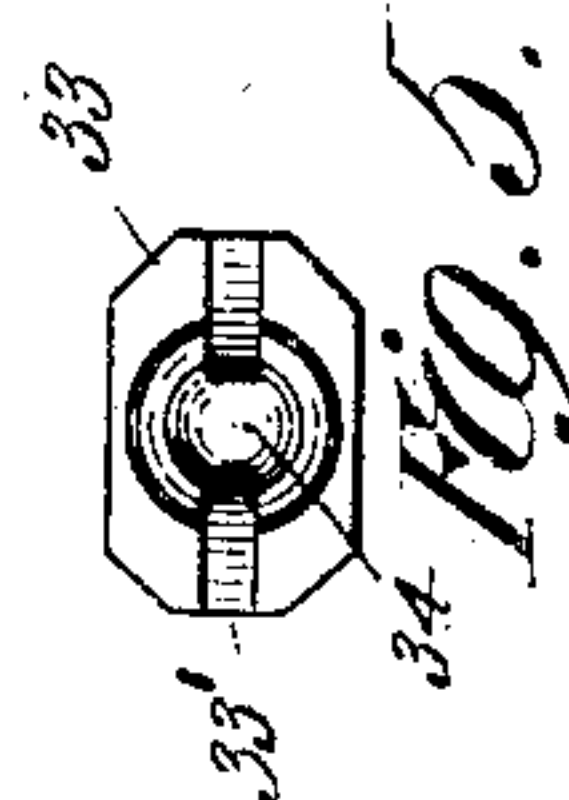
