

[54] **HINGE WITH MEANS FOR
CONDUCTING ELECTRICITY
THERE THROUGH**

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[58] Field of Search200/61.62-61.84,
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[57] **ABSTRACT**

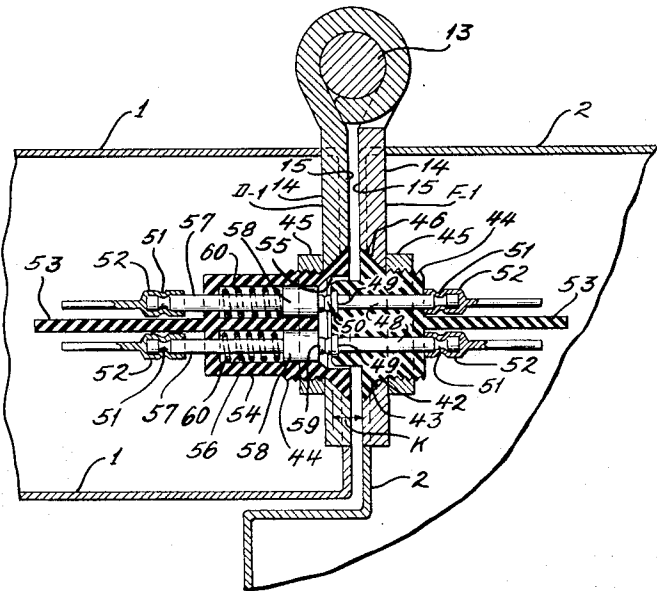
A hinge wherein the leaves are pivotally secured together on a pin, one of said leaves having electricity conducting means connected thereto which contacts cooperating electricity conducting means connected to the other leaf of said hinge to permit the flow of electricity from one leaf to another when the door is in its door-closed position.

