# United States Patent [19]

**Foltz**

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## [54] HINGE PLATE SWITCH STRUCTURE


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[73] Assignee: **Lawrence Brothers, Inc.**, Sterling, Ill.



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[21] Appl. No.: **175,148**

[52] **U.S. Cl.** .....**200/61.7**, 200/61.82, 339/4

[51] **Int. Cl.**.....**H01h 3/16**

[58] **Field of Search** .....200/8 R, 8 A, 6 A, 200/61.64–61.83; 339/4



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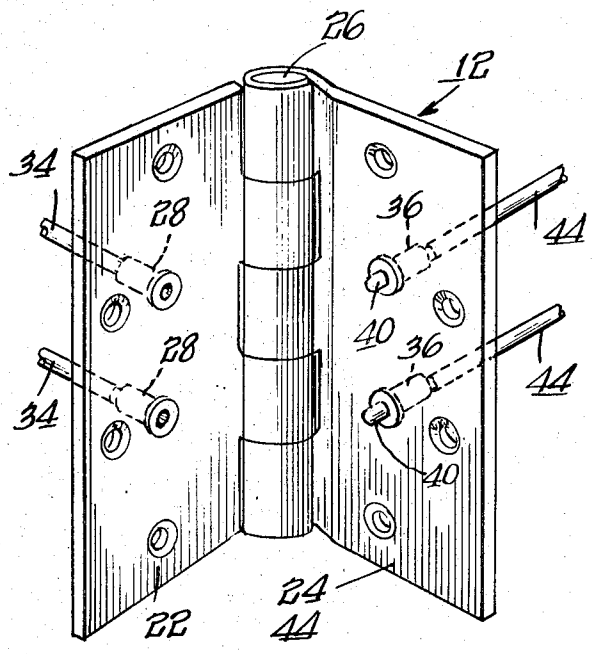
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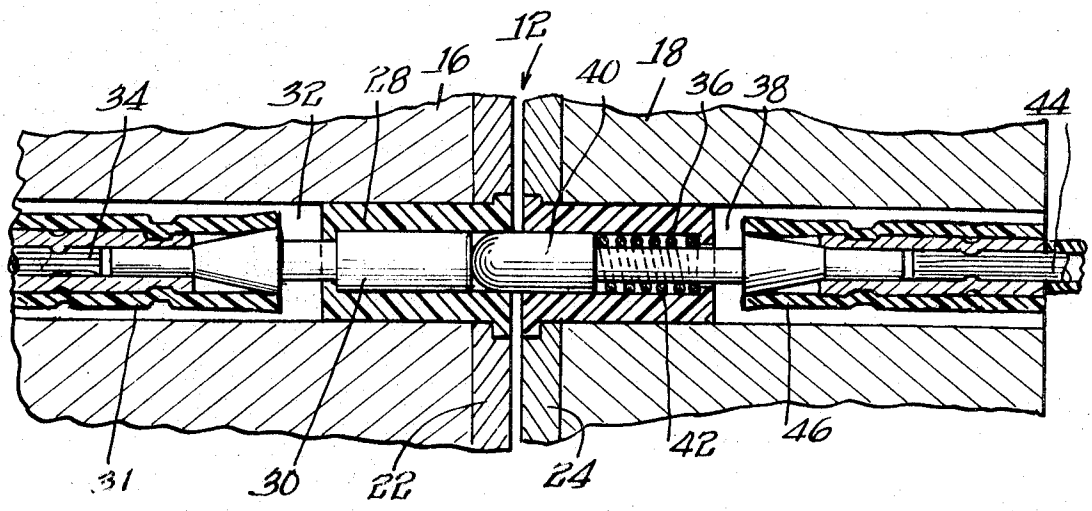


[57] **ABSTRACT**

The present invention relates generally to improvements in door hinge structures and more particularly to improvements in door hinges adapted to control electrical circuits. The hinge disclosed herein includes a pair of hingedly connected hinge plates or leaves having in association therewith contact means for opening and closing an electrical circuit, one hinge leaf being mountable upon the vertical edge of the door and the other mountable upon a door frame.


