

No. 877,301.

PATENTED JAN. 21, 1908.

J. H. DALE.
WALL SWITCH.

APPLICATION FILED MAY 18, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

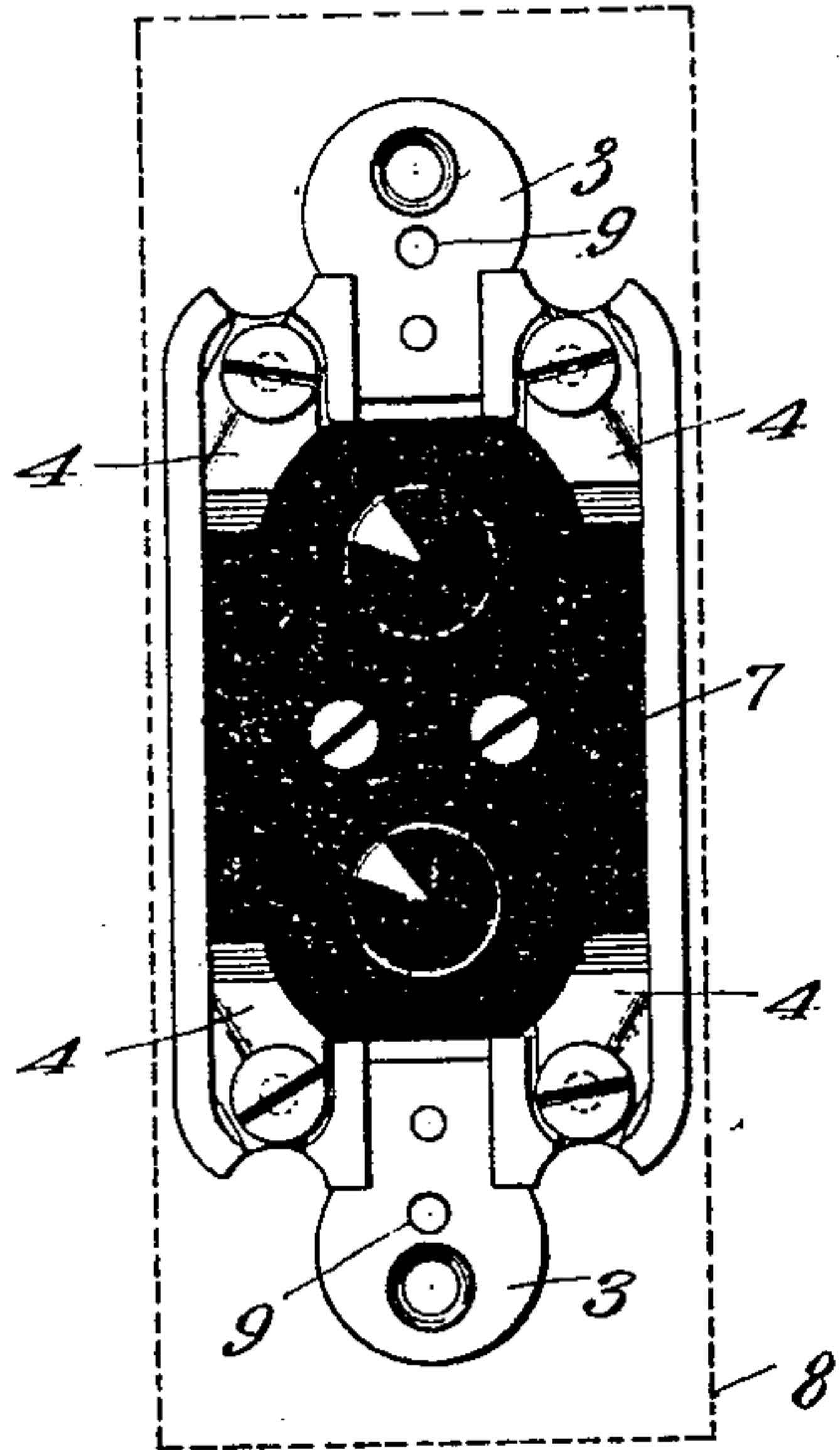


Fig. 2.