[56] **References Cited**

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615,209 12/1898 Baxter339/4

11 Claims, 9 Drawing Figures



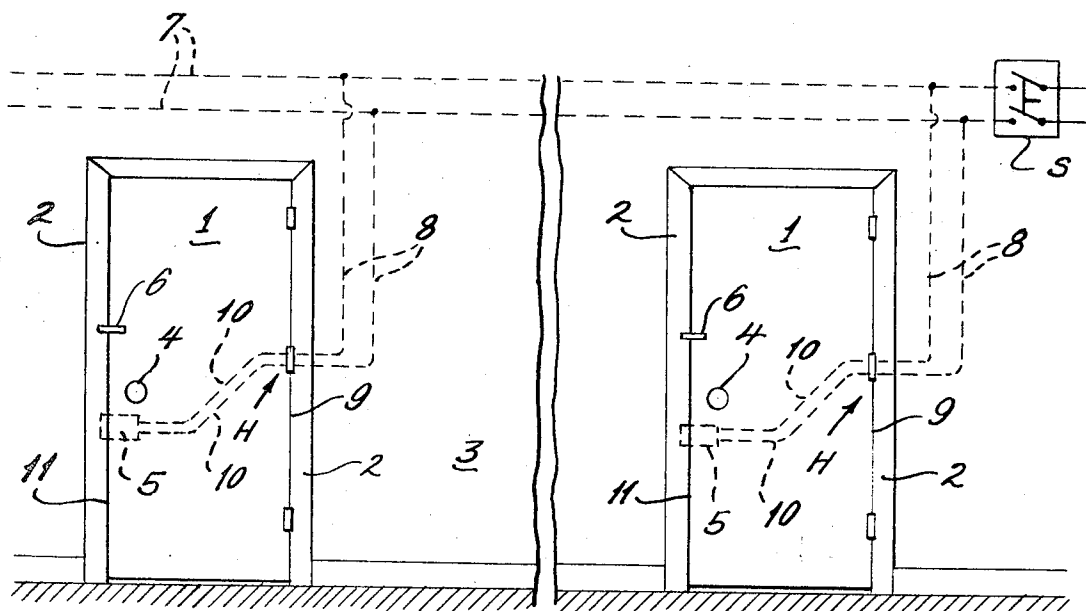
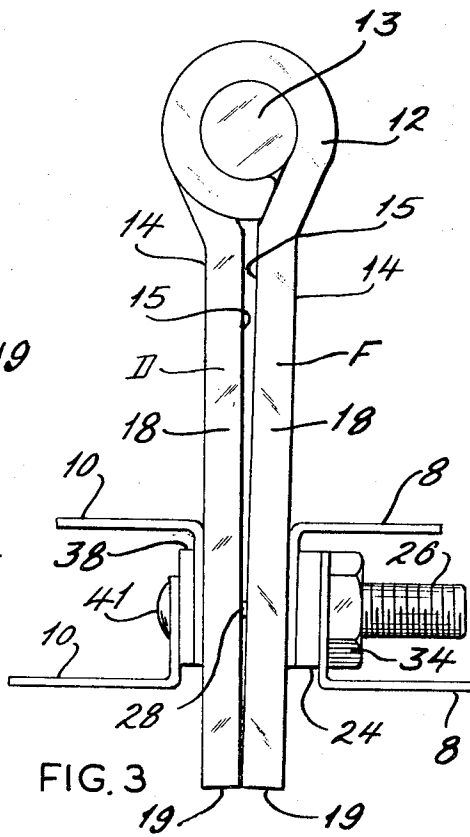
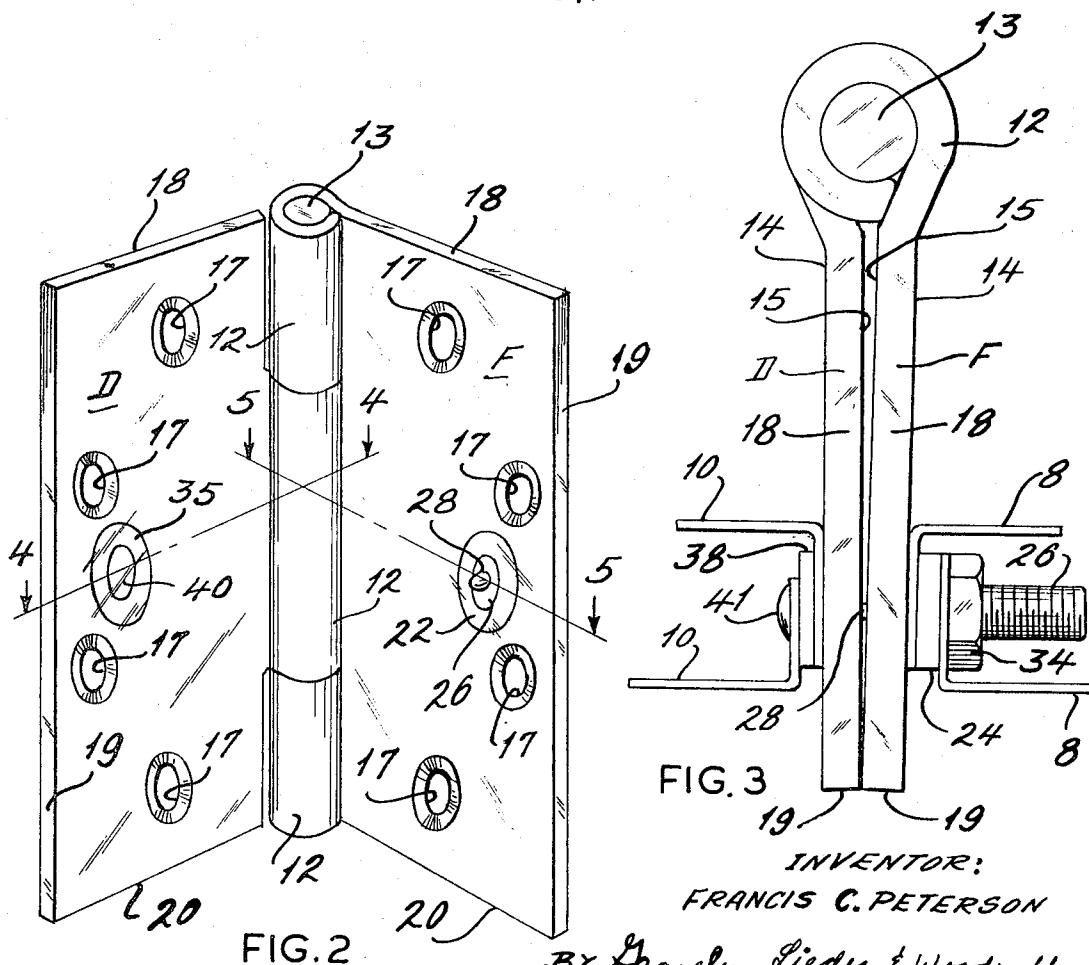


