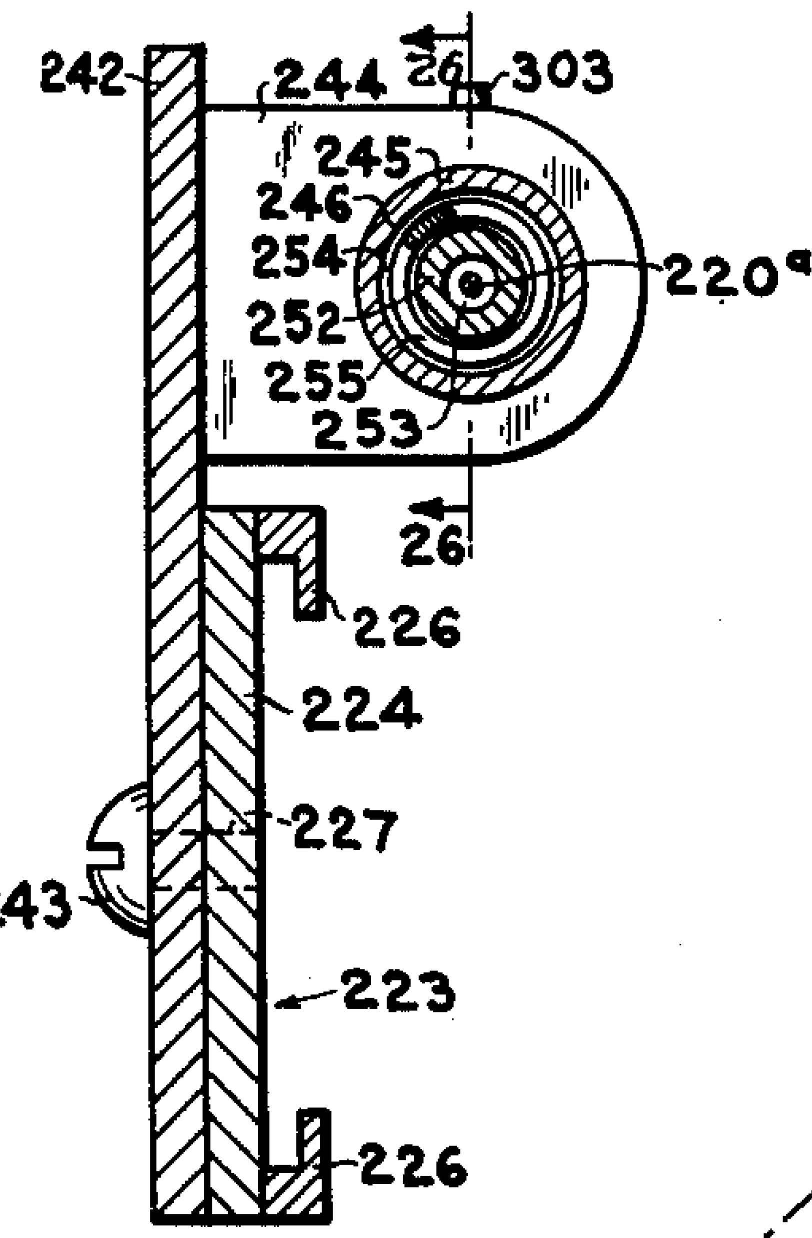

Fig. 25.

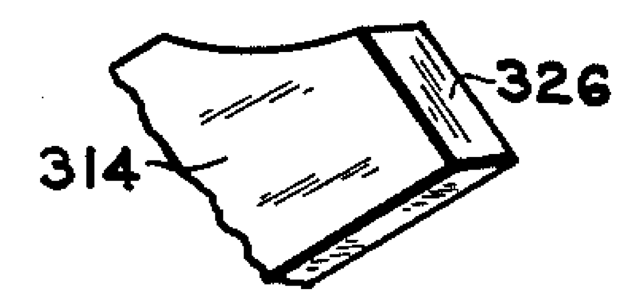

Fig. 23.

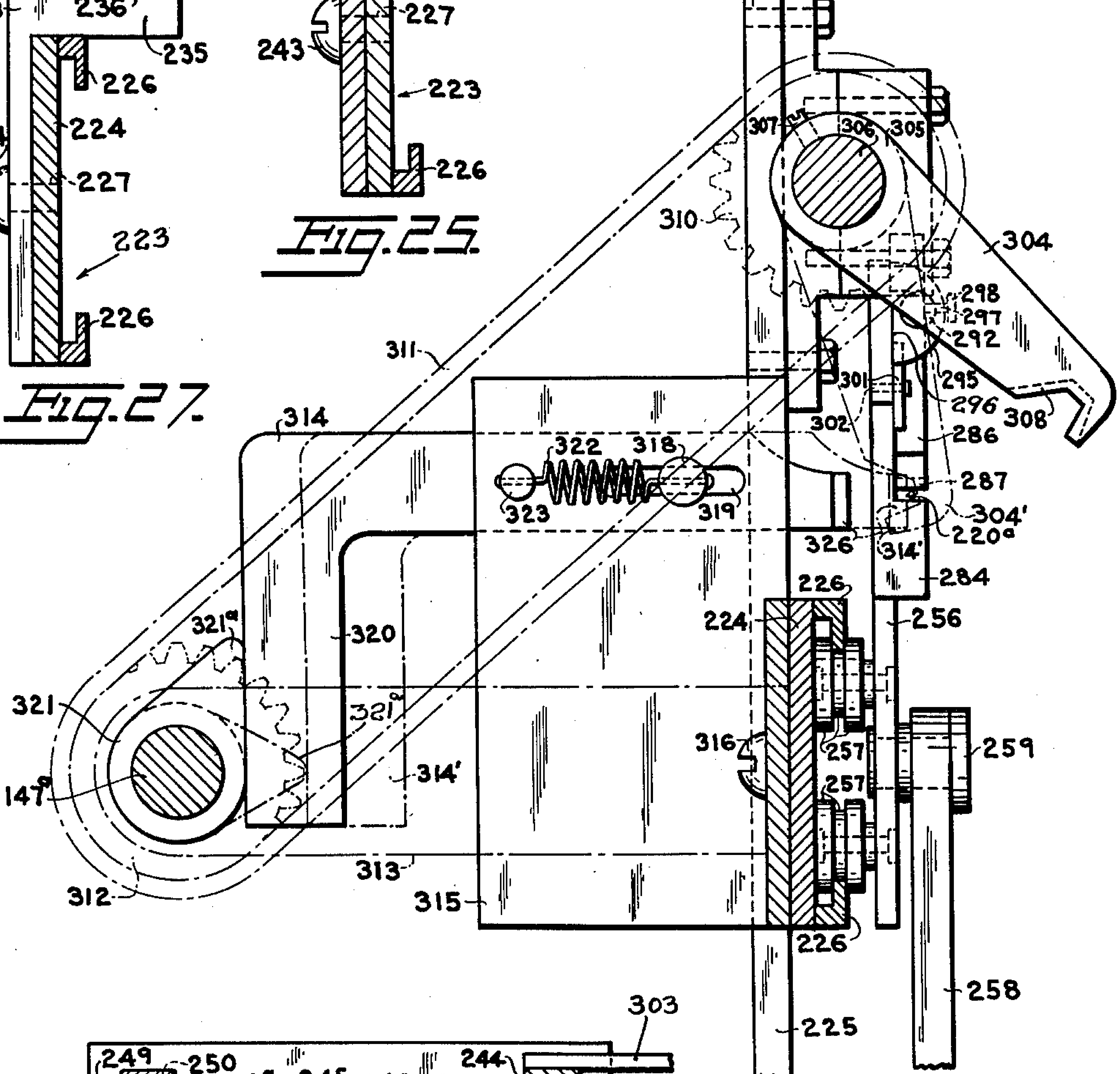

Fig. 20.

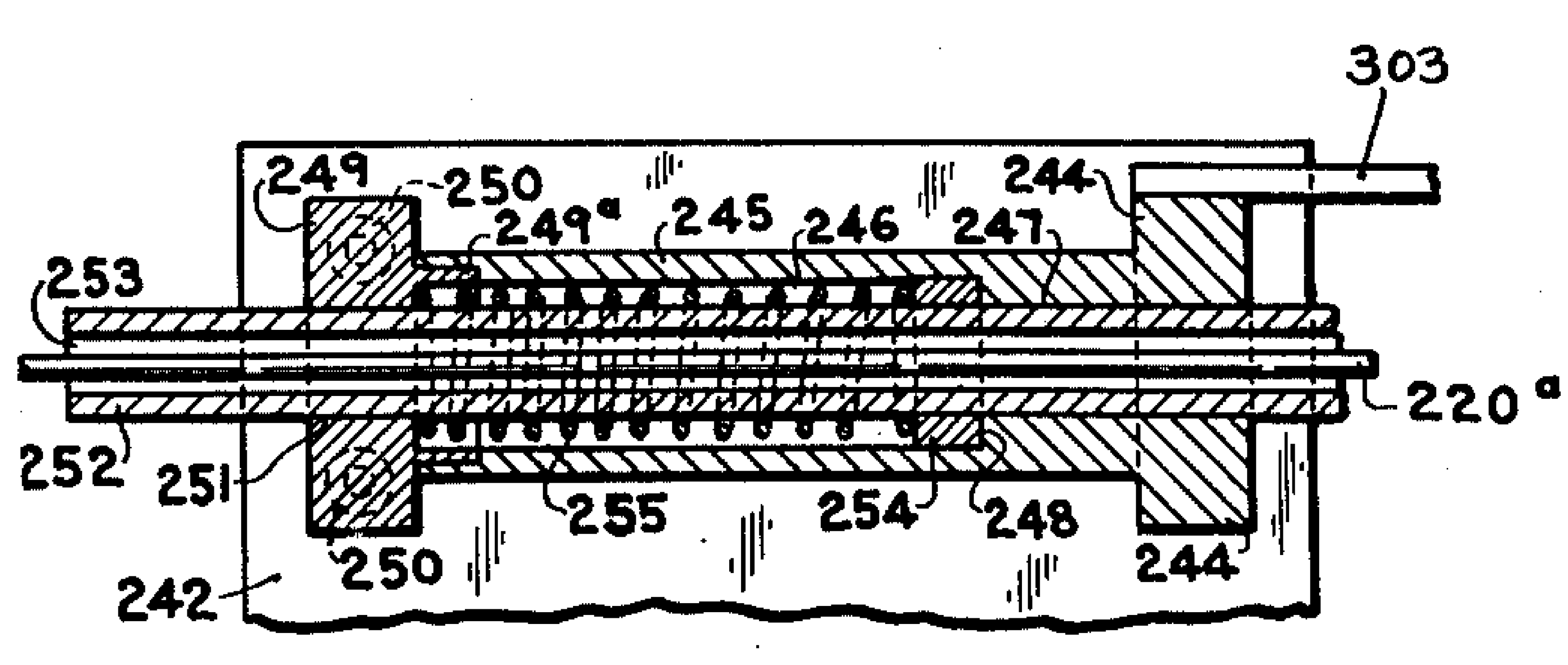

Fig. 26.

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AUTOMATIC LEAD SEAL CASTING MACHINE

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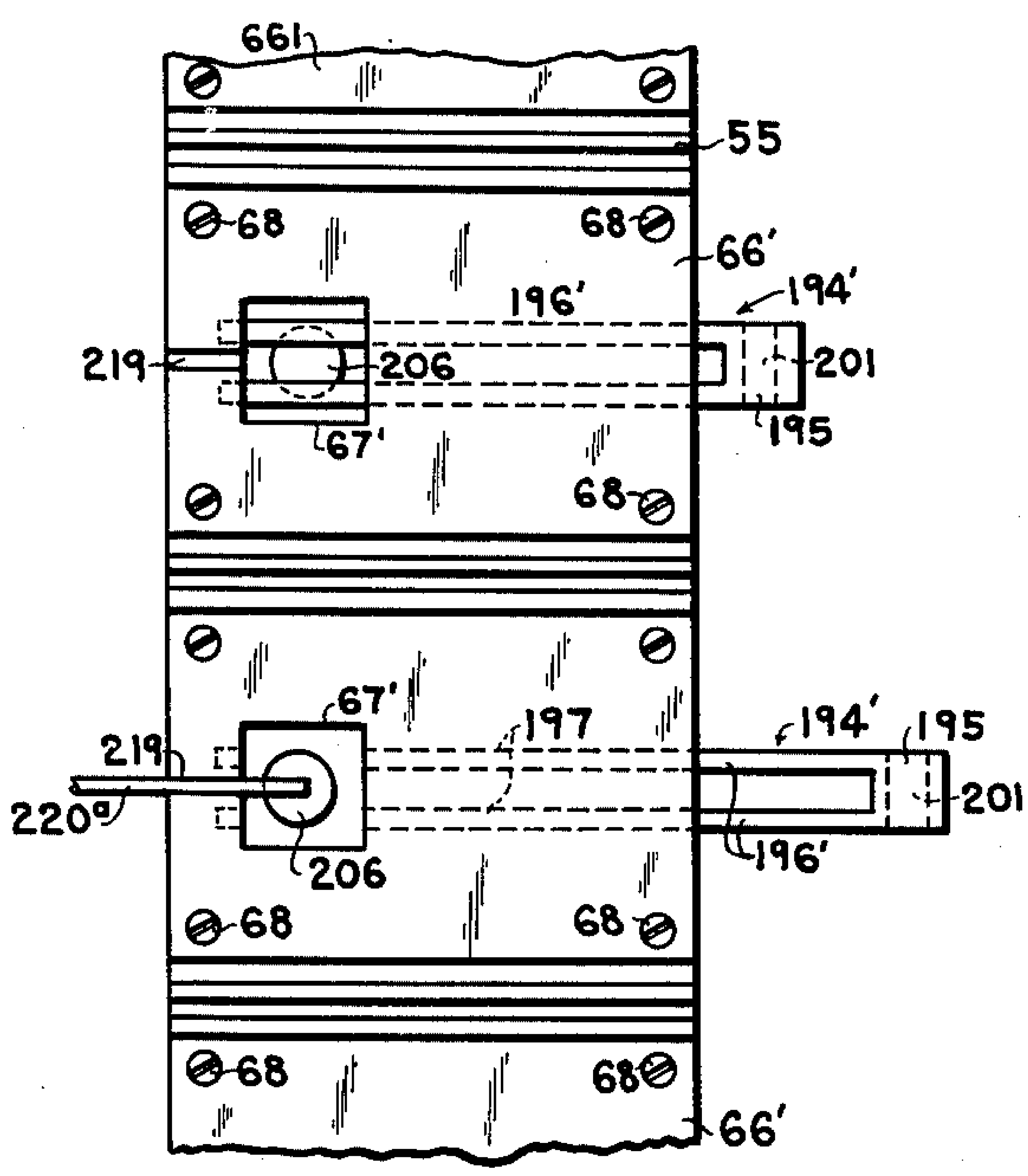

Fig. 28.

