(No Model.) 2 Sheets—Sheet 1.

R. BAUMANN.

AUTOMATIC ELECTRIC SWITCH.

No. 453,572. Patented June 2, 1891.

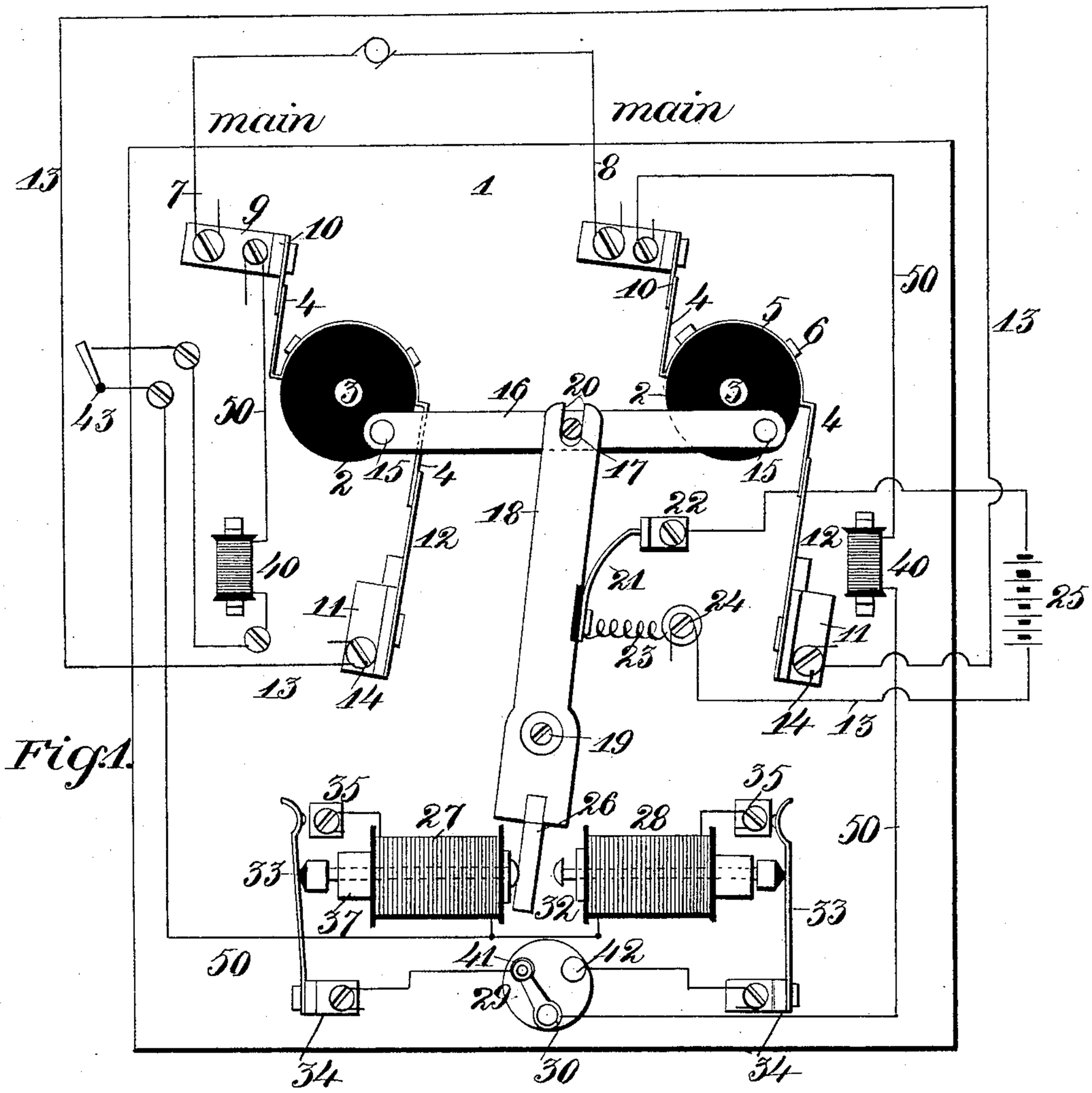

Fig. 1.

