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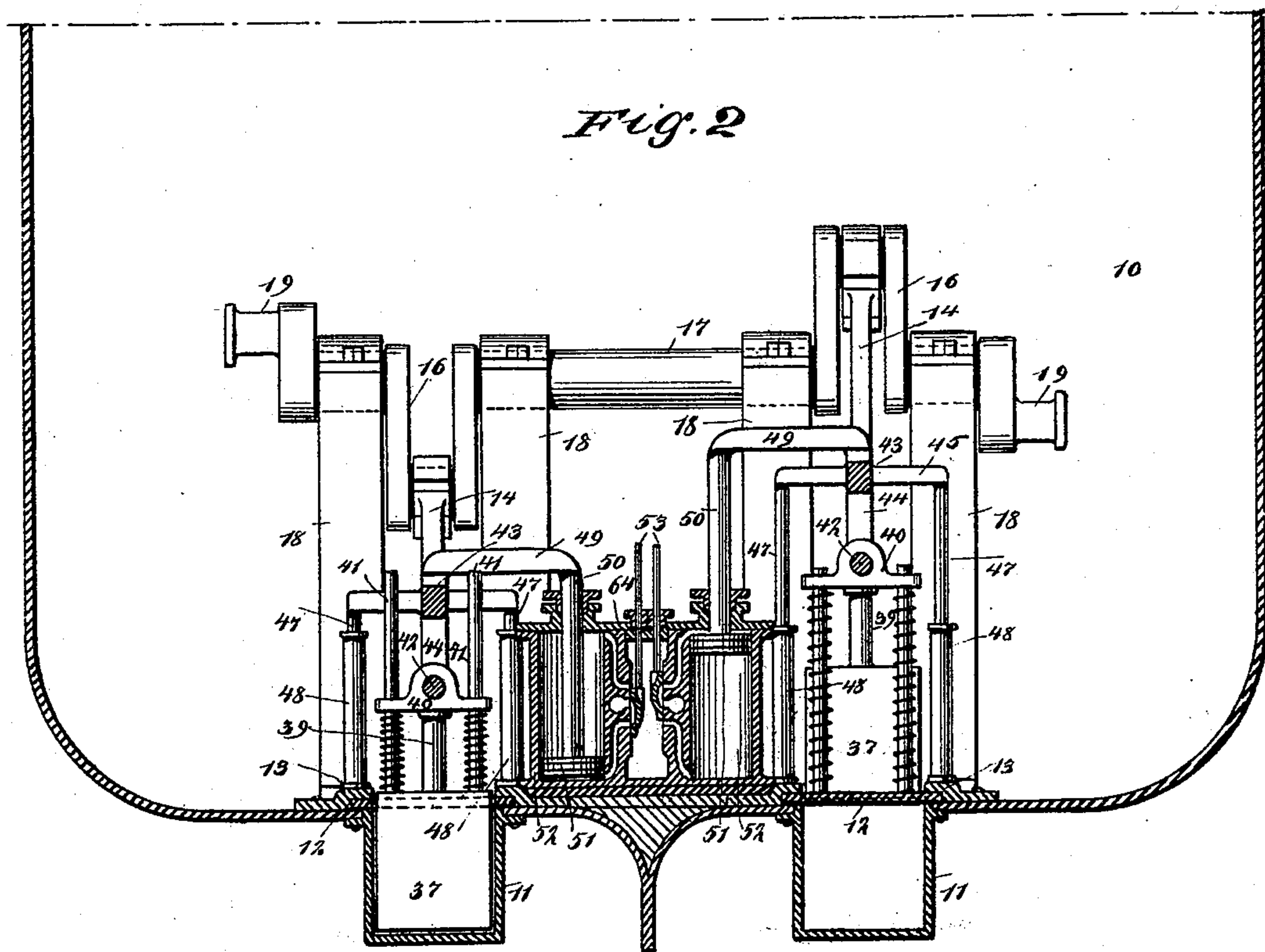
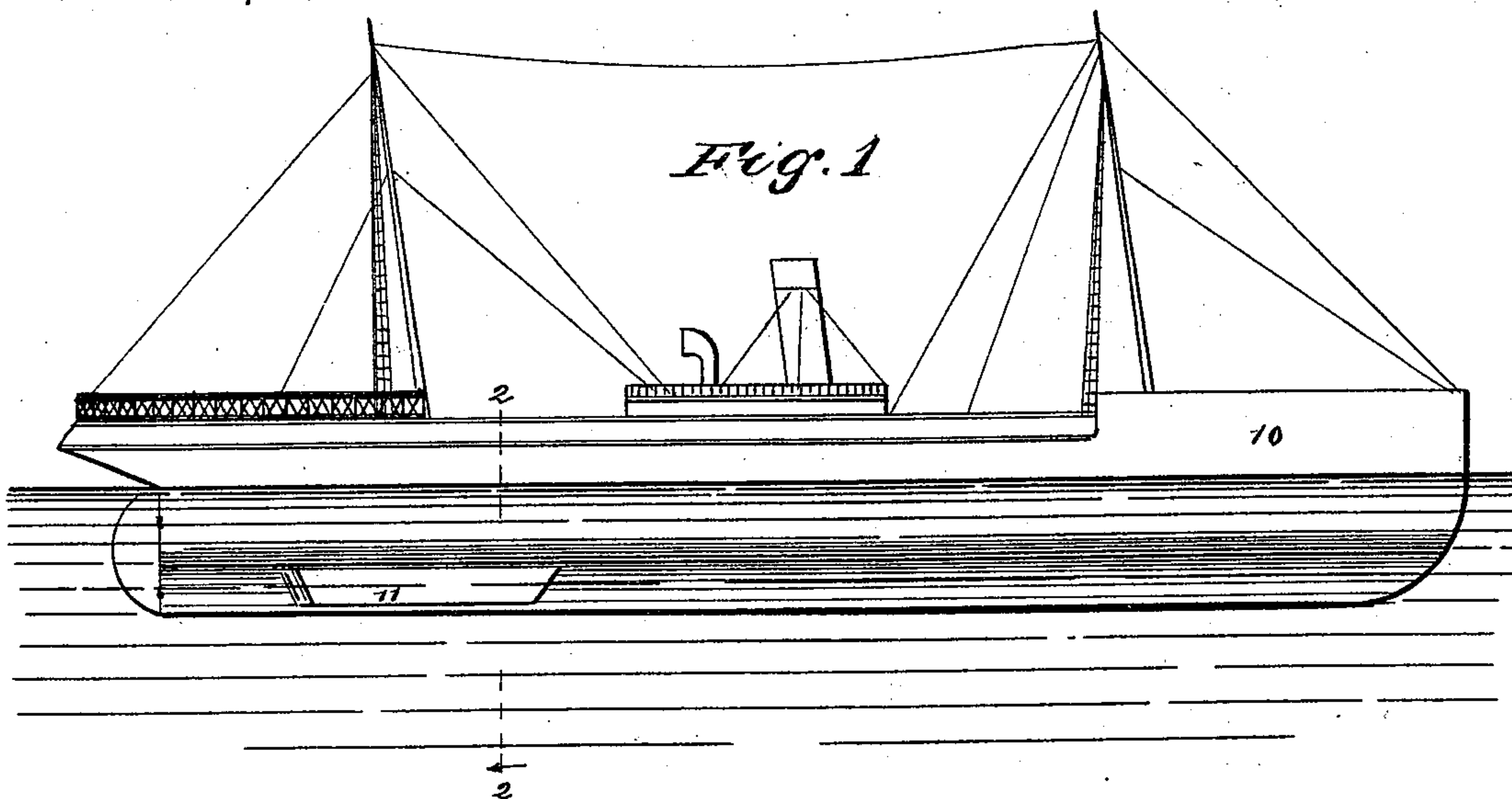
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W. H. WITTE.

