

No. 666,123.

Patented Jan. 15, 1901.

S. T. & C. H. WELLMAN & J. W. SEAVER.

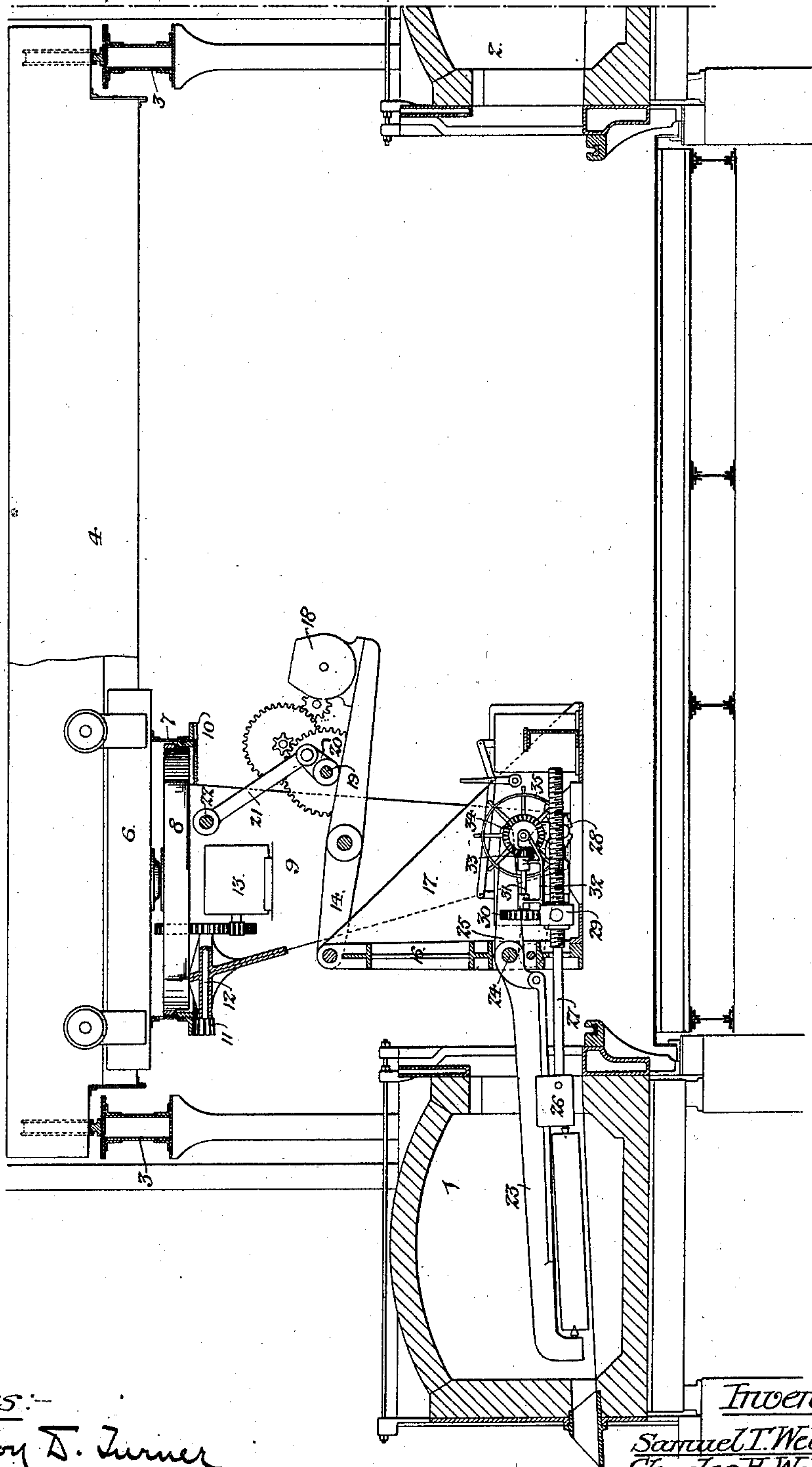
FURNACE CHARGING APPARATUS.

(Application filed Jan. 17, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses:

