

No. 775,797.

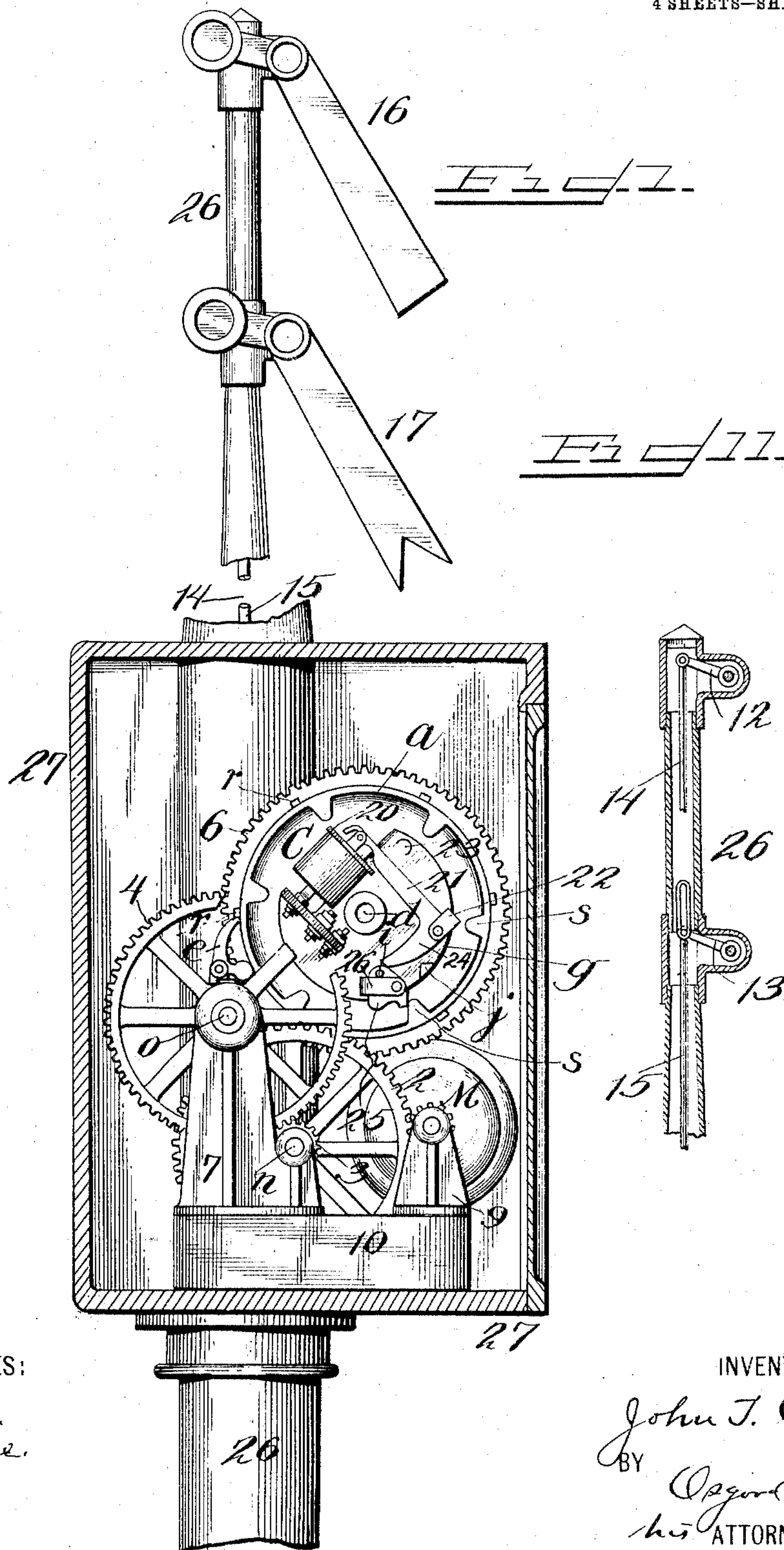
PATENTED NOV. 22, 1904.

J. T. CADE.
RAILWAY SIGNALING APPARATUS.

APPLICATION FILED OCT. 6, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



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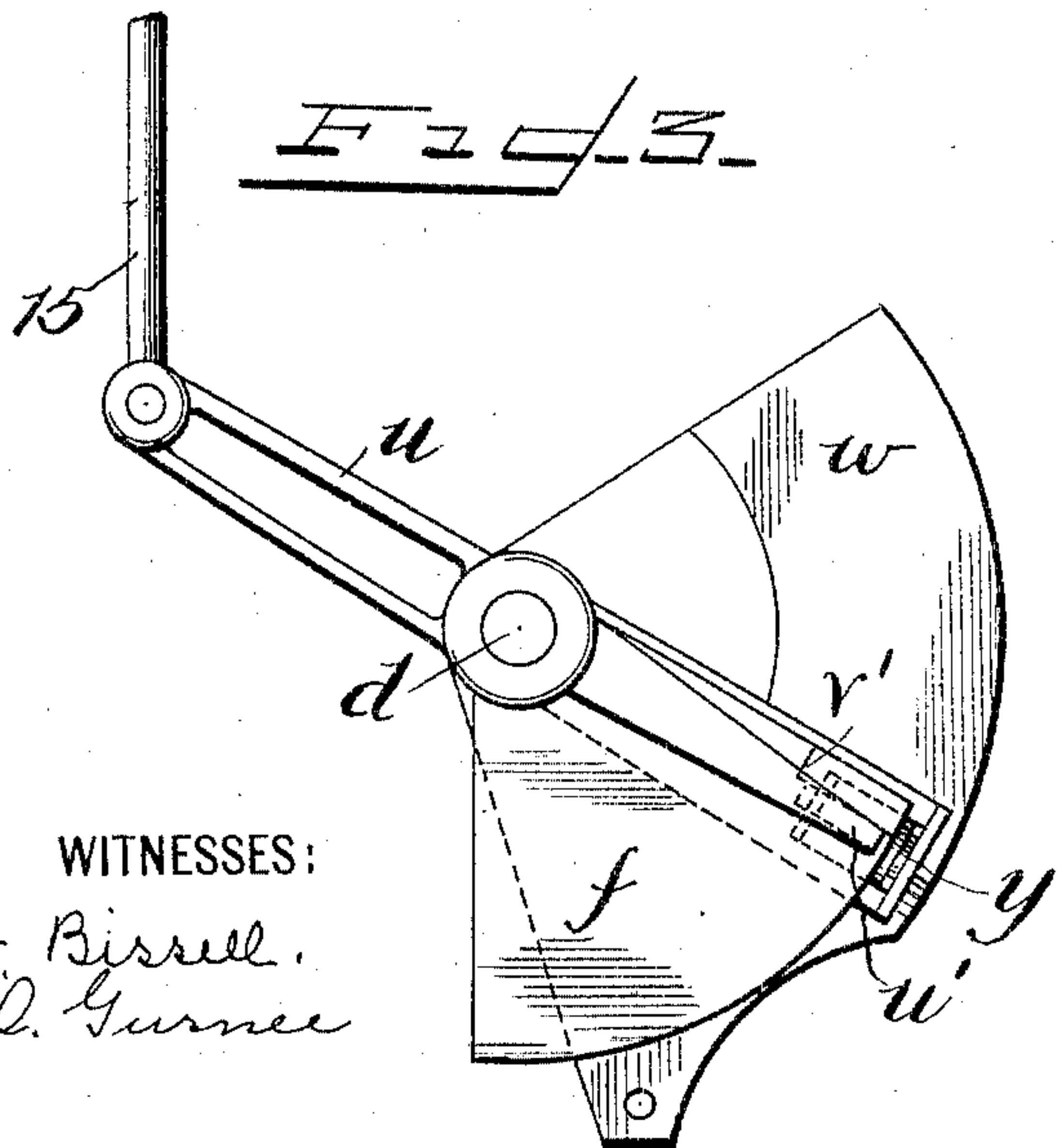
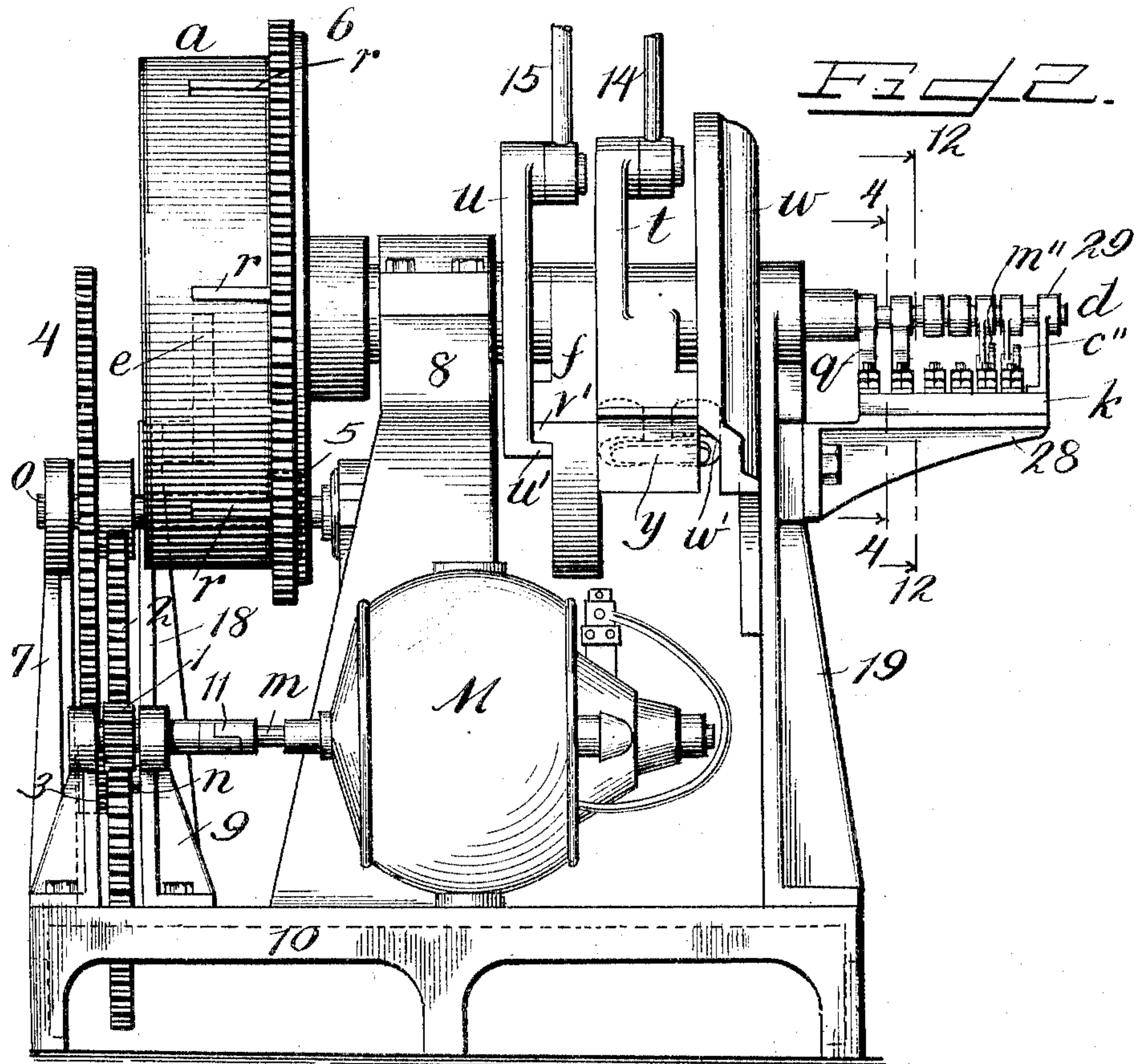
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