MEANS FOR THE PROPULSION OF VESSELS.

No. 516,419.

Patented Mar. 13, 1894.



WITNESSES:

J. A. Bergstrom
C. Sedgwick

INVENTOR

W. H. Witte
BY *Munn & Co*

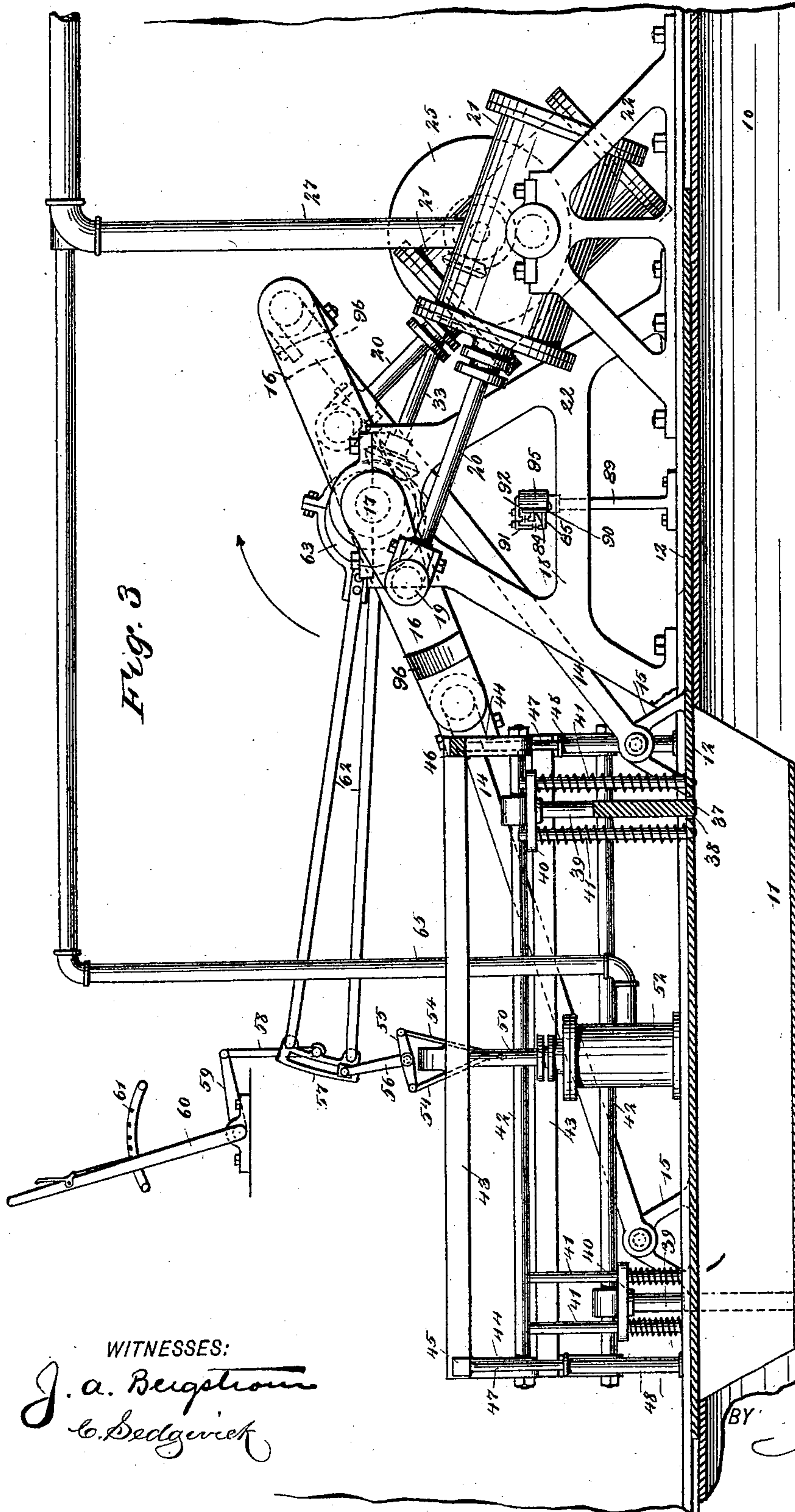
ATTORNEYS.

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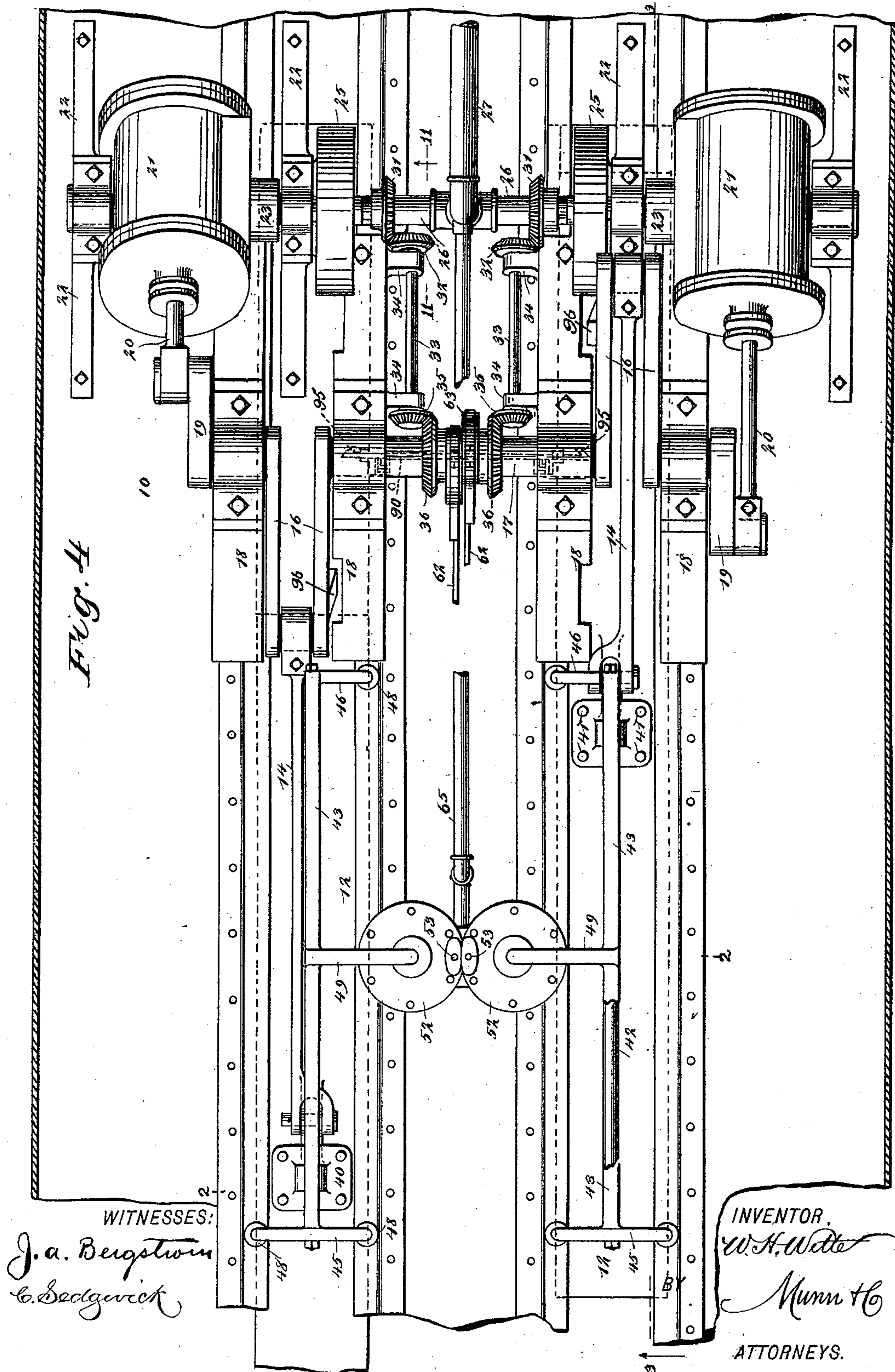
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W. H. WITTE.

