

No. 763,189.

PATENTED JUNE 21, 1904.

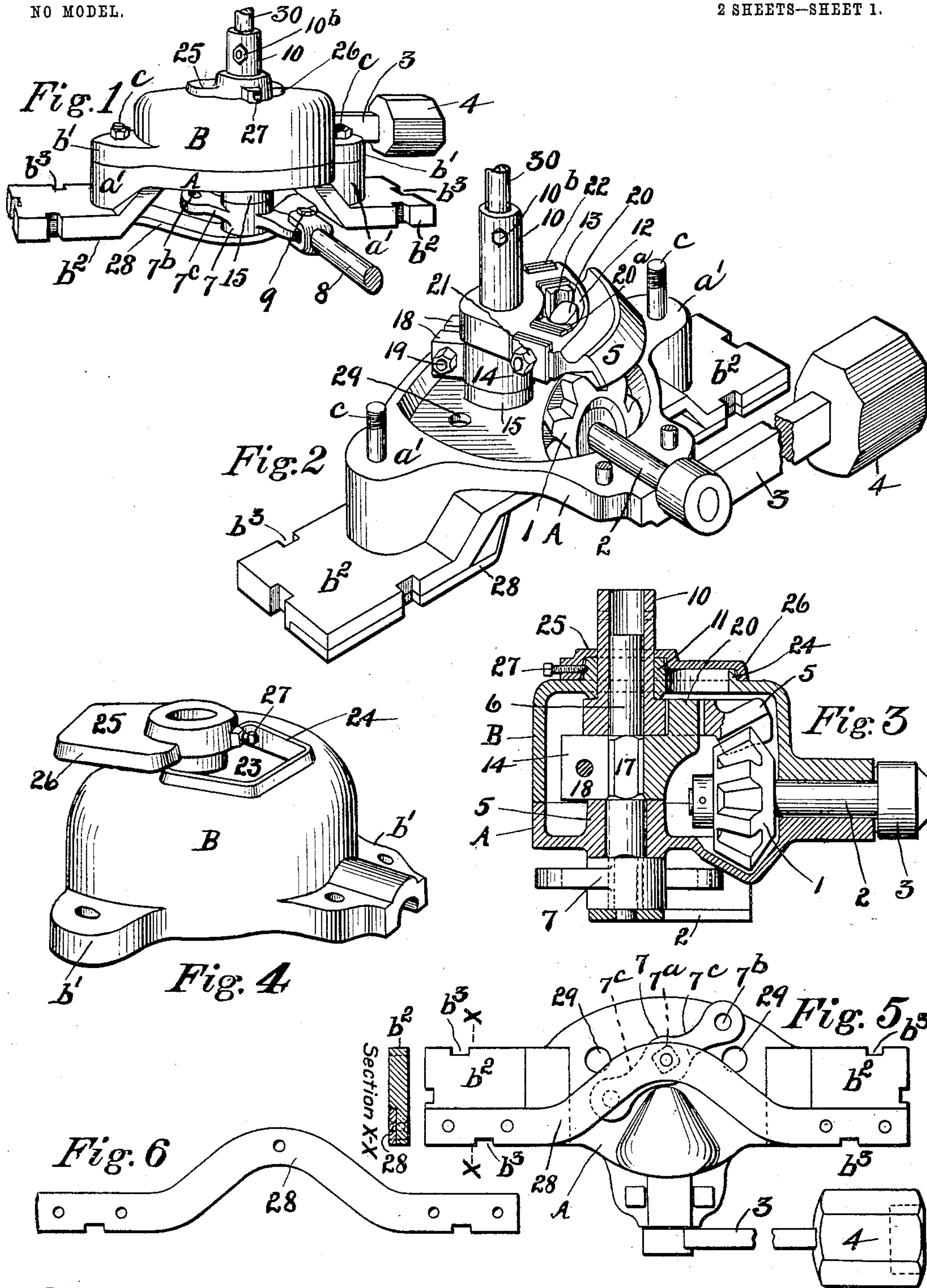
M. W. LONG & J. M. HOFFER.

SWITCH STAND.