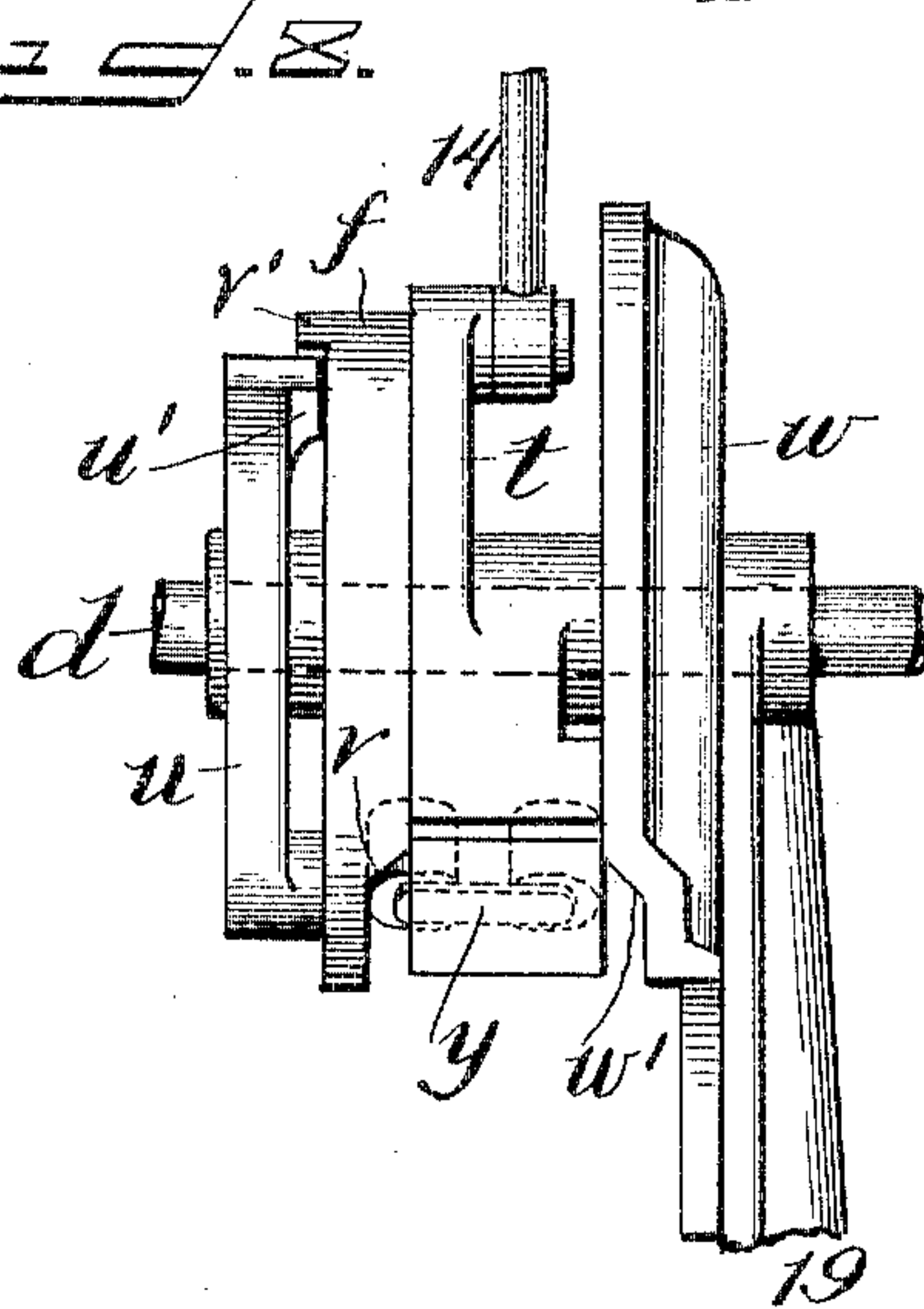
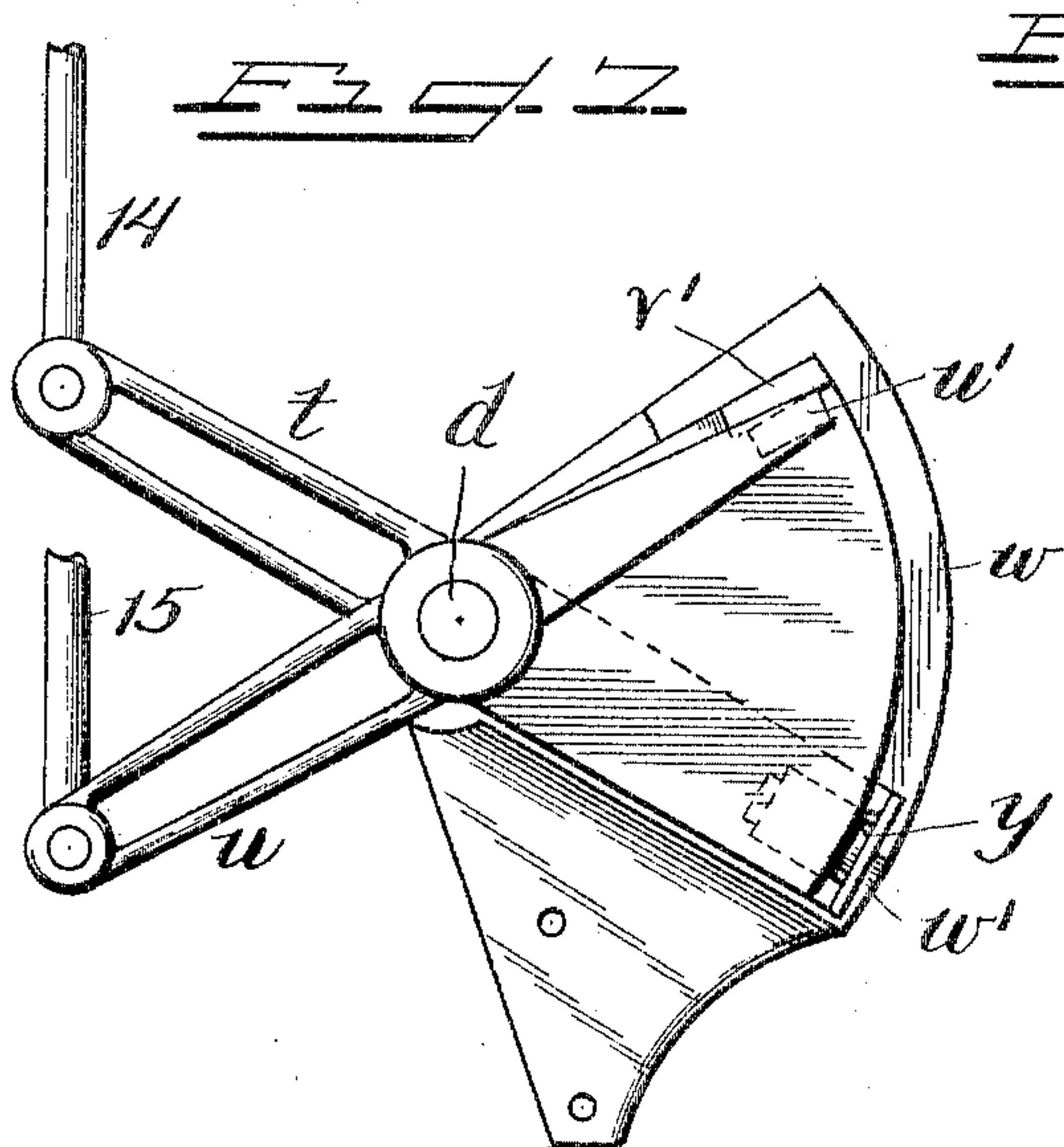
