No. 635,319. Patented Oct. 24, 1899.

J. HEINZE, JR.

CIRCUIT CONTROLLING DEVICE.

(Application filed May 20, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

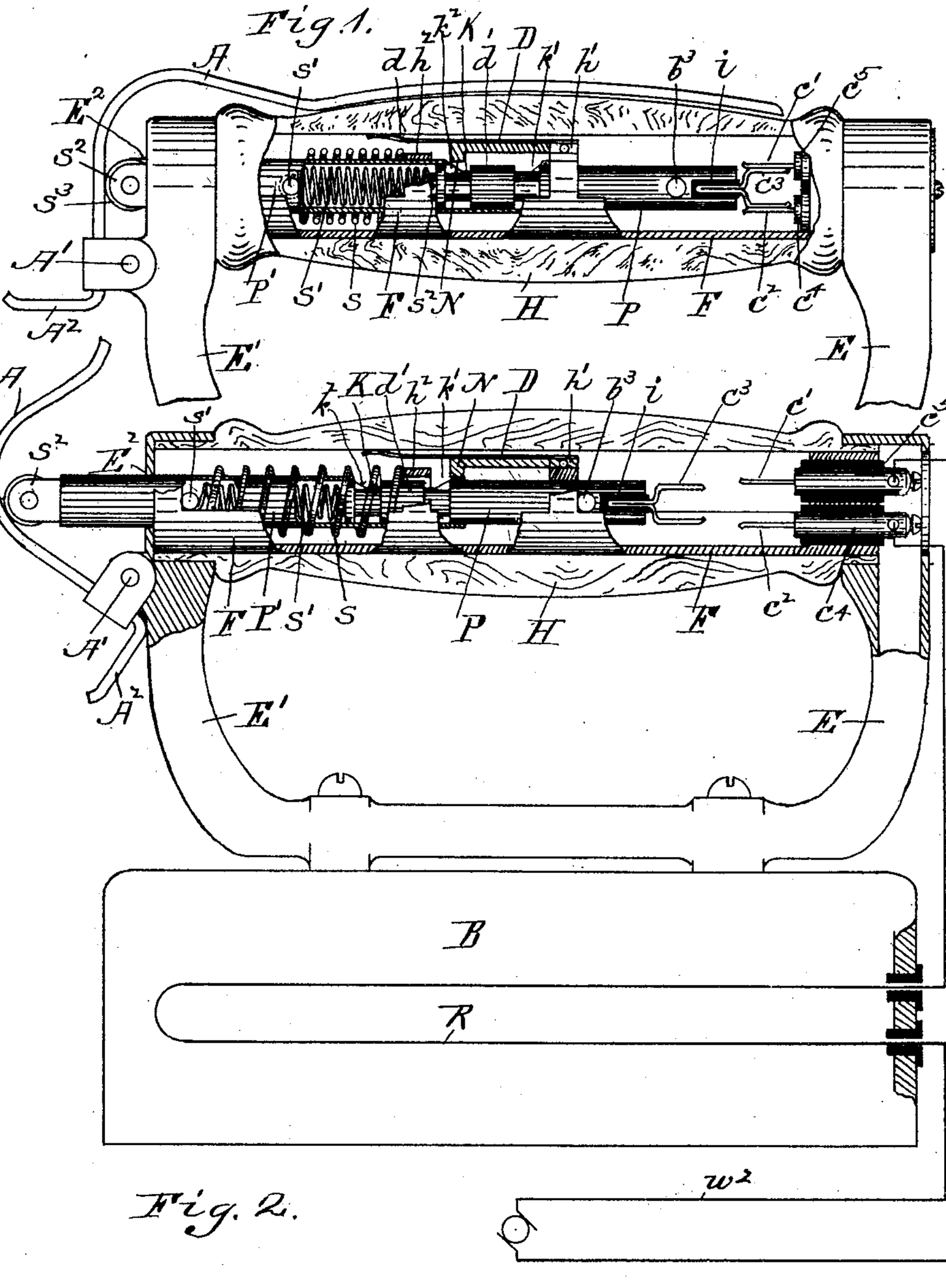