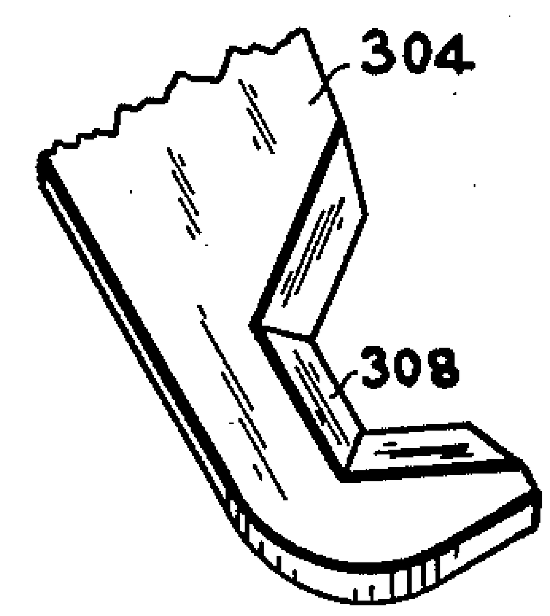

Fig. 24.

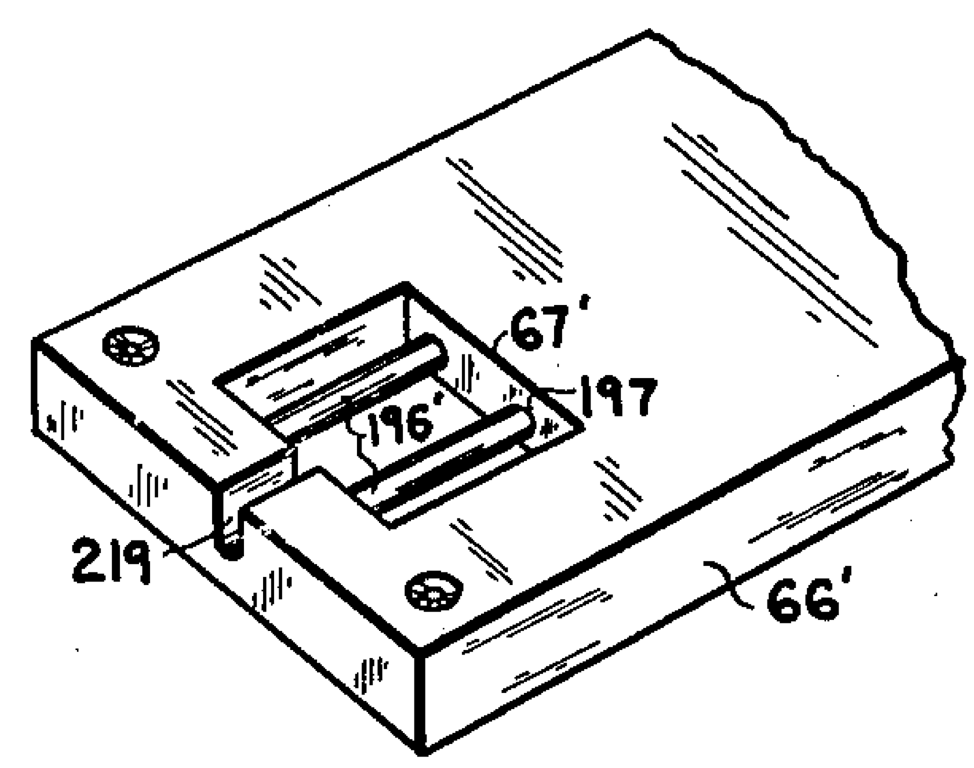

Fig. 29.

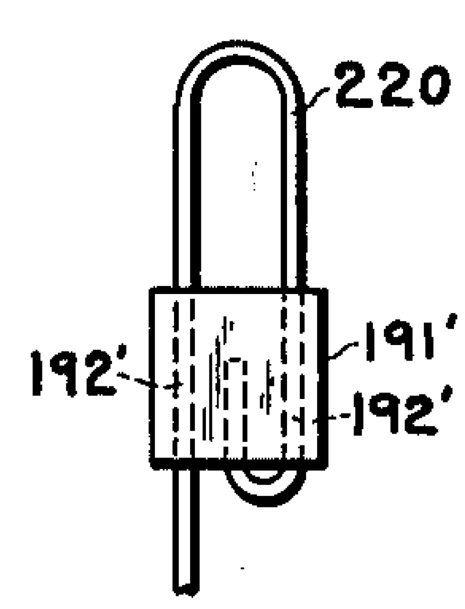

Fig. 31.

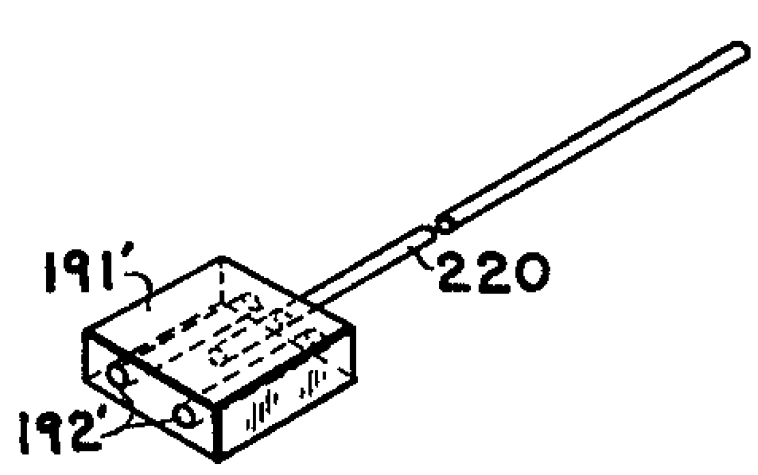

Fig. 30.

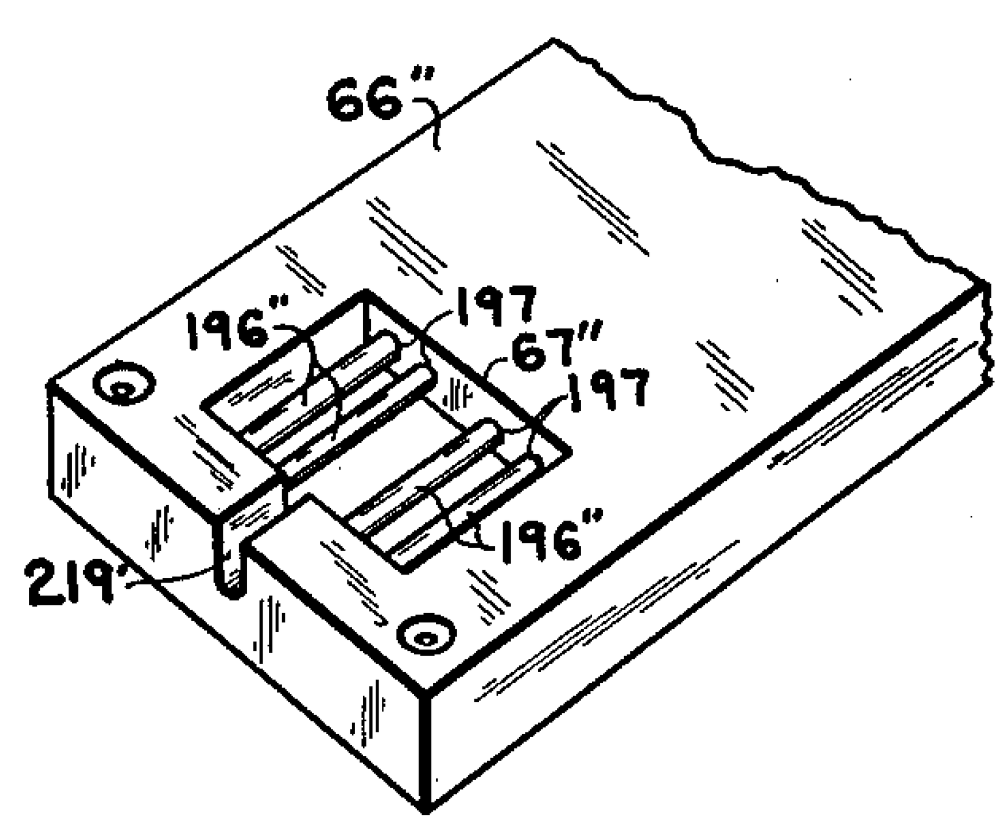

Fig. 32.

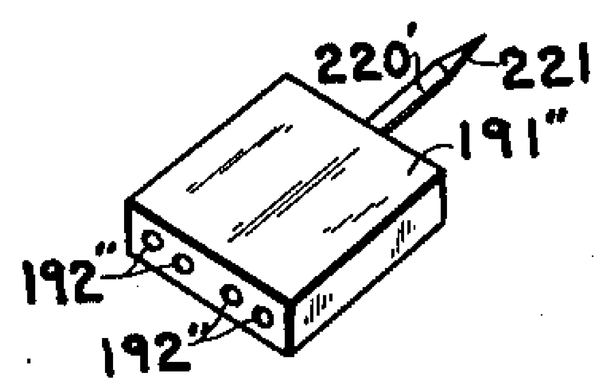

Fig. 33.

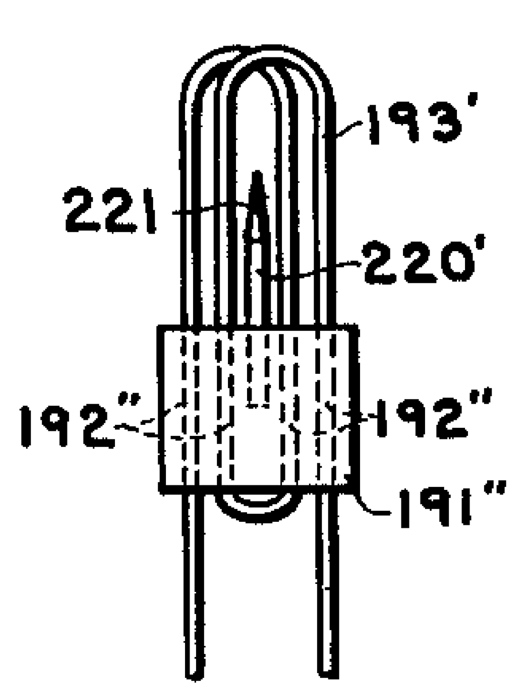

Fig. 34.

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Patented Feb. 24, 1953

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UNITED STATES PATENT OFFICE

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AUTOMATIC LEAD SEAL CASTING MACHINE

William R. Scott, Greene, N. Y.

Application November 27, 1948, Serial No. 62,400

12 Claims. (Cl. 22—58)

1

This invention relates to new and useful improvements in a lead casting machine, the molds for use on such a machine and the lead members cast on such a machine.

Prior to the present invention all lead casting has been tediously done by hand at greatly increased costs to both the manufacturer and the ultimate consumer. Machines are known which were designed for the casting of other metals; such as, copper, bronze and the like, and lead was included in the list of metals which could be cast upon such machines. However, attempts to cast lead objects on those prior art casting machines have proven unsuccessful as the casting of lead presents certain specific problems not encountered in the casting of those other metals and which problems were not taken into account in the construction of those prior art machines.

The present invention relates specifically to the construction of an automatic casting machine designed primarily for the casting of objects of lead which overcomes the objections of the prior art casting machines permitting lead objects to be quickly and easily cast with a minimum of attention on the part of the operator of the machine.

More particularly, the present invention relates to a fully automatic casting machine for the production of lead seals for use by the utility companies for sealing gas and electric meters and by the U. S. Post Office Department for sealing bags of registered and other valuable mail. While the present invention is concerned chiefly with the casting of lead seals it is by no means limited to such use as the machine is equally well adapted to the casting of other small objects of lead merely by interchanging the molds used on the casting machine.

Experimentation which led to the development of the casting machine of the present invention clearly disclosed that the successful casting of lead objects in a machine of the present invention is dependent upon introducing the molten lead into the mold when the mold is neither too hot nor too cold. For if the mold is too hot, the molten lead is further heated within the cavity of the mold instead of setting immediately, and if the mold is too cold, the molten lead sets too rapidly and in each case the surface of the cast object, when removed from the mold, is irregular and interrupted by small teats which form on the surface thereof.

The present invention proposes to overcome those objections by providing a head for rotation in a vertical plane and provided about its periphery with a plurality of like molds, preferably twelve in number, with means for introducing the molten lead into the cavity of the topmost mold of the rotatable head and for removing the cast object from the mold at a point four molds removed from the mold into which the molten lead is being introduced in a manner so that for the major portion of each complete revolution of the rotatable head, the molds are idle and cooling between the ejection of one lead object and the refilling of the mold for the casting of the next lead object.

