

No. 640,586.

Patented Jan. 2, 1900.

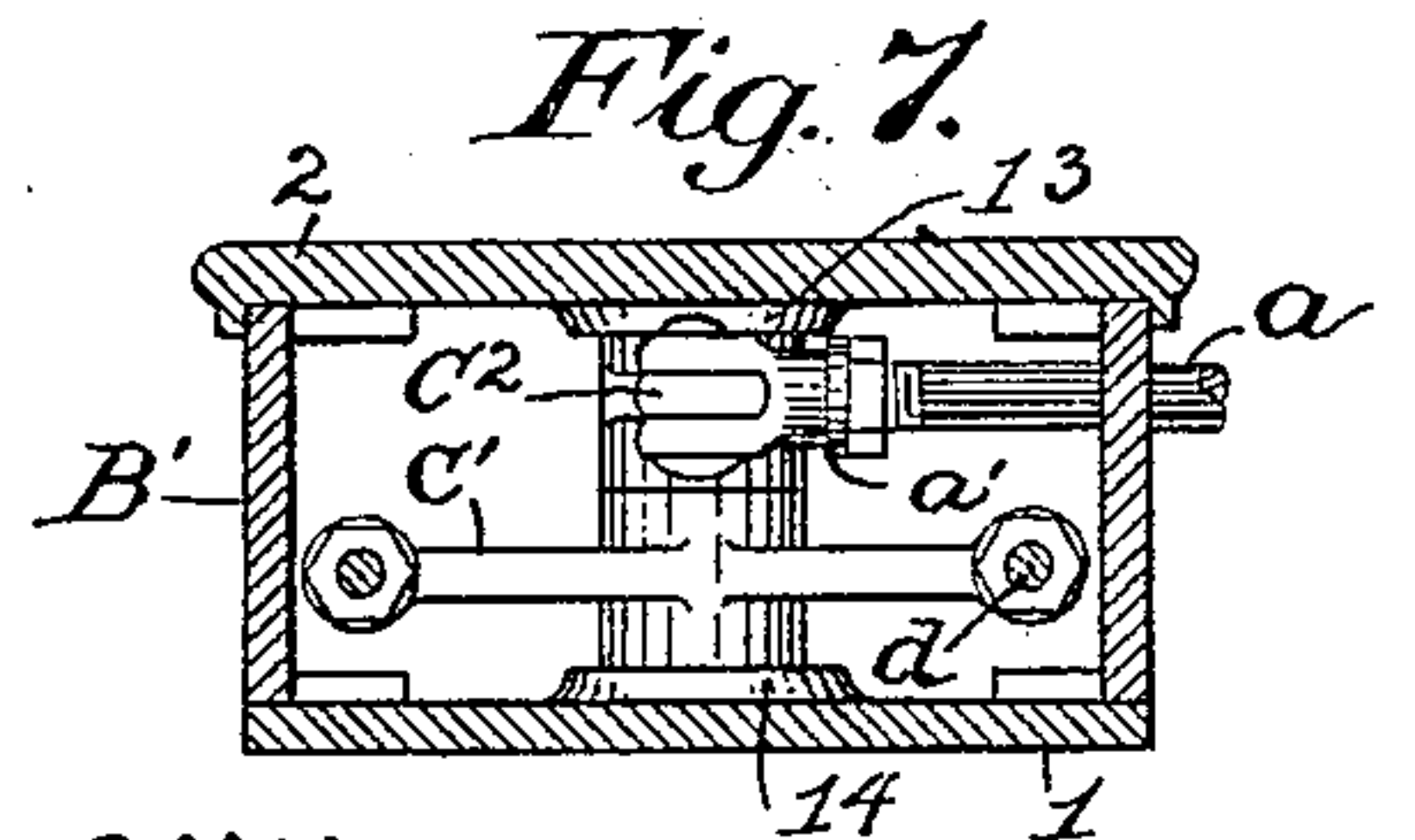
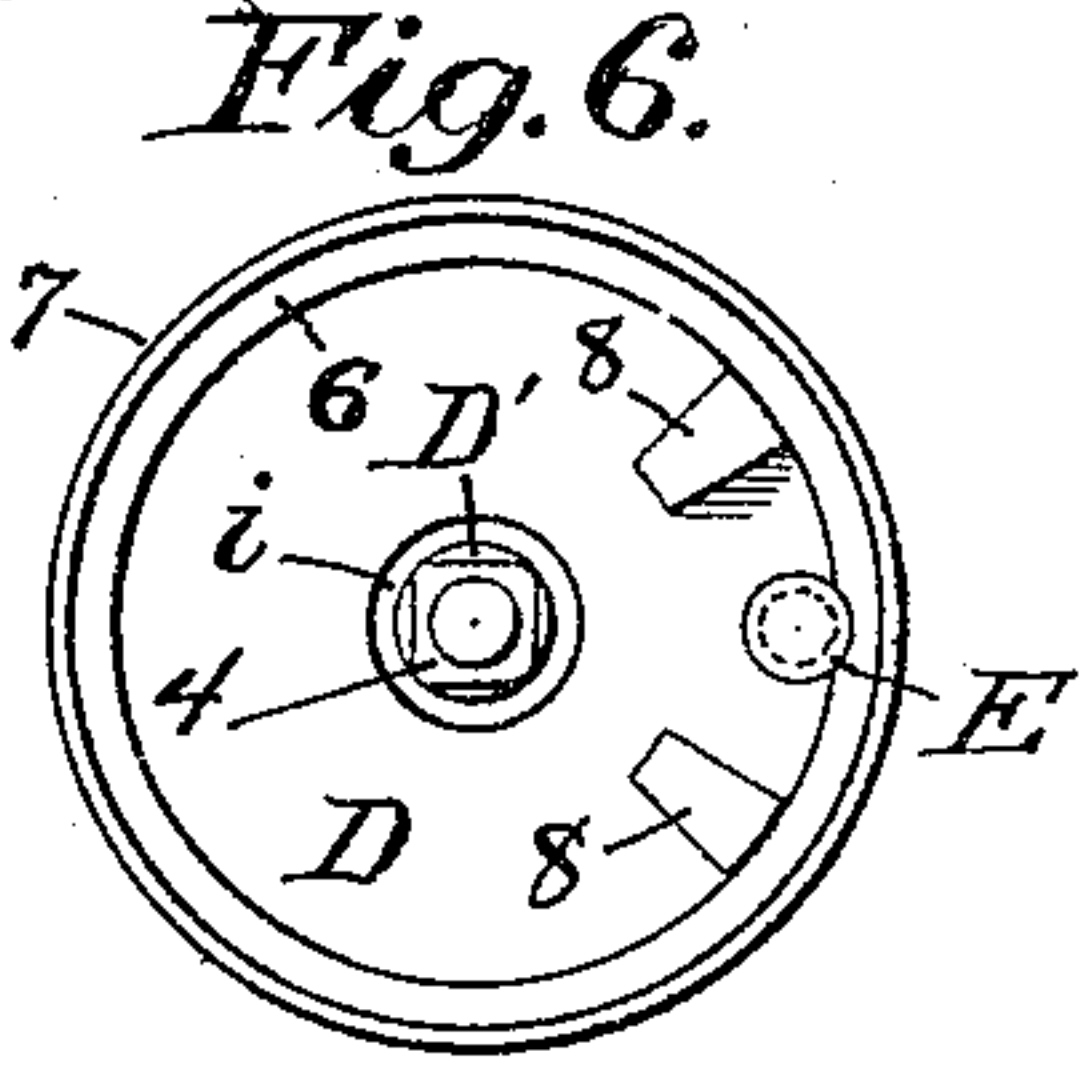
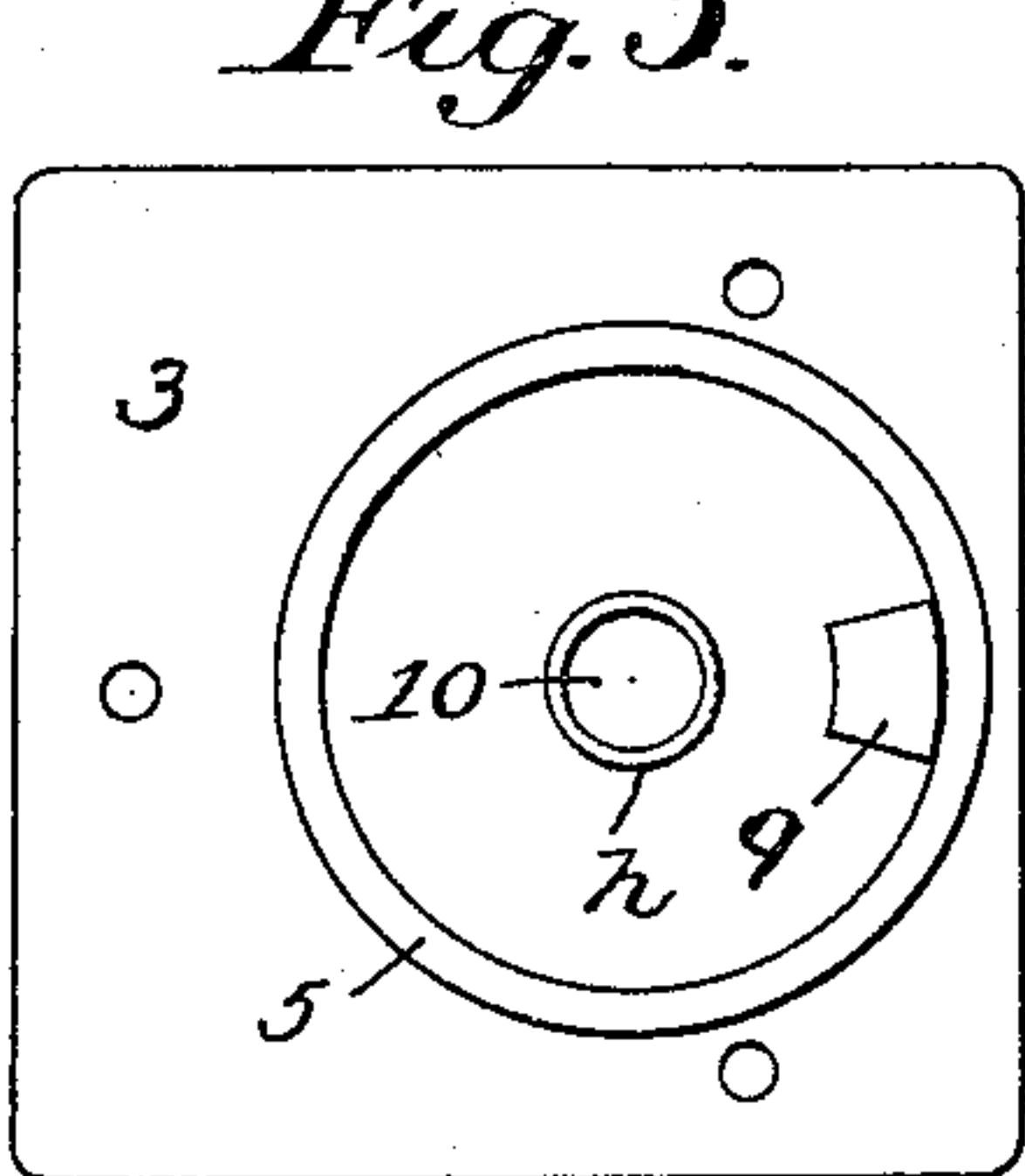