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No. 516,419.

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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

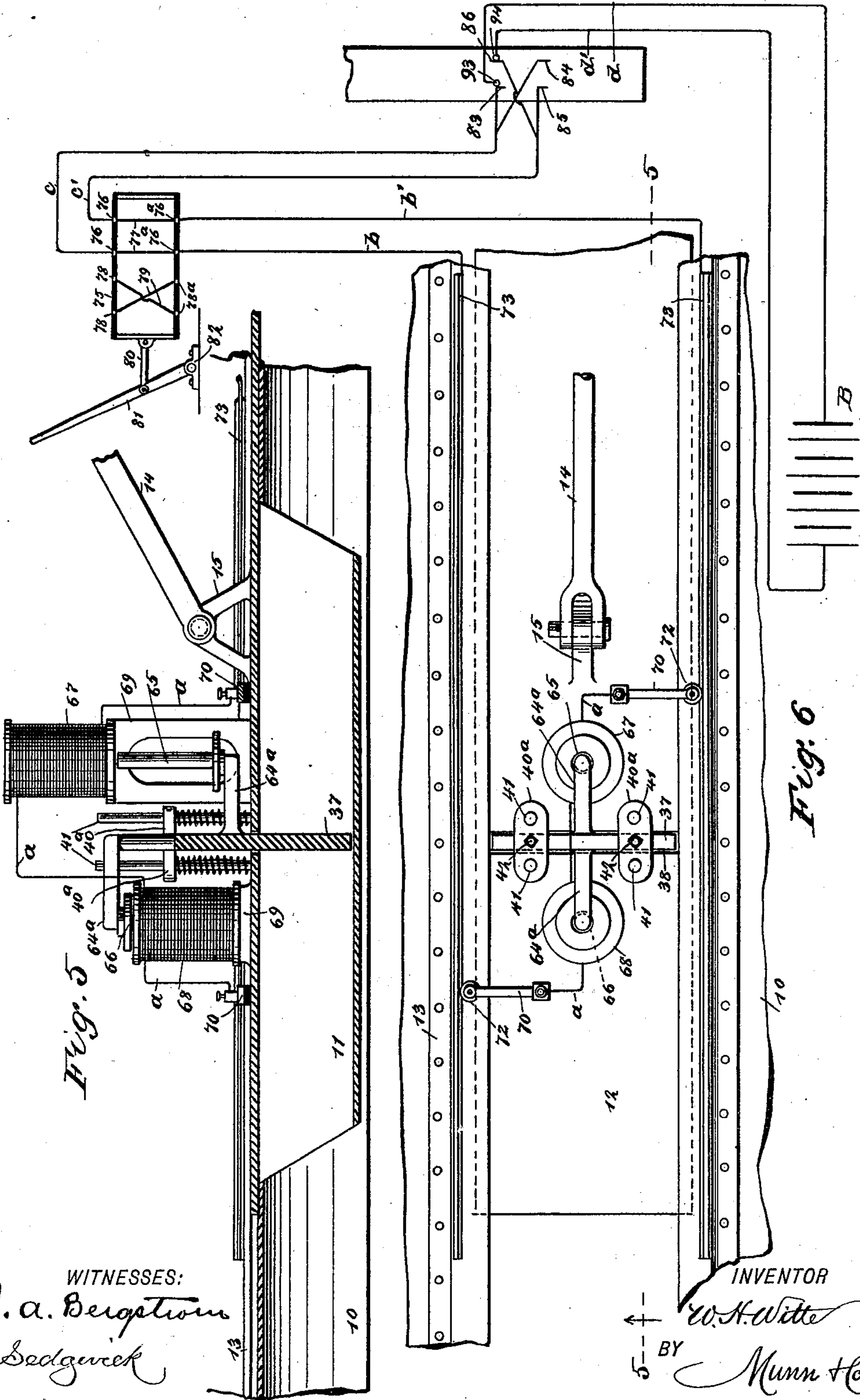
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Fig. 7

