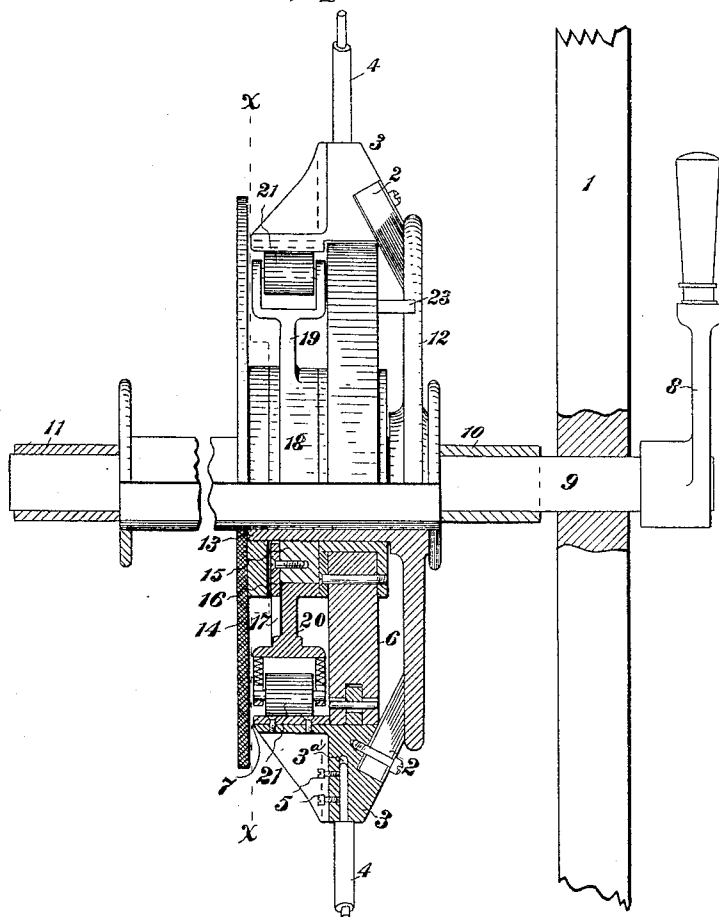


A. J. WURTS.
SWITCH FOR ELECTRIC CIRCUITS.

No. 570,418.

Patented Oct. 27, 1896.

Fig. 1.



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Fig. 2.

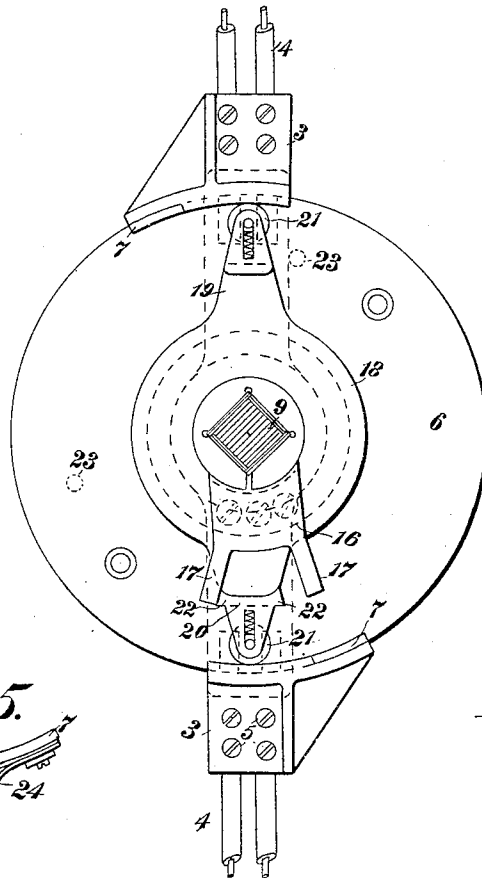


Fig. 5.

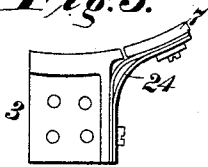


Fig. 3.

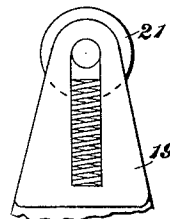
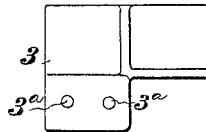


Fig. 4.