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Another object of the present invention proposes the provision of a vertically movable charging valve disposed above the topmost mold of the rotatable head and in axial alignment with its mold cavity and formed at the lower end thereof with a discharge opening arranged in a manner to seat over the mold cavity of the topmost mold when the charging valve is lowered.

A further object of the present invention proposes providing the charging valve with a slidably mounted valve plunger normally closing the discharge opening of the charging valve and which is operated in timed synchronism with the lifting and lowering of the charging valve in a manner to open the discharge opening when the charging valve is in a lowered position on the topmost mold to deliver a predetermined quantity of molten lead to the mold cavity of the topmost mold.

Still further, the present invention proposes a novel means for rotating the head and for lifting and lowering the charging valve in timed synchronism with each other in a manner so that the head will be rotated to successively align the molds thereof with the charging valve while the charging valve is in its raised position.

Another object of the present invention proposes novel means for connecting the charging valve with a pot of molten lead which is pivotally supported in a manner to permit slight vertical movement of the charging valve relative to the rotatable head and to convey the molten lead from the pot to the molds.

It is a still further object of the present invention to provide the machine with strategically located heaters for melting the lead placed in the pot and for retaining the molten lead at a proper casting temperature during its transit from the pot to the molds.

The present invention also proposes the provision of a novel wire feed mechanism operated in timed synchronism with the rotation of said head and arranged in a manner to feed the end of a length of wire partially into the mold cavity of the topmost mold prior to the introduction of the molten lead in a manner so that as the molten lead cools the length of wire will become anchored in the cast object.

It is proposed to characterize the wire feed mechanism by the fact that it is capable of drawing the wire from a continuous source and automatically cutting it to the proper preselected length and feed the end of the cut-off length into the mold cavities and by the fact that it is adjustable to feed wires of any desired length into the mold cavities.

The present invention also proposes that the rotatable head be provided on its periphery with a plurality of molds which are removably attached thereto in a manner to be removable to be interchanged with other molds having differently shaped mold cavities.

Still another object of the present invention proposes the provision of a novel means for pulling outwards on the mold cores after the molten lead has had a chance to set sufficiently within the mold cavity and prior to ejection of the cast object from the mold cavity, so that the cast object will be free to be automatically ejected from the mold cavity.

The present invention further proposes the provision of a novel means for restoring the mold cores to their positions in which the core fingers traverse the mold cavities prior to refilling the mold cavity in a manner so that the fingers will be in position to form the aligned passages in the next cast object.

It is a still further object of the present invention to construct a lead casting machine which is entirely automatic in its operation, which is simple and durable and which can be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a front elevational view of the lead seal casting machine constructed in accordance with the present invention.

Fig. 2 is an end elevational view of the casting machine looking from the right-hand side of Fig. 1.

Fig. 3 is an enlarged detailed view of a portion of Fig. 1.

Fig. 4 is a horizontal sectional view taken on the line **4—4** of Fig. 3.

Fig. 5 is an enlarged sectional view taken on the line **5—5** of Fig. 3 showing one side of the rotating head assembly in elevation.

Fig. 6 is an enlarged sectional view taken on the line **6—6** of Fig. 3 showing the other side of the rotating head assembly in elevation.

Fig. 7 is a longitudinal sectional view through the rotating head assembly taken on the line **7—7** of Fig. 5.

Fig. 8 is an enlarged vertical sectional view of the rotating head, per se, taken on the line **8—8** of Fig. 7.

Fig. 9 is a developed plan view of a portion of the rotating head, per se.

Fig. 10 is a perspective view of one of the ejectors, per se, for ejecting the cast seal from the mold of the rotating head assembly.

Fig. 11 is a partial perspective view of a por-

tion of one of the mold cores, per se, of the rotating head assembly.

Fig. 12 is a perspective view of a seal cast in the mold shown in Fig. 9.

Fig. 13 is a plan view of the seal provided with a cord or wire.

Fig. 14 is an enlarged vertical sectional view of the charging valve, per se.

Fig. 15 is an enlarged detailed view of a portion of Fig. 14 showing a different position of the parts.

Fig. 16 is a sectional view taken on the line **16—16** of Fig. 15.

Fig. 17 is a vertical sectional view taken on the line **17—17** of Fig. 14.

Fig. 18 is an enlarged front elevational view of the wire feed mechanism per se.

Fig. 19 is a plan view of the wire feed head of the wire feed mechanism.

Fig. 20 is an enlarged vertical sectional view of the wire cutter and wire feed head taken on the line **20—20** of Fig. 18.

Fig. 21 is an enlarged detailed view of a portion of the wire feed head shown in Fig. 18, but illustrating a different position of the parts.

Fig. 22 is a perspective view of the wire feed tube member of the wire feed head.

Fig. 23 is an enlarged perspective view of a portion of one of the cutting blades of the wire cutter.

Fig. 24 is an enlarged perspective view of a portion of the other of the cutting blades of the wire cutter.

Fig. 25 is a vertical sectional view of the wire guide taken on the line **25—25** of Fig. 18.

Fig. 26 is a longitudinal vertical sectional view of a portion of the wire guide taken on the line **26—26** of Fig. 25.

Fig. 27 is an enlarged side elevational view of the wire gripper, per se, taken on the line **27—27** of Fig. 18.

Fig. 28 is a developed plan view similar to Fig. 9, but illustrating a modified form of mold for use on the rotating head assembly.

Fig. 29 is an enlarged perspective view of a portion of one of the molds shown in Fig. 28.

Fig. 30 is a perspective view of a lead seal cast in the mold shown in Figs. 28 and 29.

Fig. 31 is a plan view of the lead seal with the wire threaded in operative position.

Fig. 32 is a partial perspective view similar to Fig. 29, but illustrating a mold for casting a different type of a lead seal.

Fig. 33 is a perspective view of a lead seal cast in the mold shown in Fig. 32.

Fig. 34 is a plan view of the seal shown in Fig. 33 with a cord threaded in operative position.

The automatic lead casting machine, according to the present invention, includes a frame **50** having a plurality of vertical legs **51** supporting a top frame member **52** at about waist level. Rested upon the top frame member **52** at one end of the frame **50** there is a plate **53** retained in position by one or more angle irons **54**, see Fig. 1.

A head **55** is rotatably mounted on the frame **50**. The head **55** is comprised of a hollow casing **56** having an open side closed by a removable disc **57** removably secured in position by several bolts **58**. The head **55** is rotative upon a fixed shaft **59**, see Figs. 5 and 7, which has its ends mounted in blocks **60**. The shaft **59** is held against rotation by a bolt **61** threadedly engaged through one of the blocks **60** and engaging an opening **62** formed in the adjacent end of the shaft **59**.

The blocks 60 are adjustably mounted for adjusting the vertical position of the fixed shaft 59 and in turn the vertical position of the head 55. This adjustable mounting is characterized by threaded shanks 63 which depend from the blocks 60 and which freely pass through complementary openings formed in the plate 53. Lock nuts 64 are threaded on the shanks 63 above and below the plate 59 for holding the shanks 63 and in turn the blocks 60 in desired adjusted positions relative to the top face of the plate 53.

The head 55 is thus rotatively supported to rotate in a vertical plane and has its periphery formed with a plurality of flat surfaces 65, see Fig. 8, upon each of which a mold 66 is mounted. Each of the molds 66 is alike in construction and each includes a mold cavity 67 and is releasably attached to its respective flat surface 65 of the head 55 by means of several removable screws 68. This removable mounting of the molds 66 permits the molds in use to be removed and interchanged with molds having mold cavities 67 of different shapes for molding differently shaped lead objects.

In the embodiment of the present invention shown on the drawings, the head 55 is illustrated as provided on its periphery with twelve flat surfaces 65 and twelve molds 66; however, this is by way of illustration only, as the head may be provided with any desired number of flat surfaces 65 and corresponding molds 66. Experimentation has shown that the machine is more favorable in operation if the head 55 is provided with twelve molds 66, but machines have been successfully operated with heads having more and less molds than twelve, but in each instance the number of molds has been a multiple of two, such as, eight, ten or twelve; or a multiple of four, such as, eight, twelve or sixteen.

Disposed above the head 55, in axial alignment with the mold cavity 67 of the topmost mold 66 of the head 55, there is a charging valve 69 designed to fill the mold cavities 67 of the mold 66 with a predetermined quantity of molten lead. The charging valve 69 is characterized by a vertical tubular valve casing 70 formed at its lower end with a discharge opening 71, see Fig. 15, which is adapted to seat over the mold cavity 67 of the topmost mold 66 in the lowered position of the charging valve 69. A pipe 72 extends radially from the side of the valve casing 70 intermediate of its height and connects with the interior of the valve casing, as clearly illustrated in Fig. 14. The free end of the pipe 72 is connected to the side of a pot 73 for molten lead. The pipe 72 connects the valve casing 70 of the charging valve 69 to the pot 73 and conveys the molten lead from the pot 73 to the charging valve 69 to be discharged into the mold cavities 67 of the molds 66.

A gas burner 74, see Figs. 2 and 4, is disposed on the plate 53 beneath the pot 73 for melting bulk lead placed in the pot 73 through the open top thereof. Similar gas burners 75 and 76 are mounted beneath the pipe 72 and along the sides of the valve casing 70, respectively, for retaining the molten lead at the proper casting temperature while in transit between the pot 73 and the charging valve 69. Suitable flexible hoses 77 are provided for conveying the required gas from a source to the gas burners 74, 75 and 76.

The pot 73 is pivotally supported to the rear of the head 55 to permit the required vertical movement of the charging valve 69 to seat and unseat the discharge opening 71 of the charging valve 69 relative to the mold cavity 67 of the topmost mold 66. To accomplish this pivotal mounting of the pot 73, trunnions 78 extend from diametrically opposite sides of the pot 73 and have their ends rotatively supported in bearing blocks 79. At the rear of the machine, certain of the legs 51 have ends 51^a extended vertically upwards beyond the top of the frame 50. Adjustably mounted on the front faces of the upwardly extended ends 51^a of the legs 51 there are plates 80 upon which the bearing blocks 79 are fixedly mounted. The top and bottom ends of the plates 80 are formed with vertically arranged elongated slots 81 and clamp bolts 82 pass through the elongated slots 81 and threadedly engage the upwardly projected ends 51^a of the legs 51. Thus, the position of the plates 80 may be adjusted vertically on the front faces of the upwardly projected ends 51^a to slightly adjust the position of the pot 73 and the charging valve 69 to agree with vertical adjustments of the rotatable head 55.

Slidably disposed within the valve casing 70 of the charging valve 69, there is a valve plunger 83 formed at its lower end with a reduced portion 83^a, see Fig. 15, which enters and closes the discharge opening 71 of the valve casing 70 in the lowered position of the valve plunger 83, as shown in Fig. 14. The valve plunger 83 is of a cross-sectional diameter less than the inside diameter of the valve casing 70 and the valve plunger 83 is retained in a position coaxial of the inside of the valve casing 70 by vertically spaced groups of spaced radial lugs 84, see Figs. 14 to 16, formed on the inside of the valve casing 70 and which bear against the sides of the valve plunger 83. The top end of the valve plunger 83 is slidably extended through a cap 85 threaded into the top end of the valve casing 70.

Drive means 86 is provided for lowering the charging valve 69 into facial contact with the topmost mold 66 and for lifting the valve plunger 83 to open the discharge opening 71 of the charging valve 69 to deliver a controlled quantity of molten lead to the topmost mold 66 of the head 55 and for then closing the charging valve 69 and for raising the charging valve 69 back to its starting position. In the raised position of the charging valve, the drive means 86 then functions to advance the head 55 a distance equal to the space between adjacent molds 66 to align the next mold 66 of the head 55 with the discharge opening 71 of the charging valve 69.

The drive means 86 comprises an electric motor 87 mounted on a shelf 88 mounted on certain of the legs 51 of the frame 50 beneath the plate 53. The driven shaft 89 of the motor 87 is connected to a gear reduction unit 90 mounted on the shelf 88 alongside of the electric motor 87. The driven shaft 91 of the gear reduction unit 90 carries a pulley 92 engaged by a continuous belt 93. Mounted on the endmost legs 51, at a point above the shelf 88, there is a second shelf 94 supported on several brackets 95 which extend laterally from the side of the legs 51. Mounted on the shelf 94 there is a pair of spaced brackets 96 which rotatively support the ends of a horizontal shaft 97 which has interposed therein a conventionally constructed frictional slip clutch 98 which divides the shaft 97 into two halves. A pulley 99 is fixedly mounted on the shaft 97 on one side of the clutch 98 and has the belt 93 passing thereover to drive the shaft 97 when the pulley 92 rotates.

Mounted on the shaft 97 on the side of the clutch 98 opposite the pulley 99, there is a sprocket wheel 100 engaged by a continuous chain

101. The chain 101 engages a second sprocket wheel 102 mounted on a shaft 103 disposed above the plate 53. The shaft 103 is rotatively supported intermediate of its ends in a bearing 104 mounted on the top face of the plate 53 and has its front end rotatively supported in a bearing block 105 mounted on the side of a support 106 which extends vertically from the top face of the plate 53.

The front end of the shaft 103 carries a sprocket wheel 107 engaged by a continuous chain 108. The diametrically opposite side of the sprocket chain 108 engages a sprocket wheel 109 mounted on the front end of a stud shaft 110. The stud shaft 110 is rotatively supported intermediate of its ends upon a support 111 by means of a bearing block 112. The support 111 extends vertically from the plate 53 to one side of the support 106 and extends parallel thereto. A diagonal brace 113 extends between the top end of the support 106 and the adjacent side of the support 111 connecting the supports 106 and 111 together for greater rigidity.

The rear end of the stud shaft 110 carries a lifting and lowering cam 114 for lifting and lowering the charging valve 69 as the stud shaft 110 is rotated. The cam 114 bears against a roller 115 rotatively supported between the arms of a forked member 117 by means of a pin 116, see Figs. 14 and 17. The forked member 117 is fixedly mounted on the upper end of a shank 118 which has threaded engagement with a lug 119 which extends laterally from the side of the valve casing 70 on the side diametrically opposite the pipe 72. A nut 120 on the threaded shank 118 is arranged to be tightened against the top face of the lug 119 for securing the threaded shank in various vertical adjusted positions relative to the lug 119.