**3 Claims, 11 Drawing Figures**



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Fig. 1.

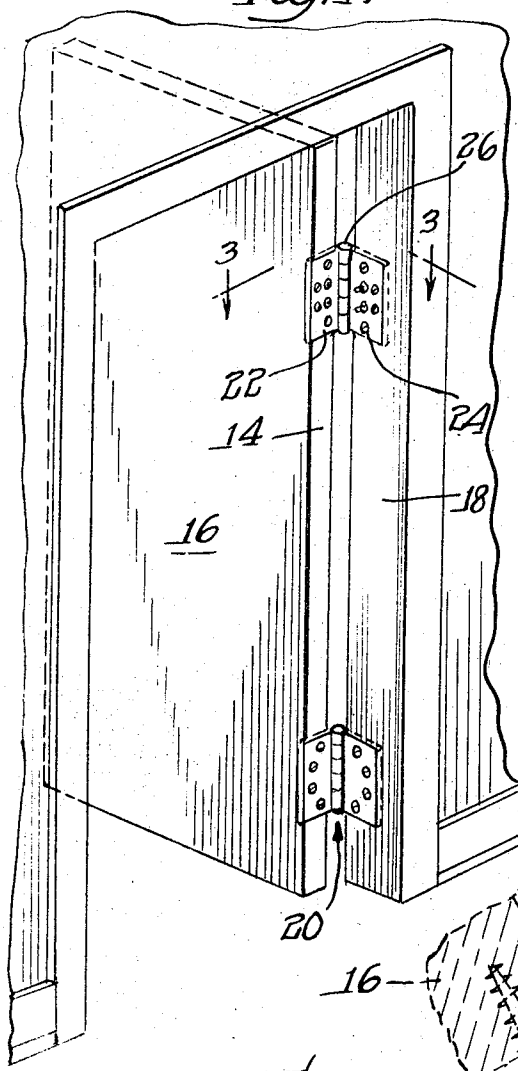



Fig. 2.

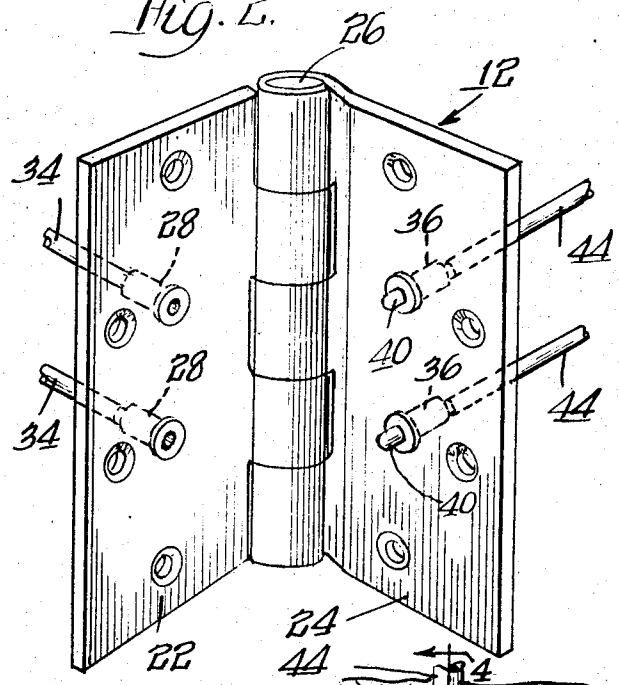



Fig. 3.

