Nov. 2, 1937. E. J. DILLMAN 2,098,181

ELECTRIC SWITCH

Filed March 9, 1934 2 Sheets-Sheet 1

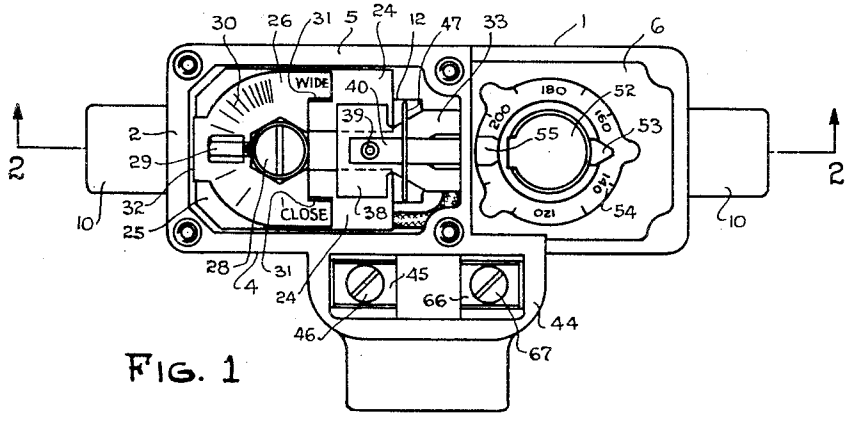


FIG. 1

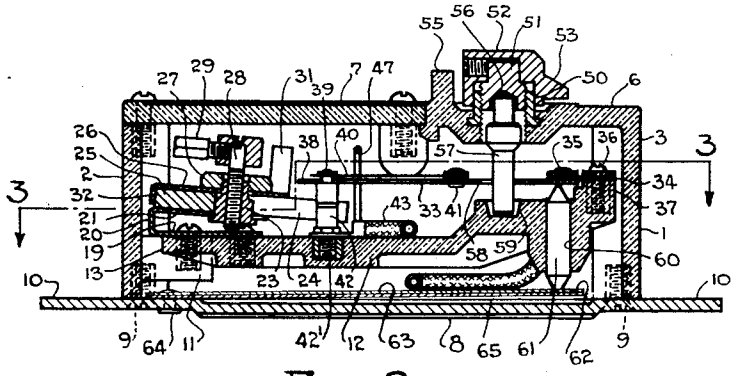


FIG. 2

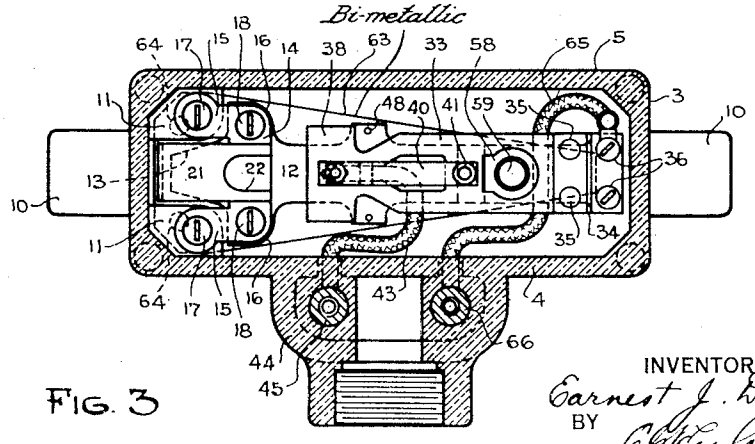


FIG. 3

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ELECTRIC SWITCH

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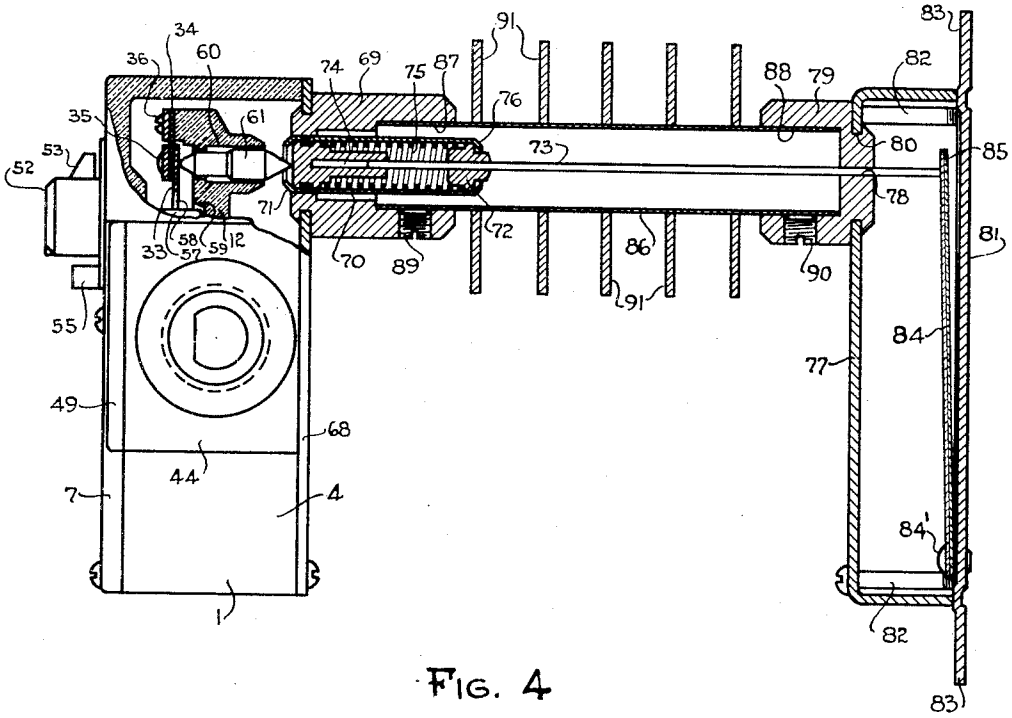


FIG. 4

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2,098,181

UNITED STATES PATENT OFFICE

2,098,181

ELECTRIC SWITCH

Earnest J. Dillman, Detroit, Mich., assignor to Detroit Lubricator Company, Detroit, Mich., a corporation of Michigan

Application March 9, 1934, Serial No. 714,743

24 Claims. (Cl. 200—138)

My invention relates to electric switches, and more particularly to a switch which is automatically operable by temperature responsive means or the like.

An object of my invention is to provide an electric switch which is particularly adapted to be secured in heat conducting relation to a fluid conveying conduit or the like so that the automatic means for actuating the switch will respond to the temperature of the fluid in the conduit.

Another object is to provide a switch which will have a quick operating action so as to prevent arcing at the switch contacts.

Another object is to provide a switch which is readily adjustable to regulate both its range of operation and the differential operation between making and breaking of contact.

Another object is to provide novel means for adjusting and supporting a magnet cooperable with the contact carrying arm of the switch.

The invention consists in the improved construction and combination of parts, to be more fully described hereinafter and the novelty of which will be particularly pointed ont and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated a switch embodying my invention, in which drawings—

Figure 1 is a top plan view of the switch housing, having a top cover or closure member removed to show certain of the internal construction;

Fig. 2 is a view in section on the line 2—2 of Fig. 1, but with the cover member in place;

Fig. 3 is a view in section substantially on the line 3—3 of Fig. 2, and

Fig. 4 is a view of another form of switch operating means in longitudinal central section as applied to the switch of Fig. 1.