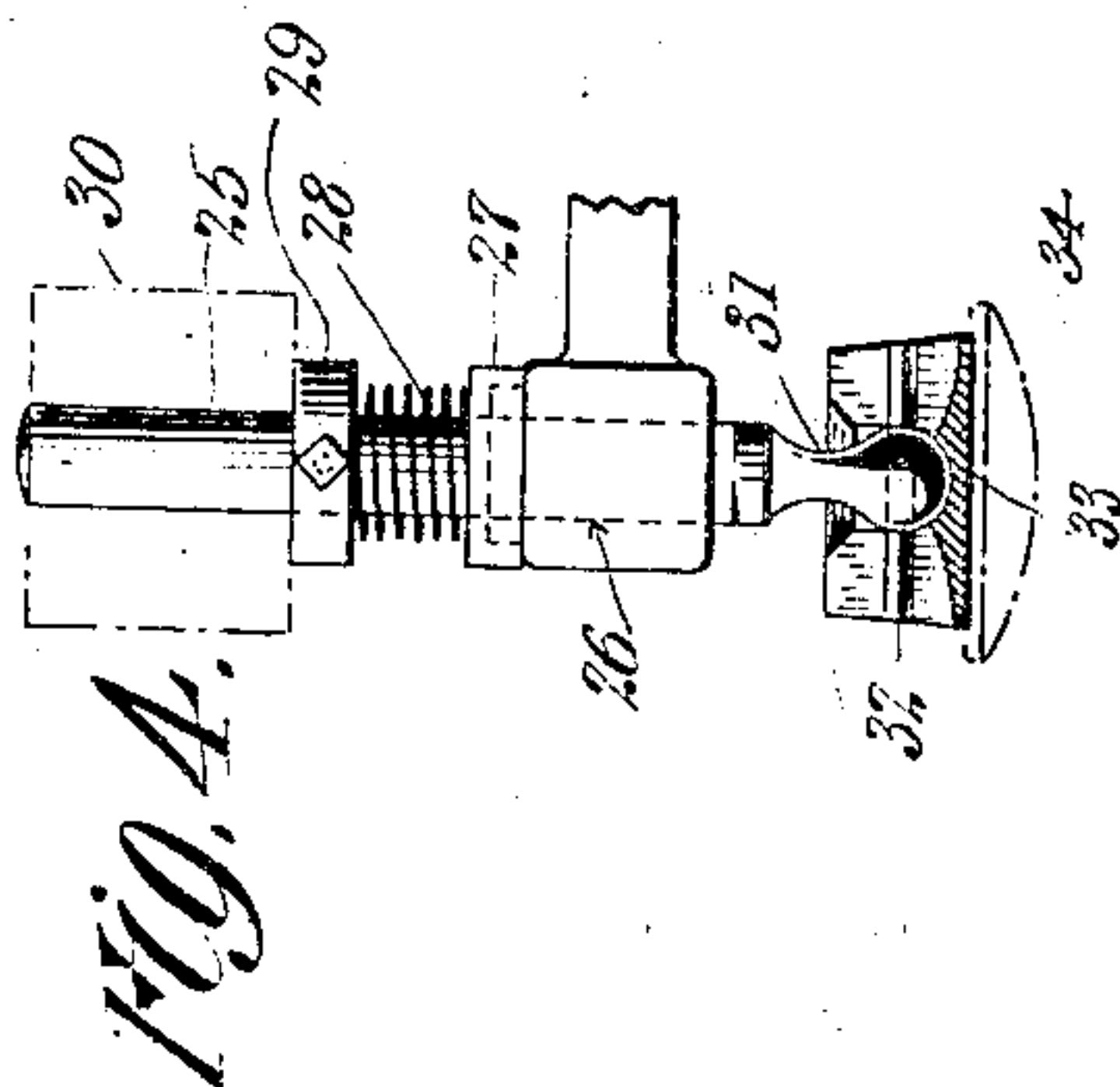
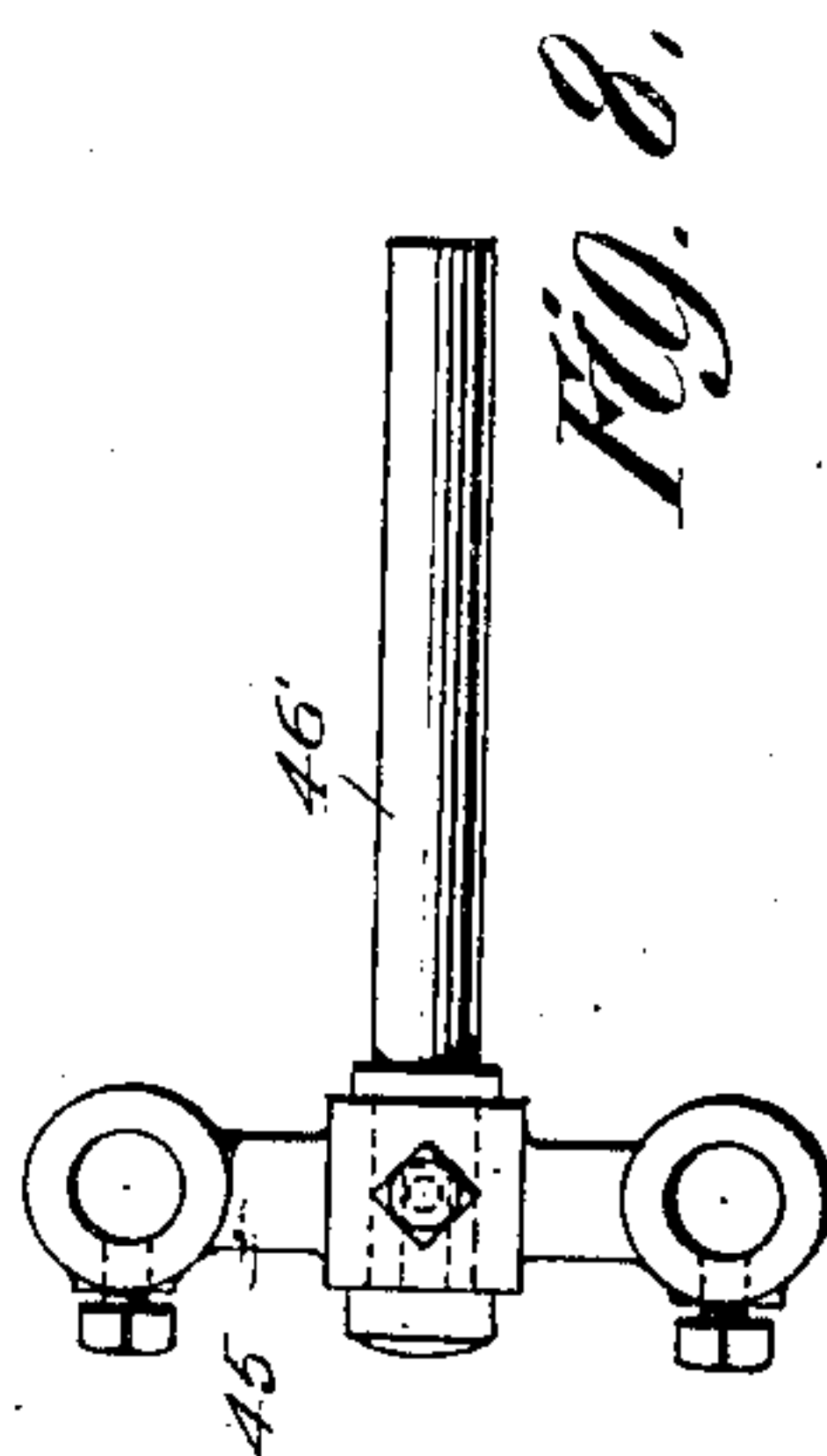
