May 10, 1932. M. S. RUNSVOLD 1,857,663

ELECTRIC CONNECTION PLUG

Filed Dec. 28, 1929

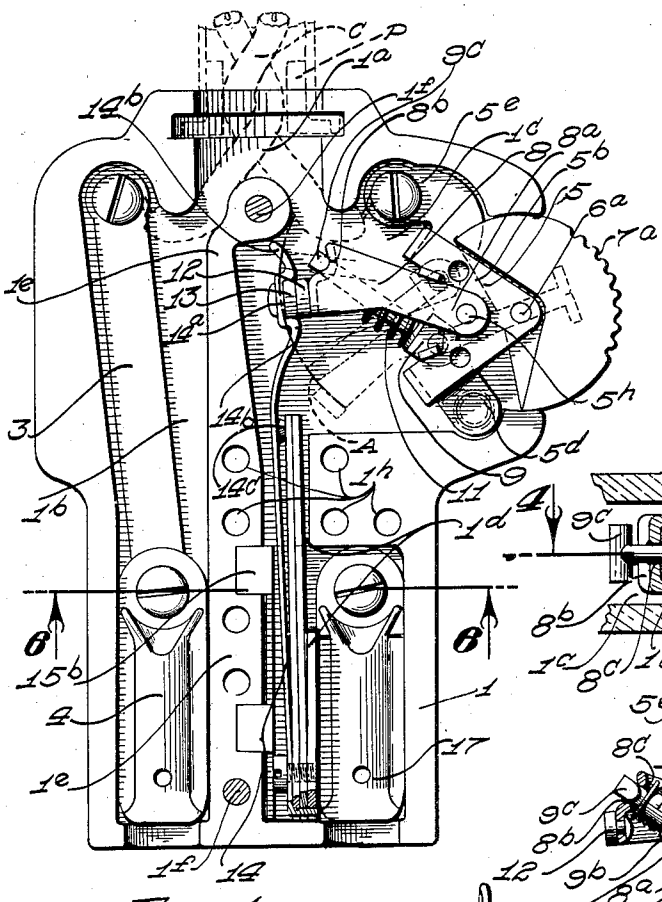


FIG. 1

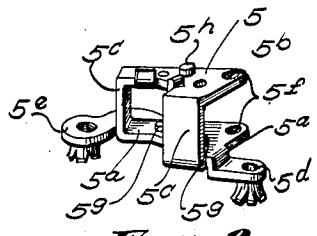


FIG. 2

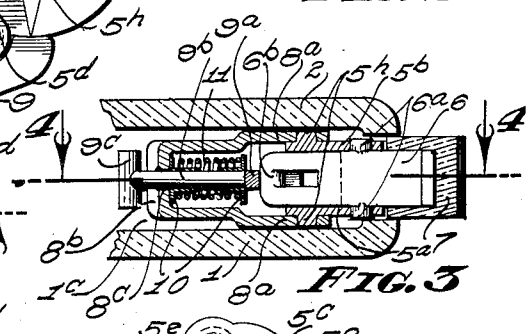


FIG. 3

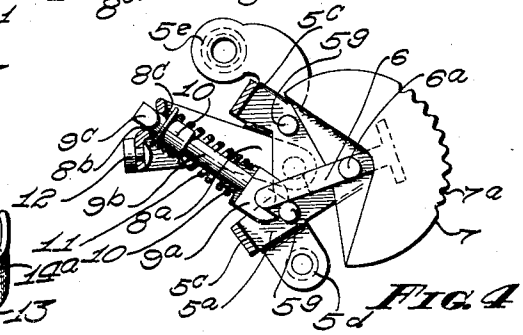


FIG. 4

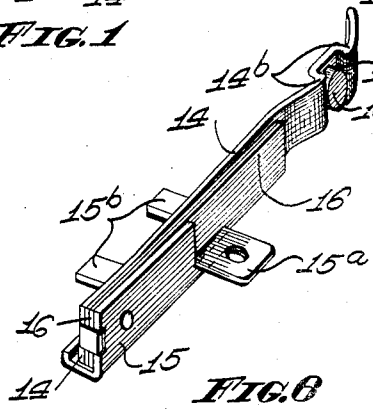


FIG. 6

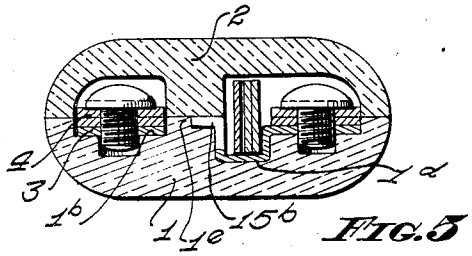


FIG. 5

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ELECTRIC CONNECTION PLUG

Application filed December 28, 1929. Serial No. 417,027.

