

No. 816,049.

PATENTED MAR. 27, 1906.

B. F. TRIPP,  
DOOR LOCKING MECHANISM.

APPLICATION FILED JULY 10, 1905.

5 SHEETS—SHEET 1.

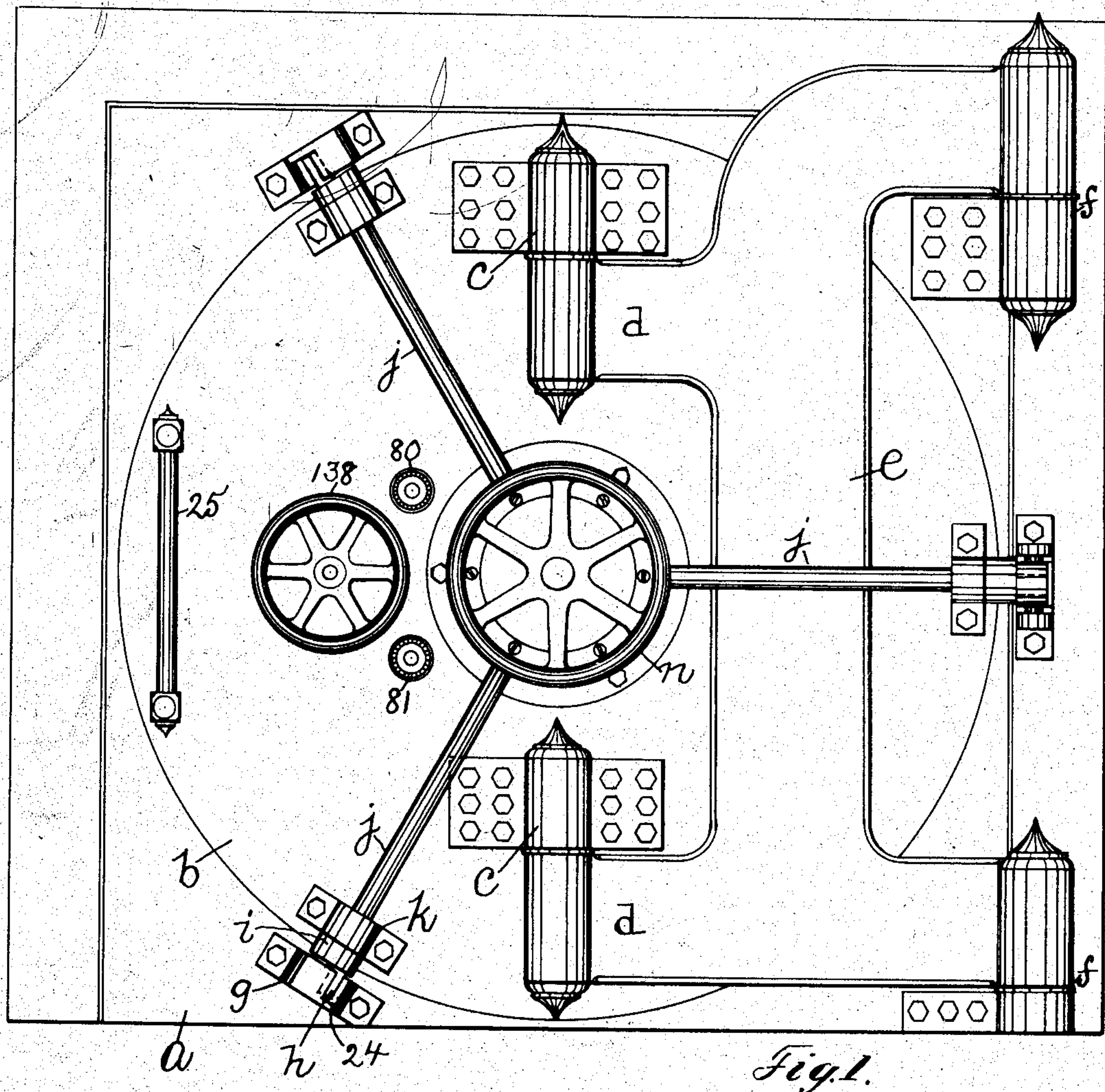


Fig. 1.

