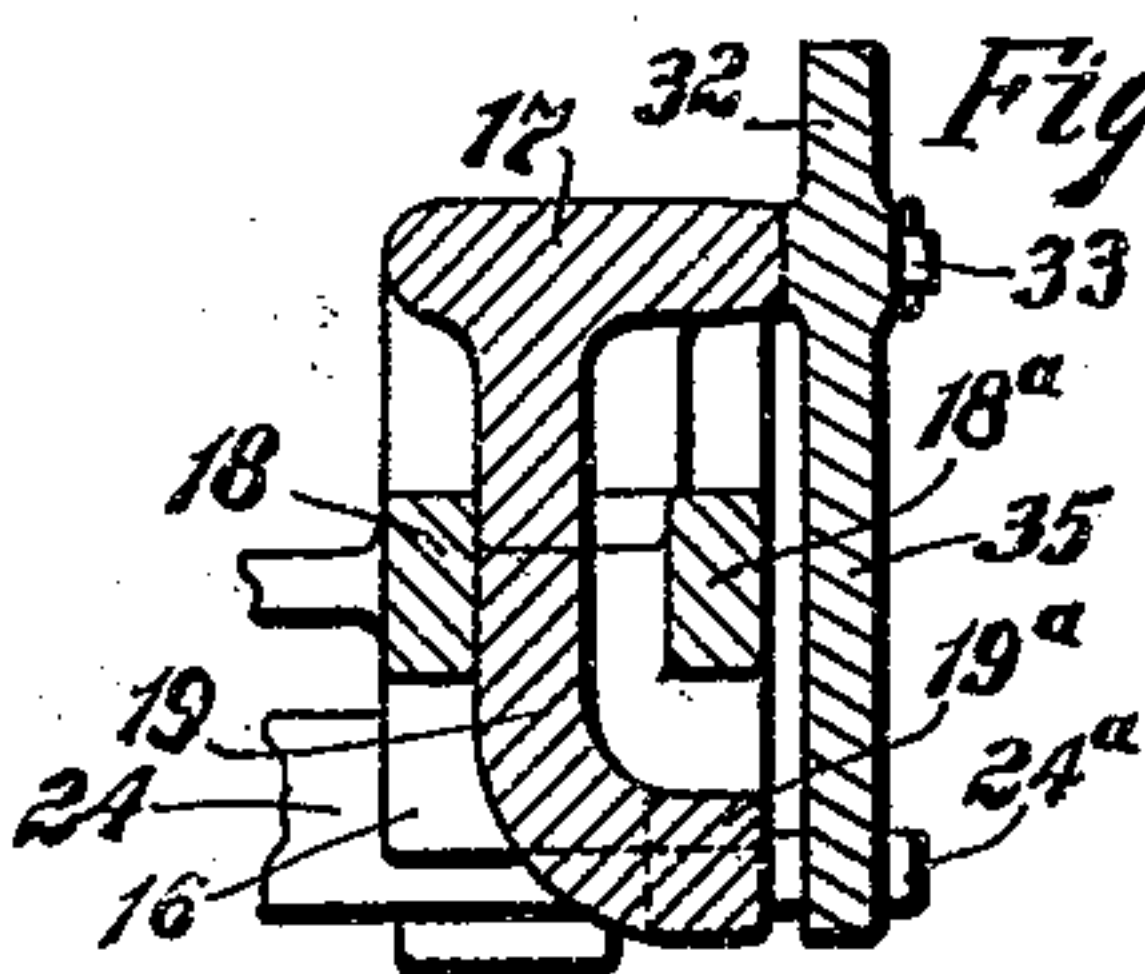
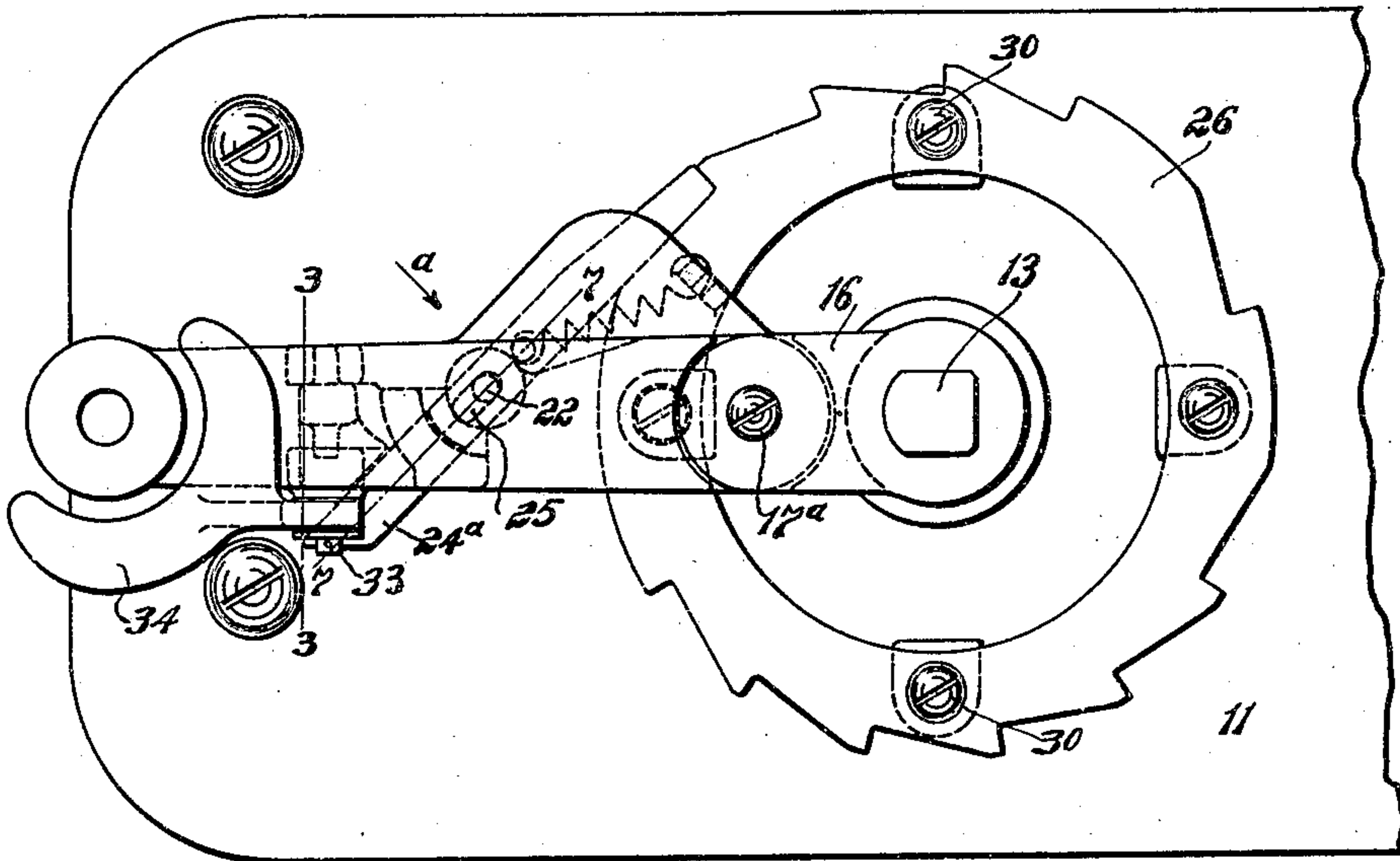