Referring to the drawings by characters of reference, 1 designates generally a base member, preferably in the form of a rectangular housing having end walls 2, 3 joined by side walls 4, 5 and having a top wall 6 which covers one end portion of the housing, these walls being of electric insulating material. The remainder of the open top of the housing is closed by a cover member 7 also of electric insulating material. The bottom wall of the housing is formed by a plate member 8 preferably of metal or other suitable heat conducting material which is secured to the housing by screws 9 and which has end portions 10 projecting beyond the housing end walls for engagement by clamping bands or the like so that the housing and particularly the plate member 8 may be secured to a heat conducting surface. Within the housing at one end there is a supporting means preferably in the form of laterally spaced lugs or brackets 11 which are adjacent to but spaced from the bottom wall 8. Extending longitudinally within the housing there is an elongated supporting member 12 preferably of electric insulating material which extends at one end, as at 13, between the lugs 11, being pivotally secured thereto by a hinge member 14 of resilient sheet metal. The member 14 has spaced, substantially parallel arm portions 15 which bridge the space between the lugs 11 and lateral flanges 16 adjacent the end portion 13 of the member 12, the arm portions 15 extending parallel to and serving as the fulcrum for the member 12. Each of the arm portions 15 is secured to its respective lug and flange by screws 17, 18 respectively. Between the arm portions 15 there is a tongue portion 19 which lies upon the projecting end 13 and which is turned upward, as at 20, and then back upon itself, as at 21, to provide a supporting bracket arm which normally converges or is inclined toward the portion of member 14 joining the arm portions 15. The bracket arm 21 has an end slot or opening 22 which receives a sleeve member 23 having an end flange engaging the underside of the arm 21. The sleeve member 23 extends upward through the slot formed between the arms or poles 24 of a U-shaped permanent magnet 25 and through an aperture in a dial plate 26 which rests upon the top face of the magnet. The plate 26 and magnet 25 are secured to the arm 21 by a nut 27 which is screw-threaded on the upper end portion of the sleeve member 23. The bore of the sleeve member 23 is screw-threaded to receive an adjustment screw 28 which bears at its lower end on the hinge member 14 between the arm portions 15. The upper end of the screw 28 is provided with a laterally projecting arm 29 by which the screw may be rotated and serves as a pointer cooperable with suitable indicia 30 carried by the dial plate 26. The arm 29 cooperates with stop members 31 which project upward from the plate 26 to limit rotation of the screw 28. The plate 26 is provided with a lip or flange 32 which engages the base of the magnet to prevent movement of the stop members 31 when they are engaged by the arm 29. Pivotally secured to the supporting member at its end opposite the magnet 25, there is a contact carrying arm 33. The pivotal connection for the arm 33 is formed by a hinge member 34 such

as a plate of resilient sheet metal riveted or otherwise secured, as at 35, to one end of arm 33 and secured by screws 36 or the like to the end of the supporting member 12. The end of the supporting member 12 to which the arm 33 is secured is provided with a step or transverse extension 37 to the top face of which the hinge member is secured by the screws 36 so that the arm 33 is in spaced overlying, substantially parallel relation to the supporting member 12. The arm 33 extends longitudinally of the member 12 toward the magnet 25 and terminates in an armature portion 38 which overlies and cooperates with the magnet poles 24. The arm 33 carries a contact member 39 which is fixed to the free end of a leaf spring 40 extending longitudinally of the arm 33 and secured thereto, as at 41, by a rivet and clamping plates. The contact member 39 is provided with a neck portion received by a slot in the arm 33 so that the contact member is movable transversely to the arm 33. The contact member 39 extends toward the supporting member 12 and cooperates with a contact member 42 rigidly secured to and projecting from the member 12 between the magnet poles 24. The contact member 42 is preferably in the form of a post which is screw-threaded, as at 42', in the bore of an insert embedded in the top face of the member 12. A flexible lead wire 43 has one end secured to the contact member 42 by a flange on the contact member which clamps the end of the lead wire against the supporting member 12. The other end of the lead wire 43 extends through an aperture in the front housing wall 4 into an outlet box 44 formed integral with the housing member. This other end of the lead wire 43 is secured to a terminal member 45 having a binding screw 46 positioned in the outlet box 44. A stop member 47 of inverted U-shaped form bridges the arm 33 and has its ends secured, as at 48, in the supporting member 12 adjacent the armature 38 to limit movement of the arm 33 away from the supporting member 12. The cover member 7 has an extension 49, see Fig. 4, which overlies and closes the open top of the outlet box 44. Transversely through the top wall 6 there is an opening in which is secured an internally screw-threaded sleeve member 50 which projects from the top face of the wall 6. Threaded in the bore of the sleeve member 50 there is an adjustment screw 51 having a knob 52 fixed on its outer projecting end. The knob 52 is provided with a finger 53 cooperable with a dial 54 on the top face of wall 6 to indicate its position of adjustment and also cooperable with a stop member 55 projecting from the wall 6 and preferably integral therewith to limit rotation of the adjustment screw 51. The inner end of the screw 51 is provided with a socket or recess 56 to receive one end of a pin or rod 57 which extends through an aperture 58 in the arm 33 and into a socket or recess 59 in the top face of the supporting member 12. Between the recess 59 and the pivotal support for the arm 33 there is a guideway 60 extending transversely through the supporting member 12 and having its longitudinal axis transverse to the arm 33. In the guideway 60 there is a longitudinally reciprocable operating or thrust member 61 which projects at its ends from the opposite faces of the supporting member 12. The thrust member 61 is preferably in the form of a cylindrical rod having conical or pointed end portions of which one end portion engages the underside of the arm 33 adjacent its fulcrum so as to swing the arm 33 away from the supporting member 12. The other pointed end of the thrust member 61 abuts the free end portion 62 of a thermostatic blade or element 63 of bimetal which serves as a power means for moving the thrust member 61 and actuating the arm 33. The blade 63 extends longitudinally of the supporting member 12 and substantially parallel thereto, being rigidly fixed to the bottom housing wall 8 in heat conducting relation thereto by rivets 64 or the like adjacent the end housing wall 2. The contact member 39 is supplied with current by a flexible lead wire 65 having one end secured to the hinge member 34 by one of the screws 36. The other end of the lead wire 65 extends through an aperture in the front housing wall 4 into the outlet box 44 where it is secured to a terminal member 66 having a binding screw 67.