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Fig. 6.

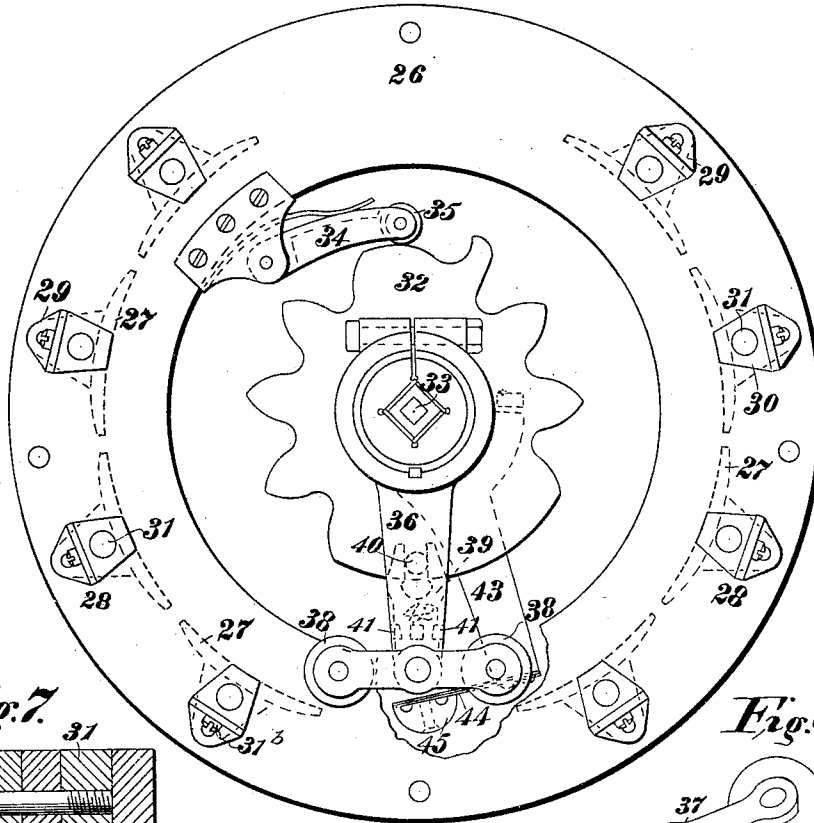


Fig. 7.

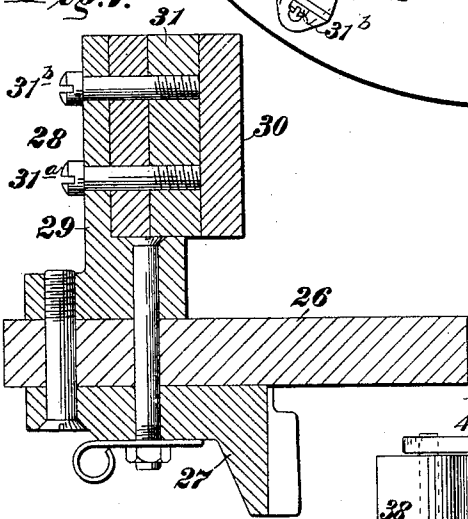


Fig. 8.

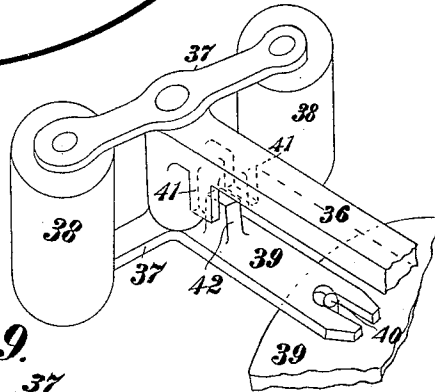
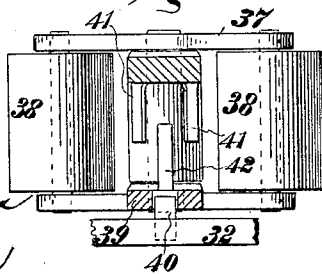


Fig. 9.