An expansion spring 121 has its top end engaged about the lower end of the threaded shank 118 and disposed in a recess 122, see Fig. 14, formed in the bottom face of the lug 119 about the lower end of the threaded shank 118. The bottom end of the expansion spring 121 rests in a cup-shaped member 123 integrally formed on the top end of a short threaded bar 124 which has threaded engagement with a lug 125 which extends laterally and then rearwards from the side of the vertical support 111. The expansion spring 121 thus exerts an upward push on the lug 119 retaining the roller 115 in facial contact with the cam 114 and the lower end of the charging valve 69 out of contact with the topmost mold 66 of the head 55.

As clearly shown in Fig. 17, the cam 114 is formed with a high part 114a arranged to ride on the roller 115 to press downwards on the lug 119 against the action of the expansion spring 121 to lower the charging valve 69 and engage its lower end onto the top face of the topmost mold 66 as shown in Fig. 15. When the cam 114 turns to a position in which its low part is again engaging the roller 115, the expansion spring 121 will urge the charging valve 69 back to its starting position shown in Fig. 14.

A second stud shaft 125 is rotatively supported in a bearing block 126 mounted on the support 111 above the bearing block 112. The front end of the top stud shaft 125 carries a gear 127 which meshes with a second gear 128 mounted on the lower stud shaft 110, between its bearing block 112 and the sprocket wheel 109. The gears 127 and 128 act to rotate the top stud shaft 125 in timed relation to the lower stud shaft 110.

Mounted on the rear end of the stud shaft 125 there is a cam 129 for lifting and lowering the valve plunger 83 to open and close the discharge opening 71 of the charging valve 69. The cam 129 bears against a roller 130 mounted on the front end of a short arm 131 pivotally supported intermediate of its ends upon the top end of a vertical extension 132 of the lug 119, by means of a pivot pin 133. The rear end 134 of the short arm 131 is bifurcated and engaged about the extended top end of the valve plunger 83 beneath a nut 135 threadedly engaged upon the extended top end of the valve plunger 83.

The cam 129 is formed with a raised part 129a, see Fig. 17, arranged to engage the roller 130 to pivot the short arm 131 and lift the valve plunger 83 to lift the reduced lower end 83a thereof out of the discharge opening 71 of the valve casing permitting a quantity of the molten lead in the valve casing to discharge from the discharge opening 71 into the mold cavity 67 of the mold 66 located beneath the lower end of the charging valve 69. From Fig. 17 it will be noted that the high parts 114a and 129a of the cams 114 and 129 are so disposed with relation to each other that the cam 114 will first function to lower the charging valve 69 into facial contact with the topmost mold 66, then the cam 129 will function to cause the valve plunger 83 to be raised and lowered, while the charging valve 69 is in its lowered position, to discharge a predetermined quantity of the molten lead into the mold 66, after which the cam 114 will turn to a position freeing the valve 69 to be returned to its starting position by the expansion spring 121. It is appreciated, of course, that the slight vertical movement of the charging valve 69 to lower into engagement with the topmost mold 66 and to again raise that valve 69 is permitted by the pivotal mounting of the lead pot 73.

Resilient means is provided for retaining the valve plunger 83 in its lowered position in the valve casing 70 in which it closes the discharge opening 71 and for also returning the valve plunger 83 to its starting position after having been raised by the cam 129. This resilient means is comprised of an expansion spring 136 coaxially engaged about the upper extended end of the valve plunger 83. The bottom end of the expansion spring 136 bears against a flat collar 137 mounted on the valve plunger 83 and the top end of the spring 136 bears against a pair of inverted L-shaped lugs 138 formed on the top face of the cap 85 which closes the top of the valve casing 70.

The length of time that the charging valve 69 is in its lowered position and the length of time that the valve plunger 83 is in its raised position while the charging valve 69 is in its lowered position may be varied by replacing the cams 114 and 129 by other cams having differently shaped high parts 114a and 129a.

The drive means 86 also provides the required power for turning the head 55 a distance equal to the distance between adjacent molds 66 to align the cavity 67 of the next mold with the lower end of the charging valve 69 during the time that the valve is in its raised position. This portion of the drive means 86 comprises a ratchet disc 139 mounted on the exposed face of the disc 57 which closes the open side of the head 55 and which is formed with ratchet teeth 140 corresponding in number to the number of molds 66 mounted about the periphery of the head 55. In the shown embodiment of the present invention, the ratchet disc 139 is formed with twelve ratchet teeth 140.

A pusher lever 141 is slidably extended through a block 142 to slide relative thereto and relative to the ratchet disc 139. A pawl 143 is pivotally supported upon the front end of the pusher lever 141 by means of a pivot pin 144 and is normally disposed behind one of the ratchet teeth 140 of the ratchet disc 139, as shown in Fig. 5. Gravity is depended upon to retain the pawl 143 in a lowered operative position against a stop pin 145 which extends from the side of the pusher lever 141 below the pivot pin 144.

The rear end of the pusher lever 141 bears against a cam 146 fixedly mounted on a shaft 147 which extends at right angles to the shaft 103 at the same horizontal level. The shaft 147 is rotatively supported in several bearing blocks 148 supported on brackets 149 mounted on the top face of the plate 53. The rear end of the shaft 103 is provided with a bevel gear 150 which meshes with a second bevel gear 151 mounted on an adjacent portion of the shaft 147 for causing the shaft 147 to be rotated as the shaft 103 is rotated, to rotate the cam 146.

Resilient means is provided for retaining the rear end of the pusher lever 141 in contact with the peripheral edge of the cam 146. This resilient means comprises a contraction spring 151 operating between a pin 152 mounted on the side of the pusher lever 141 and a second pin 153 mounted on the side of the block 142. The cam 146 is formed with a high part 146ᵃ, see Fig. 5, for urging the pusher lever 141 forward against the action of the contraction spring 151 causing the pawl 143 to turn the ratchet disc 139 and in turn the head 55 through a distance equal to the space between adjacent mold cavities 67 of the molds 66. When the high part 146ᵃ of the cam 146 moves clear of the rear end of the pusher lever 141, the contraction spring 151 will draw rearwards on the pusher lever 141 and retain its rear end in contact with the peripheral edge of the cam 146 until the high part 146ᵃ completes a revolution and again engages the rear end of the pusher lever. On the return movement of the pusher lever 141, the pawl 143 engages and rides over the next ratchet tooth 140 pivoting in a direction away from the stop pin 145. The cam 146 is mounted on the shaft 147 in a rotative position to operate in timed synchronism with the cam 114 which lowers the charging valve 69 to turn the head 55 only during the time that the charging valve 69 is in its raised position. This is essential in order that the corners of the head 55 may pass freely beneath the lower end of the charging valve 69 without striking that lower end and jamming up the operation of the machine.

Indexing means is also provided in connection with the ratchet disc 139 and operated by the drive means 86 for retaining the head 55 against any possible accidental rotation during the time the charging valve 69 is in a lowered position on the topmost mold 66 of the head 55. This indexing means comprises an indexing stop pin 154 disposed beneath the pusher lever 141 and slidably supported in a block 155. The indexing stop pin 154 has a cutaway front end 156 which engages one of the ratchet teeth 140 holding the head 55 against turning in a direction to change the mold 66 aligned with the lower end of the charging valve 69. An arm 157 depends from the rear end of the indexing stop pin 154 and a contraction spring 158 has one end attached to the bottom end of the arm 157 by means of a screw 159 and its other end attached to the block 155 by means of a screw 160 for urging the stop pin 154 into an operative position engaging one of the ratchet teeth 140, as shown in Fig. 5.

A retracting lever 161, for withdrawing the indexing stop pin 154 against the holding action of the contraction spring 158, is pivotally mounted intermediate of its ends upon the top end of a post 162, by means of a screw 163. The retracting lever 161 has one end disposed in front of the depending arm 157 mounted on the rear end of the indexing stop pin 154 to draw rearwards on the pin when the retracting lever 161 is pivoted. The other end of the retracting lever 161 is bent upwards and engaged against the peripheral edge of a second cam 164 mounted on the shaft 147 and having a high part 164ᵃ which operates in timed relation with the cam 146. The high part 164ᵃ of the cam 164 functions to pivot the retracting lever 161 to withdraw the indexing stop pin 154 to disengage the cutaway front end 156 thereof from the ratchet tooth 140 freeing the ratchet disc 139 and the head 55 to be rotated by the pusher lever 141. The high part 164ᵃ of the cam 164 retains the indexing stop pin 154 in its retracted position all the time the pusher lever 141 is advancing the ratchet disc 139 and the head 55.

The blocks 142 and 155 are disposed one above the other and retained in vertical spaced relation by means of an interposed connector post 165. The lowermost block 155 is fixedly mounted on the top end of a vertical post 166 which has its bottom end freely passing through the plate 53. Lock nuts 167 are threadedly engaged upon the vertical post 166 above and below the plate 53 for holding the vertical post 166 and in turn the blocks 142 and 155 in desired vertical adjusted positions corresponding to the vertical adjusted positions of the head 55.

Also mounted on the vertical post 166 there is means for limiting rotation of the head 55 to one direction only, in a clock-wise direction as viewed in Fig. 5, for successively advancing the molds 66 into filling position beneath the charging valve 69. This rotation limiting means comprises a block 168 vertically slidably mounted on the post 166 beneath the block 155 and which is retained in a desired vertical position on the vertical post 166 by means of a set screw 169. A slot 170 is cut into the front end of the block 168 and an arm 171 has its lower end pivotally retained in the slot 170 by a pivot pin 172. The top end of the arm 171 is disposed beneath the tooth 140 of the ratchet disc 139 engaged by the indexing stop pin 154 and against the periphery of the ratchet disc 139 between adjacent teeth 140, as shown in Fig. 5. The arm 171 is resiliently retained in this operative position by an expansion spring 173 which has its rear end disposed in a recess 174 which extends rearwards from the rear end of the slot 170. The front end of the expansion spring 173 bears against the adjacent edge of the arm 171 retaining the arm 171 in its operative position against the side of the ratchet disc 139. When viewing the head 55 as shown in Fig. 5, if the head should be accidentally rotated in a counter-clockwise direction such rotation will be stopped by the arm 171; however, the head is free to be rotated in the proper clockwise direction in which event the arm 171 is pivoted against the holding action of the expansion spring 173 permitting the ratchet teeth 140 to idle past the free end of the arm 171.

The side of the rotatable head 55 opposite the ratchet disc 139 is provided with an auxiliary indexing means for assisting the indexing stop pin 154 in holding the head 55 against being rotated while the charging valve 69 is in a lowered position on the topmost mold 66 and for insuring proper alignment of the mold cavity 67 of the topmost mold 66 with the discharge opening 71 of the charging valve 69. This auxiliary indexing means comprises an indexing ring 175 which is concentrically secured, as by welding or the like, to the side of the head 55 and which is provided on its outer periphery with twelve radially inwardly extending notches 176, there being one notch 176 for each of the molds 66 mounted on the periphery of the head 55.

Pivotally mounted on the top end of a bracket 177 there is an indexing finger 178 retained in position by a pivot pin 179, see Fig. 7. The lower end of the bracket 177 is fixedly mounted upon the fixed shaft 59 which rotatively supports the head 55.

The end of the indexing finger 178, closely adjacent the pivot pin 179, is arranged to engage one of the notches of the indexing ring 175 to hold the head 55 against rotating, and means operated by the drive means 86 is provided for pivoting the indexing finger 178 to disengage the end thereof from the indexing ring 175 to free the head 55 to be rotated. The pivoting means is comprised of a depending portion 180 formed on the bottom edge of the indexing finger 178 between the pivot pin 179 and the end thereof remote from the end which engages the notches 176 of the indexing ring 175. A cam surface 181 is formed on the bottom end of the depending portion 180 which rides on the peripheral edge of a cam 182 mounted on an intermediate portion of a jack shaft 183. The jack shaft 183 extends parallel to the shaft 103 and has its ends rotatively supported in bearing blocks 184 mounted on a base 185 in turn fixedly mounted on the top face of the plate 53. A contraction spring 186 has one end attached to the free end of the indexing finger 178 and its other end attached to a lug 187 formed on the base 185, to exert a force which retains the cam surface 181 of the depending portion 180 of the indexing finger 178 in contact with the cam 182.

Mounted on the jack shaft adjacent the cam 182, there is a sprocket 188 engaged by a continuous chain 189 which extends over a second sprocket 190 mounted on the shaft 103 to rotate the jack shaft 183 in timed relation with the shaft 103 when the shaft 103 is rotating. Rotations of the jack shaft 183 similarly rotate the cam 182 which has a high part 182^a which holds the indexing finger 178 in a pivoted position, against the action of the contraction spring 186, in which its end will be engaged with one of the notches 176 of the indexing ring 175 to hold the head 55 against being rotated. However, when the low part of the cam 182 is engaged by the cam surface 181 of the indexing finger 178, the contraction spring 186 will then pivot the indexing finger 178 about the pivot pin 179 into a position in which the end of the indexing finger 178 is disengaged from the respective notch 176 of the indexing ring 175 leaving the head 55 free to be rotated. The cam 182 operates in timed relation with the cam 164 which withdraws the indexing stop pin 154 from its engaged position with the respective tooth 140 of the ratchet disc 139, so that the indexing finger 178 will be pivoted to its inoperative position at the same time that the indexing stop pin 154 is moved to its inoperative position freeing the head 55 to be rotated by operation of the cam 146 on the end of the pusher lever 141.