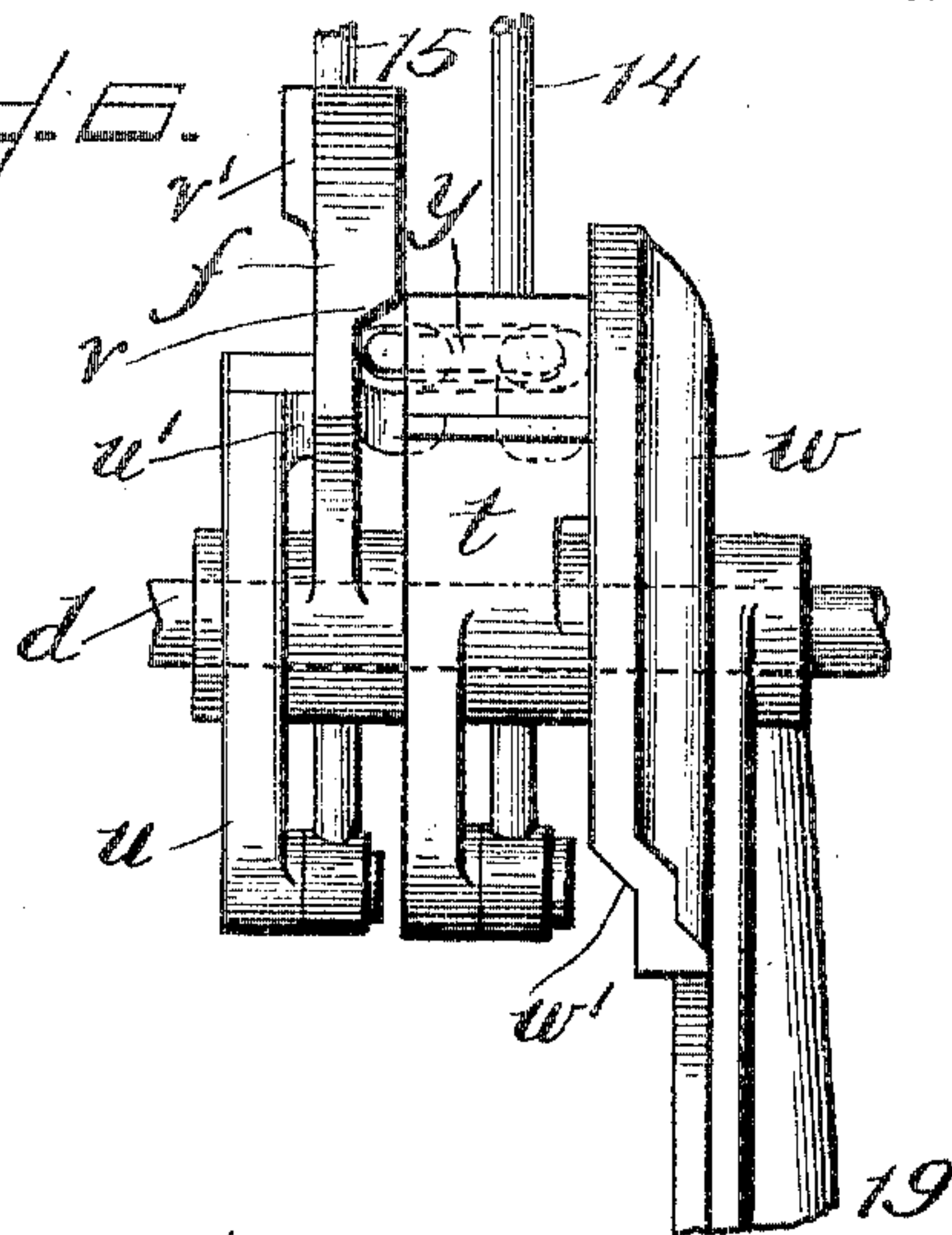
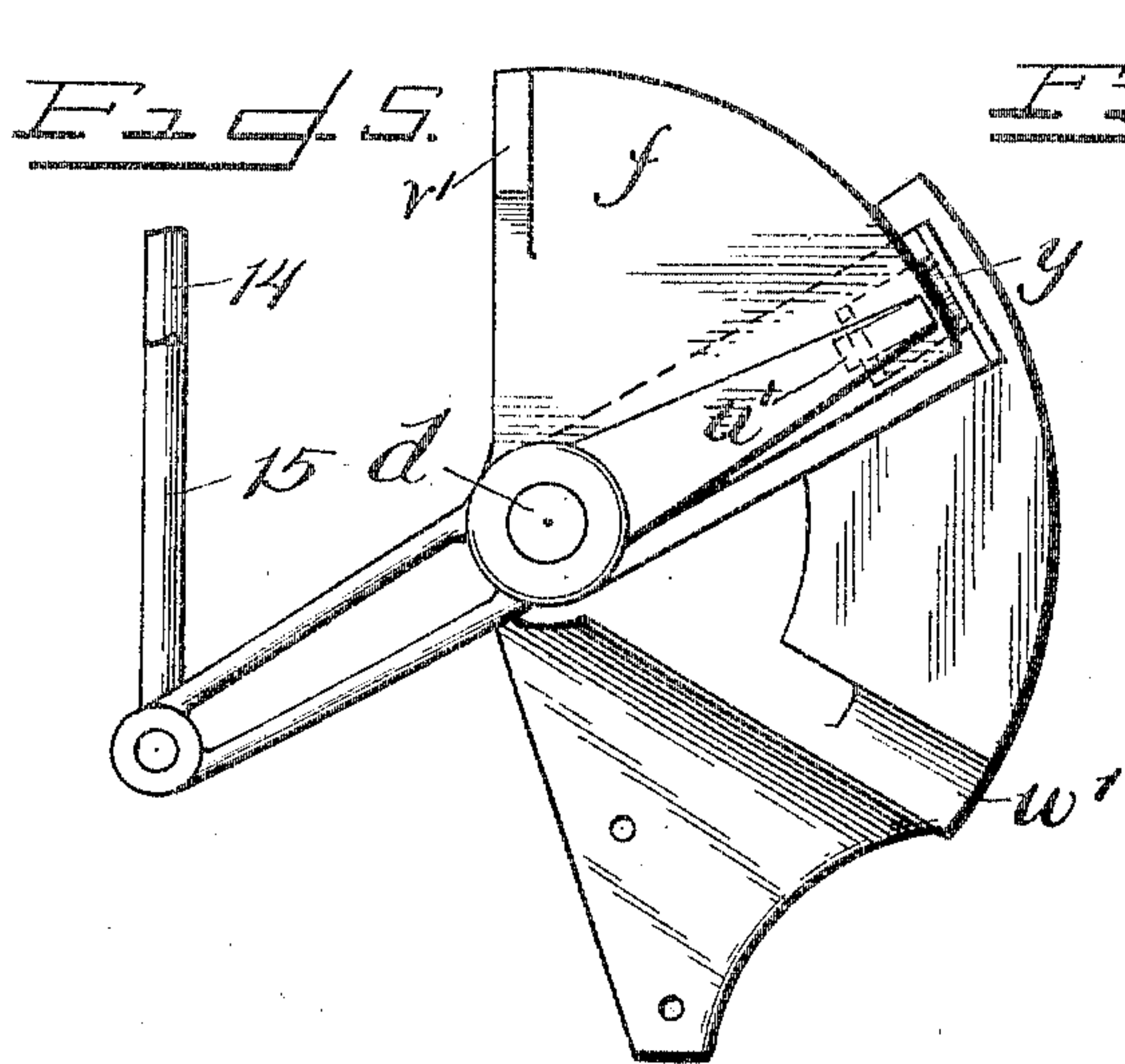