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 3

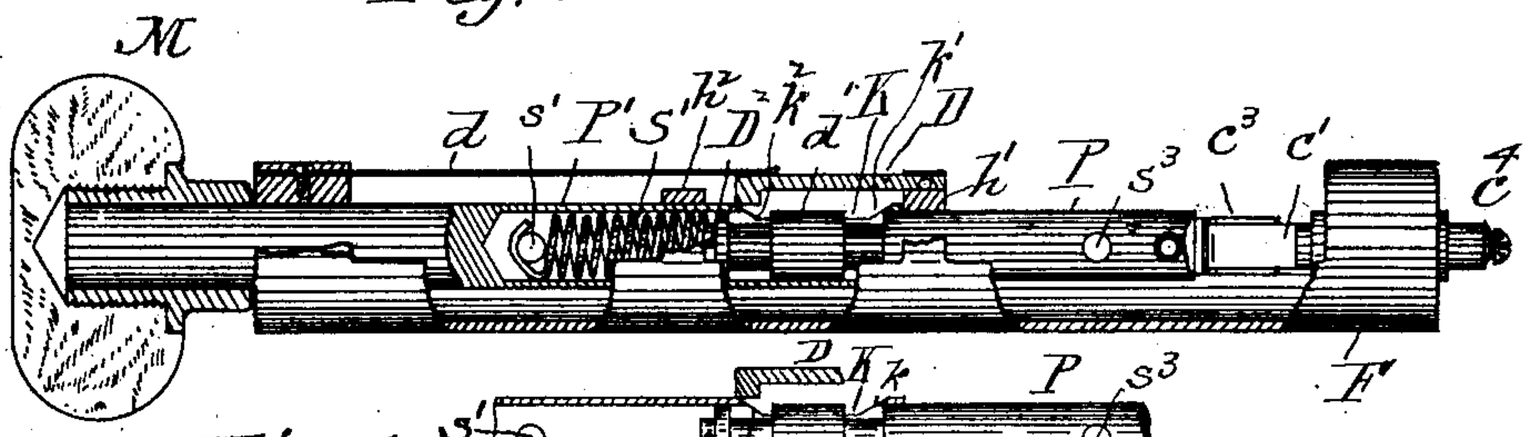


Fig. 4.

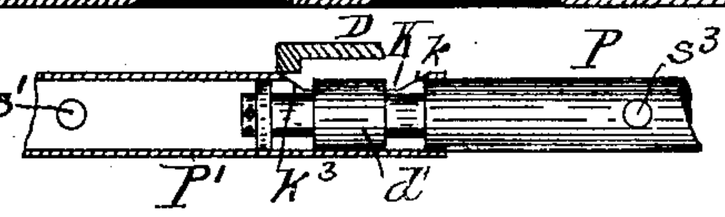


Fig. 5.

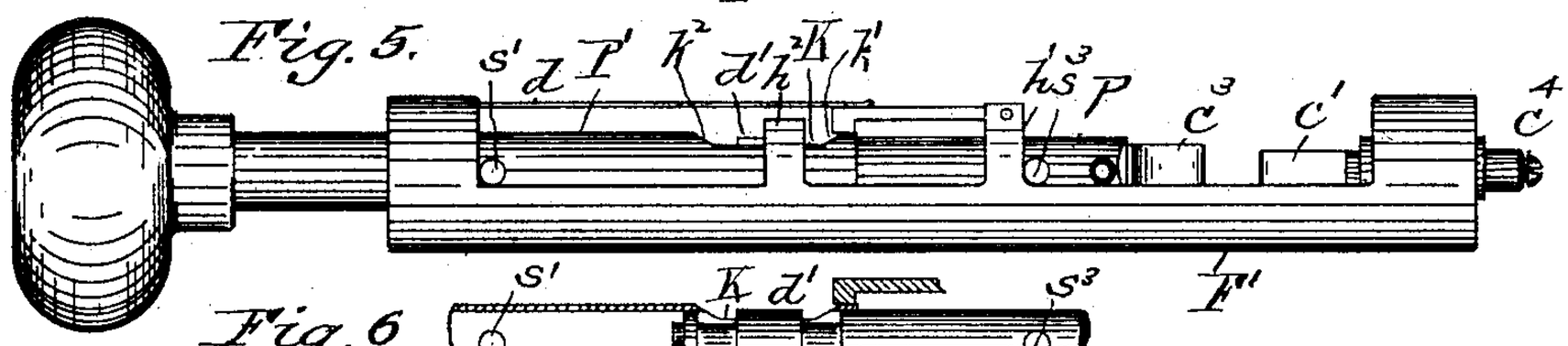


Fig. 6

Fig. 7.