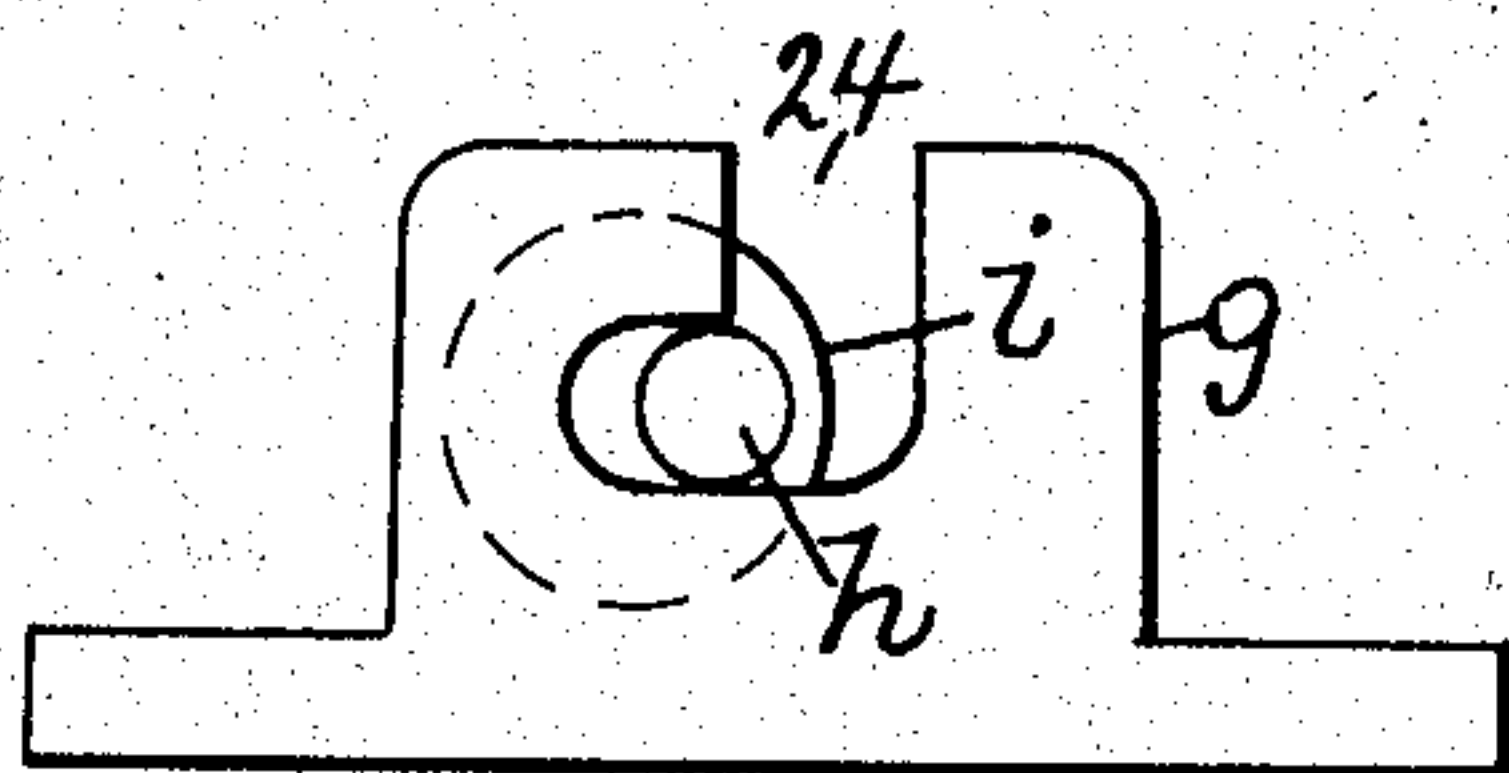


Fig. 2.

Witnesses.  
C. H. Barnett  
J. Murphy

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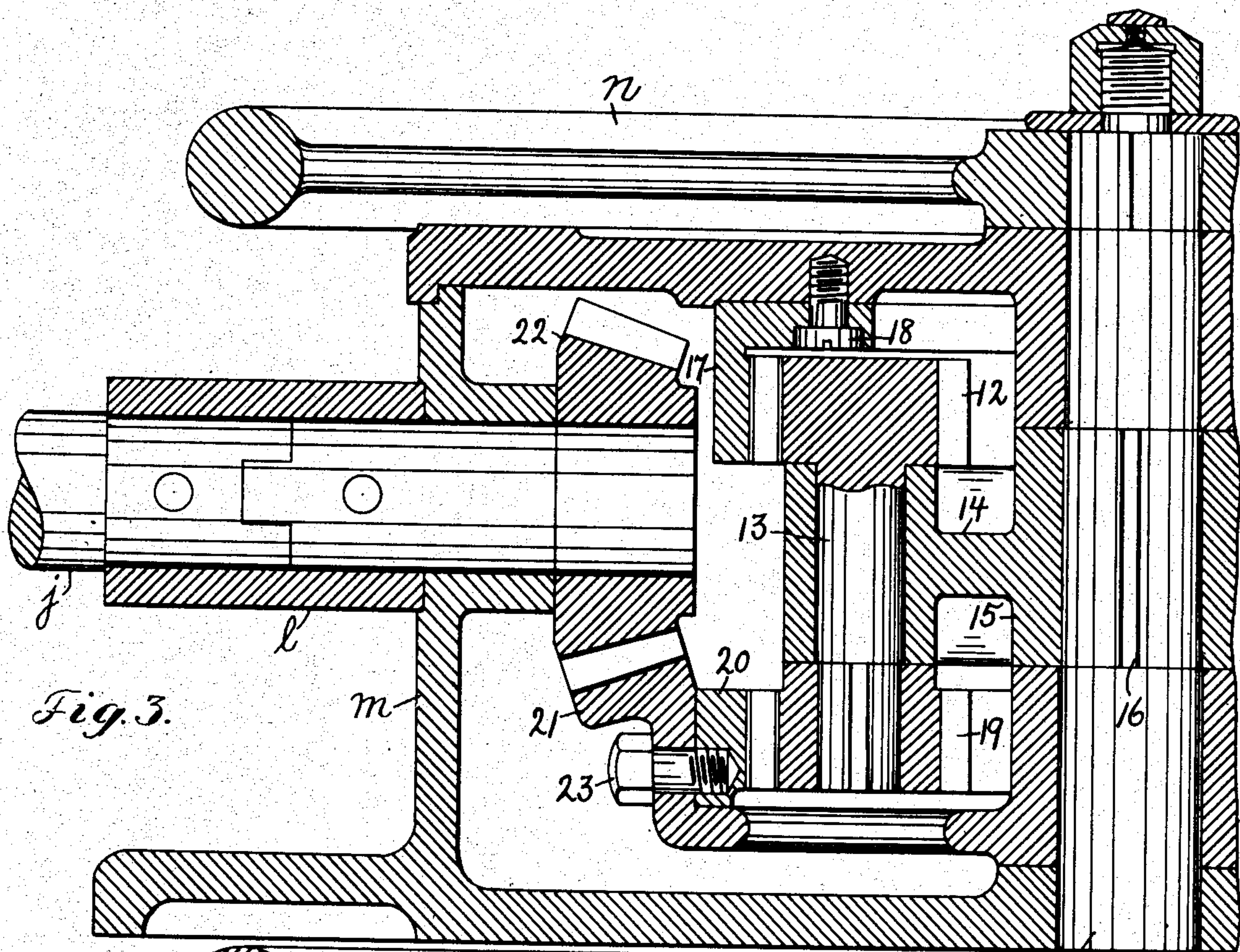