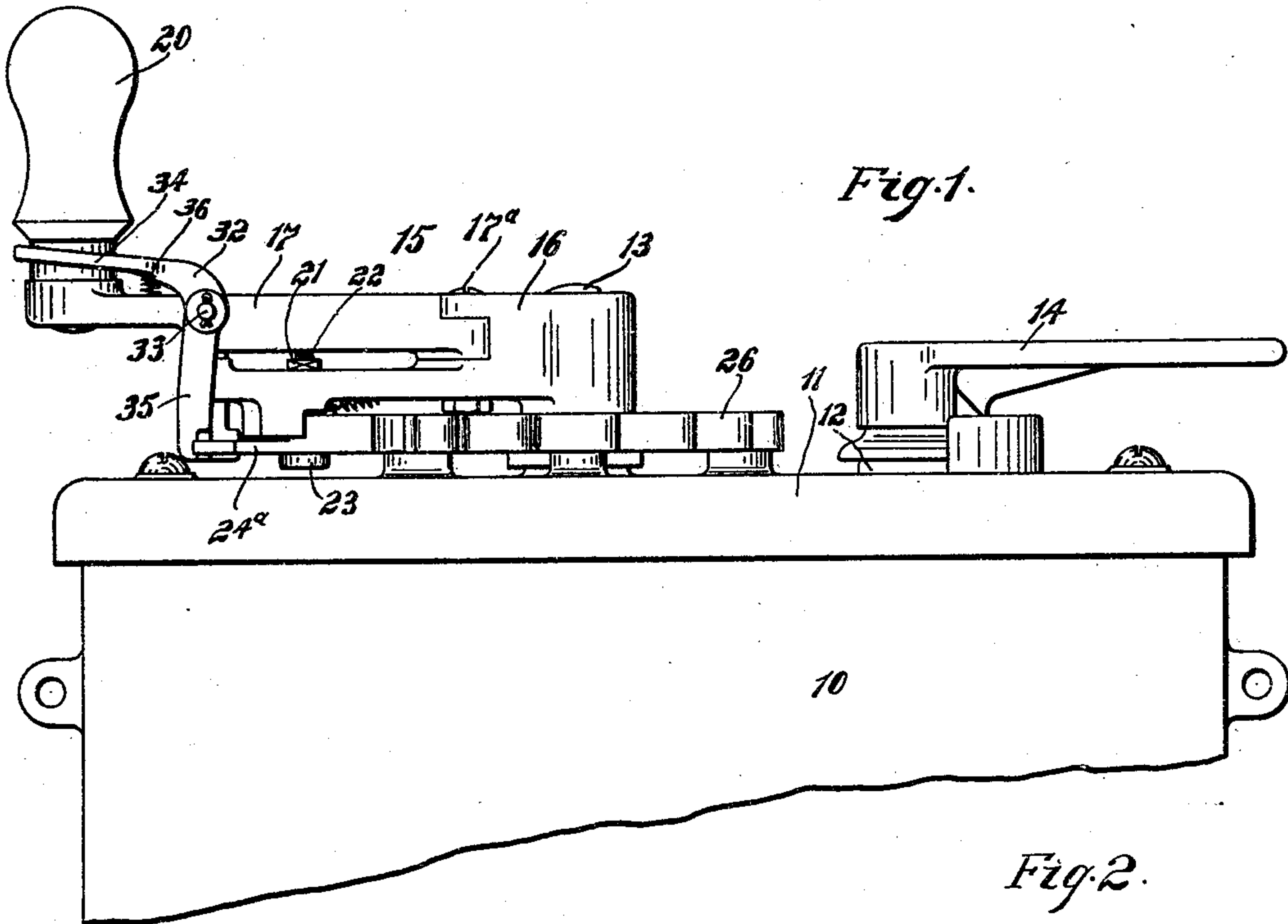