APPLICATION FILED MAR. 11, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

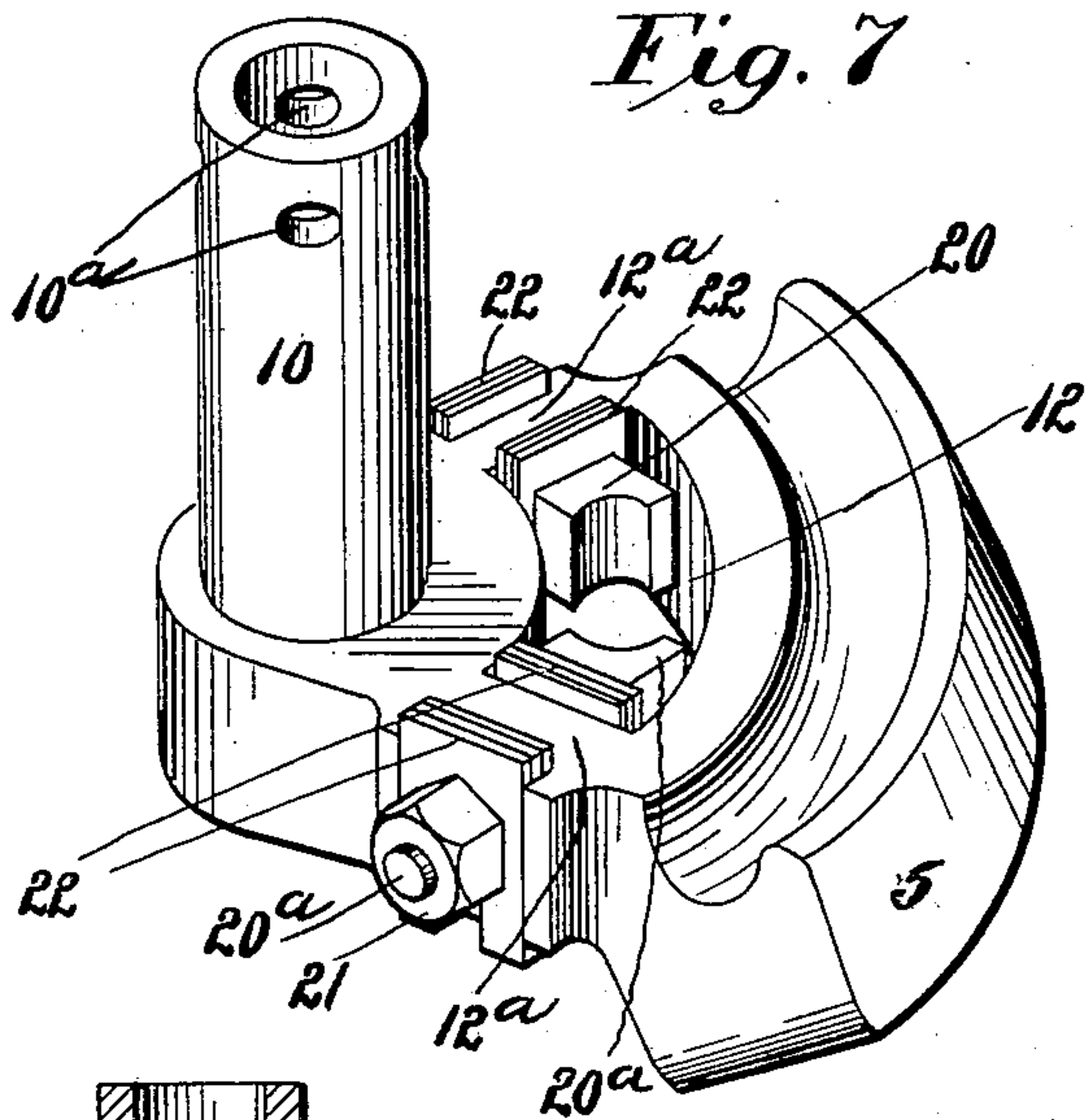