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*Fig. 3.*

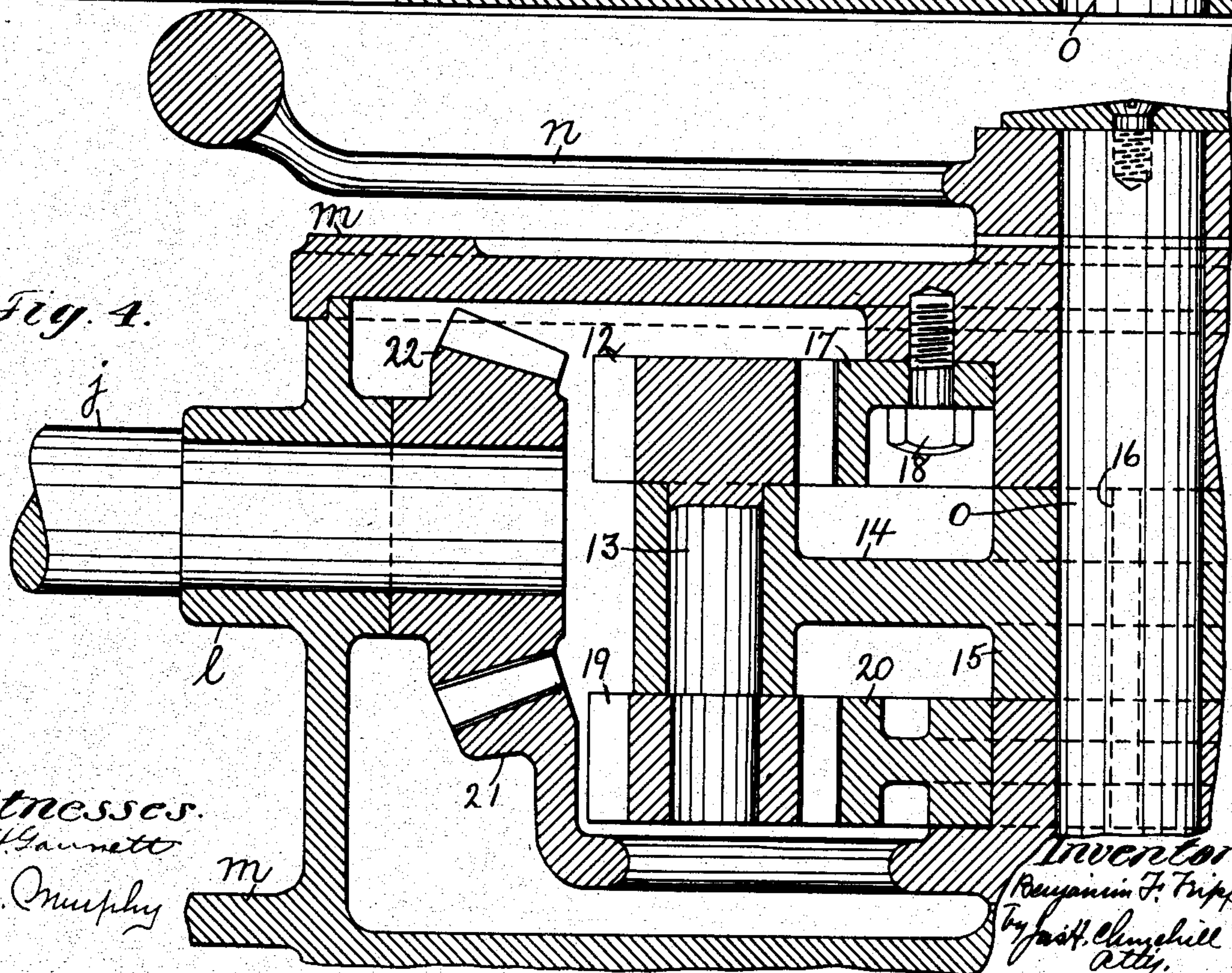


Fig. 4.

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5 SHEETS—SHEET 3.