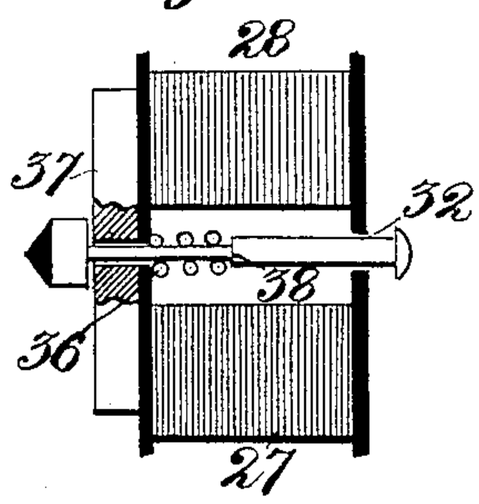

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

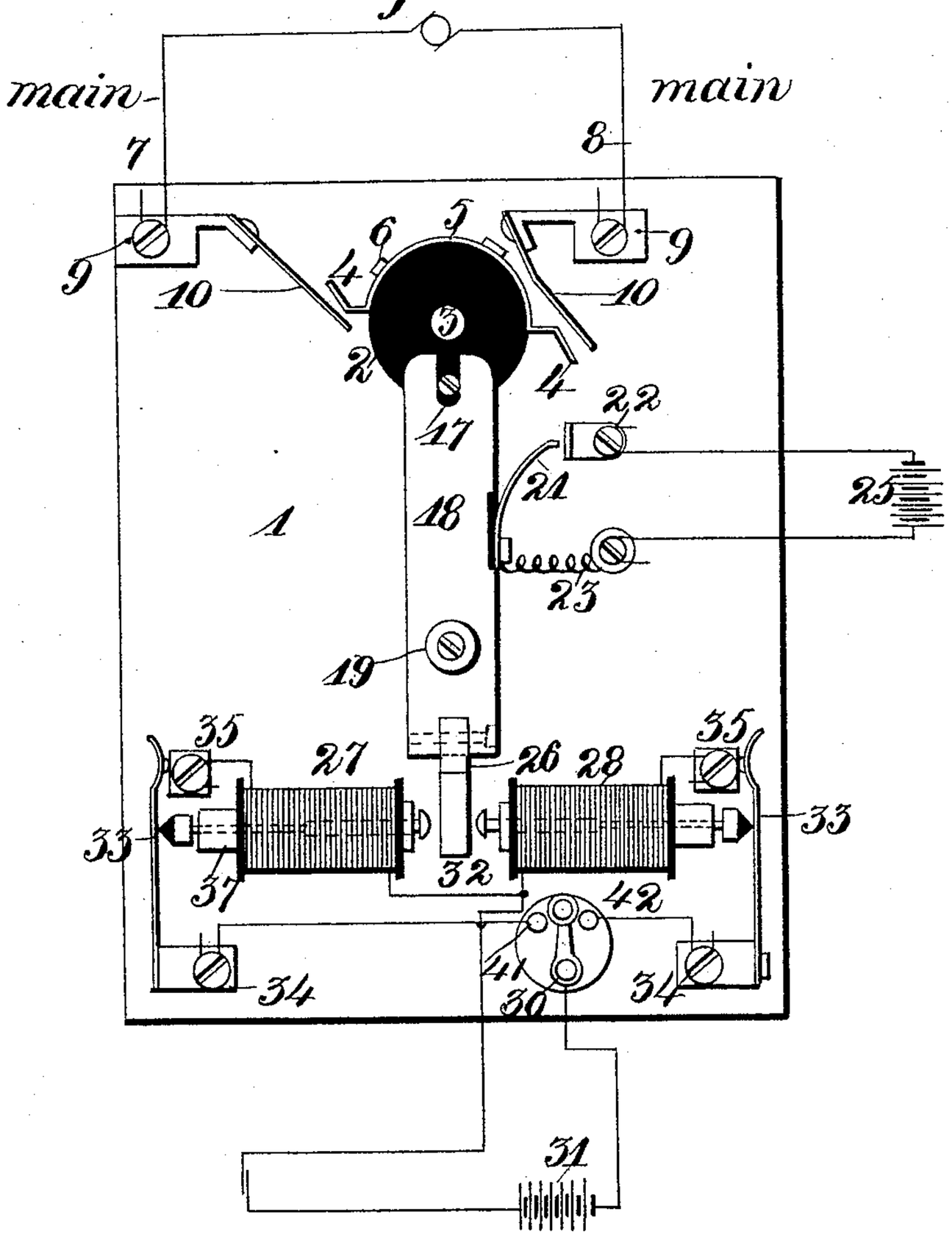
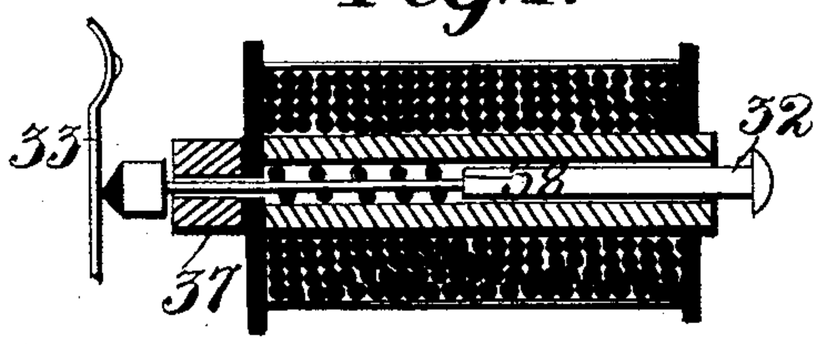