Fig. 7

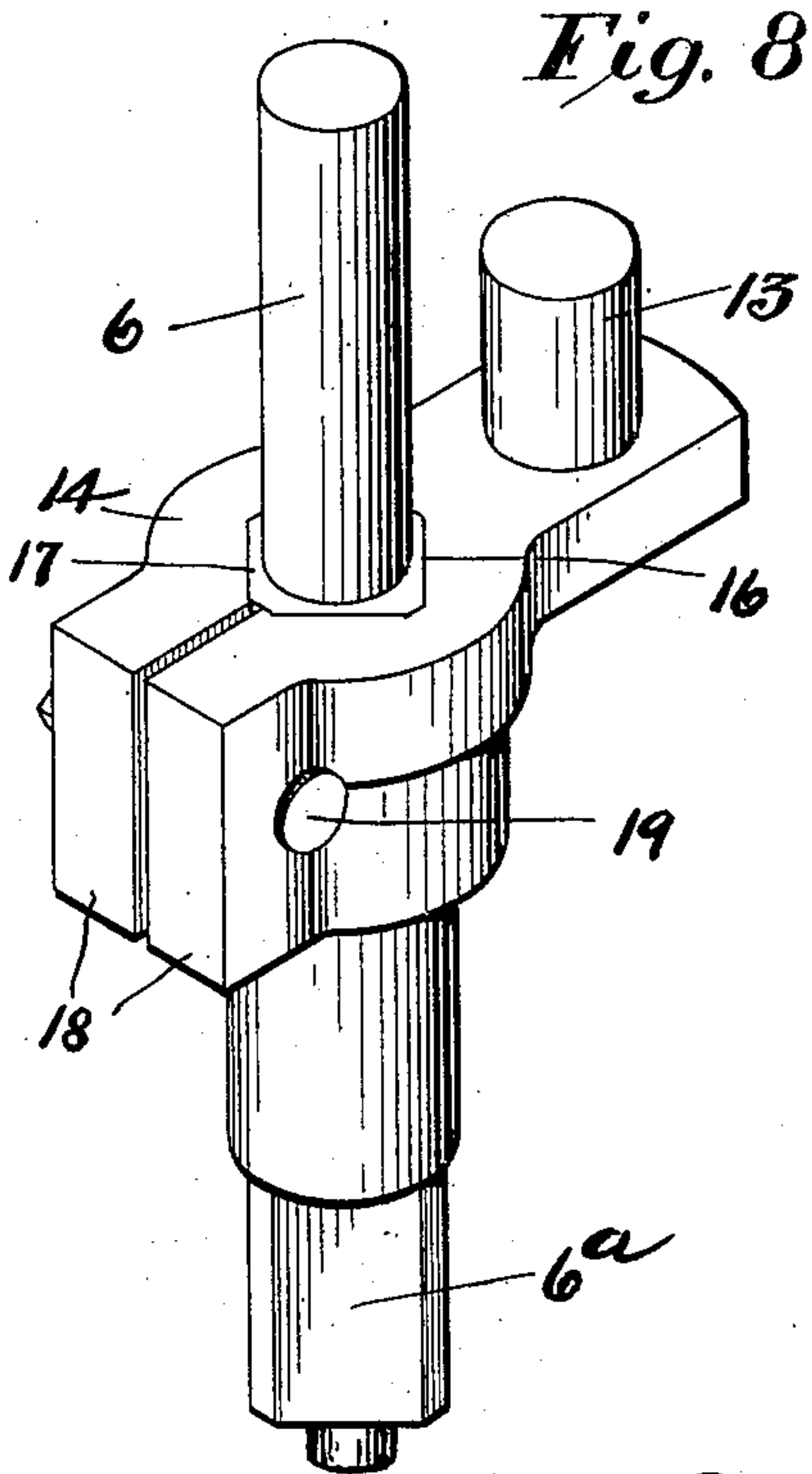


Fig. 8

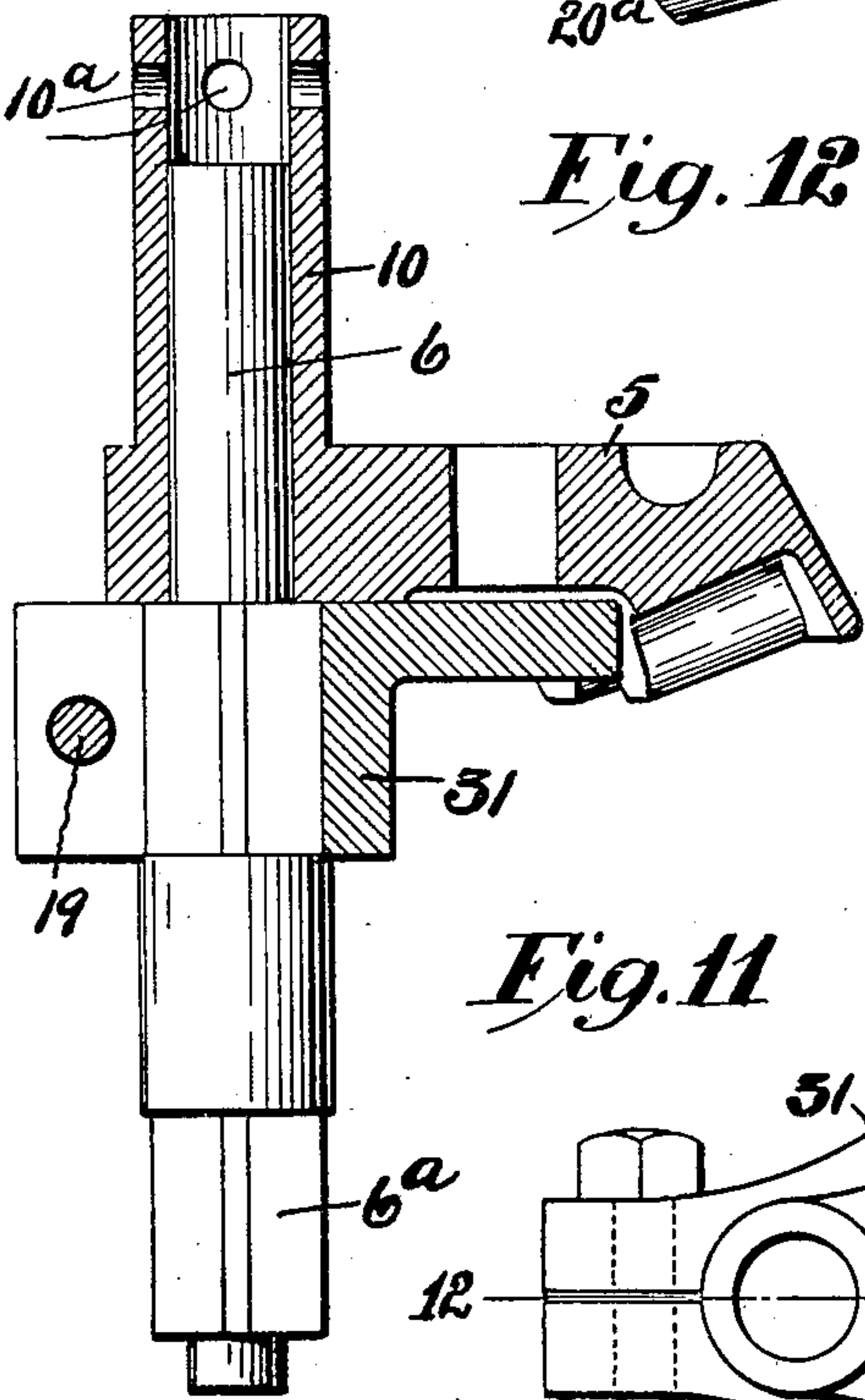