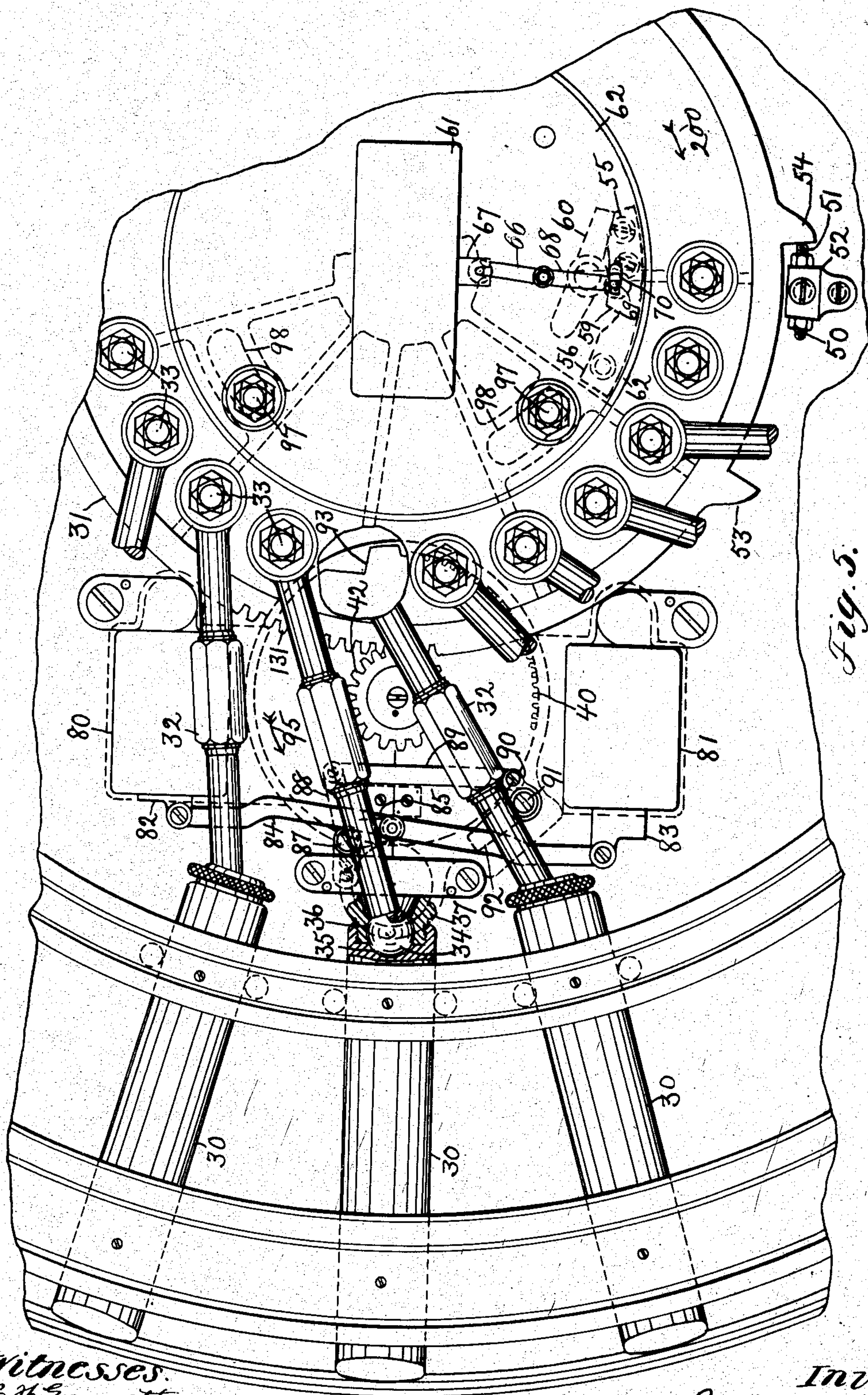


Fig. 5.