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UNITED STATES PATENT OFFICE.

ALEXANDER JAY WURTS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 570,418, dated October 27, 1896.

Application filed May 8, 1896. Serial No. 590,662. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER JAY WURTS, a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Switches for Electric Circuits, (Case No. 702,) of which the following is a specification.

My invention relates to switches for electric circuits; and it has for its object to provide a device of this character which shall be simple and compact in construction and the parts of which shall be so constructed, combined, and arranged that the circuit with which the switch is employed may be opened and closed without danger of injury to the main current-carrying contacts or to the operator whatever may be the character or volume of the current carried by the circuit.

In order to prevent arcing between the main contacts of switches or circuit-breakers employed for interrupting circuits carrying heavy currents, it has heretofore been usual to employ auxiliary contacts located in a shunt around the main current-carrying contacts and formed of carbon or some other substantially infusible conducting material. Devices of this character are well adapted for interrupting circuits of large carrying capacity, but it has been found necessary, or at least advisable, to employ a separate switch for closing the circuit on account of the objectionable and sometimes dangerous flashing and spluttering incident to closing such a circuit through the carbon shunt-contacts.

I propose by my present invention to so construct a switch that the manipulation of a single operating-handle will serve to both open the circuit at the auxiliary or shunt contacts and to close the same through the main current-carrying contacts. I propose also to make such a combination and arrangement of parts that any number of switches which it may be found necessary or desirable to operate simultaneously, as in multiphase work, for example, may be actuated by means of a single handle located upon the side of the switchboard opposite said switch or switches.

In the accompanying drawings, Figure 1 is a view, partially in side elevation and par-

tially in section, of one form of switch constructed according to my invention; and Fig. 2 is a sectional view taken on line xx of Fig. 1. Fig. 3 is a detail view of one of the movable shunt-contacts, and Fig. 4 is a detail view of one of the stationary shunt-contacts. Fig. 5 illustrates a modified construction of the stationary shunt-contact. Fig. 6 is a front elevation of another form of switch embodying my invention. Fig. 7 is a detail sectional view through one of the stationary contacts. Figs. 8 and 9 are respectively a perspective view and a front elevation of the shunt-contact device.

Referring now to Figs. 1 to 4 of the drawings, 1 represents a switchboard-panel of the usual material and construction, and 2 the stationary main contacts, which, as shown, are preferably laminated and provided with beveled contact-faces. These contacts are respectively fastened to conducting-blocks 3, preferably by means of screws, as shown. They may also be soldered to the block, if desired, or otherwise united in such a manner as to make a good low-resistance joint. Each of the blocks 3 is provided with sockets 3^a for the reception of the ends of the conductors 4 and with binding-screws 5 for retaining the ends of the conductors in the sockets. The terminal blocks 3 are mounted upon a plate 6, of suitable non-combustible insulating material. Each terminal block 3 is provided on its inner face with a plate 7, of carbon or other substantially infusible conducting material. This plate may extend circumferentially over the entire face of the terminal block, or over a portion only, as may be desired.

8 is the actuating-handle of the switch, which is mounted upon the shaft 9, the latter being mounted in suitable bearings 10 and 11. Between the bearings 10 and 11 the shaft is preferably square in cross-section, as indicated in the drawings. The movable main contact 12 is mounted upon the squared portion of the shaft 9, and is extended through the plate 6 in the form of a sleeve 13. A protecting-disk 14, of suitable insulating material, abuts against the end of the sleeve 13 which is opposite the arms of the contact 12

which engage with the faces of the stationary contacts 2. The sleeve 13 is preferably surrounded on one side of the plate 6 with a collar 15, the sleeve and collar being held together by a screw-thread engagement. Fastened to the collar 15, by means of screws or otherwise, is a plate 16, provided with two stops 17. A ring 18 is mounted upon the collar 15 so as to be free to turn thereon and is provided with two arms 19 and 20. In the end of each of these arms is journaled a roller 21, which is composed of carbon or some other substantially infusible conducting material, and, as shown in Figs. 1 and 2, these rolls are mounted in yielding bearings in order that the rollers may move freely over the contact-faces of the terminal blocks 3 and at the same time may make good contact therewith. The arm 20 is provided with projections 22, which are in position to engage the stops 17.