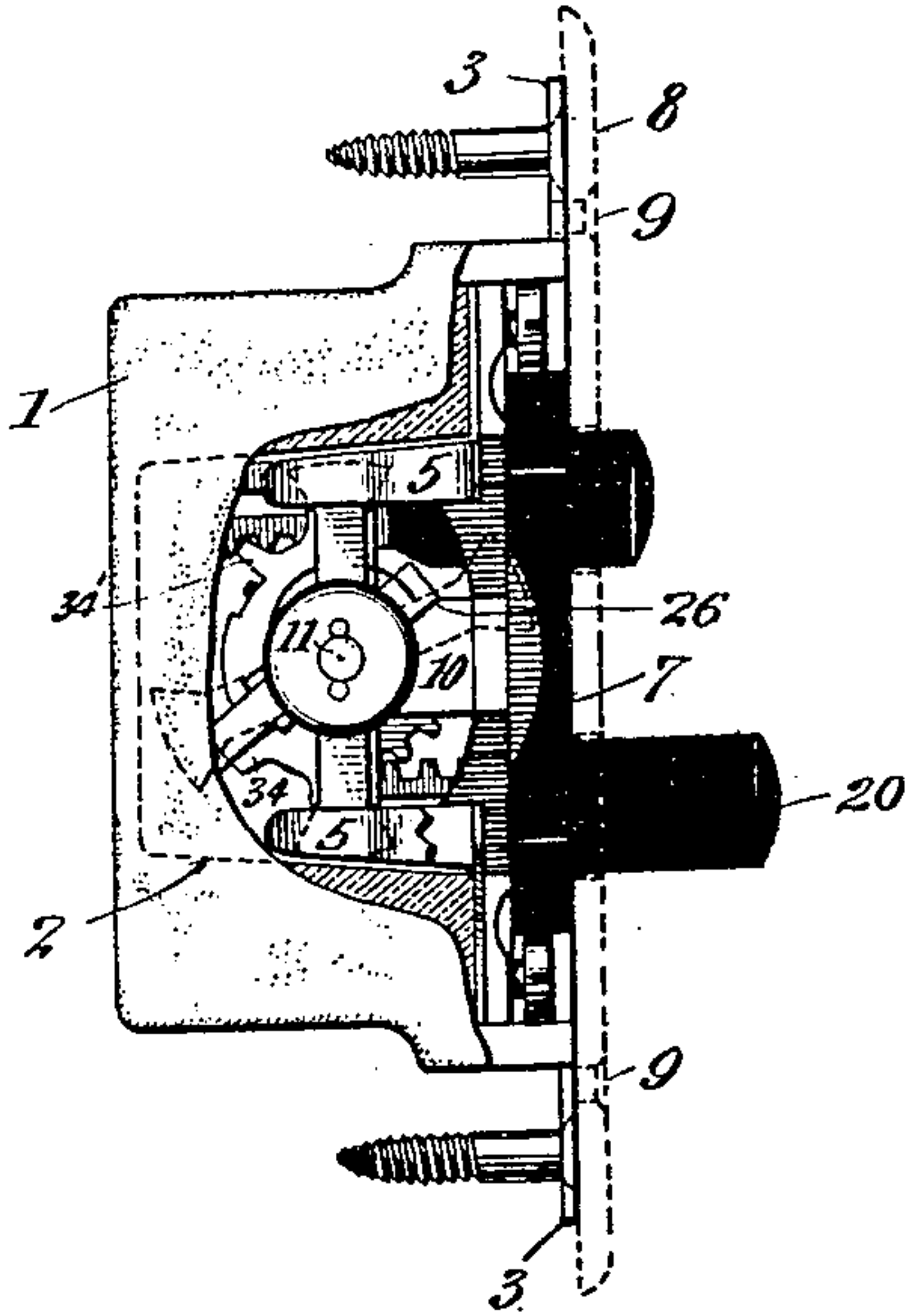


Fig. 3.

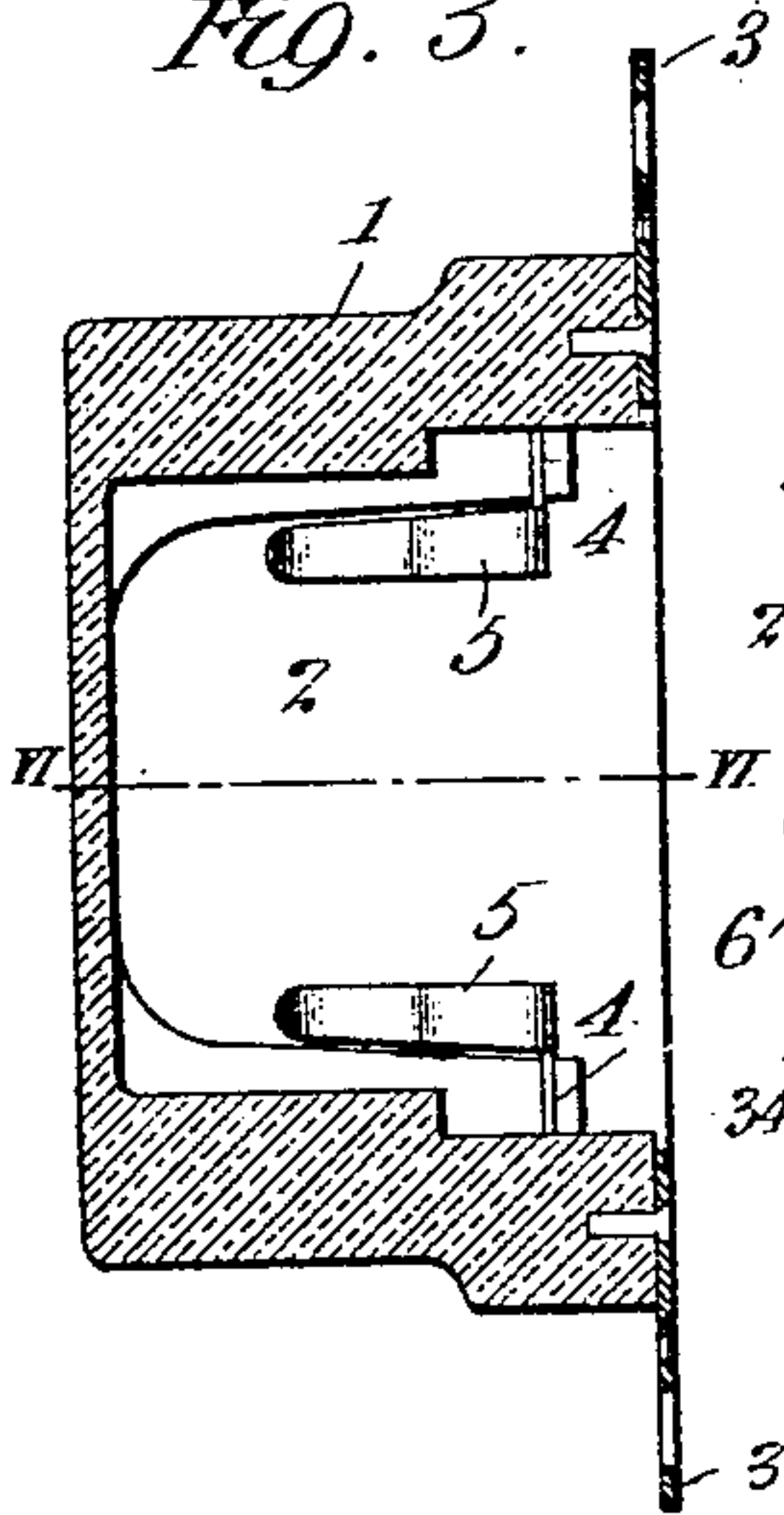


Fig. 4.