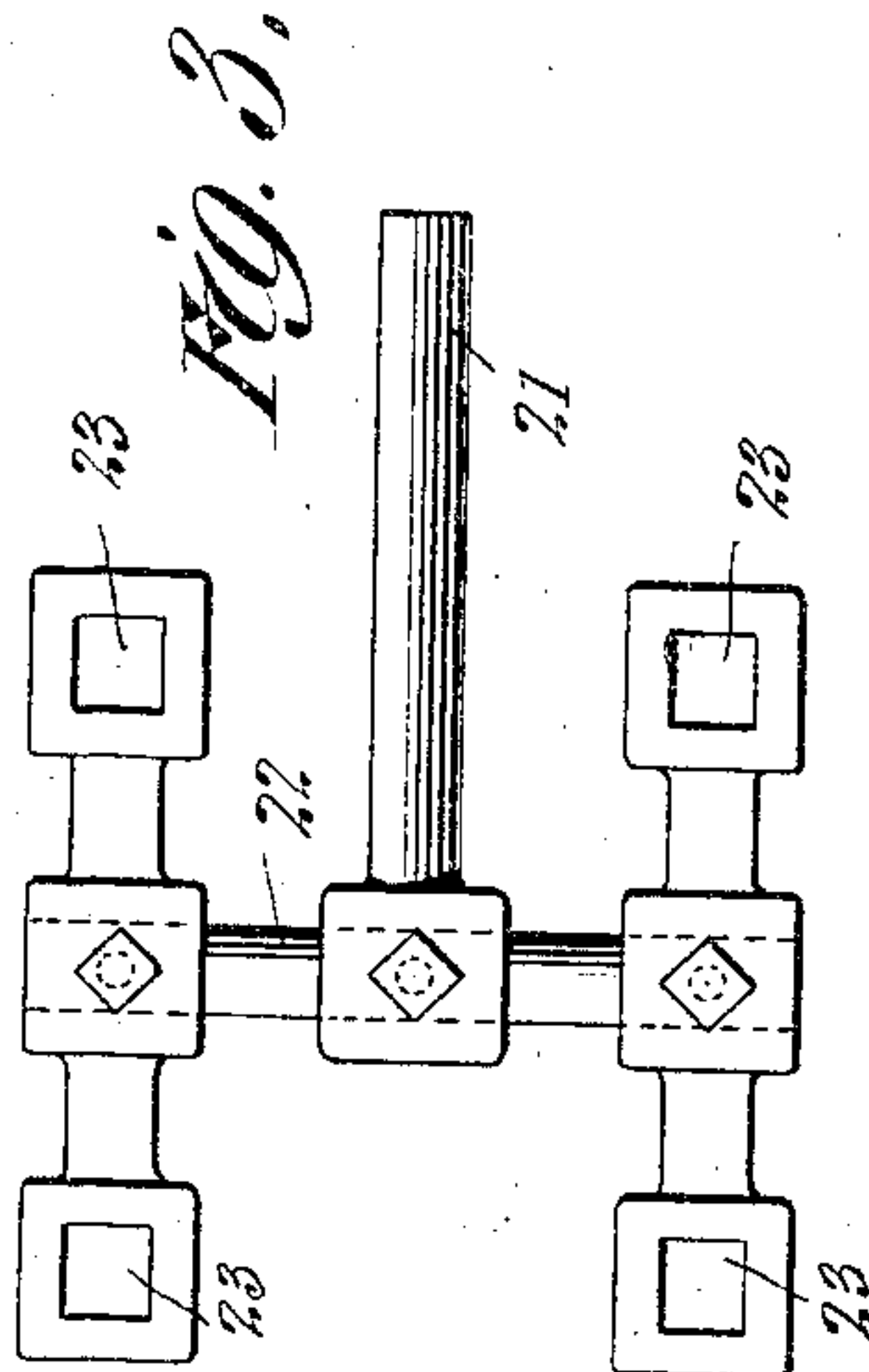