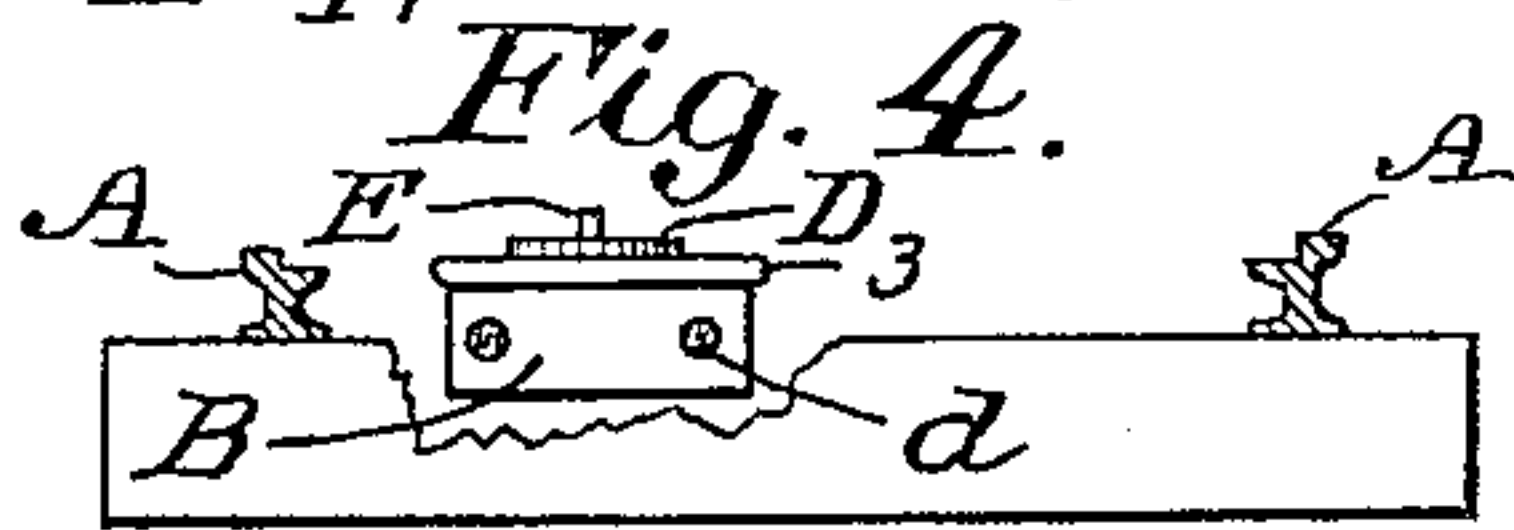
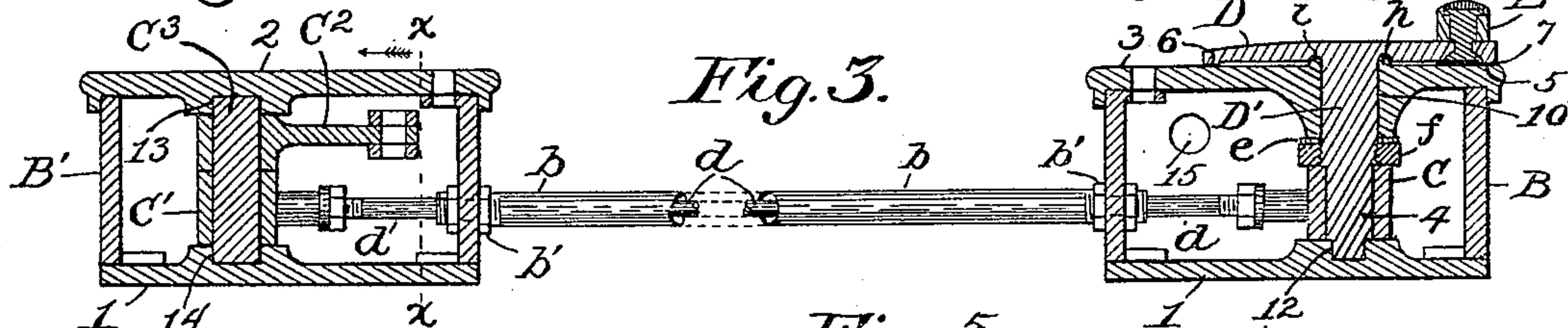
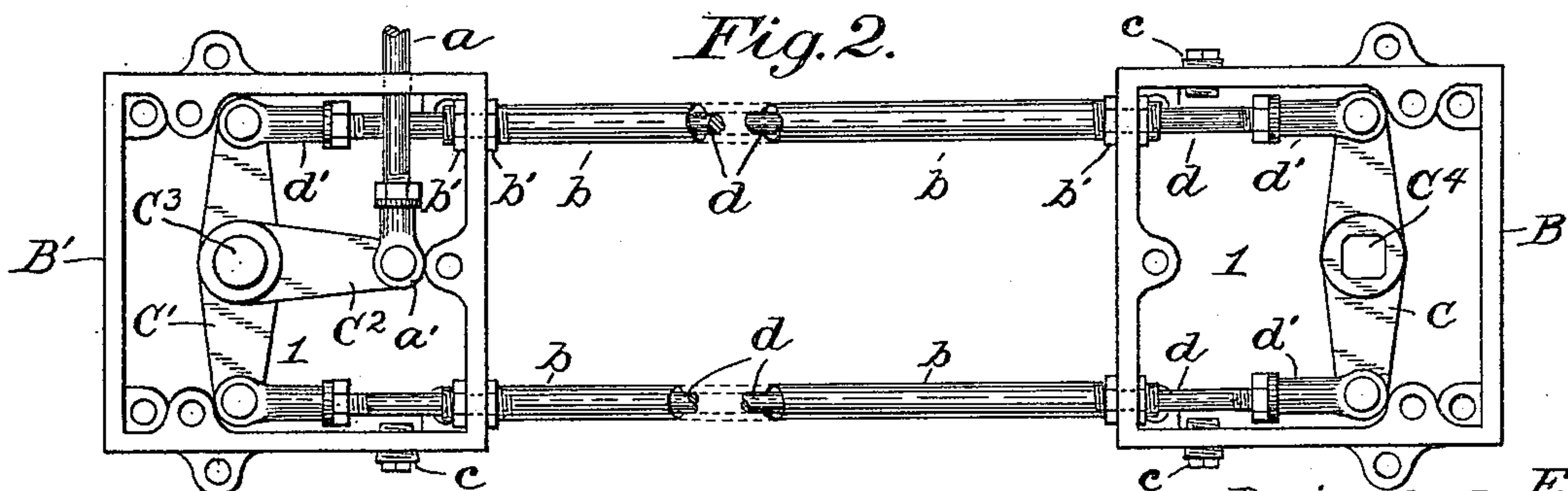
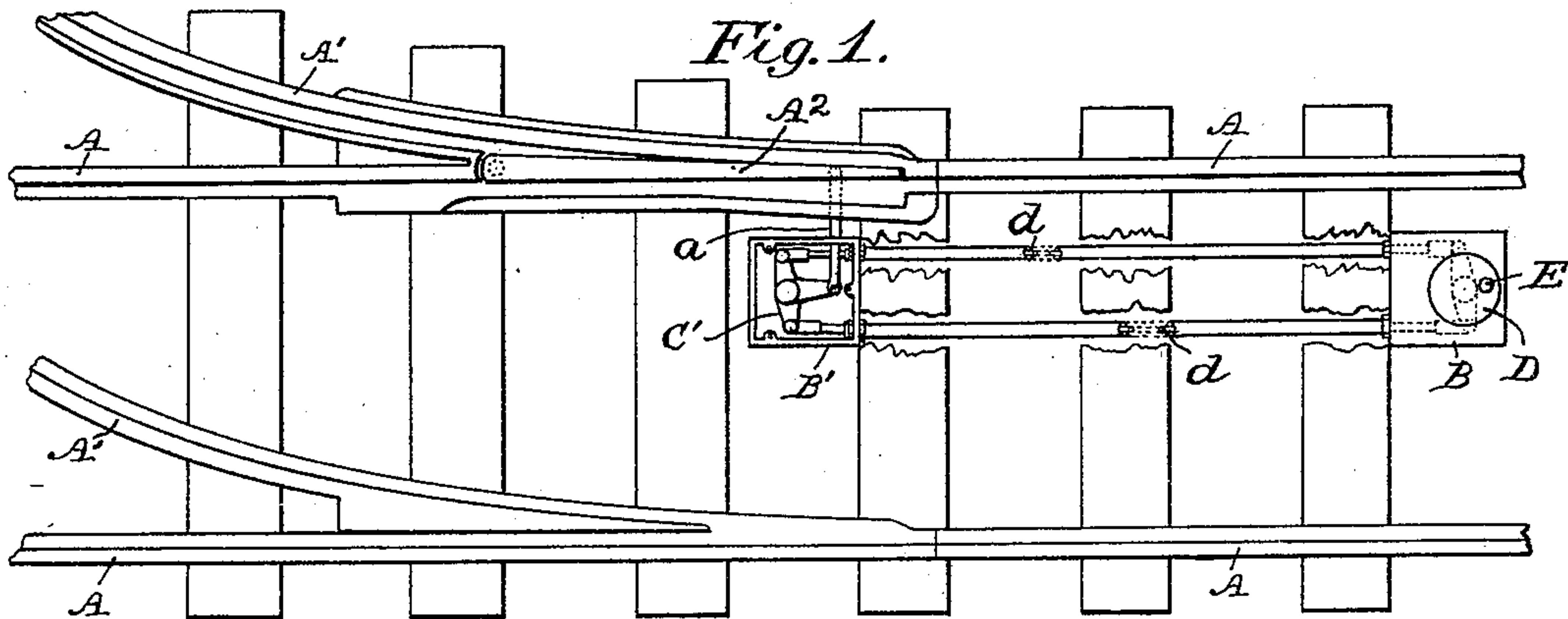
W. S. PHELPS.