The operation of the switch shown in Figures 1, 2, and 3 is as follows: When the temperature to which the thermostatic element 63 is subjected by conduction through the metal bottom wall or plate 8 increases, the element 63 will bend or warp at its free end portion 62 away from the plate 8. Movement of the end portion 62 will move the thrust member toward and into engagement with the contact carrying arm 33 and when the force exerted by the thermostatic element 63 exceeds the attractive force of the magnet for the armature portion 38, the contact members 39 and 42 will be separated with a quick, substantially snap action. Due to the lost motion between the arm 33 and the contact supporting leaf spring 40, the arm 33 will be in motion prior to engagement of the arm 33 with the spring 40 which results in movement of contact member 39. When the thermostatic element 63 cools after contact has been broken such that its free end portion 62 moves toward the plate 8, the thrust member 61 will move therewith under the force of the resilient hinge member 34 which acts against the thrust member 61 through the arm 33 and causes the arm 33 to approach the magnet 25. When the armature portion 38 has moved sufficiently into the field of the magnet 25, the attractive force of the magnet acting on the armature portion 38 will pull the arm 33 quickly toward the supporting member 12 and the contact member 39 into engagement with the fixed contact member 42. Movement of the arm 33 toward the magnet will be limited by engagement of the arm with the head of the contact member 39, the arm having slight movement against the resilient force of leaf spring 40 after contact is made. The range of operation of the instrument may be controlled by adjustment of the knob 52. Adjustment of the knob to move the supporting member 12 against the resilient force of its supporting hinge member 14 toward the plate 8 will result in the thermostatic element 63 acting to break circuit between the contact members 39 and 42 at a lower temperature. When the knob 52 is rotated counterclockwise of Fig. 1, the resilient hinge member 14 will move the supporting member 12 away from the plate 8 and maintain the supporting member in engagement with the rod 57. Movement of the free end of the supporting member 12 away from the plate 8 will require a higher degree of temperature to break circuit as the thermostatic element must have greater movement in order to actuate the arm 33 to break contact between the contact members 39 and 42. The differential operation of the instrument is controlled by the magnet 25. If the adjustment screw 28 is turned in a clockwise

direction facing Fig. 1 so that the magnet poles 24 are moved away from the supporting member 12 and toward the armature portion 38, the differential between making and breaking of contact will be increased as the thermostatic element 63 will have to exert a greater force to overcome the attractive force of the magnet. The magnet is held in its adjusted position by the inherent resilience of the supporting bracket which urges the magnet poles toward the supporting member 12. When the adjustment screw 28 is rotated in a counterclockwise direction facing Fig. 1 to permit movement of the magnet poles toward the supporting member 12 by the inherent force of the magnet supporting bracket, the air gap between the magnet poles and the armature portion 38 will be increased thereby decreasing the differential operation of the instrument. Since the magnet 25 and the contact members 39, 42 are carried by the supporting member 12, the differential operation of the instrument will not be affected by the adjustment of the operating range.

