Oct. 4, 1949. B. S. CARPENTER 2,483,808

CASTING MACHINE

Filed Aug. 9, 1944 3 Sheets-Sheet 1

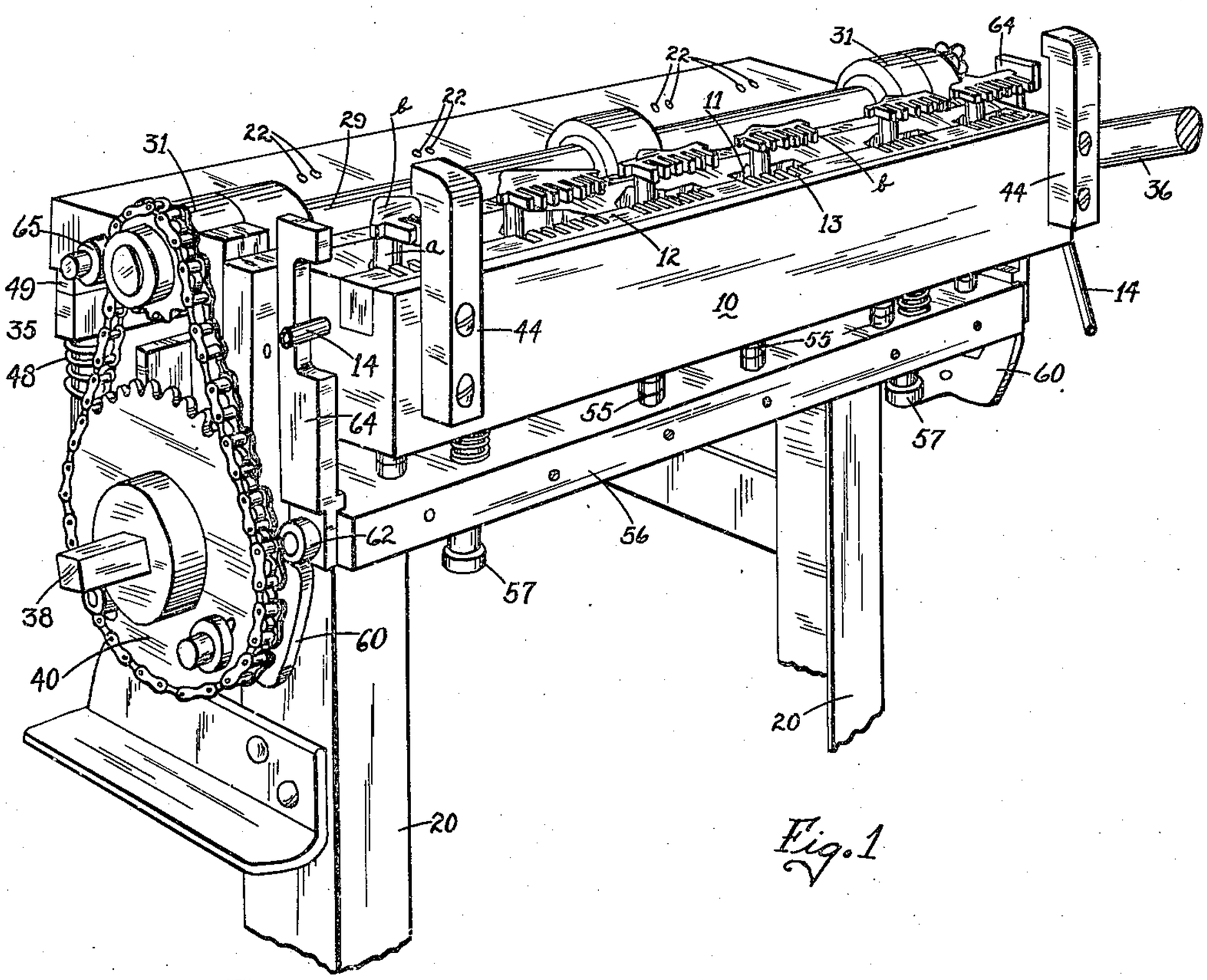

Fig. 1

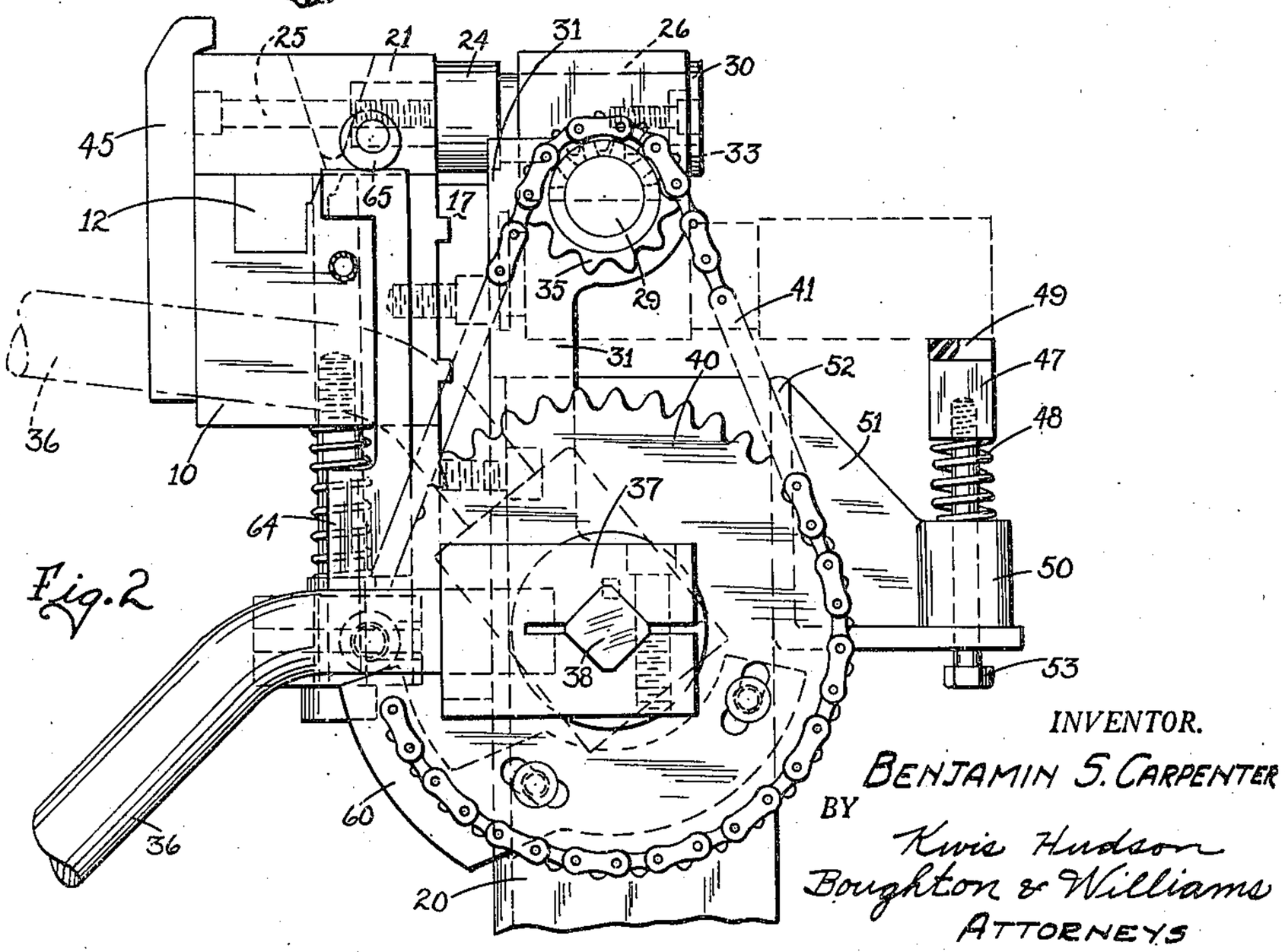

Fig. 2