FIG. 1



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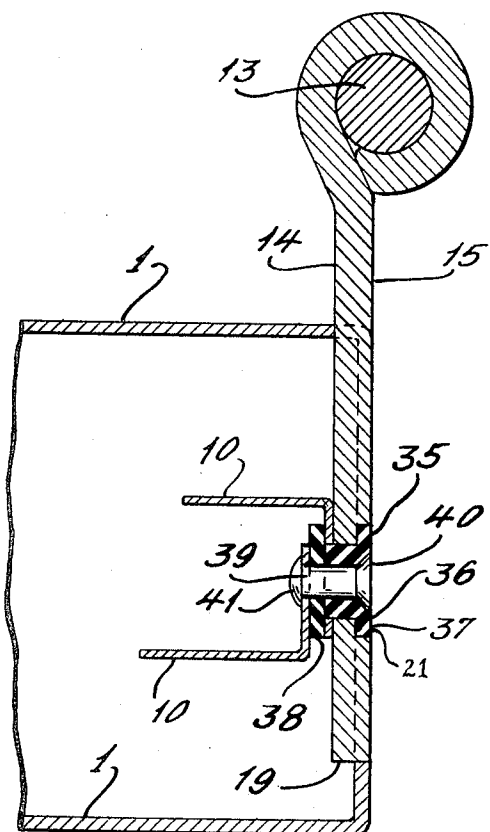


