

No. 734,511.

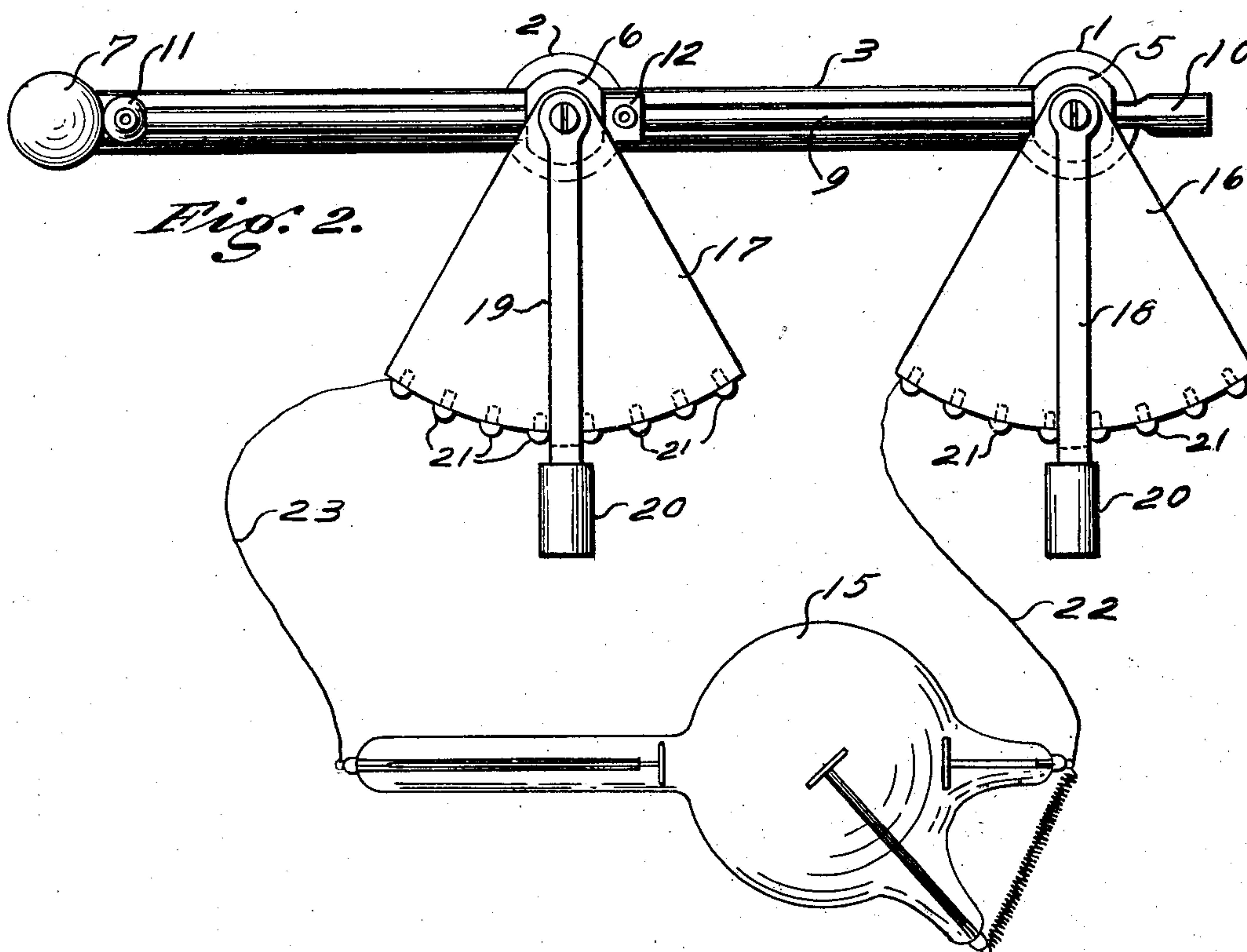
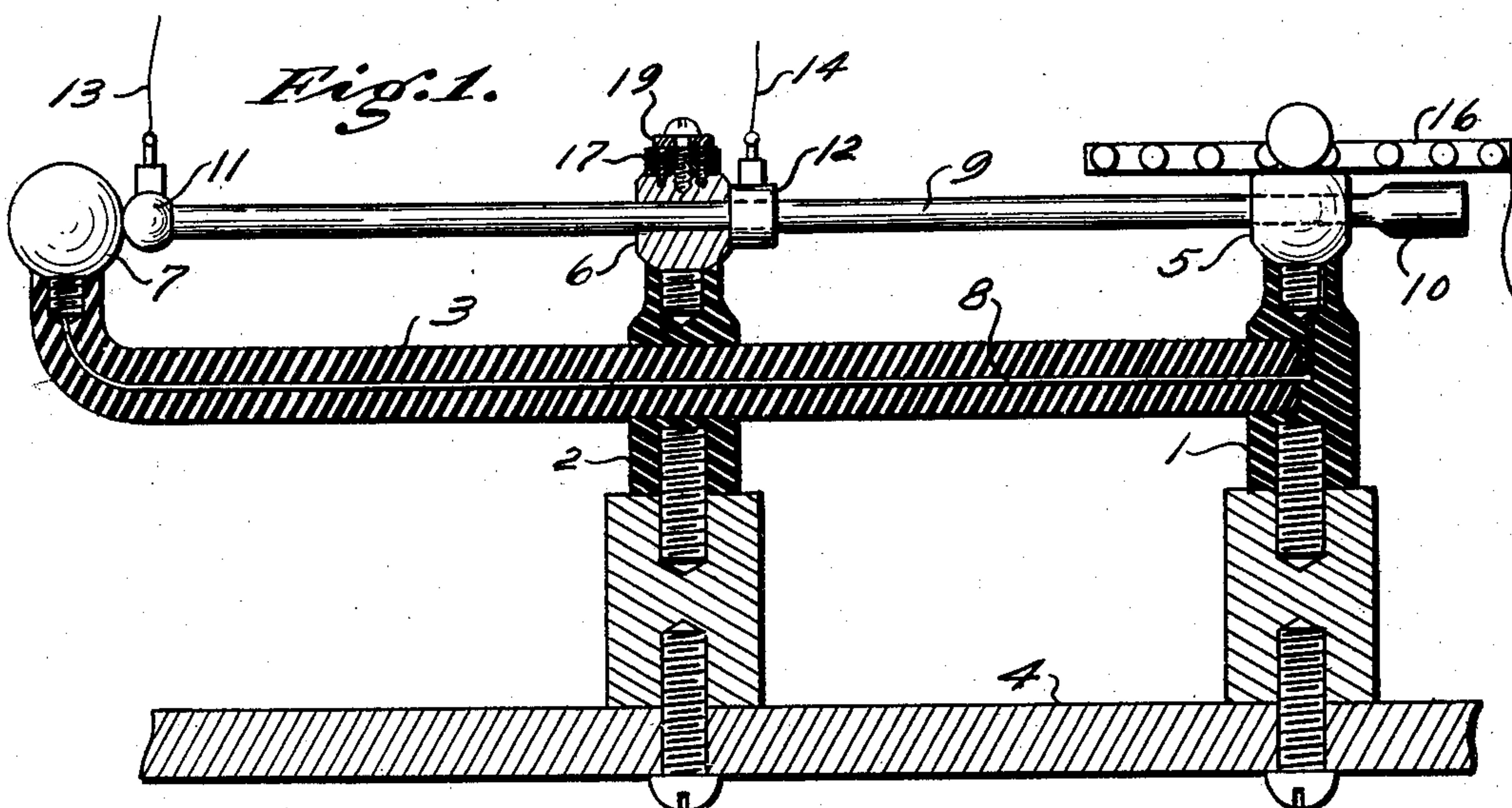
PATENTED JULY 28, 1903.