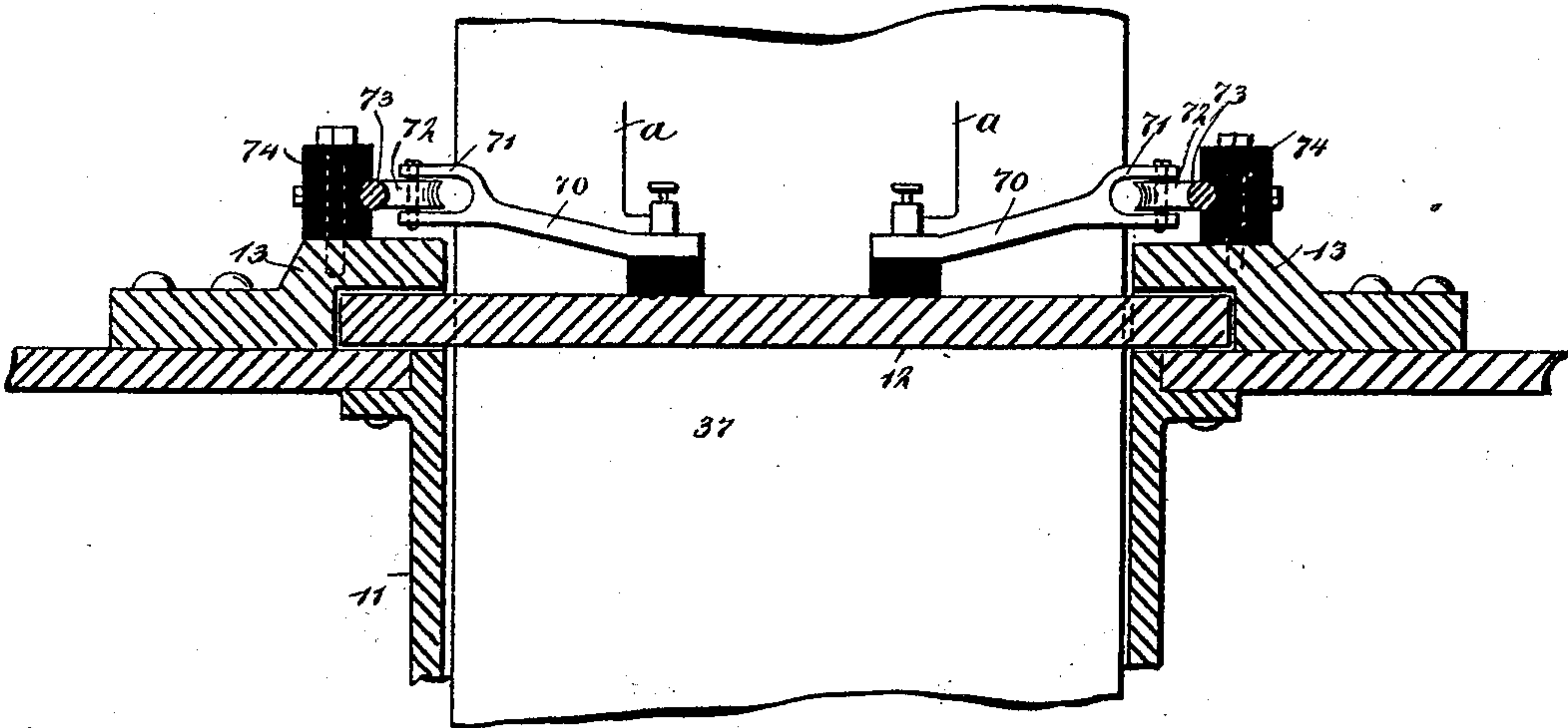


Fig. 8

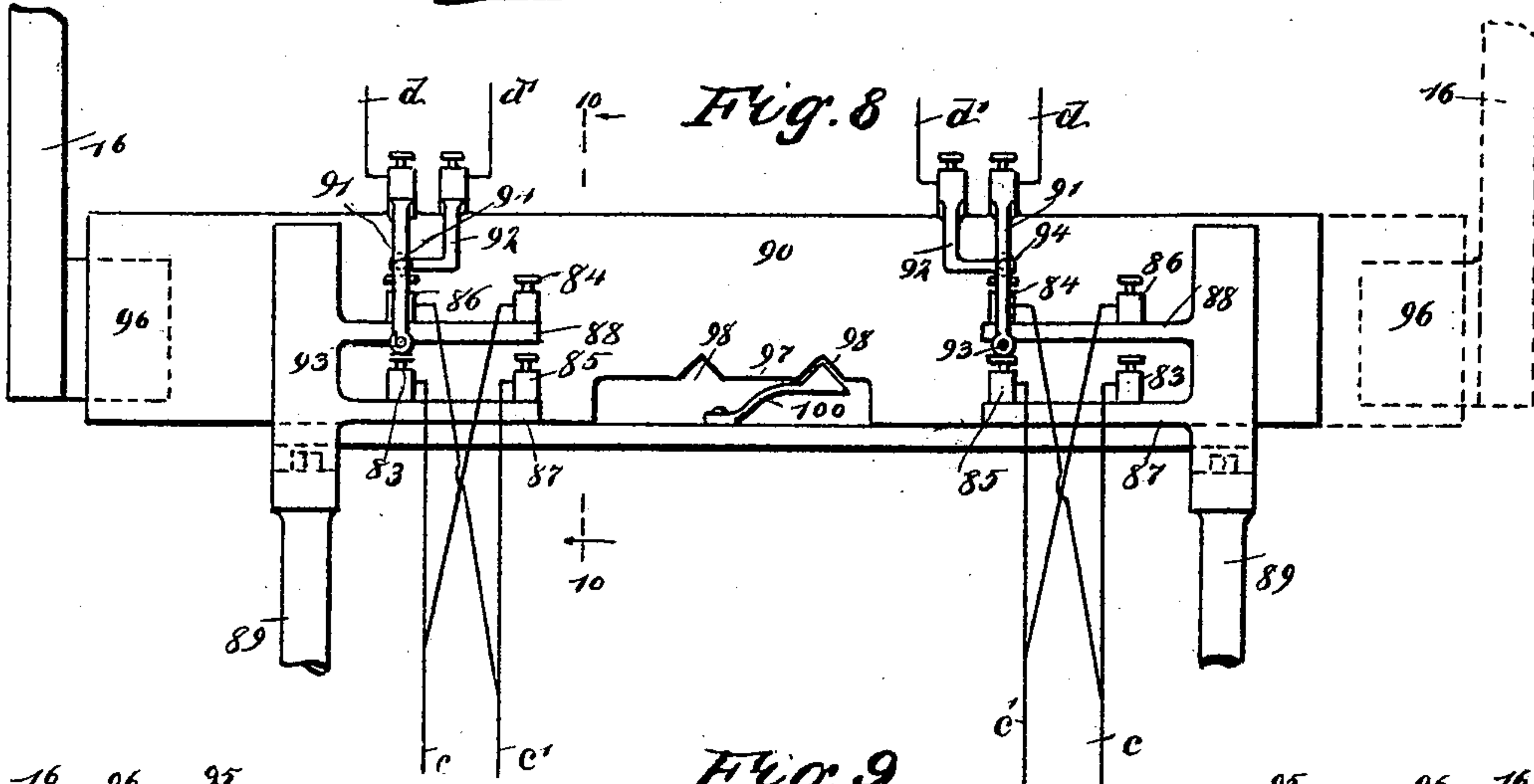


Fig. 9

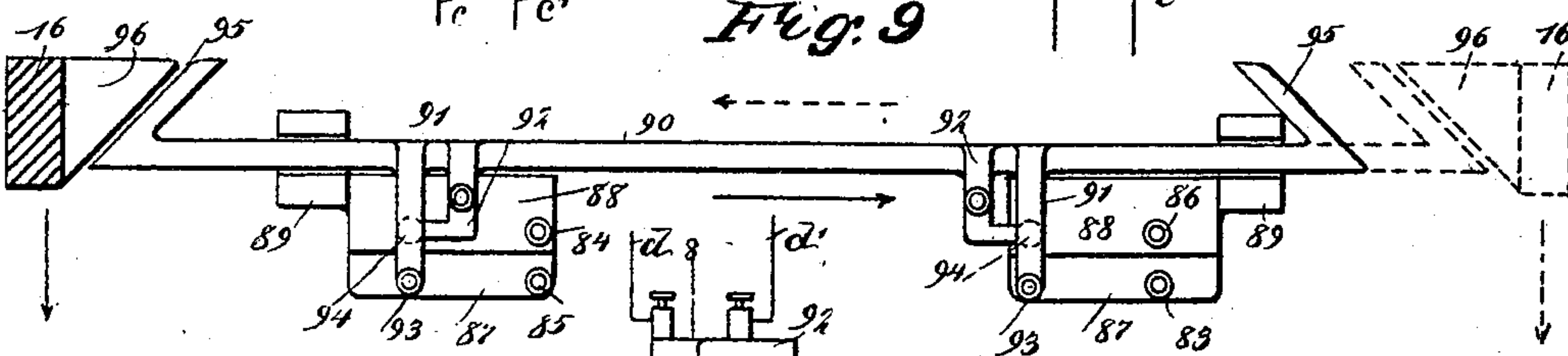
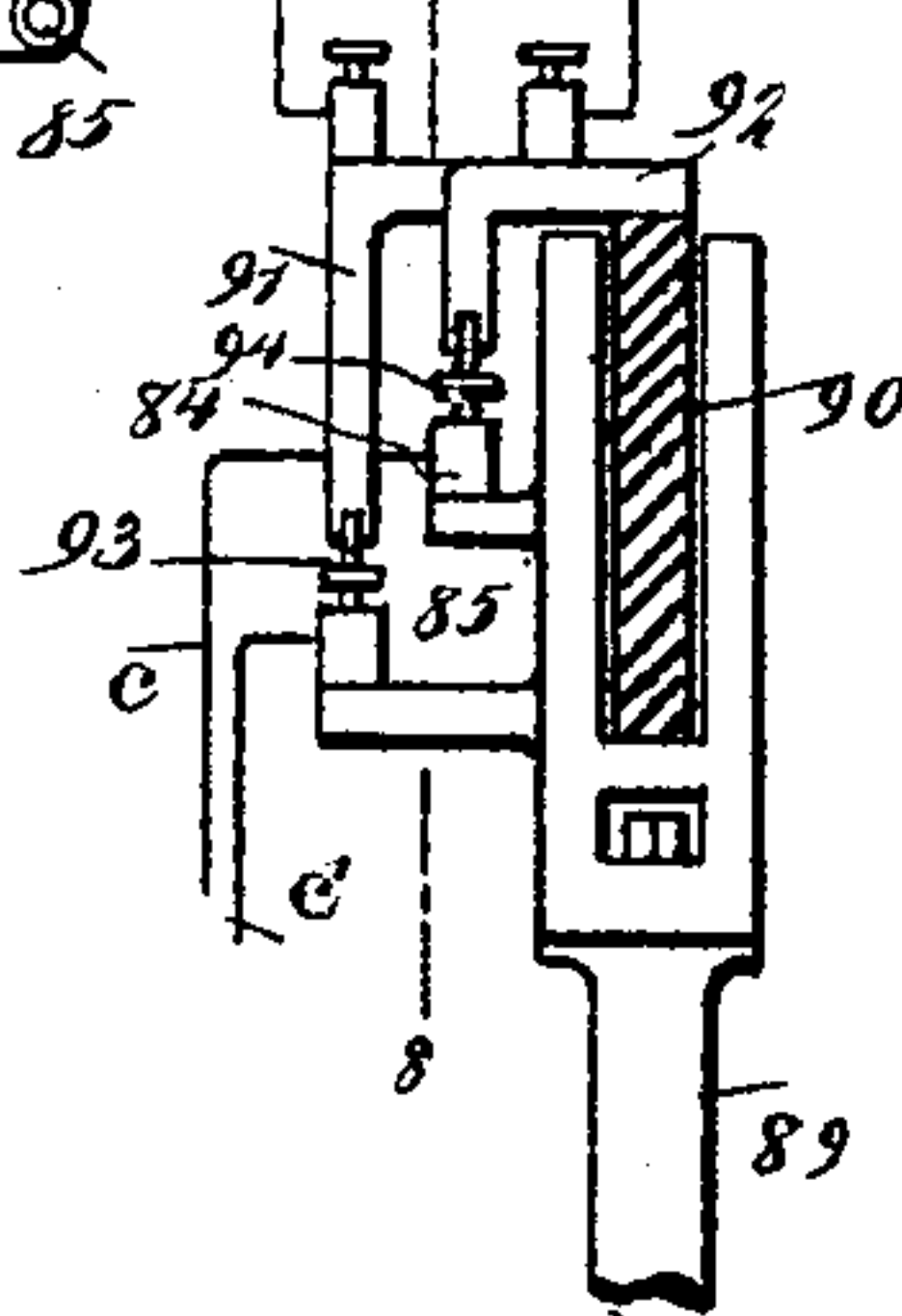