RAILWAY SWITCH OPERATING MECHANISM.

(Application filed June 17, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
A. O. Hatch.
J. H. Claypool

Inventor:
Walter S. Phelps.
 By *E. J. Silvers.*
 Attorney

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2 Sheets—Sheet 2.

Fig. 8.

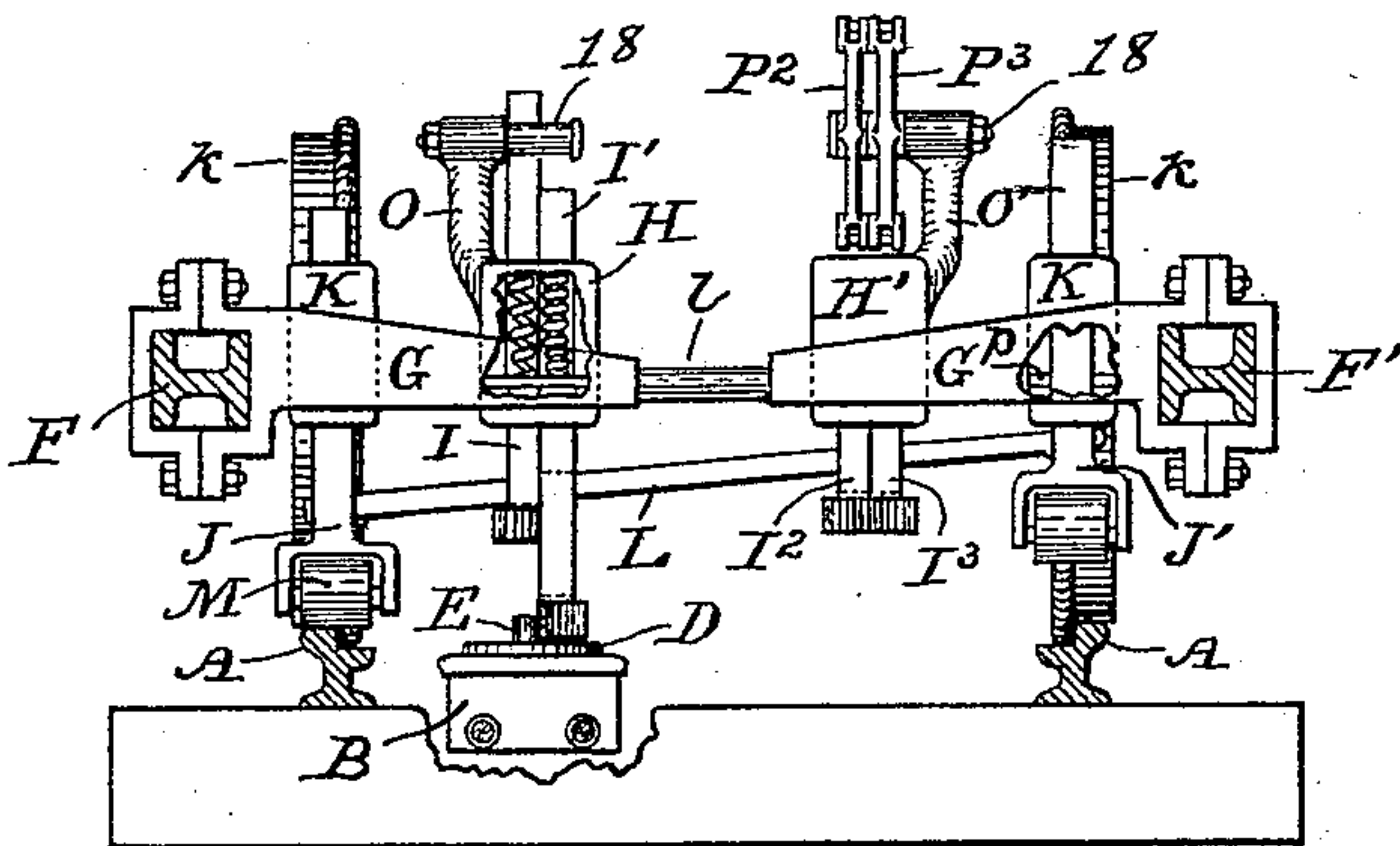


Fig. 9.