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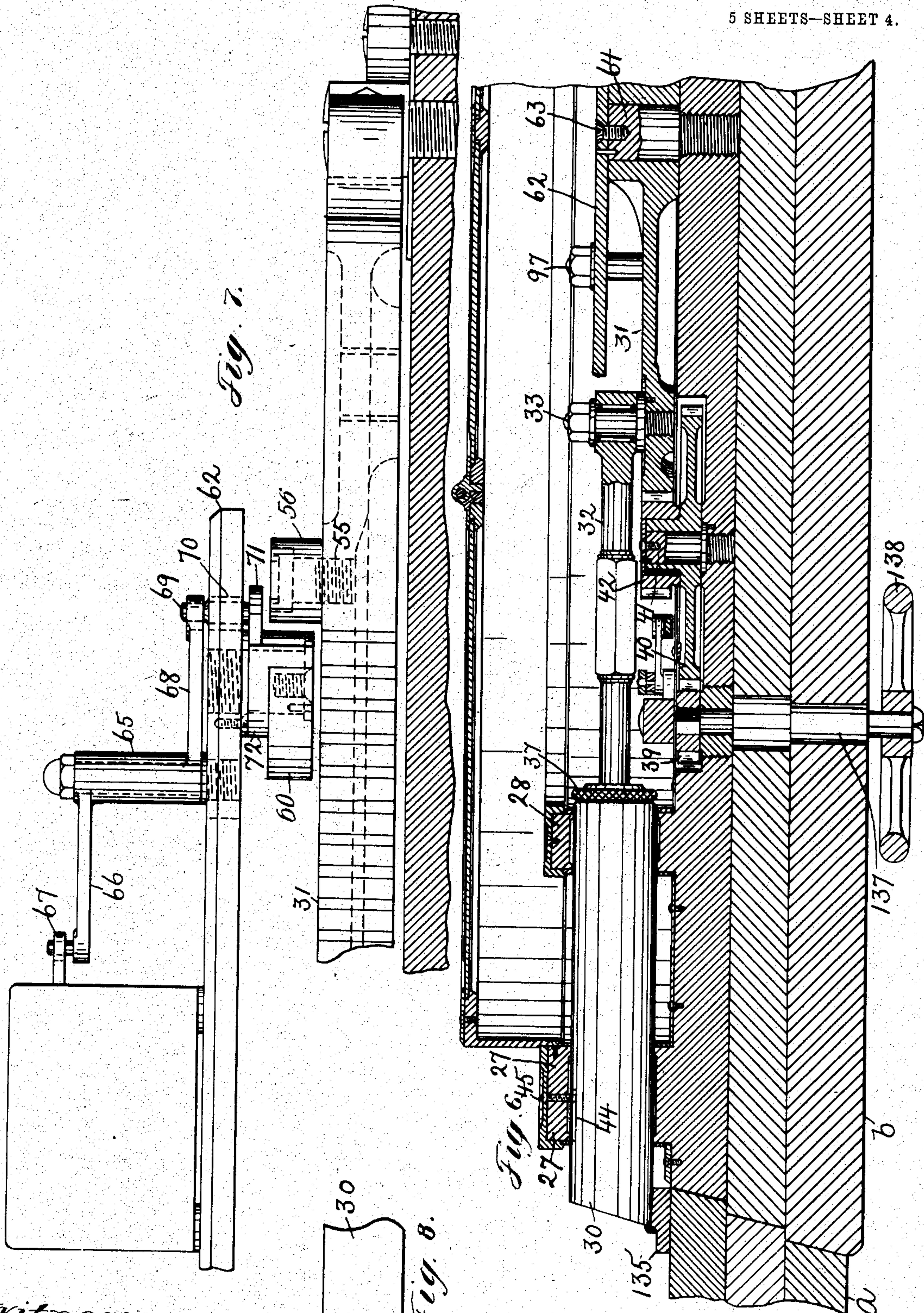
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5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

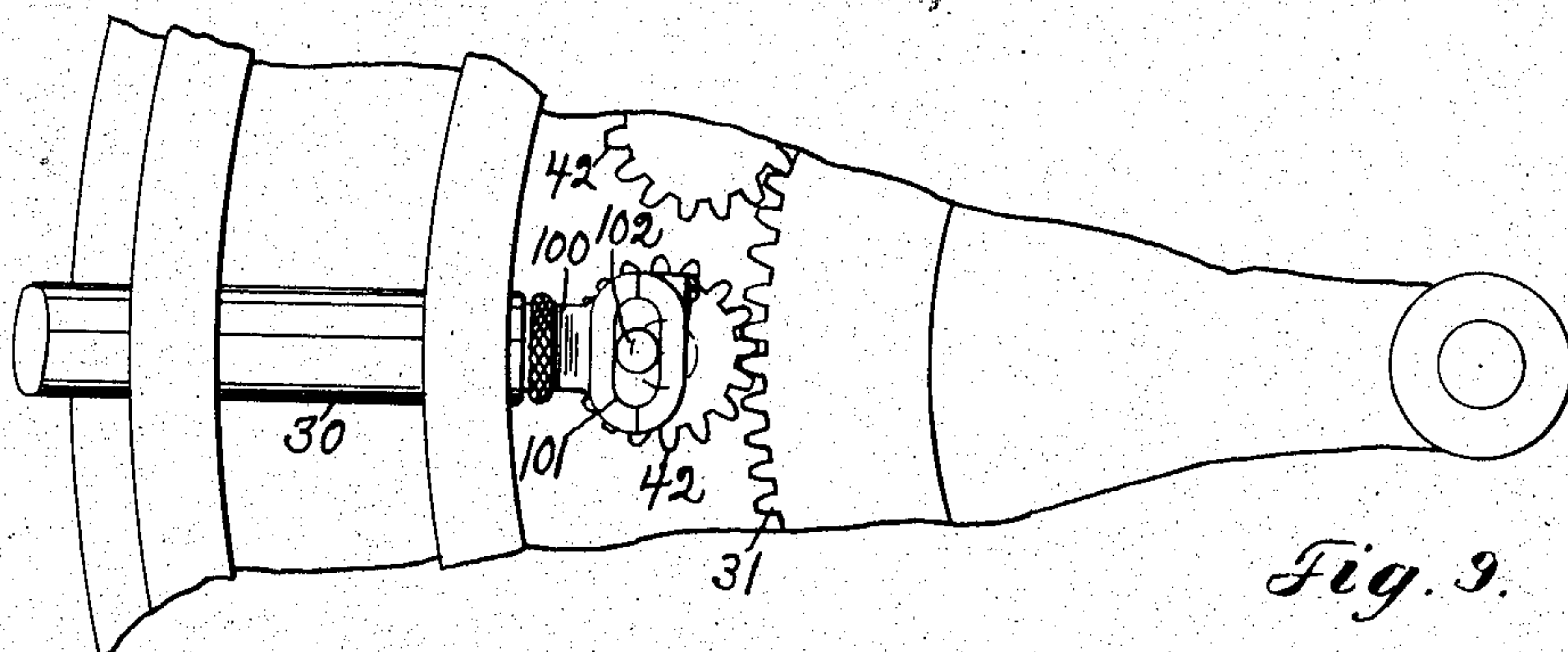


Fig. 9.