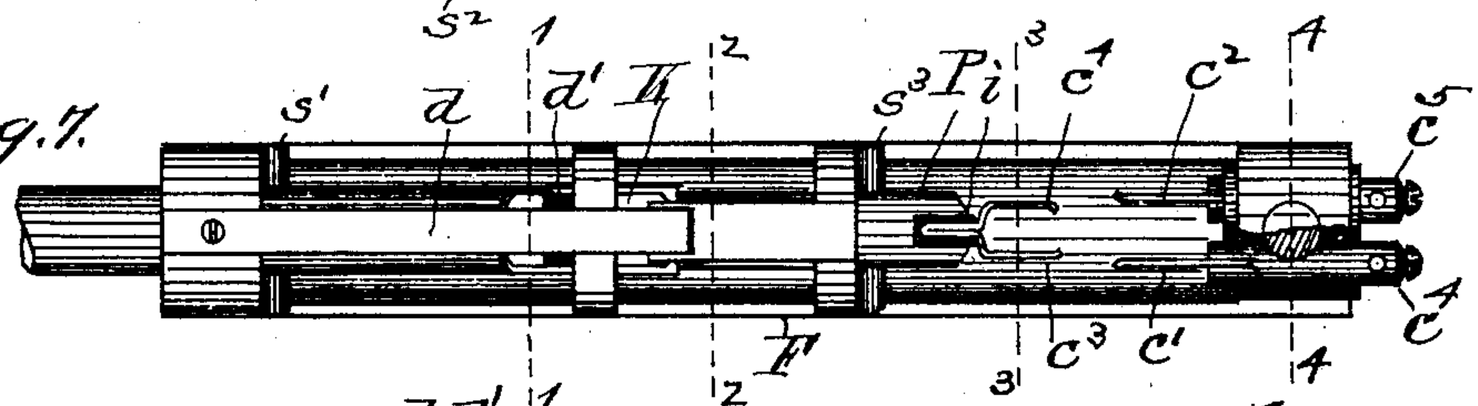


Fig. 8

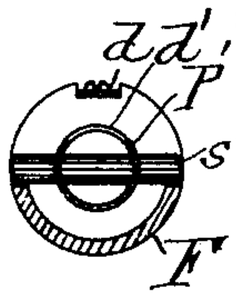


Fig. 9.

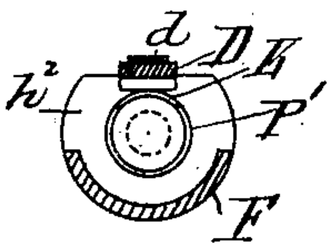


Fig. 10.

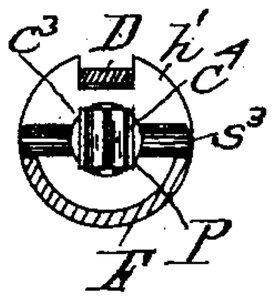
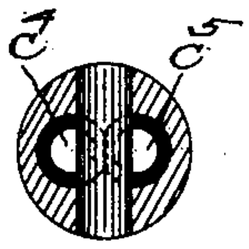


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN HEINZE, JR., OF REVERE, MASSACHUSETTS, ASSIGNOR TO THE SIMPLEX ELECTRICAL COMPANY, OF BOSTON, MASSACHUSETTS.

CIRCUIT-CONTROLLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 635,319, dated October 24, 1899.

Application filed May 20, 1899. Serial No. 717,544. (No model.)

To all whom it may concern:

Be it known that I, JOHN HEINZE, JR., a citizen of the United States of America, and a resident of Revere, county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Circuit-Controlling Devices, of which the following is a specification.