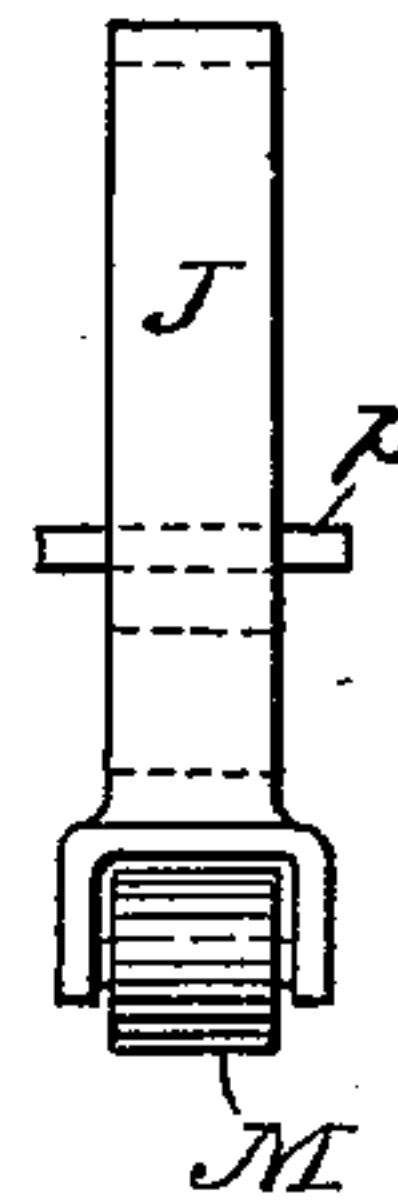


Fig. 10.

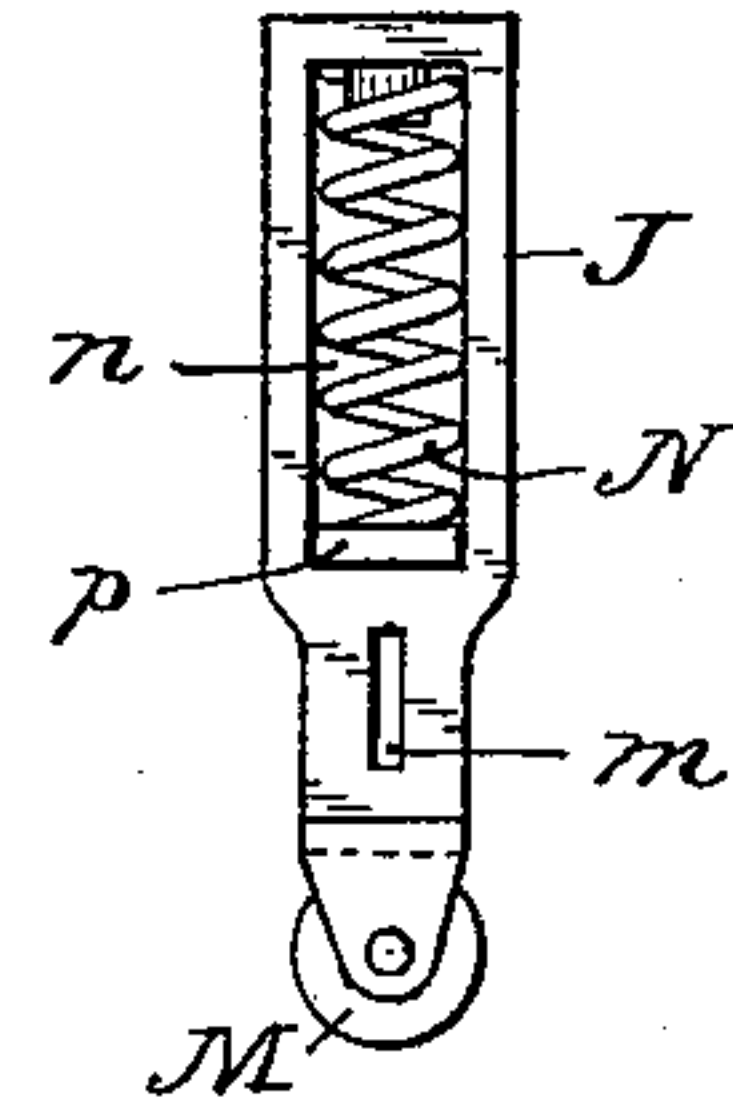


Fig. 11.

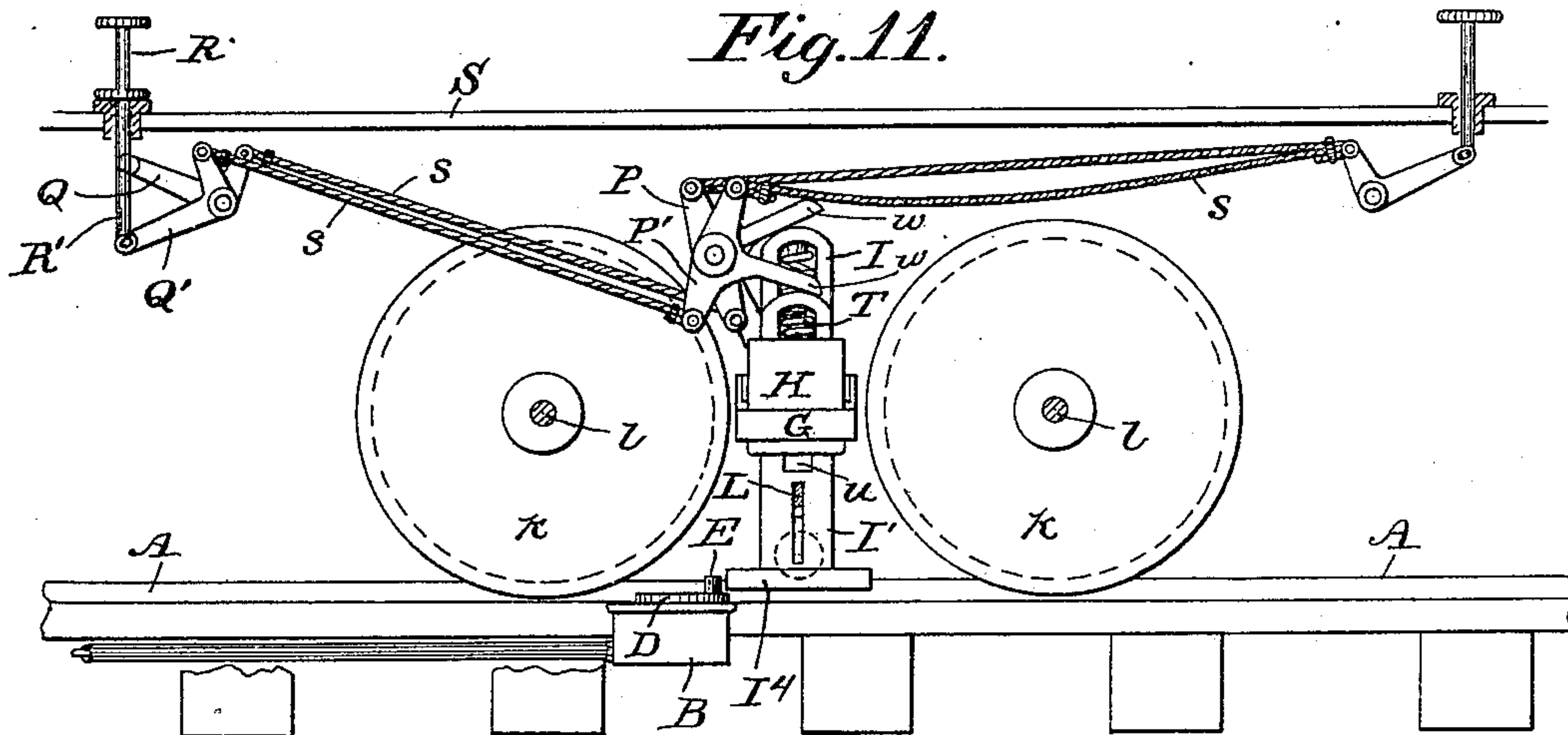


Fig. 12.