In Figure 4, the housing for the switch mechanism which is substantially identical with that above described and therefore not shown is separated from the thermostatic switch operating element so as to prevent transmission of heat to the switch mechanism from the heat source to which the thermostatic element is subjected. The housing member 1 is provided in lieu of the plate 8 with a closure plate 68 which is apertured coaxially with the thrust member 61 to receive a sleeve member 69 having a tubular casing 70 reciprocably guided in its bore. Fixed in the inner end of the casing 70 there is a plug member 71 which engages the thrust member 61. Reciprocable in the casing 70 and positioned at the other end thereof there is an abutment member 72 through which a rod 73 extends, the rod being rigidly fixed to the abutment member. The end portion of the rod 73 within the casing 70 is guided for reciprocation in a longitudinal guideway 74 in the plug member 71. A helical coil spring 75 surrounds the rod 73 within the casing 70 and seats at its opposite ends against the plug member 71 and the abutment member 72 so that the rod 73 normally acts to move the casing 70 but is permitted lost motion relative thereto upon compression of the spring 75. The end of the casing 70 is provided with an inturned flange 76 which prevents movement of the abutment member 72 out of the casing. The rod 73 extends at its other end into a casing 77 through a guideway 78 in a supporting member 79 secured in an aperture 80 through a wall of the casing 77. The wall of the casing 77 opposite the supporting member 79 is formed by a metal plate member 81 which is secured in position by screws 82. The plate member 81 has projecting end portions 83 which extend beyond the end walls of the casing and which are adapted to be secured by clamping bands or the like to a conduit or other heated or cooled surface. A thermostatic element 84 is positioned within the casing 77 and is fixed at one end by rivets 84' or the like to the inside face of the plate 81. The element 84 extends longitudinally of the casing and at its free end portion 85 is in abutting relation to the end of the rod 73 which extends into the casing 77. The element 84 extends transversely to the rod 73 so that when it bends or warps in response to temperature change to which the plate 81 is subjected, it will push on the end of the rod 73. The rod 73 extends longitudinally through a tubular supporting member 86 which extends at its opposite ends into cylindrical bores or sockets 87, 88 formed respectively in the sleeve member 69 and the supporting member 79. The tubular member 86 is secured in its respective end sockets by set screws 89, 90 so that the casing 77 and the housing member 1 are rigidly connected together with the housing member 1 supported from the casing 77. The tubular member 86 is provided with heat radiating fins 91 which are apertured to receive the tubular member 86 and which provide an extended cooling surface to prevent transmission of heat from the casing 77 to the housing member 1.

The operation of the device of Figure 4 is as follows: When the temperature to which the element 84 is subjected by conduction through the casing wall 81 increases, the free end portion 85 thereof will bear against the end of the rod 73 and move it together with the tubular casing 70 toward the housing member 1. The casing 70 will move with the rod 73 due to the interposed spring 75. The movement of the casing 70 will be transmitted through its plug member 71 to the thrust member 61 which engages the contact carrying arm 33. When the force exerted by the element 84 becomes sufficient to overcome the magnet acting on the arm 33, contact will be broken as above described in connection with Figures 1, 2, and 3. Should the element 84 continue to push on the rod 73 after the arm 33 has reached its limit of movement as determined by the stop member 47, then the spring 75 will permit overtravel of the rod 73 without movement of the casing 70 and the thrust member 61. When the element 84 cools in response to lowering of temperature to which it is subjected, the hinge member 34 will move the thrust member 61 and rod 73, maintaining the thrust member in engagement with the rod 73 and the rod in engagement with the element 84 until the contact carrying arm 33 has reached its limit of movement toward the supporting member 12 and contact is made.

Although the thermostatic elements 63 and 84 have been described as acting to break circuit on rise of temperature, it will be obvious that their operation may be reversed so that they move away from their supporting plates and break circuit on decrease of temperature to which they are subjected.