This invention relates to circuit-controlling devices for miscellaneous electrical instruments, and is especially adapted to be used in situations where a compact and at the same time durable and safe device is required. This is useful as a separate contrivance adapted to attachment to electrical circuits and to electrically-heated tools or instruments, and in particular to devices for accomplishing the closure of the electric circuit of which an electroheating resistance forms a part, with a view especially to automatic control of such circuit-closure.

Electric heating has been found to be of distinct advantage in the use of such tools as sad-irons, treeing-irons, soldering-irons, and the like for the reason that the heat required can by the use of electricity be generated at and applied to the spot or surface where the heat is required, and can be almost instantaneously generated and as instantaneously turned off when not required. In the following specification I use for the illustration of my invention the description of an electrically-heated sad-iron which serves well as a type of electrically-heated tools and of which the normal conditions of use are characteristic of most, if not all, of such devices. My invention, however, may be applied to other electrically-heated tools and will demonstrate its utility wherever the use of the tool involves its being grasped in the hand of the workman and where the application of the tool to its work is irregular and intermittent. In the use of the electrically-heated sad-iron, which I take for my example, the continuous application of the electrically-generated heat is economically inconsistent with the intermittent use of the tool, and unless the user is careful to place the iron upon a properly-constructed stand during the intermissions in its use the constant generation of heat becomes a source of danger, because if the tool is allowed to rest upon the cloth to be ironed or upon any other destructible surface the confinement of the constantly-generated heat quickly raises the temperature to a point where the substance on which the iron rests will be charred or burned and even to the point where the electroresistance itself is in danger of being destroyed. This invention aims at the avoidance of such destructive conditions and also increases the economy with which the tool can be used.

In the drawings, wherein like letters are used to designate like parts, Figure 1 is a view, partly in longitudinal section, of the handle of an electrically-heated instrument with the circuit-controller in closed-circuit position. Fig. 2 shows the device of Fig. 1 with the circuit-controller in open-circuit position and mounted upon an electrically-heated smoothing-iron, which, with its heating resistance, is conventionally depicted. Fig. 3 is a view, partly in longitudinal section, of a snap-switch similar in construction to that shown as part of the device of Figs. 1 and 2. Fig. 4 is a detail, partly in section, of Fig. 3. Fig. 5 is a longitudinal elevation of the switch shown in Fig. 3, the switch in this instance being in open-circuit position. Fig. 6 is a detail, partly in section, of Fig. 5. Fig. 7 is a plan view, in part section, of Fig. 5. Fig. 8 is a cross-section of Fig. 7 at the line 1 1. Fig. 9 is a section of Fig. 7 at the line 2 2. Fig. 10 is a cross-section of Fig. 7 at the line 3 3; and Fig. 11, a cross-section at the line 4 4 of Fig. 7, all these sections being viewed from the right-hand end of Fig. 7.

In Fig. 2 the body of the tool to be heated (marked B) contains the resistance R, which is conventionally depicted, but which may be any efficient and commercially acceptable heat-resistance—such as, for instance, the well-known enameled resistance—in which the resisting-conductor is embedded in and protected by a coating of enamel adhesively applied to the heat-conducting body. The wires w and w^2 serve for the introduction of the electric current to the resistance R, and the leading wires w' and w^2 serve to conduct the current from the source of supply. The resistance R is not constantly included in a closed circuit; but the closure of the resist-

ance-circuit is controlled by a circuit-closing switch which is carried by the tool itself.

A convenient manner of arranging the circuit-controlling devices in a sad-iron is illustrated in the drawings.

The handle H, which is secured in the ordinary position upon arms E E′, which are part of or secured to the body B of the iron, is made longitudinally hollow, so as to afford space within for the internal operative parts of the circuit-controlling devices. Contact-terminals c' c^2, separated and insulated from each other, are connected, respectively, to external binding-posts c^5 c^4. The wire w connects one end of the resistance R with the contact-terminal c^2. The wire w^2 connects the other end of said resistance with the source of supply of the electric current. The current, were it not for the separation of the terminals c' c^2, would pass from the wire w' through post c^5, terminals c' c^2, post c^4, wire w, resistance R, and wire w^2.