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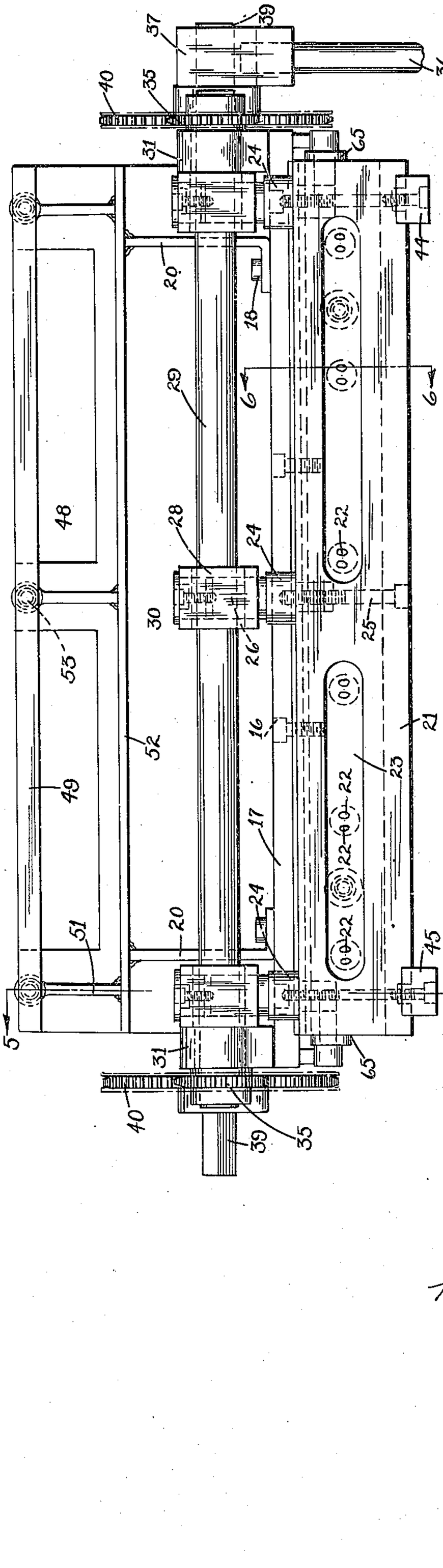