Fig. 4.



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AUTOMATIC ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 453,572, dated June 2, 1891.

Application filed November 7, 1890. Serial No. 370,627. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BAUMANN, of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Automatic Electric Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to electro-magnetic cut-outs for use in electric lighting or other comparatively heavy circuits; and it consists in the constructions, arrangements, and combination of parts, as hereinafter more fully described and claimed.

In the drawings, Figure 1 is a front elevation of a base-board having my invention applied thereto, the several circuits being shown in diagrammatic form. Fig. 2 is a detail view showing one of the magnets detached, the figure being a plan, partly in section. Fig. 3 is a front elevation of a modified form of switch. Fig. 4 is a detail section through one of the coils of a magnet and illustrating a modified construction of the cutting-out devices.

1 indicates a base, which for purposes of this specification should be looked upon as if it were entirely of insulating material, and upon which at suitable distances apart, and preferably in a horizontal line, are mounted two or more rocking plates or disks 2 upon pivotal supports or pins 3. These rocking disks are preferably constructed of insulating material and in the form of circular disks, having a central perforation for the passage of their respective supporting-pins, and they have mounted upon them and projecting from their opposite edges metallic contact-blades 4, which are in the form of flat flexible plates of conducting material. These contact-blades 4 are electrically connected—that is, the two carried by each disk are so connected—and this may be done in any desired way—for instance, as here shown, the two upon each disk are formed integral with a flexible conducting-strip 5, and this is suitably adapted to the disk and to form opposite blades, and is secured to said disk by means of screws or rivets 6, the same passing around the periphery of the disk and the blades being bent and located so as to project in opposite directions. The construction of these rocking disks is the same, whether used in the "single-break" cut-out shown in Fig. 3 or in the "double-break" shown in Fig. 1. So, also, the construction of the parts in either form is such that either of the terminals 7 and 8 may be used for leading current into the device; or, in other words, I may say the terminals of the device are interchangeable, and the workman, in making his connections, may use either of said terminals as his leading-in connection.

9 9 are metallic plates secured to the base in any suitable manner at a convenient point for attachment thereto of the terminal wires 7 and 8, and these also carry suitable contact blades or plates 10, (one each,) which are so adjusted as to be in the path of and contacted by the blades carried by the disks 2.

I will now proceed to describe the construction of the double-break cut-out or switch, as the construction of the two forms is somewhat different. (See Fig. 1.) 11 11 are two metallic plates or supports suitably secured to the base, one of each just beneath each rocking disk 2, and each plate having mounted thereon, so as to project upwardly and be contacted by one of the blades 4, a contact-blade 12, and to these plates 11 the main circuit-wires 13 are connected by means of binding screws or posts 14, so that said parts will all be in said circuit when the switch is in a closed position. Each of the rocking disks 2 is provided with what I may term a "crank-pin" 15, which projects from its face side, and a connecting or coupling bar, rod, or plate 16, carrying a pin 17, which projects outwardly from its face side, is mounted on said pins 15, with its apertures or bearings engaging the latter. The respective crank-pins of each rocking disk are set at the same radius, and as each pin is coupled to the other by the connecting-bar 16, it follows that any movement imparted to the latter will partially revolve or rock each disk simultaneously. To impart movement to the connecting-bar 16, I pivotally mount an oscillating lever 18 on a pin 19, projecting from the face of the base-board, so that said lever will be fulcrumed at a point intermediate of its length, and whereby when its lower free end is moved in either direction by any suitable force, its upper end will move in an