23 are stops with which the arms of contact 12 engage to limit the movement of said contact in either direction.

In cases where it is desired to open and close two or more switches simultaneously, as in multiphase work, for example, the shaft 9 may be made of such length as to permit of mounting thereon the movable members of the desired number of switches, so that all may be operated by means of a single handle 8.

The operation of the switch above described is as follows: Assuming the parts to be in the position shown in Figs. 1 and 2 and the operator facing the front of the switchboard, if the handle 8 be turned from left to right the projection 22 on the arm 20 will engage the stop 17, as indicated in Fig. 2, and in this position of the parts the rollers 21 will remain in contact with the carbon plates 7 after the main contacts 2 and 12 have become separated, thus shunting the current through the auxiliary contacts and interrupting it when the rollers leave the contact-plates 7. So far as this particular operation is concerned it does not differ materially from that of the devices heretofore employed for preventing arcing between the main current-carrying contacts. In the operation of closing the switch, however, the movement of the handle 8 from right to left will serve to bring the left-hand stop 17 into engagement with the corresponding projection 22, since there is sufficient friction between the ring 18 and the adjacent stationary part of the device with which it is in contact to prevent its movement until the said stop engages with the projection 22. This lost motion between the movable main contact 12 and the rollers 21 is sufficient to insure the engagement of the said main contact with the contacts 2 before the rollers 21 engage with the carbon plates 7.

In the modification shown in Fig. 5 the carbon plate 7 is shown as mounted upon supporting-springs 24. This construction may be utilized in lieu of the spring-supports for the bearings of the contact-rollers 21 or in connection therewith, as may be desired.

Furthermore, it will be understood that movable contacts which make frictional sliding engagement with the plate 7 may be employed in lieu of the rollers 21, if desired, the invention being in no wise limited as regards the particular form of the various features of the switch.

Referring now to Figs. 6 to 9, 26 is a supporting-ring, which is preferably, but not necessarily, of insulating material. Mounted upon the lower side of this ring are metal contact-pieces 27, these being the stationary main contacts. Bolted to the ring 26 and also to the contact-pieces 27, and thus in electrical connection with the latter, is a corresponding number of shunt-contacts 28. These contacts preferably consist of a main body or backing piece 29, of metal, and a contact block or plate 30, of carbon or other substantially infusible conducting material. Each contact-block 30 is provided with a core 31, of brass or other metal, and screws 31^a 31^b extend through the backing-piece 29 and the said core.

32 is a notched disk which is loosely mounted upon a shaft 33 or on a sleeve carried by said shaft, the latter being provided with a suitable actuating-handle. (Not shown.)

A pawl 34, having a roller 35 mounted in its free end, is suitably attached to the ring 26 and spring-pressed against the edge of the disk 32. Rigidly mounted upon the shaft 33 is an arm 36, on the outer end of which is pivoted a frame 37. This frame 37 carries two rollers 38, constructed of carbon or some other substantially infusible material, and has an arm 39, projecting inwardly toward the shaft 33 from between the two rollers. The arm 39 is bifurcated at its inner end, and this bifurcated end engages a pin 40 on the notched disk 32. The arm 36 is provided near its outer end with two inwardly-projecting stop-lugs 41, and the arm 39 is provided with a single lug 42, which projects outwardly between the lugs 41. Another arm 43 is rigidly mounted upon the shaft 33 and is provided at its outer end with a laminated spring 44, to the free end of which is fastened a metal contact-piece 45. The arms 36 and 39 project in front of the ring 26 in such position that the rollers 38 may engage with the faces of the carbon blocks 30 of the auxiliary contacts, and the arm 43 projects behind the ring 26, so as to bring the contact-piece 45 in position to engage with the stationary contact-pieces 27. Since this contact-piece 45 is located midway between the two rollers 38, one or the other of the rollers must drag behind the contact-piece whichever may be the direction in which the shaft 33 is turned.