My invention relates to electric connection plugs, more particularly to connection plugs having a switch means associated therewith, and the objects of my invention are: first, to provide a connection plug of this class which tends to maintain an electric iron or other heating element connected thereto at a constant temperature; second, to provide a connection plug of this class in which the influence of heat stored and retained in the connection plug casing has a minimum effect upon the thermostat mechanism, said mechanism being directly connected to one of the terminals of the plug in such a manner that it is affected principally by the heat from the iron or other heating element; third, to provide a connection plug of this class having a manual switch control associated with the thermostat control so that the circuit can be broken permanently when desired; fourth, to provide a connection plug of this class in which openings for cooling purposes are provided in the casing adjacent to the thermostat element and arranged in such a manner that a wire or the like cannot be inserted therein to come in contact with the various portions of the electrical circuit; fifth, to provide a connection plug of this class in which the contacts of the switch are wiped after each operation of the switch so as to maintain their contacting surfaces clean and free from oxidation or deleterious matter which might cause them to weld together or function improperly; sixth, to provide a connection plug of this class in which the thermostat element does not require a wide range of temperature in order to function properly; and seventh, to provide on a whole a novelly constructed electric connection plug which is extremely simple of construction proportional to its functions, durable, efficient in its action, and which will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter, my invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

Figure 1 is an enlarged, elevational view of the plug with one of the casing members removed; Fig. 2 is a perspective view of the switch supporting member; Fig. 3 is an enlarged, fragmentary, sectional view through the switch mechanism, with the centers of the various portions thereof shown in axial alignment, and parts and portions shown in elevation to facilitate the illustration; Fig. 4 is a sectional view thereof through 4—4 of Fig. 3 with parts and portions shown in elevation to facilitate the illustration; Fig. 5 is a transverse, sectional view through 6—6 of Fig. 1; and Fig. 6 is a perspective view of the thermostat element, the contact arm and the support therefor.

Similar characters of reference refer to similar parts and portions throughout the several views of the drawings.

Casing members 1 and 2, conductor 3, terminal 4, switch support 5, trip arm 6, switch button 7, contact support 8, support shifting member 9, sleeves 10, spring 11, contact members 12 and 13, contact arm 14, thermostat support 15, thermostat 16, and terminal 17 constitute the principal parts and portions of my electric connection plug.

The connection plug includes a pair of casings 1 and 2, which complement one another so as to form a complete casing for the mechanism therein, in a manner similar to the conventional electric connection plug casing. Except for the transverse sectional views 3 and 4, the casing member 2 is not shown, but is provided with suitable spaces to receive any of the mechanism which extends above the abutting face of the casing member 1. At its upper end, the casing member 1 is provided with a substantially centered, axially extending opening 1*a* which receives the cord C and the protecting member P, as shown by dotted lines in Fig. 1.

Offset to the one side of the opening 1*a* is an axially extending depression 1*b*, which extends into the lower or extended end of the plug. This depression receives a conductor 3 and a terminal 4, which forms a socket

adapted to fit over the conventional terminals found on electric irons, toasters, and other electrical apparatus. Offset to the other side of the opening 1*a* is a depression 1*c* which receives the switch mechanism. This depression opens into a longitudinal depression 1*d* separated from the depression 1*b* by a partition 1*e*. In the depression 1*d* is mounted the thermostat mechanism and the other terminal described hereinafter.

The two casings 1 and 2 are held together by suitable screws 1*f* which extend through holes extending transversely through the casings, preferably passing through the partition 1*e*. The upper portions of the casings 1 and 2 are extended transversely at their one side so as to provide room for the switch mechanism. Mounted in the depression 1*c* and positioned adjacent the side most remote from the longitudinal axis of the casing, is the body 5 of the switch support. The body member is substantially V-shaped in plan with the apex positioned adjacent extended side of the casing, and the leg portions thereof extending inwardly towards the partition 1*e*. The body member comprises a lower and upper V-shaped portion 5*a* and 5*b*, which are connected together and held in parallel disposed relation by vertically extending portions 5*c*, joining the extended ends of the leg portions, as shown best in the perspective view, Fig. 2.

The lower V-portion 5*a* is provided with a pair of outwardly extending lug portions 5*d* and 5*e*. Each lug portion is offset downwardly from the V-portion 5*a* so that the body of the switch support is spaced upwardly from the bottom of the depression 1*c*, as shown best in Fig. 3.

The lug portions are provided with openings therein, in which the metal is extruded so as to be anchored within the material of the casing 1, and thereby permanently hold the support in position therein. The one lug 5*e* extends towards the supported end of the plug and makes a connection with one of the cords C, by means of a screw as shown in Fig. 1.

At the apex of the V-portions 1*a* and 1*b*, there are provided oppositely disposed openings 5*f*, which form bearings.

