

S. B. CONDIT, JR.
DOUBLE THROW MOTOR STARTING SWITCH.
APPLICATION FILED JAN. 21, 1909.

953,084.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

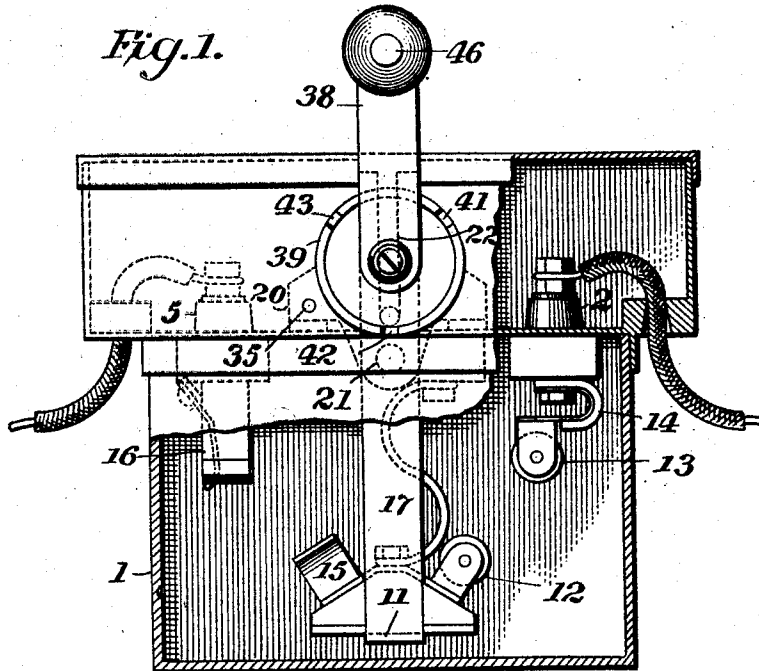
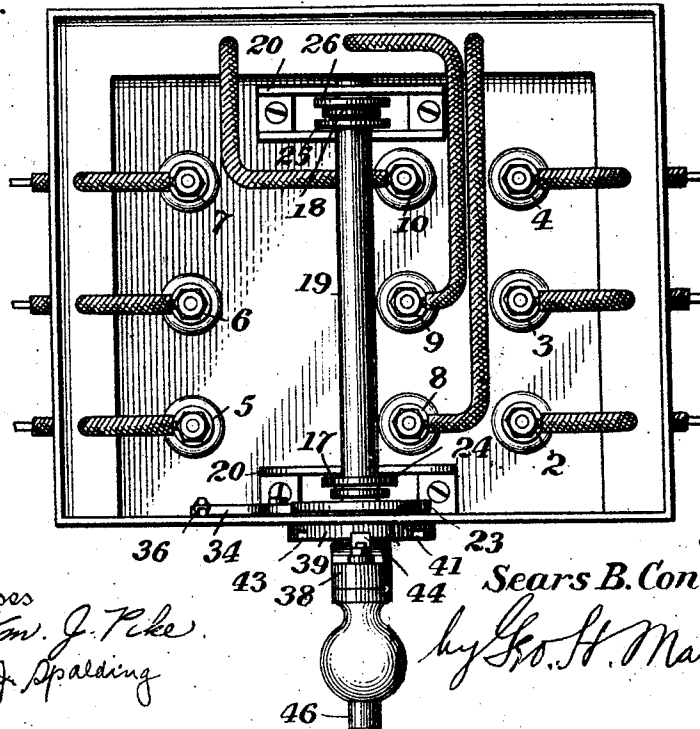


Fig. 2.



Witnesses
Wm. J. Pike
M. J. Spalding

Inventor
Sears B. Condit Jr.

by Geo. H. Maxwell,

Attorneys

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2 SHEETS—SHEET 2.

Fig. 3.