opposite direction. The upper end of said lever is bifurcated or provided with a slot 20, which slot loosely engages the pin 17 on the connecting-bar. 21 is a contact-blade, having one end rigidly secured to the lever 18, but insulated therefrom in case said lever be of conducting material, and having its free end projecting out and adapted for contact with a contact-plate 22, mounted upon the face of the base-board in the path of said free end of the blade 21. 23 is a loose coil (not a spring) connecting the fixed end of the spring 21 to a binding post or screw 24, and 25 represents a local circuit of the usual construction, in which are included the blade 21 and contact-plate 22. This local circuit may be used for any desired purpose around the building in which the switch is located—such, for instance, as the lighting of electrically-operated gas-jets. 26 is a vibrating armature rigidly mounted upon and carried by the free lower end of lever 18, so as to vibrate in the fields of two magnets 27 and 28, one of which is adapted, when current is passed through its coils to attract said armature and move said lever in one direction, and the other, when circuit is closed through it, (and the first-named magnet is cut out) is adapted to attract said armature and move said lever in an opposite direction. These magnets are adapted to be alternately thrown in circuit by means of a suitable switch or push-button, such as 29, the handle 30 of which is adapted to be manually operated; or, as is perfectly obvious, any other suitable form of circuit-closing device may be included in circuit with said magnets, whether it be located directly on the base-board, as I have here shown it, or whether it be located at some distance therefrom. For instance, the switch for energizing the magnets may be located down near the floor of a room within convenient reach of the operator while the switch for the main circuit (the devices above described) may be located up near the ceiling, thus permitting the operator to control the current in the main circuit when at a distance therefrom.

To prevent enfeeblement in case a local battery such as 31 (see Fig. 3) is used to energize said magnets by permanent closing of the circuit of such battery, and to prevent wastage of current in case a shunt-circuit from the main line is made use of, I provide automatic circuit-breaking devices for the magnets 27 and 28, which are constructed as follows: 32 32 are short rods or pins mounted loosely in suitable bearings in the framing of said magnets, one each in the space between the coils and extending in the direction of the length of said coils, with their inner ends projecting normally in the path of the armature 26 and having their opposite ends insulated, but adapted for contact with the contact blades or springs 33, one end of each of which is fixed to a conducting-plate 34, rigidly mounted upon the base-board, and in circuit with the switch 29 and the magnets aforesaid. The free ends of each blade or spring 33 are normally in contact with a conducting-plate 35, fixed upon the base-board in proximity to said ends, and each plate 35 is in circuit with one of the magnets.

Although the inherent flexibility of the blades or springs 33 may be sufficient to normally hold their free ends in contact with the plates 35, and also normally hold the inner ends of the rods or pins 32 projected into the path of the armature, yet I may in some cases provide an additional spring—such as 36—which is encircled about the said rods or pins, with one end resting in contact with the cross-bar 37 of said magnets, and its opposite end in contact with a shoulder or projection 38, formed upon said rods or pins, Fig. 2. In some cases I may further modify this construction by using tubular cores for the coils of the magnets and locating the rods or pins 32 within said hollow cores. (See Fig. 4.)

To energize the magnets of my improved switch or cut-out, I, in the present instance, show them in a shunt-circuit with a suitable resistance-coil 40 located directly between the manual switch 29 and each terminal of the main circuit. I use two resistance-coils for the purpose before stated—viz., so that the terminals 7 and 8 may be used interchangeably. The handle 30 of manual switch 29 has one end fixed in the shunt-circuit and the other end free to be swung around or over into contact with either the contact-plate 41 or the contact-plate 42 of said switch, the first-named plate 41 being looped with magnet 27 and the last-named plate 42 being in circuit with the other magnet 28, so that when said handle is thrown into contact with plate 41, the first-named magnet will attract the armature, and when said handle is thrown in contact with plate 42, magnet 27 will be cut out of the shunt-circuit (or local circuit) and the magnet 28 will be thrown in, and so on.

The operation of this construction is as follows: The handle 30 being thrown to position in which it is shown in Fig. 1, current will enter either one of the main terminals 7 8, and pass (say it enters 7) through 9, 10, 4, and 5, thence to 12, (on the left-hand side of Fig. 1 only,) thence to the line 13, and around, up, and over to the right-hand of the figure and down through 13 on that side, and through like parts on that side, and out through the other terminal 8 to the dynamo.