F. CEDERGREN.

POLE CHANGER AND CROOKES TUBE CONTROLLER.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

FRED CEDERGREN, OF CHICAGO, ILLINOIS.

## POLE-CHANGER AND CROOKES-TUBE CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 734,511, dated July 28, 1903.

Application filed March 16, 1903. Serial No. 148,011. (No model.)

*To all whom it may concern:*

Be it known that I, FRED CEDERGREN, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pole-Changers and Crookes-Tube Controllers, of which the following is a specification.

The main objects of my invention are to provide an improved form of pole-changer particularly adapted for use in connection with static machines and Crookes tubes and to provide improved means for regulating the number of spark-gaps, and thus controlling the tension of the electric current and raising or lowering the vacuum of a Crookes tube. I accomplish these objects by the structure shown in the accompanying drawings, in which—

Figure 1 is a partly-sectional elevation of a device constructed according to my invention. Fig. 2 is a top plan of said device, having connected thereto a Crookes tube.

In the device shown the frame or standard consists of the uprights 1 and 2 and the arm 3. Said uprights are shown secured to a base-piece 4, which may form an extension in front of a static machine. The knobs 5, 6, and 7 are rigidly supported on the standard, being each insulated therefrom, but the knobs 5 and 7 being electrically connected by a conductor 8, carried in the arm 3. The rod 9 is formed of insulating material and provided with a handle 10. Said rod is slidably supported in apertures through the knobs 5 and 6, is provided at one end with a metallic knob 11, and has near its middle part a metallic collar 12. The knob 11 may be connected through the conductor 13 with one pole of a static machine or other electrical generator, and the collar 12 will be connected to the opposite pole through the conductor 14. The current is taken from either the knob 5 or the knob 6 and returned through the other of said two knobs. As shown in Fig. 2, the Crookes tube 15 is suitably connected to take the current from the knob 5 and return same through the knob 6.

The insulating-plates 16 and 17 are secured upon the knobs 5 and 6, respectively. The metallic arms 18 and 19 are pivotally secured to the knobs 5 and 6 above the insulating-

plates, and each is provided with an insulating-handle 20. Each of the insulating-plates is provided with a row of metallic knobs 21, providing spark-gaps between each arm 18 or 19 and the knob 21, to which is connected the conductor 22 or 23, as the case may be. In the device shown in Fig. 2 the current would pass from the knob 5 through the arm 18, sparking between the knobs 21, which intervene between said arm 18 and the conductor 22. The current will return from the conductor 23 through the arm 19 in similar manner.

