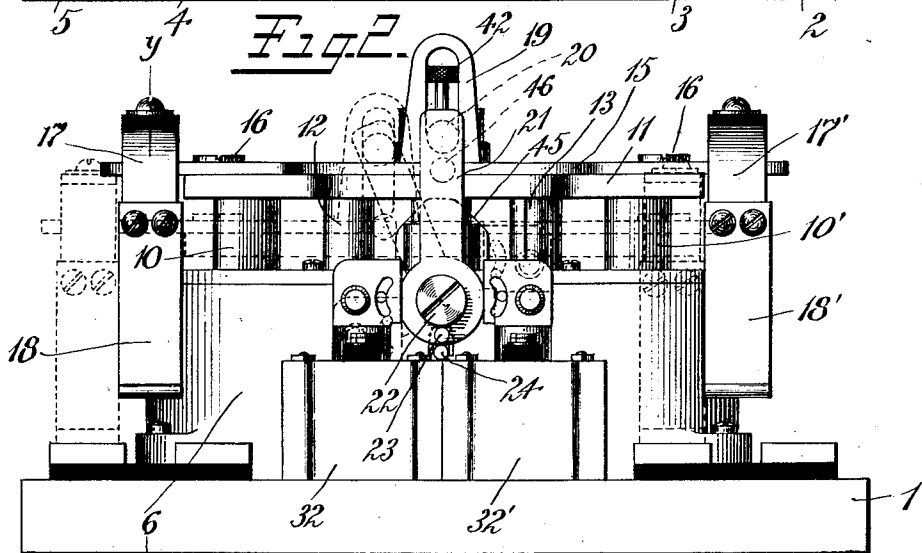
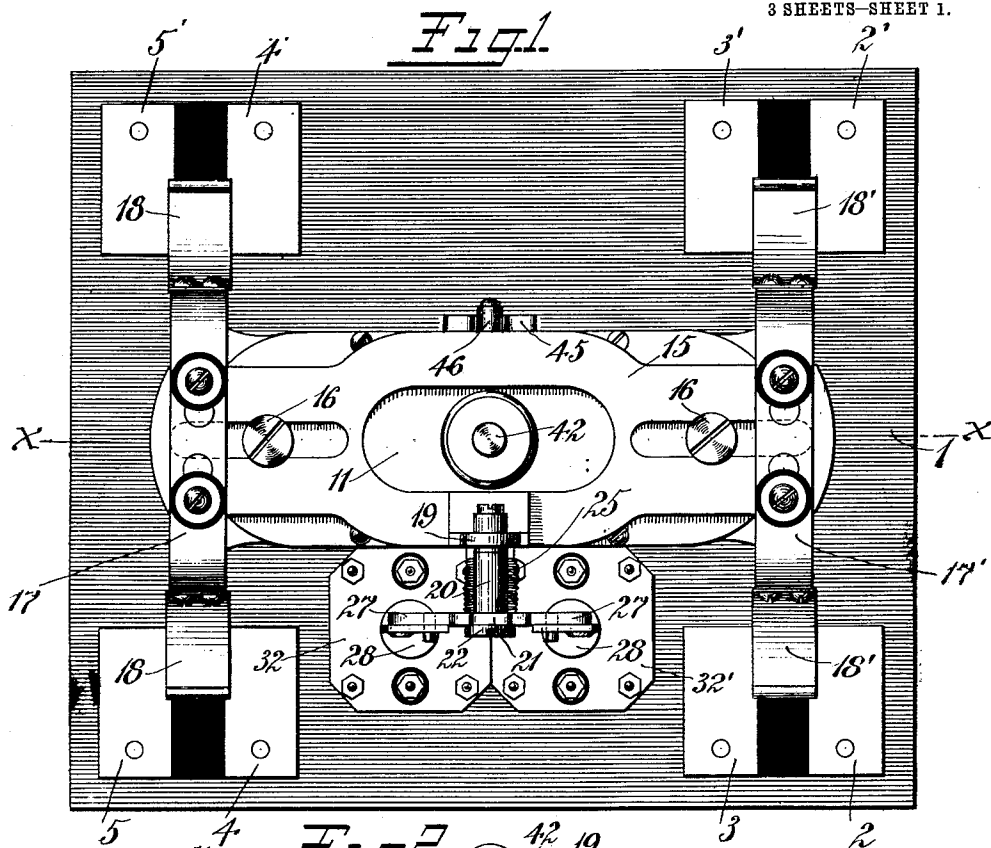