The course of the current in the local shunt-circuit is as follows: Starting at 9 on the left hand of Fig. 1 it passes down the line 50 to one of the coils 40, thence up to the switch 43, thence down and around the coils of whichever magnet is in the circuit, thence out to whichever spring 33 is in the circuit, thence to switch 29 and its handle 30, thence to the right hand of the figure and up to the coil 40 on that side of the figure, and thence through the remaining portion of the shunt-circuit to the main terminal 8, and vice versa, according to the direction of the main current. When said han-

dle 30 is thrown to 42, the reverse movement will take place, as the magnet 28 will be energized, attracting armature 26 to it, throwing the upper end of lever 18 toward the left hand, rocking the disks 2 simultaneously, moving the connecting-bar 16 toward the left hand, and separating the several contact-blades of the switch, making a break in the main line at four different points, also separating the free end of blade or spring 21 from plate 22, and thereby simultaneously and automatically breaking the circuit 25. Further, the movement of armature 26 has thrown out the pin or rod 32 of the magnet which last attracted it, and this pin or rod has pushed the spring 33 out of contact with 35, and the shunt or local circuit stands broken until the handle 30 shall be thrown in an opposite direction. 43 is a switch in the shunt-circuit, which obviously should be closed to produce the above-described movements. It will thus be observed that by my invention I automatically break a number or series of distinct circuits, all of which may be used for different purposes well known to electricians, and I prefer to use the local controlling-switch, as by that means the main switch may be more suddenly and easily thrown than merely by the hand, and as I am able to place the main switch (which is often large and cumbersome) at a point where it will be out of the way, while the local switch, which is much smaller, may be placed where it will be readily reached. It will also be seen that I may use the circuits made by the main switch for any purposes to which electricity is applied, as for electric lighting, fire and burglar alarm circuits, ringing electric bells, &c.

In the modification shown in Fig. 3, I have dispensed with a shunt-circuit for energizing the magnets and make use of a local battery 31, in circuit with which are placed the manual switch 29 and the said magnets, the connections of said battery-line being made at same points on said switch and said magnets as were used with the shunt-circuit, and as shown in Fig. 1.

In Fig. 3 I have also shown the lever 18 attached directly to the pin 17 of a single rocking disk, and the blades 4 out of contact with blades 10.

In Fig. 1 the handle 30 of the manual switch is shown thrown into contact with the plate 41, or rather after it has been so thrown and after the magnet 27 has attracted the armature and the rod or pin 32 which it carries has broken the local circuit by separating spring 33 on that (the left-hand) side of the device from the plate 35.

What I claim is—

1. In an electric switch, the combination, with a rocking disk, of a conducting-strip having its central portion secured to the periphery thereof and having its ends bent outward, and contact-plates adapted to be connected to the opposite poles of electric circuit and to make simultaneous contact with the outwardly-extending ends of the said strip, as described.

2. In an electric switch, a rocking disk carrying two contacts in electrical connection with each other, a base, a main circuit in which both the contacts carried by said disk are placed, two fixed contact-points connected to the opposite poles of the said main circuit and adapted to make contact with the said contacts on the rocking disk, a local circuit, a magnet in said local circuit, the armature of which is adapted to rock said disk, and a manual switch in said local circuit for throwing in and cutting out said magnet, substantially as described.

3. In an electric switch, the combination of a base, a pair of magnets having their poles facing each other, a lever 18, fulcrumed to said base and carrying at one end an armature that is common to both magnets, a main circuit, contacts in said main circuit adapted to be separated electrically upon movement of said lever in one direction, and a local circuit in which either of the said magnets may be placed, means actuated by the lever for breaking the said circuit upon the approach of the said lever to either of the said magnets, and a switch for making and breaking said local circuit, substantially as described.

4. In an electric switch, the combination of a base, main-circuit terminals, contacts in said main circuit, a pair of magnets, a suitable armature or armatures for said magnets, a local circuit in which said magnets are adapted to be alternately included, a manual switch for making and breaking said local circuit, mechanical connections between said armature and said contacts in the main circuit, and an automatic switch for said local circuit operating to break same when either of said magnets attracts said armature, substantially as described.

5. In the electric switch, the combination, with a main and a local circuit, of a contact-closer contained in the said main circuit, a magnet contained in the said local circuit, an armature for the said magnet controlling the position of the said contact-closer, and a contact-spring included in the local circuit and adapted to break the said circuit on the approach of the said armature to the said magnet, as described.

6. The combination, with an electrical circuit, of a magnet contained therein, an armature for the said magnet, a spring closing the said circuit and located in the rear of the said magnet, and an insulating-rod contained between the said armature and spring, as described.

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

ROBERT BAUMANN.

Witnesses:
C. F. A. MUELLER,
A. J. FLORI.