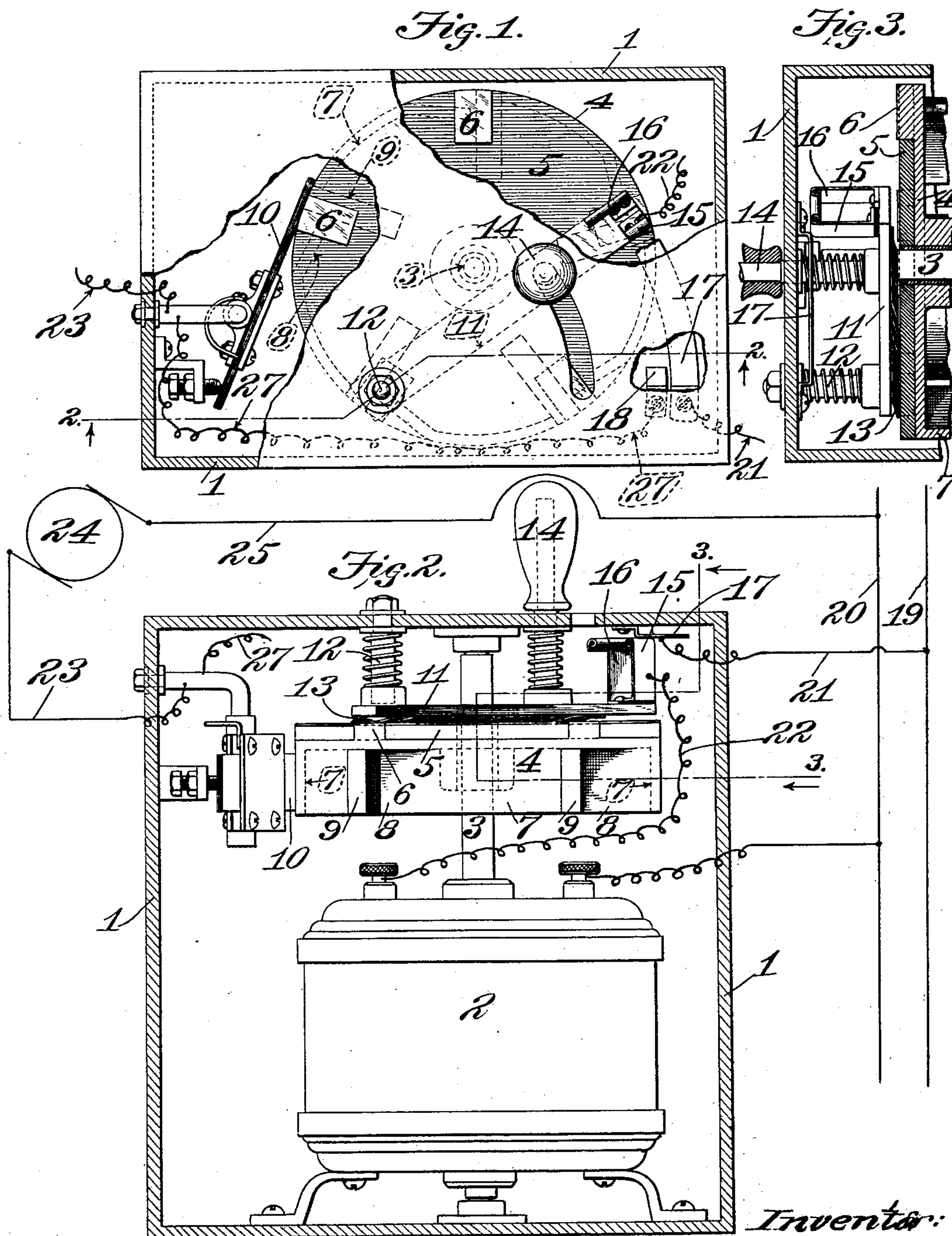


G. P. McDONNELL.
ELECTRICAL INTERRUPTER.
APPLICATION FILED MAR. 17, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

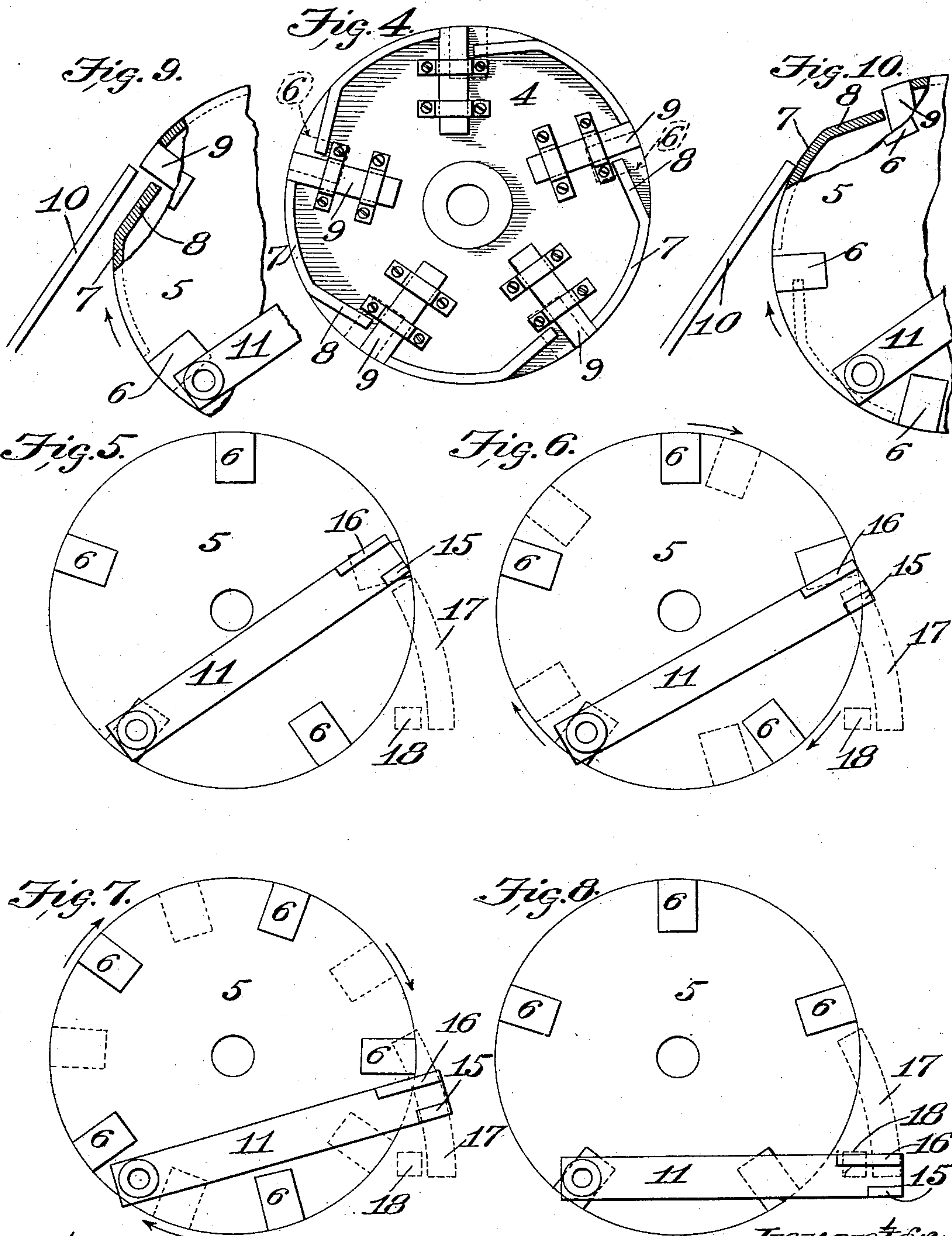
G. A. Pennington
Ralph Tallich

Inventor:
George P. McDonnell,
by R. Kewell Cornwall
Atty.

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3 SHEETS—SHEET 2.