For forming a square lead seal 191, see Figs. 12 and 13, having four parallel passages 192 formed therein, from end to end, for the reception of a sealing cord or wire 193 as shown in Fig. 13, the cavities 67 of the molds 66 are square in outline and each mold 66 is provided with a slidably mounted mold core 194, shown partially in perspective in Fig. 11, for forming the passages 192. Each of the mold cores 194 is composed of an end portion 195 integrally formed with four parallel finger portions 196. The finger portions 196 are preferably of round cross-section. The finger portions 196 are slidably disposed in corresponding passages 197 formed in the molds 66 and the finger portions 196 are of a length to extend completely across the mold cavities 67 in the pushed position of the mold cores 194 as shown at the top of Fig. 9. The molten lead is poured into the mold cavities 67 with the mold cores 194 in the pushed in position shown at the top of Fig. 9 so that as the molten lead solidifies forming the seal, the finger portions 196 form the passages 192 in the seal 191, as shown in Figs. 12 and 13. However, before the cast lead seals can be ejected from the mold cavities 67 it is necessary to pull the mold cores 194 outwards, to the position shown at the bottom of Fig. 9, to withdraw the finger portions 196 from the passages 192 formed in the lead seal 191 freeing the lead seal to be ejected.

Means is provided for pulling outwards on the mold cores 194 prior to ejection of the cast seals 191 from the mold cavities 67 to free the seals to be ejected. The means for pulling outwards on the mold cores 194 comprises a slidably mounted extracting rod 198 slidably supported in a suitable U-shaped bracket 199 mounted on the plate 53. The extracting rod 198 is located in substantially axial alignment with the mold core 194 of the mold 66 which is three molds removed from the mold 66 being filled by the charging valve 69, and at one end of the jack shaft 183. The end of the extracting rod 198 adjacent the head 55 is formed with a cutout 200 normally disposed in the path traversed by complementary tail portions 201 formed on the end portions 195 of the mold cores 194. The arrangement of the tail portions 201 and the cutout 200 of the extracting rod 198 is such that as the head 55 rotates one of the tail portions 201 enters the top of the cutout 200 so that when the head 55 stops rotating that tail portion will be within the cutout 200 and when the head 55 is again rotated that tail portion 201 moves out of the bottom of the cutout and the tail portion 201 of the mold core 194 of the next adjacent mold 66 moves into the top of the cutout 200.

A substantially elliptical cam 202 is mounted on the end of the jack shaft 183 adjacent the extracting rod 198 and engages a collar 203 mounted on an intermediate portion of the extracting rod 198 between the brackets 199. Concentrically mounted upon the extracting rod 198 there is an expansion spring 204 which operates between the collar 203 and the adjacent bracket 199 for retaining the extracting rod 198 in a position in which the collar 203 engages the elliptical cam 202 and the cutout 200 is in a proper position to be entered by the tail portions 201. The cam 202 functions to draw the extracting rod 198 away from the head 55 against the action of the expansion spring 204 to draw outward on the respective mold core 194. The cutout 200 should preferably be of a sufficient length to permit the extracting rod 198 to be returned to its starting position without pushing in on the drawn out mold core 194 in the event the tail portion 201 of that drawn out mold core has not moved clear of the cutout 200.

Means is provided within the hollow of the head 55 for ejecting the lead seals 191 from the mold cavities 67 after the mold cores 194 have been pulled out, this ejection taking place one mold removed from the mold at which the mold cores 194 are drawn out. Details of the lead seal ejecting means are illustrated in Figs. 7, 8 and 10 from which it will be noted that the ejecting means includes a cam 205 fixedly mounted on the fixedly mounted shaft 59 within the head 55. The cam 205 is formed at one point with a narrow high part 205ª which is in radial alignment with the center of the mold 66 which is one mold removed from the mold at which the mold cores 194 are withdrawn.

Disposed radially within the head 55, there is an ejector 206 for each of the molds 66 mounted on the periphery of the head 55. Each of the ejectors 206 is alike in construction, and each comprises a cylindrical outer portion 207 slidable in a complementary passage 208 formed in the head 55 in axial alignment with the center of the mold cavity 67 of the respective mold 66. The inner end of the cylindrical outer portion 207 continues into a reduced inner portion 209 which extends into the hollow of the head 55. Mounted on the inner end of the reduced inner portion 209 of each of the ejectors 206, there is a head 210 which rotatively supports a roller 211 arranged to roll on the peripheral edges of the fixedly mounted cam 205 as the head 55 rotates relative to the fixedly mounted shaft 59. An expansion spring 212 is concentrically mounted on the reduced inner portion of each of the ejectors 206 and operates between the head 210 and the adjacent face of the inside wall of the head 55 for retaining the ejectors 206 in a position in which outer ends of the cylindrical outer portions 207 are flush with the base walls of the mold cavities 67 and in which the rollers 211 engage the cam 205.

To retain the ejectors 206 against rotation and in a position in which their rollers 211 will be in proper alignment with the cam 205 to roll about the periphery thereof, the side of the cylindrical outer portion 207 of each ejector 206 is formed with an elongated groove 207ª, see Figs. 8 and 10, engaged by a complementary pin 55ª inserted from the side of the head 55 into the respective passage 208 of the head 55 through which the cylindrical outer portion 207 extends.

In assembling the head 55, the ejectors 206 minus the heads 210 and the rollers 211 are slipped into the passages 208 from the outside of the head 55, with the pins 55ª engaging the grooves 207ª. The expansion springs 212 are then slipped onto the inner ends of the reduced inner portions 209 and the heads 210 with the rollers 211 are then slipped into position and welded, brazed or in any other manner fixedly secured to the inner ends of the reduced inner portions 209 of the ejectors 206.

As the head 55 rotates, the rollers 211 will successively roll up onto the high part 205ª of the cam 205 and cause the ejectors 206 to be successively urged outwards against the action of the expansion springs 212, as shown in Fig. 8, to force the completed seals 191 from the mold cavities. Upon being ejected, the seals 191 may collect in a suitable box, not shown on the drawing, located beneath the machine, or they may fall onto a suitable conveyor, not shown on the drawing, which will carry them away from the machine. When ejection of the finished seal is completed, the rollers 211 then roll down the opposite side of the high part 205ª of the fixed cam 205 freeing the ejectors 206 to be returned to their starting position by the expansion springs 212.

At the side of the head 55 diametrically opposite the side at which the mold cores 194 were drawn outwards, means is provided for pushing inwards on the mold cores 194 to return them to their starting position prior to refilling the mold with molten lead. The mold core pushing in means is characterized by an inserting rod 213 slidably supported by a U-shaped bracket 214, in axial alignment with the mold core 194 which is to be pushed inwards to its starting position. Mounted on the inserting rod 213 within the bracket 214, there is fixedly mounted a collar 215 which engages an elliptical cam 216 mounted on the end of the jack shaft 183 remote from the end upon which the elliptical cam 202 is mounted. The end of the inserting rod 213 remote from the head 55 extends for a considerable distance beyond the bracket 214 and a collar 217 is fixedly mounted on that projecting end. An expansion spring 218 is coaxially positioned on the extended end of the inserting rod 213 and operates between the adjacent faces of the collar 217 and the bracket 214 holding the inserting rod in a position in which the collar 215 bears against the cam 216 and in which the end thereof adjacent the head 55 is at a position slightly beyond the end of the mold core 194 when in its drawn out position. While the head 55 is standing still, the inserting rod 213 is in axial alignment with one of the mold cores 194 and the cam 216 rotates extending the inserting rod 213 against the action of the expansion spring 218 to engage the end portion 195 of the respective mold core 194 and push it in to extend its finger portions 196 across the mold cavity 67 prior to its being refilled with molten lead.

In Figs. 28 and 29 of the drawings, there is illustrated a modified form of mold 66′ for use on the periphery of the head 55 for molding the lead seal 191′ shown in Figs. 30 and 31 of the drawing. This mold 66′ differs from the previous mold in that its top face is formed with a groove 219, which extends from one side of the mold cavity 67′ to the adjacent edge of the mold proper, for the insertion of one end of a sealing wire 220 into the mold cavity 67′ prior to the filling of the mold cavity with the molten lead. Furthermore, the mold core 194′ is provided with only two finger portions 196′ designed to form two passages 192′ in the lead seal 191′.

From a careful examination of Figs. 28 and 29 it will be noted that the groove 219 is so located that the end of the wire 220 will be fed into the mold cavity 67′ between the adjacent sides of the finger portions 196′ so that when the completed seal 191′ is ejected from the mold cavity 67′ the end of the wire 220 will be anchored in the seal between the passages 192′ to have its free end threaded through the passages in sealing position as shown in Fig. 31.

In order to permit the seal 191′ with the end of the wire 220 anchored therein to be ejected from the mold cavity 67' it is essential that the groove 219 open to the top face of the mold 66'. A minor portion of the molten lead will flow into the open portion of this groove 219 above the inserted end of wire 220; however, it has been found that the lead immediately coagulates plugging the open portion of the groove 219 and preventing the loss of molten lead through the groove 219. The small nipple formed by this slight seepage of the molten lead into the groove 219 has not been found objectionable and if desired can be removed after the seal has been ejected from the mold 66'.

In Fig. 32 of the drawing, there is shown in perspective a portion of a still further embodiment of the mold 66'' which may be mounted in the periphery of the head 55 for forming the lead seals 191'' shown in Figs. 33 and 34. As in the embodiment shown in Figs. 28 to 31, the mold 66'' is formed with the groove 219' for the insertion of one end of a short length of wire 220' into the mold cavity 67'' prior to filling the same with the molten lead. The mold core of the mold 66'' is formed with four finger portions 196'' arranged in spaced pairs on opposite sides of the groove 219', see Fig. 32, so that when the seal 191'' is completed it will be formed with four passages 192'' arranged in spaced pairs on opposite sides of the inserted end of the wire 220'. The passages 192'' permit the insertion of a length of cord or wire 193' in sealing position as shown in Fig. 34. After the seal 191'' has been removed from the mold 66'' and before the length of word or wire 193' has been threaded into position, the free end of the wire 220' may be pointed, as indicated at 221 in Figs. 33 and 34.

The lead seals shown in Figs. 12 and 13 and Figs. 30 and 31 are of the type which can be used by the utility companies and similar concerns to seal gas and electric meters and similar boxes, while the seal shown in Figs. 33 and 34 is of the type which can be used by the U. S. Post Office Department to seal bags of valuable mail. After the mail bag has been filled, the neck thereof is drawn closed and the sealing wire 193' is engaged about the drawn closed neck with the pointed end 221 of the wire 220' pointing toward the neck of the bag and as the wire is drawn tight to draw the seal 191'' up close to the neck of the bag, the pointed end 221 to be pressed into the neck of the bag rendering it impossible to slip the seal over the top of the drawn together neck of the mailbag.

The present invention proposes the construction of a novel wire feed mechanism 222, shown in detail in Figs. 1 and 18 to 27, operated by the drive means 86 for feeding the ends of predetermined lengths of wire into the grooves 219 of the molds 66' shown in Figs. 28 and 29 or into the grooves 219' of molds 66'' shown in Fig. 32, when either of such molds are mounted upon the periphery of the head 55 in place of the molds 66. The operation of the parts of the machine previously described is exactly alike regardless of which type of mold is mounted on the periphery of the head 55.

The wire feed mechanism 222 is composed of a track 223 comprising a bed rail 224 mounted on the front face of a pair of brackets 225 which extend vertically from the top frame member 52 of the frame 50. Mounted on the front face of the bed rail 224 there is a pair of parallel vertically spaced rail members 226, see Figs. 18 and 20. Between the spaced rail members 226, the bed rail 224 is formed with a horizontal line of evenly spaced threaded holes 227 for the passage of attaching screws for the attachment of desired operating parts of the wire feed mechanism to the track 223 in desired longitudinal spaced positions relative to each other, as will become clear as this specification proceeds. As shown in Fig. 1, the track 223 extends longitudinally of the machine with one end adjacent the head 55 and with its other end extended from the head 55.

Mounted on the top frame member 52, beyond the end of the track 223, there is a pair of upwardly extending brackets 228, only one of which is shown in Fig. 1, which support between them a spindle 229 upon which there is rotatively mounted a roller 230 having wound thereon a continuous length of wire 220^a. Mounted on the end of the track 223 and more particularly upon the end of the bed rail 224 there is a wire straightener formed of a plate 231 upon which a plurality of rollers 232 are mounted for free rotation and between which the end of the wire 220^a is to be drawn to straighten the same.

After leaving the wire straightener, the end of the wire 220^a passes through a wire gripper having a body 233 which extends vertically along the back face of the bed rail 224 of the track 223. The bottom end of the body 233 is secured to the bed rail 224 by several screws 234 which pass through openings formed in the body 233 and which threadedly engage a complementary pair of the threaded holes 227 formed in the bed rail 224. Thus, the position of the wire gripper along the length of the bed rail 224 is adjustable by removing the screws 234 and reengaging them with a different pair of the threaded holes 227.

Integrally formed with the front of the body 233 there is formed a wire supporting ledge 235 which projects forwardly across the top of the track 223, see Fig. 27, and across the top face of which the end of the wire 220^a passes. Mounted on the side of the body 233 adjacent the wire straightener there is a wire guide 236 formed with a small wire guide hole 237. The wire guide hole 237 is of a diameter slightly greater than the diameter of the wire 220^a so that the wire may pass freely therethrough insuring that the wire will be properly guided across the top face of the wire supporting ledge 235 beneath the lower end of a finger 238 mounted on the body 233 above the wire supporting ledge 235.

The top end of the finger 238 is pivotally supported upon a fixedly mounted pin 239 which extends from the front face of the body 233. The lower end of the finger 238 is formed with serrations 240 and is urged towards the top face of the wire supporting ledge 235 by a spring 241 which has one end attached to the pin 239 and its other end bent to engage the side of the finger 238 remote from the wire guide 236, see Fig. 18.