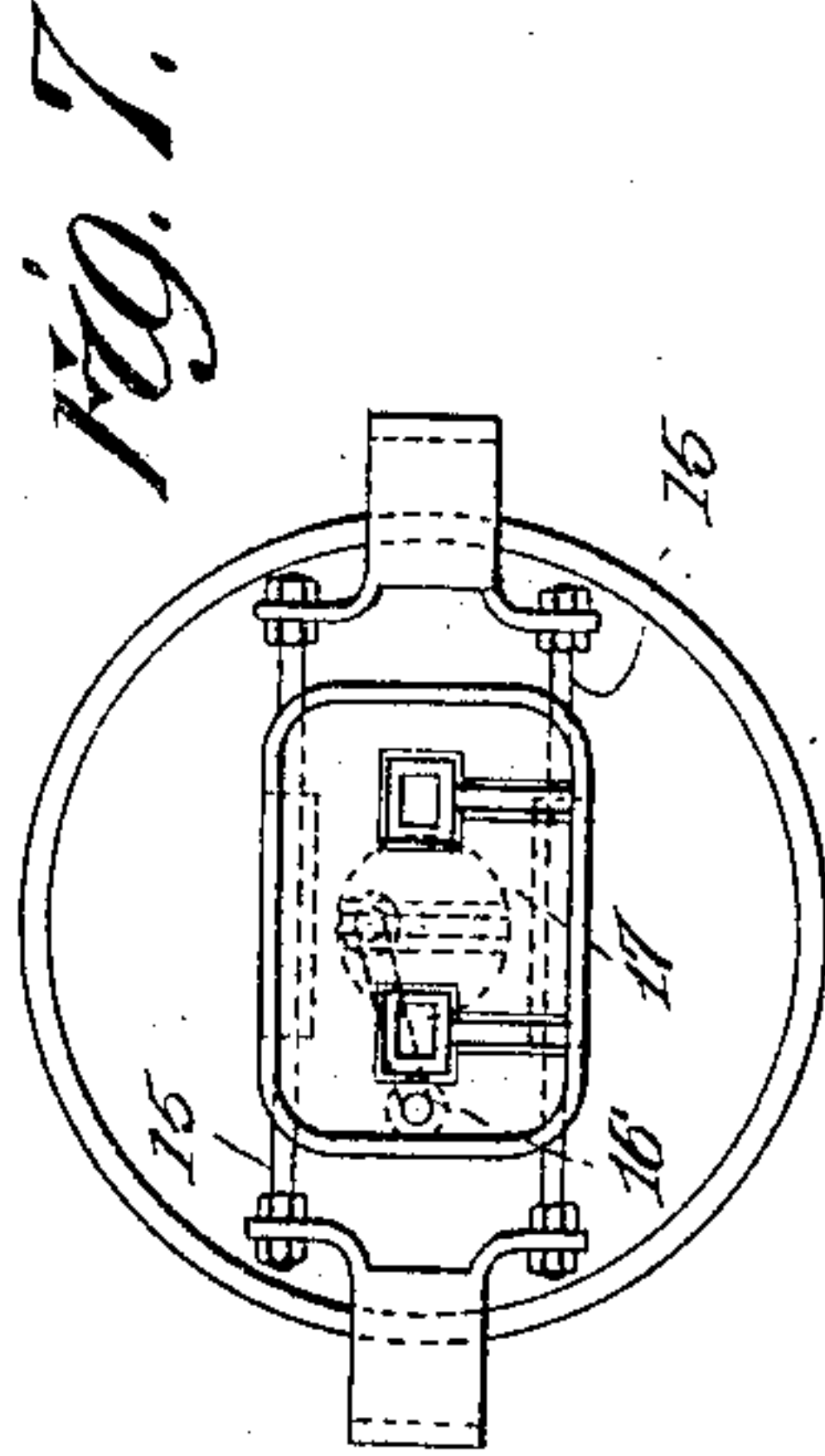