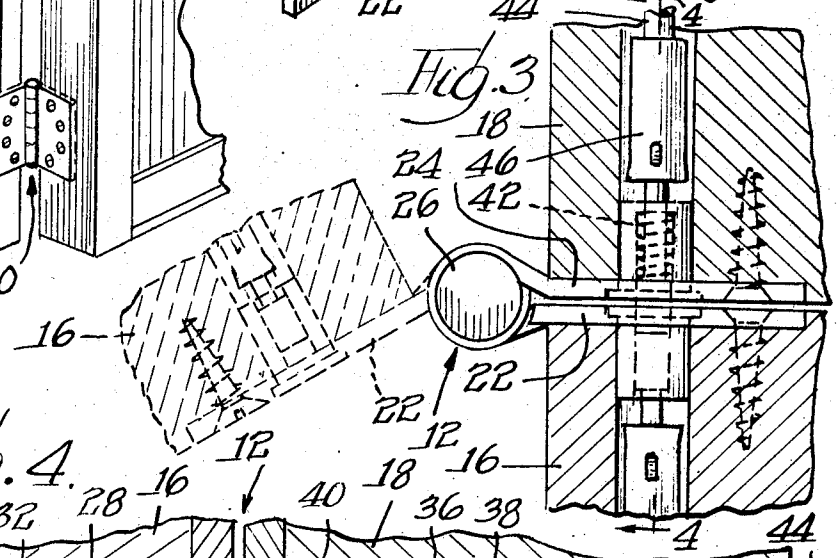
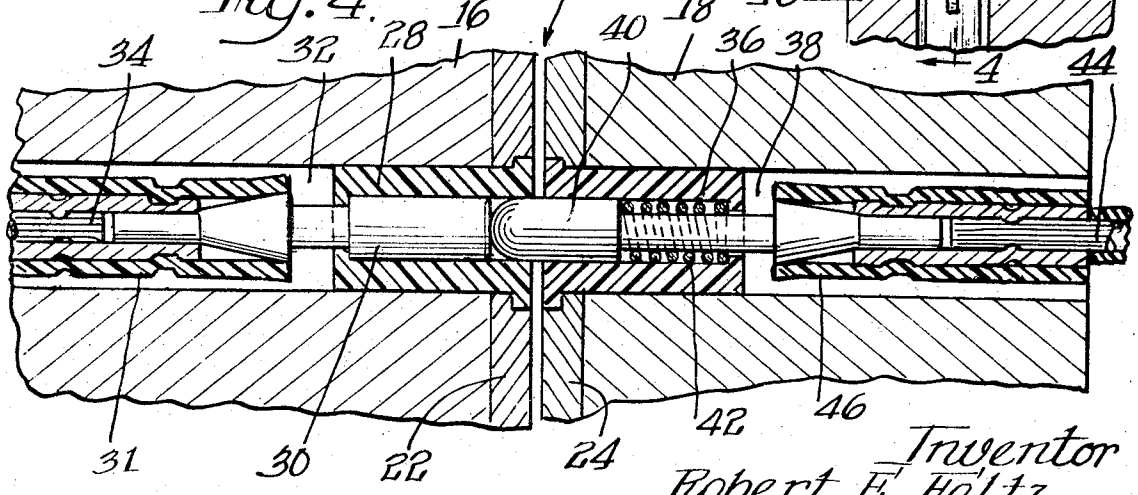



Fig. 4.




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Fig. 5.

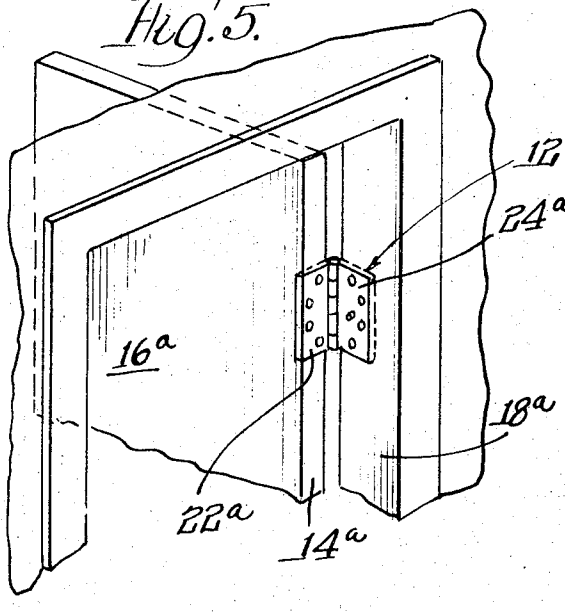



Fig. 6.