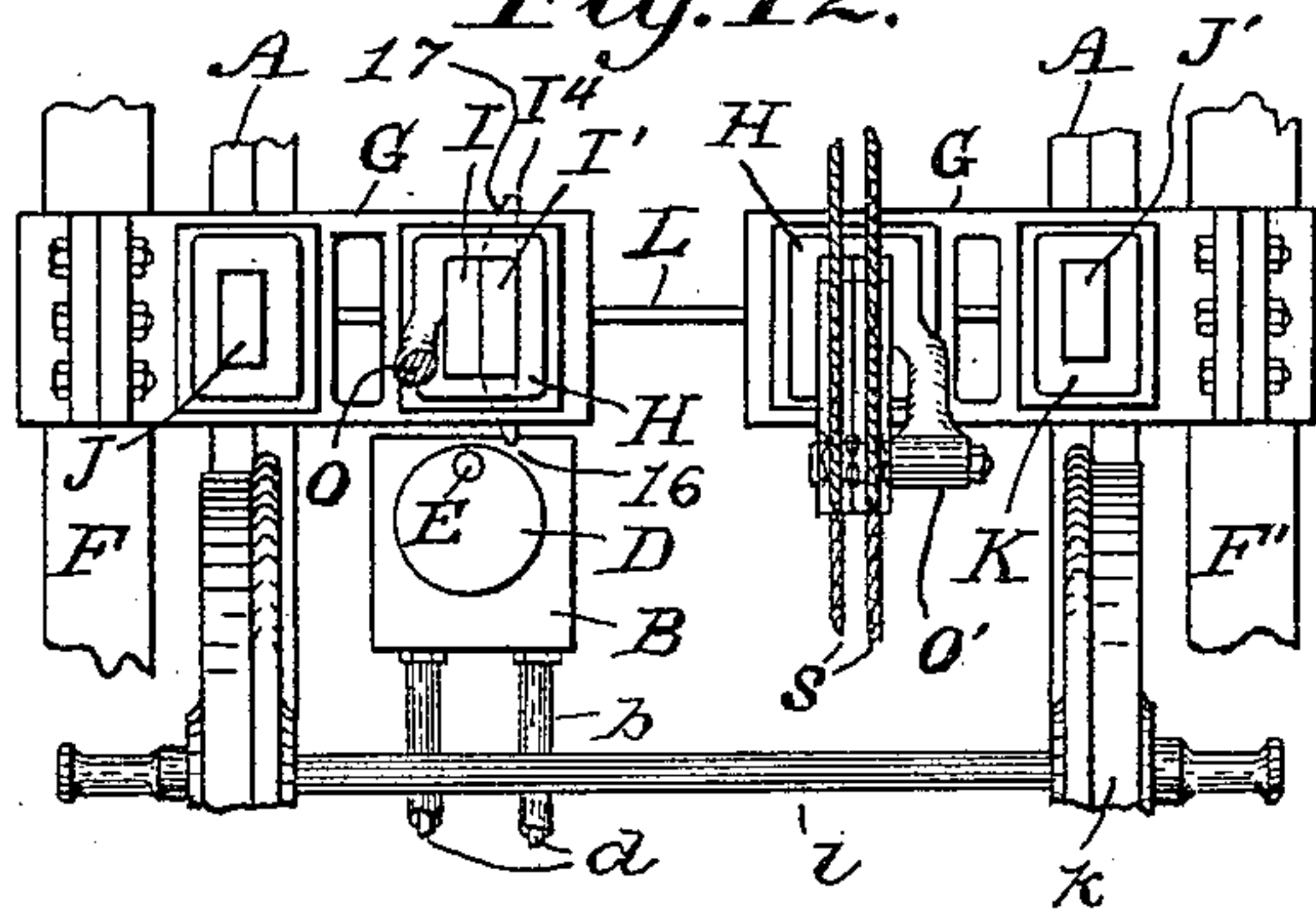


Fig. 13.

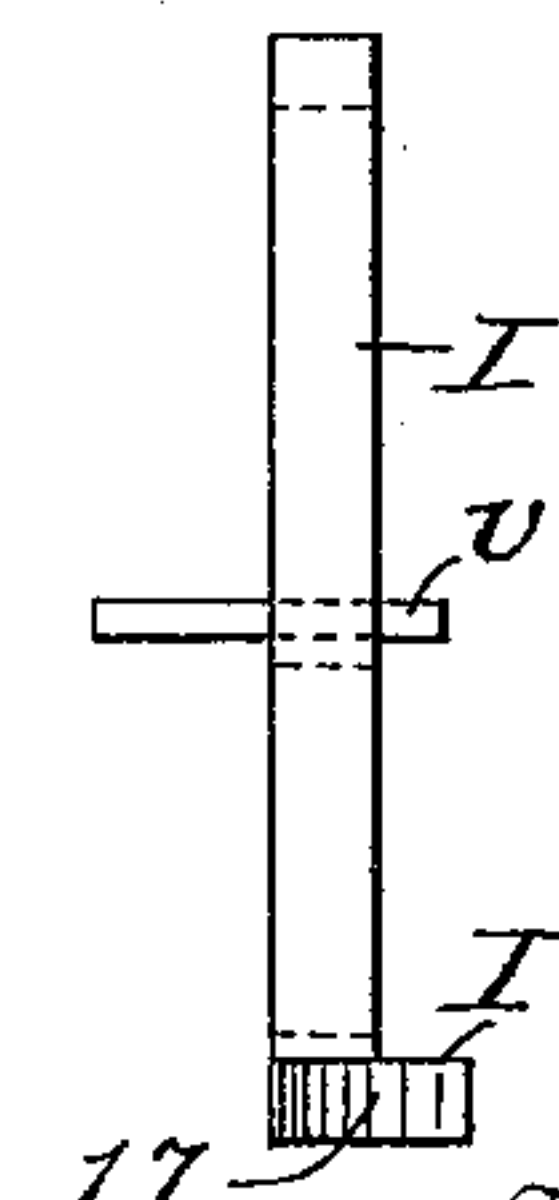
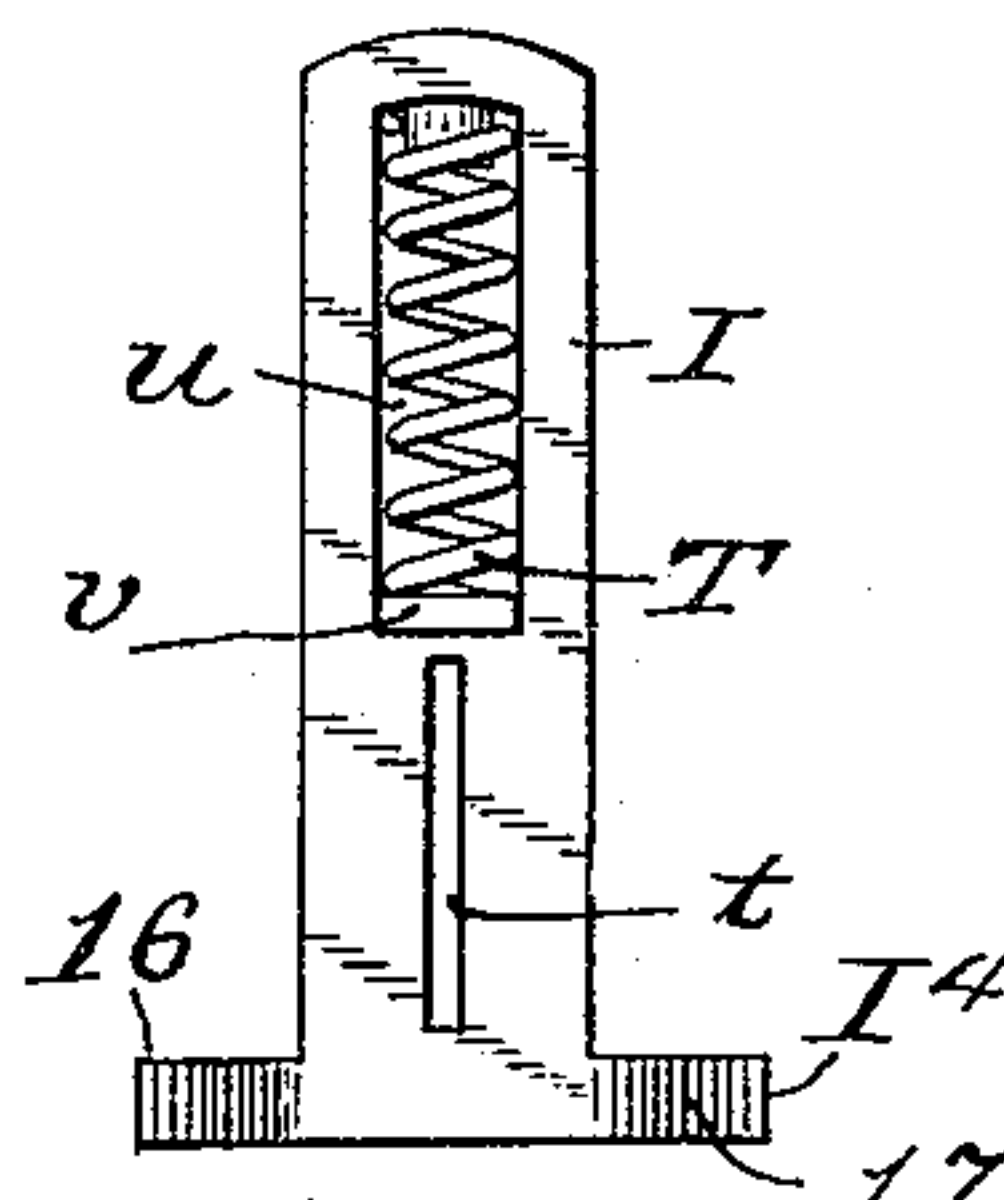