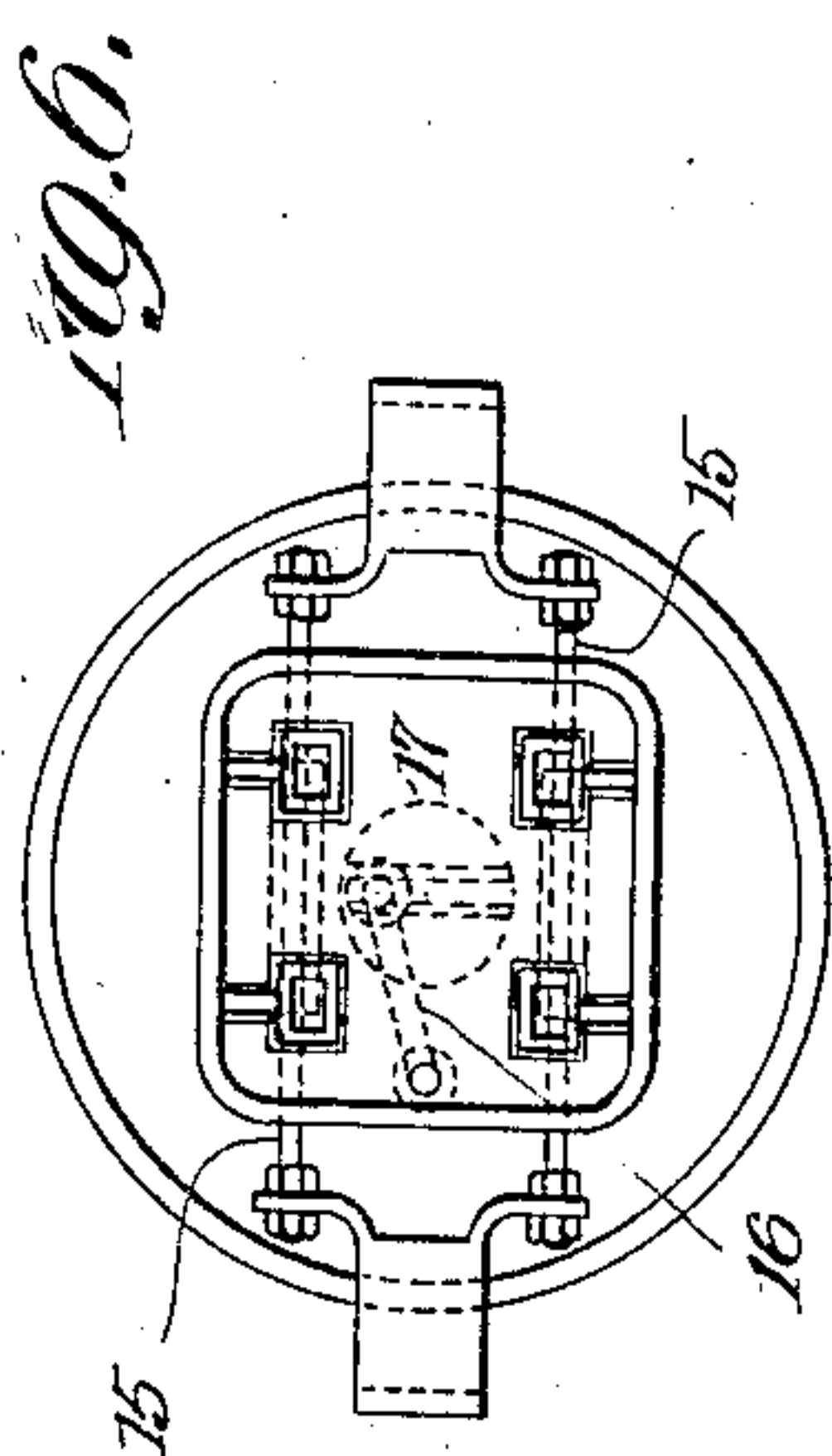
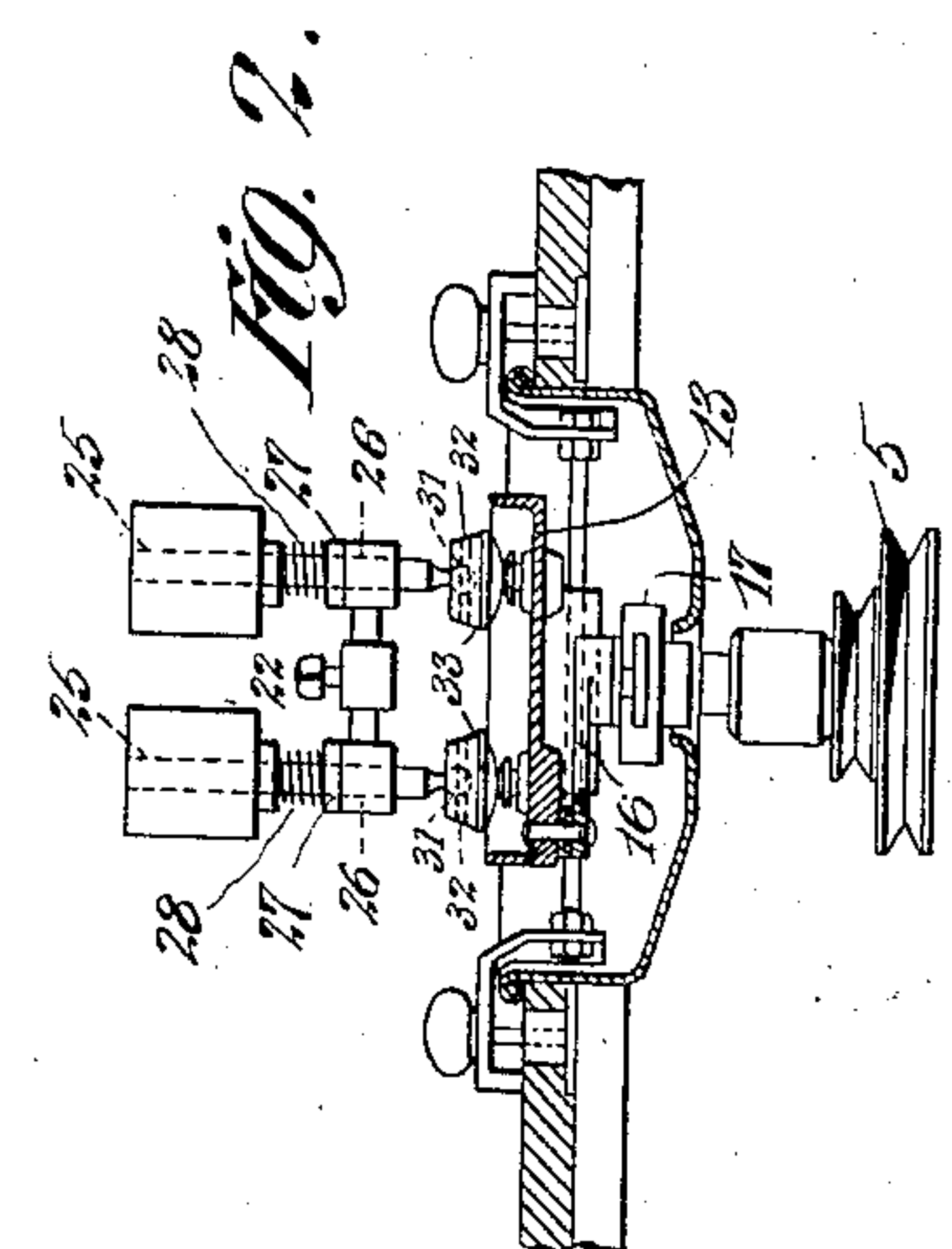