The spring 241 exerts a sufficient pressure to retain the finger 238 in a position in which its serrations 240 will touch the wire 220^a and hold it loosely in position on the top face of the wire supporting ledge 235. The length of the finger 238 as compared with the distance between the fixed pin 239 and the top of a wire 220^a resting on the wire support ledge 235 is such that the finger 238 is longer, so that when the serrations 240 of the finger 238 are engaging the top of the wire 220a, the finger 238 assumes a downwardly inclined position toward the head 55 permitting a free movement of the wire 220a beneath the serrations 240 toward the head 55. However, if a force is applied to the wire 220a tending to move it towards the wire straightener, the spring 241 pivots the finger 238 causing the wire 220a to be tightly gripped between the serrations 240 and the top face of the wire supporting ledge 235 arresting any possible reverse movement of the wire.

After leaving the wire gripper the end of the wire 220a passes through a wire guide also mounted on the bed rail 224 of the track 223 on the side of the wire gripper opposed to the wire straightener. The wire guide comprises a panel 242 secured to the back face of the bed rail by several screws 243 which pass through openings formed in the panel 242 and which are threadedly engaged with an aligned pair of the threaded holes 227 formed in the bed rail 224. As in the case of the wire gripper, the position of the wire guide on the bed rail 224 may be adjusted by removing the screws 243 and reengaging them with another pair of the threaded holes 227.

Secured to the front face of the panel 242 above the track 223, there is a bracket 244 integrally formed with an outer body portion 245 which projects laterally from the side of the bracket 244 towards the wire gripper. The interior of the outer body portion is formed with axially aligned passages 246 and 247 of different diameters forming a shoulder 248 between their adjacent ends, see Fig. 26. The end of the passage 246 at the free end of the outer body portion 245 is closed by means of a cap 249 secured in position upon the front face of the panel 242 by several spaced screws 250. The cap 249 has a portion 249a which extends into the open end of the passage 246 forming a support for the free end of the outer body portion 245 upon the cap 249. The cap 249 is formed with a passage 251 arranged concentric with the passages 246 and 247; the passage 251 being of the same diameter as the passage 247.

A tube 252 is slidably extended through the concentric passages 246, 247 and 251 and has its ends normally projecting beyond the bracket 244 and the cap 249. The tube 252 has an internal bore 253 only slightly greater in diameter than the diameter of the wire 220a and has its axis on the same horizontal plane as the top face of the wire supporting ledge 235 of the wire gripper, so that the end of the wire 220a may pass in a direct line between the top face of the wire supporting ledge 235 and the bore 253 of the tube 252. Intermediate of its ends and within the passage 246, the tube 252 is provided with an enlarged collar 254 arranged to engage the shoulder 248 to limit sliding movement of the tube 252 in a direction towards the head 55. An expansion spring 255 coaxially wound on the tube 252, within the passage 246, operates between the adjacent faces of the collar 254 and the cap 249 for retaining the tube 252 in a position in which the collar 254 engages the shoulder 248.

Mounted for longitudinal movement on the track 223, there is a wire feed head for inserting the end of a length of wire into the groove 219 of the mold 66′ or into the groove 219′ of the mold 66″ or similarly constructed molds mounted on the head 55 when the wire feed head is moved towards the head 55. The wire feed head comprises a carriage 256 extended vertically along the front face of the track 223, see Fig. 20. On its rear face, the carriage 256 is provided with four rotatively mounted flanged wheels 257. One pair of the flanged wheels 257 engages the top rail member 226 of the track 223 and the other pair of flanged wheels 257 engages the bottom rail member 226 supporting the carriage 256 for rolling movement along the length of the track 223.

A vertical lever 258 is connected at its top end to the center of the front face of the carriage for pivotal movement relative thereto by means of a pivot pin 259. The bottom end of the vertical lever 258 is connected by means of a pivot pin 260 to one end of an idler link 261 which is pivotally connected at its other end upon one of the legs 51 of the frame 50, by means of a pivot pin 262. The arrangement is such that the end of the idler link 261 connected to the bottom end of the vertical lever 258 will move up and down slightly as movement of the vertical lever 258 causes the carriage 256 to move horizontally to and fro along the length of the track 223.

Slidably mounted on the vertical lever 258 intermediate of its ends, there is a block 263 which may be secured in desired adjusted positions along the length of the vertical lever 258 by means of a clamp bolt 264, see Fig. 1. Pivotally engaged upon a stud 265 which extends laterally from the side of the block 263 there is a connector member 266. A horizontal link 267 has one end connected to the connector 266 by means of several bolts 268. The bolts 268 pass freely through openings formed in the connector 266 and are selectively threadedly engageable with a pair of several complementary threaded openings 269 formed in the adjacent end of the horizontal link 267. By reengaging the bolts 268 with a different pair of the openings 269, the operative length of the horizontal link 267 relative to the connector 266 can be adjusted.

The opposite end of the horizontal link 267 is connected by means of a pivot pin 270 to one end of an arm 271. The other end of the arm 271 is removably secured to one end of a stud shaft 272 rotatively supported intermediate of its ends in a bearing block 273 mounted on the inner face of one of the legs 51 at the adjacent end of the frame 50. A sprocket wheel 274 is fixedly mounted on the other end of the stud shaft 272.

A second sprocket wheel 275 is fixedly mounted on an intermediate portion of a shaft 276 rotatively supported between bearing blocks 277 mounted on the inner faces of a pair of the legs 51 at the opposite end of the frame 50. A continuous sprocket chain 278 engages over the sprocket wheels 274 and 275 to rotate the stud shaft 272 when the shaft 276 is rotated. The continuous sprocket chain 278 also passes over a pair of vertically spaced idler sprocket wheels 279 mounted on the inside face of an intermediate leg 51 of the frame 50 for supporting and tensioning the sprocket chain 278 in view of its length. If desired, the idler sprocket wheels 279 could be individually rotatively mounted on blocks vertically adjustably mounted on the respective leg 51 to be adjusted relative to each other to vary the tension on the sprocket chain 278.

Means is provided for connecting the shaft 276 to the drive means 86 to cause the shaft 276 to be rotated to in turn move the carriage 256 back and forth on the track 223 by means of the intervening linkage described last above. This connecting means comprises a sprocket wheel 280 mounted on the shaft 276 and a complementary sprocket wheel 281 mounted on the shaft 97 on the side of the clutch 98 opposed to the pulley

99. A continuous chain **282** engages over the sprocket wheels **280** and **281** for driving the shaft **276** from the shaft **97**. The means for moving the carriage **256** is synchronized to the rotation of the head **55**, so that the carriage **256** will reach the end of the track **223** during the time the head is standing still between successive rotations and just prior to the time that the mold cavity of the top most mold **66'** or **66''** at the top of the head **55** in alignment with the charging valve **69**, is filled with molten lead.

The end of the carriage **256** adjacent the head **55** is formed with an upward extension **283** formed with a forwardly extending wire supporting ledge **284** which overlies the top of the track **223**. The top face of the wire supporting ledge **284** is on the same horizontal plane with the bore **253** of the tube **252** of the wire guide, so that the wire **220**^{a} may pass in a direct line from the bore **253** across the top face of the wire supporting ledge **284**, see Fig. 18. A fixedly mounted pivot pin **285** is securely mounted on the front face of the upward extension **283** above the wire supporting ledge and a gripping finger **286** is pivotally mounted on the fixed pivot pin **285** to pivot relative thereto. The bottom of the gripping finger **286** is formed with serrations **287** for gripping and holding the end of the wire **220**^{a} in position on the top face of the wire supporting ledge **284**, as shown in Fig. 18. A leaf spring **288** has one end fixedly secured to the fixed pivot pin **285** and its other end engaged behind a lug **289** formed on the gripping finger **286** beneath the pivot pin **285**, for resiliently holding the gripping finger in its operative position shown in Fig. 18. With the gripping finger **286** holding the end of the wire **220**^{a} in position as shown in Fig. 18, the wire feed head may be moved towards the head **55**, and such movement will draw the wire **220**^{a} from the roller **230** through the wire straightener, across the top face of the wire supporting ledge **235** of the wire gripper and through the bore **253** of the tube **252** of the wire guide means.

The upward extension **283** is formed with a laterally extending projection **290** and means is mounted on that projection for holding the gripping finger **286** in the inoperative position shown in Fig. 21 in which the gripping action of the finger **286** on the wire **220**^{a} has been released. The means on the projection **290** comprises a block **291** which slidably supports a plunger **292** for movement towards and away from the gripping finger **286**. The end of the plunger **292** is undercut as shown at **293** to engage a notch **294** formed on the top of the gripping finger **286** in the pivoted position thereof. When the gripping finger **286** is in the operative position shown in Fig. 18, the undercut end **293** merely engages the side of the finger **286** as shown in Fig. 18. The opposite end of the plunger **292** is formed with an enlarged head **295** formed with a flat side **296**, see Fig. 20, which slides across the front face of the projection **290** and retains the plunger **292** against rotating in the block **291**. A contraction spring **297** operates between a peg **298** mounted on the enlarged head **295** and the fixed pivot pin **285** for retaining the plunger **292** with its undercut end **293** engaging the side of the gripping finger **286** in the operative position of the finger shown in Fig. 18, or with its undercut end **293** engaging the notch **294** in the inoperative position of the finger **286** shown in Fig. 21. As the undercut end **293** of the plunger **292** engages the side of the gripping finger **286** above the fixed pivot pin **285**, when the finger is in the operative position shown in Fig. 18, the contraction spring **297** exerts a force on the gripping finger **286** which assists the leaf spring **288** in holding the finger in its operative position.

The gripping finger **286** is formed with an upwardly extending extension **299** which projects above the top edge of the upward extension **283**. The extension **299** is located to engage a trip finger **300**, see Figs. 1, 3 and 4, to pivot the gripping finger **286** from the operative position shown in Fig. 18 to the inoperative position shown in Fig. 21, as the carriage **256** reaches the end of its movement in a direction towards the head **55**. The trip finger **300** is integrally formed with or mounted on the bracket **225** which supports the end of the track **223** adjacent the head **55**.

A trip pawl **301** is pivotally supported intermediate of its ends upon the front face of the laterally extending projection **290** by means of a pivot pin **302** and has its top end engaging the adjacent side of the enlarged head **295** of the plunger **292** in both the operative and inoperative positions of the gripping finger **286**. When the gripping finger **286** is moved to the inoperative position shown in Fig. 21 by the engagement of the extension **299** with the trip pawl **300**, the contraction spring **297** draws the plunger **292** toward the gripping finger **286** engaging its undercut end **293** with the notch **294** as shown in Fig. 21 to lock the gripping finger in the pivoted inoperative position.

Simultaneous with movement of the plunger **292**, the trip pawl **301** is pivoted from the position shown in Fig. 18 to the position shown in Fig. 21. In the latter position, the lower end of the trip pawl **301** extends below the bottom edge of the laterally extending projection **290** to engage and be pivoted by a trip dog **303** mounted on the bracket **244** of the outer body portion **245** of the wire guide, as the carriage **256** completes its movement in the direction of the wire guide. This pivoting of the trip pawl **301** draws on the plunger **292** against the holding action of the contraction spring **297** disengaging the undercut front end **293** of the plunger **292** from the notch **294** freeing the gripping finger **286** to be pivoted from the inoperative position shown in Fig. 21 back to the operative position shown in Fig. 18, by the leaf spring **288**.

A wire cutter is provided for cutting the desired length of wire from the continuous length thereof at the end of the tube **252** adjacent the head **55**. The cutter comprises a rotative blade **304** mounted on a bushing **305** slidable along the length of a shaft **306**. The bushing **305** is arranged to be secured in desired shifted positions along the length of the shaft **306** by means of a set screw **307** so that the bushing **305** and rotative blade **304** will turn in a complete circle with the shaft **306** when the shaft rotates. The rotative blade **304** extends radially from the shaft **306** and is formed with a cutting edge **308**, see Figs. 20 and 24, on one side of its outer end and arranged to engage the wire **220**^{a} at the adjacent end of the tube **252**.

The shaft **306** is supported at its ends in bearing blocks **309** mounted on the brackets **225** above the track **223**, so that the shaft **306** is located above the track **223** and extended parallel thereto. The end of the shaft **306**, adjacent the wire straightener, is provided with a sprocket wheel **310**, see Figs. 1 and 20, engaged by a continuous sprocket chain **311**. The sprocket chain **311** also engages a further sprocket wheel **312** mounted on an extended end 147ª, see Figs. 4 and 20, of the shaft 147 so that the shaft 306 will rotate in timed synchronism with the shaft 147 to turn the rotative blade 304. The end 147ª of the shaft 147 is rotatively supported in a bracket 313 which extends from the bracket 225 at the end of the track 223 adjacent the wire straightener. The bracket 313 is shown in dot and dash lines in Fig. 20.

A slidable blade 314 is slidably supported for movement at right angles to the wire 220ª upon an L-shaped bracket 315. One arm of the L-shaped bracket 315 is secured to the back face of the bed rail 224 of the track 223 by several screws 316 which pass through openings formed in the arm of the bracket 315 and which threadedly engage a complementary pair of the threaded holes 227 formed in the bed rail 224. Thus, the position of the slidable blade 314 may be adjusted by removing the screws 316 and reengaging them with a different pair of the threaded holes 227.

The other arm of the L-shaped bracket 315 extends at right angles to the back face of the track 223 and formed with a groove 317 in which the slidable blade 214 is disposed for sliding movement relative to the wire 220ª. The slidable blade 314 is formed with a headed rivet 318 which extends through an elongated slot 319 formed in the adjacent arm of the L-shaped bracket 315 with the head of the rivet 318 engaging the side of the arm on the side opposite the groove 217 to retain the slidable blade 314 in position in the groove 317.