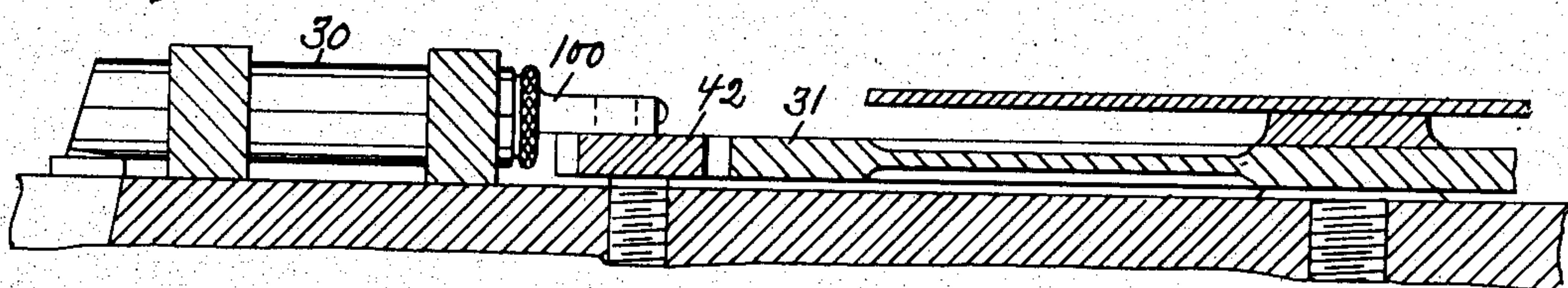


Fig. 10.

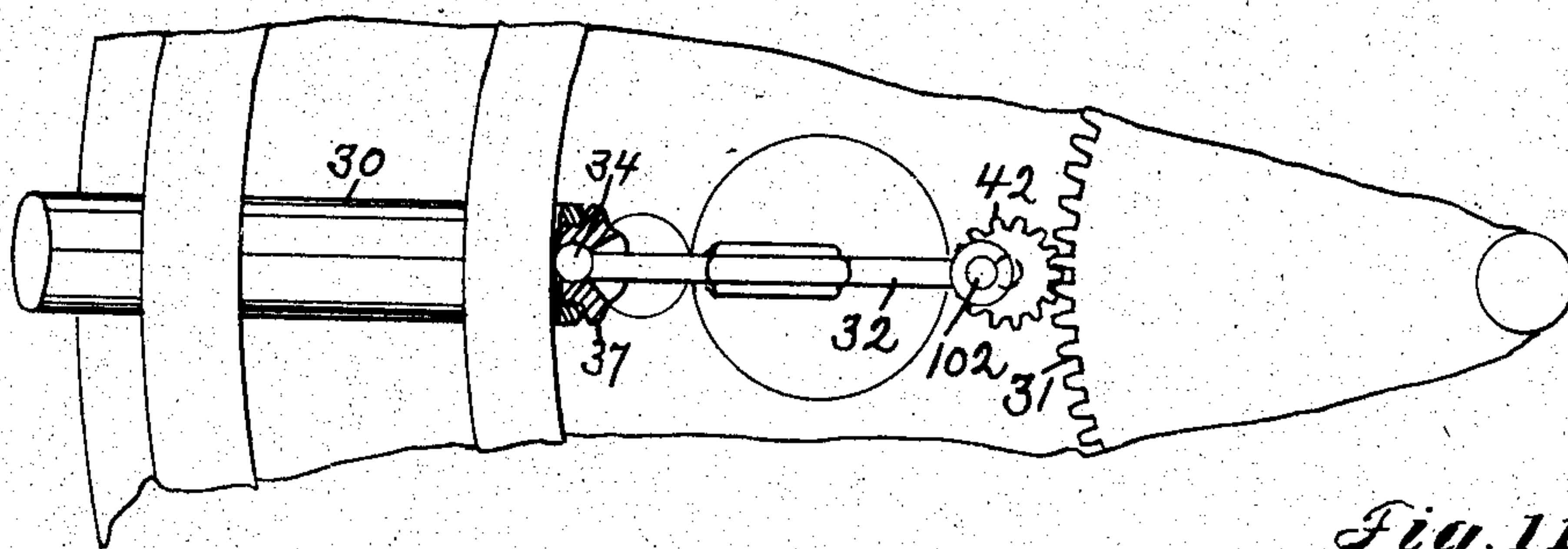


Fig. 11.

Witnesses.

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# UNITED STATES PATENT OFFICE.

BENJAMIN F. TRIPP, OF MEDFORD, MASSACHUSETTS.

## DOOR-LOCKING MECHANISM.

No. 816,049.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed July 10, 1905. Serial No. 288,954.

*To all whom it may concern:*

Be it known that I, BENJAMIN F. TRIPP, a citizen of the United States, residing in Medford, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Door-Operating Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to mechanism for locking doors, which is especially designed and adapted for use on heavy doors of vaults, safes, and like receptacles. For this purpose I employ mechanism, as will be described, for locking the door with which the bolts may be moved into their locking position with substantially great power and with a minimum friction. Provision is made for regulating the throw of the bolts and for lubricating the same.