Fig. 9.

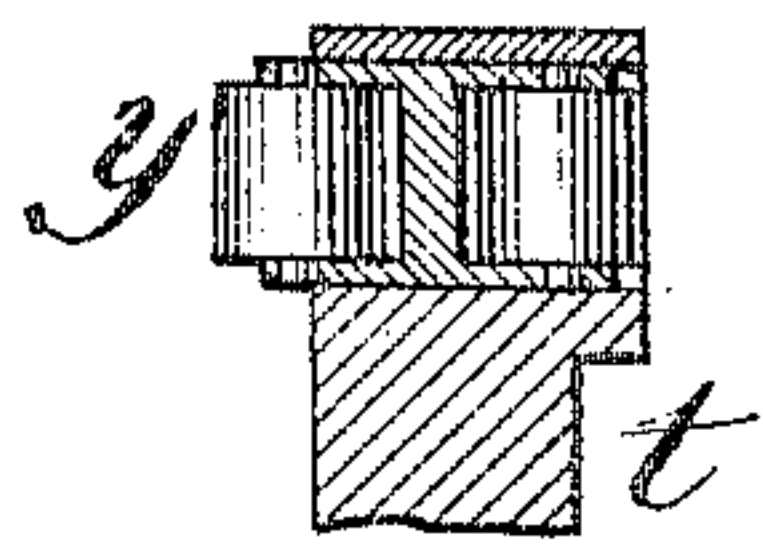
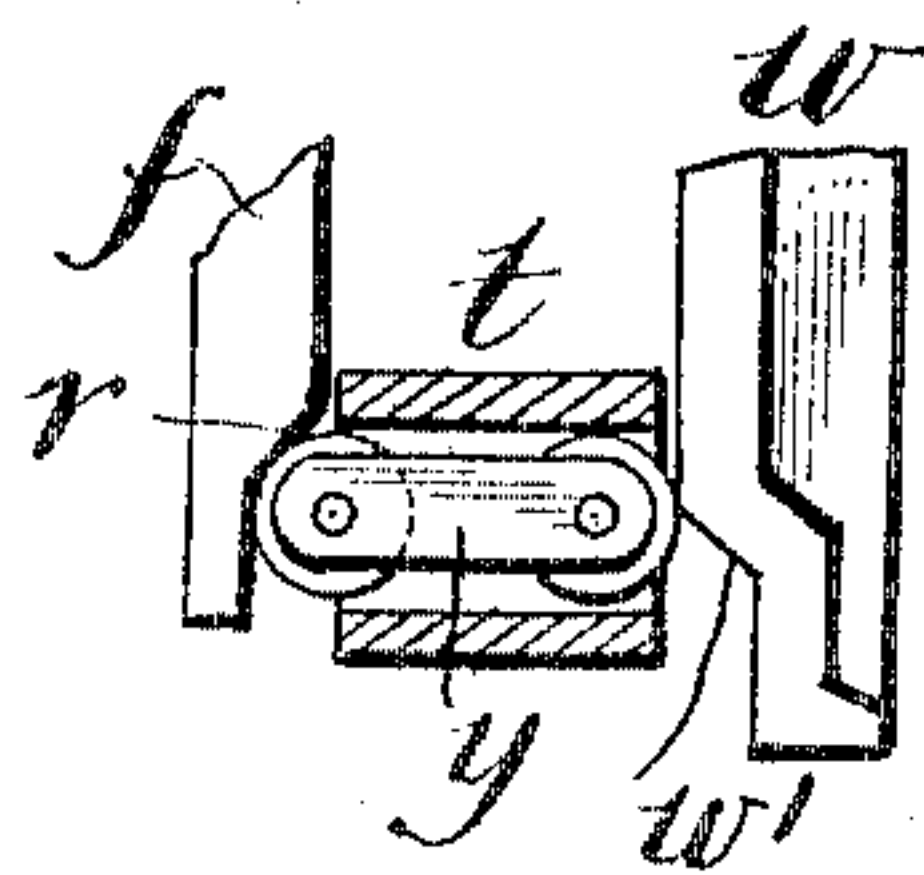


Fig. 10.



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4 SHEETS—SHEET 4.

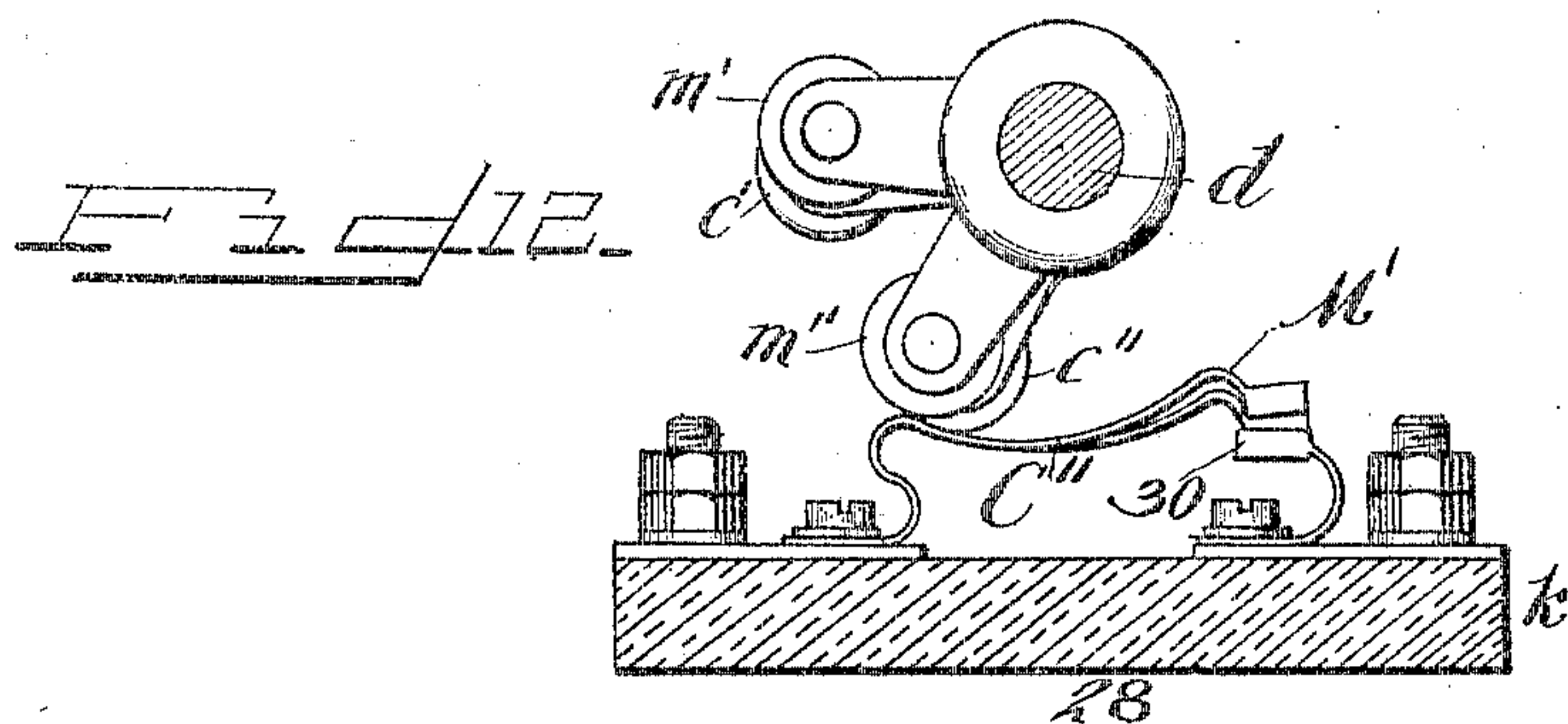


FIG. 13.

FIG. 14.

