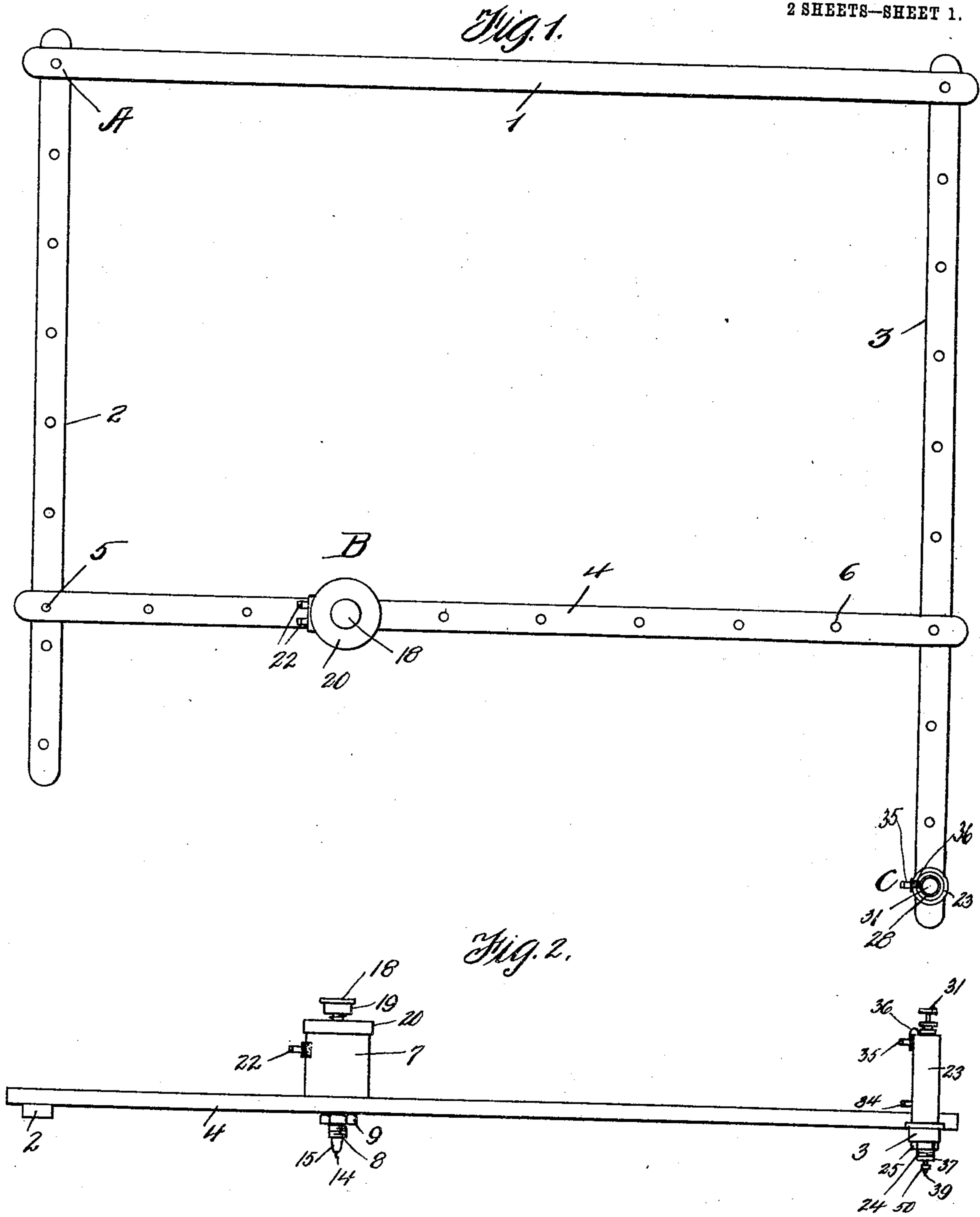


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ELECTRIC CONTROL FOR PANTOGRAPHS.  
APPLICATION FILED JAN. 22, 1909.

938,936.

Patented Nov. 2, 1909.  
2 SHEETS—SHEET 1.