Fig. 14.



Witnesses:

A. B. Hatch

J. H. Claypool

Inventor:

Walter S. Phelps.

By E. T. Silvius.

Attorney.

UNITED STATES PATENT OFFICE.

WALTER SCOTT PHELPS, OF MUNCIE, INDIANA.

RAILWAY-SWITCH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 640,586, dated January 2, 1900.

Application filed June 17, 1899. Serial No. 720,912. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT PHELPS, a citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented certain new and useful Improvements in Railway-Switch-Operating Mechanism; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to mechanism whereby the switch is operated by the moving motor when approaching the switch; and it consists in improved means wherewith the switch is connected and directly controlled; and it also consists in improved means connected with the motor for operating the switch and connections and embracing mechanism whereby the rails are utilized as guides to insure proper contact with the ground-levers; and the invention consists, further, in the parts and combination and arrangement of parts hereinafter particularly described and claimed.

The objects of my invention are, first, to provide reliable means whereby to operate a switch from an approaching motor or locomotive when at a sufficient distance therefrom to observe that the switch is properly adjusted as desired and which shall permit of the switch being operated independently when necessary; second, to provide operating mechanism which shall be positive in action, so as to not be affected by either the vertical or lateral oscillations of the motor; third, to provide a switch-operating mechanism that may be constructed cheaply and be reliable in all seasons of the year, and, fourth, to provide such devices as may be useful and durable in use in effecting a saving in time at turnouts, and whereby accidents at such places may be avoided by prompt action. These objects are fully attained in my invention shown and described herein.

Referring to the drawings, Figure 1 represents a plan view of a street-railway switch of familiar design, to which is connected that part of my invention which is the immediate

adjunct of the switch; Fig. 2, a plan view of the switch-levers and connected inclosing cases; Fig. 3, a longitudinal central vertical sectional view of the levers and cases; Fig. 4, a transverse vertical section taken between the two cases and showing one case in elevation; Fig. 5, a top plan of the cover of one of the cases; Fig. 6, an inverted plan of the disk lever; Fig. 7, a transverse vertical sectional view taken on the line *xx* in Fig. 3; Fig. 8, a transverse vertical sectional view of portions of a street motor-truck having a portion of my invention applied thereto; Figs. 9 and 10, front and side elevations, respectively, of the guide-bar; Fig. 11, a longitudinal vertical sectional view of a portion of a motor and my devices attached thereto; Fig. 12, a fragmentary top plan of a motor-truck and portions of my devices; and Figs. 13 and 14, front and side elevations, respectively, of one of the trip-bars, by which contact with the ground-levers is made in operation.

Similar letters and numerals refer to similar parts throughout the several views.

The cases B and B', their bottoms 1 1, and the connecting-tubes *b b* constitute the framework of the ground-levers and connections for the switch, and the covers 2 3 afford protection thereto and participate as foundations or supports with the cases. The bodies or sides of the cases are preferably alike, as are also the bottoms, and the latter may be suitably perforated to permit the escape of water that may enter the case. I preferably cast the body and bottom separately and bolt or rivet the two together, and suitable lugs are provided for bolting the covers to the bodies. Suitable bearings, as 10 12 13 14, are provided, in which are journaled vertical shafts C³ D'. In the case B' is a transverse lever C', pivoted at its center, and to it is secured or forged integrally a lever C², extending at a right angle from the axis thereof. These two levers are preferably formed separately and both secured to a shaft C³, journaled in the bottom and cover of the case. In the case B is a transverse lever C, also pivoted at its center, but connected detachably with its axial shaft D', which has a portion 4, preferably rectangular in cross-section, and the lever has an aperture C⁴, corresponding

thereto, so that the shaft may rotate the lever, yet be freely inserted and withdrawn. The shaft D' has a disk cap D secured thereto for the purpose of providing a frictional resistance to prevent the accidental movement of the switch-point and to retain the same in such position in which it may be placed in operation. This cap is also designed to prevent the admission of dust and water to the case around the shaft-bearing. The top of the cover 3 has a raised annular bearing 5, and the disk D has at its under side a raised annular bearing 6, conforming to that on the cover, and it also has an annular lip or flange 7, adapted to overhang the bearing 5 to prevent dust from coming in contact with the bearings. This disk is thus supported at the annular bearings at its edge, but is guided centrally by its shaft-bearing, and it performs also the function of a lever, being provided with a crank-pin E, preferably of the roller type, situated near its edge, and stops 8 8 are cast at the under side of the disk adapted to engage a stop 9, cast upon the top of the cover. At the top of the cover at the bearing 10 is a raised annular flange *h*, and at the under side of the disk is an annular groove *i*, adapted to receive the flange *h*, but is slightly deeper than the flange, so that when the disk is in position upon the cover an air-space is provided above the flange *h*, so that air confined therein shall prevent water from flowing over the flange into the shaft-bearing 10. The shaft D' is provided with screw-threads at one portion above the square portion 4, and a threaded nut *f* is applied to retain the shaft within the bearing in the cover, a bearing-washer *e* being also preferably employed; but I may substitute a pin or set-screw for the nut. Thus the disk and shaft may be connected to the cover before the latter is bolted to the case-body. By this construction the pin E may be moved back and forth within the limit of the stops to swing the lever C in the operation of the switch. The cases are provided with a suitable number of apertures 15 in the sides to admit the switch-rod *a*, and those unused are filled by plugs *c*.

The cases B and B' are connected, but spaced at a suitable distance apart, by means of a pair of tubes *b b*, having screw-threads at their ends entering suitable apertures and secured by means of nuts *b'*. In the tubes loosely are connecting-rods *d d*, each of which is connected at one end to opposite ends of the lever C and at the opposite ends to opposite ends of the lever C' by means of jaws *d'*, pivoted to the levers and preferably made adjustable by means of screw-threads and nuts. The connected cases, equipped with the levers and connections, are set in the roadway-bed, so that if in a paved street the top of the case top is even with the top of the pavement, or approximately so, and between the rails A A, so that the case B' is near the switch-

point and the case B at a suitable distance therefrom in the direction from which a motor approaches the switch. The rod *a* is suitably connected to the switch-point A², leading to the turnout A', and also to the lever C², preferably by means of an adjustable jaw *a'*. In a steam-railway where two switch-points are employed the rod *a* may obviously be extended through the case and connect the opposite switch-point, or independent connections may be made between the pair of points.