Fig. 12

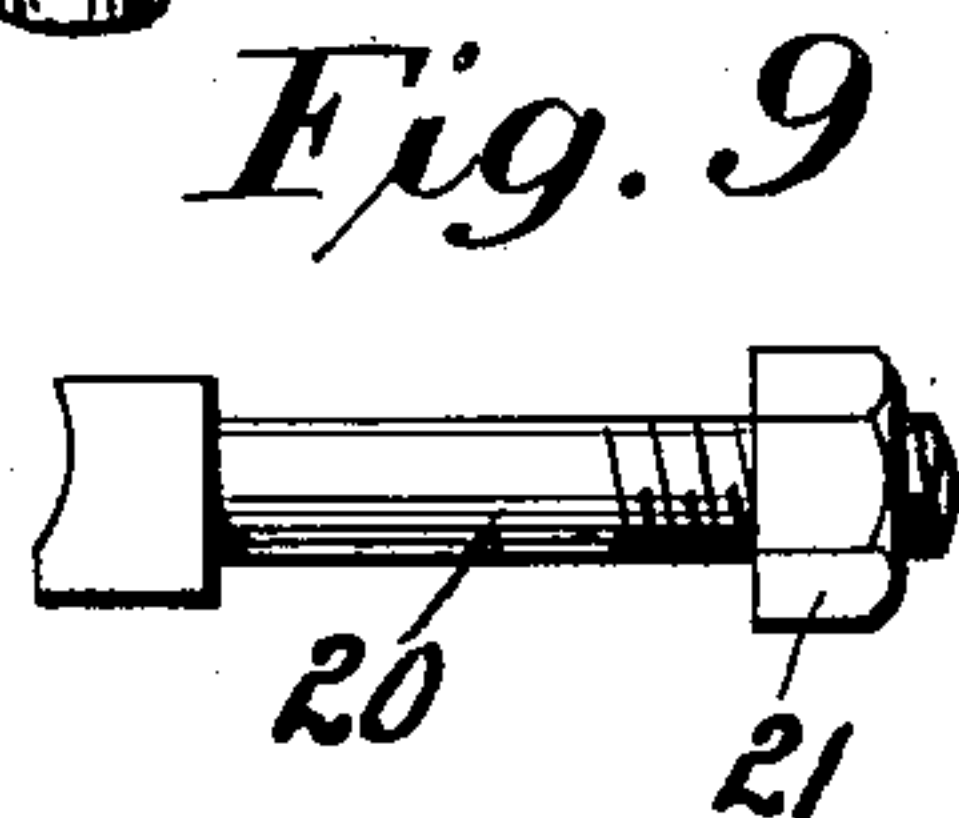
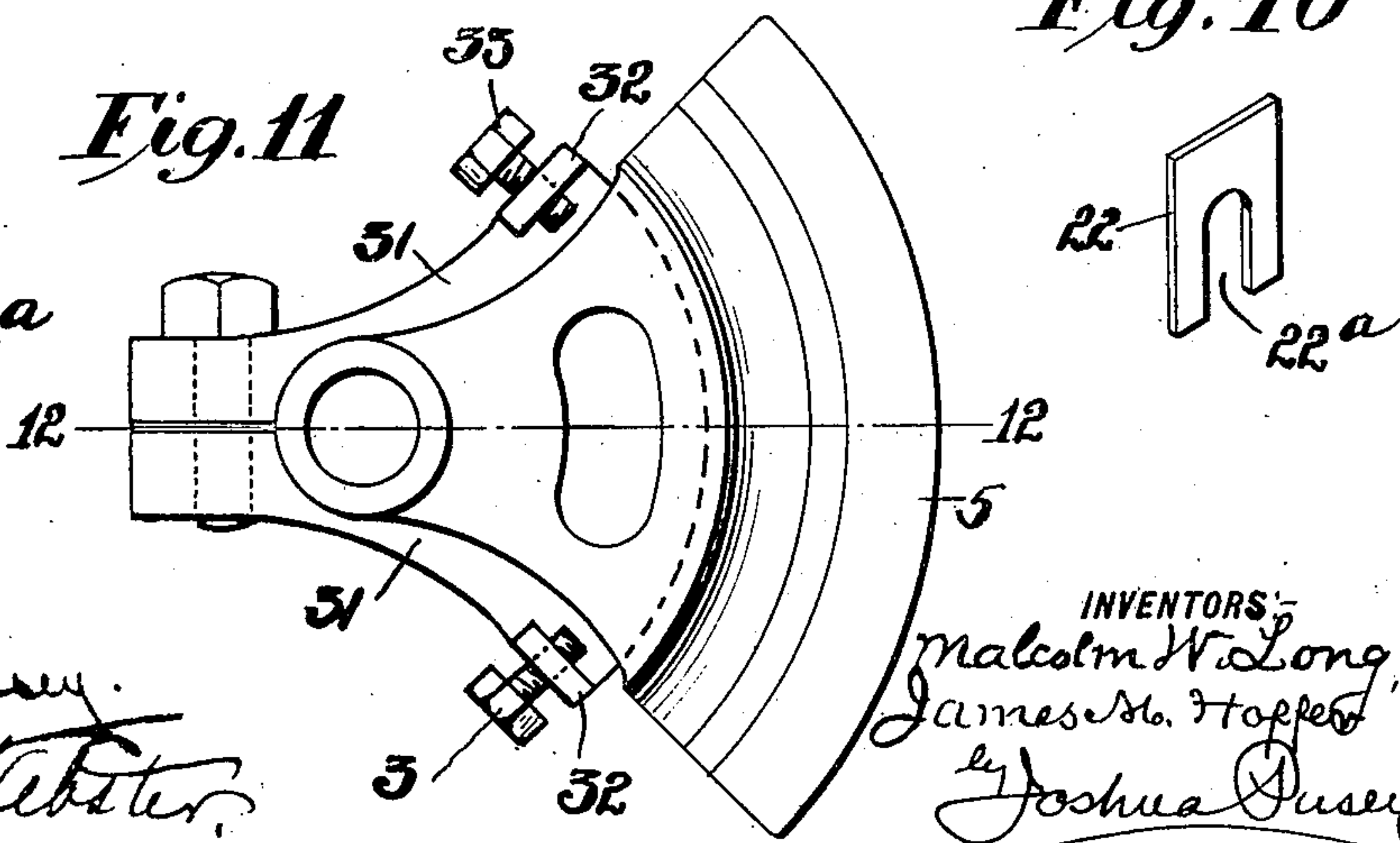