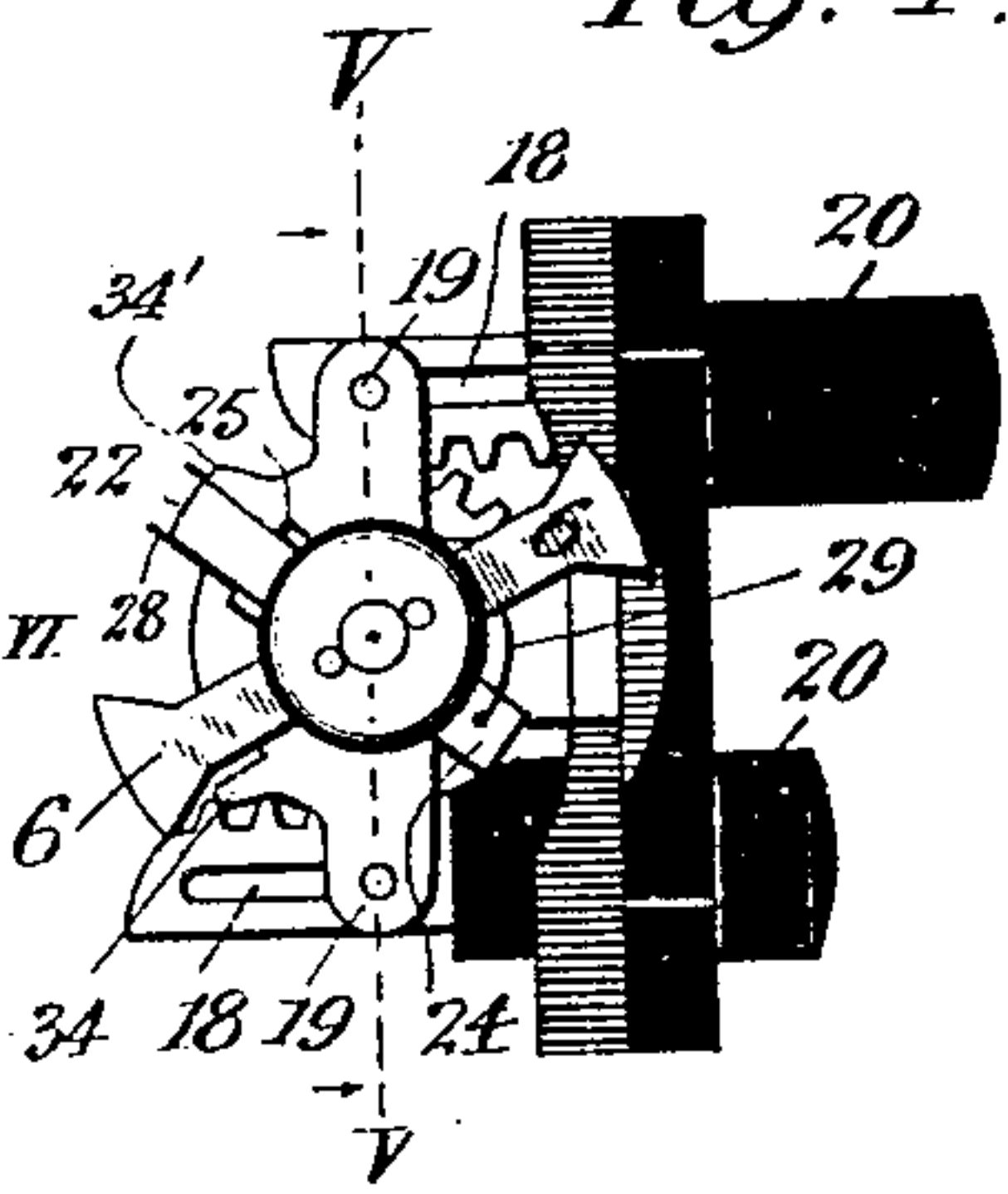


Fig. 5.

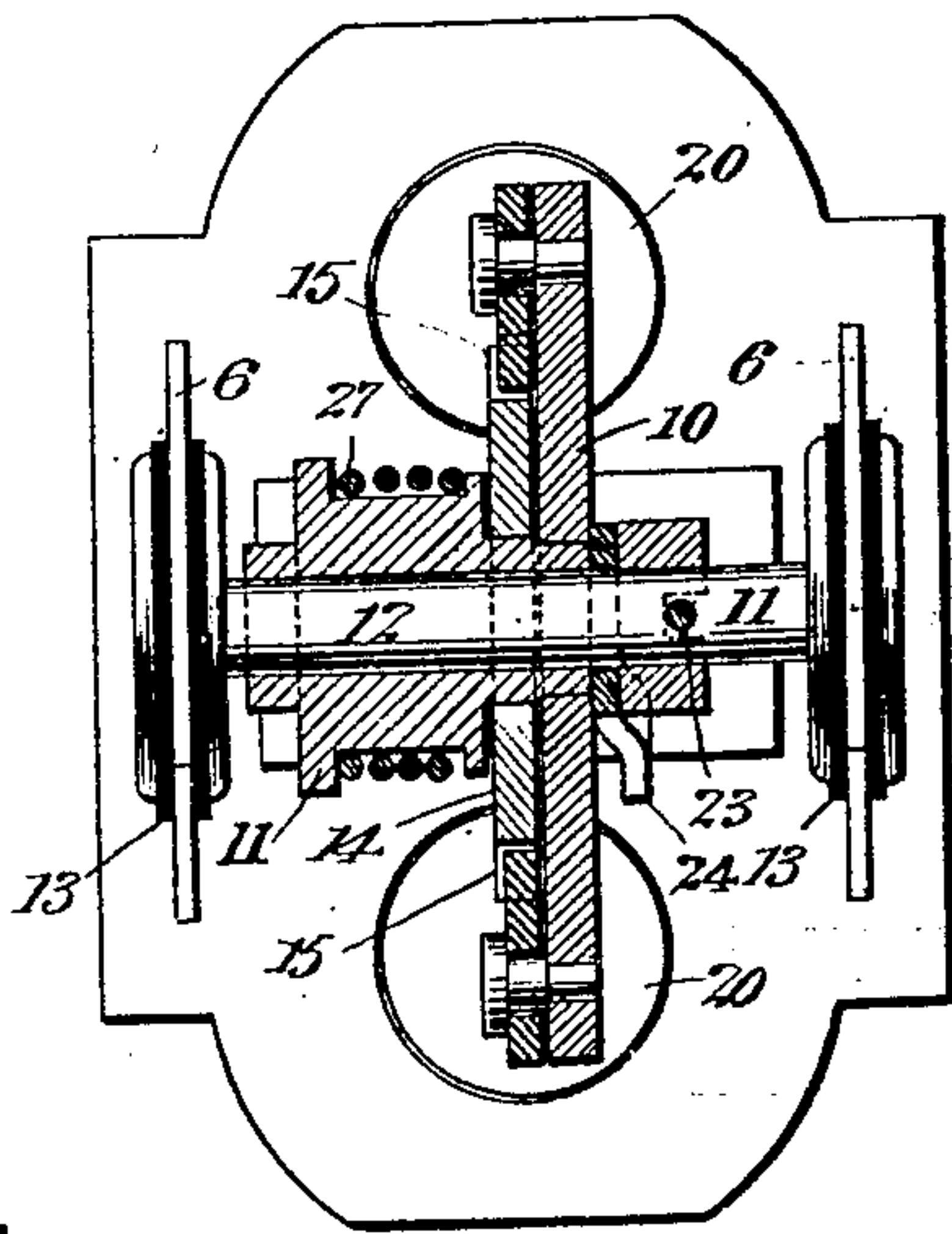
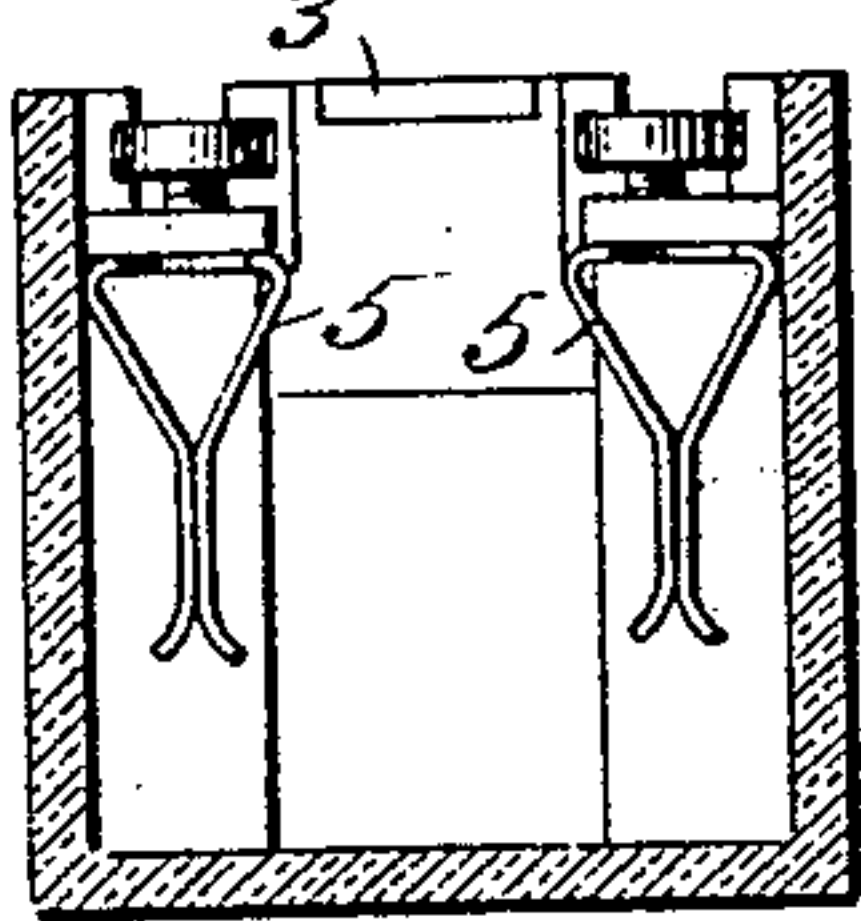