G. W. HART.
MULTITHROW SWITCH.
APPLICATION FILED MAR. 3, 1911.

1,014,300.

Patented Jan. 9, 1912.

3 SHEETS—SHEET 1.



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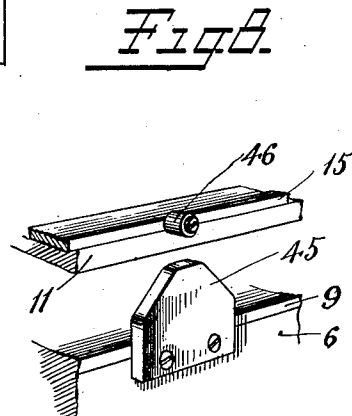
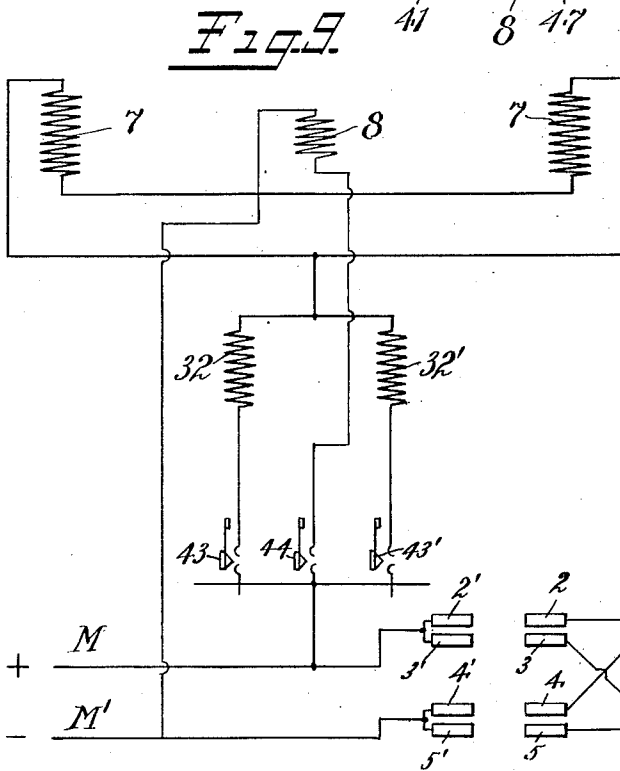
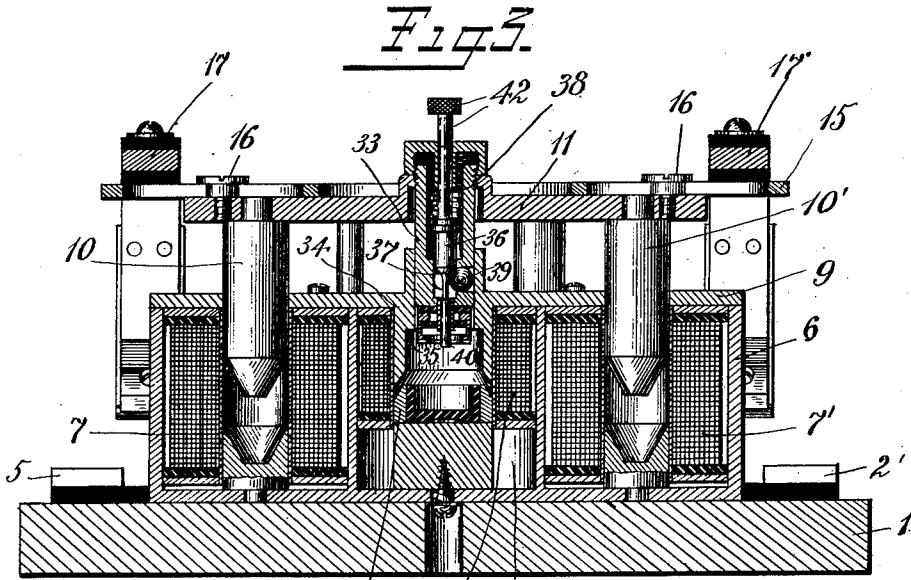
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3 SHEETS—SHEET 2.