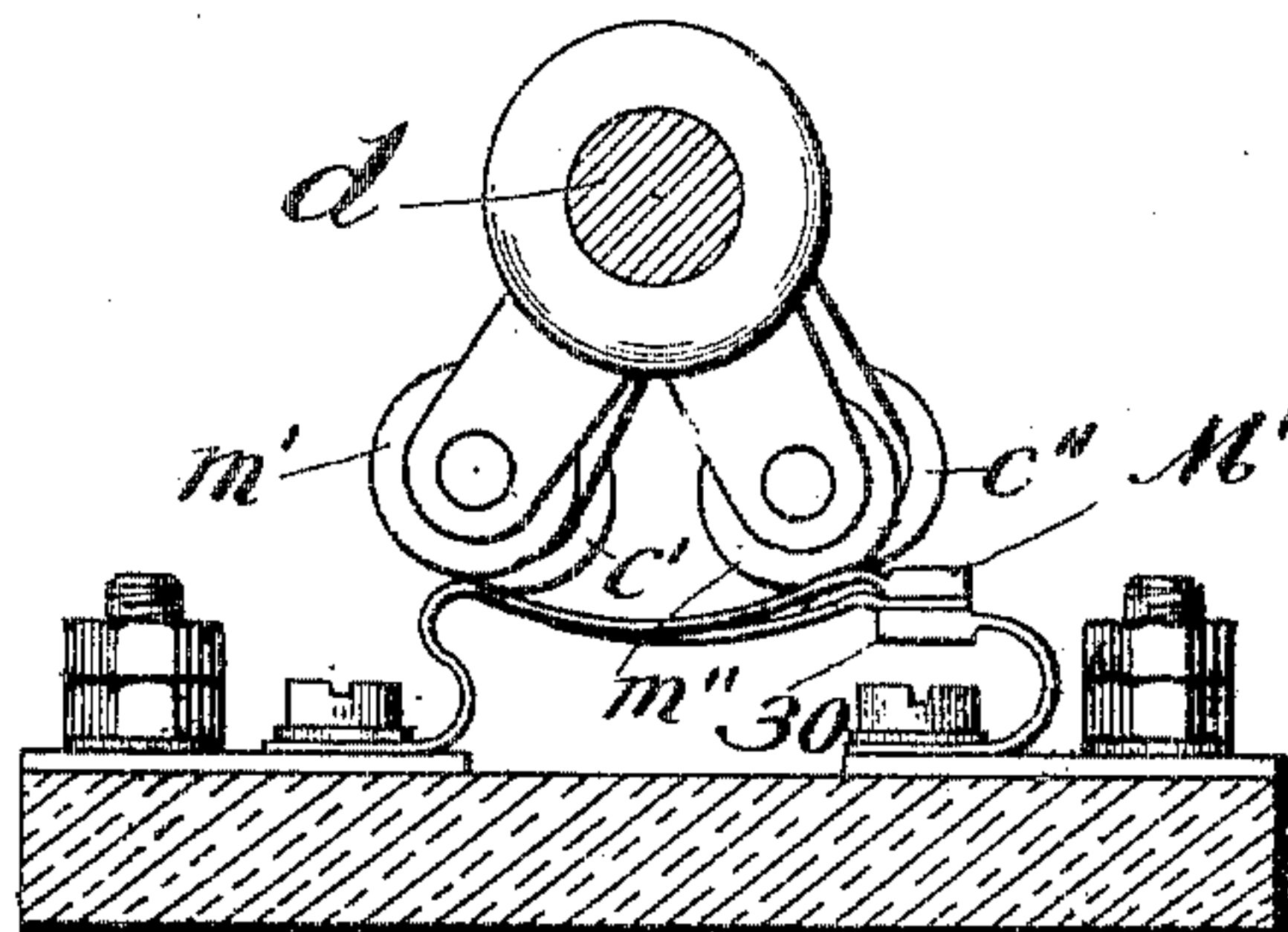
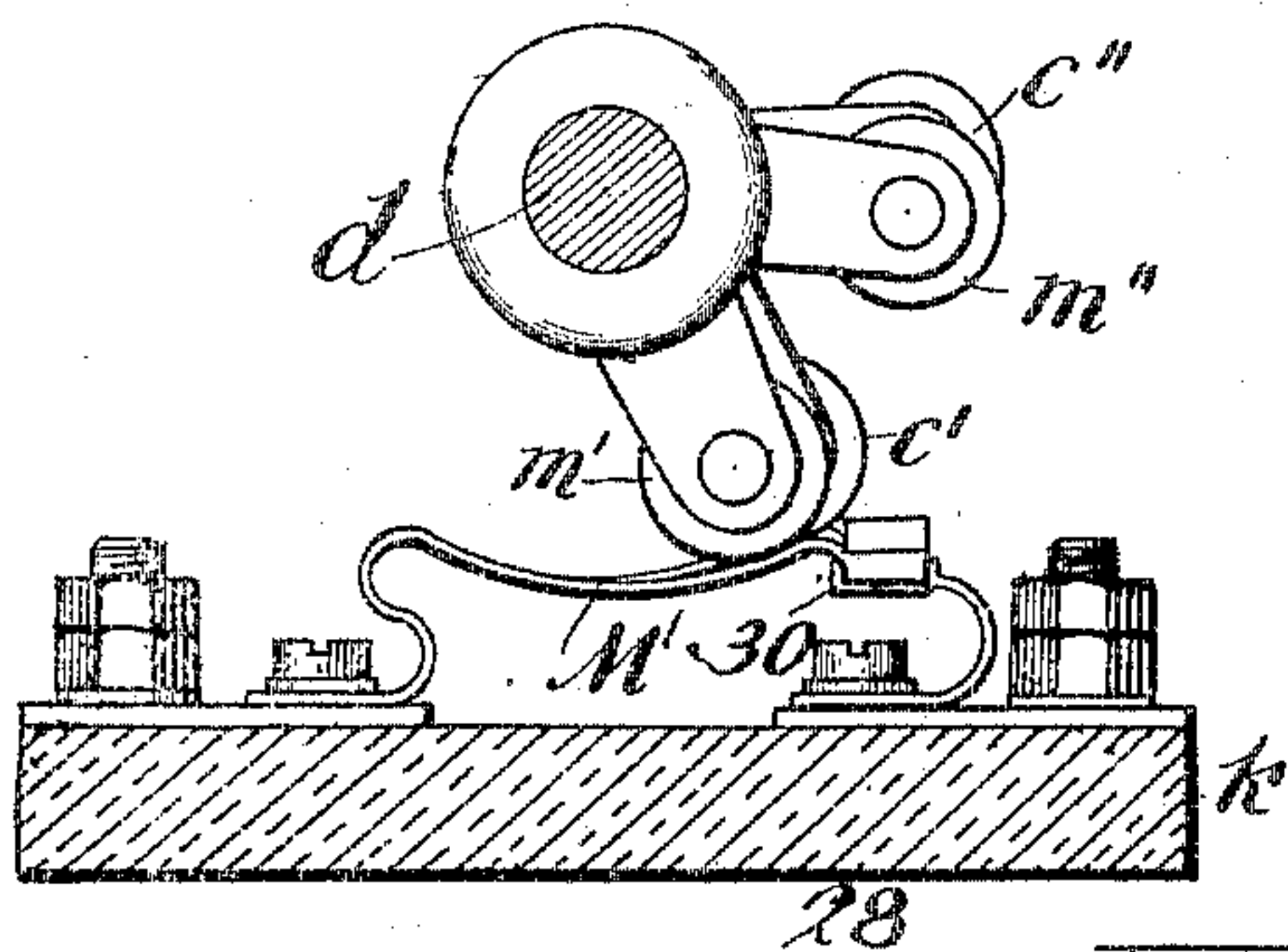
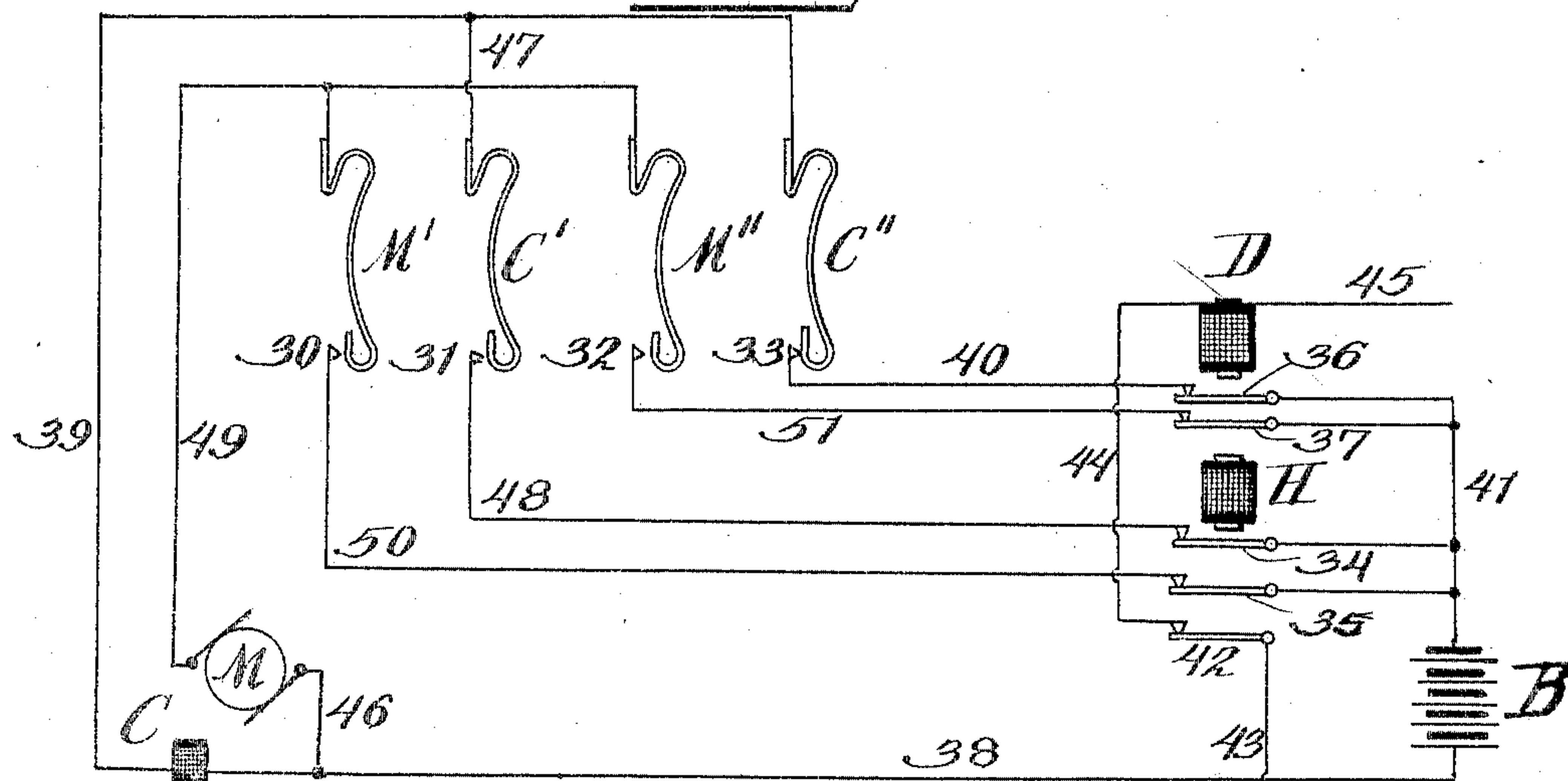