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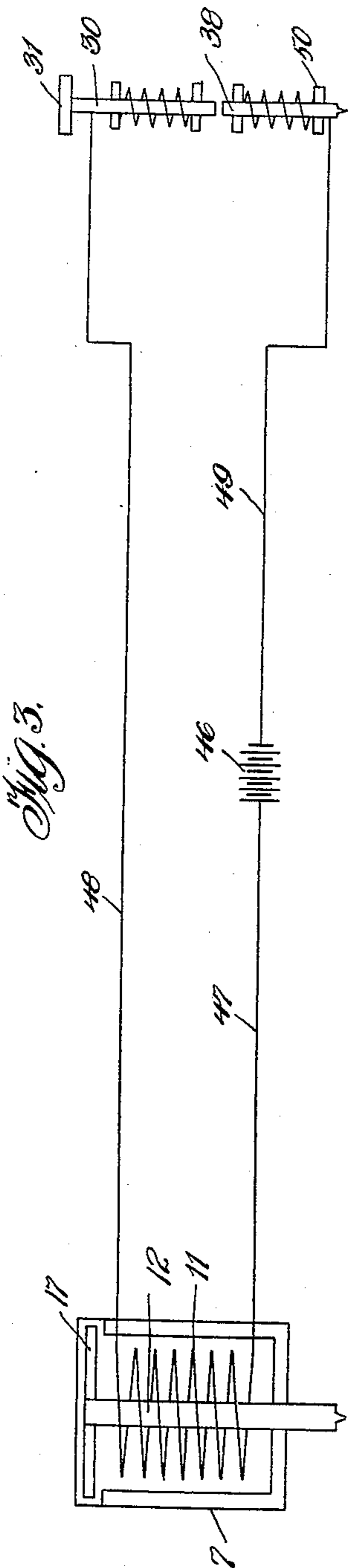


Fig. 3.

Fig. 7.