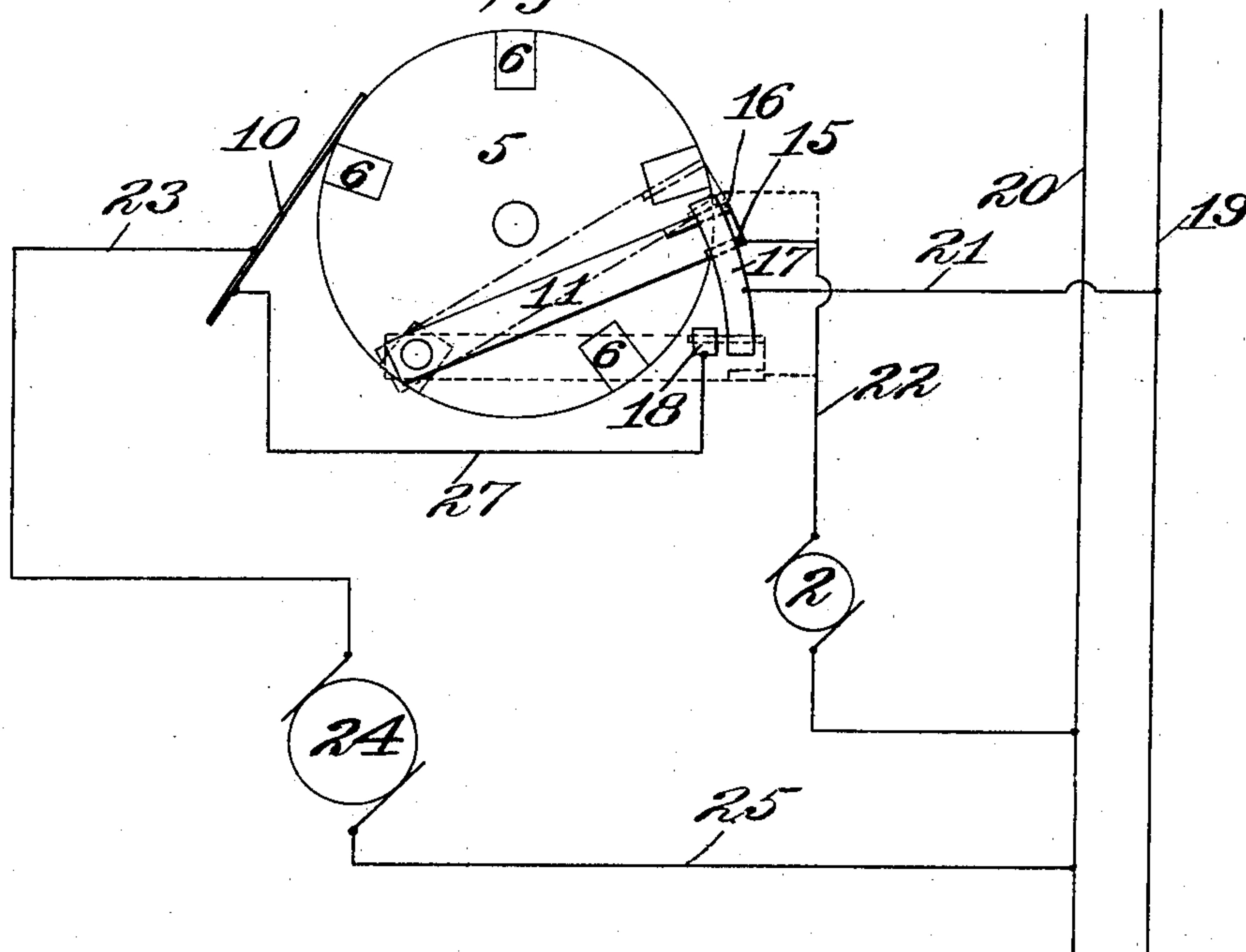
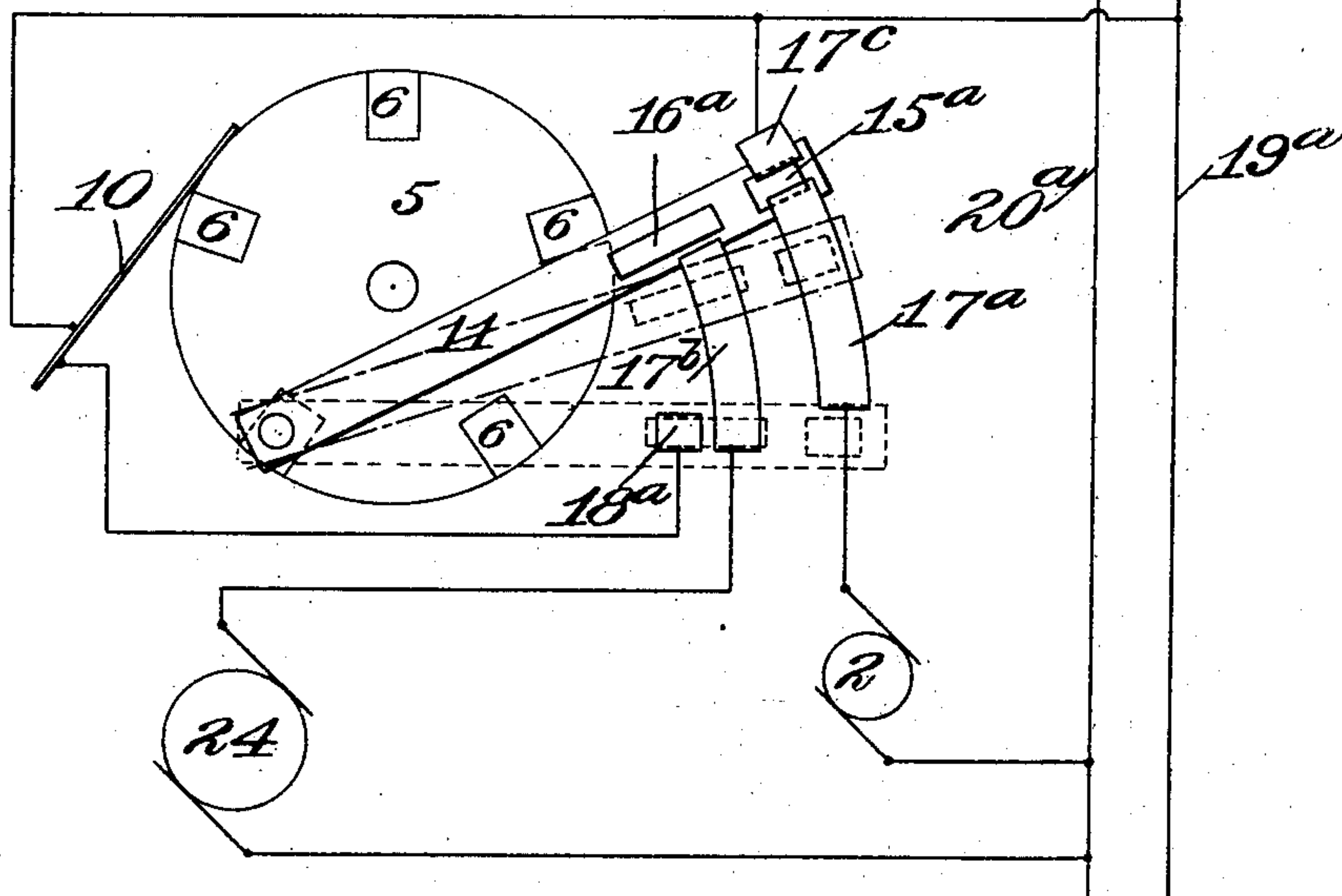
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by R. Kewell Cornwall
Attys