By means of the construction described if the shaft 33 be turned from left to right when the roller is in one of the notches in the disk 32 the binding action between the roller and the adjacent tooth will be sufficient to hold the disk temporarily in that position, and hence the pin 40 will rock the arm 39 to the

right and throw the right-hand roller down into position to engage the face of the stationary contact 28 after the contact 45 has left the corresponding stationary contact 27, thus providing for the interruption of the circuit through the auxiliary carbon contacts. This action will take place at every position during the movement from left to right. If the movement be reversed, the pin 40, as will be readily seen, will act upon the arm 39 and rock it in the other direction until the stop 42 comes into engagement with the corresponding stop 41, and thus bring the other roller 38 in position to drag behind the contact 45, and thus interrupt the circuit at the carbon contacts. The relative construction and arrangement of parts is such, however, that the frame carrying the rollers will rock back into such position in passing from one notch to another that the circuit will always be closed through the main metal contacts. This construction of switch is particularly well adapted for use in connection with controllers for railway-motors, but is obviously also suitable for use in other relations where it is necessary to make and break a circuit in succession through a series of contacts.

I desire it to be understood that my invention is not limited to the particular construction and arrangement of parts shown and described, since the devices may be considerably modified without departing from the spirit and scope of the invention.

I claim as my invention—

1. A switch for electric circuits comprising main contacts, auxiliary contacts in shunt thereto, and a single operating-handle, the movable contacts having a limited movement independent of each other, and the shunt-contacts having a retarding connection with a stationary part of the switch, whereby the circuit is closed through the main contacts and opened at the shunt-contacts.

2. In a switch for electric circuits, the combination with stationary and movable metal contacts, of corresponding shunt-contacts of substantially infusible conducting material, and a single operating-handle, said movable contacts having a limited movement independent of each other, and the shunt-contact having a frictional retarding connection with a stationary portion of the switch, whereby the circuit may be closed through the metal contacts and opened at the shunt-contacts.

3. In a switch for electric circuits, the combination with movable and stationary circuit-closing metal contacts and corresponding circuit-breaking contacts of substantially infusible conducting material, the movable members of the two sets being loosely connected, of a single operating device for both movable members, and retarding means for the movable circuit-breaking contact, said means

being operative for every movement of the switch.

4. In a switch for electric circuits, the combination with movable and stationary metal contacts, of corresponding carbon contacts in shunt thereto, a lost-motion connection between the movable metal and carbon contacts, a constantly-acting retarding means for the movable carbon contact, and a single operating-handle for the said parts.

5. A switch for electric circuits comprising two electrically-connected stationary contact-terminals, one of which has a contact portion composed of substantially infusible material, two electrically-connected movable contacts one of which has an engaging portion composed of substantially infusible material, said movable contacts having a pivotal engagement with each other and having limiting-stops and a frictional retarding connection between the infusible contact and a stationary part of the switch whereby the former will be caused to drag behind the member with which it is pivotally connected both when the switch is closed and when it is opened.

6. In a switch for electric circuits, the combination with stationary main and shunt contacts, of a movable shunt-contact and a corresponding main contact having a limited movement independent of said shunt-contacts, a single actuating-handle rigidly connected to the movable main contact and retarding means for the movable shunt-contact acting thereon to cause the same to drag behind the main contact both in opening and in closing the switch.

7. In a switch for electric circuits, the combination with sliding main contacts, of a stationary shunt-contact plate, a cooperating contact-roller having lost motion with reference to the main movable contact, and a constantly-acting retarding means for said roller which causes it to drag behind the main contact, whereby the opening of the circuit by means of the shunt-contacts and the closing of it by means of the main contacts is effected.

8. The combination with a switchboard, of stationary and movable main contacts, and corresponding shunt-contacts, the main and shunt movable members having a lost-motion connection between them, a single operating-handle and a constantly-acting retarding means for the movable shunt-contact, said contacts and handle being located upon opposite sides of the switchboard.

In testimony whereof I have hereunto subscribed my name this 5th day of May, A. D. 1896.

ALEXANDER JAY WURTS.

Witnesses:

WESLEY G. CARR,
HUBERT C. TENER.