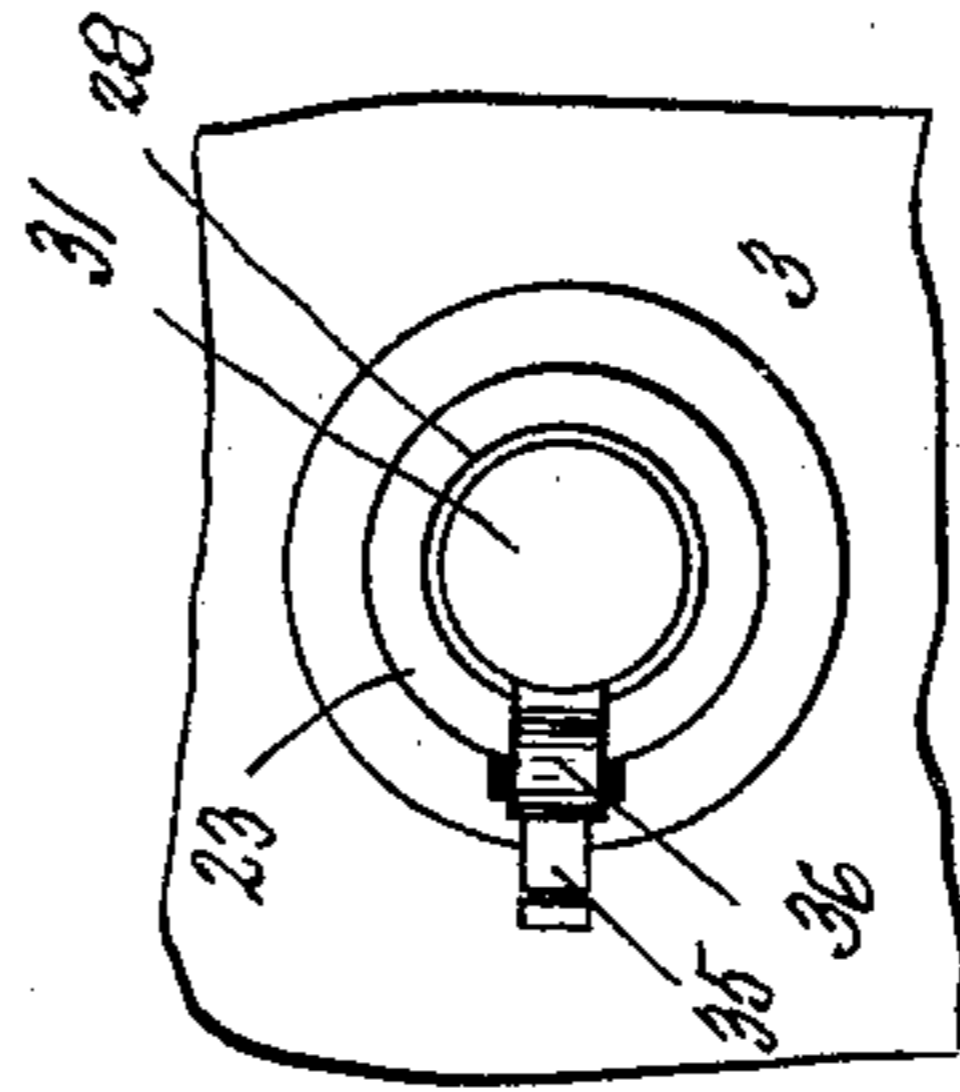


Fig. 8.

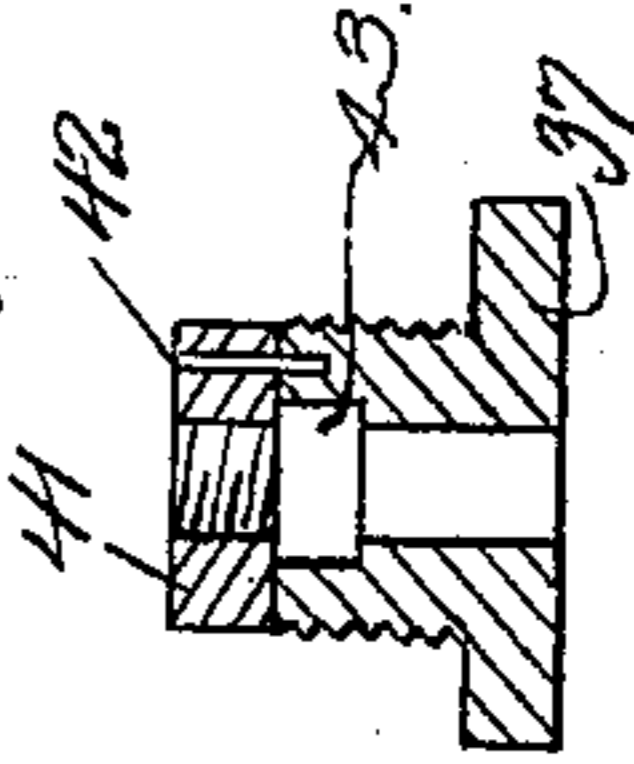


Fig. 6.