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3 SHEETS—SHEET 3.

Fig. 11.*Fig. 12.**Witnesses:**S. A. Pennington.**Ralph Talish**Inventor:*

George P. McDonnell,
by Bakewell Cornwall
Attys

UNITED STATES PATENT OFFICE.

GEORGE P. McDONNELL, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO AMERICAN ELECTRIC COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRICAL INTERRUPTER.

SPECIFICATION forming part of Letters Patent No. 720,729, dated February 17, 1903.

Application filed March 17, 1902. Serial No. 98,632. (No model.)

To all whom it may concern:

Be it known that I, GEORGE P. McDONNELL, a citizen of the United States, residing at St. Louis, State of Missouri, have invented a certain new and useful Improvement in Electrical Interrupters, of which the following is a full, clear, and exact description, 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, forming part of this specification, in which—

Figure 1 is a plan view of my improved interrupting device. Fig. 2 is a sectional view on line 2 2, Fig. 1. Fig. 3 is a sectional view on line 3 3, Fig. 2. Fig. 4 is an inverted plan view of the interrupter-disk. Fig. 5 is a top plan view showing the switch-blade in one of its positions. Figs. 6, 7, and 8 are views showing the switch-blade in different positions. Figs. 9 and 10 are detail views showing the interrupter-disk partly in section. Fig. 11 is a diagrammatic view showing a plan of using my improved interrupter, and Fig. 12 is a diagrammatic view illustrating another plan of using my interrupter.