Hamilton D. Turner

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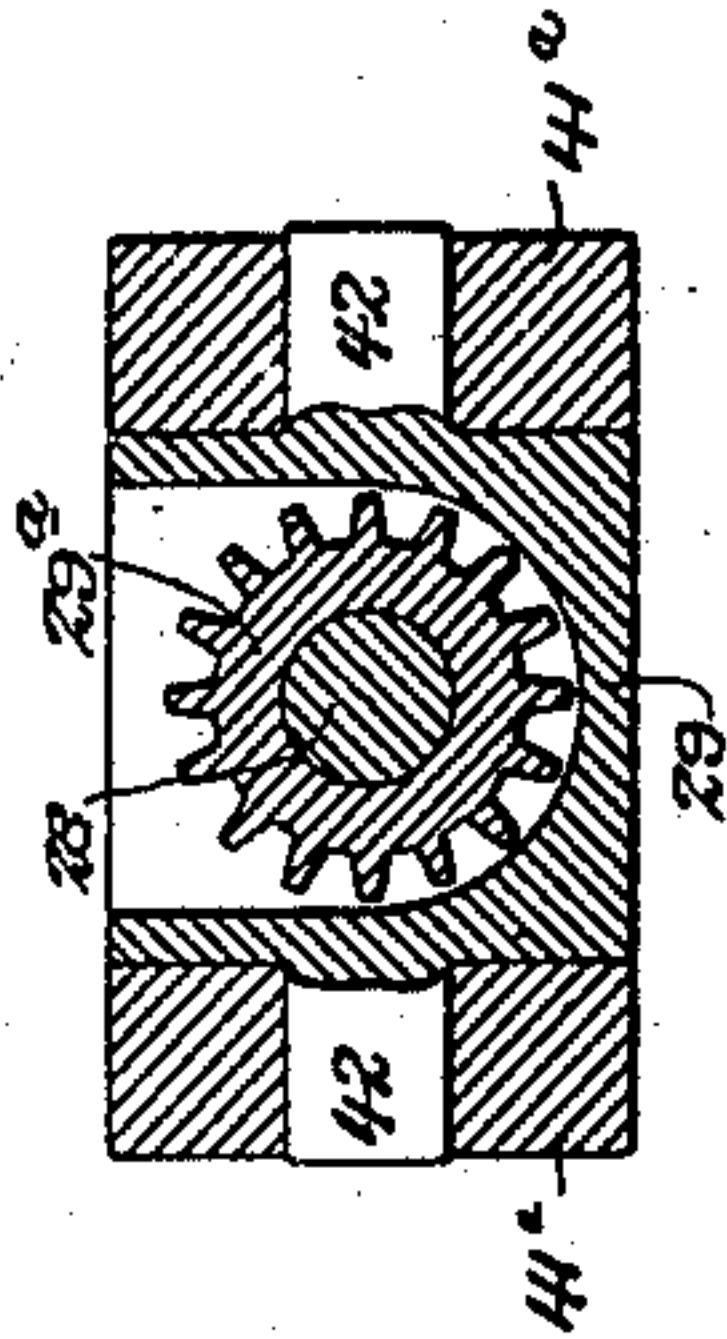


Fig. 8.