The closure of the above-described circuit is effected by the electrical juncture of the contact-terminals c' c^2. This is accomplished by means of a circuit-controlling switch located within the shell of the handle H. The construction and operation of the circuit-controlling switch are as follows: A resilient circuit-closer consisting of a double-leafed spring c^3 is secured to and carried by the rod P, from which the circuit-closer c^3 is insulated by suitable insulating material at i. The circuit-closer carrier P slides freely in the tubular switch-slide P′, which passes through the opening E^2 in the handle-arm E′ and terminates in a rounded end S^2, which may be provided with a roller S^3. A frame F within the handle H serves as a guide for the switch-controller and its associated parts. The tubular slide P′ is slotted at K, and within or under the slot K the rod P is provided with an enlargement d'. The rod P and tubular slide P′ are yieldingly connected together by a spiral spring S′, which lies within the tubular portion of the switch-slide P′ and is secured at one end to the pin s', which passes through the slide P′, and at the other end to a hole s^2 in the inner end of rod P. The spring S′ being fastened at both ends is thus capable of acting either in compression or tension, according to the relative positions of the rod P and slide P′. The frame or carrier F is provided with bridges h' h^2, which serve as guides for rod P and slide P′, respectively. Pivoted upon the bridge h' there is a detent D, which hangs over the slot K in operative relationship with the enlargement d'. A leaf-spring d, secured to the detent D, presses against the inner surface of handle H and urges the detent D into coactive relationship with the enlargement d'. The two parts P and P′ constitute a sectional rod whereof the two sections are connected by a spring, so that movement of one section of the rod in either direction from a position of rest compresses or extends the spring from its inert condition. As the other section of the rod is temporarily held from movement by the detent, the moving section puts a load on the spring and constitutes a "spring-loader." At the ends of the slot K are inclined cam-surfaces k' k^2, which when the slide P′ is moved to either of its extreme positions lift the detent D out of engagement with the enlargement d', thus releasing the rod P from restraint and permitting the spring S′ to move the rod P in the direction in which the spring S′ happens to be exerting its force. The enlargement d' constitutes a catch for the detent D. The sectional rod thus acts somewhat like a spring-gun. The section P′, which serves as a base-piece from which the spring S′ exerts its force on the section P, acts first as a spring-loader, loading the spring until the detent, acting as a trigger, lets off the spring and shoots the section P in one direction or the other. Coiled around the outside of the slide P′ is the master-spring S, which abuts against the bridge h^2 at one end and the projecting ends of the pin s' at the other end and is always in compression, so that if left to itself the master-spring S will force the slide P′ to its extreme outer position.

The circuit-controlling switch, which in the instance described is composed of the contact-maker c^3, rod P, and switch-slide P′ and their associated parts, is externally controlled by a switch-controller which, generally speaking, has this character: It controls the circuit-controlling switch by any suitable connection and is movable toward and from the handle of the electrically-heated tool, and its relationship with the switch is such that when the switch is open the switch-controller occupies a position in which it constitutes a material obstacle to the normal grasping of the tool-handle by the person who is to use the tool, and, further, when the switch under the control of the switch-controller is in a position of closed circuit the switch-controller has moved into a position where it no longer constitutes such an obstacle. More particularly stated, the switch-controller, when the switch under its control is in open-circuit position, forms an excrescence from the handle of the tool, and when the switch under control is moved to closed position the switch-controller moves to a position where it practically merges with the handle, and thus offers no impediment to the normal grasping of the handle itself. The utility of such an arrangement lies in the fact that when the workman grasps the tool by that act he moves the switch-controller to the position of circuit-closure, and in order to have the switch-controller move automatically to the position of open circuit it is only necessary to provide means whereby the normal position of the switch and its controller shall be that of open circuit. This may be accomplished in various ways. The specific mode shown in connection with the sad-iron herein described involves the use of the master-spring S.