This invention relates to a new and useful improvement in electrical interrupters, the same being designed for use in controlling an electric current whereby the strength of the current may be decreased by interrupting the same periodically, thus dispensing with the employment of resistance.

The device is designed to be used in connection with street-cars, elevators, and the like.

My invention consists in the construction, arrangement, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

In the drawings, 1 indicates a casing or housing in which is arranged a motor 2. The armature-shaft 3 of this motor carries an interrupter-disk 4, said disk, as shown more clearly in Figs. 4 to 10, having a face-plate 5, of insulating material, through which project at the periphery of the disk contact plates or faces 6. The opposite side of the disk is provided with a peripheral flange 7, formed with

tongues 8, bent inwardly, so as to break the circuit at this point.

9 represents carbon blocks arranged flush with the periphery of the flange 7, over which the brush 10 passes, said brush breaking the circuit by leaving the carbon block, so that the blocks can be renewed from time to time as required by the disintegration of the sparks.

Brush 10, as shown in Figs. 1 and 2, is preferably mounted so as to be pressed by a spring inwardly against flange 7, and when opposite the tongue 8 said brush will break the circuit through the carbon block 9 and again contact with the flange 7 adjacent to the tongue 8.

11 indicates a lever pivoted at 12 in the housing 1 and carrying contact-plates 13 on its under side. This lever is also provided with a handle 14, which projects through the housing 1 and by which said lever may be manipulated. Lever 11 also carries contact-points 15 and 16, which cooperate with terminals 17 and 18, respectively.

Referring now to Fig. 11, 19 indicates the inlead-wire, and 20 the return-wire, of an electric circuit. Wire 19 is connected to the plate 17 by means of a wire 21. When the lever 11 is at its extreme innermost position, neither of the contacts 15 nor 16, carried thereby, engages the plate 17, and consequently no current can pass through the device. However, upon the first movement of the lever, as shown by dot-and-dash lines in Fig. 11, the contact-point 15 engages the plate 17, and the current from the inlead-wire passes through a wire 22 and through the motor 2 to the return-wire 20, thus starting the motor 2 and causing the interrupter-disk to be rotated. The contact-point 15 is insulated from the lever 11, so that no current can flow through the lever 11 by reason of the engagement of said contact-point with the plate 17. Upon the further outward movement of the lever 11 contact-point 16, mounted thereon, is caused to engage the plate 17, as shown by full lines in Fig. 11, and the current now flows through lever 11 to the brushes or contact-making devices on its under side and from said brushes to the contact-making faces 6. As

the lever 11 is shown resting upon one of the faces 6 at its pivot end, it is obvious that the current will pass through the interrupter-disk to brush 10 and through wire 23 to a motor 24, which for the sake of distinction we will term the "service-motor," and thence by wire 25 to the return-wire 20. As the interrupter-disk is rotating, it is obvious that the face 6 will leave the contact-brushes on lever 11, and to prevent the break in the service-motor circuit being made at this point I so adjust the brush 10 that it leaves its carbon block 9 to locate the break at the carbon block. As the disk continues to rotate another face 6 is brought into contact with the brushes on lever 11, and about the same time the brush 10 contacts with the flange 7, so that the service-motor circuit is again completed. Depending upon the position of lever 11 the length of the intervals of interruption is governed. When the lever is in the position shown by full lines in Fig. 11, it follows that the faces 6 only contact with the brushes carried by the lever when they are practically under the pivotal point of the lever. As the lever is moved outwardly to the position shown in dotted lines in Fig. 11 the length of the interval is shortened gradually until in the final position of the lever no break occurs in the circuit of the service-motor. In this position of lever 11, which is equivalent to said lever making contact with a continuous ring, as the brushes carried thereby extend beyond and contact with one of the faces 6 at all times, it is obvious that the necessity for rotating the interrupter-disk no longer exists and that the current used in driving the motor 2 is practically wasted. I have therefore provided an additional stationary contact 18, with which the movable contact 16 engages in the extreme outermost position of lever 11, so as to conduct the current through a short-circuiting wire 27 continuously to the brush 10. The contact 15 is now out of engagement with plate 17, and the driving-motor for the interrupter is cut out of circuit, causing the interrupter to cease rotating. Under these conditions full strength of the current is given to the service-motor 24, and the interrupter driving-motor is cut out. When the lever 11 is moved inwardly, the short circuit is first broken and then the driving-motor for the interrupter cut in. As the lever continues its inward movement the length of the interruptions gradually increases, so that less current is admitted to the service-motor 24, until the lever reaches its innermost position, when both of the contacts 15 and 16 are out of engagement with the plate 17. In this extreme innermost position the circuits of both the interrupter driving-motor and of the service-motor are broken.