The invention further consists in a novel means for connecting the time and combination locks with the bolt-operating mechanism, as will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation of a vault-door provided with a closing and locking mechanism embodying this invention; Fig. 2, a detail to be referred to; Fig. 3, a sectional detail, on an enlarged scale, of the mechanism preferred by me for closing the door; Fig. 4, a modification of the mechanism for closing the door; Fig. 5, a detail in elevation of the locking-bolts and their operating mechanism; Fig. 6, a detail in section of the bolt-operating mechanism shown in Fig. 5; Fig. 7, a detail, on an enlarged scale, of the mechanism operated by the time-clock; Fig. 8, a detail of a portion of one of the bolts, and Figs. 9, 10, and 11 modifications to be referred to.

Referring to the drawings, *a* represents the casing or frame of a vault, safe, or like receptacle, which is provided with a door *b*, herein shown as circular in shape and provided with socket-pieces *c*, which are fitted over suitable pintles, not shown, but which are secured to arms *d* of a frame or carrier *e*, which is vertically hinged at *f* to the casing *a*. The door-casing *a* is provided with the usual housings *g* (see Fig. 2) for the cams or crank-pins *h* on disks *i*, attached to cam-shafts *j*, which are

journalled in bearings *k*, attached to the door, and in hubs *l*, secured to a stationary casing *m*, fastened to the door *a*.

The cam-shafts *j* are operated to close the door *a* by a hand-wheel *n*, fast on a shaft *o*, having bearings in the stationary casing *m* and operatively connected with the cam-shaft by a differential gearing, as will be described. The differential gearing may be made as herein shown and, as shown in Fig. 3, consists of a pinion 12 on a shaft 13, carried by an arm 14 on a hub 15, rendered fast on the shaft *o*, as by the key 16. The pinion 12 meshes with an internally-toothed stationary gear 17, secured, as by the screw 18, to the casing *m*. The shaft 13 has fast on it a second pinion 19, having a different number of teeth from the pinion 12 and which meshes with an internally-toothed gear 20, secured by the screw 23 to a bevel-gear 21, which meshes with the bevel-pinion 22, fast on the cam-shaft *j*. In Fig. 4 another arrangement of the differential gearing is shown, in which the stationary gear 17 is externally toothed and the gear 20 is keyed to the hub of the bevel-gear 21. The cam-shafts *j* may be made in sections, as represented in Fig. 3, to permit the mechanism to be quickly and easily assembled. By turning the wheel *n* the cam-shafts *j* are rotated through the differential gearing, so as to cause the cams or crank-pins *h* to be entered into or withdrawn from their slots 24 in the housings *g* to close or open the door. By means of the differential gearing the door *b* can be closed with increased power and the door provided with an operating mechanism which is durable and substantially inexpensive. The door *b* is also provided with means for effectively locking the door when in its closed position. For this purpose the door *a* is provided on its inner side with a plurality of sliding bolts 30, (see Figs. 5 and 6,) supported in bearing-rings 27 28, attached to the door, said bolts being arranged about the door *b* radially with relation to the center of an actuating oscillating device, preferably a wheel 31, herein shown as provided with teeth 131, said bolts being operatively connected to said wheel, which may and preferably will be effected, as shown in Figs. 5 and 6, by connecting-rods 32, which are mounted at one end on pivot or crank pins 33, carried by the wheel 31, and are connected at their other



ends to the bolts 30 by ball-and-socket joints, which may be effected, as herein shown, (see Fig. 5,) by providing the end of each connecting-rod 32 with a ball 34, which fits a circular socket 35 in the inner end of the bolt and is retained therein by the wall of a circular opening 36 in a nut 37, fitted on the connecting-rod and engaging a threaded opening in the end of the bolt, as clearly shown in Fig. 5.

The connecting-rods 32 are pivoted to the wheel 31, so that when the bolts are in their withdrawn position (represented in Fig. 5) the pivots 33 for the connecting-rods are out of line with the bolts and are brought into or substantially into line with the bolts when the latter are in their closed or forward position, thereby causing the bolts to be forced home or into their closed or operative position with substantially great power, which is utilized to draw the door firmly into its seat, so as to effect a liquid-tight joint and prevent the introduction of liquid explosives between the door and its seat. The seating of the door may be effected, as herein shown, by providing the door frame or casing with wedges or inclined blocks 135, (see Fig. 6,) which are rigidly secured to the door and with which the bolts cooperate, the latter being preferably provided at their outer ends with a substantially small flat portion 136, (see Fig. 8,) which engages said wedges. By means of the inclined surfaces 135, rigidly secured to the door-frame in the path of movement of the sliding bolts, the door is pulled into its seat, so as to make a liquid-tight joint, and is held in its seat and prevented from being moved slightly away therefrom by any reverse movement of the pressure mechanism operated from outside of the door.

The bolt-actuating wheel 31 is operatively connected with a shaft or spindle 137, extended through the door and provided with a hand-wheel 138. The spindle 137 has fast on it on the inner side of the door a pinion 39, which meshes with a gear 40 on a shaft 41, provided with a pinion 42, which meshes with the actuating-wheel 31. It will thus be seen that rotation of the hand-wheel 138 effects a partial rotation of the wheel 31, and thereby moves the bolts, so as to lock or unlock the door.

By means of the ball-and-socket connection between the bolts and their connecting-rods the bolts are capable of being moved in their bearings with freedom and with a minimum friction. To insure the flat surface 136 of the bolt properly engaging the inclined blocks or wedges 135, each bolt is provided with a longitudinally-extended slot 44, (see Fig. 6,) into which projects a guiding screw or pin 45, extended down through the bearing-ring 27 into the slot 44. By removing the guide pin or screw 45 the bolts are capable of being rotated or turned in their bear-

ings when the door is in its open position, thereby enabling them to be quickly and easily cleaned and oiled, if desired, to insure easy working of the bolts.