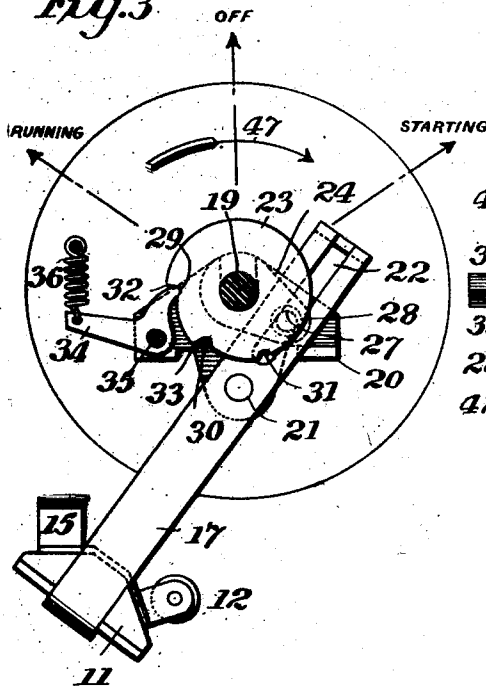


Fig. 6.

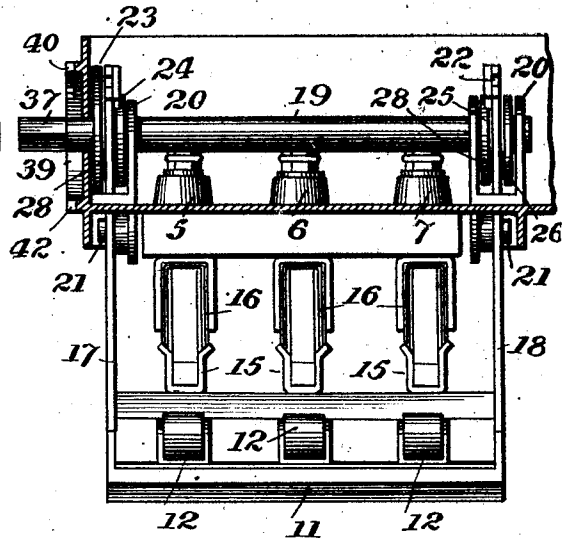


Fig. 4.

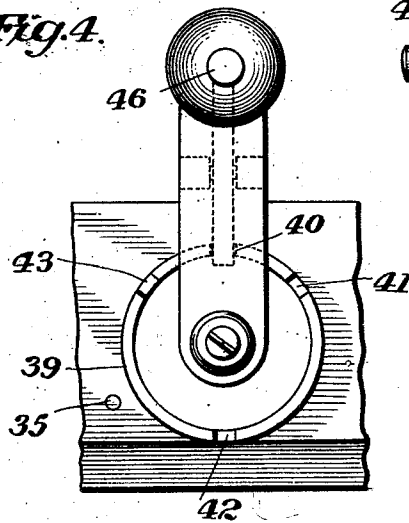
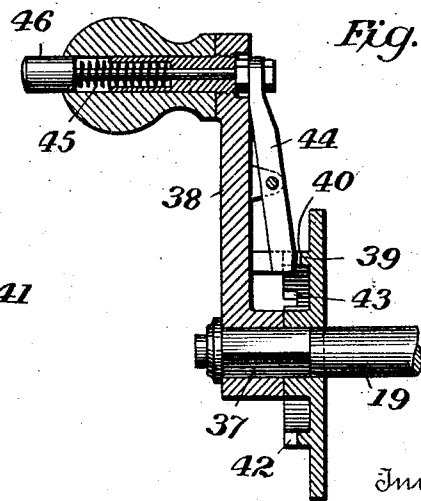


Fig. 5.



Witnesses
Wm. J. Pike.
M. J. Spalding

Inventor
Sears B. Condit Jr.
by Geo. S. Maxwell,
 Attorneys

UNITED STATES PATENT OFFICE.

SEARS B. CONDIT, JR., OF BROOKLINE, MASSACHUSETTS.

DOUBLE-THROW MOTOR-STARTING SWITCH.

953,084.

Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed January 21, 1909. Serial No. 473,485.

To all whom it may concern:

Be it known that I, SEARS B. CONDIT, JR., a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Double-Throw Motor-Starting Switches, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

My invention is a multi-throw switch whose handle has preferably a rotary movement whereby is produced a reciprocating movement of the contacts; my invention residing broadly in providing in connection with opposite sets of contacts, a reciprocating contact maker actuated to make contact successively with said opposite contacts by a handle which is compelled to move in a predetermined manner.

While this switch is primarily intended as a motor-starting switch, its use is not restricted thereto as it is applicable to a wide range of uses. Preferably also the switch handle is capable of certain reverse movements in connection with its forward rotary movement. Also when the contacts are moved to one position they are automatically locked against accidental movement away from that position.