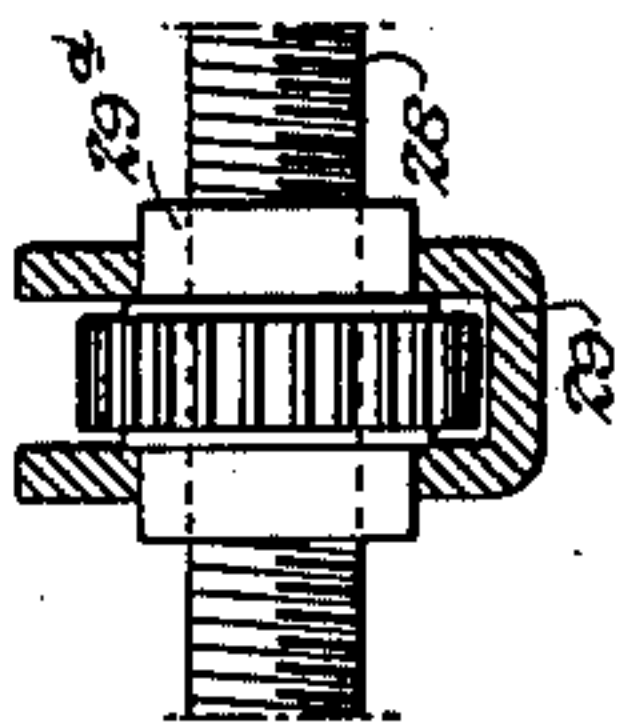
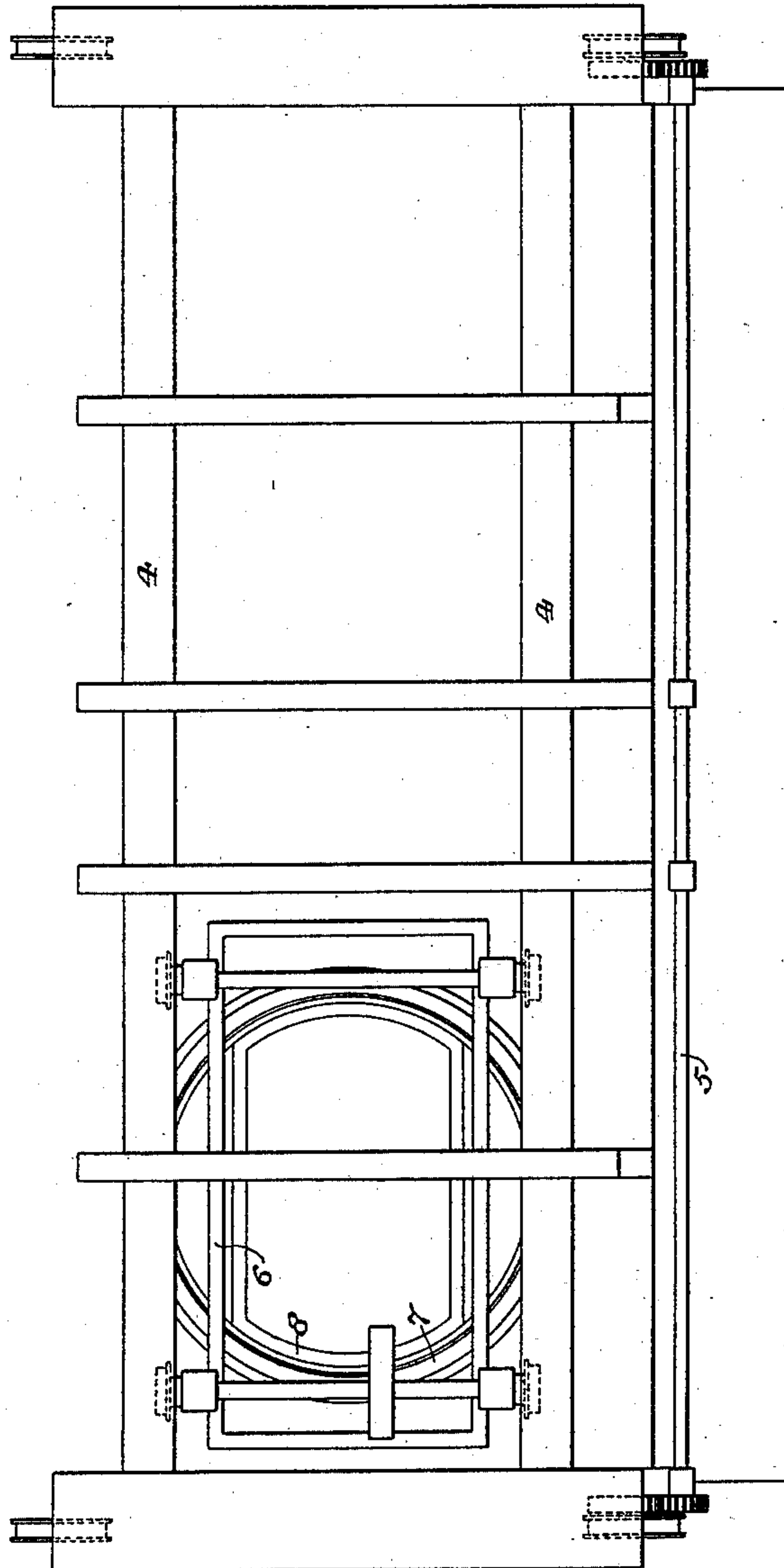


Fig. 7.

Fig. 6.



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3 Sheets—Sheet 3.