In Figs. 8, 11, and 12 only so much of a motor truck and frame are shown as to illustrate the relation of my appliances thereto, *k k* representing carrying-wheels mounted on axles *l l*, between a pair of which I mount the main parts of my invention that are designed to be carried by the motor, so that the four wheels bearing upon the rails afford the most positive gage and support for the working of the various parts. In some cases, however, good results may be had by mounting my devices at the opposite side of a pair of wheels. Where the trip-bar may be hung to framework which has no springs interposed between the same and the journal-boxes of the wheel-axles, the guide-bar may be dispensed with; but as such an arrangement is in most cases impracticable I provide a guide-bar to act upon the top of the rail or with slight modification from the form shown to act upon the periphery of a carrying-wheel or upon an axle, so that the trip-bar shall descend invariably a proper distance to form contact with the ground-lever when operating the switch. This function I prefer to perform and carry out by means of a pair of counterpart foundation-brackets G G, bolted to truck-frame bars F F'. These brackets are provided with either fixed or detachable housings K K of identical form and H H', also of identical form, but having arms O O' preferably attached thereto, so as to be at opposite sides as a right-hand and a left-hand arm. Each housing K has mounted therein a vertically-movable guide-bar J or J' of identical form and provided at the lower end with a roller M. The upper portion of the guide-bar has an opening *n*, in which is a spiral spring N, seated at its upper end against the top of the opening and at its lower end upon a bearing-plate *p*, extending through the opening and supported at its ends by the housing K. Between the opening *n* and the roller M is a vertical slot *m* to receive the end of the compression-beam L. Thus by means of the spring N and plate *p* the bar is supported in the housing, which acts also as a guide in which the bar slides vertically.

Each housing H or H' supports a pair of counterpart but reversed trip-bars, as I I' or I² I³, each bar having at the upper portion an opening *u*, in which is a spiral spring T, seated at its upper end at the top of the opening and at its lower end upon a bearing-plate *v*, which extends through the opening and is supported at its ends in the housing, one plate

extending through a pair of bars and supporting the springs of both bars. In the lower portion of the bar is a slot *t* of sufficient vertical length to permit the compression-beam L to have play therein when the companion bar is acting thereon, the beam L extending through all the guide-bars. Each guide-bar has a foot *I*⁴, having projecting points 16 with a beveled face 17 at one side, the beveled faces of a pair of bars being adjacently disposed, so that when one foot engages the crank-pin E the latter is drawn over toward and under the opposite foot of the pair, the amount of angularity of the face 17 being adapted to the throw of the crank-pin and the switch-point. As shown, the beam L extends through from one guide-bar to the other and is in effect slidably pivoted therein or suitably retained to prevent dislodgment. When one guide-bar and one pair of trip-bars only are employed, the opposite or unemployed end of the beam L may be pivoted to the truck-frame.

The arms O and O' each have a fulcrum-bolt 18, upon each of which is an identically-formed lever P or P', having a compression-lever *w* bearing upon the top of a trip-bar to force the same down to an operative position. The lever P may be of either the single-end type or of the double-end type, as shown, and is suitably connected at its free end, as by a cable *s*, to a bell-crank, as Q or Q', suitably supported and having a push-bar R or R', suitably mounted and supported at the end of the motor platform or floor S, so that the operator may press his foot upon a push-bar and operate a trip when approaching a switch and shift the same to the desired position.

It will be obvious that I may place the whole mechanism either centrally with the rails of the road or near one rail, the fixed or ground connections being in conformity to the movable or motor connections, as circumstances may require.

The mode of operation having been above described in detail, further allusion seems superfluous, the functions of the several parts being obvious. It may be pointed out, however, that an advantageous application of my invention provides that a push-bar is placed at the right-hand side of the motor and connected so as to shift the switch, so that the motor shall keep to the right, and the left-hand side bar will be pressed when it is desired to continue to or turn to the left-hand side of the two courses. It will be apparent that when a trip-bar *I*¹ is forced down against its spring-pressure after moving a short distance it engages the pressure-bar L, forcing the same down and with it the guide-bar J until the latter comes in contact with the rail A, which limits the movement of the trip-bar, so that the latter strikes the pin E fairly without interfering with the disk or case or other obstruction, the case being essentially set at a proper depth relatively to the rails. Thus a positive vertical guide is provided, which compensates

for all vertical movement of the motor upon its springs, and obviously my devices may be adapted for use in connection with locomotives of whatever type that operate upon railways.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A railway-switch provided with a case and a vertical shaft journaled in the case and provided with a horizontal disk working upon the top of the case, a vertical contact-pin secured to the disk, and a lever detachably secured to the vertical shaft within the case and operatively connected to the switch.

2. A switch-operating mechanism comprising a pair of connected cases, connected levers mounted in the cases, a rod connecting the switch-point with a lever in one of the cases, a crank-pin connected with a lever in the other case, a trip-bar and a guide-bar therefor acting upon the rail or like stable element and mounted movably upon a motor or equivalent vehicle, and means whereby the trip-bar may be actuated to form contact with the crank-pin, for operating the switch.

3. A switch-operating mechanism comprising a lever having a vertical crank-pin and having connection with a switch-point, a trip-bar and a guide-bar therefor acting upon the rail or like stable element and mounted movably upon the motor-vehicle, and a lever whereby the trip-bar may be shifted to form contact with the crank-pin for operating the switch.

4. A switch-operating mechanism comprising a lever having a vertical crank-pin and suitably mounted in the roadway and connected to control the switch, a trip-bar mounted upon a motor, a compression-beam controlled by the trip-bar, a guide-bar actuated by the compression-beam and provided with a roller, springs whereby the trip-bar and the guide-bar are normally retained in inactive position, levers whereby the trip-bar is actuated to contact with the crank-pin to operate the switch and whereby the guide-bar is forced into contact with the rail to limit the movement of the trip-bar whereby the same is prevented from interfering with obstructions.

5. A switch-operating mechanism comprising a laterally-moving lever having a vertical contact-pin and to which the switch is connected, and a vertically-movable trip-bar adapted to engage with the contact-pin and controlled in its vertical movement downward by means acting against the railway-rail as a gage whereby accurate adjustment for contact with the pin is obtained.

6. A railway-switch provided with a case having an annular bearing upon the top thereof and a lever mounted within the case and operatively connected to the switch, a horizontally-rotating disk mounted on the annular bearing upon the case and provided

with a vertical contact-pin and operatively connected to the levers within the case below.

7. A switch-operating mechanism comprising a pair of counterpart cases, levers mounted in the cases and connected together operatively, a rod connecting the switch with the lever in one case, a vertical contact-pin mounted above the opposite case and operatively connected to the lever therein, a pair of vertically-movable trip-bars each having a beveled foot facing each other and carried by a motor-vehicle, and a guide-bar carried by the same motor-vehicle and controlled by either of the trip-bars to contact with the railway-rail or like stable element already existing as a gage whereby accurate adjustment may be had for either of the pair of trip-bars in contact with the vertical contact-pin.

8. A switch-operating mechanism comprising a pair of connected cases, a disk mounted upon one of the cases, a vertical contact-pin secured to the disk, a lever in each of the cases and connected and one of which is operatively connected to the disk and the other of which is operatively connected to the switch, a pair of trip-bars each provided with an adjacently-disposed beveled contact-face whereby the contact-pin is engaged, a guide-bar adapted to gage the downward movement of the pair of trip-bars and operated by either of the trip-bars independently of the other, and means whereby the trip-bars are operated.

9. In a switch-operating mechanism, the combination of the motor, the brackets attached to the motor-frame, the housings attached to the brackets, the trip-bar, the guide-bar, the supporting-springs for the trip-bar and the guide-bar, the compression-beam, and the levers and connections whereby the trip-bar and guide-bar are forced downward, substantially as shown and described.