Referring to my preferred construction in which the switch is used for starting an induction motor, its construction is such that when first operated only the desired set of contacts can be closed thereby, but after said contacts have been caused to cooperate for the starting of the motor, then the other contacts are closed. To this end I preferably provide a star wheel or cam and cooperating pawl which permit the handle to be moved backward only when in starting position. If the handle is in any other position it can only be moved forward, said forward movement however producing the same starting movement of the contact. So that, in any event, the switch contacts cannot be operated improperly.

In the drawings, in which I have shown a preferred embodiment of my invention, Figures 1 and 2 show respectively in front elevation and top plan a switch embodying my invention; and Figs. 3, 4, 5, and 6, are detail views showing the handle, shaft, and controlling members respectively, in front elevation, vertical section and side elevation,

parts being broken away in section for clearness of illustration.

As herein shown, I have applied my invention to an oil switch, mounted in an oil receptacle 1 and containing one set of fixed terminals 2, 3, 4, and opposite set 5, 6, 7, between which cooperate movable terminals 8, 9 and 10, mounted on a swinging cross bar 11, herein shown as provided with roll contacts 12 at one side to cooperate with similar roll contacts 13 separated by springs 14 from the respective terminals 2-4, and provided with bridge contacts 15 at its other side to cooperate with U-shaped laminated contacts 16 of the respective terminals 5-7. The cross bar 11 is suspended at its opposite ends by similar arms 17, 18, and is actuated by a shaft 19 journaled in supports 20. The arms 17, 18 are pivoted at 21 below said shaft 19 and have longitudinal slots 22 formed in their upper ends. The shaft is severed adjacent its opposite ends and provided with cranks 23, 24, 25, 26, pinned rigidly together at their outer ends at 27 and provided with rolls 28 on said pins, to travel in the slots 22 respectively of the arms 17 and 18.

The crank 23 is enlarged to constitute a star wheel or cam, best shown in Figs. 3 and 4, where it will be seen that it is provided with notches 29, 30, 31, the former two having overhanging shoulders or stops 32, 33, and the latter being shallow for a purpose presently to be described. Cooperating with this cam is a pawl or dog 34 pivoted at 35 and normally held in engagement with the cam by a spring 36. Fast on the outer end 37 of the shaft is an operating handle 38. Suitable positive locking means of any desired kind is also provided, being herein shown as comprising a projecting arm 39 notched at 40, 41, 42, 43, to receive a detent 44 carried by said handle and normally moved to engage with said notches by a spring 45 in the handle and adapted to be released by a thumb button 46. The normal movement of the handle is in the direction of arrow 47, Fig. 3.

In use, the handle is ordinarily rotated in the direction of the arrow, whatever its position may be. Let it be supposed that the handle is in its vertical, "off" position, the operator moves it in the direction of the arrow, which, because of the engagement of the rolls 28 with the uprights 17, 18, and the fact that the latter are pivoted at 21 eccen-

trically to the shaft 18, causes the cross bar 11 and its contact to swing to the right, Fig. 1, thereby engaging the contacts 12 and 13. The switch shown is used for starting an induction motor, for which purpose it is essential that the contacts 12 and 13 shall make contact before 15 and 16 make contact, and this result is secured by the engagement of the pawl 34 with the shoulder 33, which makes it impossible for the switch to be thrown in any other way than as just described. The particular arrangement of the notches and shoulders of the star wheel or cam depends on the service for which the switch is to be used. Having moved the handle to the right into starting position, a further movement in the same direction operates, by the engagement of the rolls 28 with the slots 22 of the uprights 17, 18, to swing the movable contacts back to the left until the contacts 15 and 16 are closed, the handle meanwhile having swung downwardly from starting position and around to the full-line or "running" position, Fig. 3, in which position the pawl 34 engages the notch 29 and coöperates with the shoulder 32 in preventing a return movement of the handle. As herein shown, the only position in which the handle can be swung in either direction is from the starting position, at which time the pawl engages the notch 31. The handle can then be swung, if desired, backward to "off" position so as to restore the contacts to their out-of-contact position. When the handle is in its starting and running positions the rolls 28 and their cranks stand at right angles to the slots 22 of the uprights 17, 18, and hence tend to lock or hold the switch in closing position, but preferably I provide a positive locking device such as the spring-actuated latch 44, shown as hand-released at 46.