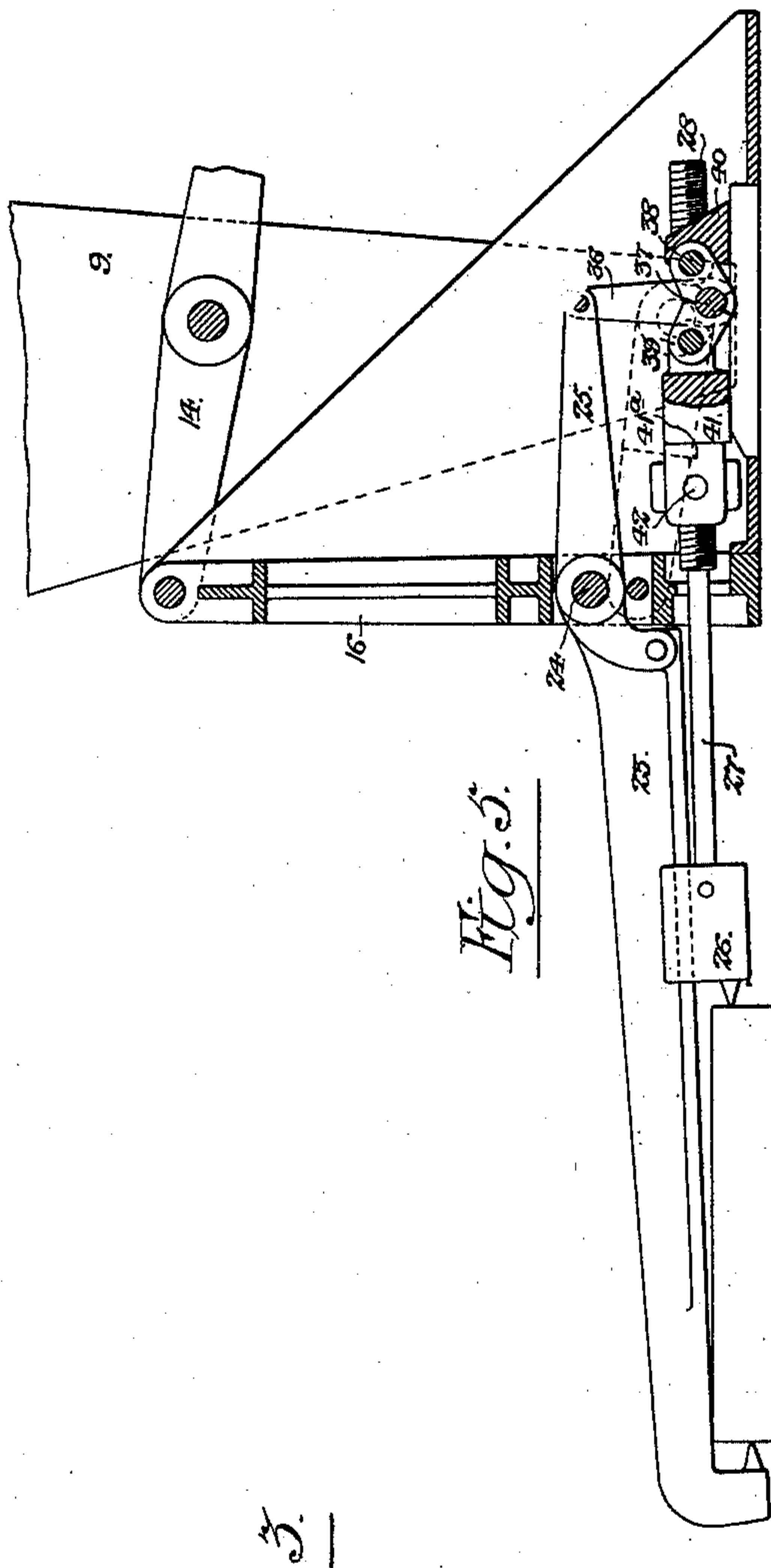


Fig. 5.