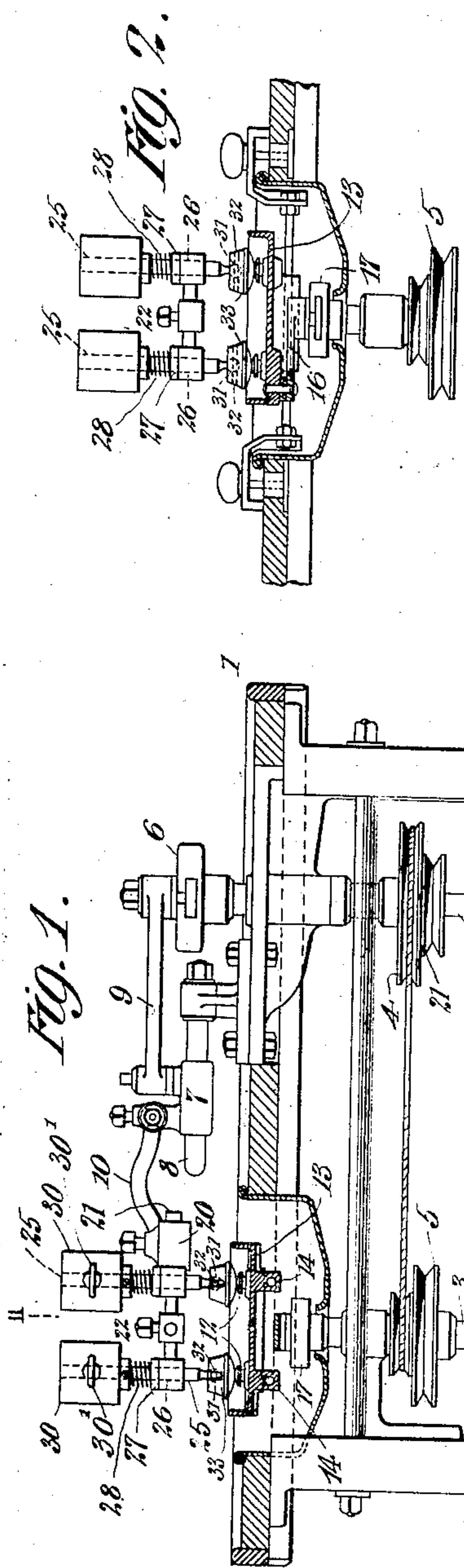