E. W. STULL.  
 CONTROLLER HANDLE.  
 APPLICATION FILED JUNE 22, 1905.

934,233.

Patented Sept. 14, 1909.  
 2 SHEETS—SHEET 1.



Witnesses:

Georges Schwartz.  
 Fred J. Kinsey.

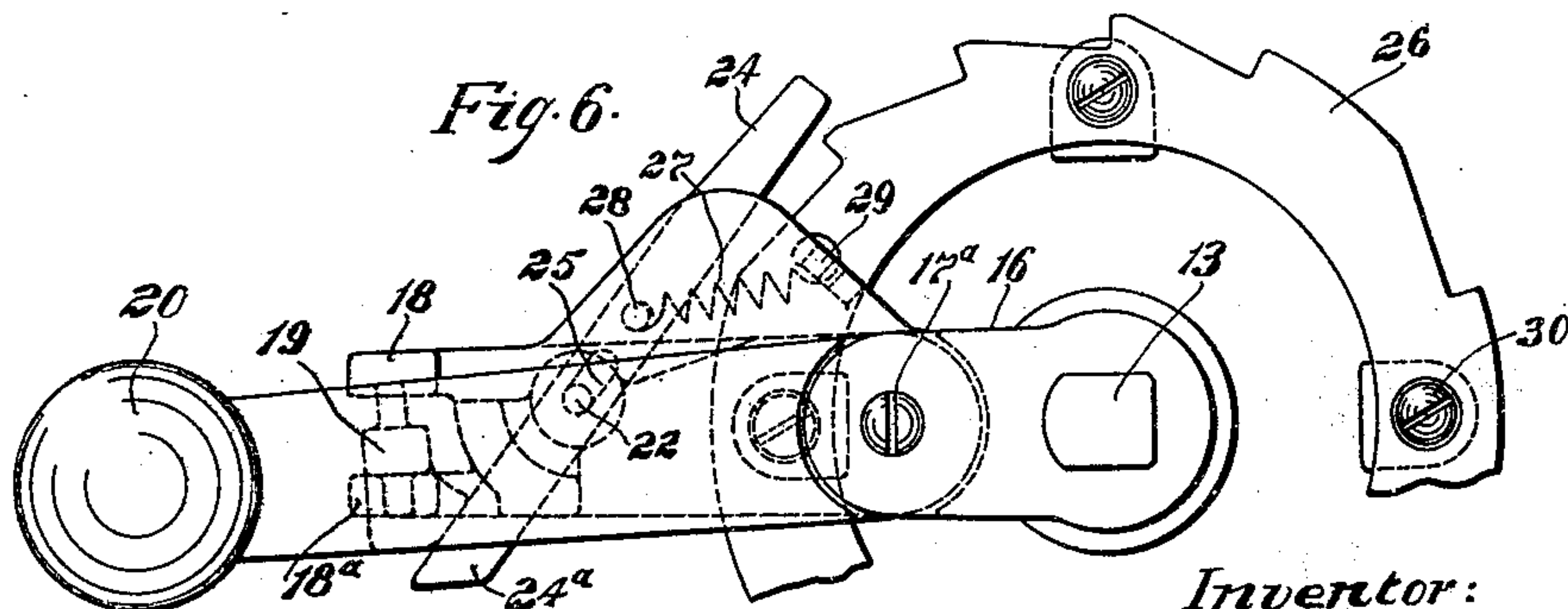
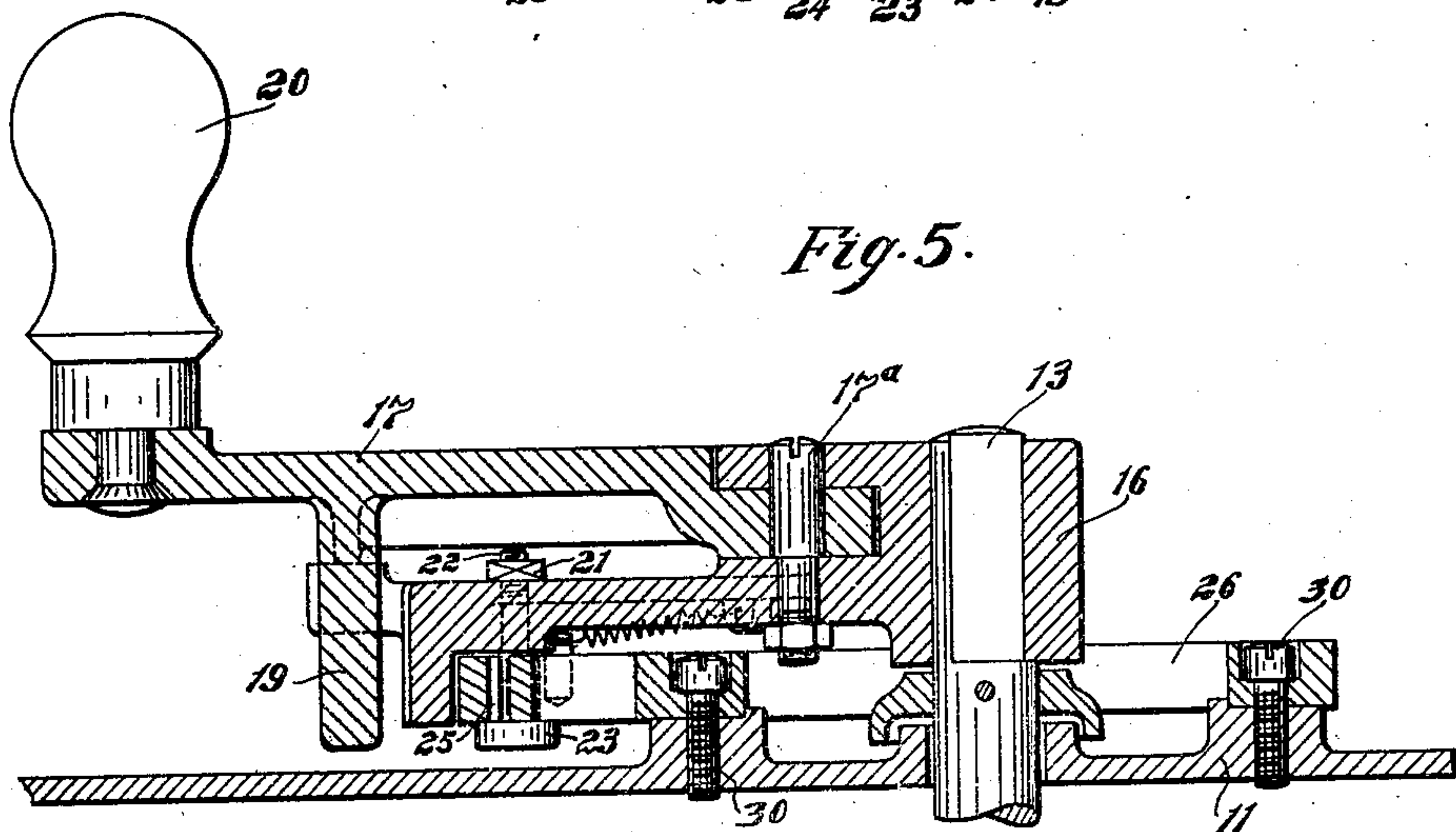
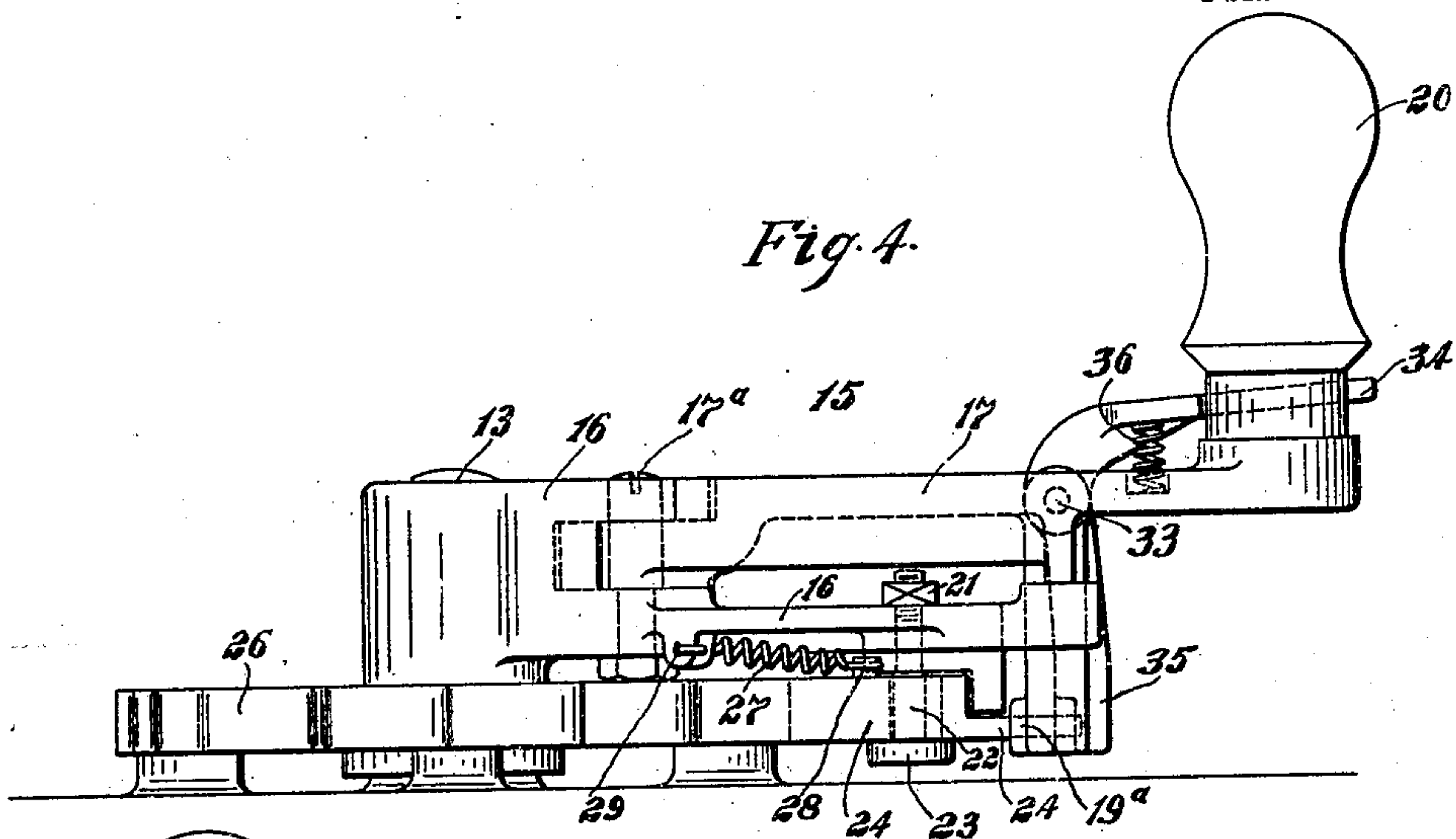
Inventor:  
 Emmett W. Stull.