In Fig. 12 I have shown another plan of utilizing my improved interrupter, in which 19^a is a supply-wire and 20^a the return-wire. In this form the lever 11 is provided with contact-making points 15^a and 16^a. There are,

however, in this plan three stationary contacts 17^a, 17^b, and 18^a. The former cooperates with a contact-making device 15^a and first admits current to the driving-motor 2 when the lever is started from its extreme innermost position. In order to complete the circuit through the small driving-motor, a stationary terminal 17^c is connected with the supply-wire and the contact-making device 15^a bridges the space therebetween and the stationary contact 17^a before the interrupted circuit is admitted to the service-motor 24. Upon leaving the stationary contact 17^c the contact 16^a on lever 11 connects with the plate 17^b, and the interrupted circuit, which in this plan enters the brush 10, passes out through the lever 11 and plate 17^b to the service-motor and back to the return-wire. As the lever 11 reaches its outermost position the contact 15^a rides off the plate 17^a and breaks the circuit to the small driving-motor for the interrupter and at the same time the contact-making device 16^a engages the stationary contacts 17^b and 18^a and short-circuits the interrupter, so that the current will flow uninterruptedly through the service-motor.

By practicing my invention by the use of the above systems it will be observed that with respect to the system illustrated in Fig. 11 the driving-motor for the interrupter during its operation is supplied at all times with current of full strength, while in the system shown in Fig. 12 the driving-motor for the interrupter starts off with the current at full strength; but as the contact-point 15^a leaves the stationary contact 17^c this condition no longer exists, and the driving-motor for the interrupter is now energized by an interrupted circuit in the same manner as is the service-motor 24.

I am aware that many minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

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

1. In an apparatus of the character described, the combination with an interrupter-disk, of a motor for driving the same, and a lever pivoted to one side of the axis of rotation of said disk and eccentrically operating over the face of said disk to make contact with portions of said disk; substantially as described.

2. In an apparatus of the character described, the combination with an interrupter-disk provided with contact-faces, of a motor for driving said disk, and a lever pivoted to one side of the axis of rotation of said disk, and carrying brushes at its free end which travel eccentrically with respect to the disk for cooperating with said contact-faces; substantially as described.

3. In an apparatus of the character described, the combination with an interrupter-disk provided with contact-faces, of a motor for driving the same, and a lever cooperating with said contact-faces, said lever being pivoted to one side of the axis of rotation of said interrupter-disk and designed in one position to be wholly out of contact with said contact-faces; substantially as described.

4. In an apparatus of the character described, the combination with an interrupter-disk, of a motor for driving the same, contact-faces on one side of said disk, a brush cooperating with said contact-faces, and a brush cooperating with the periphery of said disk, said periphery being interrupted at intervals by cam-faces; substantially as described.

5. In an apparatus of the character described, the combination with an interrupter-disk having a mutilated flange, of a brush cooperating with said flange, and carbon blocks flush with the flange and fitting against the mutilated wall; substantially as described.

6. In an apparatus of the character described, the combination with an interrupter-disk, of a motor for driving the same, said disk having a mutilated flange, carbon blocks flush with the face of the disk, and a brush for cooperating with said mutilated flange and with said carbon blocks; substantially as described.

7. In an apparatus of the character described, the combination with an interrupter-disk having contact-faces and a mutilated flange, of a lever carrying brushes for cooperating with said contact-faces, and a brush for cooperating with said mutilated flange; substantially as described.

8. In an apparatus of the character described, the combination with an interrupter-disk having contact-faces, of a lever pivoted to one side of the axis of rotation of said disk and cooperating with the contact-faces thereof, a motor for driving said disk, a mutilated flange provided on said disk, carbon blocks flush with said flange, and a brush cooperating with said mutilated flange and said carbon blocks; substantially as described.