FIG. 4

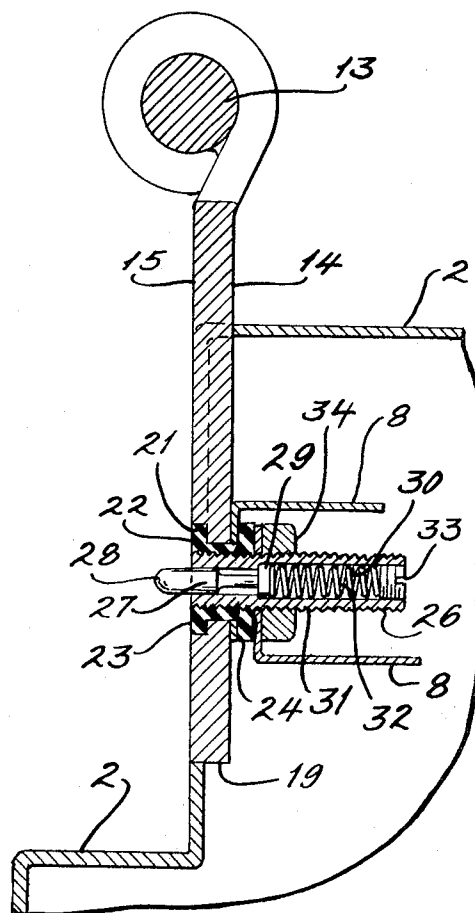


FIG. 5

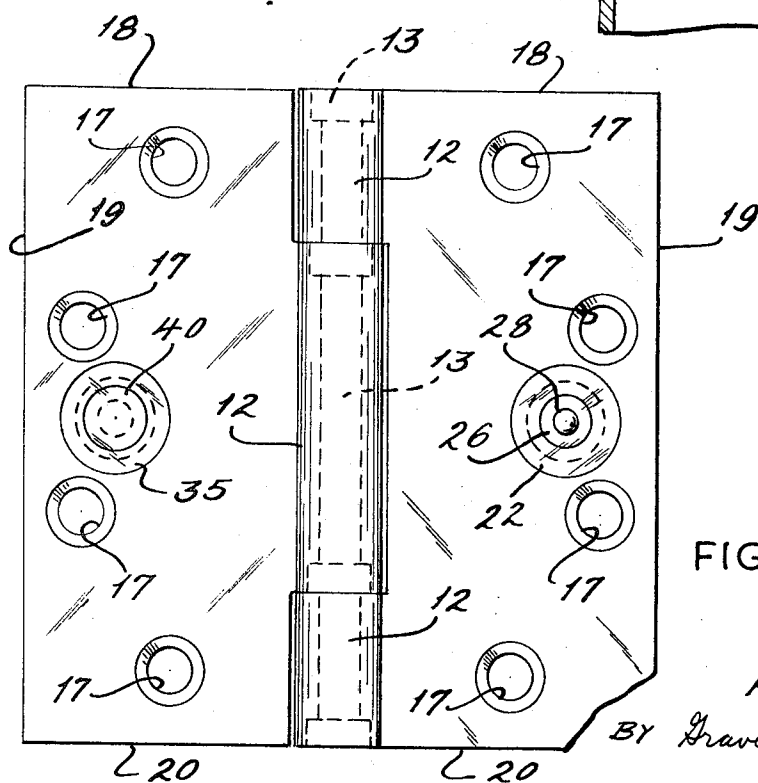


FIG. 6

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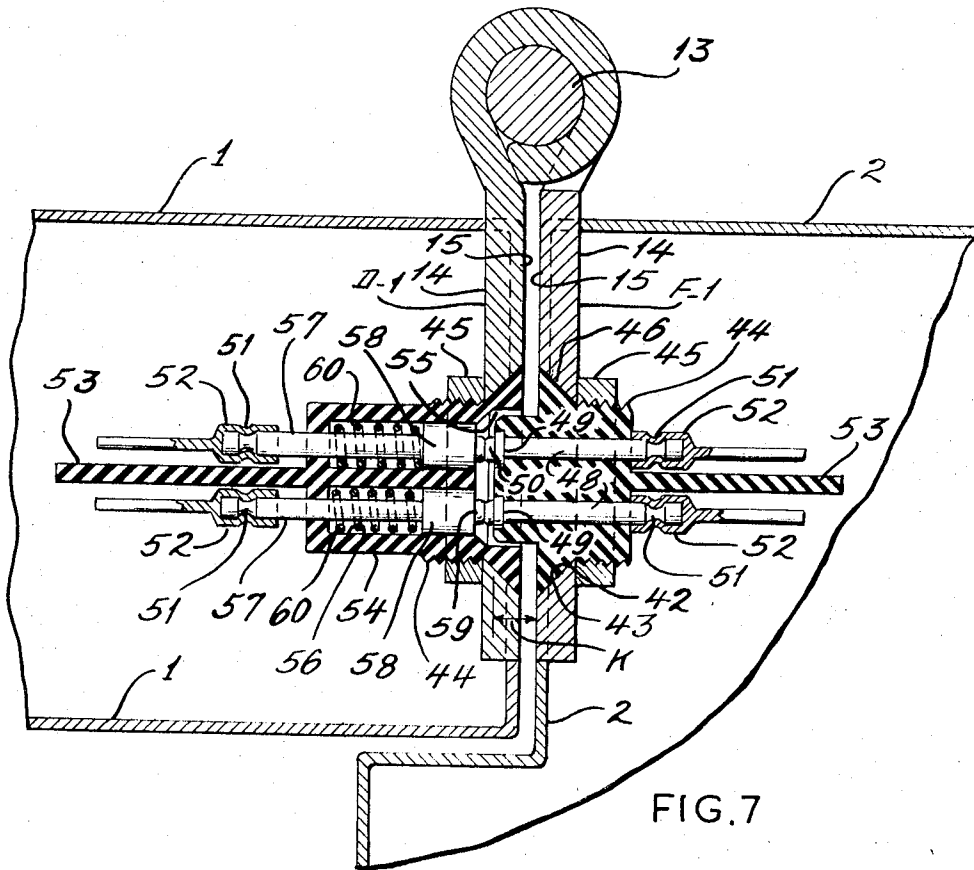