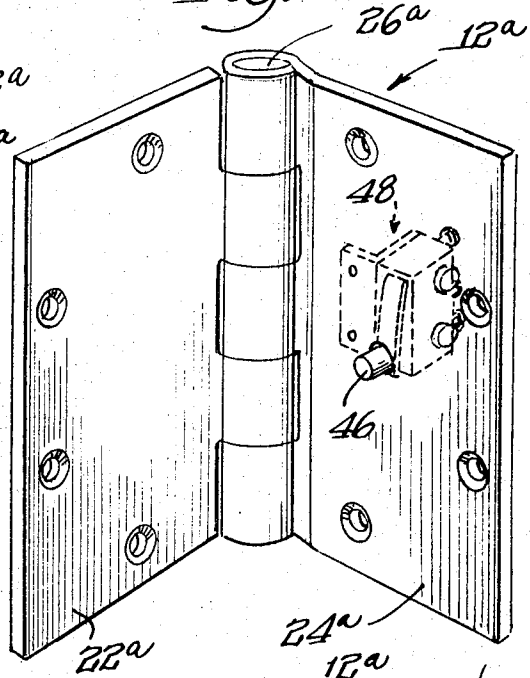



Fig. 7.

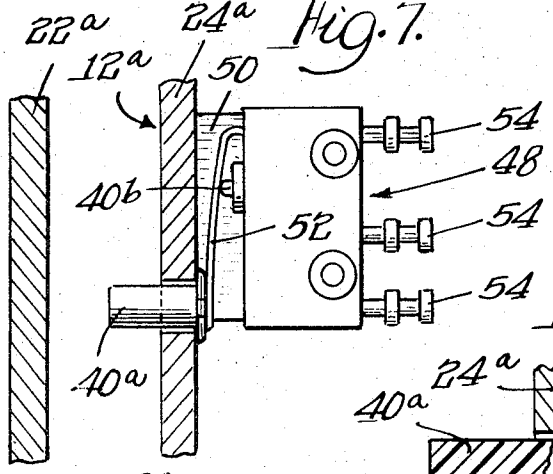



Fig. 8.

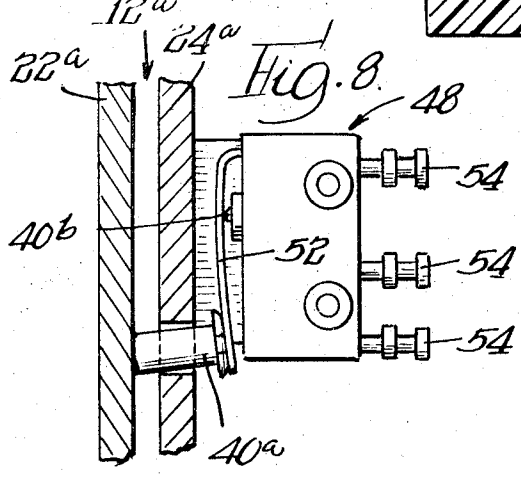



Fig. 9.

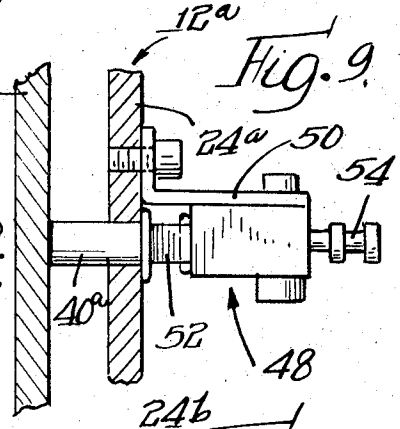



Fig. 10.