It will be understood that my invention is capable of a wide variety of constructional details and that the embodiment herein shown is merely the preferred construction, except as otherwise restricted in the claims. The rotary movement of the handle need not be through a complete cycle but may be an oscillating or reciprocating movement, and in fact, while I have shown one form of cam movement for moving the contact, I believe my invention is broadly new in providing a switch having opposite sets of contacts, a contact maker and actuating means including a handle which limits said contact maker to a predetermined order of movements, all as more definitely stated in the claims.

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

1. A multi-throw switch, comprising starting contacts, running contacts, a reciprocatory swinging contact-maker for

making contact therewith in the order mentioned, rotary operating means, and means for preventing any different order of contact closing.

2. A multi-throw switch, comprising starting contacts, running contacts, swinging contact-making mechanism, a rotary handle for oscillating said swinging contact, having running position, off position and starting position, and controlling mechanism requiring said handle to move from off position forwardly past starting position to get to running position.

3. A multi-throw switch, comprising starting contacts, running contacts, swinging reciprocating contact-making mechanism for coöperating with the aforesaid contacts, and operating mechanism therefor, including a rotary handle capable of continuous unidirectional rotation, means for preventing making contact with the running contacts without first making contact with the starting contacts, and means permitting the contact-making mechanism to be moved from starting position to off position by a retrograde movement of said handle.

4. A multi-throw switch, comprising starting contacts, running contacts, a swinging contact-maker having reciprocal movement to swing back and forth between said starting contacts and running contacts, a rotary handle having a running position, an off position, and a starting position, and capable of unidirectional rotation through a plurality of complete cycles of operation, and automatic controlling mechanism beyond the control of the operator for requiring said handle to move from off position forwardly past starting position to get to running position, but permitting said handle to be moved backward from starting position to off position.

5. A multi-throw switch, comprising separated contacts, a reciprocatory swinging contact-maker and operating means therefor including a rotary handle capable of unidirectional movement to starting position, running position, and off position successively, a controlling cam rotating with said handle, and a pawl coöperating with said cam, for restricting said handle to a predetermined order of rotary movement.

6. In a multi-throw switch, independent separated contacts, a reciprocatory swinging contact-maker for successively contacting therewith, a rotary handle pivoted eccentrically of the pivot of said swinging contact-maker, and a slot and crank connection between said contact maker and handle for translating the rotary movement of the handle into reciprocating movement of the contact-maker, said crank standing at right angles to the slot when the switch is in closed position and thereby tending to hold the switch in said closed position.

7. In a multi-throw switch, a reciproca-
tory swinging contact-maker having an off
position, a starting position, and a running
position, starting contacts to be engaged by
said contact-maker when in its starting posi-
tion, running contacts to be engaged by said
contact-maker when in its running position,
a handle for operating said swinging con-
tact-maker, and means for controlling the
direction of movement of said handle to
compel the contact-maker to make contact
successively with said contacts in an unvary-
ing predetermined order with relation to
said off position.

8. In a multi-throw switch, a rotary shaft
provided with swinging cranks, means to
rotate said shaft and cranks, an eccentrically
swinging contact maker having slotted up-
rights engaged by said cranks for translat-
ing the rotary movement of the shaft into
reciprocatory movement of the contact
maker, and opposite contacts to be succes-
sively engaged by said contact maker.

9. In a multi-throw switch, a rotary shaft
provided with swinging cranks, means to
rotate said shaft and cranks, an eccentrically
swinging contact maker having slotted up-
rights engaged by said cranks, cam mechan-
ism actuated by said shaft for restricting the

latter to a predetermined direction of move-
ment, and opposite contacts to be engaged
by said contact maker.

10. In a multi-throw switch, a rotary
shaft provided with swinging cranks, means
to rotate said shaft and cranks, an eccen-
trically swinging contact maker having
slotted uprights engaged by said cranks, a
cam and a cooperating dog actuated by said
shaft for restricting the latter to a prede-
termined direction of movement, and oppo-
site contacts to be engaged by said contact
maker.

11. In a multi-throw switch, a rotary
shaft provided with swinging cranks, means
to rotate said shaft and cranks, an eccen-
trically swinging contact maker having
slotted uprights engaged by said cranks, and
hand-released locking mechanism for auto-
matically locking the switch in closed
position.

In testimony whereof, I have signed my
name to this specification, in the presence of
two subscribing witnesses.

SEARS B. CONDIT, JR.

Witnesses:

M. J. SPALDING,
WM. J. PIKE.