What I claim and desire to secure by Letters Patent of the United States is:

1. A device of the character described, comprising a base member, a supporting member adjustably mounted at one end on said base member, a permanent magnet adjustably supported on said supporting member and extending longitudinally thereof, means to move said magnet relative to said supporting member, a contact member on said supporting member adjacent the inner end of said magnet, a contact carrying arm pivotally secured at one end to said supporting member and extending longitudinally thereof into spaced overlying relation to said magnet and said contact member, a contact member carried by said arm and cooperable with said first-named contact member, power means for actuating said arm and operatively connected thereto, and means to adjust said supporting member relative to said base member whereby to regulate the operation of said arm by said power means.

2. A device of the character described, comprising a base member, a supporting member adjustably mounted at one end on said base member,

a permanent magnet adjustably supported on said supporting member and extending longitudinally thereof, means to move said magnet relative to said supporting member, a contact member on said supporting member adjacent the inner end of said magnet, a contact carrying arm pivotally secured at one end to said supporting member and extending longitudinally thereof into spaced overlying relation to said magnet and said contact member, a contact member carried by said arm and cooperable with said first-named contact member, a thrust member reciprocably supported by said supporting member and engaging said arm, and power means engaging said thrust member to actuate said arm.

3. A device of the character described, comprising a base member, a supporting member adjustably mounted on said base member and having a laterally extending portion, a contact member fixed to said supporting member, a contact carrying arm extending substantially parallel with said supporting member and having a contact member cooperable with said first-named contact member, resilient hinge means connecting said arm at one end to the extended portion of said supporting member and acting through said arm to hold said second-named contact member in engagement with said first-named contact member, a bimetal element for actuating said arm, means operatively connecting said element and said arm for transmitting movement of said element to said arm to part said contact members, and means to adjust said supporting member relative to said base member whereby to regulate the operation of said arm by said element.

4. A device of the character described, comprising a supporting member, a resilient supporting arm in spaced overlying relation to said member and secured thereto, a magnet mounted on said arm, means securing said magnet to said arm, means for adjusting said magnet relative to said supporting member, said adjusting means being carried by said securing means, a contact carrying arm cooperable with said magnet, and means to actuate said contact arm.

5. A device of the character described, comprising a supporting member, a resilient supporting arm in spaced overlying relation to said member and secured thereto, a magnet mounted on said arm, means securing said magnet to said arm, means for adjusting said magnet relative to said supporting member, said adjusting means being carried by said securing means, a stop member cooperable with said adjusting means and fixed to said magnet by said securing means, a contact carrying arm cooperable with said magnet, and means to actuate said contact arm.

6. A device of the character described, comprising a supporting member, a resilient supporting arm in spaced overlying relation to said member and secured thereto, a magnet mounted on said arm, means securing said magnet to said arm, means for adjusting said magnet relative to said supporting member, said adjusting means being carried by said securing means, a contact carrying arm cooperable with said magnet, a resilient hinge member securing one end of said contact arm to said supporting member, and operating means acting on said contact arm adjacent said hinge member.

7. A device of the character described, comprising a base member, a supporting member, a resilient hinge member rigid with said base member and secured to one end of said supporting member, an adjustment member engaging said supporting member, a magnet adjustably mounted on said supporting member and extending longitudinally thereof, a contact carrying arm overlying said supporting member and cooperable with said magnet, a resilient hinge member rigid with said base member and secured to one end of said contact arm, a thrust member reciprocably guided in said supporting member and engageable with said contact arm, and temperature responsive means for moving said thrust member.

8. A device of the character described, comprising a base member, a supporting member, a resilient hinge member rigid with said base member and secured to one end of said supporting member, an adjustment member engaging said supporting member, a magnet adjustably mounted on said supporting member and extending longitudinally thereof, a contact carrying arm overlying said supporting member and cooperable with said magnet, a resilient hinge member rigid with said base member and secured to one end of said contact arm, a thrust member reciprocably guided in said supporting member and engageable with said contact arm, and a bimetal blade having one end rigid with said base member and having its other end engaging said thrust member.