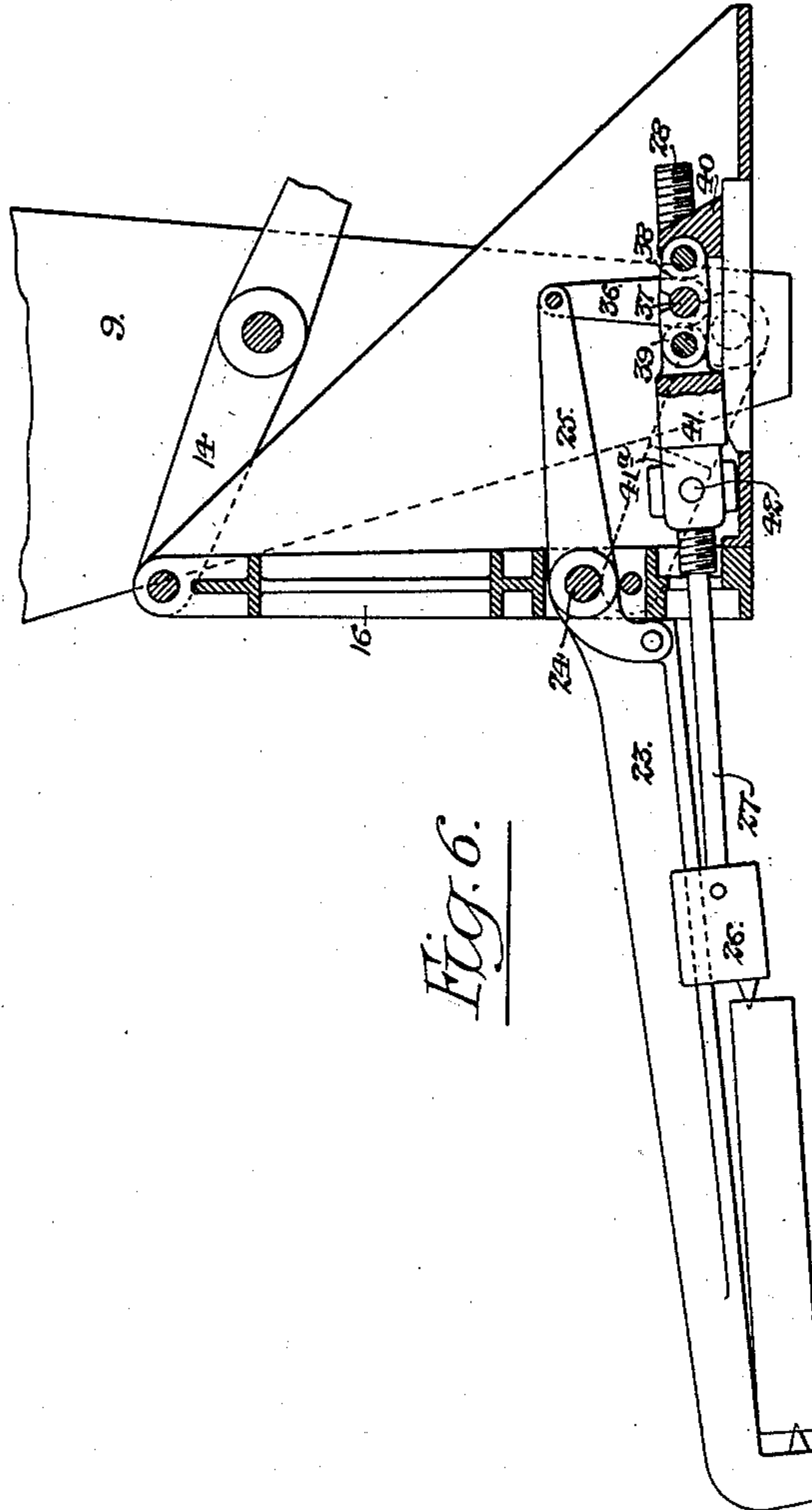


Fig. 6.