Fig. 6.



Witnesses
Thomas O. [Signature]
Waldo M. Chapin

Inventor
John H. Dale
By his Attorneys
Rosenbaum & Stockbridge

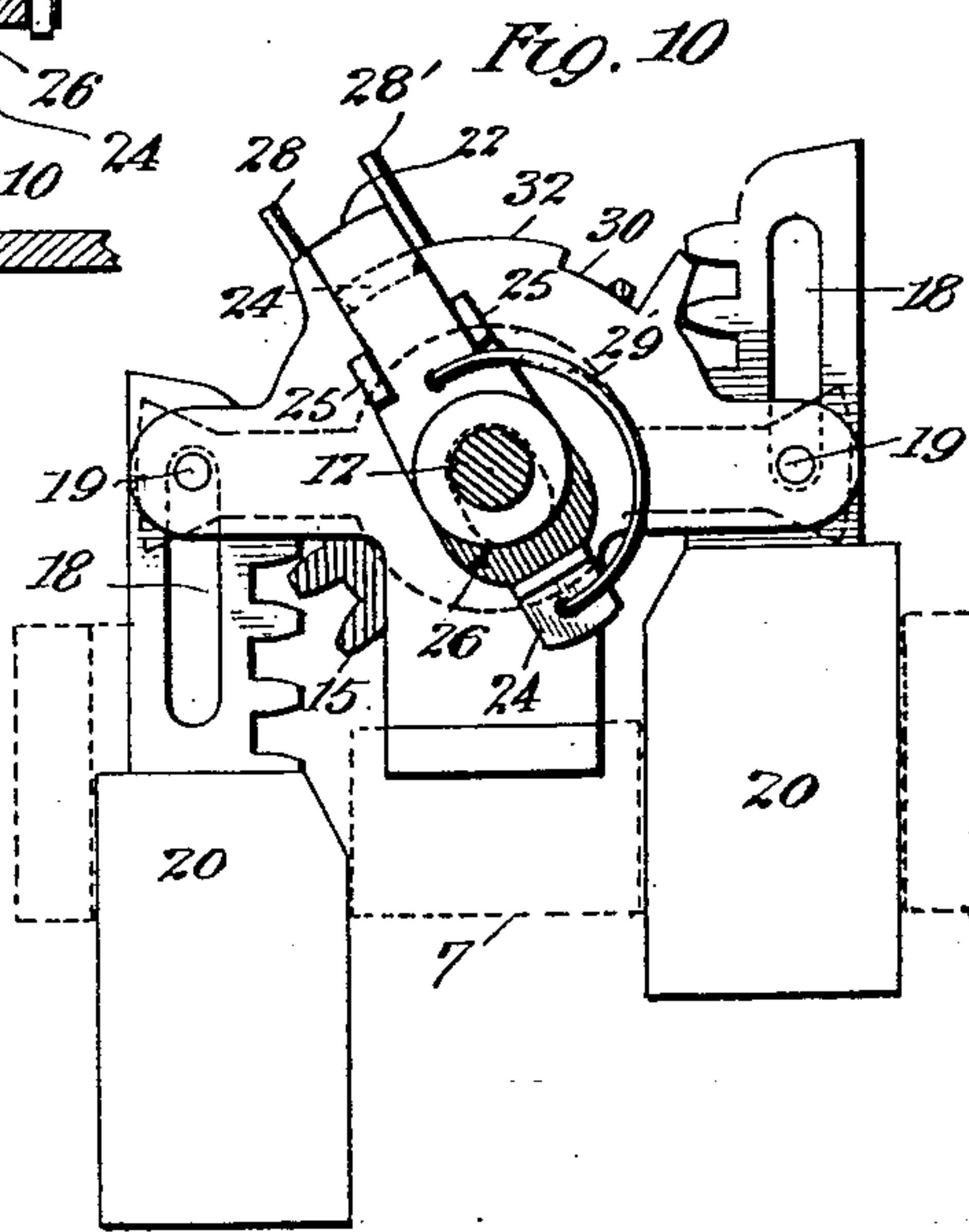
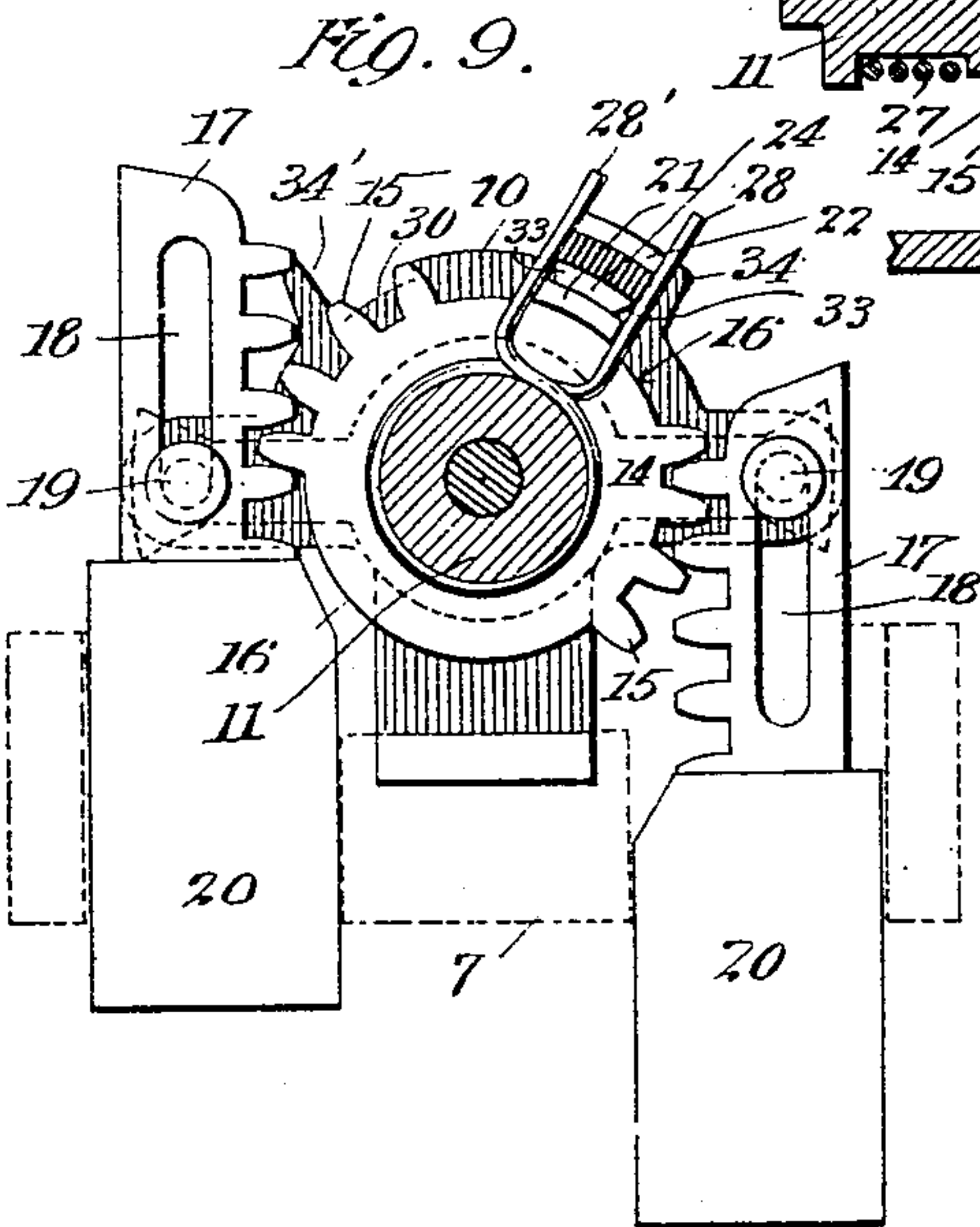
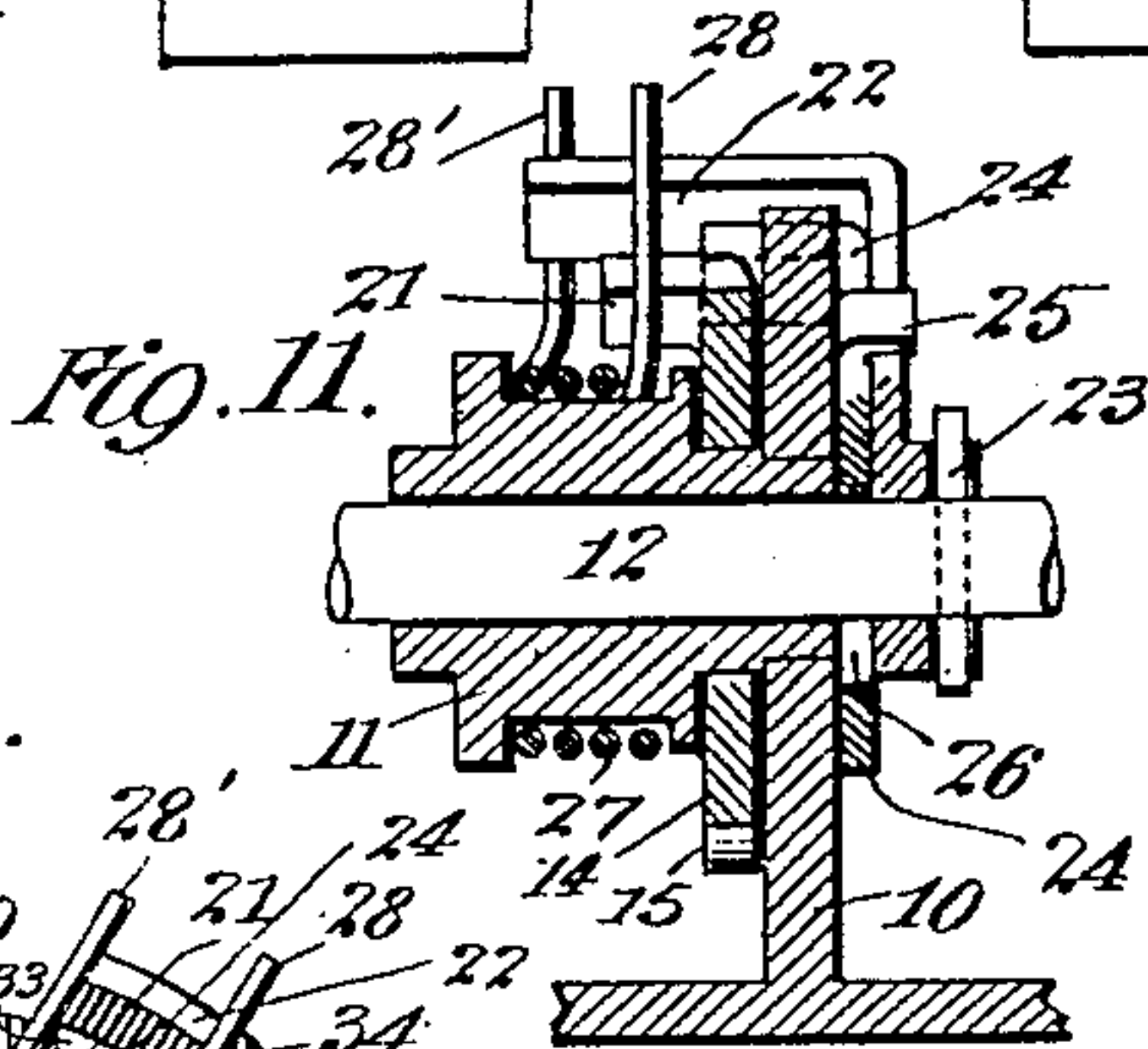
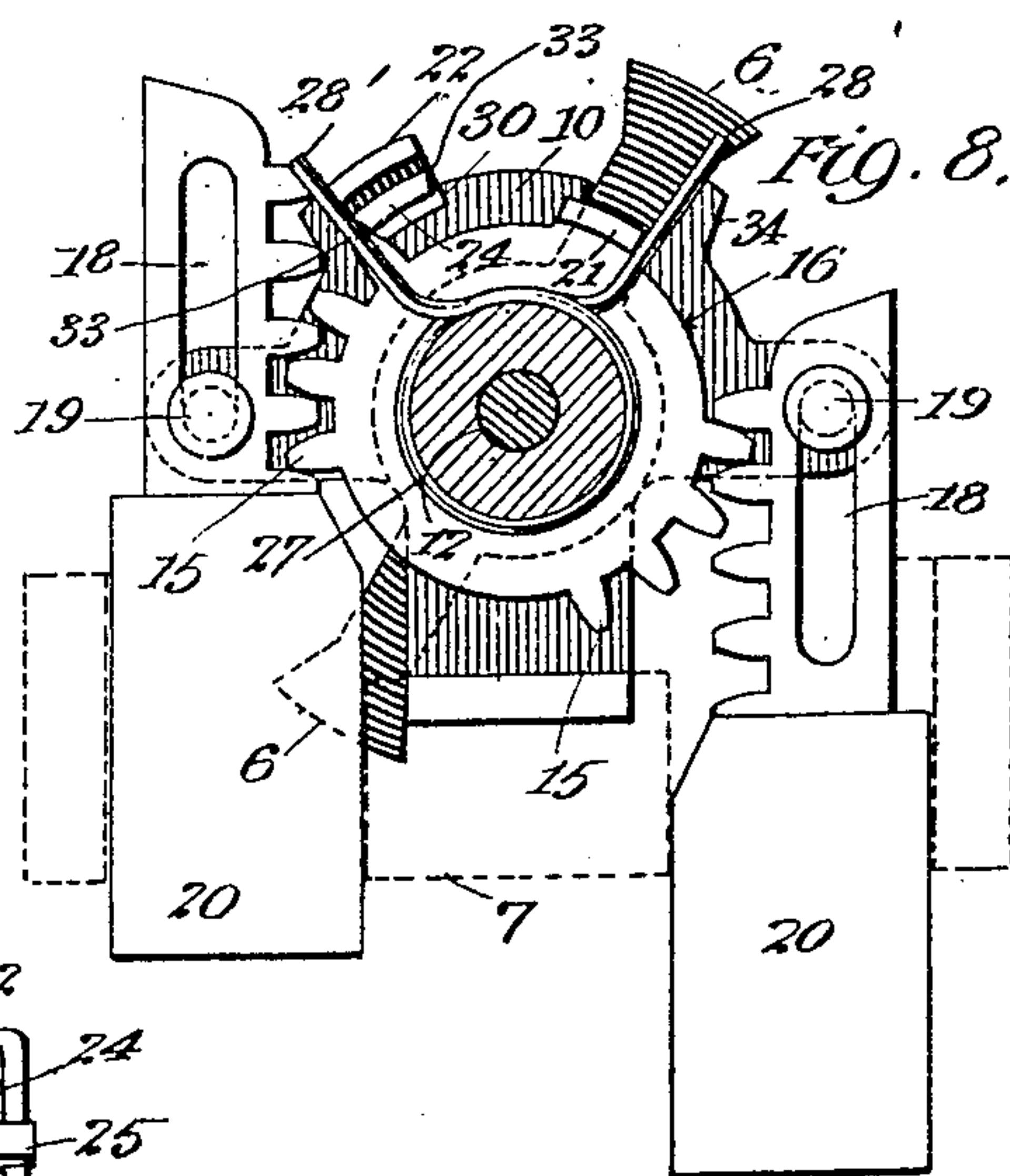