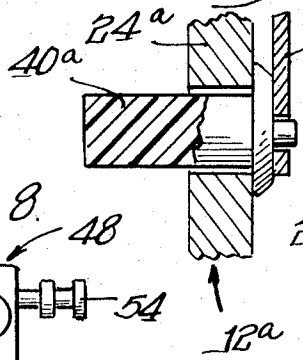
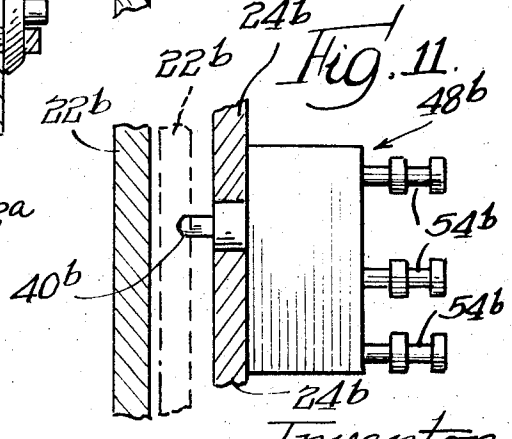



Fig. 11.




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# HINGE PLATE SWITCH STRUCTURE

## SUMMARY OF THE INVENTION

The present invention is concerned primarily with provision of simple and very practical door hinge arrangement adapted to control the opening and closing of an electrical circuit as an incident to the opening and closing of a door member with which the hinge may be associated.

More specifically, the present invention contemplates a hinge design of the above mentioned type, wherein the hinge leaves are equipped with a novel arrangement of relatively shiftable contact actuating means, adapted upon the swinging of the door member between open and closed position to condition an electrical circuit.

Still more specifically, the present invention envisions a unique, telescopic arrangement of electrical actuating elements associated with hinge leaves which serve effectively to open and close an electrical circuit.

## BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and advantages of the present invention will be more readily understood when considered in connection with the accompanying drawings wherein:

FIG. 1 is a fragmentary perspective view of a door member and frame equipped with a hinge structure which is representative of one embodiment of the present invention;

FIG. 2 is an enlarged, perspective view of the novel hinge structure contemplated by the present invention;

FIG. 3, is a fragmentary plan view of the hinge device illustrated in FIG. 2, when said hinge is in a closed position, said view being taken substantially along the line 3—3 of FIG. 1;

FIG. 4, is a fragmentary sectional view taken longitudinally of the telescopic contact actuating elements;

FIG. 5, is a fragmentary perspective view of a door member and frame equipped with a hinge device of modified form contemplated by the present invention;

FIG. 6, is an enlarged perspective view of the modified hinge device;

FIG. 7, is a side elevation view of a Microswitch associated with a hinge leaf secured to a door frame;

FIG. 8 is a view similar to FIG. 6, disclosing the leaf spring operatively engaging a switch actuating plunger;

FIG. 9 is a plan view of the switch device illustrated in FIGS. 7 an 8;

FIG. 10 is a detailed view of the switch actuating plunger; and

FIG. 11 is a view similar to FIG. 8, illustrating a further modified form of switch mechanism secured to a hinge leaf.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings more in detail, wherein like numerals are employed to designate similar parts throughout the various views, it will be seen in FIGS. 1 to 4 inclusive, that one embodiment of a novel hinge device contemplated by the present invention is designated generally by the numeral 12. In FIG. 1, the hinge device 12 is illustrated in operative association with the vertical edge 14 of a door member 16 and a vertical door frame member 18. A conventional hinge device 20 is attached to the lower portion of the door edge 14 and the door frame 18.



The hinge device 12 includes two hinge plates or leaves 22 and 24 pivotally connected by a pin 26. Projecting laterally of and secured to the hinge leaf 22 is an electrically nonconductive sleeve 28 in which is mounted a metallic plug or electrical contact element 30. The insulating sleeve 28 extends into a complementary aperture 32 in the door member 16. The free extremity of the member 30 is suitably coupled with an electrical conductor 34, as by means of a crimped sleeve device 31. An insulating sleeve 36 is secured to and projects laterally of the hinge leaf 24 into an opening 38 of the frame 18. A metallic contact member or plunger 40 is longitudinally shiftable within the sleeve 36. A coil spring 42 encircles a reduced extremity of the shiftable contact member 40. When the hinge leaves 22 and 24 occupy the door closing position shown in FIGS. 3 and 4, of the contact member or plug 30, the spring 42 is compressed and thus serves to maintain good electrical contact between the members 30 and 40. The free extremity of the contact member 40 is coupled in any suitable manner with an electrical conductor 44, as by means of a crimped sleeve device 46. Outward movement of the contact member 40 is limited by the abutment of the extremity of the coupling sleeve device 46 with the extremity of the sleeve 36.