The operation of the device shown is as follows: When the arm 9 is in the position shown in the drawings, assuming that the positive pole of the static machine is connected to the conductor 13, then the current will pass through the knob 7 and conductor 8 to the knob 5 and through intermediate connections to the end of the Crookes tube, which should be connected with the positive pole. The other end of the Crookes tube will be connected with the negative pole through the conductor 23, arm 19, knob 6, collar 12, and conductor 14. If it should be found that the connection of the static machine with the conductor 14 is at the positive pole, the rod 9 will be moved toward the right until the knob 11 is near or in contact with the knob 6, when the collar 12 will be near or in contact with the knob 5. This will again connect the positive pole with the proper end of the Crookes tube at the right of Fig. 2. If it is found that the vacuum of the tube is lower than desired, the operator will move one or both of the arms 18 and 19, so as to increase the number of spark-gaps between said arms and their respective knobs 21, to which the conductors 22 and 23 are connected. This will increase the tension of the current and raise the vacuum of the tube. The vacuum of the tube may be reduced by moving one or both of the arms 18 and 19, so as to decrease the number of spark-gaps along the knob 21. If desired, the device may be reversed by connecting the conductors 13 and 14 to the Crookes tube and connecting the conductors 22 and 23 to opposite poles of the static machine.

It will be understood that the means for changing the poles and the means for increasing or decreasing the vacuum of the tube co-



operate with each other in properly controlling the current for a Crookes tube, but that either of said means may be used independently of the other. It will also be seen that  
 5 some of the details of the devices shown may be altered without departing from the spirit of my invention. I therefore do not confine myself to such details except as hereinafter limited in the claims.

10 What I claim as my invention, and desire to secure by Letters Patent, is—

1. An electrical apparatus comprising a standard having a first and third contact member thereon electrically connected, and a second  
 15 contact member insulated therefrom; an insulating-arm mounted on said standard and carrying two contact-pieces arranged to be moved by said arm into electrical contact either with said first and second members,  
 20 respectively, or with said second and third members, respectively; electrical conductors arranged for maintaining connection of said contact-pieces with opposite poles; an insulating-piece having thereon a series of spark-  
 25 knobs; an electrical conductor-arm having one end in electrical contact with one of said members and adapted to have the other end moved along and in electrical contact with any of said spark-knobs; an electrical conductor  
 30 connected to one of said spark-knobs; and an electrical conductor connected to one of the other contact members, substantially as and for the purpose specified.

2. An electrical apparatus comprising a  
 35 standard having a first and third contact member thereon electrically connected, and a second contact member located between the other two and normally insulated from said third member; said second member having an ap-  
 40 erture through same; an insulating-arm slidably seated in said aperture and carrying two contact-pieces arranged to be moved by said arm into electrical contact either with said first and second members, respectively, or  
 45 with said second and third members, respectively; and electrical conductors arranged for maintaining connection of said contact-pieces with opposite poles, substantially as and for the purpose specified.

50 3. An electrical apparatus comprising a standard having a first and third contact member thereon electrically connected, and a second contact member located between the other two and normally insulated from said third

member; said second member having an ap- 55  
 erture through same; an insulating-arm slidably seated in said aperture and carrying two contact-pieces arranged to be moved by said arm into electrical contact either with said first and second members, respectively, or 60  
 with said second and third members, respectively; electrical conductors arranged for maintaining connection of said contact-pieces with opposite poles; an insulating-piece having thereon a series of spark-knobs; an elec- 65  
 trical conductor-arm having one end in electrical contact with one of said members and adapted to have the other end moved along and in electrical contact with any of said spark-knobs; an electrical conductor con- 70  
 nected to one of said spark-knobs; and an electrical conductor connected to one of the other contact members, substantially as and for the purpose specified.

4. An electrical apparatus comprising a 75  
 standard having a first and third contact member thereon electrically connected, and a second contact member located between the other two and normally insulated from said second member and one of the other members, each 80  
 having an aperture through same; an insulating-arm slidably seated in said apertures, having an insulating-handle located on the side of said other member opposite the sec- 85  
 ond member, and carrying two contact-pieces arranged to be moved by said arm into electrical contact either with said first and second members, respectively, or with said second and third members, respectively; elec- 90  
 trical conductors arranged for maintaining connection of said contact-pieces with opposite poles; an insulating-piece having thereon a series of spark-knobs; an electrical conductor-arm having one end in electrical contact with one of said members and adapted 95  
 to have the other end moved along and in electrical contact with any of said spark-knobs; an electrical conductor connected to one of said spark-knobs; and an electrical conductor connected to one of the other con- 100  
 tact members, substantially as and for the purpose specified.

Signed at Chicago this 9th day of March, 1903.

FRED CEDERGREN.

Witnesses:

BLANCHE MICHAEL,  
 WM. R. RUMMLER.