The operation of the circuit-closing switch and switch-controller is illustrated as follows: In Fig. 1 the switch is shown in position of circuit-closure, the spring c^3 joins the terminals c' c^2 electrically, and the heating-resistance circuit is closed and in operation. Under these conditions the hand of the workman grasps and encircles the handle H, and thus holds the switch-controller A close to the handle H. The switch-controller is mounted on the tool, in this case pivoted at A′ to the handle-arm E′ or an extension thereof. From the pivot A′ the switch-controller rises in a curve over the end of the handle H and lies close to the top of the handle and so far as the workman's hand is concerned is practically a part of or merged in the handle H itself. In this position the outer end s^2 of the switch-slide P′ abuts against the curved portion of the switch-controller A, which under the workman's hand holds the switch-slide P′ in its extreme inner position, thus compressing the master-spring S between the bridges h^2 and pin s'. The rod P, with the circuit-closing spring c^3 attached, rests in the position shown in Fig. 1, the spring S′ being substantially inert. Now suppose the workman lets go the tool or sets it aside. Instantly the master-spring S, which is strong enough to overcome the opposing force of the spring S′, forces the switch-controller up and away from the handle H and extends the spring S′, the rod P being temporarily held in position by the coöperation of the lug d' and detent D. When, however, the master-spring S forces the switch-slide P′ to its extreme outer position, carrying the switch-controller A with it, the cam-surface k' at the end of the slot K passes under the hook N of detent D and lifts it away from enlargement d', releasing the rod P. At this moment the spring S′ is in extreme tension and instantly jerks the rod P out of the position of circuit-closure, removing the spring-contact c^3 from between the terminals c' c^2. This action restores the parts to a position of rest, the spring S′ being once more inert. With the parts in this position the switch-controller A is designed and proportioned to stand above the handle H, making an angle of from forty-five to sixty degrees therewith, so that it constitutes an awkward obstacle which must be removed before the hand of the workman can again conveniently grasp the tool-handle. In the case of the sad-iron it is well to attach the switch-controller near the butt-end of the iron, as in that position it offers a greater impediment to normal grasping of the handle. The angle at which the switch-controller stands is determined by the foot A^2, which serves as a stop by striking against the handle-arm E′. Wear and friction may be saved by placing the roller S^3 in the end of the slide P′. When the workman picks up the tool again, he naturally presses down the switch-controller A, until by merging with the handle H it ceases to be an obstacle to the normal grasping of the tool-handle. By this movement the following operations are made to take place. First, the switch-slide P′ moves inward against the pressure of master-spring S, and the detent D falls in front of enlargement d', which is thus arrested. Further movement of slide P′ compresses the spring S′, the rod P being held by the detent D. Then the cam-surface k^2 passes under the detent D, lifts it, and releases the enlargement d' and rod P, which instantly responding to the force of spring S′, now in extreme compression, jumps forward into the position of circuit-closure with contact-springs c^3, between the terminals c' c^2. These abrupt movements of the circuit-controlling switch into and out of the position of circuit-closure prevent undue sparking and burning at the contacts c' and c^2.

With such a contrivance as the above-described, to whatever tool it may be applied, the application of electrically-generated heat is effected with economy and certainty and the current is consumed only when it is needed and is automatically cut off when it is not needed, all without requiring any thought or attention on the part of the workman.

Figs. 3 to 11, inclusive, show a modification of the circuit-controlling switch above described in connection with an electrically-heated tool, and in general the description addressed to the circuit-controller in Figs. 1 and 2 applies to that of Figs. 3 to 11, inclusive. In these figures, however, the circuit-controlling switch is shown without any master-spring, which, as in Figs. 1 and 2, normally controls the operation of the circuit-controller and automatically opens the circuit whenever the attention of the operator is withdrawn; but, if desired, the switch shown in Figs. 3 to 11, inclusive, may be provided with a master-spring operating between the pin s' and the bridge h^2 of the frame F. In Figs. 3 and 5 the prolongation of the slide P′ is fitted with a knob or handle M, by which it may be positively operated.