The throw or movement of the bolts may be accurately determined, as herein shown, by means of adjusting-screws 50 51, (see Fig. 5,) carried by a post 52, secured to the door and cooperating with lugs or ears 53 54 on the bolt-actuating wheel or gear 31.

Provision is also made for locking the bolt-actuating wheel 31 from movement for a predetermined length of time, and for this purpose the said wheel has secured to it, as by screws 55, (see dotted lines, Figs. 5 and 7,) a bar or block 56, provided with a notch or tooth 59, with which cooperates a dog, pawl, or lever 60, operatively connected with a time-lock 61, which may be of any suitable or usual construction and is secured to a supporting-disk 62, fastened, as by the screw 63, to the stud or shaft 64, on which the gear or wheel 31 is mounted. The time-lock 61 is operatively connected with the pawl or dog 60, as herein shown, (see Figs. 5 and 7,) by a rocking shaft or sleeve 65, carried by the disk 62 (see Fig. 7) and having a crank 66, connected to a movable device or member 67 of the time-lock and provided with a second crank or arm 68, loosely connected to a crank-pin 69, extended through a slot 70 in the disk 62 and carried by a crank or arm 71 of a sleeve or hub 72, to which the dog or pawl 60 is secured. When the door is locked, the pawl 60 engages the notch or tooth 59 and prevents rotation of the wheel 31 in the direction indicated by the arrow 200, thereby preventing the bolts being withdrawn until the proper time. Provision is also made for operatively connecting the bolt-operating mechanism with the combination-locks 80 81, which may be of any suitable or usual construction and which have their bolts 82 83 connected by the link or bar 84, to which is pivotally connected at or near its center one arm 85 of an elbow-lever pivoted at 87 to the door and having its other arm 88 joined by a link 89 to one arm 90 of an elbow-lever pivoted at 91 and having its other arm 92 adapted to be moved into the path of movement of a lug or projection 93 on the gear 40 to thereby prevent movement of said gear in the direction indicated by the arrow 95 and permit the door to be unlocked.

The arm 92 constitutes a locking pawl or dog for the gear 40, and thereby for the bolts, and when said pawl is in the position shown in Fig. 5 it is rendered inoperative upon the gear and permits the same to be turned in the direction indicated by the arrow 95 if the time-lock is in its operative position or condition.

The plate 62, supporting the time-lock 61, may be secured to the door by means of bolts



or screws 97, extended through slots 98 in the wheel 31.

I may prefer the construction shown in Fig. 5, by which the bolts are operated by a crank-motion; but I do not desire to limit my invention in this respect, as the crank-motion may be obtained with other constructions—such, for instance, as shown in Figs. 9 to 11, inclusive.

10 In Figs. 9 and 10 the bolt 30 has rigidly attached to it a shank 100, provided with a slot 101, into which extends a crank-pin 102 on the pinion 42, which meshes with the wheel 31.

15 In Fig. 11 the connecting-rod 32 is shown as connected to the crank-pin 102 on the pinion 42. In the constructions shown in Figs. 9 to 11 it will be understood that there is a pinion 42 for each bolt.

20 The mechanism herein shown and described for closing the door is not herein claimed, as it forms the subject-matter of another application, Serial No. 299,069, filed by me February 2, 1906.

I claim—

25 1. The combination with a door, of mechanism for locking said door carried by the same and comprising a sliding bolt, a rod connected to said bolt by a ball-and-socket joint, a rotatable wheel, means for connecting said  
30 rod with said wheel, and means to rotate said wheel, substantially as described.

35 2. The combination with a door, of mechanism for locking said door, carried by the same and comprising a bolt, gears operatively connected with said bolt to move the same, a pawl or dog coöperating with one of said  
40 gears to prevent movement of said bolt, combination-locks carried by the door, a bar or link connecting said combination-locks, and means connected to said link or bar substantially at its center and with said pawl or dog to effect engagement and disengagement of

said pawl or dog with said gear by movement of said bar by either of said locks, substantially as described.

45 3. The combination with a door, of mechanism for locking said door, carried by the same and comprising a sliding bolt, a wheel operatively connected with said bolt, a time-lock, a stop carried by said wheel, a pawl co-  
50 operating with said stop, and a lever positively connected with said pawl and said time-lock, substantially as described.

55 4. The combination with a door provided with a bearing-rib, a bolt extended through and supported by said bearing-rib and provided with a guideway, and means carried by  
60 and removable from said bearing-rib and extended into said guideway, substantially as described.

65 5. The combination with a door, of mechanism for locking said door carried by the same and comprising a sliding bolt, a rod connected to said bolt by a ball-and-socket joint, an oscillating device for said bolt to which  
65 said rod is connected to be actuated thereby, and means to move said actuating device, substantially as described.

70 6. The combination with a door, of mechanism for locking said door carried by the same and comprising a sliding bolt, a wheel operatively connected with said bolt, lugs or  
75 ears on said wheel, a stationary post interposed between said lugs, and adjustable stops coöperating with said post and lugs, for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN F. TRIPP.

Witnesses:

JAS. H. CHURCHILL,  
J. MURPHY.