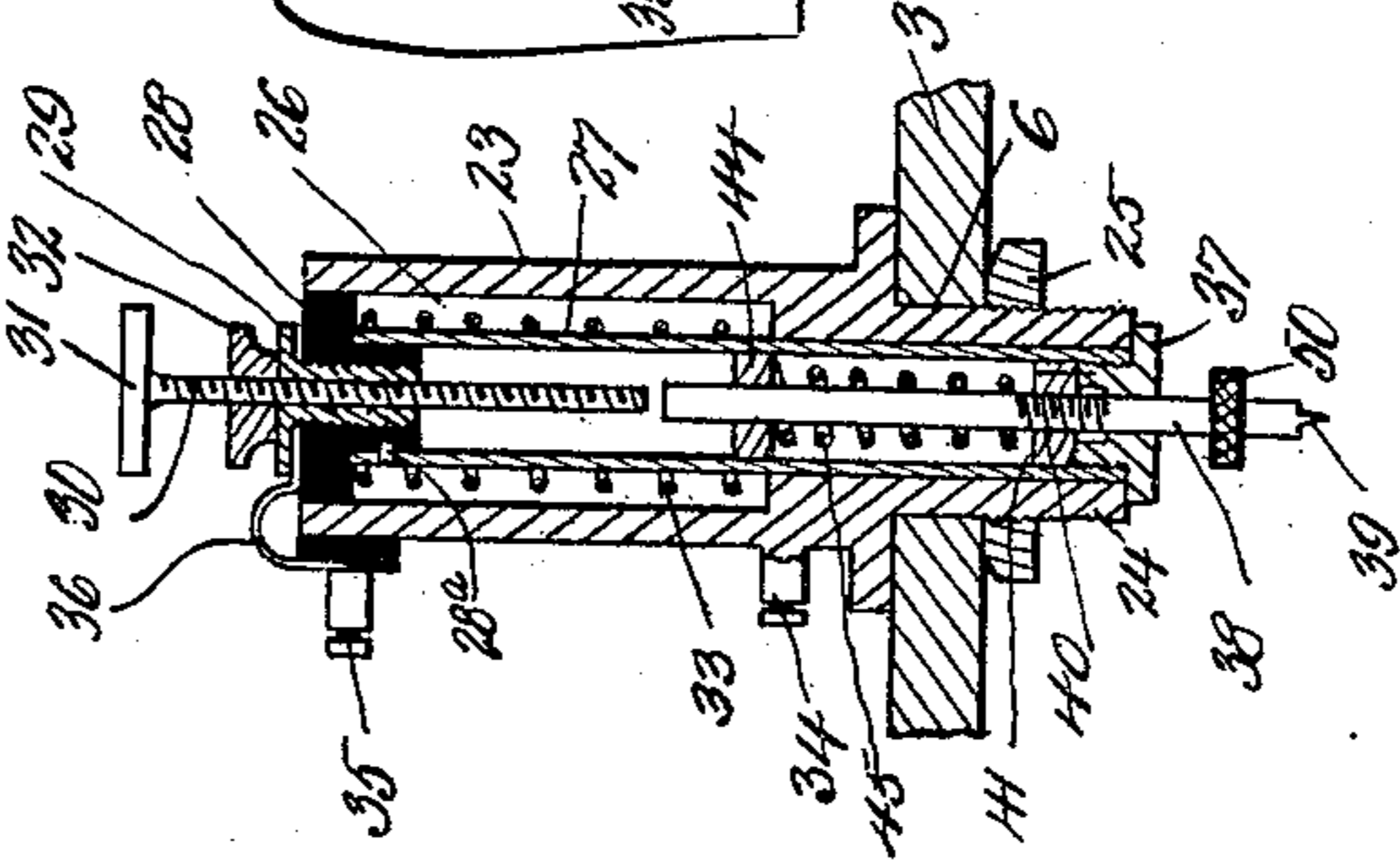


Fig. 5.