FIG. 7

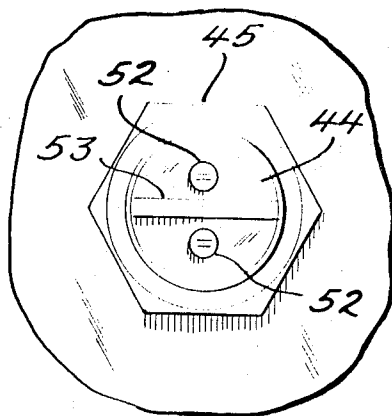


FIG. 8

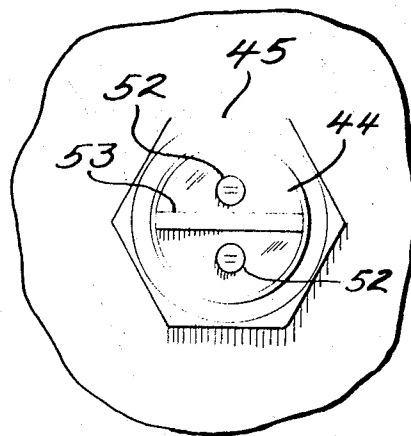


FIG. 9

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HINGE WITH MEANS FOR CONDUCTING ELECTRICITY THERETHROUGH

This invention relates to an improved hinge, and in particular, to a hinge having means for conducting electricity from one leaf to the other leaf thereof when the door is closed. Such a hinge may receive an electrical conduit attached to the wall and/or door frame, either on the outside or inside thereof, and conducts electricity from the door hinge to an electrically operated latch or lock on an unhinged edge of the door. Such a hinge may also be used in burglar alarm systems.

The security of buildings, industrial plants, and the like has received increased attention in recent years because of higher crime rates. In the past, doors have been locked individually by mechanical means. This requires a person to lock each door individually with a latch or with a key inserted into a lock, or both. Such doors are sometimes protected automatically by an electric alarm system, which sounds an alarm and/or a signal at the police station or private watching service when opened after the alarm has been set. Such electrical alarm system is frequently connected or set automatically when the door is closed and then locked with a key.

One of the principal objects of the present invention is to provide a hinge having means for conducting electricity therethrough so that electrical conductors can extend through the walls and doors of a building and be connected, thereby permitting a plurality of doors to be locked electrically by activating one switch which actuates locking means on the individual doors. Another object is to provide a hinge having two leaves, each of which has electricity conducting means connected thereto which are in contacting relation when the door is closed. Another object is to provide means for conducting electricity from a conduit on or within a wall and/or frame to a conduit within a door which extends from the hinge to the latch on an edge of the door other than the edge on which the hinge is mounted. Still another object is to provide a hinge in which electricity conducting means are mounted on the leaves so as to be in contacting relation when the leaves are in their door-closed position. Another object is to provide a hinge capable of carrying electricity through the leaves thereof and which can be used in connection with a burglar alarm system.

These and other objects and advantages will become apparent hereinafter.

The present invention is embodied in a hinge having leaves pivotally secured together on a pin wherein each leaf has means for conducting electricity connected thereto, said means being in contacting relation and capable of carrying electricity when the leaves are in their door-closed position. The word door as used herein includes doors of all sorts, panels, cabinet doors, windows and the like, wherein one edge is equipped with hinges.