By  
 Chas. E. Lord  
 Attorney.

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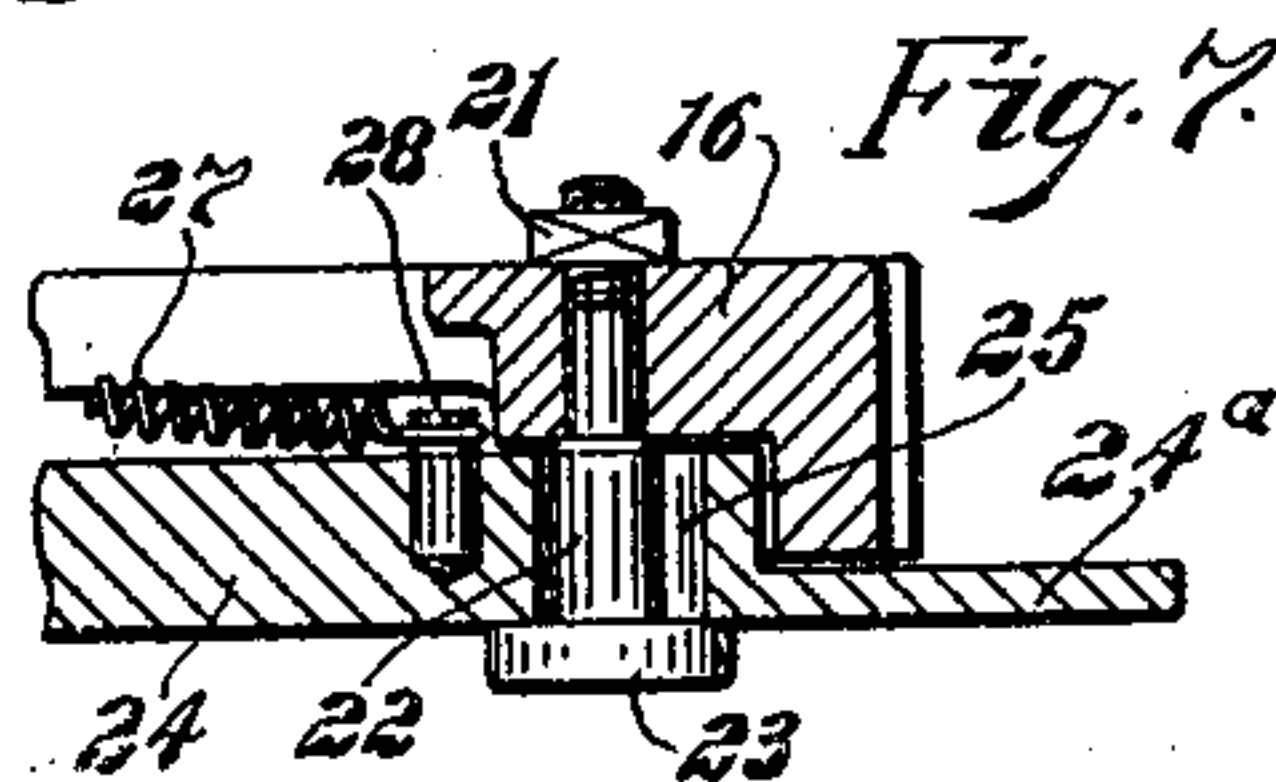
934,233.

Patented Sept. 14, 1909.  
 2 SHEETS—SHEET 2.



Witnesses:

*George Schwartz.*  
*Fred J. Kinsey.*



Inventor:

*Emmett W. Stull.*

By

*Chas. E. Lord*  
 Attorney.



# UNITED STATES PATENT OFFICE.

EMMETT W. STULL, OF NORWOOD, OHIO, ASSIGNOR TO THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

## CONTROLLER-HANDLE.

934,233.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed June 22, 1905. Serial No. 266,523.

*To all whom it may concern:*

Be it known that I, EMMETT W. STULL, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Controller-Handles, of which the following is a full, clear, and exact specification.

My present invention relates to improvements in motor controllers and particularly to the operating means for controllers employed in connection with electric railway equipments.