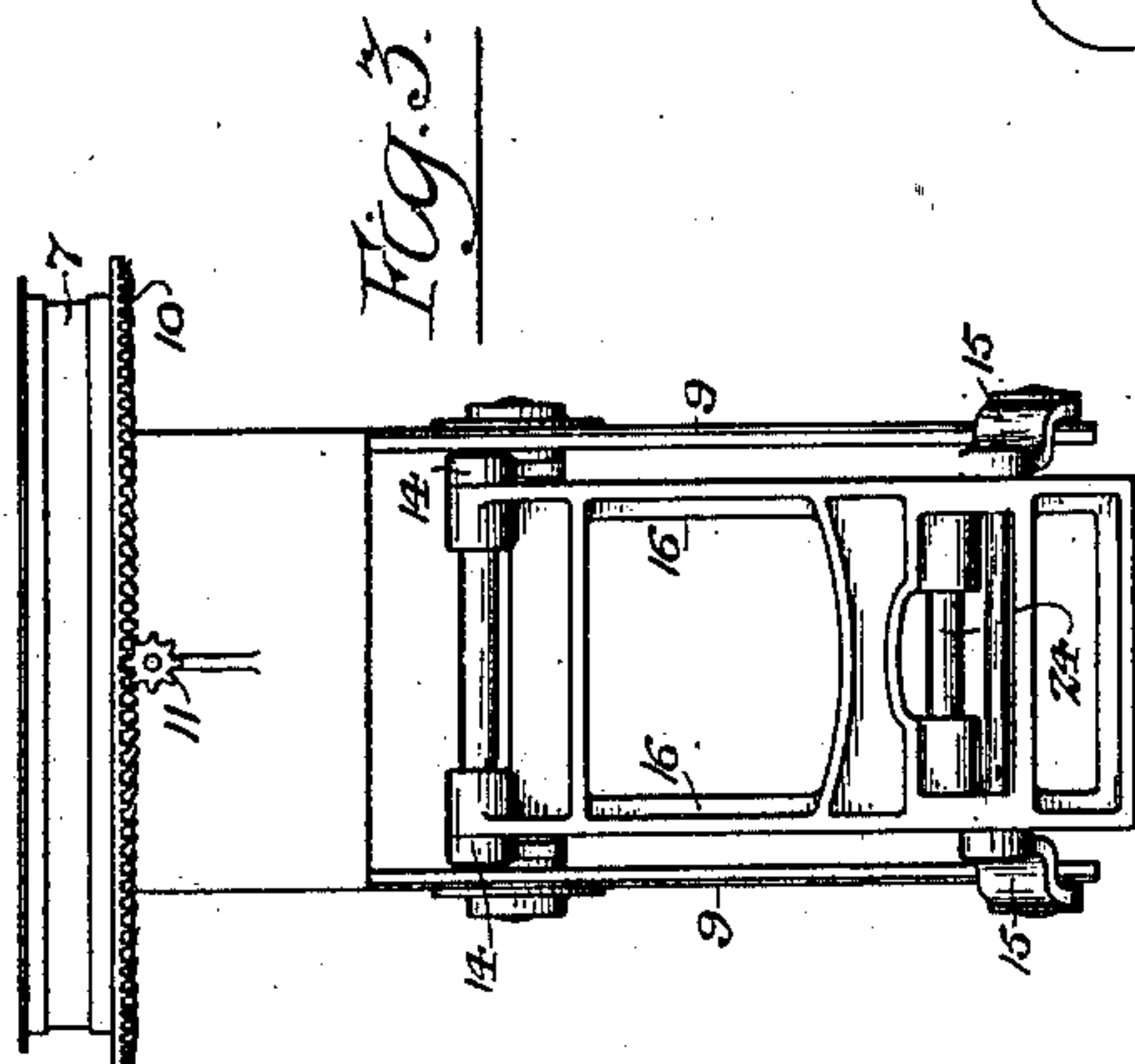


Fig. 7.

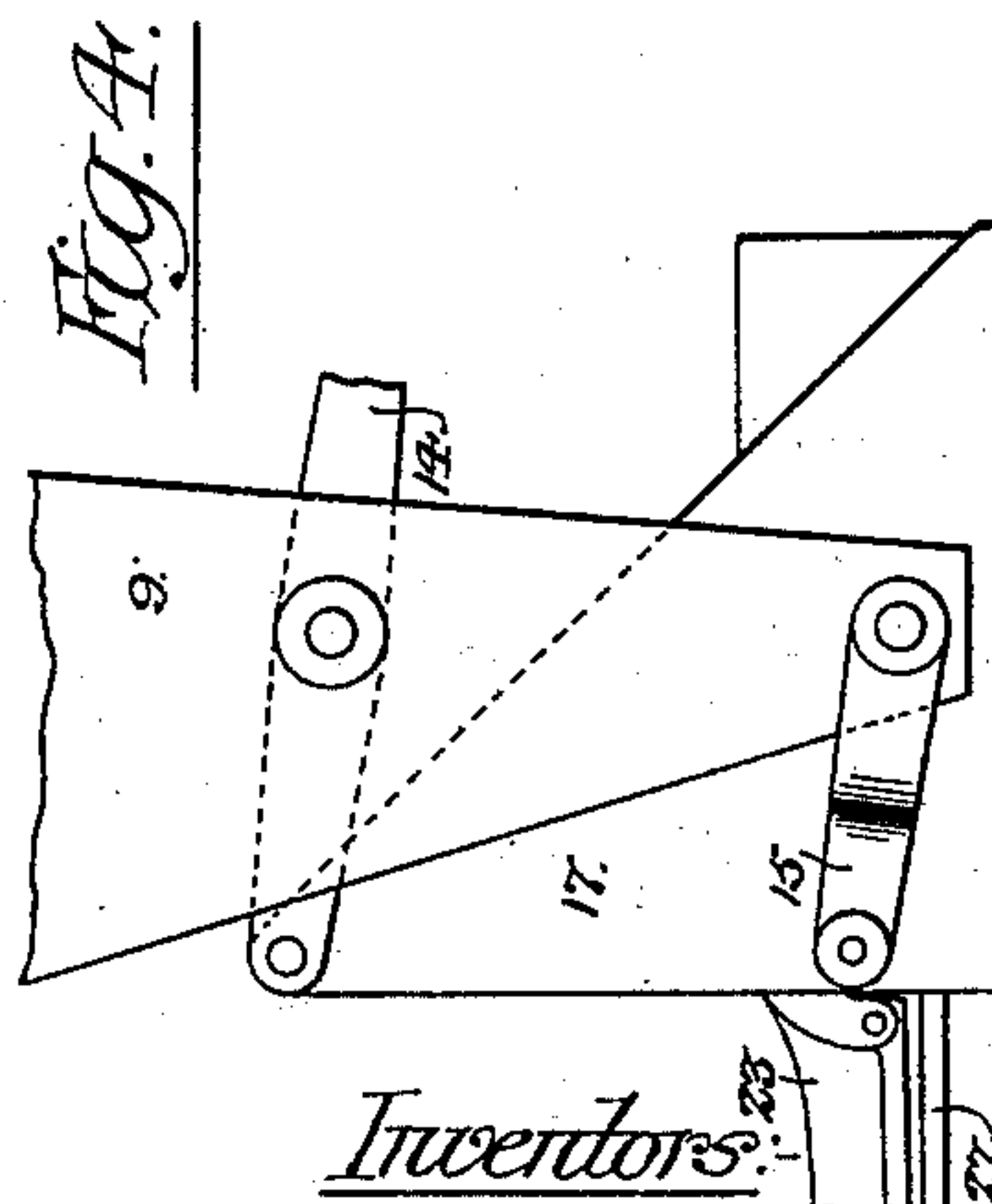


Fig. 8.