FIG. 15.



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UNITED STATES PATENT OFFICE.

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ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL RAILWAY SIGNAL
COMPANY, OF GATES, NEW YORK, A CORPORATION OF NEW YORK.

RAILWAY SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 775,797, dated November 22, 1904.

Application filed October 6, 1902. Serial No. 126,026. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. CADE, a subject of His Majesty the King of Great Britain, and a resident of Midland township, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Railway Signaling Apparatus, of which the following is a specification.

My invention relates to railway signaling apparatus, and the means embodying my invention, hereinafter particularly described, are adapted for use in an electrical automatic signaling system.

According to my invention I produce two different clear indications with the employment of a single clutch.

According to my invention an actuating part is provided which receives motion from a suitable motive mechanism under the control of such single clutch and which produces one clear indication in one part of its movement and the other clear indication in another part of its movement.

My invention also includes a lock for holding the home signal at "clear," such lock being controlled by the actuating part, and my invention includes various improvements in the construction and combination of parts, and has for its principal objects simplicity of construction and reliability of action and durability.

I will now describe the railway signaling apparatus embodying my invention, which is illustrated in the accompanying drawings, and will thereafter point out my invention in claims.

Figure 1 is a side elevation of a signal embodying my invention with the signal-box in section. Fig. 2 is an end elevation of the signal-actuating mechanism. Fig. 3 is a detail side elevation of the signal-operating levers and engaging part and back plate, showing the normal position of these parts with both signals at "safety." Fig. 4 is a detail section on the line 4 4, Fig. 2, of the sliding contact for the conductor of the clutch-electromagnet. Fig. 5 is a detail side elevation, and Fig. 6 is a detail end elevation, of the signal-

operating levers and engaging part and back plate, showing the position of these parts with both signals at "danger." Figs. 7 and 8 are similar views with the home signal at "clear" and the distant signal at "danger." Figs. 9 and 10 are details of the movable lock and adjacent parts. Fig. 11 is a vertical section of the upper part of the post, showing the connections between the up-and-down rods and the semaphores or signals. Figs. 12, 13, and 14 are enlarged sections on the line 12 12, Fig. 2, of the circuit-controller for the motor and clutch circuits in different positions. Fig. 15 is a diagram of the controlling-circuits of the motor and the clutch.

I shall describe the operation of the signal apparatus in a normally clear system, and Figs. 1 to 4, inclusive, and Figs. 12 and 15 illustrate the position of parts with both signals in the clear position. The drawings illustrate a construction of signaling apparatus in which two signals are employed—a home signal 16 and a distant signal 17—such signals constituting signal indicating means constructed to give three different indications of the conditions of railway traffic, "two blocks clear" with both signals in the safety position, as shown in Fig. 1, "one block clear" with the distant signal only in the danger position and "danger" or "train in home block" with both signals in the danger position.

The signals are shown as carried upon a signal-post 26. The signal-box 27 is secured upon this post and incloses and protects the signal-actuating mechanism. The up-and-down rods 14 for the home signal and 15 for the distant signal extend up through the post.

The actuating means for the signal mechanism are shown as consisting of an electric motor M, supported on the base 10, preferably pivotally on a vertical axis, so that the motor may be turned to permit ready access for cleaning the commutator-brushes, &c. The shaft *m* of this motor is connected by a clutch 11 with the shaft of a pinion 1, carried in bearings in the standard 9, this clutch permitting the motor to be turned on a vertical axis, as above described.

The motor imparts movement to a toothed actuating-drum *a*, which is loosely fitted on the main shaft *d*, so as to rotate freely thereon when not connected thereto by the clutch or electric slot mechanism hereinafter described. The connection between the motor *M* and the actuating-drum *a* is effected by a train of reducing-gearing, shown as comprising the pinion 1, above mentioned, meshing with the gear-wheel 2 on an intermediate shaft *n*, the pinion 3 on the shaft *n* meshing with the gear-wheel 4 on a second intermediate shaft *o* and the pinion 5 on the intermediate shaft *o* meshing with the gear-teeth 6 on the actuating-drum *a*. A suitable standard 7 provides front bearings for the shafts *n* and *o*, and the rear bearing for the shaft *n* is provided in a standard 18, and the rear bearing for the shaft *o* is provided in the central standard 8. This standard 8 also contains the front bearing for the main shaft *d*, the other main bearing for the main shaft *d* being provided in the rear standard 19.

The function of the electric motor and connecting-gearing is to actuate the main shaft *d* when the clutch or slot is engaged to put the signals to "clear." It is obvious that other constructions of motive mechanism may be employed for this purpose and that the motor may be pneumatic or gas-operated or of other suitable types.

The clutch or slot mechanism shown is of the same general construction as that shown in the patent to T. B. Keeler, No. 542,769, dated July 16, 1885. The electromagnet *C* of this slot mechanism is of the well-known iron-clad type, with a disk-shaped armature 20, and the armature-lever 21 has a loose and pivotal connection with the armature 20, so that the armature may freely seat itself on the poles of the electromagnet. The electromagnet *C* is carried on the disk *g*, which is rigidly secured upon the main shaft *d* and is located within the actuating-drum *a*, the drum *a* being, as aforesaid, loose upon the main shaft *d*. The armature-lever 21 is pivoted in a bracket 22, secured to the disk *g*, and its movement is limited by a back stop 23, and it has a projecting arm 24, arranged to engage with and lock the pawl 25 when the armature 20 is held against the poles of the clutch-electromagnet *C*. The pawl 25 is pivoted in a bracket 26, and its movement is limited by stops *i* and *j*, and when locked by the armature-lever it engages with one of the lugs *s*, thereby rotatively connecting the drum *a* and main shaft *d*, so that the actuation of the drum by the motor will actuate the main shaft. As shown in Fig. 1, with the signals in the normal clear position the clutch-electromagnet *C* is energized and the pawl 25 is in engagement with a lug *s* and holds the signals at "clear" against the resistance of their counterweights. With the parts in this position after the completion of the movement to "clear" the motor is

deenergized, and in some instances the friction of the gearing may be relied upon to prevent backward movement of the motor and accompanying movement of the signals to "danger;" but I provide a weighted pawl *e*, which will engage with a tooth *r* on the drum *a*, to prevent the counterweights from forcing the gearing and motor backward and putting the signals to "danger" when the clutch is energized and the motor deenergized.