Fig. 3

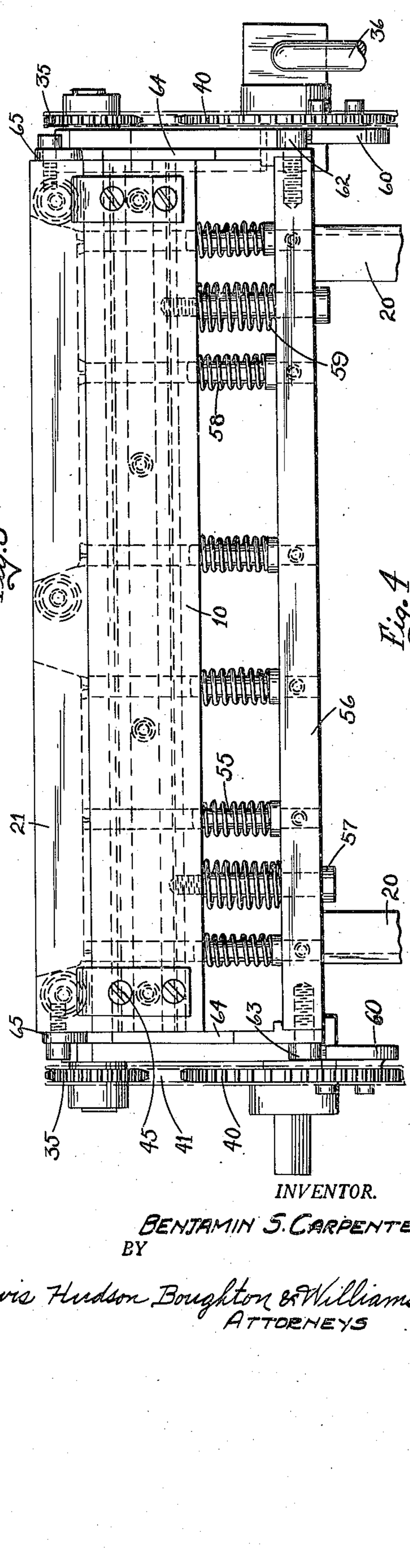

Fig. 4

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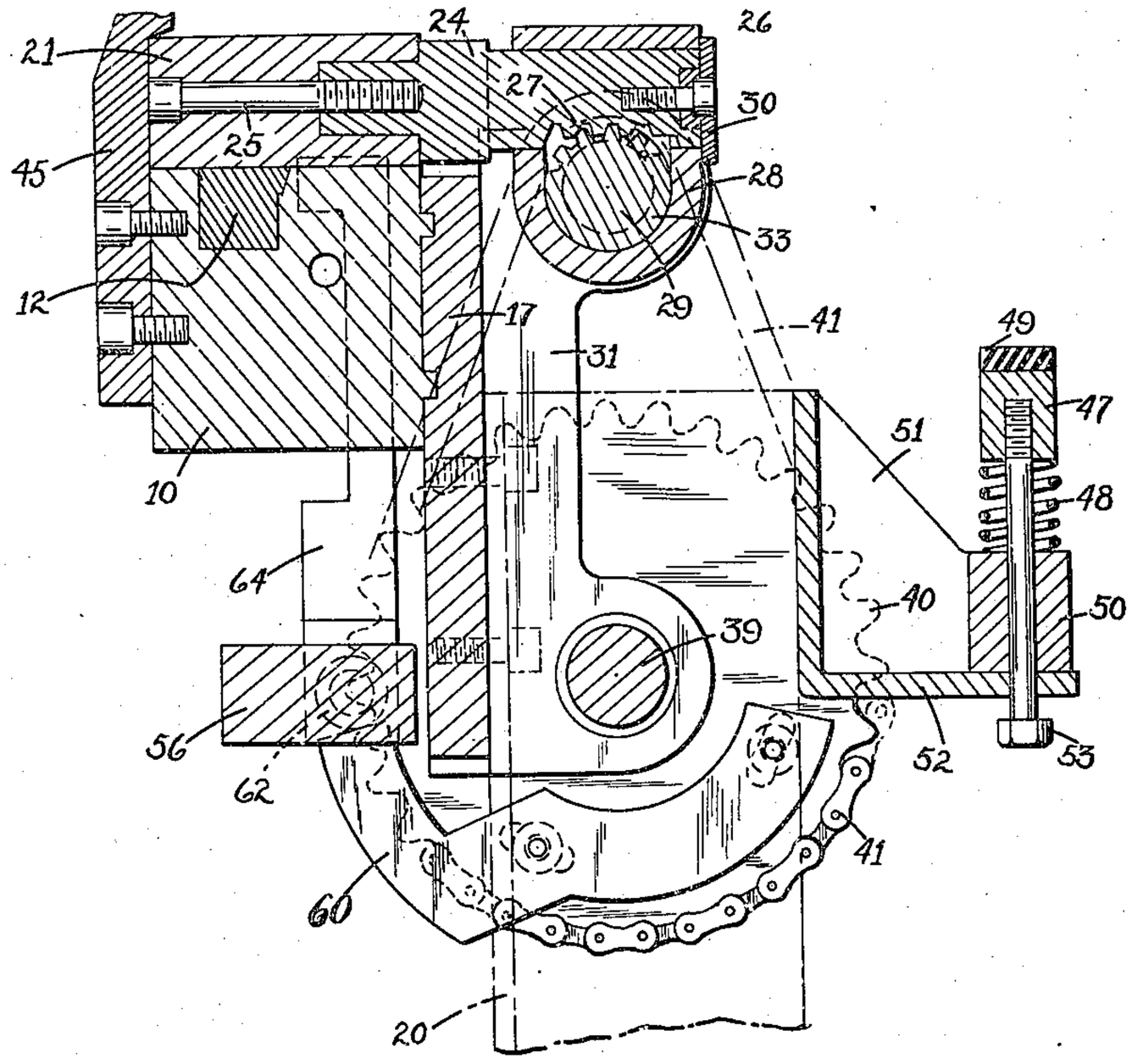