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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, CHARLES H. WELLMAN, AND JOHN W. SEAVER, OF CLEVELAND, OHIO, ASSIGNORS TO THE WELLMAN-SEAVER ENGINEERING COMPANY, OF SAME PLACE.

FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 666,123, dated January 15, 1901.

Application filed January 17, 1900. Serial No. 1,791. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL T. WELLMAN, CHARLES H. WELLMAN, and JOHN W. SEAVER, citizens of the United States, and residents of Cleveland, Ohio, have invented certain Improvements in Furnace-Charging Apparatus, of which the following is a specification.

Our invention consists of certain improvements in or modifications of the furnace-charging apparatus for which Letters Patent No. 569,075 were granted on the 6th day of October, 1896, the objects of our present invention being to provide for the automatic gripping of the ingot by the tongs, to permit of the swinging of the tongs to any desired position and the use of the same for charging either a right-hand furnace or a left-hand furnace, to counterbalance or partially counterbalance the weight of the tongs and their appurtenances, and to provide for the ready release of the ingot from the tongs.

In the accompanying drawings, Figure 1 is a view, partly in side elevation and partly in section, illustrating an ingot-handler for furnaces constructed in accordance with our invention. Fig. 2 is a plan view of the crane structure forming part of the apparatus. Fig. 3 is a front view of the tongs-carrier and of the frame in which the same is mounted. Fig. 4 is a side elevation illustrating the means for suspending the tongs-carrier. Figs. 5 and 6 are views illustrating the automatic gripping action of the tongs, and Figs. 7 and 8 are views illustrating the construction of one of the parts of the apparatus.

In Fig. 1 two furnaces or members of two rows of furnaces facing each other are represented respectively at 1 and 2, and above these furnaces or rows of furnaces are suitably supported longitudinal girders 3, which carry rails forming runways for wheels upon a transverse crane-girder 4, certain of these wheels being rotated by gearing from a shaft 5, which may be driven by an electric or other suitable motor, so as to traverse the crane-girder 4 longitudinally.

To suitable rails on the girder 4 are adapted the wheels of a trolley 6, which can run from one end of the girder to the other, and depending from this trolley is a ring 7, which carries

the lower race for a series of balls, upon which is mounted an annular rail carried by a ring 8, the latter being provided with a depending structure 9, upon which the tongs and the mechanism for raising and lowering and opening and closing said tongs are mounted.

The depending ring 7 has secured to it an annular rack 10, and with this rack engages a pinion 11 on a shaft 12, which is adapted to suitable bearings on the depending structure 9 and is driven through the medium of suitable gearing from an electric or other motor 13, mounted on said depending structure 9. Hence by a suitable operation of this motor said structure can be caused to turn in either direction around a vertical axis coincident with the axis of the ring 8.

To the depending structure 9 are hung levers 14 and arms 15, and upon these levers and arms is supported the tongs-carrying structure, which consists in the present instance of a transverse front frame 16 and side plates 17, the whole forming a sort of box or cage in which the operator sits and which contains the mechanism for opening and closing the tongs and the various switches and controllers whereby the electric motors, constituting the operating devices of the crane, are governed and thrown into and out of action.

The rear arms of the levers 14 carry an electric motor 18, which by means of suitable gearing drives a shaft 19, mounted in suitable bearings on said levers 14 and having a crank 20, which is connected by a link 21 to a fixed shaft or stud 22 at the upper portion of the hanger 9. Hence by rotating said shaft 19 the crank may be caused to turn and the rear arms of the levers 14 may be caused to rise or fall, so as to lower or lift the tongs-carrying structure, thus permitting the tongs to descend into position to engage with an ingot and after such engagement to lift the ingot from the truck or other support on which it rests, the crane then carrying the ingot to the furnace, inserting it therein, and depositing it upon the furnace hearth or floor, from which it can be removed by a reversal of the operation or by any suitable means.

By mounting the motor and its gearing upon

the rear arms of the levers 14 the weight of the same counterbalances or partially counterbalances the weight of the tongs and their appurtenances, and thus facilitates the raising and lowering of said tongs and relieves the raising and lowering devices from a considerable portion of the strain which would otherwise be exerted upon them.

The fixed jaw of the tongs is carried by or forms part of an arm 23, which is mounted upon a rod or shaft 24, carried by the transverse frame 16, and to said rod or to the arm 23 is connected a rearwardly-projecting arm 25 or a pair of such arms, for a purpose hereinafter set forth.