9. In an apparatus of the character described, the combination with an interrupter-disk provided with contact-faces, of a motor for driving the same, a lever cooperating with said contact-faces, contact-points carried by said lever, and stationary terminals in the path of said contact-points; substantially as described.

10. In an apparatus of the character described, the combination with an interrupter-disk having contact-faces and a mutilated flange, of a motor for driving said disk, a brush cooperating with said mutilated flange, a lever cooperating with said contact-faces on the disk and carrying contact-points, and stationary terminals with which the contact-points of said lever cooperate; substantially as described.

11. In an apparatus of the character de-

scribed, the combination with an interrupter-disk having a flange, carbon blocks protruding through said flange, tongues 8 on said flange which form recesses adjacent said carbon blocks, a spring-held brush cooperating with said flange and said carbon blocks, and means for limiting the inward movement of the free end of said brush; substantially as described.

12. In an apparatus of the character described, the combination with an interrupter-disk having contact-faces, of a lever pivoted above the path of movement of said contact-faces, contact plates or brushes carried by the inner face of said lever, a spring surrounding the pivot-point of the lever for forcing said plates onto the face of the interrupter-disk, a handle on the outer end of said lever, a casing in which the interrupter-disk and its handle are arranged, said casing being provided with a slot through which projects said handle, and a spring coiled about the handle and interposed between the casing and the free end of the lever for holding the free end of the lever in contact with the interrupter-disk; substantially as described.

13. In an apparatus of the character described, the combination with a circuit, of an interrupter-disk, a motor for driving said interrupter-disk, means for varying the interruptions in said circuit, said means cutting in and cutting out the driving-motor to and from said circuit at its extremities of movement; substantially as described.

14. In an apparatus of the character described, the combination with a circuit, of an interrupter located therein, a motor for driving said interrupter, a lever cooperating with said interrupter for regulating the length of the interruptions, means on said lever for cutting in the motor before the circuit is admitted to the interrupter, and means for cutting out the driving-motor and short-circuiting the circuit around the interrupter when the lever is in one extreme position; substantially as described.

15. In an apparatus of the character described, the combination with an interrupter-disk, of a motor for driving the same, a lever for regulating the length of the interruptions, a circuit, stationary contacts in said circuit, and contacts on said lever, whereby, in one position of the lever, the apparatus is cut out of the circuit, the first movement of the lever cutting in the driving-motor, a continued movement of said lever gradually decreasing the length of the interruptions, and the final movement of the lever short-circuiting the interrupter; substantially as described.

16. In an apparatus of the character described, the combination with an interrupter, of a motor for driving the same, means for regulating the length of the interruptions, said means carrying contact-points for cooperating with stationary contacts in the circuit, whereby in one position of said means

the interrupter is cut out of the circuit, said means, upon being operated, cutting in the driving-motor, a continued movement in the same direction of said means gradually decreasing the length of the interruptions, the final extreme position of said means cutting out the driving-motor; substantially as described.

17. In an apparatus of the character described, the combination with a circuit, of a service-motor therein, an interrupter in the circuit of said service-motor, a motor for driving said interrupter, and a device for cutting in the driving-motor, regulating the length of interruptions in the circuit of the service-motor, and short-circuiting the interrupter so as to admit an interrupted flow of current to the service-motor; substantially as described.

18. In an apparatus of the character described, the combination with an electric circuit, of a service-motor therein, an interrupter in said circuit, a driving-motor for said interrupter, and a device for cutting in the driving-motor, regulating the length of interruptions, cutting out the driving-motor, and short-circuiting the interrupter so as to

permit an interrupted flow of current to the service-motor; substantially as described.

19. In an apparatus of the character described, the combination with an electric circuit, of a service-motor therein, an interrupter-disk in said motor-circuit, means for rotating said interrupter-disk, and brushes coöperating with said interrupter-disk at different points so as to successively break the circuit; substantially as described.

20. In an apparatus of the character described, the combination with an electric circuit, of an interrupter-disk provided with two sets of contact-faces, means for rotating said disk, and brushes for coöperating with the respective sets of contact-faces, said brushes being so adjusted as to successively break the contact with their respective faces; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 15th day of March, 1902.

GEORGE P. McDONNELL.

Witnesses:

GEORGE BAKEWELL,
G. A. PENNINGTON.