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3 SHEETS-SHEET 3.

Fig. 4.

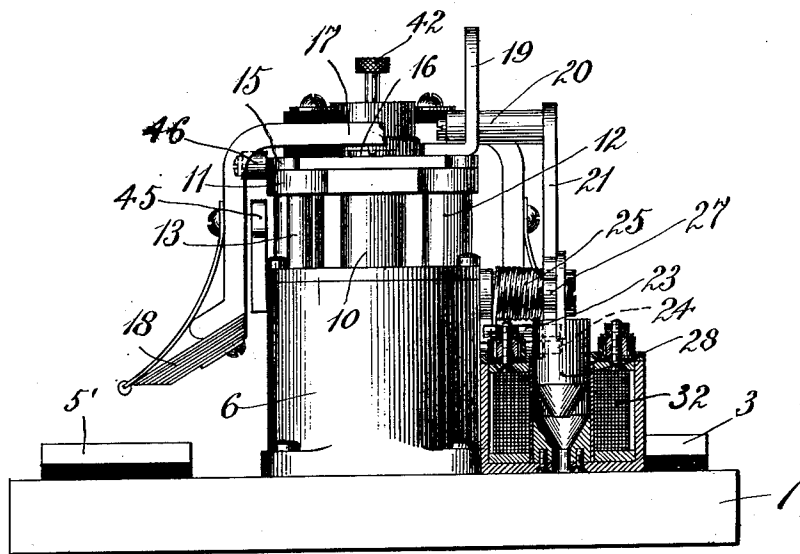


Fig. 6.

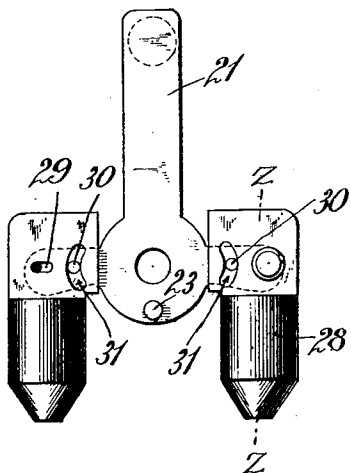


Fig. 7.

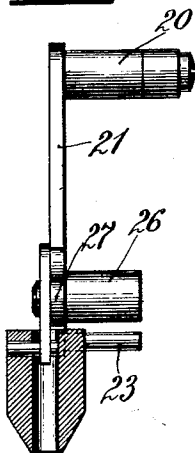
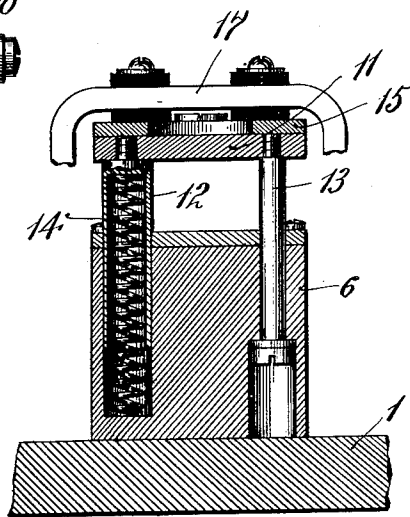


Fig. 5.