Fig. 9

Fig. 10

Fig. 11



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# UNITED STATES PATENT OFFICE.

MALCOLM W. LONG, OF HARRISBURG, AND JAMES M. HOFFER, OF STEELTON, PENNSYLVANIA, ASSIGNORS TO THE PENNSYLVANIA STEEL COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## SWITCH-STAND.

SPECIFICATION forming part of Letters Patent No. 763,189, dated June 21, 1904.

Application filed March 11, 1904. Serial No. 197,657. (No model.)

*To all whom it may concern:*

Be it known that we, MALCOLM W. LONG, residing at Harrisburg, and JAMES M. HOFFER, residing at Steelton, in the county of Dauphin, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Switch-Stands, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

Figure 1 is a perspective of the switch-stand, the parts being in the position when the switch is closed, the view being taken looking from the switch. Fig. 2 is a perspective of the stand looking toward the switch, the upper part or cover of the casing having been removed and the parts being in position occupied by them when the switch has been thrown open. Fig. 3 is a vertical section through the switch-stand on the plane of the shafts thereof, the parts being in the positions shown in Fig. 2. Fig. 4 is a perspective of the upper portion of the casing of the stand detached. Fig. 5 is a plan view of Fig. 1 inverted. Fig. 6 is a plan view of the bearing-plate for the crank-shaft detached. Fig. 7 is a perspective of the segment-gear and adjuncts detached. Fig. 8 is a perspective of the crank-shaft with arm and stud. Fig. 9 is a plan of one of the adjusting-bolts detached. Fig. 10 is a perspective of one of the adjusting-liners detached. Fig. 11 is a plan view of the segment-gear with a modified means for securing the lost motion between said gear and the crank-shaft. Fig. 12 is a section on line 12 12, Fig. 11.

This invention relates more particularly to that kind of railroad-switch stands in which the switch may be opened or closed by hand or opened by the passage of a locomotive or train trailing through the switch; and more especially the invention relates to improvements in a certain type of switch-stand that has been and now is in large use upon railroads of the United States, known as the "New Century switch-stand."