9. A device of the character described, comprising a housing member, a supporting member pivotally secured at one end to an end wall of said housing member, a magnet adjustably supported on said one end of said supporting member, a contact carrying arm pivotally supported at the other end of said supporting member and extending into overlying cooperable relation to said magnet, said contact arm having an opening therethrough, an adjustment member extending through said opening into engagement with said supporting member, means carried by the top wall of said housing member for actuating said adjustment member, a bimetal blade secured at one end to the bottom wall of said housing member, and a thrust member guided for reciprocation in said supporting member, said thrust member having one end engaging said contact arm and having its other end engaging said blade.

10. A device of the character described, comprising a housing member, a supporting member pivotally secured at one end to an end wall of said housing member, a magnet adjustably supported on said one end of said supporting member, a contact carrying arm pivotally supported at the other end of said supporting member and extending into overlying cooperable relation to said magnet, said contact arm having an opening therethrough, an adjustment member extending through said opening into engagement with said supporting member, means carried by the top wall of said housing member for actuating said adjustment member, a bimetal blade having one end fixed and having its other end movable for actuating said contact arm, and an operating member interconnecting said other blade end and said contact arm, said operating member including lost-motion means to permit overtravel of said blade.

11. A device of the character described, comprising a housing member, a supporting member pivotally secured at one end to an end wall of said housing member, a magnet adjustably supported on said one end of said supporting member, a contact carrying arm pivotally supported at the other end of said supporting member and extending into overlying cooperable relation to said magnet, said contact arm having an open-

ing therethrough, an adjustment member extending through said opening into engagement with said supporting member, means carried by the top wall of said housing member for actuating said adjustment member, a bimetal blade, a plate member supporting said blade, a tubular member supporting said plate member and secured to said housing member, an operating member reciprocably guided in said tubular member and operatively connecting said blade and said contact arm, and cooling fins on said tubular member.

12. A device of the character described, comprising a supporting member, a U-shaped supporting means of resilient sheet material secured to said member, a magnet mounted on said means in spaced relation to said member, an adjusting screw, means rigid with said magnet and carrying said screw, said screw acting against said supporting member upon adjustment of said magnet, a control arm cooperable with said magnet, and means to actuate said arm.

13. A device of the character described, comprising a supporting member, a resilient supporting arm in spaced overlying relation to said member and secured thereto, a magnet mounted on said arm, means securing said magnet to said arm, means for adjusting said magnet relative to said supporting member, said adjusting means being carried by said securing means, a control arm cooperable with said magnet, means to actuate said control arm, and means to limit operation of said adjusting means.

14. A device of the character described, comprising a supporting member, a resilient supporting arm in spaced overlying relation to said member and secured thereto, a magnet mounted on said arm, means securing said magnet to said arm, means for adjusting said magnet relative to said supporting member, said adjusting means being carried by said securing means, a control arm cooperable with said magnet, means to actuate said control arm, and cooperable means carried by said adjusting means and by said magnet and operable to limit adjustment of said adjusting means.

15. A device of the character described, comprising a supporting member, a supporting arm in spaced overlying relation to said member and movably secured thereto, a magnet mounted on and fixed to said arm, an adjusting screw carried by said magnet and cooperable with said supporting member for adjusting said magnet relative thereto, a control arm cooperable with said magnet, and means for actuating said control arm.

16. A device of the character described, comprising a supporting member, a supporting arm in spaced overlying relation to said member and movably secured thereto, a magnet mounted on and fixed to said arm, an adjusting screw carried by said magnet and cooperable with said supporting member for adjusting said magnet relative thereto, oppositely positioned stop members rigid with said magnet, a stop member carried by said screw and cooperable with said stop members to limit adjustment of said screw, a control arm cooperable with said magnet, and means for actuating said control arm.

17. A device of the character described, comprising a casing of electric and heat insulating material, a plate member of heat conducting material closing one side of said casing, temperature responsive means secured to said plate member within said casing whereby to respond to the temperature of said plate member, control mechanism within said casing, an adjusting member cooperable with said mechanism to control the range of operation thereof and extending out of said casing, means in said casing to regulate the differential operation of said mechanism, and a removable cover member on said casing whereby said last-named means is accessible.