The main shaft *d* carries an actuating part which causes one of the clear indications of the indicating means, as the putting of the home signal to "clear" by one portion of the pivotal or partly-rotative movement thereof, and the other clear indication of the indicating means, as the putting of the distant signal to "clear" by another portion of the pivotal or partly-rotative movement thereof, this actuating part being shown in the form of a plate *f*, rigidly secured upon the main shaft *d* and located thereon between the home-signal lever *t* and the distant-signal lever *u*, these two signal-levers being loosely mounted upon the main shaft so as to oscillate freely thereon and being actuated to raise the respective up-and-down rods to put the signals to "clear" by engagement with the actuating-plate *f*.

The home-signal lever *t* is connected with the home signal 16 by the up-and-down rod 14, which is pivotally joined at its lower end to the home-signal lever *t* and at its upper end to the arm 12 on the shaft of the home semaphore or signal. The distant-signal lever *u* is connected with the distant signal 17 by the up-and-down rod 15, which is pivotally joined at its lower end to the distant-signal lever *u* and has a slotted connection at its upper end with the arm 13 on the shaft of the distant semaphore or signal 17. The function of this slotted connection is to permit the distant-signal up-and-down rod 15 to perform its operations in the event of the distant signal being held at "clear" by freezing of the bearings or otherwise, so that the distant signal will not interfere with the movement of the home signal to "danger," and this slotted connection permits the distant signal to go to "danger" independently by its counterweight whenever the distant-signal up-and-down rod is lowered. It is of course understood that each semaphore is counterweighted to go to "danger" by its spectacle, as usual, and that the weight of the up-and-down rods also tends to move the signals to "danger" and the weight of the distant-signal up-and-down rod 15 will constitute the counterweighting means to open the clutch and move the distant-signal lever *t* to extreme lower position.

The normal position of the actuating-plate *f* is that shown in Figs. 2 and 3, with both signals at "clear." The signals will have been forced to this position against the action

of their counterweights by the actuating-plate *f*, which will have been actuated to effect such operation by the motor. I will now describe the operations whereby the signals are forced from their danger positions, to which their counterweights at all times tend to move them, to their normal clear positions. The positions of parts with both signals at "danger" is shown in Figs. 5 and 6, both up-and-down rods 14 and 15 being in their lowest positions. The first portion of the movement of the actuating part will clear the home signal, and this will be effected by the engagement of the actuating-plate *f* with a movable lock *y* in the home-signal-operating lever *t*. This movable lock *y* is shown as having end antifriction-rollers and is fitted to slide in a cross-slot which is formed in the end of the home-signal-lever *t* opposite to that at which the up-and-down rod 14 is connected thereto, and the actuating-plate *f* has an inclined face *v*, which bears against the front roller of the movable lock *y*, and the rear roller of the movable lock *y* bears against the lock-plate *w*, which is secured to the rear standard 19. The engagement of the movable lock *y* and the actuating-plate *f* causes the home-signal-operating lever *t* to move with the actuating-plate and force the home signal to "clear." At the completion of this movement the lock *y* is in the position shown in Fig. 10, ready to be forced back into a notch *w'* in the lock-plate *w* and clear of the actuating-plate *f* upon a further forward movement of the actuating-plate. Should the conditions of traffic require only the home signal to be put to "clear," the parts will remain in this position, (shown in Figs. 7, 8, 9, and 10,) the lock *y* bearing against the inclined face *v* of the actuating-plate ready to force the clutch open should the clutch-electromagnet C be deenergized and to return the home signal to "danger" in such event. The movement from the position indicating "one block clear" to the position indicating "two blocks clear" or the putting of the distant signal to "clear" is effected by a further forward movement of the actuating-plate *f*. The initial movement will move the lock *y* rearwardly into the notch *w'* and clear of the actuating-plate *f*, so that the further forward movement of the actuating-plate will not affect the home signal. The projection *v'* on the front face of the actuating-plate *f* will now engage with a projection *u'* on the distant-signal-operating lever *u*, and the actuating-plate will move the distant-signal-operating lever, thereby moving upward the distant up-and-down rod 15 and forcing the distant signal to "clear." At the completion of this movement the parts will be in the normal position. (Shown in Figs. 1, 2, and 3 and also in Fig. 11, the latter view showing the position of the up-and-down rods 14 and 15.) The counterweighting means, consisting of the up-and-down rod 15, now exert a pressure against the actuating-plate *f* at the engaging

projections *u'* and *v'* ready to force open the clutch as soon as the clutch-electromagnet C is deenergized.

The motor and clutch circuits are controlled by the movement of the signal-operating mechanism through a circuit-controller at the rear end of the main shaft *d*. This circuit-controller comprises four contact-springs M' C' M'' C'', (shown in diagram in Fig. 15,) these contact-springs being adapted to make contact with fixed points 30, 31, 32, and 33, respectively, under the control of rollers *m'* *c'* *m''* *c''*, respectively, carried on arms projecting from the main shaft *d*, the contact of each controlling-roller with its spring closing the spring upon its contact-point. The drawings also show a construction of sliding contacts for the conductors of the clutch-electromagnet C, comprising the two sliding contacts *p*, carried on arms on the main shaft *d* and moving at all times in contact with the conductor-springs *q*. (See Fig. 4.) The two conductor-springs *q* and the four contact-springs M' C' M'' C'' and the respective contact-points are carried on an insulating-plate *k*, supported on a bracket 28, this bracket 28 extending rearwardly from the rear standard 19, and the extreme rear end of the main shaft *d* is shown as guided in a bearing-piece 29, extending up from the rear end of the plate *k*.

For the purpose of controlling the indications of the signals suitable controlling means, automatic or manual, may be provided. For automatic control suitable circuits would be provided, affected by the conditions of traffic on the railway-line. The particular construction of controlling means or circuits forms no part of the present invention, and I have only illustrated in Fig. 15 a relay H, which will be the home relay or track-relay and will release its armature with a train in the home block, and a distant relay D, which will be included in either a track or a line circuit and will release its armature when the advance home signal is at "danger" or the block in advance of the home block is occupied by a train and which is shown as controlled by the home relay H through the armature-finger 42, so that its circuit will be opened when the home relay releases its armature. I have illustrated a portion only of the circuit of the distant relay, including the wire 43, armature-finger 42, and wires 44 and 45, and have not shown any part of the circuit of the home relay. I have shown diagrammatically armature-fingers 34, 35, and 42, carried by the home-relay armature and armature-fingers 36 and 37 carried by the distant-relay armature.

Figs. 12 and 15 illustrate the position of the parts with both signals in the normal clear position, the clutch-circuit being closed from the battery B through wire 38, clutch C, wire 39, spring C'', contact-point 33, wire 40, armature-finger 36, and wire 41 back to the battery. When a train passes the signals, the

home-relay will release its armature, and this will open the circuit of the distant relay D at the armature-finger 42, and the distant relay D will release its armature and open the clutch-circuit at the armature-finger 36. The armatures of both the home relay H and the distant relay D are now released. The counterweighting means will now open the clutch and return the signals to "danger," and thereby the main shaft will be partly rotated backwardly; but as the clutch and motor circuits are all opened at the relays H and D no circuits will be closed during this backward movement of the main shaft, and both signals will go to "danger." When the train leaves the home block, the home relay H will attract its armature. The circuit-controller will then be in the position shown in Fig. 13, the home motor-spring M' and the home clutch-spring C' being closed against their contact-points 30 and 31, respectively, and the attraction of the armature of the home relay H will close the motor-circuit and clutch-circuit, and the signal-actuating mechanism will be operated, as heretofore described, to put the home signal to "clear." The clutch-circuit will be from battery B through wire 38, clutch-electromagnet C, wires 39 47, home clutch-spring C', point 31, wire 48, armature-finger 34, and wire 41 back to battery. The motor-circuit will be from battery B by wires 38 46, motor M, wire 49, home motor-spring M', point 30, wire 50, armature-finger 35, and wire 41 back to battery. At the conclusion of the movement of putting the home signal to "clear," the circuit-controller will be in the position shown in Fig. 14, with the home motor-spring M' open, and thereby the motor will have been deenergized, and with the distant motor-spring M'' closed ready to energize the motor when the distant relay D is caused to attract its armature. The home clutch-spring C' is still closed, maintaining the direct control of the home relay H on the clutch-circuit. When the train leaves the advance block, or the advance home signal is cleared, the distant relay D will attract its armature, thereby closing the motor-circuit through the distant motor-spring M'' and causing the signal-actuating mechanism to be operated as described to put the distant signal to "clear." This motor-circuit will be as follows: from battery B by wires 38, 46, motor M, wire 49, distant motor-spring M'', point 32, wire 51, armature-finger 37, and wire 41, back to battery. The distant clutch-spring C'' closes before the home clutch-spring C' opens, so as to maintain the clutch-circuit closed without interruption. The circuit closed by the distant clutch-spring C'' is the normally closed circuit heretofore described. At the conclusion of this movement the parts are in normal position, the final movement opening the distant motor-spring M'' and leaving the distant clutch-spring C'' closed to hold the signals in the normal clear position so long

as the home block and the advance block are clear of trains.