A leading feature of the invention comprises

means for effecting a certain lost motion between parts of the stand, whereby the usual segment-gear engaging the pinion upon the shaft, which carries the weighted lever for throwing the switch by hand, will be caused to move a predetermined distance when said lever is operated before actuating the crank-shaft with which the switch is connected, whereby certain advantages result, as hereinafter described.

Another leading feature of the invention comprises means for varying the amount of said lost motion as may be required.

Other features of the invention relate to minor details that are designed to improve the construction and operation of switch-stands of the kind referred to, which features will be hereinafter particularly pointed out.

Referring to the drawings, in which similar or corresponding parts where they occur are denoted with similar reference-marks, the frame of the stand consists of two parts or castings—A the base and B the top or cover—these being secured together by bolts *c* passing through lugs *a'* of the base and *b'* of the cover, and when these two parts are together they form a casing that incloses the gears against the admission, practically, of dirt, snow, &c. The base is provided with downwardly and laterally extending feet *b''*, that are adapted to rest upon the ties to which the stand is secured by spikes entered into slots *b'''* of the feet.

1 is a pinion fixed upon a horizontal shaft 2, that is journaled in the casing. Upon the end of this shaft extending beyond the latter is a lever 3, having a weight 4 at its free end.

5 is a segment-gear whose teeth engage those of pinion 1, which gear is connected to a vertical shaft 6, having a crank 7 at its lower end, to which a rod 8, Fig. 1, that is connected to the railroad-switch, is coupled by a bolt 9.

The foregoing describes in a general way the construction of the switch-stand to which our present improvements relate.

In carrying out these improvements instead



of mounting the segment-gear 5 fixedly upon the shaft 6 (which shaft in the prior construction carries the usual "target") we mount the said gear in a suitable bearing, so that it (the gear) is capable of rotation independently of the said shaft. In the present instance the hub of the gear is provided with an elongated tubular extension or sleeve 10, that fits loosely upon the upper part of the crank-shaft, which latter extends up through the said sleeve projecting through a boss 11, Fig. 3, of the cover-casting B. We provide said segment-gear with a slot 12, Figs. 2 and 7, into which extends a stud 13 of considerably less diameter than the length of said slot in line with the length thereof, which stud projects from an arm 14, which is fixed to the crank-shaft. When the parts of the stand are assembled, the under side of the hub of said arm rests upon a boss 15 of the base A of the casing, Figs. 2 and 3, and the hub of the segment-gear rests upon the hub of said arm.

Preferably the arm 14 is made separate from the crank-shaft, and the opening in the hub portion of the arm is squared, as seen at 16, Fig. 8, and adapted to fit over correspondingly-squared faces 17, Figs. 3 and 8, of the shaft. The hub of the arm is also made with separated extensions 18, through which passes a bolt or screw 19, whereby the arm is clamped to the shaft.

It will be obvious that there will be lost motion between the segment-gear and the crank-shaft if reciprocating rotary movement be given to the former, as by throwing the lever 3 by hand from one side to the other and back again, the extent of such lost motion depending upon the length of the slot 12 with relation to the said diameter of the stud.

It is desirable for reasons hereinafter appearing that the amount of this lost motion may be varied. This we do in the preferable way by providing means for varying the effective length of said slot as distinguished from varying the said diameter of the stud. One means for doing this which we have devised is as follows: Passing through the end walls 12<sup>a</sup>, respectively, of the slot 12 and projecting into the latter are bolts 20 20<sup>a</sup>, having, preferably, an adjusting-nut 21 on their outer ends and having enlarged heads on their inner ends, as seen in Figs. 2 and 7. For ordinary adjustments of said bolts—that is, of the extent of protrusion of these heads into the slot 12—we employ similar liners 22, one of which is shown detached in Fig. 10, having a slot 22<sup>a</sup>, Fig. 10, to allow the liner to be slid vertically over and upon a bolt. By drawing off one or more of these liners from one side of the wall of the slot and transferring the same to the opposite side the bolts may be readily adjusted as required—i. e., either to lengthen or shorten the slot, or more precisely the distance between the heads of the two bolts. In doing this the nuts 21 would be loosened,

if necessary, and tightened up to clamp the liners when the transfer has been effected.

In order to afford ready access to the described bolt-adjusting devices, we make in the top of the cover B of the casing above the path of movement of the segment-gear an opening 23, Fig. 4, around the edge of which in the present instance is a flange 24. This opening is kept normally closed by means of a cover-plate 25, having a flange 26, that is adapted to fit over the flange 24. This plate is rotatably mounted at one side upon the aforesaid boss 11 of the casing and is held against vertical displacement by a set-screw 27. By releasing the latter and lifting the plate so as to disengage its flange from the flange 24 it (the plate) may be swung around to expose the opening 23.