The invention also consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed. In the accompanying drawings which form part of this specification and wherein like numerals and symbols refer to like parts wherever they occur:

FIG. 1 is a diagrammatic side elevational view of two of a plurality of doors provided with means for locking the door electrically and showing the conductor means through the walls and door,

FIG. 2 is a front perspective view of a hinge embodying the present invention with the leaves in partially open position,

FIG. 3 is a top plan view of the hinge shown in FIG. 2, but with the leaves in door-closed position,

FIGS. 4 and 5 are horizontal cross-sectional views of the hinge leaves mounted on a door and frame, respectively, with the sections taken along the lines 4-4 and 5-5 of FIG. 2,

FIG. 6 is a side elevational view of the assembled hinge with its leaves opened 180° to show a view of the electricity conducting means mounted therein,

FIG. 7 is a horizontal cross-sectional view of hinge leaves containing a modified form of the invention wherein two plungers on one hinge leaf cooperates with two contacts on the other hinge leaf, and

FIGS. 8 and 9 are fragmentary elevational views showing a portion of the outer or rear surface of each leaf of FIG. 7 with the wire connectors thereon.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention which has been illustrated comprises a hinge H having a leaf D and a leaf F which are adapted to be secured to a door 1 and a frame 2, respectively.

A typically environment for the hinge H is shown in FIG. 1 wherein a door 1 is mounted within a frame 2 with a wall portion 3 therearound. The door 1 has upper, middle, and lower hinges H, a door knob 4, and an electrically operated locking means 5. The door may also be provided with mechanical locking means, such as a bolt or latch 6, in addition to the usually retractable means actuated by rotating the door knob 4. The wall 3 contains electrical conductors 7 with a switch S therein. Electrical conductors 8 extend from the conductors 7 to the hinge side 9 of the door 1. The hinge H connects the conductors 8 with conductors 10 extending through the door 1 from the hinge H to the edge 11 of the door 1 containing the electrical locking means 5. A plurality of doors may be electrically connected in this manner. If desired, all of the doors of a building may be so connected, so that the activation of a single switch S completes the circuit and electrically locks each electrically operated locking means 5 on each door 1.

The hinge H has two leaves D and F, which are provided with cooperating knuckles 12 through which a hinge pin 13 extends. The hinge H may be of any suitable type, may have any number of knuckles 12 as desired, and may be provided with additional features, such as bearings, if so desired. The present invention may be used on any of the hinges wherein two leaves D and F are pivotally mounted on a hinge pin 13 and which leaves are in relatively close substantially parallel position when the door is closed. The leaf F is adapted to be connected to the frame 2 and the leaf D to the door 1, but if desired, the leaf F can be connected to the door 1 and the leaf D to the frame 2.

The leaf F has an outer surface 14 adjacent to the frame 2 and an inner surface 15 which is visible to a viewer than the leaf F is mounted to the frame 2, such as by screws which fit through the holes 17. The leaf F has a top edge 1, an outer edge 19 which is usually parallel to the hinged edge and the hinge pin 13, and a lower edge 20. The leaf F is provided with an opening 21, which is larger at the inner surface 15 than at the outer surface 14. A plastic washer 22 is mounted within said opening 21. The plastic washer 22 has an inner flange 23 thereon whose base is flush with the inner surface 15 of the leaf F. The washer 22 has a head 24 thereon. A ground wire 8 can be connected between said head 24 and the outer surface 14 of leaf F. A plunger assembly 26 is suitably mounted within the plastic washer 22 and contains a plunger 27 having a plunger head 28 and retaining means 29 which slides on the inner walls 30 of the plunger assembly casing 31. A spring 32 is mounted within the assembly 26 so as to bias the plunger 27 forwardly of the inner surface 15 at all times. A set screw 33 is provided in the rear of the assembly 26 for adjusting the force needed to contract the plunger 27. The other electrical conductor 8 is secured between the plastic washer 22 and a nut 24. The plunger 27 is mounted on the leaf F in a position so that it contacts a contact on the leaf D when the hinge is in its door-closed position.