Fig. 10



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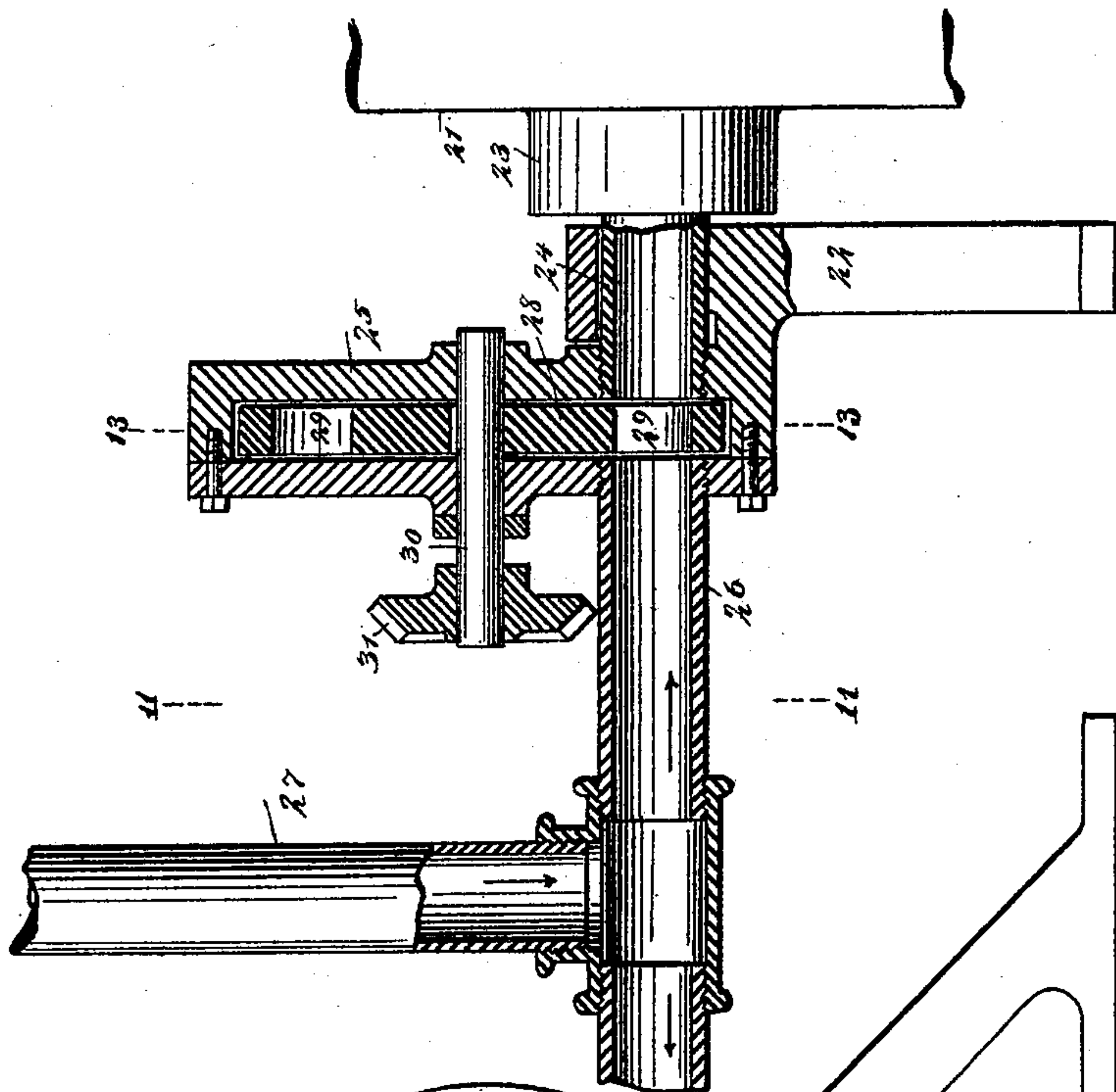