The rear end of the slidable blade 314 is formed with a depending tail portion 320 located to the front of the extended end 147ª of the shaft 147. Mounted on that extended end 147ª there is a cam 321 having a high part 321ª for pushing forward on the slidable blade 314 as the shaft 147 rotates. A contraction spring 322 operates between the head of the headed rivet 318 and a lug 323 formed on the arm of the L-shaped bracket 315 at the rear end of the elongated slot 319 for drawing rearward on the slidable blade 314 to retain its depending tail portion 320 in contact with the cam 321. The cam 321 is slidable on the length of the end 147ª of the shaft 147 and on one side thereof is formed with an integral laterally extending bushing 324, see Fig. 18, through which a set screw 325 is threadedly engaged for holding the cam 321 in desired adjusted positions along the length of the end 147ª of the shaft 147 to coincide with adjusted positions of the slidable blade 314 on the track 223.

The front end of the slidable blade 314 is formed with a cutting edge 326, see Figs. 23 and 24, which in the forwardly extended position of the slidable blade 314, indicated by the dot and dash lines 314′ in Fig. 20, is immediately at the rear of the wire 220ª. When the slidable blade 314 is in its forwardly extended position, the rotative blade 304 will assume the position illustrated by the dot and dash lines 304′, with its cutting edge 308 immediately at the front of the wire 220ª, so that the least further rotation of the rotative blade 304 in a clockwise direction, as viewed in Fig. 20, will cause the cutting edge 308 of the rotative blade 304 to pass the cutting edge 326 of the slidable blade 314 and cut the wire 220ª at the end of the tube 252 adjacent the head 55.

Mounted on the edge of the wire feed head adjacent the head 55, there is a funnel-shaped member 327 having a reduced end portion 328 having a central bore 329 only slightly larger than the diameter of the wire 220ª so that the end of the wire 220ª may freely pass therethrough. The bore 329 is arranged in axial alignment with the groove 319 of the mold 66′ (or the groove 319′ of the mold 66″), as shown in Fig. 19, for feeding the end of the wire 220ª into that groove 319 and then into the mold cavity 67′ as the carriage 256 of the wire feed head approaches the end of the track 223 adjacent the head 55. The top of the funnel-shaped member is formed with a cutout 330, see Figs. 19 and 22, arranged in alignment with the bottom end of the gripping finger 286 providing clearance for the pivoting of the gripping finger 286 between its operative and its inoperative positions.

Normally, the end of the wire 220ª will project slightly from the end of the tube 252 of the wire guide where it had been last cut by the blades 304 and 314 of the wire cutter. The tube 252 functions to hold the cut end of the wire 220ª in horizontal alignment with the top face of the wire supporting ledge 284 of the wire feed head. The vertical lever 258 will be pivoted by the drive means 86 and the interposed linkage to move the carriage 256 toward the wire guide. When the carriage 256 is moving in that direction, the gripping finger 286 will be pivoted to the inoperative position shown in Fig. 21, and will be retained in that position by the engagement of the undercut end 293 of the plunger 292 with the notch 294 of the finger 286.

As the carriage 256 approaches the wire guide the top face of the wire supporting ledge 284 will begin to pass beneath the end of the wire 220ª and the adjacent side of the wire supporting ledge 284 will strike the end of the tube 252 and urge it against the action of the spring 255 relative to the wire 220ª. The wire 220ª will be retained against any possible movement in a direction towards the roller 230 during movement of the tube 252 by the clamping action of the finger 238 of the wire gripper which firmly presses the wire against the top face of the wire supporting ledge 235 of the wire gripper. Movement of the carriage 256 towards the wire guide continues causing the end of the wire 220ª to be projected across the top face of the wire supporting ledge 284 and through the funnel-shaped member 327 until the end of the wire projects from the end of the reduced end portion 328 of the funnel-shaped member 327 a sufficient distance to pass through the groove 219 of the mold 66′ and into the mold cavity 67′ on the reverse movement of the carriage 256 on the track. When the carriage completes its movement toward the wire guide, the depending end of the trip pawl 301 will strike the trip dog 303 and cause the trip pawl 301 to be pivoted to push on the enlarged head 295 and draw on the plunger 292 against the action of the contraction spring 297. This will immediately disengage the undercut end 293 of the plunger 292 from the notch 294 freeing the gripping finger 286 to be urged to the operative position shown in Fig. 18 by the leaf spring 288. In its operative position the bottom end of the gripping finger 286 clamps the wire 220ª against the top face of the wire supporing ledge 284 and the serrations 287 dig into the surface of the wire 220ª securely clamping the end of the wire in position on the top face of the wire supporting ledge 284 of the wire feed head.

The vertical lever 258 now reverses its pivoting action moving the carriage 256 on the track 223 away from the wire guide and towards the head 55. Immediately, the depending end of the trip pawl 301 moves clear of the trip dog 303, freeing the plunger 292 so that it may be moved by the contraction spring 297 to have its undercut end 293 engage the adjacent side of the gripping finger 286 so that the pressure exerted by the contraction spring 297 may be used to augment the pressure created by the leaf spring 288 in urging the bottom end of the gripping finger 286 into its operative position clamping the wire 220^a against the top face of the wire supporting ledge 284.

At the start of the movement of the carriage 256 in the direction of the head 55, the compressed expansion spring 255 exerts a pressure on the collar 254 which causes the tube 252 to move with the carriage 256 until the collar 254 strikes the shoulder 248. The carriage 256 will now move away from the end of the tube 252 drawing the wire from the roller 230, through the wire straightener, beneath the finger 238 of the wire gripper and through the bore 253 of the tube 252, leaving the tube 252 to support the portion of the wire 220^a between the tube 252 and supporting ledge 284 of the wire feeding head in the proper horizontal alignment with the cutting edge 326 of the slidable blade 314. Normally, the slidable blade is retained in a rearward retracted position by the contraction spring 322, in which its cutting edge 326 will be out of the path traversed by the carriage 256 in moving toward and away from the wire guide.

At one point during the movement of the carriage 256 towards the head 55, the cutting edges 308 and 326 of the blades 304 and 314 will be caused to cross one another, as previously described to cut the wire when the desired length has been withdrawn for the particular type of lead seal being cast by the machine. The operation of the cutting edges 308 and 326 of the blades 304 and 314 is controlled by the rotative settings of the rotatable blade 304 on the shaft 306 and the cam 321 on the projected end 147^a of the shaft 147.

As the carriage approaches the end of its movement toward the head 55, the end of the cutoff length of wire 220^a which extends from the reduced end portion 328 of the funnel-shaped member 327 begins to enter the groove 219 of the mold 66′ at the top of the head 55 which is now standing still until the end projects into the molding cavity 67′. Simultaneously, the upward extension 299 of the gripping finger 286 strikes the trip finger 300 and the charging valve 69 which has been lowered onto the topmost mold 66′ is opened to discharge a desired quantity of molten lead into the mold cavity 67′ which immediately flows about the end of the wire 220^a anchoring the same in the seal being cast.

As the upward extension 299 of the gripping finger 286 struck the trip finger 300, the gripping finger was pivoted to the inoperative position illustrated in Fig. 21, through the cutout 330 to the funnel-shaped member. This releases the gripping action of the gripping finger 286 on the wire 220^a, so that when the vertical lever 258 again reverses its pivotal direction to move the carriage 256 away from the head 55, the supporting ledge 284 of the wire feed head will merely move from beneath the wire 220^a leaving the end thereof anchored in the seal being cast in the mold cavity 67′ of the topmost mold 66′.

It is appreciated of course that the position of the wire gripper, the wire guide and the cutting blades 304 and 314 of the wire feed mechanism 222 may be adjusted relative to the head 55 to control the length of the piece of wire which will be anchored in each lead seal cast by the machine, and that the connections between the block 263 and the vertical lever 258 and the connector 266 and the horizontal link 267 may be adjusted to control the length of the oscillatory movement of the carriage 256 on the track 223 so that the carriage will move between the wire guide and the head 55 in all adjusted positions of the panel 242 of the wire guide on the track 223. The wire feed mechanism 222 is only to be used when molds, such as the molds 66′ or 66″, having grooves for the insertion of wires are mounted on the periphery of the head 55. When molds such as the molds 66 are mounted on the head 55, for molding lead seals which do not have projecting wires, the wire feed mechanism 222 is rendered inoperative by disconnecting the arm 271 from the stud shaft 272 so that the stud shaft will merely rotate idly.

The operation of the lead casting machine constructed in accordance with the present invention, is as follows:

The bulk lead to be cast into the lead seals is first placed into the lead pot 73 through the open top thereof, and the gas burners 74, 75 and 76 are ignited. This will melt the bulk lead in the lead pot 73 from where it will flow through the pipe 72 into the hollow of the valve casing 70 of the charging valve 69. The gas burners 75 on the pipe 72 and the gas burners 76 arranged about the charging valve 69 will retain the molten lead at the proper temperature for casting. From Fig. 2 it will be noted that the top of the charging valve 69 is arranged above the top of the lead pot 73 so that the molten lead will seek its own level within the hollow of the valve casing 70 in conformity with the level of the molten lead in the lead pot 73.

After the bulk lead has been melted, the electric motor 87 of the drive means 86 is energized for supplying the required power to operate the machine, it being understood, of course, that energization of the electric motor 87 is only effected after the proper molds for casting the desired lead seals have been mounted about the periphery of the head 55. With the head 55 retained against any possible accidental rotation by the engagement of the cutaway front end 156 of the indexing stop pin 154 and the upper end of the arm 171 on opposite sides of one of the teeth 140 of the ratchet disc 139 and the engagement of the end of the indexing finger 178 with one of the notches 176 of the indexing ring 175, the high part 114^a of the cam 114 engages the roller 115 and causes the charging valve 69 to be lowered into facial engagement with the top face of the topmost mold on the head 55.

This downward movement of the charging valve 69 seats the bottom end of the valve casing over the open top of the mold cavity 67 of the topmost mold 66, as shown in Fig. 15, closing the open top of the mold cavity. If seals of the type provided with integrally formed wire members are being cast, the wire feed mechanism 222 functions, as previously described to insert the end of a piece of wire 220^a through the groove of the mold and partially into the mold cavity. With the charging valve 69 in the lowered position and with the end of the wire in position in the mold cavity, if a wire is required, the high part 129^a of the cam 129 then engages the roller 130 pivoting the short arm 131 to momentarily raise the valve plunger 83 against the action of the expansion spring 136 to open the discharge opening 71 of the charging valve 69 and permit the desired quantity of molten lead to flow into the mold cavity of the topmost mold. The high part 129a of the cam 129 then rides off the roller 130 freeing the valve plunger 83 to be returned to its position closing the discharge opening 71 by the expansion spring 136. The high part 114a of the cam 114 then rides off the roller 115 freeing the charging valve 69 to be raised off the top face of the topmost mold by the expansion spring 121—all vertical movements of the charging valve 69 being permitted by the pivotal mounting of the lead pot 73 about its laterally extending trunnions 78.

The length of time that the charging valve 69 is in its lowered position and the length of time that the valve plunger 83 is in its raised position permitting the molten lead to flow through the discharge opening 71 may be varied by replacing the cams 114 and 129 by cams having differently shaped high parts. However, the sequence of lowering the charging valve 69, then raising and lowering the valve plunger 83 and finally raising the charging valve 69 must be adhered to if no molten lead is to be wasted by spilling.

With the charging valve 69 in the raised position, the cam 164 goes into operation to pivot the retracting lever 161 to pull on the indexing stop pin 154 to disengage its cutaway front end 156 from the tooth 140 of the ratchet disc 139 with which it was engaged. Simultaneously, the cam 182 goes into operation to free the indexing finger 178 to be pivoted by the contraction spring 186 to disengage its end from the notch 176 of the indexing ring 175 with which it was engaged. Movement of the indexing stop pin 154 and the indexing finger 178 frees the head 55 to be rotated to move the filled mold 66 from beneath the charging valve 69 and to bring the next mold into position beneath the charging valve 69 to be filled. Rotation of the head 55 is effected by the cam 146 which then pushes on the pusher lever 141, against the action of the contraction spring 151, to cause its pawl 143 to advance the ratchet disc 139 through one-twelfth of a turn to similarly advance the head 55. During such movement one tooth of the ratchet disc 139 merely idles past the free end of the spring loaded arm 171.

When the one-twelfth movement of the head 55 is effected, the cam 146 then frees the pusher lever 141 to be returned to its starting position by the contraction spring 151 and during such movement the pawl 143 merely idles over the topmost tooth 140 of the ratchet disc 139. Reverse movement of the head 55 is prevented by the engagement of the end of the spring loaded arm 171 against one of the teeth 140 of the ratchet disc 139. At the instant that the pusher lever 141 is freed, the cam 164 also frees the indexing stop pin 154 to be returned to its starting position in which its cutaway front end 156 reengages one of the teeth 140 of the ratchet disc 139 and the high part 182a of the cam 182 reengages the indexing finger 178 to pivot the finger against the action of the contraction spring 186, back to its starting position in which its free end reengages one of the notches 176 of the indexing ring 175. The head 55 is then locked against any accidental rotation and the new mold aligned with the charging valve 69 may be filled with a charge of molten lead.

Successive movements of the head 55 and charging of the molds is continued until the first charged mold moves into alignment with the mold core extracting rod 198. As the first charged mold moves toward the extracting rod 198, the tail portion 201 of the mold core 194 of that first charged mold moves into the cutout 200 of the extracting rod 198, from the top, so that during the time the head 55 is standing still, the tail portion 201 will be disposed within the cutout 200. The elliptical cam 202 then goes into operation to move the extracting rod 198 away from the head 55, against the action of the expansion spring 204 drawing the mold core 194 outwards until the ends of the finger portions 196 move entirely clear of the mold cavity freeing the cast seal to be ejected from the mold. Withdrawal of the mold core 194 takes place at a mold which is three molds removed from mold where the mold was charged with the molten lead.