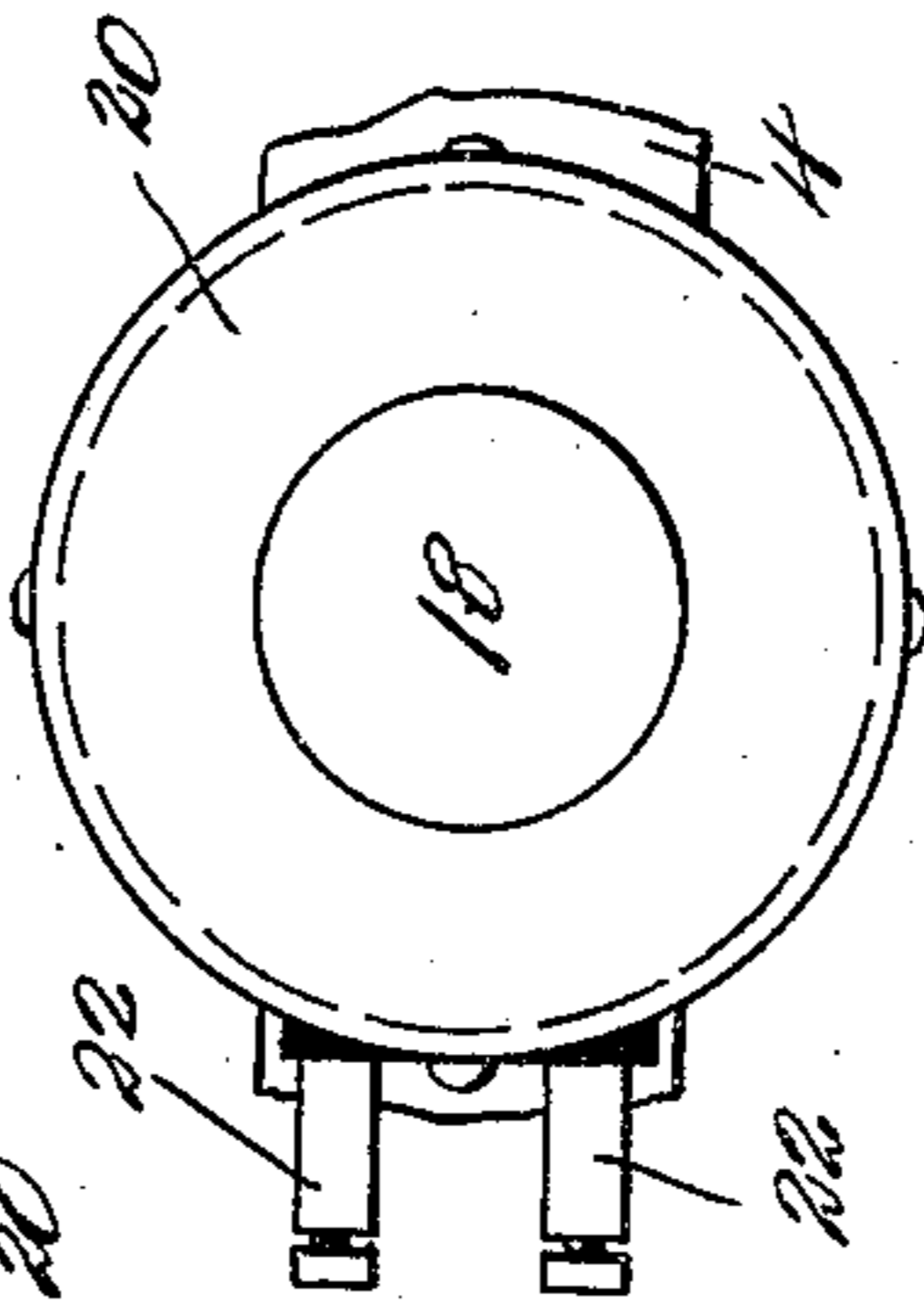
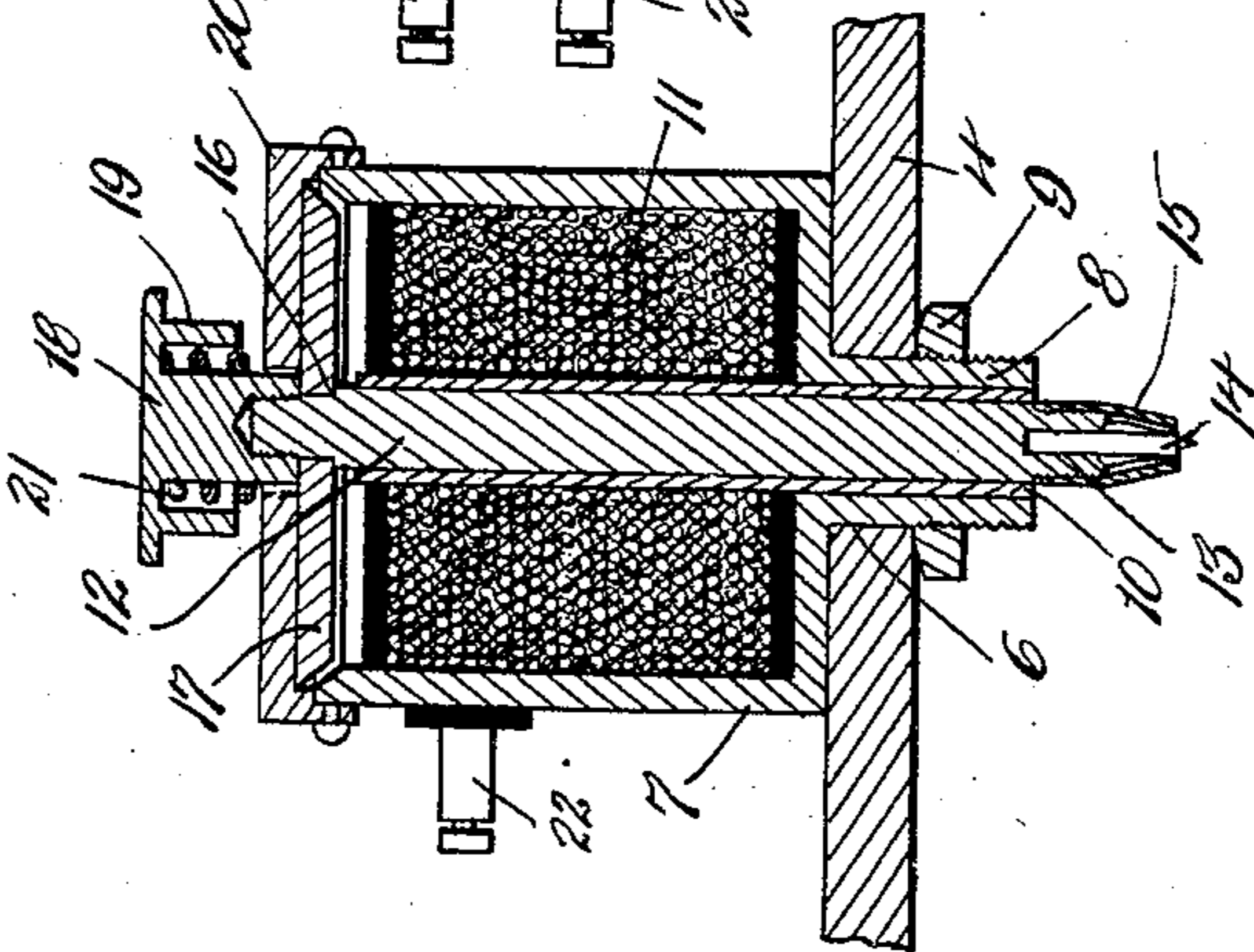