The leaf D has an outer surface 14 adjacent to the door 1 and an inner surface 15 which is visible to a viewer when the leaf F is mounted to the door 1, such as by screws which fit through the holes 17. The leaf D has a top edge 18, an outer edge 19 which is usually parallel to the hinged edge and the hinge pin 13, and a lower edge 20. The leaf D is provided with an opening 21 which is larger at the inner surface 15 than at the outer surface 14. A plastic washer 35 is mounted within said opening 21. The plastic washer 35 has an inner flange 36 thereon whose base 37 is flush with the inner surface 15 of the leaf D. The washer 35 has a head 38 thereon which is adapted to secure a ground wire 10 between said head 38 and the outer surface 14 of leaf D. A rivet 39 made from an electricity con-

ducting material is suitably mounted within the plastic washer 35 and contains a flat surface 40 which is flush with the inner surface 15 of the leaf D and which receives the plunger 27 in contacting relation. The rivet 39 has a head 41. An electrical conductor 10 is secured between the rivet head 41 and the plastic washer head 38. The plunger 27 is mounted on the leaf F in a position so that it contacts the rivet surface 40 on the leaf D when the hinge H is in its door-closed position.

A modified form of the invention is shown in FIGS. 7-9, wherein each leaf D-1 and F-1 has a pair of electricity conducting means connected thereto instead of the one electricity conducting means shown in the form previously described (FIGS. 1-6). The modified form (FIGS. 7-9) is connected to wiring or circuits in a manner similar to the previous form. As in the previous form, either the door leaf or the frame leaf may contain the plunger or movable contact. With hollow metal doors, it may be desirable to have the two movable plunger form connected to the leaf mounted on the door rather than to the leaf mounted on the frame.

The leaf F-1 (FIG. 7) has an outer surface 14 adjacent to the frame 2 and an inner surface 15 which is visible to a viewer when the leaf F-1 is mounted on the frame 2 in the usual manner, such as shown in FIG. 7. The leaf F-1 has a top edge, an outer edge, and a lower edge, as in the previous form of the invention (FIG. 5). The leaf F-1 is provided with an opening 42, which is larger at the inner surface 15 than at the outer surface 14. A plastic washer 43 is mounted within said opening 42 and extends forwardly of said inner surface 15 a predetermined distance K. The washer 43 has threads 44 thereon for receiving a nut 45. The washer 43 has a sloping surface 46 extending rearwardly from the opening 42. Tightening the nut 45 secures the washer 43 in the leaf F-1 securely. The washer 43 contains two openings which each receive a rod 48 having a collar 49 and contact 50 thereon. The outer portion of the rod 48 has a groove 51 therein on which a wire connector 52 can be crimped. The washer 43 contains an insulated separator 53 for separating the wire connectors 52. Individual wires 8 are soldered to the wire connectors 52 to electrically connect the leaf F-1 with the source of electricity.

The leaf D-1 (FIG. 7) has an outer surface 14 adjacent to the door 1 and an inner surface 15 which is visible to a viewer when the leaf D-1 is mounted on the door 1 in the usual manner, such as shown in FIG. 7. The leaf D-1 has a top edge, an outer edge, and a lower edge, as in the previous form of the invention (FIG. 4). The leaf D-1 is provided with an opening, which is larger at the inner surface 15 than at the outer surface 14. A plastic washer 54 is mounted within said opening and has a recess 55 therein for receiving the forward portion of the washer 43 mounted on the leaf F-1. The washer 54 has threads 44 thereon for receiving a nut 45. The washer 54 has a sloping surface 46 extending rearwardly from the opening. Tightening the nut 45 secures the washer 54 in the leaf D-1 securely. The washer 54 contains two openings 56 which each receive a plunger 57 having a plunger head 58 and contact 59 thereon. Springs 60 are positioned in the openings 56 in circumscribing relation to the plunger 57 for biasing the plunger heads 58 rightwardly as shown or toward said other leaf F-1. The outer portion of each plunger 57 has a groove 51 therein on which a wire connector 52 can be crimped. The washer 54 contains an insulated separator 53 for separating the wire connectors 52. Individual wires 10 are soldered to the wire connectors 52 to electrically connect the leaf D-1 with the electric lock 5.