Fig. 12

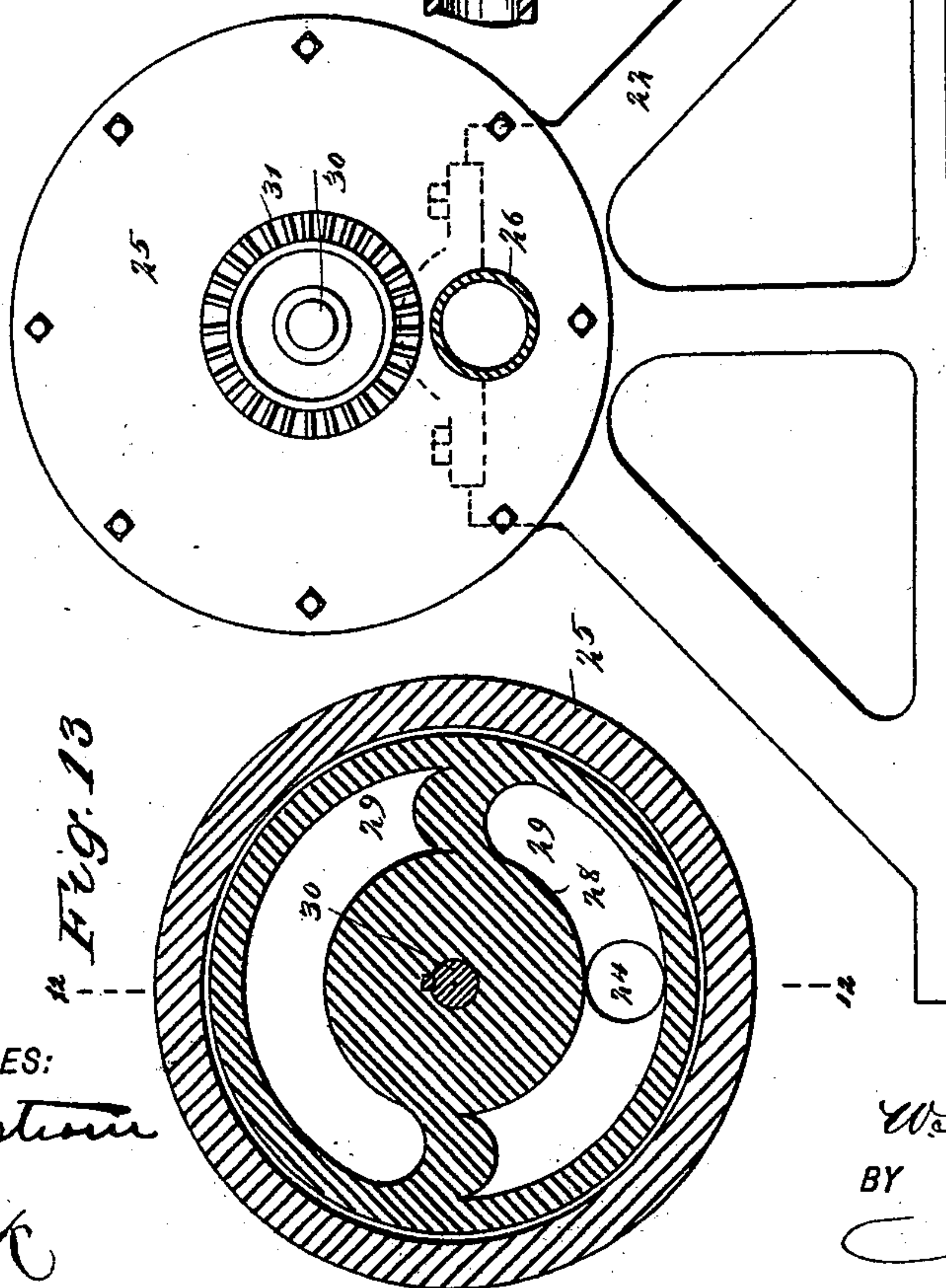
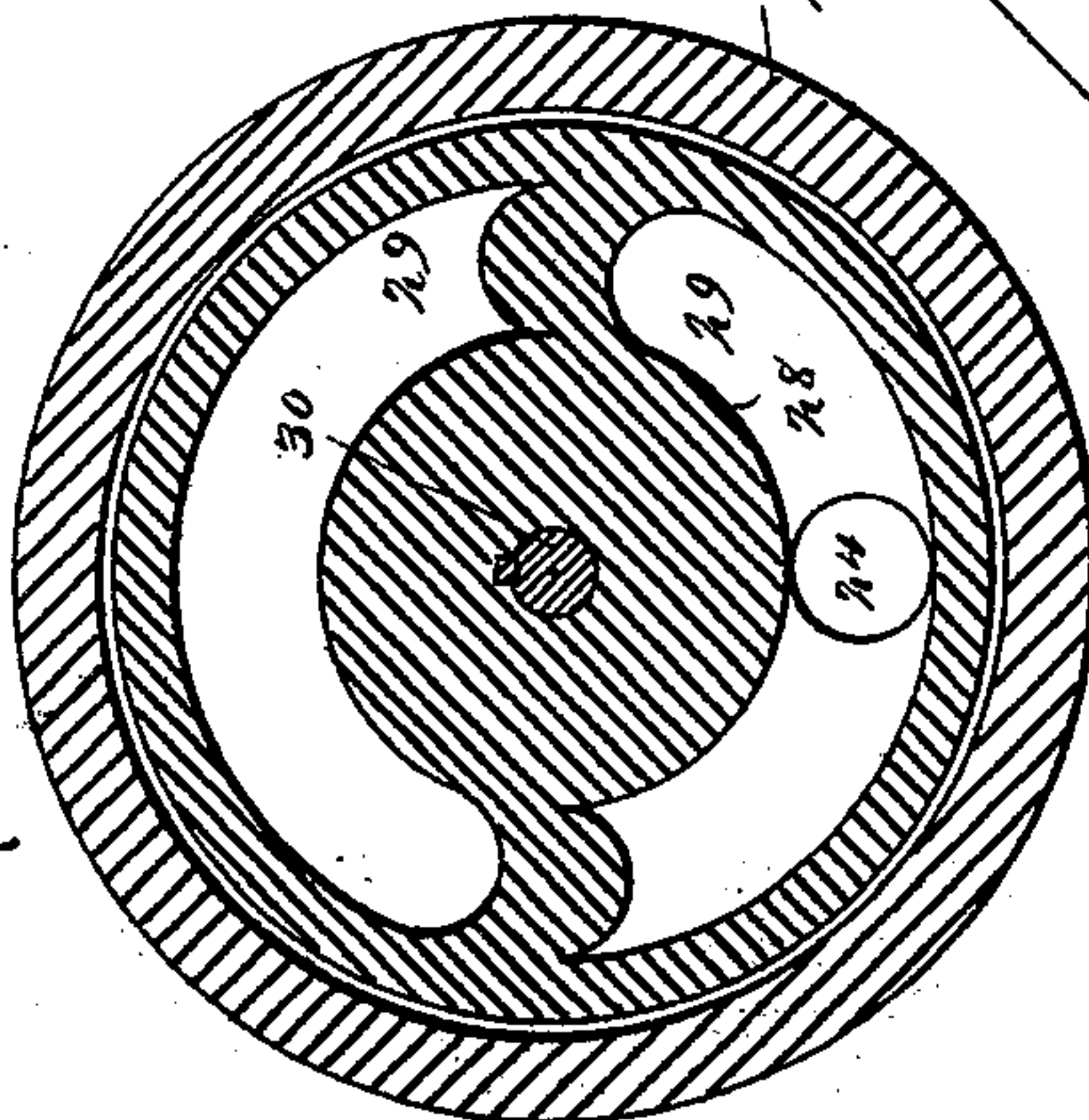


Fig. 11

Fig. 13



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UNITED STATES PATENT OFFICE.

WILLIAM H. WITTE, OF LONG ISLAND CITY, NEW YORK.

MEANS FOR THE PROPULSION OF VESSELS.

SPECIFICATION forming part of Letters Patent No. 516,419, dated March 13, 1894.

Application filed March 25, 1893. Serial No. 467,583. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WITTE, of Long Island City, (Astoria,) in the county of Queens and State of New York, have invented
5 a new and useful Improvement in Propulsion of Vessels, of which the following is a full, clear, and exact description.

My invention relates to improvements in means for propelling marine vessels; and the
10 object of my invention is to produce an apparatus which is adapted to move pistons in open ended pipes extending longitudinally beneath the vessel, so that the impact of the
15 pistons on the water will cause the vessel to move rapidly ahead and, furthermore, this arrangement causes the jet or current of water issuing from the pipes to also act in forcing the vessel ahead.

A further object of my invention is to construct the apparatus so that it will work positively, may be easily controlled, and will not
20 get out of repair readily.