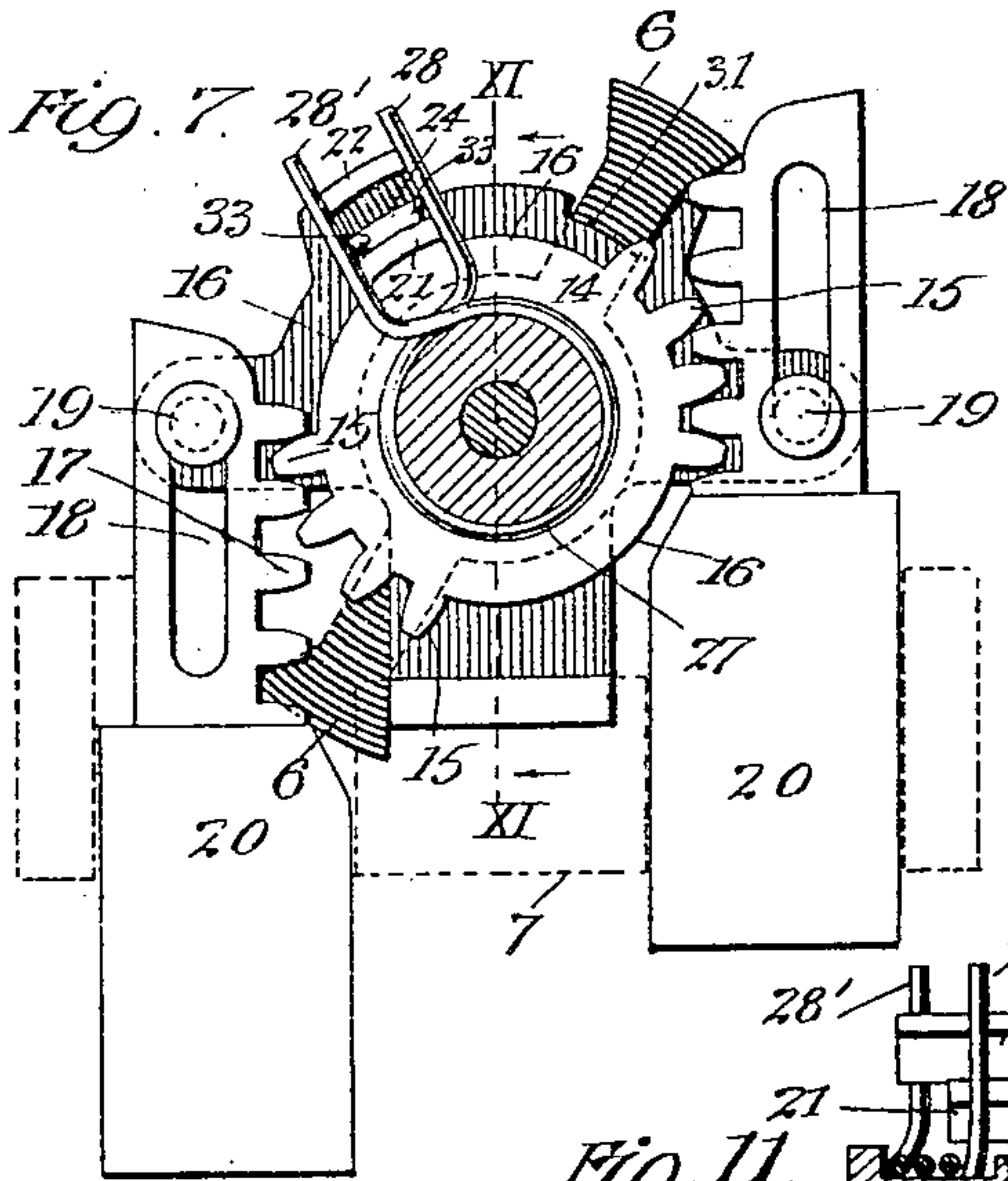
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2 SHEETS—SHEET 2.