Fig. 4.



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# UNITED STATES PATENT OFFICE.

ALFRED T. ZIEGLER, OF PITTSBURG, PENNSYLVANIA.

## ELECTRIC CONTROL FOR PANTOGRAPHS.

938,936.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed January 22, 1909. Serial No. 473,754.

*To all whom it may concern:*

Be it known that I, ALFRED T. ZIEGLER, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric Control for Pantographs, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an electric control for pantographs, and instruments used in reproducing plans, maps and other drawings, so that the copy may be very similar to, or larger or smaller than the original.

The primary object of my invention is to provide a pantograph with detachable tracing and following points, the latter controlling the operation of the former.

Another object of this invention is to provide a pantograph with a normally elevated tracing point, which can be automatically lowered by the operator of the pantograph to produce a point or line.

A further object of this invention is to utilize electrical appliances in connection with a pantograph to facilitate the operation of the same and insure accuracy.

Considerable difficulty is experienced when using a pantograph in properly positioning the same, whereby the tracing and following points will cooperate to gradually reproduce a drawing, thus requiring skill on the part of the operator to manage the pantograph whereby just such lines that are desired will be produced. In other words, the tracing point often contacts with the paper and produces points and lines that are not wanted, consequently the operator must continuously watch the tracing point and carefully handle the pantograph. I obviate these defects by providing a normally elevated tracing point, which can be automatically lowered by the operator of the pantograph, and whereby points and lines can be produced without giving attention to the tracing point. This is accomplished by providing a novel following point which can be manipulated by the operator to automatically move the tracing point, whereby it will produce a point or line, but will clear the paper entirely while the following point is shifted from one place to another. This is an important characteristic of my invention as it enables a draftsman to mark off the

principal points in a copy, through which lines may afterward be drawn, and during such operation it will be impossible for any points to be accidentally placed upon the paper when shifting the pantograph.

The invention will be hereinafter described in detail, and reference will now be had to the drawings, wherein—

Figure 1 is a plan of the pantograph equipped with the electric control, Fig. 2 is a side elevation of the same, Fig. 3 is a diagrammatic view of the electrical circuits of the pantograph, Fig. 4 is a vertical sectional view of the tracing point of the pantograph, Fig. 5 is a plan of the same, Fig. 6 is a vertical sectional view of the following point, Fig. 7 is a plan of the same, and Fig. 8 is an enlarged vertical sectional view of an adjusting nut forming part of the following point.

In the accompanying drawings, 1, 2, 3 and 4 designate the rails constituting the frame of a pantograph, said rails being adjustably and pivotally connected together by pins 5 or similar fastening means extending through openings 6 formed in the rails. At two of these openings are located the tracing and following points, and as shown in Fig. 1, the point A represents the fixed point of the pantograph when the same is to be used, the point B the tracing point, and the point C the following point, the following point C being manipulated by the operator of the pantograph in following the lines or demarcations of the drawing to be reproduced by the tracing point.