From the foregoing it will be apparent that when the door member 16 is in closed position the contact members 30 and 40 will function to close the electrical circuit of which the conductors 34 and 44 form a part. Such a circuit could include a signaling device or other electrically controlled mechanism (not shown). Also, as illustrated in FIG. 2, a plurality of circuit controlling devices could be mounted in the door member 16 and the door frame 18, to accommodate a variety of electrical circuits.

In FIGS. 5 to 10 inclusive a modified form of hinge device 12a is shown. The elements of the hinge device 12*a*, corresponding with the elements of the previously described hinge device 12, are designated by like numerals bearing the suffix (a). Whereas the previously described hinge device 12 employs the contact elements 30 and 40, the hinge device 12*a* incorporates a Microswitch mechanism designated generally by the numeral 48. The switch mechanism 48 is suitably mounted upon a hinge leaf 24*a* by mean of a bracket 50. As the hinge plate or leaf 22*a* moves from open to closed position, as illustrated in FIGS. 7 and 8 respectively, said plate engages the projecting extremity of an electrically nonconducting or insulating pin 40*a*, so as to close the switch mechanism 48 by deflecting a yieldable switch element 52. Terminal members 54 are adapted to accommodate electrical conductors (not shown).

In FIG. 11, a slightly modified switch mechanism 48*b* is illustrated wherein the switch housing is mounted flush with a hinge plate 24*b*. A button or pin 40*b* forming an element of the switch mechanism is engaged by the other hinge plate 22*b* as said plate approaches its door closing position. Depression of the button 40*b* effects actuation of the switch mechanism 48*b*.

From the foregoing description, it will be understood that the present invention contemplates the provision of an improved and unique hinge device for swinging doors which is adapted to control an electrical circuit. Obviously such electrical circuits may be designed for use in a wide variety of environments, as for example for signaling the open and closed condition of a swinging door at a remote location. The structural simplicity of the hinge device contemplated by the present invention enables the economical production thereof. The embodiments of the invention as illustrated in FIGS. **1** to **4**, inclusive, incorporate cylindrical contact members which are composed of electrically conductive metallic material, and hence require the use of the sleeves **28** and **36** to electrically insulate the contact members **30** and **40** from the metallic hinge plates **22** and **24**, respectively. However, when the switch mechanisms **48** and **48***b* are employed, the shiftable cylindrical members **40***a* and **40***b* are electrically nonconductive, and it is unnecessary to equip the hinge plates **22***a* and **22***b* with the cylindrical contact member **30** illustrated in FIGS. **1** to **4**, inclusive. This obviously makes for simplicity in design and requires only slight movement of the door member to effect closing of the switch mechanisms **48** and **48***b*.

The invention is claimed as follows:

**1**. An electrical circuit control hinge device including first and second pivotally connected hinge plates, the first of said plates being apertured to accommodate fastener elements such as screw members for attachment to the vertical edge of a swingable door member and the second being apertured to accommodate fastener elements such as screw members for attachment in a fixed position upon a vertical door frame, electrical circuit control means mounted on said second hinge plate including an electrically nonconductive control member projectable from the exposed surface of said second hinge plate and shiftable transversely of said second hinge plate as an incident to the approach thereto of said first hinge plate, means for connecting said control means with an electrical conductor, and means for biasing said control member toward the projecting position thereof.

**2**. An electrical circuit control hinge device as set forth in claim **1**, electrical circuit control means includes switch means operable as an incident to the movement of said electrically nonconductive shiftable member.

**3**. An electrical circuit control hinge device as set forth in claim **1**, wherein said electrical circuit control means includes a switch spring adapted to be engaged and moved by said electrically nonconductive shiftable member.

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