Witnesses
Samuel Ober
Waldo M. Chapin

Inventor
John H. Dale.
By his Attorneys
Rosenbaum & Stockbridge

UNITED STATES PATENT OFFICE.

JOHN HENRY DALE, OF NEW YORK, N. Y.

WALL-SWITCH.

No. 877,301.

Specification of Letters Patent.

Patented Jan. 21, 1908.

Application filed May 18, 1906. Serial No. 317,447.

To all whom it may concern:

Be it known that I, JOHN HENRY DALE, a citizen of the United States, residing at the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Wall-Switches, of which the following is a full, clear, and exact description.

My invention relates to an electric switch, particularly of that class which is placed in the wall of a room to make or break any desired lamp or other electric circuits.

The principal object of my invention is to provide a switch of this character which has an abrupt movement in both completing and breaking the circuit, and in which the throw of the switch elements is through a comparatively wide angle.

A further object of the invention is to provide a switch having a direct action; in other words, one in which the switch element is so connected that the application of power is efficiently directed, without frictional or other losses.

A still further object of the invention is to provide a mechanical construction, which is very compact, and very strong and durable.

With these and other objects in view, the invention consists in the construction, combination, in the location and in the arrangement of parts as hereinafter set forth and shown, and finally particularly pointed out in the appended claims.

In the drawings: Figure 1 is a front view of an electric switch embodying the principles of my invention. In this view the usual front plate is removed, its position being indicated by dotted lines; Fig. 2 is a side view of the same, part of the housing being broken away; Fig. 3 is a sectional view of the box or housing; Fig. 4 is a detail view showing the switch in its open relation; Fig. 5 is an enlarged sectional view on the line V—V of Fig. 4; Fig. 6 is a sectional view through the box or housing taken on the line VI—VI of Fig. 3; Fig. 7 is an enlarged sectional view showing the operative parts of the switch in open relation; Fig. 8 is a similar view showing the relation of the parts when the switch has been partly operated to close the same; Fig. 9 shows the relation an instant later when the switch element closes; Fig. 10 is a detail side view showing certain additional parts; and Fig. 11 is a section on the line XI—XI of Fig. 7.

In order to effectually control electric cir-

cuits it is important to have the circuit rupture accomplished with a maximum degree of suddenness, in order to avoid the formation of a destructive or dangerous arc. This is particularly the case with switches which control groups or clusters of lamps, or apparatus requiring considerable current, such as are ordinarily operated by wall switches. Not only is it necessary to secure a quick rupture of the circuit, but it is also important to provide for a quick completion of the circuit as well, and to have the switch elements incapable of being manipulated by the operator so as to form an arc. This is not only to avoid damage by ignorant or careless persons, but to avoid possibility of injury by irresponsible parties who sometimes are the lighting switches for the amusement of observing the hiss and smoke which attend the formation of such an arc. In addition to all the above requisites, it is important that a very good electrical circuit be made when the switch is in closed relation, and one capable of carrying a fairly large current. In carrying out my invention I aim to secure all the above mentioned desiderata by the use of a compact, simple and easily constructed form of switch.

Referring now to the drawings in which like parts are designated by the same reference sign wherever they occur, 1 indicates a box or housing which is conveniently made of porcelain or other vitreous or insulating material, with a central cavity 2.

3 indicates ears by which the box is secured in position upon the wall where it is placed.

4 denotes metallic plates or terminals, which have the spring contacts 5 projecting therefrom. As many spring contacts 5 may be provided as are desired. In the drawing I have shown four disposed in two pairs, and forming part of separate circuits.

The movable blade or blades of the switch are designated at 6 in the drawing, and are mounted on a support which is independent of and movable from the box or housing 1.

7 indicates the main portion of this supplemental frame, which is conveniently of porcelain, formed to fit within the open part of the box or housing 1, and to be secured therein in any suitable way, as, for example, by the engagement of a cover plate, indicated in the drawings at 8 in dotted lines. The cover plate may be screwed to the ears 3 by small screws, at the points 9.

Fastened to and forming a fixed part of the

supplemental frame 7 is a plate extension 10, which has an extension or bushing 11 rigidly fastened thereto. The bushing 11 forms a bearing for the shaft or spindle 12, which constitutes the support of the switch blades or elements proper (see particularly Fig. 5). In practice the switch blade or blades 6 are insulated from the shaft or spindle 12, by any well known form of insulating collars 13.

Upon the outside of the bushing or journal 11 is loosely mounted a mutilated gear 14, which has a number of spur teeth 15 at diametrically opposite points, and separated by plain or untoothed portions 16.