Journalled in the openings 5*f* by lugs 6*a* on its upper and lower sides, and extending between the V-portions 5*a* and 5*b* towards the partition 1*e*, is a trip arm 6. The trip arm 6 is adapted to oscillate, and is limited in its movement by stop portions 5*e* extruding from the V-portions 5*a* and 5*b*. The trip arm extends from its supported portion through an opening 1*g* provided in the side walls of the casing 1 and communicating with the depression 1*c*. This end of the trip arm 6 is molded within a switch button 7, which protrudes from the casing, as shown in Fig. 1. The switch button 7 is preferably of arcuate form, with its center of curvature at the center of rotation of the trip arm 6.

A portion of the periphery of the switch button 7 is knurled as indicated by 7*a*, so that it may be readily shifted from one position to the other by pressure of one's thumb.

A contact support lever 8 is provided. This member is substantially U-shaped, and its leg portions 8*a* are provided at the extended ends, with openings. Formed on the outer sides of the V-portions 5*a* and 5*b* at the apexes thereof, but inwardly from the openings 5*f* are projections 5*g* which form journals for the openings provided in the leg portions 8*a* of the contact support lever 8. The contact support lever extends between the legs of the V-portions 5*a* and 5*b* towards the partition 1*e*. The cross portion of the contact support, and the ends of the legs 8*a* adjacent thereto are provided with a channel or depression 8*b*, intersected by an opening 8*c*. The trip arm 6 extends between the extended portions of the legs 8*a*, and is provided with a slot near said end which leaves a journal portion 6*b*.

A support shifting member 9 is provided which has a flat, bifurcated end portion 9*a* adapted to straddle the journal portion 6*b* so that the shifting member may rotate thereabout. Extending from the bifurcated portion 9*a* is a shank 9*b*, which extends outwardly from the trip arm 6 between the leg portions 8*a*, towards the cross portion of the contact support 8, and through the opening 8*c* intersecting the depression 8*b*, as shown best in Figs. 3 and 4.

The extended ends of the shifting member 9 form a wiping head 9*c*, having shoulder portions which engage the margin of the opening 8*b*. The head portion 9*c* normally rests partially within the depression 8*b*.

Adjacent the bifurcated portion 9*a*, and the inner margins of the cross portion of the contact support 8, are sleeve members 10. These sleeve members are provided with shoulder or flange portions, two in all, which receive the ends of the spring 11, and tend to maintain the head portion 9*c* within the depression 8*a*, thereby holding the trip arm 6 in one or the other of its extreme positions.

The cross portion and the ends of the leg portions adjacent thereto are extended to the one side of the depression 8*a*, preferably towards the extended end of the casing 1. Secured to this extended portion is a contact member 12. The surface of this contact member is approximately tangential to the circle described by the movement of the contact support 8. The contact member 12 is adapted to engage a second contact member 13, which is mounted adjacent the extended end of a contact supporting arm 14. The contact arm 14 extends longitudinally with the casing 1 adjacent the partition 1*e* to a point near the extended end of the casing, that is,

the end which is fastened to an electrical implement.

The contact member 13 is mounted in a recess portion 14*a* of the switch arm 14, so that its contacting face is flush with the margins of said recess, as shown in Figs. 1 and 6. On either side of the recess 14*a*, are formed approaches 14*b* which enable the wiping head 9*c* to traverse the contact 13 without catching on the side margins thereof.

Adjacent its lower end the contact arm 14 is secured through a thermostat 16, to a thermostat support 15, which extends in vertical, parallel disposed relation to the switch arm and thermostat. The support extends along the side of the thermostat for approximately half its length, and there is provided with a horizontally extending lug 15*a*, to which is secured a terminal 17. The support 15 extends underneath the thermostat and switch arm, and is provided with two other lugs 15*b* which extend upwardly between the contact arm and the side wall of the partition 1*e*, then inwardly along the upper surface thereof in depressions formed in said upper surface of the partition so as to be readily clamped between the two casing members 1 and 2, as shown in Fig. 5. The contact arm 14 is made slightly resilient and is adapted to be bent out of engagement with the contact member 12, by distortion of the thermostat 16. To facilitate this movement, the contact arm 14 is provided with a projection 14*a* which engages the adjacent surface of the thermostat 16 adjacent its extended end.

My electric connection plug operates as follows: When the mechanism is in the position shown in Fig. 1, the switch is in its "on" position, and heat is conducted from the terminals of the electrical implement to the terminal 17, then to the thermostat support 15, and then to the thermostat 16, causing at a predetermined temperature the contact 13 to disengage from the contact 12 breaking the circuit.

As electrical implement cools, the thermostat moves towards its normal position until the contact between the members 12 and 13 is again made, completing the circuit. Thus, the electrical implement can be held at an approximately constant temperature.