After withdrawal of the mold core 194, the cam 202 then frees the extracting rod 198 to be returned to its starting position by the expansion spring 204, the cutout 200 is long enough, as previously described, to permit such movement of the extracting rod 198 without pushing inwards on the drawn out mold core 194. During the next movement of the head 55, the tail portion 201 of the mold core 194 then moves out of the bottom of the cutout 200 of the extracting rod 198, and the first mold then moves on to the ejecting station one mold removed from the mold at which the mold core 194 was pulled outwards.

At the ejecting station, the ejector 206 of the first charged mold aligns itself with the high part 205a of the cam 205. That is, the roller 211 of that ejector 206 rolls up onto the high part 205a of the cam 205 and the ejector 206 is urged radially outwards against the action of the expansion spring 212, causing the outer end of the ejector 206 to pass through the mold cavity forcing the cast seal from the mold cavity. During the next movement of the head 55, the roller 211 merely rides down the other side of the high part 205a of the cam 205 freeing the ejector 206 to be returned to its starting position by its respective expansion spring 212.

Successive movements of the head 55 are then continued until the mold core 194 of the first charged mold reaches a position aligned with the inserting rod 213, which takes place on the side of the head 55 diametrically opposite from the extracting rod 198. This also happens while the head 55 is standing still, and the elliptical cam 216 then goes into operation to move the inserting rod 213 towards the head 55, against the action of the expansion spring 217, to push inwards on the mold core 194, which has been drawn outwards by the extracting rod 198, to return the finger portions 196 to their starting position extended across the mold cavity restoring the mold to its starting position for a recharging with molten lead as the first charged mold again moves into position beneath the charging valve 69. It will be apparent from Fig. 6, that extracting and inserting of the mold cores 194 occur simultaneously on opposite sides of the head 55.

From the foregoing description it will be apparent that a full automatic lead seal casting machine has been provided in which all parts are positively driven in proper time synchronism to accomplish successive casting of lead seals without attention on the part of the operator, except to maintain the supply of molten lead in the lead pot 73. As all drive connections on the driven side of the slip clutch 98 are of the intermeshed gear type or of the sprocket and chain type, the clutch 98 which divides the shaft 97 into aligned driven and driving portions permits relative rotation between the portions of the shaft in the event the machine should become jammed up preventing damage to the operating parts of the machine.

An important feature of the present invention is that during the time a seal is ejected until the mold reaches a position aligned with the charging valve 69, each mold passes through a cooling stage wherein the mold is idle for eight successive movements of the head 55. This permits each mold to cool to a proper casting temperature between each ejection of a completed seal and a refilling of the mold for casting the next seal therein. To prevent the head 55 from becoming too hot and to permit any heat which may collect within the interior of the hollow of the head 55 to discharge itself, the disc 57 which closes the open side of the head 55 is formed with a series of small openings 331, see Fig. 5.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead mounted above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its mold cavities to an upwardly facing position, means acting on said valve casing to pivot said pot against the action of said resilient means to seat the lower end of said valve casing onto the mold head closing the upwardly facing mold cavity and means for raising said valve plunger during the time that said valve casing has its lower end seated on the mold head to open said discharge opening so that a charge of molten lead can flow from said valve casing into the upwardly facing mold cavity.

2. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead mounted above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its mold cavities to an upwardly facing position, means acting on said valve casing to pivot said pot against the action of said resilient means to seat the lower end of said valve casing onto the mold head closing the upwardly facing mold cavity, means for raising said valve plunger during the time that said valve casing has its lower end seated on the upwardly facing mold to open said discharge opening so that a charge of molten lead can flow from said valve casing into the upwardly facing mold cavity, a stationary support extended vertically alongside of said valve casing on the side opposite said pot and having a lug extended toward said valve casing, and a lug extending laterally from said valve casing toward said support and spaced above first lug, said resilient means comprising an expansion spring operating between the adjacent faces of said lugs.

3. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead mounted above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its mold cavities to an upwardly facing position, means acting on said valve casing to pivot said pot against the action of said resilient means to seat the lower end of said valve casing onto the mold closing the upwardly facing mold cavity, means for raising said valve plunger during the time that said valve casing has its lower end seated on the mold heads to open said discharge opening so that a charge of molten lead can flow from said valve casing into the upwardly facing

mold cavity, a stationary support extended vertically alongside of said valve casing on the side opposite said pot and having a lug extended toward said valve casing and a lug extending laterally from said valve casing toward said support and spaced above said first lug, said resilient means comprising an expansion spring operating between the adjacent faces of said lugs, said pot pivoting means comprising a roller mounted on top of the lug of said valve casing, a pivoting cam rotatively mounted on said support and engaging said roller and means for rotating said cam to lower said valve casing once for each revolution of said cam.

4. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead mounted above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its mold cavities to an upwardly facing position, means acting on said valve casing to pivot said pot against the action of said resilient means to seat the lower end of said valve casing onto the mold head closing the upwardly facing mold cavity, means for raising said valve plunger during the time that said valve casing has its lower end seated on the mold head to open said discharge opening so that a charge of molten lead can flow from said valve casing into the upwardly facing mold cavity, a stationary support extended vertically alongside of said valve casing on the side opposite said pot, a lug extending laterally from said valve casing toward said support, a vertical extension projected upward from said lug between said valve casing and said support with its top end above the top of said valve casing, said valve plunger raising means comprising a horizontal arm pivotally mounted intermediate of its ends on the top end of said extension, said valve plunger having its top end projected from the top end of said valve casing and connected to one end of said arm, a roller on the other end of said arm, a cam rotatively mounted on said support and engaging said roller and means for rotating said cam to pivot said arm and raise said valve plunger once for each rotation of said cam.

5. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its molds to an upwardly facing position, a stationary support extended vertically alongside of said valve casing on the side opposite said pot, a lug extending laterally from said valve casing toward said support, a roller mounted on said lug, a pivoting cam rotatively mounted on said support and engaging said roller, means for rotating said cam to pivot said pot and lower said valve casing onto the top of said mold closing the upward facing mold cavity once for each revolution of said cam, an extension extended vertically from said lug between said support and said valve casing and having its top end above the top end of said valve casing, a horizontal arm pivotally mounted intermediate of its ends on the top end of said extension, said valve plunger having its top end projected from the top end of said valve casing and connected to one end of said arm, a roller on the other end of said arm, a cam rotatively mounted on said support and engaging said latter roller, and means for rotating said latter cam in timed synchronization with said first cam to cause said valve plunger to be raised only while said valve casing has its lower end resting on the mold to discharge molten lead into said upward facing mold cavity.

6. A dispensing valve for a lead casting machine having a mold head with mold cavities opening to the periphery thereof and mounted to rotate on a horizontal axis and means for stopping the mold head with one of the mold cavities facing upward, comprising a pot for molten lead mounted above and to one side of the mold head to pivot on an axis parallel to the rotation axis of the mold head, a tubular valve casing positioned over the mold head and extended vertically upward above the center of the said one upwardly facing mold cavity, said tubular valve casing having a bottom discharge opening aligned with the upwardly facing mold cavity, a pipe mounting said valve casing on said pot and connecting the interior of said pot with the interior of said valve casing for conveying the molten lead from said pot to said valve casing, a valve plunger vertically slidably mounted in said valve casing for closing said discharge opening, resilient means acting on said valve casing for holding said pot in a pivoted position in which the bottom end of said valve casing will be raised off the mold head leaving the mold head free to be rotated to bring another of its mold cavities to an upwardly facing position, means acting on said valve casing to pivot said pot against the action of said resilient means to seat the lower end of said valve casing onto the mold head closing the upwardly facing mold cavity, means for raising said valve plunger during the time that said valve casing has its lower end seated on the

mold head to open said discharge opening so that a charge of molten lead can flow from said valve casing into the upwardly facing mold cavity, a stationary support extended vertically alongside of said valve casing on the side opposite said pot, and having a lug extended toward said valve casing, a lug extending laterally from said valve casing toward said support and spaced above said first lug, said resilient means comprising an expansion spring operating between the adjacent faces of said lugs, said pot pivoting means comprising a roller mounted on said lug, a pivoting cam rotatively mounted on said support and engaging said roller, means for rotating said cam to lower said valve casing once for each revolution of said cam, said spring acting to maintain said roller in contact with said cam, said roller being mounted on the top end of a shank threaded into said lug, so constructed and arranged that the position of said roller with relation to said lug can be adjusted by turning said shank in one direction or the other relative to said lug to vary the degree of pivotal movement of said pot.

7. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mould head and a wire groove extended in from one end of each of the molds and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire, limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up the free end of the wire supported by said wire guide and feeding it toward the mold head as the feed head moves from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide, and means for moving said feed head to and fro in timed synchronization with the rotation of the mold head.

8. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mold head and a wire groove extended in from one end of each of the molds and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head, to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up the free end of said wire supported by said wire guide and feeding it toward the mold head as the feed head moved from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide and means for moving said feed head to and fro in timed synchronization with the rotation of the mold head, said wire gripper comprising a body mounted on the bed rail and having a ledge across which the free end of the wire passes to be guided into said wire guide, a finger pivotally mounted on said body above said ledge and resiliently urged toward said ledge to grip the wire and limit movement thereof in a direction toward the mold head, and a wire guide block mounted on said body on the side adjacent said source and having a small guide hole through which the wire passes to be directed beneath said finger and into said first-mentioned wire guide.

9. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mold head and a wire groove extended in from one end of each of the molds and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up the free end of said wire supported by said wire guide and feeding it toward the mold head as the feed head moves from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide, means for moving said feed head to and fro in timed synchronization with the rotation of the mold head, said wire feed head comprising a carriage mounted for rolling movement on said bed rail and to which said moving means is connected, a wire supporting ledge on said carriage on the level of said wire guide to receive the free end of the wire from said wire guide, a funnel-shaped member mounted on said ledge on the side facing the mold head for guiding the free end of the wire into the wire groove of the mold, and a spring pressed pivotally mounted gripping finger securing the wire in

position on said ledge while said carriage is moving from said wire guide to the mold head.

10. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mold head and a wire groove extended in from one end of each of the molds and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up the free end of said wire supported by said wire guide and feeding it toward the mold head as the feed head moves from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide, means for moving said feed head to and fro in timed synchronization with the rotation of the mold head, said wire feed head comprising a carriage mounted for rolling movement on said bed rail and to which said moving means is connected, a wire supporting ledge on said carriage on the level of said wire guide to receive the free end of the wire from said wire guide, a funnel-shaped member mounted on said ledge on the side facing the mold head for guiding the free end of the wire into the wire groove of the mold, and a spring pressed pivotally mounted gripping finger securing the wire in position on said ledge while said carriage is moving from said wire guide to the mold head, a stationary pawl adjacent the mold head for engaging and pivoting said gripping finger to an inoperative position to free the wire as the carriage reaches the end of its movement toward the mold head, and latch means on said carriage for securing said gripping finger in its inoperative position during the time that said carriage is moving from the mold head to said wire guide.

11. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mold head and a wire groove extended in from one end of each of the molds, and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up and free end of said wire supported by said wire guide and feeding it toward the mold head as the feed head moves from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide, means for moving said feed head to and fro in timed synchronization with the rotation of the mold head, said wire feed head comprising a carriage mounted for rolling movement on said bed rail and to which said moving means is connected, a wire supporting ledge on said carriage on the level of said wire guide to receive the free end of the wire from said wire guide, a funnel-shaped member mounted on said ledge on the side facing the mold head for guiding the free end of the wire into the wire groove of the mold, a spring pressed pivotally mounted gripping finger securing the wire in position on said ledge while said carriage is moving from said wire guide to the mold head, a stationary pawl adjacent the mold head for engaging and pivoting said gripping finger to an inoperative position to free the wire as the carriage reaches the end of its movement toward the mold head, latch means on said carriage for securing said gripping finger in its inoperative position during the time that said carriage is moving from the mold head to said wire guide, and a trip dog mounted on said wire guide on a level to engage said latch means and move it to free said gripping finger to move back to its operative position as said carriage reaches the end of its movement toward said wire guide.

12. Wire feed mechanism for use with a lead casting machine having a rotatively mounted circular mold head with a plurality of molds mounted about the periphery of the mold head and a wire groove extended in from one end of each of the molds, and communicating with mold cavities in the molds, comprising a stationarily mounted horizontally elongated bed rail extended longitudinally from the mold head at the ends of the molds from which the grooves extend, a source of a continuous length of wire at the end of said bed rail remote from the mold head, a wire gripper mounted on said bed rail closely adjacent said source of wire limiting movement of the wire in a direction toward the mold head, a wire guide mounted on said bed rail closely adjacent the wire gripper but on the side thereof opposite the source of wire for supporting the free end of the wire in alignment with the wire groove of the mold then at the top of the mold head to be picked up and fed toward the mold head and into the groove and partially into the mold cavity of that top mold of the mold head, a wire feed head slidably mounted on said bed rail for movement to and fro between said wire guide and the mold head, means on said wire feed head for picking up the free end of said wire supported by said wire guide and feeding it toward the mold head as the feed head moves from said wire guide to the mold head, a wire cutter for cutting off the length of wire extended by said feed head at said wire guide, means for moving said feed head to and fro in timed synchronization with the rotation of the mold head, said wire feed head com-

prising a carriage mounted for rolling movement on said bed rail and to which said moving means is connected, a wire supporting ledge on said carriage on the level of said wire guide to receive the free end of the wire from said wire guide, a funnel-shaped member mounted on said ledge on the side facing the mold head for guiding the free end of the wire into the wire groove of the mold, a spring pressed pivotally mounted gripping finger securing the wire in position on said ledge while said carriage is moving from said wire guide to the mold head, said wire guide including a spring pressed slidably mounted tube extended toward said carriage for supporting said wire to be cut by said wire cutter when said carriage is moved away from said wire guide, said tube being mounted at an elevation to have its free end struck by said ledge to be urged toward said wire gripper to expose the cut off end of the length of wire and have said ledge move therebeneath as said carriage reaches the end of its return movement toward said wire guide.

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