18. A device of the character described, comprising a casing, a supporting member fulcrumed at one end in and to said casing, a switch arm carried by said supporting member and having an aperture therethrough, a contact member mounted on said supporting member and cooperable with said switch arm, means to actuate said switch arm, said casing having an opening through a wall thereof in registry with said aperture, an adjustment member extending through said opening and said aperture and engaging said supporting member, a hand grip member having an indicator and fixed to said adjustment member external of said casing, and a dial on said casing cooperable with said indicator.

19. A device of the character described comprising a base member, a supporting member movably carried by said base member and having an aperture therethrough, a switch arm movably carried by said supporting member on one side thereof and overlying said aperture, means cooperable with said switch arm to control an electric circuit, a temperature responsive element for actuating said switch arm and disposed on the other side of said supporting member in overlying relation to said aperture, a thrust member positioned in said aperture for sliding movement relative to said supporting member and having one end abutting said element and its other end abutting said switch arm, and manually operable means for moving said supporting member to regulate operation of said switch arm by said element.

20. A device of the character described, comprising a base member, a supporting member movably carried by said base member, switch mechanism carried by said supporting member, means for actuating said switch mechanism, an adjustment member engaging said supporting member and operable to move the same whereby to regulate the operation of said mechanism, means to adjust said switch mechanism to regulate the differential operation thereof, a guide bore through said supporting member, and a thrust member reciprocable in and projecting at its opposite ends from said bore, said thrust member having operative engagement with said switch mechanism and with said actuating means.

21. A control device comprising a housing having an opening in a wall thereof, a removable closure member of heat conducting material closing said opening, an adjustable supporting member carried by and disposed within said housing, a contact member mounted on said supporting member, a magnet mounted on one end of said supporting member and having a pole extending toward said contact member, a contact carrying arm movably mounted on the opposite end of said supporting member and having an armature portion extending into cooperable relation to said magnet, a contact member mounted on said arm and cooperable with said first-named contact member, an operating member carried by and on the inner wall of said removable closure member and removable therewith as a unitary structure, said operating member being operable to actuate said arm, and means to adjust

said supporting member relative to said operating member.

22. A control device comprising a housing having an opening in a wall thereof, a removable closure member of heat conducting material closing said opening, an adjustable supporting member carried by and disposed within said housing with one side of said supporting member disposed toward said closure member, said supporting member having an aperture therethrough, a contact member carried by said supporting member, a magnet carried by and disposed adjacent one end of said supporting member and having a pole extending toward said contact member, a resilient contact carrying arm movably mounted on the opposite end of said supporting member, said arm being mounted on the opposite side from said one side of said supporting member in overlying relation to said aperture and having an armature portion extending into cooperable relation with said magnet, a contact member carried by said arm and cooperable with said first-named contact member, a temperature responsive blade carried by and on the inner wall of said closure member, said blade having a free end positioned in overlying relation to said aperture on said one side of said supporting member, a loosely disposed connecting member disposed for reciprocal movement in said aperture for operatively connecting said blade and said arm, and means to adjust said supporting member relative to said blade to regulate the operation of said arm by said blade.

23. A device of the character described comprising a base member, a supporting member movably carried by said base member, a switch blade movably carried by said supporting member and having an aperture overlying said supporting member, means cooperable with said blade to control an electric circuit, temperature responsive means for actuating said blade, manually operable means overlying said blade and operable for moving said supporting member to regulate operation of said blade by said temperature responsive means, and a thrust member extending through the aperture in said blade and operatively connecting said supporting member and said manually operable means.

24. A device of the character described comprising a base member, a supporting member movably carried by said base member and having an aperture therethrough, a switch blade movably carried by said supporting member and overlying said aperture, said blade having an aperture therethrough, means cooperable with said blade to control an electric circuit, a temperature responsive element for actuating said blade, manually operable means for moving said supporting member to regulate the operation of said blade by said element and having a socket, and a pair of laterally positioned thrust members, one of said thrust members engaging in said socket and extending through said aperture in said blade to engage said supporting member, the other of said thrust members extending through the aperture in said supporting member and operatively connecting said blade and said element.

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