The object of the invention is to insure a gradual supply of current to the motors, so as to prevent an unnecessary waste of current in starting the motors, and also to avoid sudden and dangerous shocks to the controlled apparatus. This is accomplished by means of a novel form of controller handle which prevents a too rapid cutting out of the resistance in the motor circuit by necessitating a positive notching-up movement of the controller in a forward direction without interfering with its free movement in a backward direction.

A further object of my invention is to render it possible to move the controller forward at any desired rate of speed in case of emergency. This is accomplished by providing means for rendering the notching-up mechanism inoperative when found necessary.

More specifically considered the invention consists of a controller handle carrying a pawl which is adapted to engage a relatively fixed notched member, such as a quadrant or circle, said handle being provided with means for causing the pawl to engage one of the notches of said member when the handle is moved forward and for releasing said pawl from said notch when the handle is moved slightly backward. The device is preferably so constructed and arranged that the pawl is prevented from engaging the same notch when the handle is again moved forward.

In the accompanying drawings which illustrate the preferred embodiments of my invention, Figure 1 is a front elevation of the upper part of a railway controller equipped with my improved handle; Fig. 2 is a plan view of the controller handle shown in Fig.

1; Fig. 3 is a sectional view on the line 3—3 of Fig. 2; Fig. 4 is a rear elevation of the handle shown in Fig. 1; Fig. 5 is a longitudinal section through the improved handle; Fig. 6 is a plan view similar to Fig. 2 with the operating mechanism in a different position and omitting the means for rendering the notching-up mechanism inoperative; Fig. 7 is a section on line 7—7 of Fig. 2 looking in the direction indicated by arrow *a*.

Referring now to the drawings, it will be seen that the controller casing 10 is provided with the cap-plate 11 through which project the upper ends of the reversing switch shaft 12 and the main switch shaft 13. The reversing switch shaft is provided with the customary operating handle 14. The main switch shaft is provided with my improved operating handle 15 which permits a semiautomatic notching-up of the controller to prevent a too rapid cutting out of the resistance in the motor circuit, and a too rapid acceleration of the motors. The handle is preferably provided with means for rendering the notching-up mechanism inoperative so that in case of an emergency the handle may be moved without obstruction from the "off" position into any desired position. The handle 15 comprises the arm 16 fixed to shaft 13 and the arm 17 pivoted at 17<sup>a</sup> on the arm 16 and movable relative thereto. This relative movement is limited by the lug 19, which operates between lugs 18 and 18<sup>a</sup> forming a bifurcated end of arm 16. These co-acting limiting lugs are clearly shown in section in Fig. 3. The outer end of the arm 17 is provided with the knob 20 which is grasped by the hand of the operator. The force exerted by the operator to turn the controller drum forward is transmitted through the arm 17 and arm 16 to shaft 13, the lug 19 being then in positive engagement with the lug 18 as shown in Figs. 2 and 3. During the backward movement of said drum the lug 19 is in engagement with lug 18<sup>a</sup> as clearly shown in Fig. 6.

Fastened to the arm 16 by means of nut 21 is a pin 22, which projects below said arm and is provided at its lower end with an enlarged head 23. As shown in Fig. 7, the part of said pin which projects below the arm 16 is of slightly larger diameter than the part which passes through said arm.



This pin forms the support for the pawl 24, said pawl being provided with the enlarged slot 25 to permit a free rotary movement of the pawl about said pin 22, and a reciprocatory movement of the pawl relative to the pin or of the pin relative to the pawl. The pawl 24 is provided with means tending normally to maintain said pawl in engagement with the notched member, such as a notched quadrant or circular rack 26, said means consisting of a spring 27 one end of which is fastened to the pawl 24 at 28 and the other end of which is fastened to the projecting lug 29 on arm 16. The spring 27 also tends to maintain the pawl at one limit of its reciprocatory movement as shown in Fig. 6. As shown in Fig. 6, the pawl has been moved out of engagement with the notches of rack 26, by a slight backward movement of the arm 17 relative to the arm 16 without moving the controller drum. During this slight backward movement of the controlling handle, the projection 19<sup>a</sup> on the lower end of lug 19 strikes the rear end 24<sup>a</sup> of the pawl 24 and rotates said pawl about the pin 22 to move it away from the notched member. The notched member is fastened to the cap-plate 11 by screws 30.

It is advantageous at times in cases of emergency to be able to move the controller drum forward rapidly from the "off" position. For this purpose I have provided means for rendering the notching-up mechanism inoperative, said means comprising an auxiliary bell crank lever 32 pivoted at 33 on the arm 17 of handle 15. One arm of this lever is provided with the crescent-shaped plate 34 partially embracing the lower end of knob 20. This plate is engaged by the hand of the operator by a slight downward movement from said knob and is purposely so constructed and arranged that it requires especial attention and effort on the part of the operator to so place his hand that he can grip the knob 20 and at the same time throw the plate 34 downward. Such an arrangement tends to discourage the operator from attempting to use this device except in case of an emergency. When the plate 34 is depressed by the operator, the arm 35 of the lever 32 is moved into engagement with the projection 24<sup>a</sup> of pawl 24 to move the latter positively out of engagement with the notched member 26. The lever 32 is maintained in the position shown in Figs. 1 and 4 by means of the spring 36. This lever for cutting out the notching-up mechanism may be omitted if desired, (as shown in Fig. 6.)