Fig. 5

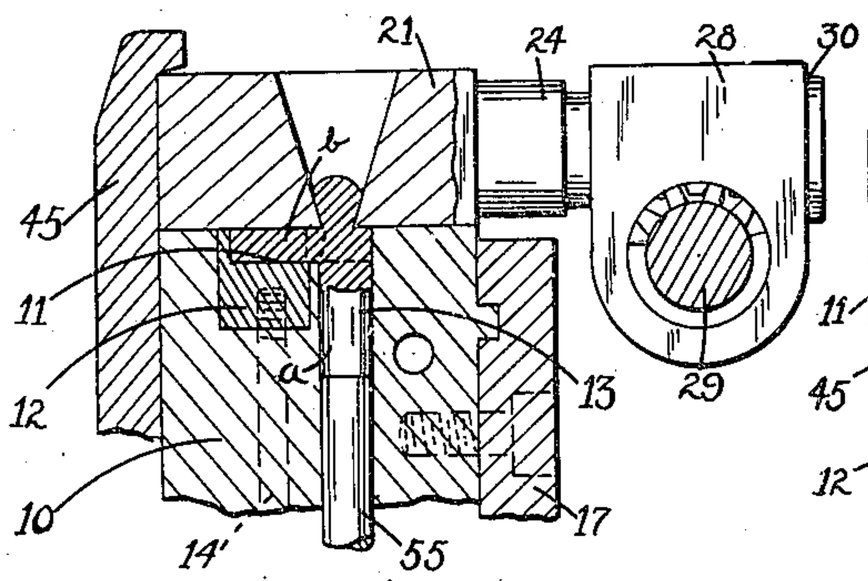

Fig. 6

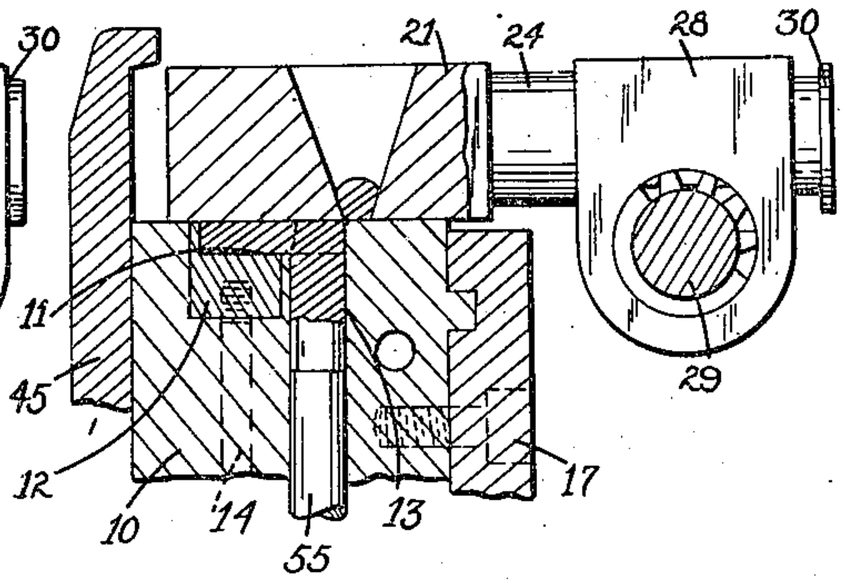

Fig. 7

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Patented Oct. 4, 1949 2,483,808

UNITED STATES PATENT OFFICE

2,483,808

CASTING MACHINE

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Application August 9, 1944, Serial No. 548,643

4 Claims. (Cl. 22—92)

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The present invention relates to casting plate connecting machines and, more particularly, to a machine for casting straps used in storage batteries.

The principal object of the present invention is the provision of a simple, inexpensive, reliable machine for casting articles, such as storage battery plate connecting straps, which machine comprises a single operating lever, manipulation of which shears off the gates, unclamps and opens the mold, ejects the gates, ejects the articles, closes and clamps the molds and returns or assures the return of the article ejector mechanism to its initial position.

Another object of the invention is the provision of a casting machine of the character referred to having a readily replaceable foot core bar, thus permitting the casting of a wide variety of straps with the machine without making a major change by merely changing the foot core bar.