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UNITED STATES PATENT OFFICE

GERALD W. HART, OF WEST HARTFORD, CONNECTICUT, ASSIGNOR TO THE HART MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF NEW JERSEY.

MULTITHROW SWITCH.

1,014,300.

Specification of Letters Patent.

Patented Jan. 9, 1912.

Application filed March 3, 1911. Serial No. 612,071.

To all whom it may concern:

Be it known that I, GERALD W. HART, a citizen of the United States, residing at West Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Multithrow Switches, of which the following is a full, clear, and exact description.

My invention relates to multi-throw switches, and has for its object to produce a remote controlled multi-throw switch.

It further has for its object to produce a multi-throw switch having laterally displaced contacts with which a switch arm, movable relatively to its support, is adapted to make a selected engagement.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view. Fig. 2 is a front elevation. Fig. 3 is a section on the line $x-x$ Fig. 1. Fig. 4 is an end elevation, parts being broken away, and other parts being shown in section. Fig. 5 is a section on the line $y-y$ Fig. 2. Fig. 6 is a detail. Fig. 7 is a side view of the detail of Fig. 6, part being shown in section on the line $z-z$ Fig. 6. Fig. 8 shows a detail of a guide. Fig. 9 is a diagram of circuits.

Referring more particularly to the drawings, 1 is a base on which are mounted four pairs of contacts 2-2', 3-3', 4-4', 5-5'.

6 is a casting of iron, or other magnetic material, having three coil cavities, in two of which are located switch closing solenoids 7-7', and in the other of which is located a detent releasing solenoid 8. 9 is a magnetic cover closing said openings, and having three perforations. Through two of these perforations extend two magnetic cores 10-10', which are connected to a cross bar 11. This cross bar is guided by two tubes 12, and two headed rods 13, which work in guide openings in the casting 6. Within the tubes 12 are springs 14 which normally tend to raise the bar 11. The heads of the rods 13 limit the upward throw of the bar 11. A sliding plate or carriage 15 is secured to the bar 11 by screws 16. This sliding plate carries two U-shaped switch arms 17-17', which are insulated therefrom and which terminate in laminated portions 18-18' each adapted to engage two adjacent pairs of contact plates, one pair at a time.

Connected to the plate 15 is a lug 19 having an opening through which a stud 20 projects. This stud is connected to an arm 21 pivoted at 22. The lower portion of the arm 22 carries a projection 23, which, when the arm is in upright position, is immediately over a projection 24 secured to the casting 6. These two projections 23 and 24 are embraced by the ends of a spring 25 mounted on the support 26 of the arm 21 so as to retract the arm 21 whenever it is moved in either direction from the vertical position in the ordinary manner of push-button switches. The hub of the arm 22 has two lateral projections 27, to which are pivoted solenoid cores 28, the pivot slots as shown at 29 being slightly elongated. The arms carry auxiliary pins 30 working in slots 31, which maintain the pivots of the armatures 28 in the same vertical line whatever may be the position of the arms 27, thus securing a rectilinear movement of the cores, the action being that described in my Patent No. 828,739, granted August 14, 1906. Mounted on the base are two iron-clad solenoids 32-32' into which the cores 28 project.

Located at the center of the plate 11 is a downward projection 33 constituting the intermediate member of a clutch. Depending from the cover 9, and in line with this projection, is a stationary abutment 34 having a shoulder 35. Within the intermediate member 33 is a second and movable abutment 36 having a recess 37. The spring 38 tends to make this movable abutment 36 move downwardly. The intermediate member has a plurality of perforations in which are located ball detents 39, which, when the parts are in position shown in Fig. 3, are contained in the perforations in the intermediate member and the recess 37, and when the parts are depressed, are contained within the perforation in the intermediate member and the recess formed by the shoulder 35. When the parts are in this last named position, the spring 38 forces the movable abutment 36 downward so as to force the balls outward beneath the shoulder 35. The movable abutment 36 has a downward projection 40. Beneath this projection is a movable armature 41 which is attracted by the releasing solenoid 8. When the switch is closed, the projection 40 comes in close proximity to the armature 41, so that when the armature 41 is raised by the solenoid 8,

the movable abutment 36 is raised until the recess 37 comes opposite the detent 39, whereupon the parts become unlocked and the switch opens by reason of the action of the
 5 springs 14. The movable abutment can also be lifted manually by the knob 42 so as to unlock the switch and permit it to open.