The lower end of the crank-shaft 6, reduced as seen in Figs. 3, 8, and 12, has a bearing in a plate 28, preferably of steel or wrought-iron and bowed, as clearly seen in Figs. 5 and 6. This plate extends between the feet *b*<sup>2</sup> of the casing, and its ends are let into the former so as to be flush with the under side thereof and is riveted to the feet. The object of having the said plate separate from the cast-metal base B is to save expense, and the purpose of making the same of steel or wrought-iron and bow-shaped is to obtain combined lightness and strength.

Although the crank on the end of shaft 6 may sometimes be a single crank and integral with the shaft, we preferably make the crank detachable and double, as shown, so that either limb of the crank may be used, as may be required, the hub of the crank being provided with a squared opening 7<sup>a</sup>, as shown in Fig. 5, adapted to fit upon a correspondingly-squared section 6<sup>a</sup>, Figs. 8 and 12, of said shaft near the lower end thereof. When this crank is in place, it lies between the top of plate 28 and the under side of the base A of the casing, as seen in Figs. 1, 3, and 5. We also prefer to make a part of the crank between its hub and the hole 7<sup>b</sup> for the coupling-bolt 9 of the switch-connecting rod of such reduced size, as at 7<sup>c</sup>—that is, of such relative weakness—that in case an extraordinary strain or thrust should come upon the crank it will give way on the line of said reduced portion, and thus prevent the possible breakage of the switch-point or the fracture or disabling of some part of the stand more expensive or not so readily replaceable as the crank. We also make through the base of the casting openings 29, Fig. 5, located to register with the holes 7<sup>b</sup> in the crank for the coupling-bolt 9 when the crank is turned to a certain position. This bolt 9 is passed through one of said openings 29 to couple the switch-connecting rod to the crank, and the space between the top of the crank and the under side of the base A being less than the length of said bolt 9 the latter cannot be withdrawn to



uncouple rod 8 when the stand is in place for use except by bringing the parts into an abnormal position. In this way accidental uncoupling or successful tampering with the coupling by idle boys or men is obviated.

Having described the construction of our invention, we proceed to explain the mode of operation thereof, as follows: Premising that the switch being closed, the parts occupy the position seen in Figs. 1 and 5, at which time the head of bolt 20 (not shown in said figures) will be in contact with or close to the stud 13. To throw the switch open by hand, the switchman raises the lever 3 and throws it over to the opposite side—that is, from the position of Figs. 1 and 5 to that of Fig. 2. The movement of the lever causes the rotation of the segment-gear 5; but the crank-shaft does not move until said gear moves a sufficient distance for the head of bolt 20<sup>a</sup> to engage the stud 13, whereupon said shaft partakes of the motion of the gear for the remainder of the throw of the lever. The switchman instead of, as in prior switch-stands, having to begin the throw of the switch at the outset of the movement of the lever and when the latter is in a disadvantageous position for application of power not only obtains a better position for applying the power, but also the advantage of a certain momentum of the lever and its weight before meeting the resistance of the switch, which resistance does not occur until the lost motion between the segment-gear and the crank-shaft is taken up by the contact of the bolt 20 or 20<sup>a</sup>, as the case may be, with the stud. In case, however, the switch should be thrown open by a locomotive or car trailing the switch none or little lost motion will obtain, for when the switch is closed the stud will be in contact with or close to the head of bolt 20, and the force of the passing locomotive or car in opening the switch will be transmitted instantly to the crank-shaft, and consequently at the same time to the segment-gear.

As hereinbefore described, the throw of the switch may be varied by suitable adjustment of the bolts 20 20<sup>a</sup>. If required, the adjustment of one of these bolts may be made to a greater or less extent than that of the other.

We would usually make the crank 7 of such length that the movements of the switch will be effected when the crank has rotated through an arc of less than ninety degrees, the difference between this arc and the extent of the arc in which the crank actually moves corresponding with the extent of the aforesaid lost motion between the segment-gear and crank-shaft.

In the switch-stands of the kind to which our improvements particularly relate the crank-shaft (usually termed the "target-shaft") carries at its upper end the target; but in our present construction as the rotation of the segment-gear, and consequently

its sleeve 10, is always the same—practically ninety degrees—while the movement of the crank-shaft is less and may be varied we fasten the target (not shown) to said sleeve 10. To this end we provide the latter with holes 10<sup>a</sup>, Figs. 3, 7, and 12, through which is passed a bolt 10<sup>b</sup>, Figs. 1 and 2, which passes also through corresponding holes in the target-rod, the end of the latter being inserted in said sleeve. The target-rod (marked 30) is shown broken off in Figs. 1 and 2.

Other means or devices in lieu of those shown and described may be employed for securing lost motion between the segment-gear and the crank-shaft, and other means for effecting adjustments of the extent of such lost motion may be used.