When further use of the implement is undesired, the switch button 7 is rotated, causing the trip arm 6 to rotate from the extreme position shown by solid lines in Figs. 1 and 4 to the position shown by dotted lines in Fig. 4, first compressing the spring until the centers of rotation of the contact support 8 and trip arm 6, and shifting members 9 are in their axial alignment, as shown in Fig. 3. Continued movement causes the shifting member to overbalance by reason of the action of the spring 11, thereby shifting the contact support 8 to the dotted position thereof shown in Fig. 1. As indicated by the line A, the head 9*c* of the shifting member 9 first moves to a centered position, as shown in Fig. 3, then moves back to its receded position as the contact support 8 moves to its dotted or "off" position. This causes the head 9*c* to be extended during the first portion of its movement so as to wipe across the contact 13 and the approaches 14*b* thereto, and remove oxidized particles or other deleterious matter which interfere with the proper operation of the switch. The approaches 14*b* of the switch arm 14, and the contact 13, in turn, wipe the contact 12 during return movement of the contact support 8. Thus, the contact members 12 and 13 are always maintained in a clean satisfactory condition for the conduction of electricity from the cord C to the terminal 17.

The casings 1 and 2 are provided with a plurality of openings 1*h* therethrough, extending transversely through the partition 1*e* and through the projecting portions separating the depression 1*c* from the depression 1*d*. The openings 1*h* of the two casings thus abut and form a continuation one of the other so that there is no communication between the openings and the various portions of the mechanism within the casing. These openings 1*h* assist the cooling of the casing around the thermostat so that the influence of the casing upon the thermostat is reduced to a minimum.

Though I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of my invention the construction, combination and arrangement substantially as set forth in the appended claims.

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

1. In a device of the class described, a pair of terminal means connectible to a heating element, the one terminal means secured to the one lead of an electric circuit, a thermostat member arranged to receive heat from the other of said terminal means, a contact arm associated with said thermostat but free of its movement in one direction, a switch mechanism securable to the other lead of said electric circuit, and a contact lever forming a part of said switch mechanism, said lever shiftable into and out of engagement with said contact arm by the action of said switch, said contact arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat member.

2. In a device of the class described, a pair of terminal means connectible to a heating element, the one terminal means secured to the one lead of an electric circuit, a thermostat member arranged to receive heat from the other of said terminal means, a contact arm associated with said thermostat, a switch

mechanism securable to the other lead of said electric circuit, a contact lever forming a part of said switch mechanism, said lever shiftable into and out of engagement with said contact arm by the action of said switch, said contact arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat member, and means for wiping the contacting portion of said contact arm with the movement of said switch.

3. In a device of the class described, a pair of terminal members, the one terminal connected directly to the one lead of electric circuit, a support member connected to the other terminal member, a thermostat secured to said support member and extending contiguous thereto so as to receive the heat from said terminal member, a contact arm secured with said thermostat member to said support but free at its end therefrom in one direction, a switch mechanism connected to the other lead of said electric circuit, and a contact lever forming a part of said switch mechanism, said contact lever shiftable into and out of engagement with the extended portion of said contact arm by the action of said switch mechanism, said contact arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat member.

4. In a device of the class described, a pair of terminal members, the one terminal connected directly to the one lead of electric circuit, a support member connected to the other terminal member, a thermostat secured to said support member and extending contiguous thereto so as to receive the heat from said terminal member, a contact arm secured with said thermostat member to said support, a switch mechanism connected to the other lead of electric circuit, a contact lever forming a part of said switch mechanism, said contact lever shiftable into and out of engagement with the extended portion of said contact arm by the action of said switch mechanism, said contact arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat member, and wiping means associated with said switch arranged to traverse the contacting portion of said contact arm with the movement of said switch mechanism.

5. In a device of the class described, a switch mechanism including a body member connected to the one lead of an electric circuit, a contact lever oscillatably connected with said body member and shifting means for said contact lever, a contact arm having a contact portion engageable with and extending substantially tangentially with said contact lever, a thermostat member for shifting said contact arm, a terminal secured to said thermostat member and said contact arm and connectible with a heating element whereby heat from said element is conducted to said thermostat member, said contact lever shiftable into and out of engagement with said contact arm by the operation of said shifting means, said contact arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat member, and a contact wiping means forming a part of said shifting means, arranged to traverse the contacting portion of said contact arm.

6. In a device of the class described, a manual switch operated contact lever, a thermostat actuated contact arm, said contact lever forming a wiping contact with said contact arm, and shiftable out of and into engagement with said contact arm by the operation of said manual switch, said contact lever arm shiftable into and out of engagement with said contact lever by the distortion of said thermostat.

In testimony whereof, I have hereunto set my hand at San Diego, California, this 12th day of December, 1929.

MARTIN S. RUNSVOLD.