The washer 43 in the leaf F-1 extends inwardly sufficiently far so that in the door-closed position it is received within the recess 55 in the leaf D-1. This is frequently called a safety stud hinge in the trade, since it prevents the door 1 from being removed from the frame should the hinge pin 13 be taken out when the door 1 is in closed position. That is, the door is safe from being removed by removing the hinge pins and taking the door off the hinges to gain entry. A washer 43 from one leaf fitting within the opening of the other leaf prevents one leaf

from being moved laterally with respect to the other leaf.

What is claimed is:

1. In a hinge having leaves pivotally secured together on a pin, the improvement wherein one of said leaves has means connected thereto adapted to cooperate with means on the other leaf, each of said means being an electrical conductor, one of said means being movable through said one leaf and being biased toward said other leaf, and the other of said other leaves has cooperating means connected thereto for being contacted by said one of said means when said leaves are in substantial parallel relation in a door-closed position, thereby establishing electrical contact between said leaves and permitting the flow of electricity through said means in said leaves when said leaves are in their door-closed position.

2. The improvement set forth in claim 1 wherein said means biased toward said other leaf comprises a plunger which normally extends forwardly of the surface adjacent to said plunger in a direction toward said other hinge leaf.

3. The improvement set forth in claim 2 wherein said plunger contacts said means on said other leaf when said hinge is closed, but does not contact said means in said other leaf when said hinge is open.

4. The improvement set forth in claim 2 wherein each leaf is mounted on its respective door and door frame and said plunger is biased toward said electrical conductor in said other hinge leaf by a spring and is partially retracted against the compressive force of said spring by said electrical conductor on said other hinge leaf when said door is in its door-closed position.

5. The improvement set forth in claim 1 wherein said means biased toward said other leaf comprises a pair of plungers, each of which normally extends forwardly of the surface adjacent to said plungers in a direction toward said other hinge leaf and wherein each of said plungers is adapted to contact separate electrical conducting means connected to said other hinge leaf.

6. The improvement set forth in claim 1 wherein each conductor which is connected to each of said hinge leaves is insulated from said hinge leaf by means of a circumscribing insulator mounted in each hinge leaf.

7. The improvement set forth in claim 1 wherein each of said leaves has an inner surface and an outer surface, and each has an opening therethrough for receiving an insulating material with an opening therethrough for receiving each said electrical conductor, said each electrical conductor being adapted to be connected to an electrical conduit, said each electrical conductor connected to one of said leaves having a surface flush with the inner surface of the leaf to which it is connected, said each electrical conductor connected to the other of said leaves having a plunger biased at all times toward said other leaf, said plunger being extended forwardly of said inner surface of the leaf to which it is connected and being moved inwardly when contacted by the other electrical conductor on said other leaf as the leaf of the hinge is moved to its door-closed position.

8. The improvement set forth in claim 1 wherein said means on one leaf extends forwardly of the inner face of said leaf and is adapted to extend into said means in the other leaf when the leaves are in their door-closed position.

9. The improvement set forth in claim 8 wherein one of said means comprises a plunger in one of said leaves mounted rearwardly of the inner surface of said leaf and is adapted to move at all times in positions rearwardly of the inner surface.

19. The improvement set forth in claim 1 wherein each leaf is mounted on its respective door and door frame and is provided with a washer having a pair of electricity conducting means therein, one of said washers having a recess therein, the other of said washers having a portion adapted to extend into said recess when the door is in its door-closed position.

11. The improvement set forth in claim 10 wherein each washer has a pair of contacts thereon connected to a pair of connectors, said connectors having an insulator therebetween.

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