In the operation of my improved controller handle, when the knob 20 is grasped by the operator and the handle 15 is moved forward from the "off" position, the arm 17 is moved on its pivot 17<sup>a</sup> until the lug 19 engages lug 18 and the power thus applied to

the handle is then transmitted through its arm 16 to rotate the controller drum. As said drum moves into its first operative position the pawl 24 is drawn by spring 27 into one of the notches of the member 26 as shown in Fig. 2 and further forward movement is arrested when the pin 22 strikes the opposite end of slot 25. To release the pawl from said notch it is necessary to move the handle, that is, the arm 17 of said handle, backward a very short distance or until the projection 19<sup>a</sup> strikes the part 24<sup>a</sup> of pawl 24, and moves the pawl about pin 22 away from the notched member or rack. This is preferably accomplished without moving the arm 16 or the controller drum backward. As soon as the outer end of pawl 24 passes the top of the tooth of the notched member, the spring 27 acts to move said pawl into the opposite limit of its reciprocatory movement, so that the opposite end of slot 25 strikes the pin 22. This position of said pawl is clearly shown in Fig. 6. It will thus be seen that means are provided for preventing the pawl from falling back into the same notch when the handle is moved forward into the next advance position. This notching-up of the controller drum by positively locking the handle against forward movement and then releasing the handle by a slight backward movement of same is repeated at each operative position of the controller, the notches in the member 26 corresponding to such positions. When it is desired to move the controller rapidly forward from the "off" position or any other position in case of emergency, the operator depresses the plate 34 thereby holding the pawl 24 positively out of engagement with the notched member 26. It will be noted that the notches of member 26 are so constructed and arranged as to offer no obstruction to a backward movement of the controlling handle.

I am fully aware that many changes and modifications may be made in my improved handle without departing from the spirit and scope of the invention, and I aim in the appended claims to cover all such modifications and changes.

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

1. In combination, a controller handle, a relatively fixed notched member, a pawl carried by said handle and normally engaging said member, means for releasing said pawl from a notch of said member by a slight backward movement of said handle, and means for moving said pawl into engagement with said member and for preventing the pawl from engaging the same notch when the handle is again moved forward after having released the pawl from a certain notch.

2. A controller handle, provided with a



notching-up mechanism, comprising a pawl carried by the handle, a notched member with which said pawl engages, means for causing said pawl to engage one of the notches of said member when the handle is moved forward and for releasing said pawl from said notch when the handle is moved slightly backward, and means for rendering said notching-up mechanism inoperative in case of an emergency.

3. In combination, a controller handle, a relatively fixed notched member, a pawl carried by said handle and normally engaging said member, means for releasing said pawl from a notch of said member by a slight backward movement of said handle, means for moving said pawl into engagement with said member and for preventing the pawl from engaging the same notch when the handle is again moved forward after having released the pawl from a certain notch, and means for holding said pawl out of engagement with said member so that the handle may be moved through its entire range of movement in a forward direction without obstruction.

4. In a controller, a shaft, an operating handle therefor comprising an arm fixed upon said shaft and a second arm having a limited movement relative to the arm on said shaft, a relatively fixed notched member, a pawl carried by said handle, means tending to move said pawl into engagement with said member, means carried by said second arm for engaging said pawl to release same from a notch of said member by a movement of the second arm relative to the arm fixed on said shaft, and means for permitting said pawl to be moved independently a predetermined distance so that it will not reengage the notch from which it has just been released.

5. In a controller, a handle, a notched member, a pawl mounted on said handle and capable of a rotary and a reciprocatory movement relative to said handle, means tending normally to maintain said pawl in engagement with said notched member and for moving said pawl forward relative to said handle when the pawl is released from one of the notches of said member, and means for releasing said pawl from the notch in said member by a slight backward movement of the handle.

6. In a controller, a handle, a notched member, a pawl mounted on said handle and capable of a rotary and reciprocatory movement relative to said handle, a spring normally tending to maintain said pawl in engagement with said notched member and for forcing said pawl forward relative to said handle when the pawl is released from one of the notches of said member, and means for releasing said pawl from said notch by a slight backward movement of the handle.

7. In combination, a controller handle, a pawl carried by said handle, a relatively fixed rack, means for causing said pawl to engage one of the notches of said rack when the handle is moved forward, means for releasing said pawl from said rack by a slight backward movement of the handle, and means for preventing the pawl from engaging the same notch when the handle is again moved forward, the teeth on said rack being so constructed and arranged as to permit an unobstructed backward movement of the handle.

8. A controller handle, provided with a notching-up mechanism comprising a pawl carried by said handle, a rack with which said pawl engages, means for causing said pawl to engage one of the notches of said rack when the handle is moved forward and for releasing said pawl from said notch when the handle is moved slightly backward, and a lever carried by said handle adapted to engage said pawl and render the notching-up mechanism inoperative in case of an emergency.

9. A controller handle, provided with a notching-up mechanism comprising a pawl carried by said handle, a notched member with which said pawl engages, means for causing said pawl to engage one of the notches of said member when the handle is moved forward and for releasing the pawl from said notch when the handle is moved slightly backward, and a bell crank lever pivoted on said handle and having one arm adjacent to the knob on said handle so as to be engaged readily by the operator's hand and its other arm adapted to engage said pawl to hold same out of engagement with said member so as to render the notching-up mechanism inoperative in case of an emergency.