Guided so as to slide longitudinally on the arm 23 is the movable jaw 26 of the tongs, which is connected to a rod 27, having a threaded portion 28, which is adapted to a nut 29^a, Fig. 7, free to turn in, but longitudinally confined to, a box or casing 29, said nut being toothed for engagement with a spur-wheel 30 on a shaft 31, which is adapted to bearings on a projecting bracket 32 and carries a bevel-pinion 33, the latter meshing with a bevel-wheel 34 on a shaft likewise adapted to bearings in the bracket 32 and provided with a hand-wheel 35 within reach of the attendant, who can by moving this hand-wheel in one direction or the other impart rotative movement to the nut contained in the box or casing 29, and can thus advance or retract the rod 27 and cause movement of the jaw 26 of the tongs from or toward the fixed jaw of the same.

The arm 25 of the tongs, or each of said arms if a pair is employed, is connected by a link 36 to the central pin or knuckle 37 of a pair of toggle-levers 38 and 39, one hung to a fixed abutment 40 on the floor of the tongs-carrying structure and the other hung to a sliding block 41, which has a projecting lug or ear 41^a engaging with a pin 42, which projects from the holder 29 for the nut, which receives the adjusting-screw 28. (See Figs. 5 and 6.)

The outer projecting arm 23 of the tongs is much heavier than the inner arm or arms 25. Hence said arm 23 has a normal tendency to drop, so as to raise the toggle-levers to the position shown in Fig. 6.

The movable jaw 26 of the tongs is first adjusted so that an ingot can readily enter between the jaws and as the tongs-carrying structure is lowered the arm 23 comes into contact with the ingot and is lifted slightly thereby, so as to depress the toggle-levers 38 and 39, as shown in Fig. 5. The movable jaw having been so adjusted that the spurs of the two jaws are adjacent to or lightly in contact with the ends of the ingot, the tongs-carrying structure is raised. The first effect of this action is to cause the straightening of the toggle-levers 38 39 and the consequent forcing outward of the block 41, the nut-holder 29, rod 27, and slide 26, so that the ingot is firmly and automatically gripped between the

fixed and movable jaw of the tongs, as shown in Fig. 6, further lifting movement of the tongs-carrying structure raising the tongs and ingot along with it, so that the heavier the ingot the tighter will be the grip of the tongs upon it.

When the tongs-carrying structure is lowered so as to deposit the ingot upon the bed of the furnace, further downward movement of said structure will cause the lifting of the arm 23 of the tongs and the toggle-levers 38 and 39 will be again bent in order to retract the screw-adjusting mechanism of the slide 26 and withdraw the latter from engagement with the ingot.

By the provision of a longitudinally-traveling crane with transversely-movable trolley having a turn-table which carries the supporting and operating devices for the tongs extreme mobility of the tongs is provided for and the latter can readily feed furnaces facing either the right or left and can pick up an ingot from or deposit it at any point within the longitudinal or transverse traverse of the crane, the raising and lowering of the tongs being facilitated by the counterbalancing effect of the motor and gearing, whereby such movement is effected, and by so constructing the tongs as to automatically grip the ingot as the tongs are raised the attendant is relieved from the duty of imparting such heavy pressure to the movable jaw of the tongs as to effect such secure gripping of the ingot.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination in an ingot-charging machine, of a tongs-carrying structure, lever mechanism having said tongs-carrying structure supported on one side of the fulcrum thereof, and mechanism for raising and lowering the tongs-carrying structure supported on the other side of said fulcrum, so as to counterbalance or partially counterbalance the weight of the tongs-carrying structure.

2. The combination in an ingot-charging apparatus, of a tongs-carrying structure, lever mechanism upon which the same is mounted, a crank also mounted on said lever mechanism and connected by a link to a fixed stud or pin on the lever-supporting structure, and means for rotating said crank.

3. The combination of gripping-tongs having a movable jaw, with toggle mechanism connected to said jaw and serving to move the same as the tongs are raised or lowered.

4. The combination of a tongs-carrying structure having a tongs-lever with heavy projecting arm, and lighter inner arm, a movable jaw operating in conjunction with said projecting arm, and mechanism interposed between said movable jaw and the inner arm of the lever and including a toggle which is bent and straightened as the tongs-lever swings on its fulcrum.

5. The combination of the tongs-carrying structure having a tongs-lever with heavy

projecting arm and lighter inner arm, a movable jaw sliding on said projecting arm, a threaded stem connected to said jaw, a nut engaging with said stem, a nut-holder, and a toggle acting upon said nut-holder and connected to the inner arm of the tongs-lever.

6. The combination of the tongs-carrying structure having a tongs-lever with heavy projecting arm and lighter inner arm, a movable jaw sliding on said projecting arm, a threaded stem connected to said jaw, a nut engaging with said stem, a nut-holder, and a

toggle connected to said inner arm of the tongs-lever and connected to the nut-holder, so as to both project and retract the same. 15

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

SAMUEL T. WELLMAN.
CHARLES H. WELLMAN.
JOHN W. SEAVER.

Witnesses:

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S. R. SAGUE.