The invention resides in certain constructions and combinations and arrangements of parts hereinafter more fully described and further objects and advantages will be apparent from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification in which similar reference characters designate corresponding parts, and in which

Fig. 1 is a perspective view of a casting machine embodying the present invention, with the mold open;

Fig. 2 is an end view of the machine with the mold closed, looking into the rear end as shown in Fig. 1;

Fig. 3 is a plan view of the casting machine;

Fig. 4 is a front elevational view of the casting machine;

Fig. 5 is a sectional view, with portions in elevation, approximately on the line 5—5 of Figs. 3 and 4;

Fig. 6 is a fragmentary sectional view, with portions in elevation, approximately on the line 6—6 of Figs. 3 and 4; and

Fig. 7 is a view similar to Fig. 6 but showing the parts in a different operating position.

The invention is herein shown and described as embodied in a machine for simultaneously casting two terminal and four intermediate plate connecting straps used in storage batteries; however, it is to be understood that the invention is not limited to the casting of battery straps or to the particular construction and arrangement shown.

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Referring to the drawings, the casting machine shown comprises a water-cooled mold block or lower mold member 10 having mold cavities 11 within which the post portions *a* of the straps are formed and a strap foot core bar 12 having mold cavities 13 therein within which the foot portions *b* of the straps are formed as distinguished from the posts. Water is circulated through the mold block 10 by the pipes 14, one of which is connected to a water supply and the other to a drain. The strap foot core bar 12 is detachably secured in a longitudinal channel in the mold block 10 by machine screws 15 extending up through the mold block and threaded into tapped apertures in the bottom thereof and is readily replaceable so as to permit the casting of a wide variety of straps having the same size post but different feet without making a major change in the machine. The mold block 10 is detachably connected as by machine screws 16 to a back plate 17 extending lengthwise of the machine, which back plate is in turn connected by the bolts 18 to the upper end of spaced vertical angle irons 20 forming a part of a stand for the mold.

The upper mold member 21 which constitutes the mold gate is slidably and rotatably supported with respect to the mold block 10 and has a plurality of gate openings 22 therein communicating with the mold cavities 11, 13 when the mold gate is closed and with a basin or depression 23 in its upper side which facilitates pouring. The rear side of the mold gate 21 is provided with a plurality of gate carrying members 24, in the present instance three, fixed thereto as by machine screws 25, the rear cylindrical ends 26 of which members have racks 27 formed on their under sides and project through apertures in bearing blocks 28, one for each member 24. The bearing blocks 28 are rotatably supported on a pinion and sprocket shaft 29 extending across the rear of the machine. Forward movement of the members 24 relative to the bearing block 28 is limited by disk-like members 30 fixed to the rear ends of the parts 26 of the members 24.

The shaft 29 is rotatably supported in suitable bosses formed integral with the upper ends of shaft bearing supports 31 at opposite ends of the machine, which supports are bolted to the ends of the back plate 17. The shaft 29 is provided with a plurality of pinions 33 formed integral therewith, one of which pinions is continuously in mesh with each of the racks 27 on the members 24. The number of teeth in the racks 27

and on the pinions **33** is limited and the construction is such that upon rotation of the shaft **29** the mold gate **21** is rotated about the center of the shaft **29** if it is free to rotate in the direction in which the shaft is rotated, otherwise the pinions **33** cooperate with the racks **27** to reciprocate or move the gate carrying members **24** and in turn the mold gate **21** towards or from the bearing blocks **28.**

The ends of the shaft **29** are provided with sprockets **35** keyed thereto through the medium of which the shaft **29** is adapted to be manually oscillated by a handle **36** fixed to a handle socket **37** detachably secured to one or the other of the squared ends **38** of a handle and sprocket shaft **39.** The shaft **39** is provided with sprockets **40** connected to the sprockets **35** by sprocket chains **41.** The shaft **39** is rotatably supported in bosses formed integral with the lower ends of the shaft bearing supports **31** and projects through suitable apertures in the angle irons **20.**