To these ends my invention consists in certain features of construction and combinations of parts, as will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures and letters of reference
30 indicate corresponding parts in all the views.

Figure 1 is a side elevation of a vessel provided with my improved propelling apparatus. Fig. 2 is an enlarged cross section on
35 the lines 2—2 in Figs. 1 and 4. Fig. 3 is a detail longitudinal section on the line 3—3 in Fig. 4, showing the arrangement of the various parts of the apparatus. Fig. 4 is a plan view of the propelling mechanism. Fig. 5 is
40 a longitudinal section on the line 5—5 in Fig. 6, and shows a modified means of raising and lowering the pistons at the ends of their strokes. Fig. 6 is a plan view of the mechanism shown in Fig. 5. Fig. 7 is a detail cross
45 section of the piston-carrying slide plate and shows in detail the arrangement of the conducting arms and trolleys which carry the electrical current to the piston operating magnets. Fig. 8 is a detail side elevation of the
50 mechanism operated by the crank shaft for shifting the course of the electrical current at each stroke of a piston. Fig. 9 is a plan view

of the current changing mechanism shown in Fig. 8. Fig. 10 is a cross section on the line 10—10 in Fig. 8. Fig. 11 is an enlarged section on the lines 11—11 in Figs. 4 and 12, and
55 shows the steam valve for regulating the flow of steam to the cylinders which operate the piston-carrying slides. Fig. 12 is a section, on the line 12—12 in Fig. 13, of the steam controlling mechanism; and Fig. 13 is a detail
60 cross section on the line 13—13 in Fig. 12.

The vessel 10 may be of any kind or shape and it has, on its under side and on opposite sides of its keel parallel open ended pipes 11
65 which are preferably rectangular in cross section, and these pipes may be of any necessary length. They are closed on their inner sides by slide plates 12 which cover the openings between the pipes and the hull of the
70 vessel, thus preventing the inflow of water to the vessel, and these plates move longitudinally through suitable slideways 13, the slides being of such length as to always cover the inner sides of the pipe. The slides are
75 reciprocated by means of pitmen 14 which are pivoted to brackets 15 on the tops or inner sides of the slides and which are also pivotally connected with cranks 16 on the
80 transverse crank shaft 17 which turns in suitable supports 18 and is provided, at its ends, with driving cranks 19, these being pivoted to piston rods 20 connecting with pistons of the usual kind which are held in the
85 common form of oscillating steam cylinders 21, the trunnions of which are journaled in suitable supports 22. The cranks 16 extend from opposite sides of the crank shaft, so that the two slides 12 are moved simultaneously but in opposite directions. The steam
90 chests 23 of the cylinders 21 are supplied with steam through the pipes 24 which connect with a steam valve casing 25, these being preferably of cylinder shape, and the casings also connect by means of branch pipes 26
95 with the main steam pipe 27. In each casing 25 is a rotary valve 28, having slots or ports 29 on diagonally opposite sides, which ports or slots are adapted to turn opposite the pipes 24 and 26 so as to permit a free passage
100 of steam through the valve, but when the ports do not register with the pipes named, the steam is cut off. The valves 28 are carried by shafts 30 which are journaled cen-

trally in the casings, and each shaft 30 connects by a pinion 31 with a pinion 32 on a shaft 33 which is journaled in brackets 34 on the supports 18; and the shaft 33 is driven
 5 by pinions 35 and 36 to connect the said shaft to the crank shaft 17. Each slide 12 carries a vertically movable piston 37 which is adapted to move through a slot 38 in the slide plate and the piston is of such a size that it
 10 completely fills the pipe 11. Each piston is adapted to move backward through the pipe and, by its impact on the water, it forces the vessel ahead and it also ejects the water from the pipe so that the retreating column of wa-
 15 ter, acting on the surrounding body of water, also serves to force the vessel ahead. Each piston 37 has an upwardly extending shank 39 which is provided at the top with a cross head 40 which slides vertically on guide
 20 posts 41 carried by the slide plate 12, and around these posts are coiled spiral springs which normally raise the cross head and the piston connected therewith.

In the modified form of apparatus for moving the pistons vertically, each piston is provided with two cross heads 40^a, see Figs. 5 and 6, but the guide posts are arranged as described in both cases. In the form shown in Figs. 2, 3 and 4 each cross head 40 slides
 30 longitudinally on a guide rod 42 forming part of a guide frame which has a top beam 43 parallel with the guide rod 42, vertical end pieces 44 connecting the guide rod and top beam, and cross heads 46 and 45 at the ends
 35 of the frame. The frame is adapted to move up and down with the pistons which it guides and it has on the cross heads 45 and 46, depending vertical pistons 47, which slide in dash pots 48, on opposite sides of the slide
 40 plate. It will thus be seen that the guide rod 42 may move up and down with the piston, but it has no endwise movement, consequently the piston when reciprocated is guided very nicely by the rod, both while it is in the pipe
 45 11 and when it is raised above the pipe. The top beam 43 of each guide frame is provided with a laterally-extending arm 49 which is rigidly attached to the piston rod 50 of a steam cylinder 52, the two cylinders being arranged
 50 side by side, as shown in Figs. 2 and 4, so that they have a common steam chest arranged between them in the usual way. The steam cylinders are provided with the customary valves to control the steam inlet, which
 55 valves have the usual valve stems 53 extending upward from the steam chest, and the valve stems are connected by rods 54 with the walking beam 55, see Fig. 3, which has an upwardly-extending arm 56 pivoted in
 60 the usual manner in a link 57 which is pivotally supported on a rod 58 suspended from an arm 59 which is moved vertically by a lever 60, the latter being held in the usual manner by a quadrant 61. The opposite ends
 65 of the link 57, connect by rods 62 with eccentrics 63 on the crank shaft 17. It will be seen that by shifting the position of the

link, the strokes of the pistons in the steam cylinders may be reversed, so that either piston will work first, as described, but no novelty is claimed on this reversing gear, as it is substantially of the usual kind.

The steam chest 64, which is arranged between the steam cylinders, is supplied by a steam pipe 65 and the pistons 51 are arranged
 75 to move alternately so that the pistons 37, operated by the steam pipes 65 will be also alternately raised and depressed. When the mechanism is started, the revolution of the crank shaft causes the slides 12 to be reciprocated
 80 by means of the pitmen 14 connecting the slides with the crank shaft, and at each forward movement of the slide, when the slide reaches the end of its stroke, the piston 51 connected with the piston 37 moves downward,
 85 so that the piston 37 is forced into the pipe 11, at which point the slide moves back, thus carrying the piston 37 with it and propelling the vessel in the manner already described. It will be observed that the guide frame will
 90 move up and down with each piston 37 while remaining stationary, so far as endwise movement is concerned, and thus the piston is moved effectively and without slack or lost motion.

Instead of using steam mechanism like that described for raising the propelling pistons 37, the pistons may be alternately and automatically operated by the mechanism illustrated in Figs. 5 to 10 and described below.
 100 As shown in these figures, each piston is provided, at a point above the slide plate when the piston is lowered, with oppositely-extending arms 64^a which are arranged at different heights, and these are provided with arma-
 105 tures 65 and 66, one extending upward, and the other downward from said arms, and the armature 65 is adapted to move upward into the solenoid magnet 67, while the armature 66 is adapted to move downward into a similar
 110 solenoid magnet 68, these magnets being held on suitable supports 69 and at different heights to provide for the movement of the piston 37. It will be seen that when the magnet 67 is energized and the armature 65 drawn into it,
 115 the piston 37 is withdrawn from the pipe 11, but when the opposite magnet is energized the opposite effect takes place and the piston is drawn back into the pipe. The magnets 67 and 68 are arranged in the same circuit but
 120 they are reversely wound, but when the current passes through them in one direction, the armatures 65 and 66 will be moved upward, one being sucked up by the solenoid 67 and the other expelled by the solenoid 68 and when
 125 the current is reversed, the reverse action takes place and the piston is pushed back into the pipe.