10. In combination, a controller handle, means for stopping said handle at predetermined points in its forward movement, means for releasing said stopping means by a slight backward movement of the handle, and means for rendering the stopping means inoperative in order to permit a continuous forward movement of the handle.

11. In combination, a controller handle, a pawl for stopping said handle at predetermined points successively in its forward movement, means operated by the handle during a slight backward movement thereof for releasing said pawl, and means for rendering said pawl inoperative in order to allow an uninterrupted forward movement of the handle.

12. In combination, a controller handle, a pawl carried thereby, a fixed member with which the pawl is arranged to engage to stop the controller handle at predetermined points in the forward movement of the latter, and means operated by the handle dur-



ing a slight backward movement thereof for separating the pawl from the fixed member.

13. In combination, a controller handle, a pawl carried thereby, a fixed member with which the pawl is arranged to engage to stop the controller handle at predetermined points in the forward movement of the latter, means operated by the handle during a slight backward movement thereof for separating the pawl from the fixed member, and means for holding said pawl away from said fixed member in order to allow an uninterrupted forward movement of the handle.

14. In combination, a controller handle, notching-up mechanism requiring said handle to be moved forward in a series of steps between successive steps of which series a comparatively slight backward movement of the handle is necessary, and means for rendering said notching-up mechanism inoperative.

15. In combination, a controller handle, a pawl carried thereby, a fixed notched member with the notches of which said pawl is adapted to engage to stop the controller handle at predetermined points in the forward movement of the latter, and means for disengaging the pawl and the notch by a slight backward movement of the handle.

16. In combination, a controller handle, a pawl carried thereby, a fixed notched member with the notches of which said pawl is adapted to engage to stop the controller handle at predetermined points in the forward movement of the latter, means for disengaging the pawl and the notch by a slight backward movement of the handle, and means for preventing the engagement of the pawl with the notches.

17. In combination, a controller handle, means for stopping said handle at a predetermined point in its forward movement, means for releasing said stopping means by a comparatively slight backward movement of the controller handle, and means for preventing the operation of said stopping means.

18. In combination, a controller handle, means for stopping said handle at predetermined points in its forward movement, means for releasing said stopping means by a movement of the handle, and means for preventing the operation of said stopping means.

19. In a controller, a movable member, an operating handle having a limited movement on said member, a stop, a dog loosely pivoted on said member and arranged to engage with said stop upon a movement of said member in the "on" direction, means on said handle for lifting the dog out of engagement with the stop upon a movement of the handle in the "off" direction, and means for then moving the dog forward past the stop.

20. In a controller, a movable member, an

operating handle provided with a projection and having a limited movement on said member, a stop, a dog loosely pivoted on said member and arranged to engage with the said stop upon a movement of said member in the "on" direction, the projection on said handle being arranged to engage the dog and lift it out of engagement with the stop upon a movement of the handle in the "off" direction, and a spring arranged to push the dog forward as soon as it is lifted out of engagement with the stop.

21. In a controller, a shaft, an operating handle therefor comprising an arm fixed upon said shaft and a second arm pivoted on the arm on said shaft and having a limited movement relative thereto, a notched member, a pawl carried by said handle, means for moving said pawl into engagement with said member, means carried by the second arm for engaging said pawl and moving same away from said member when the second arm is moved relative to the arm fixed upon said shaft, and means for preventing the pawl from engaging the same notch of said member twice in succession.

22. In combination, a controller handle, means for stopping said handle at predetermined points in its forward movement, and means for releasing said stopping means by a slight backward movement of the handle.

23. In combination, a controller handle, a pawl for stopping said handle at predetermined points successively in its forward movement, and means operated by the handle during a slight backward movement thereof for releasing said pawl.

24. In combination, a controller handle, means for stopping said handle at a predetermined point in its forward movement, and means for releasing said stopping means by a comparatively slight backward movement of the controller handle.

25. In combination, a controller handle, means for stopping said handle at predetermined points in its forward movement, and means for releasing said stopping means by a turning movement of the handle.

26. In a controller, a rotary member, an operating handle having a limited movement on said member, means for locking said member against movement in the "on" direction, and means for releasing said member operative upon a movement of the handle in the "off" direction.

27. In a controller, a rotary member, an operating handle having a limited movement on said member, means for locking said member against movement in the "on" direction, and means controlled by a movement of the handle in the "off" direction independently of the said member for releasing said member.

28. In a controller, a movable member, an



operating handle, a dog for locking said member against movement in the "on" direction, and means operated by the handle upon a reverse movement thereof for releasing the dog.

29. In a controller, a movable member, an operating handle, a dog for locking said member against movement in the "on" direction, and means controlled by a reverse movement of the handle for releasing the dog.

30. In a controller, a movable member, an operating handle, a series of stops, a dog arranged to engaged successively with said stops to lock said member against movement in the "on" direction, and means operated by the handle upon movement thereof in the

off direction for releasing the dog from said stops.

31. In a controller, a movable member, an operating handle, a series of stops, a dog arranged to engage successively with said stops to lock said member against movement in the "on" direction, and means controlled by the movements of the operating handle in the "off" direction for releasing the dog from said stops.

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

EMMETT W. STULL.

Witnesses:

L. LOWENBERG,  
FRED J. KINSEY.