F. BUCHHOP.
LENS GRINDING MACHINE.
APPLICATION FILED DEC. 16, 1908.

939,975.

Patented Nov. 16, 1909



Witnesses:

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UNITED STATES PATENT OFFICE.

FERDINAND BUCHHOP, OF NEW YORK, N. Y., ASSIGNOR TO THE MEYROWITZ MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

LENS-GRINDING MACHINE.

939,975.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed December 16, 1908. Serial No. 467,811.

To all whom it may concern:

Be it known that I, FERDINAND BUCHHOP, a citizen of the United States, residing at the city of New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Lens-Grinding Machines, of which the following is a full, clear, and exact description.

My invention relates to lens grinding machines of the general type set forth in my prior application Serial No. 441,996, filed July 6, 1908, and which is adapted for all classes of lens grinding.

The present invention is designed exclusively for toric and cylindrical grinding, and includes means whereby four or any less number of lenses may be ground simultaneously without requiring substantially any more mechanism than is ordinarily employed in grinding a single lens. In this action the various lenses receive an individual pressure suitable to their separate needs and are individually acted upon in substantially the same way as if they were ground separately. Means are also provided whereby any number of the separate lens grinding devices may be thrown out of action individually so that the machine operates on one, two or three lenses in the absence of the full number, without any disturbance or interference from the idle parts of the mechanism.

The invention consists in the features of construction and combination hereinafter set forth and claimed.

In the drawings: Figure 1 is a vertical sectional view of a lens grinding machine embodying the principles of my invention; Fig. 2 is a section on the line II—II of Fig. 1; Fig. 3 is a plan view of the carrier for the work holders; Fig. 4 is a detail view of one of the work-holding spindles; Fig. 5 is a plan view of a work-holder; Fig. 6 is a plan view of the tool-holder and its associated parts; Fig. 7 shows a slight modification of the same, and Fig. 8 shows a work-carrier adapted to the tool-holder shown in Fig. 7.

In grinding cylindrical and toric lenses, a tool having a surface corresponding to the surface to be ground is reciprocated in one direction while the lens blank, fixed on a suitable work-holder, is reciprocated at right angles to the path of movement of the tool. The lens blank should be capable of tilting freely in all directions and also yielding ver-

tically up and down so as to follow the curvature of the tool in its movement. In ordinary practice individual tools and work-holders are mounted to satisfy these conditions, but so far as I am aware the grinding of a plurality of cylindrical or toric lenses simultaneously by a single operating mechanism, has not been accomplished. I have provided a construction having a carrier frame with separate work-holding spindles which are mounted to accomplish the various functions mentioned.

1 denotes a table which constitutes a supporting frame for the various mechanisms.

2 and 3 designate shafts which rotate on vertical axes within the table, the shaft 2 being the driving shaft and having pulleys 4 which may be belted to corresponding pulleys 5 on the driven shaft 3. The shaft 2 also has a crank disk 6 on its upper end above the surface of the table 1, which serves to reciprocate the cross-head 7 guided on fixed rods 8, by means of a pitman connection 9.

10 designates a freely swinging arm fulcrumed on the crosshead and extending forwardly to support the work-holders.