The magnets are connected by a wire *a* with conducting arms 70 which are secured
 130 to and suitably insulated on the slide plate 12, see Fig. 7, and the arms have forked outer ends 71 which project above the slideways 13 and carry trolleys or trucks 72 which run on

conductors 73 held on suitably insulated supports 74 on the tops of the slideways 13. This arrangement enables the current to be supplied to the magnets at any point of the stroke of the slide plate. The conductors or tracks 73 connect by means of wires *b* and *b'* with a circuit changer 75, as shown in Fig. 6, this circuit changer having oppositely-arranged contacts 76 and 76^a which are arranged in pairs and connected by wires 77. The circuit changer has also contacts 78 and 78^a which are arranged on opposite sides and connect by cross wires 79. The contacts 76 and 78 are adapted to connect with a source of electricity and the contacts 76^a and 78^a are adapted to connect with the wires *b* and *b'*, so that when the circuit changer is moved endwise the current is reversed through the wires *b* and *b'*, and consequently through the magnet. The contacts 76 and 78 are adapted to connect with a source of electricity through wires *c* and *c'*, and it will be observed that when the circuit changer is in the position shown in the drawings the current will pass from the wires *c* to the wire *b*, but if the circuit changer is moved endwise so as to bring the contacts 78 and 78^a into the position of the contacts 76 and 76^a, the current will pass from the wire *c* through the wire *b'*, thus reversing the current through the magnets. The circuit changer connects by means of a rod 80 with a lever 81 which is fulcrumed at one end, as shown at 82, and by means of this lever the circuit changer may be moved.

The circuit changer described is adapted to be operated by hand if necessary, but in ordinary circumstances, the current will be changed automatically as will appear below.

The wire *c* connects stationary contacts 83 and 84 which are arranged in different planes, and the wire *c'* connects with contacts 85 and 86, which are also arranged in different planes, the contacts 85 and 83 being supported on an arm 87 and the contacts 84 and 86 on an arm 88, and the two arms are secured to an upright 89 which serves as a support for the slide plate 90, which acts as a switch and is arranged adjacent to the contacts just named and between the cranks 16 of the shafts 17. There is one of these supports 89 near each end of the plate and a set of contacts for each pair of magnets 67 and 68. The switch plate 90 carries arms 91 and 92, which are suitably insulated on the switch plate and which are provided with rollers 93 and 94 adapted to contact with the contacts 83 and 85, and 86 and 84. The arm 91 connects by a wire *d* with one pole of a battery B or other source of electricity, while the arm 92 connects by a wire *d'* with the opposite pole of the battery.

It will be seen that when the slide plate is moved longitudinally, the current will be automatically reversed; that is to say, if the roller 93 which receives its current from the wire *d* is in the position shown in Fig. 8, the current will pass through the contact 83 and wire *c* to the magnets, but when the switch

plate 90 is moved endwise, the roller 93 will touch the contact 85 and the current will then pass through the wire *c'*. The current will also be shifted from the wire *d'* to the wire *c*, so that each reciprocation of the switch plate changes the course of the current and reverses the movements of the magnet armatures in the manner already described.

The complete circuit as illustrated in Fig. 6 is as follows: from the battery B through the wire *d*, the roller 93, the contact 83, the wire *c*, one of the wires 77, the wire *b'*, one of the conductors or tracks 73, an arm 70, the wire *a*, the magnets 68 and 67, the second arm 70, the other track 73, the wire *b*, the other wire 77, the wire *c'*, the contact 86, the roller 94, and the wire *d'*, back to the battery.

When the switch plate is moved to its second position, the circuit will be as follows: from the battery B through the wire *d*, the roller 93, the contact 85, the wire *c'*, one of the wires 77, the wire *b'*, one of the tracks 73, an arm 70, the wire *a*, the magnets 67 and 68, the other arm 70, the other track 73, the wire *b*, the other wire 77, the wire *c*, the contact 84, the roller 94 and the wire *d'* back to the battery. The switch plate 90 has inclined ends 95 which extend into the paths of the inclined cams 96, carried by the cranks 16, and consequently at each revolution of the cranks, the switch plate will be struck and moved endwise, first in one direction and then in the other, and as the movement of the cranks corresponds with the revolution of the crank shaft and the stroke of the pistons 37, it will be observed that the switch plate may be easily arranged so that the current will be reversed and the pistons 37 operated at the proper time.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a vessel, of an open ended pipe extending along the hull of the vessel beneath the water line, a piston held to move longitudinally through the pipe, and mechanism for automatically raising the piston from the pipe at one end of its stroke and inserting it in the pipe at the opposite end of its stroke, substantially as described.

2. The combination, with a vessel, of an open ended pipe on the hull of the vessel beneath the water line, a slide plate held to move over the inner side of the pipe, a piston carried with the slide plate and held to move through the pipe, and mechanism for withdrawing the piston from the pipe, substantially as described.

3. The combination, with a vessel, of an open ended pipe arranged on its hull beneath the water line, a slide plate held to move opposite the inner side of the pipe, a crank mechanism for moving the slide plate, a piston held to move with the slide plate and adapted to enter the pipe, and mechanism for moving the piston at right angles to the pipe at each end of the stroke of the slide plate whereby the

piston is inserted or withdrawn, substantially as described.

4. The combination with a vessel, of an open ended pipe arranged on the hull of the vessel
5 beneath the water line, a slide plate held to move between the pipe and the interior of the vessel, a piston carried with the slide plate and adapted to move through the pipe, mechanism
10 for inserting the piston into and withdrawing the same from the pipe, and a guide frame for the piston, the frame being also adapted to move in and out in relation to the pipe, substantially as described.

5. The combination, with the hull of a ves-
15 sel, of an open ended pipe arranged on the hull beneath the water line, a movable slide plate arranged to reciprocate opposite the inner side of the pipe, a piston carried with the slide plate and adapted to move through the
20 pipe, and electrically operated mechanism for moving the piston into and out of the pipe at each stroke of the slide plate, substantially as described.

6. The combination, with the hull of a ves-
25 sel, of an open ended pipe thereon beneath the water line, a reciprocating slide plate held to move opposite the inner side of the pipe, a piston carried with the slide plate and adapted to pass through the pipe, electro magnets
30 arranged to move the piston into and out of the pipe at each stroke of the slide plate, and mechanism for reversing the action of the magnets, substantially as described.

7. The combination, with the hull of a ves-
sel, and the open ended pipe thereon, of the 35 reciprocating slide plate to move opposite the inner side of the pipe and the piston carried with the slide plate and held to move through the pipe and also adapted to move into and out of the pipe, oppositely arranged magnets pro- 40 vided with armatures adapted to move the piston into and out of the pipe, conducting tracks arranged parallel with the slide plate, conductors carried by the slide plate and adapted to engage the tracks, electrical con- 45 nections between the conductors and the magnets, electrical connections to supply electricity to the tracks, and mechanism for reversing the current through the magnets, substan- 50 tially as described.

8. The combination, with the movable slide plate, a piston carried by the slide plate, the reversely wound magnets provided with ar-
matures and adapted to move the piston into and out of the pipe and the crank shaft to 55 reciprocate the slide plate, of a switch plate moved endwise by the cranks of the crank shaft, electrical connections for supplying electricity to the magnets, and means for re-
versing the current through the magnets by 60 the movement of the switch plate, substantially as described.

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Witnesses:

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