When the mold is closed, the mold gate **21** rests upon the top of the mold block **10** and is clamped thereto by cover or gate clamps or latches **44** connected to opposite ends of the mold block **10** and having beveled lower edges which force the mold gate **21** into tight engagement with the mold block **10** as the mold gate is slid into molding position. The mold gate clamp securely holds the mold gate **21** in closed position during the casting or pouring operation. When the handle **36** is raised to rotate the shaft **29** in a clockwise direction as viewed in Fig. 2, the mold gate **21** is first slid rearwardly along the mold block **10** to shear off the gates and unclamp the mold gate, see Figs. 6 and 7. Continued movement of the handle causes the mold gate to be rotated about the axis of the shaft **29** and the mold opened.

Rotation of the mold gate **21** in a clockwise direction as viewed in Fig. 2 is limited by a bumper bar **47** extending across the rear of the machine and supported upon helical springs **48** interposed therebetween and the upper end of short tubular members **50** forming a part of the mold stand and welded to brackets **51** carried by an angle iron **52** extending across the machine and in turn welded to the vertical angle irons **20.** Shouldered bolts **53** extending upwardly through the tubular members **50** and threaded into tapped apertures in the under side of the bumper bar **47** retain the parts in assembled relation and guide the bumper bar in its vertical movement incident to being bumped by the mold gate **21.** In addition to stopping the mold gate **21** in the position shown in dot-dash lines in Fig. 2, the spring-supported bumper bar **47** also serves to knock out or eject the gates from the recesses **23** as the mold gate is bumped thereagainst. The upper face of the bumper bar **47** which is engaged by the mold gate **21** is preferably provided with a fiber-like facing **49.** Obviously any suitable resilient or shock-absorbing material can be employed.

The present invention contemplates means for ejecting the castings from the mold cavities actuated by the lever or handle, which clamps the mold members together and unclamps the same, shears off the gates, opens and closes the mold, and ejects the gates. The cast straps, as shown, are ejected from the mold cavities by ejector pins **55** carried by an ejector pin bar **56** located underneath the mold block and slidably supported for vertical movement towards and from the mold block by shoulder studs **57** threaded into tapped apertures in the bottom of the mold block. The ejector pins **55** extend upwardly through extensions of the mold cavities **11** and form the bottoms of said cavities. The construction is such that the length of the posts of the straps to be cast can be varied by adjusting the ejector pins relative to the ejector pin bar **56**, by adjusting the ejector pin bar relative to the mold block **10**, or by changing the ejector pins for pins of a different length. The ejector pins **55** can be adjusted relative to the ejector pin bar **56** in the construction shown by inserting shims underneath the ejector pins. Helical compression springs **58, 59** surrounding the ejector pins **55** and the bolts **57**, respectively, continuously urge the ejector pin bar in a downward direction.

The ejector pin bar **56** is moved vertically to eject the castings in timed relation to the opening of the mold, etc., by ejector lifter members **60** bolted to the sprockets **40** and adjustable relative thereto so that the time of ejecting the castings relative to the other operations of the machine can be slightly varied and to adjust for identical lift at each end. The ejector lifter members **60** are adapted to engage rollers **62** connected to opposite ends of the ejector pin bar as the handle and sprocket shaft **39** are rotated in a direction to open the mold. In the event the ejector pin bar has not returned to its original or lower position when the mold gate **21** is closed, the ejector pin bar knock down arms **64** connected to opposite ends of the ejector pin bar are engaged by adjustable eccentrics **65** carried by the mold gate **21.** The eccentrics **65** are adjustable to provide for different settings of the ejector pin bar. Alternatively, means other than the eccentrics **65** may be employed to assure the return of the ejector pin bar to its initial position.

Without further description, it will be apparent that when the machine is employed to cast connector straps for storage batteries, it can be readily converted from one type of strap to another by interchanging the mold block, the foot core bar and/or the ejector pins, etc. These parts are relatively inexpensive and a number of them can be provided, thus avoiding the necessity of having a separate machine for each type of strap to be manufactured. The size or location of the post of the straps can be varied by changing the mold block and/or the ejector pins, and the feet of the straps can be varied by changing the foot core bar. In the mold block shown, the post cavities are so spaced that it is possible to cast up to nineteen plate battery straps by merely changing the foot core bar. Alternatively battery straps having posts of different diameter or shape from that shown, or straps of the offset post construction as distinguished from the center post construction shown can be cast on the present machine by changing the mold block and the ejector pins.