Fig. 9 shows one arrangement of the circuits, being the preferred arrangement for the switch when used on 110 volt circuits.
 10 As here shown, the coils 7-7' are connected to the mains M-M' in multiple. The coils 32-32' are connected in multiple through the switches 43-43', and each of the coils
 15 32-32' is connected in series with both of the coils 7-7'. The releasing coil 8 is connected across the mains M-M', and in series with a local circuit controller 44.

The operation of the switches is as follows: Assuming that the switch is open, as shown in full lines in Fig. 2, if the local circuit controller 43 is closed, the coils 32 and 7-7' are energized, with the result that the cores 10 are drawn downward, and at the
 20 same time the arm 21, by the action of the coil 32, is thrown to the left, thereby moving the plate 15, together with the switch arms 17-17' to the left so as to make engagement with the circuit terminals or contacts 3-3'
 25 and 5-5', in which position they are held by the balls 39. If then the local circuit controller 44 is closed, the coil 8 is energized and the armature 41 lifted so as to engage the projection 40 and lift the movable abut-
 30 ment 36, unlocking the switch so as to permit the springs 14 to open it. If now the local circuit controller 43' is closed, the coil 32', together with the coils 7-7' are energized, closing the switch with the switch
 40 arms in engagement with the circuit terminals or contacts 2-2' and 4-4'. In order to guard against the switch arms 17-17' coming down without moving to either the right or left, as, for instance, on account of
 45 the short circuiting of one of the coils 32-32', I mount a stop guide 45 upon the side of the casting 6, and provide the plate or carriage 15 with an anti-friction roller 46 adapted to engage with the stop guide 45.
 50 If, when one of the local circuit controllers 43-43' is closed, the plate 15 is not moved in either direction, the roller 46 engaging the top of the stop 45 will prevent the switch from closing. If, however, the plate 15 has
 55 moved in one direction or the other, but has not moved the full distance, the inclined upper surface of the stop 45 will insure its proper movement before the switch is completely closed.

60 In order to omit unnecessary complicating details, I have not shown or described herein the means for interrupting the controlling circuits in which the local circuit controllers 43-43' and 44 are included.
 65 The space 47 below the coil 8 provides for

such an auxiliary circuit interrupter, the details of which are shown in my copending application Serial No. 570,693, filed July 7th, 1910. This circuit interrupter, although
 70 of value in connection with my present switch, does not form a part of the invention embodied therein.

As will be evident to those skilled in the art, my invention permits of being embodied in various modified forms, which will
 75 leave it within the scope of the appended claims. The form shown, however, is the form preferred by me.

What I claim is:

1. In a multi-throw switch, the combination of a base, two laterally displaced contacts thereon, a support movable toward and from said base, a carriage movably mounted on said support, a switch arm on said carriage and moving therewith so as to engage
 80 either one of said contacts, means for moving said support toward said base, and means for shifting said carriage thereon.

2. In a multi-throw switch, the combination of a base, two laterally displaced contacts thereon, a support movable toward and from said base, a carriage movably mounted on said support, a switch arm on said carriage and moving therewith so as to engage
 85 either one of said contacts, electromagnetic means for moving said support toward said base, and electromagnetic means for shifting said carriage thereon.

3. In a multi-throw switch, the combination of a base, two laterally displaced contacts thereon, a support movable toward and from said base, a carriage movably mounted on said support, a switch arm on said carriage and moving therewith so as to engage
 90 either one of said contacts, electromagnetic means for moving said support toward said base, electromagnetic means for shifting said carriage thereon, and a detent for holding said switch in closed position.