While in the preferred form of our invention we employ a slot in the segment-gear, in which is entered a stud or projection of the arm of the crank-shaft, such slot is not essential, the essential of this part of our invention being merely that the crank-shaft shall be connected with the segment-gear by a connection which permits a certain lost motion of the said gear, when the switch is operated by the movement of the lever 3, as hereinbefore described.

An example of a modified means for securing such lost motion and also adjusting the extent thereof is illustrated in Figs. 11 and 12 of the drawings. This consists in providing an arm 31, fixed to the shaft 6 and corresponding to the arm 14, with lugs or projections 32 at each side, whose distance apart is greater than the width of the part of segment-gear 5 opposite thereto, with which lugs said gear is adapted to contact when the segment-gear is rotated, just as the end walls of the slot 12, or rather the bolts 20 20<sup>a</sup>, are adapted to contact with the stud 13 of the first form hereinbefore described. In order to adjust the extent of the lost motion in the modified form, we employ screws 33, Fig. 11, that pass through the lugs 32.

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

1. In a switch-stand the combination of the frame or casing, the crank-shaft, the segment-gear pivoted independently of the latter, the pinion engaging said gear, the shaft carrying said pinion, the lever mounted on said shaft, a connection between said segment and crank-shaft, means for effecting lost motion between said connection and gear, substantially as and for the purpose set forth.

2. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear, the pinion engaging the latter, the shaft carrying said pinion, the lever mounted on said shaft, a connection between said segment-gear and crank-shaft, means for effecting lost motion between said connection and gear, and means for varying the extent of



such lost motion, substantially as and for the purpose set forth.

3. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear, the pinion engaging the latter, the shaft carrying said pinion, the lever mounted on said shaft, a connection between said segment-gear and crank-shaft, means for effecting lost motion between said connection and gear, and means for varying the extent of such lost motion, in one direction of the rotation of said segment-gear independently of the opposite direction, substantially as set forth.

4. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear, the pinion engaging the latter, the shaft carrying said pinion, the lever mounted on said shaft, the arm upon said crank-shaft having a part adapted to engage said segment-gear, there being a predetermined amount of lost motion between said part and said segment-gear, substantially as and for the purpose set forth.

5. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear, the pinion engaging the latter, the shaft carrying said pinion, the lever mounted on said shaft, the arm upon said crank-shaft having a part adapted to engage said segment-gear, there being a predetermined amount of lost motion between said part and said segment-gear; together with adjustable means for varying the extent of such lost motion, substantially as and for the purpose set forth.

6. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear having the slot therein, the pinion engaging said segment-gear, the shaft carrying said pinion, the lever mounted on said shaft, the arm secured to said crank-shaft and having a projection extending into said slot, substantially as and for the purpose set forth.

7. In a switch-stand, the combination of the frame or casing, the crank-shaft, the segment-gear having the slot therein, the pinion engaging said segment-gear, the shaft carrying said pinion, the lever mounted on said shaft, the arm secured to said crank-shaft and having a projection extending into said slot; together with means for varying the length of said slot, substantially as and for the purpose set forth.

8. In a switch-stand, the combination of the frame or casing, the crank-shaft, the seg-

ment-gear having the slot therein, the pinion engaging said segment-gear, the shaft carrying said pinion, the lever mounted on said shaft, the arm secured to said crank-shaft and having a projection extending into said slot, the bolts passing through the end walls of said slot, and means for adjusting the extent of protrusion of the said bolts into the slot, substantially as and for the purpose set forth.

9. In a switch-stand the combination of the vertical rotatable crank-shaft, the rotatable segment-gear pivoted independently of the latter and having the slot, the horizontal shaft having the weighted arm, the pinion on said shaft engaging said gear, the arm secured to said crank-shaft and having a part projecting into said slot, the adjustable bolts projecting into the ends respectively of said slot, the inclosing casing having in the top, extending over the plane of movement of said segment-gear, the removable cover-plate for said opening, and means for retaining this plate in the closing position, substantially as and for the purpose set forth.

10. In a switch-stand, the combination with the casing having the foot-flanges extending in a plane below the base portion of the casing, the bearing-plate extending between the base of said foot-flanges, and secured to the latter, the vertical crank-shaft having a bearing in said plate, and the crank detachably mounted on said shaft between the underside of the base portion of the casing and said bearing-plate, substantially as described.

11. In a switch-stand, the combination with the casing, of the crank-shaft journaled therein and having the crank mounted thereon below said casing, said crank having a hole for the reception of the usual pin for coupling the switch-rod to the crank, and said casing being provided with a hole in the bottom thereof in line concentrically with said hole in the crank, which said hole is adapted to permit the passage of said coupling-pin into said hole in the crank, substantially as and for the purpose set forth.

In testimony whereof we have hereunto affixed our signatures this 7th day of March, A. D. 1904.

MALCOLM W. LONG.  
JAMES M. HOFFER.

Witnesses:

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