10. In a switch-operating mechanism, the combination of the switch, the motor, the separately-situated cases, the connecting-tubes, the levers mounted in the cases, the switch-connecting rod, the rods extending through the tubes and connecting the levers in the cases, the disk connected to the case-cover and provided with the shaft removably connected to the lever in the case below, the vertical pin attached to the disk, the stops, the trip-bars, the guide-bars, the compression-beam, the supporting-springs, the levers for operating the trip-bars, the pressure-bars, and the connecting-cables, substantially as shown and described.

11. In a switch-operating mechanism, the combination with a switch, of the cases B and B', the connecting-tubes *b*, *b*, the lever C' and attached lever C² mounted in the case B', the switch-connecting rod, the jaws *d'*, the lever C in the case B and having the aperture C⁴, the cover 2 upon the case B', the cover 3 upon the case B and provided with the annular bearing 5 and stops 9, the journal-bearing 10 and annular flange *h* surrounding the top of the bearing 10, the disk D provided with the

annular bearing 6 and flange 7 and stops 8, the annular air-chamber *i* above the flange *h*, the shaft D' attached to said disk and extending through the bearing 10 and aperture C⁴, and the pin E, substantially as shown and described.

12. In a switch-operating mechanism, the combination of the switch, the operating-levers connected with the switch, the vertical crank-pin whereby the levers are actuated, the motor, the brackets attached to the motor-frame, the housings attached to the brackets, the trip-bars in pairs spring-pressed upward in a housing, the guide-bars spring-pressed upward in a housing, the compression-beam extending through the trip-bars and connecting a guide-bar whereby the same is pressed down as a gage, the levers whereby the trip-bars are forced down, and the pressure-bars and connections whereby the trip-bar levers are operated, substantially as set forth.

13. The combination of the cases B B', the connecting-tubes adjustably attached to said cases, the lever C' and its supporting-shaft, the lever C² rigidly connected to said lever and its shaft, the connecting-rod *a*, the lever C having the square central aperture, the rods *d*, *d*, extending through said tubes and adjustably connected to said levers C and C', the cover 2, the cover 3 having the journal-bearing 10, the shaft D' engaging said lever C and provided with the nut to retain the same in position, the lever at the top of said shaft D' and having the pin E, whereby said levers may be actuated, substantially as set forth.

14. The combination of the case B having the bottom 1 provided with the bearing 12, the cover 3 provided with the bearings 10 and 5, the raised flange *h* around the end of said bearing 10, the disk-lever having the pin E and provided with the bearing 6 and flange 7, and annular air-chamber *i*, substantially as shown and described.

15. The combination with the motor-vehicle, of the bracket G, the housings H and K secured to said bracket, the trip-bar I and a spring therefor, the guide-bar J and a spring therefor, the compression-beam L connecting said trip-bar and said guide-bar, and the compression-levers suitably actuated, substantially as set forth.

16. In a railway-switch, the combination with the switch, of a case and a horizontal lever mounted therein having a connected rod attached to the switch-point and having a pair of oppositely-disposed horizontal arms situate at a right angle to the horizontal lever, a second case and a horizontal lever mounted thereon and provided with a vertical contact-pin and having a pair of oppositely-disposed horizontal arms situate at right angles thereto, and rods connecting the four described horizontal arms, substantially as set forth.

17. In a railway-switch-operating mechanism,

ism, the combination of a pair of separated cases one of which is provided with an annular bearing upon the top thereof and a journal-bearing at the center of the annular bearing, a vertical shaft in the journal-bearing and provided with a disk bearing upon the annular bearing, a vertical contact-pin secured to the disk, a pair of tubes adjustably connecting the cases, a lever in each of the cases and having each three arms situate horizontally, one of which is detachably secured to the vertical shaft and one of the arms of which in the opposite case is connected with the switch-point, adjustable rods extending through the tubes and connecting the levers in the two cases, and an annular air-chamber at the top of the journal-bearing whereby water is prevented from entering the journal-bearing, substantially as set forth.

18. In a switch-operating mechanism, the combination of the switch, the motor, the separately-situated cases, the connecting-tubes, the levers mounted in the cases, the switch-connecting rod, the rods extending through the tubes and connecting the levers in the cases, the disk mounted upon the case-cover and having frictional bearing-surfaces and provided with the shaft connected to the lever in the case below, the vertical pin attached to the disk, the trip-bars, the guide-bars, the compression-beam, the supporting-springs, and means whereby the trip-bars may be operated, substantially as shown and described.

19. In a switch-operating mechanism, the combination of the contact-pin, the motor, the brackets mounted on the motor, the trip-bars in pairs supported by the brackets and spring-pressed upward, the guide-bars supported by the brackets and spring-pressed upward, the compression-beam extending through the trip-bars and connecting a guide-bar whereby the same is pressed down as a gage by the trip-bar, and means whereby the trip-bars are forced down, substantially as shown and described.

20. In a switch-operating mechanism, the combination with a switch, of the cases B and B', the connecting-tubes *b b*, the lever C' and attached lever C² mounted in the case B', the switch-connecting rod, the lever C in the case B and having the aperture C⁴, the cover 2 upon the case B', the cover 3 upon the case B and provided with the annular bearing 5, the journal-bearing 10 and annular flange *h* surrounding the top of the bearing 10, the disk D provided with the annular bearing 6 and flange 7, the annular air-chamber *i* above the flange *h*, the shaft D' attached to said disk and extending through the bearing 10 and aperture C⁴ and removably secured in said aperture, and the contact-pin E, substantially as shown and described.

21. The combination of the case B having the bottom 1 provided with the bearing 12, the

cover 3 provided with the bearing 10, the shaft D' in said bearings, the lever detachably secured to such shaft, and the vertical contact-pin operatively connected to such shaft D' whereby the same may be rotated, substantially as set forth.

22. The combination of the case B provided with the cover 3 having the bearing 10, the shaft D' in said bearing, the disk-lever secured at the top of said shaft, the contact-pin secured to said disk-lever, the lever C secured to said shaft, the case B', the three-arm lever in said case B', and the rods connecting said three-arm lever with said lever C, substantially as set forth.

23. The combination of the case B, the shaft D', the lever C, the disk-lever provided with the pin E, the case B', the lever C', the lever C², the rod A, the tubes *b b*, and the connecting-rods *d d*, substantially as set forth.

24. The combination of the case B, the cover 3 provided with the bearing 10 and the annular flange at the top thereof, the shaft D' in said bearing and provided with the disk at the top thereof and the annular air-chamber between said flange and the disk, substantially as set forth.

25. The combination of the case B, the cover provided with the annular frictional bearing, the shaft mounted vertically in the case, the lever attached to the shaft, the disk provided with the annular frictional bearing working upon the frictional bearing upon the cover whereby the shaft is prevented from shifting accidentally, and the contact-pin attached to the disk, substantially as set forth.

26. The combination with a vertical contact-pin for actuating the switch, of a pair of vertically-moving trip-bars mounted on a vehicle face to face and each provided with a foot beveled at the working face so that the point of either foot when depressed may engage with such contact-pin and draw the same laterally so as to pass under the adjacent one of such pair of trip-bars, substantially as set forth.

27. The combination with a vertical contact-pin for actuating the switch, of a pair of vertically-moving trip-bars mounted on a vehicle and provided each with a beveled or laterally-curved foot and a vertical slot in the body of the bar, a guide-bar also mounted on the vehicle and provided with a compression-beam extending through the slots in the trip-bars whereby either of the trip-bars may actuate the guide-bar, and means whereby the trip-bars may be operated independently, substantially as set forth.

28. In a switch-operating mechanism, the combination of the trip-bars II' provided with the foot I⁴ and slot *t*, the supporting-springs, the guide-bar, and the compression-beam connected to the guide-bar and extending through the slots *t t*, substantially as set forth.

29. In a switch-operating mechanism, the combination of the trip-bars I I' provided

each with the opening *u*, the bearing-plate *v* extending through said opening *u* in both bars, and the spring in each of said openings, substantially as set forth.

- 5 30. In a switch-operating mechanism, the combination of the guide-bar J provided with the opening *n*, the bearing-plate *p*, the spring in said opening, the compression-beam connected to said bar, and the roller at the bot-

tom of said guide-bar, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER SCOTT PHELPS.

Witnesses:

WILLIAMS MORRIS,
GEORGE C. HALLECK.