17 denote racks having teeth to engage the teeth 15, and having slotted portions 18, guided by studs 19, which are fixed to the plate 10 of the frame.

20 denote buttons fixedly attached to the racks 17 and projecting outward through holes in the supplemental frame 7, as clearly shown in Figs. 1 and 2. By this arrangement the gear 14 is turned through a considerable angle when the buttons 20 are manipulated. This turning movement is not only secured through a comparatively wide angle, but is obtained with great directness, on account of the rack and gear engagement which always transmits the longitudinal into rotary movement with a maximum efficiency, in other words, the direction of the power is always normal to the movement produced, which is the most advantageous relation from a mechanical standpoint. A further feature of this engagement will be noted in connection with the support furnished by the studs 19. These are in a position to directly resist any displacement stresses exerted upon the racks by the driving engagement.

By the above means the longitudinal movement of the buttons 20 is translated into a turning movement of the gear 14, and I provide means by which the movement of this gear is effective to operate the switch blade or blades. For this purpose the gear 14 has a laterally projecting arm 21, which extends over the bushing or journal 11, as shown in Fig. 11. 22 designates a similar projecting arm which is keyed or rigidly fastened to the shaft 12, by a pin 23, or other means. The arm 22 has a sliding detent 24, guided to have a radial movement. In the practical construction which I employ, the detent 24 has ears 25, embracing the arm 22, and this detent is slotted at 26, so as to be capable of a radial movement upon the shaft or spindle 12. In a normal relation of the switch the arms 21 and 22 and the detent 24 lie in radial alinement with one another, as shown, for example, in Fig. 7.

27 indicates a spring which is coiled around the bushing or journal 11, and has two extremities 28 and 28', which project in a substantially radial direction so as to embrace

all of the parts 21, 24 and 22. The spring tension of the extremities 28, 28', is such that they are strongly impelled toward one another.

In addition to the features of construction above enumerated, I arrange to have the detent 24 specially controlled in its movement. This is secured in practice by means of a spring 29, which is connected to the detent and to the arm 22, so as to normally draw the detent radially inward. The plate 10, which forms part of the frame, as above described, is notched at points 30 and 31, and the detent 24 is impelled into these notched portions by the spring 29 whenever the detent is in alinement therewith. The intermediate portion 32 of the plate is rounded and concentric with the central axes, and does not impede angular motion of the detent thereover. An additional feature of the detent consists in the cam or inclined walls 33, which are in the path of the gear teeth 15. The inclination is such that when the gear teeth impinge against the cam inclines 33, that the detent 24 is impelled radially outward in opposition to its spring 29.

The operation is as follows: Supposing the parts to be in the relation shown in Fig. 7, which represents a normal condition of the switch in its open relation. Pressure applied to the left-hand button 20 will be transmitted through the corresponding rack 17, so that the mutilated gear 14 is rotated in a right-handed direction. The arm 21, forming part of the gear 14, of, course, shares this movement, and has the effect of swinging the spring extremity 28 to the right until the parts are in the relation shown in Fig. 8. During this motion the detent 24 remains within the notch 30 of the fixed plate 10, so that the detent and its connected arm 22 do not move with the mutilated gear, but remain in their original position. The spring extremity 28' is thereby constrained against movement and is stretched apart from the other spring extremity, so that the spring is considerably tensioned.

As the mutilated gear 14 approaches the completion of its movement, however, one of the teeth 15 strikes against the inclined surface 33 of the detent and moves the same radially outward, as above stated. As the detent moves outward it is released from the notch 30, so that the arm 22 is free to move to the right with its connected switch blade or blades under the impulse of the spring extremity 28'. The arm accordingly follows the motion of the mutilated gear by an exceedingly abrupt movement under the impelling force of the spring 27. The movement is limited by a lug 34 on the fixed plate 10, which works both of the arms 21 and 22. 34' indicates a similar arm on the opposite side of the plate to limit the reverse movement.

As soon as the arms 21 and 22 have arrived at the limit of their movement and rest against the stop 34, which constitutes the proper closed relation of the switch blade, the detent 24 falls into the adjacent notch 31 under the impulse of its spring 29. The reverse movement of the parts takes place in exactly the same way as the movement above described. It is evident that the mutilated gear will be first rotated to the left, and finally its teeth will strike the detent 24, so as to release the same, and allow the switch arm to follow the mutilated gear by an abrupt movement.

Not only is the application of power to the mutilated gear direct and positive, but the spring action upon the switch blade is also direct and efficient on account of the nature of the spring used. The arrangement of a spring 27 of steel wire coiled around the bushing 11, gives a very high degree of resiliency in the extremities 28 and 28', and which resiliency is in a direction identical with the movement produced in the switch element at all times. I regard this as an important feature, since it insures proper movement of the switch blade notwithstanding any ordinary amount of friction which may be exerted by the close rubbing contacts of the blade with the terminals 5. In practice the terminals 5 are made of fairly stiff sheet metal spring blades between which the switch elements 6 pass in one direction or the other as required.

What I claim, is:—

1. In an electric switch, a gear having teeth at diametrically opposite points separated by plain or untoothed portions, means for angularly moving the same, a switch blade, means carrying said blade and having a detent in the path of said teeth, fixed means normally engaging said detent, and spring connections between said gear and switch blade.

2. In an electric switch, a pair of buttons having racks attached thereto, a mutilated gear in engagement with said racks, a switch blade co-axial with said gear, means for impelling said switch blade to have an abrupt movement, and means acted upon by the teeth of said gear for releasing said switch blade after a predetermined angular movement of the gear.

3. In an electric switch, a switch element having an arm movable therewith, a detent having ears to engage said arm and slidable radially thereon, said detent having inclined or cam surfaces, a gear having an arm, spring connections between said arms, said gear being arranged to impinge against said inclined surfaces and release the detent.

4. In an electric switch, a frame having a plate extension projecting therefrom, said plate extension having a pair of notches therein, a spindle carried by and rotatable within said plate extension, switch blades carried by said spindle, means for impelling said spindle rotatably, and means normally resting in the notches of said plate extension arranged to resist movement of the spindle.

5. In an electric switch, a frame having a plate extension rigidly projecting therefrom, said plate extension having a pair of notches therein, a spindle carried by and rotatable within said plate extension, a spring for impelling said spindle in direction of rotation, means normally resting in said notches for restraining movement of the spindle, and a part movable to release the spindle after a predetermined movement of said part.

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

JOHN HENRY DALE.

Witnesses:

F. A. HOPTON,
E. E. BAYNON