A switch constructed like that of Figs. 3 to 11, inclusive, can very readily be inserted in the woodwork or wall of a dwelling, leaving nothing exposed except the knob M, which lends itself readily to ornamentation. The whole device takes up a minimum amount of room, and the movements of the circuit-closing portion require a very small space as compared with ordinary forms of jack-knife snap-switches. The employment of such a circuit-controller may be given an added advantage by supplying to the device in Figs. 3 and 5 a master-spring such as that which controls the switch of Figs. 1 and 2. For instance, a light in a closet or vault which is used only momentarily may be put in circuit with such a switch, so that the instant the person requiring the light withdraws the master-spring automatically breaks the circuit and extinguishes the light, thus saving the wasteful expenditure of energy without requiring any thought on the part of the user.

I claim—

1. An electric switch consisting of a sectional rod movable lengthwise, the two sections of said rod joined together by a spring which is normally inert, one section of said rod being the circuit-closer carrier, the other section being the actuating-slide, a detent coacting with the circuit-closer carrier and adapted to restrain the latter from movement in response to movement of the slide and spring, a detent-release controlled by the movement of the slide and adapted to remove the detent from coaction with the circuit-closer carrier when the actuating-slide reaches an extreme position of its lengthwise movement and thus to release the spring from constraint and permit it to act on the circuit-closer carrier, and circuit-terminals in position to coact with the circuit-closer at one extreme of its movement.

2. In an electric switch, the combination of circuit-terminals, a circuit-closer adapted to connect the terminals, a rod carrying the circuit-closer, a slide, a spring connecting the rod and slide and so mounted and proportioned as to exert effort in the direction of the length of the rod, the slide being movable to a position of spring compression in one direction and of spring tension in another direction, a detent adapted to hold the rod temporarily against response to spring effort in either direction, a detent-release controlled by the slide and coöperating with the detent so as to release the rod at predetermined points in the movement of the slide, and thus to permit the spring to exert its force actively on the rod.

3. In an electric switch, the combination of circuit-terminals, a circuit-closer adapted to connect the terminals, a rod carrying the circuit-closer, a slide, a spring connecting the rod and slide and so mounted and proportioned as to exert effort in the direction of the length of the rod, the slide being movable to a position of spring compression in one direction and of spring tension in another direction, a master-spring, of strength greater than that of the spring connecting the rod and slide, attached to the slide and normally urging the slide in one direction, a detent adapted to hold the rod temporarily against response to spring effort in either direction, a detent-release controlled by the slide and coöperating with the detent so as to release the rod at predetermined points in the movement of the slide, and thus to permit the spring to exert its force actively on the rod.

4. In an electrically-heated tool a handle provided with a longitudinal cavity, a snap-switch in said cavity composed of circuit-terminals, a circuit-closer adapted to connect the terminals, a rod carrying the circuit-closer, a spring attached to said rod and to a slide parallel therewith, said spring being so proportioned and secured as to exert effort in the direction of the length of the rod, the slide being movable to a position of spring compression in one direction and spring tension in the other direction, a detent adapted to hold the rod temporarily against response to spring effort in either direction, a detent-release controlled by the slide and so arranged as to coöperate with the detent and release the rod at predetermined points in the movement of the slide and permit the spring which joins the rod and slide to exert its force actively on the rod, and means, external to the tool-handle, whereby the slide is operated.

5. In an electrically-heated tool a handle provided with a longitudinal cavity, a snap-switch in said cavity composed of circuit-terminals, a circuit-closer adapted to connect the terminals, a rod carrying the circuit-closer, a spring attached to said rod and to a slide parallel therewith, said spring being so proportioned and secured as to exert effort in the direction of the length of the rod, the slide being movable to a position of spring compression in one direction and of spring tension in the other direction, a master-spring, of a strength greater than that of the spring attached to the rod, secured to the slide and tool-handle so as to urge the slide normally in one direction, a detent adapted to hold the rod temporarily against response to spring effort in either direction, a detent-release controlled by the slide and so arranged as to cooperate with the detent and release the rod at predetermined points in the movement of the slide and permit the spring which joins the rod and slide to exert its force actively on the rod, and means, external to the tool-handle whereby the slide is operated.

Signed by me at Boston, Massachusetts, this 16th day of May, 1899.

JOHN HEINZE, Jr.

Witnesses:
ODIN B. ROBERTS,
E. F. GROLL.