From the foregoing description of the preferred embodiment of the invention, it will be apparent that the objects heretofore enumerated and others have been accomplished and that a novel and improved casting machine has been provided, which machine is particularly applicable to the casting of connector straps used in storage batteries. The machine is simple and inexpensive in construction, can be quickly changed from casting one type of article to another, and comprises a hand lever, the movement of which in one direction unclamps the mold, shears the gates, opens the mold, ejects the gate, and ejects the casting, and in the opposite direction closes and clamps the mold.

While the preferred embodiment of the inven-

tion has been described in considerable detail, the invention is not limited to the particular construction shown or to the casting of connector straps for storage batteries and it is my intention to hereby cover all adaptations, modifications and uses thereof which come within the practice of those skilled in the art to which the invention relates and within the spirit and scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a casting machine having a frame, a mold member having a mold cavity therein, means for connecting said mold member to said frame and a gate member above said mold member, the combination with said frame, mold member, connecting means and gate member of a shaft located to one side of said mold member and rotatably supported by said frame, a pinion gear on said shaft, a first member carried by said shaft and rotatable relative thereto, a second member fixedly connected to said gate member and slidably supported in said first member, a rack on said second member in mesh with said pinion gear, means for limiting the relative movement between said pinion and said rack whereby said gate member is first reciprocated and then rotated in sequence upon oscillation of said shaft, and means for oscillating said shaft.

2. In a casting machine having a frame, a mold member having a mold cavity therein, means for connecting said mold member to said frame, a gate member above said mold member and having a gate opening upwardly and an abutment located to one side of said mold member, the combination with said frame, mold member, connecting means, gate member and abutment of a shaft rotatably supported by said frame intermediate said mold member and said abutment, a pinion gear on said shaft, a first member carried by said shaft and rotatable relative thereto, a second member fixedly connected to said gate member and slidably supported in said first member, a rack on said second member in mesh with said pinion gear, means for limiting the relative movement between said pinion and said rack whereby said gate member is first reciprocated and then rotated into engagement with said abutment in sequence upon rotation of said shaft, and means for rotating said shaft.

3. In a casting machine having a frame, a mold member having a mold cavity therein, means for detachably connecting said mold member to said frame, a gate member above said mold member and having a gate opening upwardly, an abutment located to one side of said mold member and a gate latch member fixed with respect to said frame and provided with a flange having a lower beveled surface adapted to overlie said gate

member, the combination with said frame, mold member, connecting means, gate member, abutment and latch member of a shaft rotatably supported by said frame, a pinion gear on said shaft, a first member carried by said shaft and rotatable relative thereto, a second member fixedly connected to said gate member and slidably supported in said first member, a rack on said second member in mesh with said pinion gear, means for limiting the relative movement between said pinion and rack whereby said gate member is reciprocated and rotated in sequence upon oscillation of said shaft, and means for oscillating said shaft.

4. In a casting machine having a frame, a mold member having a mold cavity therein, means for detachably connecting said mold member to said frame, a gate member above said mold member and having a gate opening upwardly, an abutment located to one side of said mold member, and a latch member fixed with respect to said frame and provided with a flange having a lower beveled surface overlying said gate member, the combination with said frame, mold member, connecting means, gate member, abutment and latch member of a shaft rotatably supported by said frame, a pinion gear on said shaft, a first member carried by said shaft and rotatable relative thereto, a second member fixedly connected to said gate member and slidably supported in said first member, a rack on said second member in mesh with said pinion gear, means for limiting the relative movement between said pinion and rack whereby said gate member is first reciprocated and then oscillated in sequence upon oscillation of said shaft, ejector mechanism for removing a casting from said mold cavity, means for slidably supporting said ejector mechanism for vertical movement relative to said mold member, means for operatively connecting said ejector mechanism to said shaft, and means for oscillating said shaft.

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