4. In a multi-throw switch, the combination of a base, two laterally disposed contacts thereon, a support movable toward and from said base, a solenoid mounted on said base, a core connected to said support and entering said solenoid, a carriage movably mounted on said support, a switch arm on said carriage and adapted to engage
 95 either of said contacts according to the position of said carriage, electromagnetic means for shifting said carriage upon said support, a local circuit controller in series with both the said electromagnetic means and said solenoid, a detent for holding said switch in closed position, and electromagnetic means for releasing said detent.
 100

5. In a multi-throw switch, the combination of a base, a switch closing solenoid mounted thereon, a support above said solenoid having a depending core, a spring normally tending to move said support
 105

away from said base, a carriage movably mounted on said support, two switch arms secured to said carriage, two laterally disposed circuit terminals on said base for each of said arms, electromagnetic means for shifting said carriage, a detent for holding said switch closed, electromagnetic means for releasing said detent, local circuits for said electromagnetic means and solenoid, and local circuit controllers in said circuit.

6. In a multi-throw switch, the combination of a base, a switch closing solenoid mounted thereon, a support above said solenoid having a depending core, a spring normally tending to move said support away from said base, a carriage movably mounted on said support, two switch arms secured to said carriage, two laterally disposed circuit terminals on said base for each of said arms, electromagnetic means for shifting said carriage in one direction, electromagnetic means for shifting said carriage in the other direction, a detent for holding said switch closed, electromagnetic means for releasing said detent, local circuits for said electromagnetic means and solenoid, and local circuit controllers in said circuit.

7. In a multi-throw switch, the combination of a base, two solenoids thereon, a support above said solenoids adapted to move toward and from said base, two cores connected to said support and entering said solenoids, spring means for retracting said support, a carriage movably mounted on said support, a plurality of switch arms on said carriage, two laterally disposed circuit terminals for each switch arm mounted on said base, a detent for holding said switch in closed position, electromagnetic means for controlling the position of said carriage relative to said support, and electromagnetic means for releasing said detent.

8. In a multi-throw switch, the combination of a base, two laterally disposed contacts thereon, a support movable toward and from said base, a solenoid mounted on said base, a core connected to said support and entering said solenoid, a carriage movably mounted on said support, a switch arm on said carriage and adapted to engage either of said contacts according to the po-

sition of said carriage, electromagnetic means for shifting said carriage upon said support, a local circuit controller in series with both the said electromagnetic means and said solenoid, a detent for holding said switch in closed position, electromagnetic means for releasing said detent, and a stop adapted to engage said carriage in a position intermediate to said two terminals.

9. In a multi-throw switch, the combination of a base, two laterally disposed contacts thereon, a support movable toward and from said base, a solenoid mounted on said base, a core connected to said support and entering said solenoid, a carriage movably mounted on said support, a switch arm on said carriage and adapted to engage either of said contacts according to the position of said carriage, electromagnetic means for shifting said carriage upon said support, a local circuit controller in series with both the said electromagnetic means and said solenoid, a detent for holding said switch in closed position, electromagnetic means for releasing said detent, and a guide preventing the engagement of said switch arms with said terminals simultaneously.

10. In a multi-throw switch, the combination of a base, two laterally disposed contacts thereon, a support movable toward and from said base, a solenoid mounted on said base, a core connected to said support and entering said solenoid, a carriage movably mounted on said support, a switch arm on said carriage and adapted to engage either of said contacts according to the position of said carriage, electromagnetic means for shifting said carriage upon said support, a local circuit controller in series with both the said electromagnetic means and said solenoid, a detent for holding said switch in closed position, electromagnetic means for releasing said detent, and a controlling member engaging said carriage and preventing the closing of said switch when said carriage is not shifted and coacting with the switch closing solenoids in insuring the proper shifting of said carriage.

GERALD W. HART.

Witnesses:

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J. B. SMITH.