The grinding tools or heads 12 are fixed in a pan 13 which has integral lugs 14 on its bottom face transversely recessed to be slidably received on a pair of fixed rods 15. The pan 13 is reciprocated on these rods in a path at right angles to the reciprocation of the work by a pitman connection 16 from a crank disk 17, fixed to the upper end of the shaft 3.

I have shown two constructions in which two and four tools, respectively, are fixed within the pan 13. These tools are of the ordinary sort for grinding cylindrical and toric lenses. The reciprocating rod or arm 10 of the work carrier has a socket 20 in which is received a stem 21 which projects rigidly from an H-shaped frame 22, the extremities of the arms of which are vertically recessed with square holes 23, to receive the work spindles. Each work spindle comprises a rod 25 with a square portion 26 adapted to be received in the square holes 23 in vertically slidable but non-rotatable relation.

27 denotes a collar which surrounds the spindle 25 and is undercut to receive the square portion thereof, and which consti-

tutes an abutment for a spring 28 which bears against an adjustable collar 29 fixed on the spindle 25.

30 designates weights which may be socketed on the upper ends of the spindles and fixed in position thereon by the thumb screws 30'.

The lower ends of the spindles are rounded into a spherical or ball shape 31 and have a transverse pin 32 which coöperates with a work-holder 33 of the ordinary sort having a transverse slot 33' and a central cavity 34. This work holder is adapted to be socketed on the lower ends of the spindles so as to have a universal or tilting action in any direction, but constrained against angular movement in a horizontal plane. The tool spindles are guided in the various cavities 23 of the work carrier and are capable of yielding and moving vertically independent of one another. Each work-holder is also capable of freely tilting in any direction independently of the other work-holders.

In use the lens grinding tools are each rigidly fixed to the pan 13 and reciprocated in one direction while the work carrier is reciprocated in another direction at right angles to the first. The curvature and character of the various tools may differ widely, but each lens blank follows the surface of the tool by a proper movement exactly the same as if each were ground by an individual carrier and pitman connection. Each lens blank is pressed on the tool by its own individual weights, and as the weights on the spindles are entirely separate from one another they may have any independent vertical movement occasioned by the varying characteristics of the tools employed.

Where only two lenses are being ground at the same time, it is possible to employ a work carrier of the form shown in Fig. 8, which consists of an arm 45 pivoted on a central support 46. In this case the work holding spindles may be fixed to the extremities of the arm, the latter having a sort of equalizing lever action which keeps both lens blanks properly pressed against their tools during the grinding action. Any number of lenses less than the full number may, however, be ground by the mechanism first described, by simply removing the lead weights 30 of the idle spindles. Under these circumstances the idle spindles are raised entirely clear of the pan 13 or any tool which may be fixed thereto by their springs

28 which are strong enough to overcome the weight of the spindles alone, although overcome and depressed whenever the weight is applied, by virtue of the preponderating pressure thereof.

What I claim, is:

1. In a lens grinding machine, a plurality of rigidly connected tools guided to reciprocate in a fixed path, a work-carrier movable across the path of movement of said tools, a plurality of work-holding spindles, and yielding means for depressing said spindles independently in said carrier.

2. In a lens grinding machine, a plurality of rigidly connected tools guided to reciprocate in a fixed path, a carrier having a plurality of arms projecting therefrom, work-holding spindles vertically depressible in the extremities of said arms, and independent means for bearing said spindles downward.

3. In a lens grinding machine, a plurality of rigidly connected tools guided to reciprocate in a fixed path, a work-carrier movable in a rectilinear path transverse to the path of said reciprocation, said work-carrier having a plurality of arms with vertical holes of non-circular transverse section, a plurality of spindles slidably guided in said holes, and means for equally and independently depressing said spindles.

4. In a lens grinding machine, a plurality of rigidly connected tools guided to reciprocate in a fixed path, a work-carrier movable in a rectilinear path transverse to the path of said reciprocation, said work-carrier having a plurality of arms with vertical holes of non-circular transverse cross section, a plurality of spindles slidably guided in said holes, springs for elevating the spindles, and weights of a force preponderating over said springs to depress the spindles when desired.

5. In a lens grinding machine, a plurality of rigidly connected tools guided to reciprocate in a fixed path, a work-carrier having a pair of equal arms pivoted thereto to constitute an equalizing lever, and work-holding spindles supported at the extremities of said arms.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

FERDINAND BUCHHOP.

Witnesses:

WAR. M. STOCKBRIDGE,
WALDO M. CHAPIN.