Considering first the tracing point B, reference will be had to Figs. 4 and 5 of the drawings. The tracer is constructed upon the principle of an electro-magnet with the core thereof serving as a pencil or point holder. The tracer comprises a cylindrical shell 7 having a depending exteriorly threaded plug 8 adapted to extend through one of the openings 6 of the frame 4, said plug being held within the opening by a nut 9 screwed thereon. Extending through the plug 8 is a vertical sleeve 10 and surrounding said sleeve within the shell 7 is a winding of wire 11 similar to an ordinary electro-magnet.

The sleeve 10 is made of brass or a non-magnetic metal, and movably mounted in said sleeve is a core 12 having the lower end thereof provided with a socket 13 for a steel

point or pencil 14, said steel point or pencil being held within the socket by a chuck 15 threaded upon the lower end of said core. The upper end of the core 12 is chamfered, as at 16, for a circular armature 17, said armature being held upon the core by a push button 18 threaded upon said core. The push button 18 is provided with a circular depending flange 19, and arranged between said button and a cap 20 mounted upon the upper end of the shell 7 is a coil spring 21, said spring normally maintaining the armature 17 and the core 12 in an elevated position. The cap 20 is cut away to provide clearance for the button 18 and limits the upward movement of the armature 17, while the lower edge of the flange 19 limits the lowering movement of said armature by contacting with the cap 20.

The sides of the shell 7 are provided with binding posts 22, and these posts are connected to the winding of wire 11 within said shell.

Reference will now be had to Figs. 6, 7 and 8, wherein I have illustrated the following point. This following point comprises a cylindrical casing 23 having a depending tubular plug 24 adapted to extend through one of the openings 6 of the frame 3. The plug is exteriorly screw threaded for a nut 25 employed for retaining the casing upon said frame. The plug 24 communicates with the bore 26 of the casing and in said plug is movably mounted a metallic sleeve 27. In the upper end of the sleeve 27 is mounted a cap of insulation 28, said cap also snugly fitting within the casing 23. Centrally of the cap 28 is arranged a flanged nut 29 and adjustably mounted in said nut is a threaded stem 30 having a head 31. Upon the stem 30 is located a lock nut 32 for holding the stem 31 in an adjusted position relative to the nut 29.

Encircling the sleeve 27 within the bore 26 is a coil spring 33, said spring engaging the insulated cap 28 and normally supporting said cap and said sleeve in an elevated position.

The casing 23 is provided with two binding posts 34 and 35, the latter being insulated from the casing 23 and provided with a metallic resilient arm 36 extending beneath the flange of the nut 29 and contacting with said nut, which is threaded in the cap of insulation 28. To retain the cap of insulation 28 in engagement with the sleeve 27, a pin 28<sup>a</sup> is used, this pin extending through the sleeve 27 into the cap of insulation, but not contacting with the nut 29.

Detachably mounted in the lower end of the sleeve 27 is a nut 37 and extending through said nut into the sleeve is a vertical rod 38 having a reduced end or following point 39. The rod is threaded, as at 40, for a nut 41, said nut being loosely held in

engagement with the nut 37 by a pin 42, and said nut 37 is cut away, as at 43, to clear the thread 40 of the rod 38. The rod 38 extends upwardly in the sleeve 27 and through a collar 44 fixed within said sleeve. Encircling the rod 38 between the collar 44 and the nut 41 is a coil spring 45, the object of which will presently appear.

In connection with the control of a pantograph a suitable source of electrical energy is used, as a battery 46. This battery is connected by a wire 47 to one of the binding posts 22 of the tracing point and the other of said binding posts is connected by a wire 48 to the binding post 35 of the following point, while the binding post 34 of said following point is connected by a wire 49 to the battery 46.

Operation: As heretofore stated, it is preferable that the operator simply manipulate the following point, after the tracing point and following point have been properly positioned on the frames of the pantograph for the desired reduction and enlargement or reproduction to be made. Assuming that the operator is locating points to be afterward connected by lines, a certain point having been located upon a copy, the operator presses downwardly upon the head 31 of the stem 30. The cap 28 and the sleeve 27 move downwardly in the casing 23, placing the spring 33 under tension. Since the nut 37 is carried by the sleeve 27 and the nut 41 by the rod 38 and said nut 41 bearing upon the nut 37, the downward movement of the sleeve 27 will be retarded by the following point 39 contacting with the copy. The final downward movement of the sleeve 27 is limited by the lower end of the stem 30 contacting with the upper end of the rod 38, this being accomplished by the rod 38 remaining stationary while the nut 37 moves out of engagement with the nut 41 carried by the rod 38, placing the spring 45 under tension, the rod 38 having free movement in the collar 44 and the nut 41 free movement in the sleeve 27.