If the signaling apparatus is operated upon the normal danger plan, the sequence of operations will be different from that above described, as is well understood.

It will be seen from Fig. 15 that the home relay H and the distant relay D are electric translating devices and that each controls the clutch and motor through the circuit-controller.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. In a railway signal apparatus, the combination of two signal indicating means each adapted to give two different indications; motive mechanism therefor; and clutch mechanism for setting the two indicating means successively and always in the same order, and for releasing them in the reverse order.

2. In a railway signal apparatus, the combination of two signal indicating means each adapted to give two different indications of railway traffic, and when free to take one indicating position; motive mechanism therefor; and a clutch mechanism actuated by the motive mechanism for setting the two indicating means successively, and for releasing them in the reverse order.

3. In a railway signal apparatus, the combination of two counterweighted signals each adapted to indicate danger and one block clear; motive mechanism therefor; and clutch mechanism for setting the two signals successively to indicate one block clear and two blocks clear, and for releasing them in the reverse order.

4. In a railway signal apparatus, the combination of two counterweighted signals each adapted to indicate danger and one block clear; motive mechanism therefor; connecting means actuated and released by said clutch and adapted to connect the motive mechanism with said two indicating means for setting them successively to indicate one block clear and two blocks clear; and a clutch between the motive mechanism and the connecting means.

5. In a railway signal apparatus, the combination of a home signal and a distance signal each adapted to indicate danger and one block clear; motive mechanism therefor; connecting mechanism comprising clutch mechanism for setting the two signals successively; and a clutch between the motor mechanism and the connecting mechanism.

6. In a railway signal apparatus, the combination of two signal indicating means each adapted to give two different indications; an actuating part; motive mechanism therefor; connecting means between the actuating part and both indicating means for setting said in-

dicating means successively; and a clutch adapted to connect the motive mechanism with the actuating part for operating the latter.

7. In a railway signal apparatus, the combination of two signal indicating means each adapted to give two indications; an actuating part; motive mechanism therefor; connecting means between the actuating part and both indicating means comprising a clutch mechanism adapted to connect with said indicating means successively to cause a clear indication of one of them and then of the other; means for returning the said indicating means to another position when released from said clutch.

8. In a railway signal apparatus, the combination of two signal indicating means each adapted to give a clear indication relating to a different portion of the railway from the other; an actuating part; motive mechanism therefor; connecting means between the actuating part and both indicating means adapted to operate one signal only, when the other signal is set; and means for returning the signals to the other position.

9. The combination of two signal indicating means each adapted to give a clear indication relating to a different portion of the railway from the other; an actuating part; motive mechanism therefor; connecting means between the motive mechanism and said actuating part; connecting means between said actuating part and each indicating means adapted to cause a complete setting movement of one indicating means by movement of the actuating part in one direction through one portion of its path, and a complete setting movement of the other indicating means by further movement in the same direction of the actuating part and to release said second indicating means by return movement of the actuating part through the same portion of the path by which it set said second indication means and to release said first indicating means by return of said actuating part through the same path by which it set said first indicating means; and a clutch between said motive mechanism and said actuating part for permitting the return of said indicating means.

10. In a railway-signal apparatus, the combination of two signal indicating means each adapted to give a clear indication with reference to a different portion of the railway from the other; a movable actuating part; motive mechanism; a clutch between said motive mechanism and said actuating part; and connecting means between said actuating part and both indicating means adapted to set one indication means by one portion of the movement of the actuating part in one direction, and to set the other indication means by further movement of the actuating part in the same direction and to return and release said indicating parts successively by a reverse movement of said actuating part.

11. In a railway signal apparatus, the combination of a home signal counterweighted to go to danger; a movable actuating part; motive mechanism; a part connected to the home signal, and with which said actuating part is adapted to engage to set the home signal against its counterweight; a part connected to the distant signal and with which said actuating part is adapted to engage to set the distant signal both signals being set successively by a movement of the actuating part in one direction; and a clutch connecting the motive mechanism and the actuating part.

12. In a railway signal apparatus, the combination of a home signal; an operating-lever, and a connecting-rod between the two; a distant signal; an operating-lever, and a connecting-rod between the two; motive mechanism; a movable actuating part adapted to engage both levers successively by a movement in one direction to cause clear indications of both signals successively; and a clutch for connecting and releasing the motive mechanism and the actuating part.

13. In a railway signal apparatus, the combination of a home signal and a distant signal; a movable actuating part; motive mechanism; a part connected to the home signal and with which said actuating part engages to set the home signal and to lock it in the clear position; a part connected with the distant signal and adapted to engage said actuating part to set the distant signal while the home signal is held locked in a set position; and a clutch mechanism between the motive mechanism and actuating part.

14. In a railway signal apparatus, the combination of a home signal and a distant signal; a movable actuating part; motive mechanism; a part connected to the home signal and with which said actuating part engages to set the home signal and to lock it in the clear position; a part connected with the distant signal and adapted to engage said actuating part to set the distant signal while the home signal is held locked in a set position.

15. The combination of a home signal counterweighted to go to danger and a part connected thereto, a distant signal counterweighted to go to danger and a part connected thereto, motive mechanism, a pivoted actuating part, means carried by said actuating part and adapted in the movement to clear to engage first with the part connected to the home signal to put the home signal to clear and then with the part connected to the distant signal to put the distant signal to clear, locking means for holding the home signal at clear controlled by the pivoted actuating part, and a single clutch adapted to connect the motive mechanism and pivoted actuating part to produce both of such indications.

16. The combination of a home signal counterweighted to go to danger, a distant signal counterweighted to go to danger, motive mechanism, a part connected to the home signal and

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a movable lock thereon, a pivoted actuating part adapted to engage with such lock to move the home signal to clear, a lock-plate adapted to receive such lock to hold the home signal at clear, a part connected to the distant signal and with which such pivoted actuating part is adapted to engage to move the distant signal to clear, and a single slot adapted to connect the motive mechanism and actuating part to produce both of such indications.

17. The combination of a home signal counterweighted to go to danger and a distant signal counterweighted to go to danger, an electrically-controlled motor, an actuating part and an electric-circuit controller controlled thereby, a single electric clutch adapted to connect the motor and actuating part, a home electric translating device controlling the clutch and motor through such circuit-controller, a part connected to the home signal and with which such actuating part is adapted to cooperate to put the home signal to clear and thereby open at such circuit-controller the motor-controlling circuit controlled by the home electric translating device, a distant electric translating device also controlling the clutch and motor through such circuit-controller, and a part connected to the distant signal and with which such actuating part is adapted to cooperate to put the distant signal to clear and thereby open at such circuit-controller the motor-controlling circuit controlled by the distant electric translating device.

18. The combination of a home signal counterweighted to go to danger and a distant signal counterweighted to go to danger, an electrically-controlled motor, a pivoted actuating part and electrical circuit-controller controlled thereby, a single electric clutch adapted to con-

nect the motor and actuating part, electric means controlling the clutch and motor through such circuit-controller, a part connected to the home signal and a movable lock thereon, the pivoted actuating part being adapted to engage with such lock to move the home signal to clear and thereby open at such circuit-controller the motor-controlling circuit for the home signal, a lock-plate adapted to receive such lock to hold the home signal at clear, and a part connected to the distant signal and with which such pivoted actuating part is adapted to engage to move the distant signal to clear, and thereby open at such circuit-controller the motor-controlling circuit for the distant signal.

19. The combination of a home signal and an up-and-down rod and operating-lever therefor, a distant signal counterweighted to go to danger and an up-and-down rod and operating-lever therefor, the distant signal and up-and-down rod being connected so as to permit the up-and-down rod to move to lower position independently of the distant signal, motive mechanism, a pivoted actuating part adapted in the movement to clear to engage first with the home-signal-operating lever to put the home signal to clear and then with the distant-signal-operating lever to put the distant signal to clear, a lock for holding the home signal at clear controlled by the pivoted actuating part, and a single clutch adapted to connect the motive mechanism and pivoted actuating part to produce both of such indications.

JOHN T. CADE.

Witnesses:

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