When the stem 30 contacts with the rod 38 an electrical circuit is completed which energizes the electro-magnet of the tracing point, attracts the armature 17 and lowers the steel point or pencil 14 to reproduce an indication of the following point. When the operator releases the stem 30, the springs 33 and 45 return the parts of the following point to their normal position, while the spring 21 returns the pencil or steel point 14 to its normal position.

The secondary or final movement of the sleeve 27 can be governed by adjusting the stem 30 relative to the rod 38, and the primary movement of the sleeve 27 can be regulated by adjusting the rod 38 in the nut 41, said nut being prevented from rotating relative to the nut 37 by the pin 42. To facilitate

tate the adjustment of the rod 38, the lower end of said rod is provided with a knurled nut 50.

The operator can lower the tracing point by depressing the button 18 without manipulating the following point of the pantograph.

From the foregoing description it will be observed that the control, can be used in connection with the frames of various types of pantographs and that the invention in its broadest aspect comprehends an electrically operated tracing point located at one place, the operator of the circuit closer controlling the operation of the tracing point.

While in the drawings forming a part of this application there is illustrated a preferred embodiment of my invention, I would have it understood that the same can be varied or changed as to shape, proportion and manner of assemblage without departing from the spirit of the invention.

Having now described my invention what I claim as new, is:—

1. In an electric control for pantographs, the combination with a pantograph frame, and a suitable source of electrical energy, of an electrically actuated tracing point located upon said frame, said tracing point comprising a detachable electro-magnet having a movable normally elevated core, a point detachably held by said core, a following point located upon said frame and in circuit with said electro-magnet and said source of electrical energy, said following point comprising a circuit closer for controlling the energizing of said electro-magnet, said circuit closer including a rod, an adjustable stem adapted to contact with said rod, and means for normally maintaining said stem out of engagement with said rod.

2. In an electric control for pantographs, the combination with a pantograph frame, and a suitable source of electrical energy, of an electrically actuated tracing point located upon said frame, said tracing point comprising an electro-magnet having a movable core, and a point detachably held by said core, a circuit closer located upon said frame and in circuit with said source of electrical energy and said electro-magnet for controlling the energizing of said electro-magnet, said circuit closer comprising a casing, a sleeve mounted in said casing, a rod

adjustably mounted in said sleeve, a stem adjustably mounted in said sleeve and adapted to contact with said rod for completing a circuit through said electro-magnet.

3. In an electric control for pantographs, the combination with a pantograph frame, and a suitable source of electrical energy, of an electrically actuated tracing point located upon said frame, said tracing point comprising an electro-magnet having a movable core, and a point detachably held by said core, a circuit closer located upon said frame and in circuit with said source of electrical energy and said electro-magnet for controlling the energizing of said electro-magnet, said circuit closer comprising a movable sleeve, a rod adjustably mounted in said sleeve, and a stem adjustably mounted in said sleeve and adapted to contact with said rod for completing a circuit through said electro-magnet.

4. In an electric control for pantographs, the combination with a pantograph frame, and a suitable source of electrical energy, of an electrically actuated tracing point located upon said frame, said tracing point comprising an electro-magnet having a movable core, and a point detachably held by said core, a circuit closer located upon said frame and in circuit with said source of electrical energy and said electro-magnet for controlling the energizing of said electro-magnet, said circuit closer comprising movable contacts adapted to establish a circuit through said electro-magnet.

5. In an electric control for pantographs, the combination with a pantograph frame, and a suitable source of electrical energy, of an electrically actuated tracing point located upon said frame, said tracing point comprising an electro-magnet having a movable core, and a circuit closer located upon said frame and in circuit with said electro-magnet and said source of electrical energy, said circuit closer comprising movable contacts adapted to establish a circuit through said electro-magnet for moving a core.

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

ALFRED T. ZIEGLER.

Witnesses:

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A. J. TRIGG.