

June 23, 1931.

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1,811,709

DISAPPEARING STAIRWAY

Filed Jan. 19, 1929

5 Sheets-Sheet 1

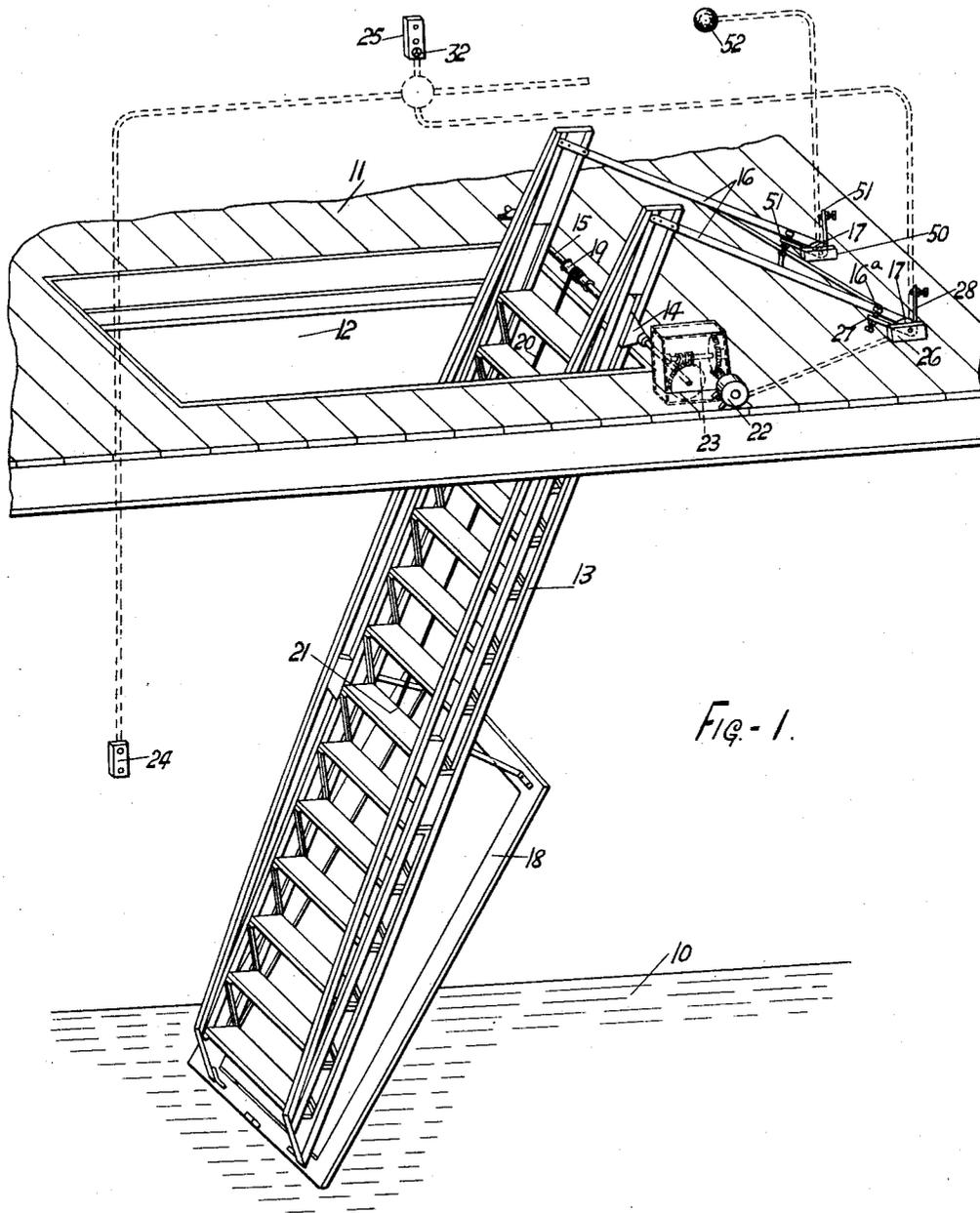


Fig. 1.

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5 Sheets-Sheet 2

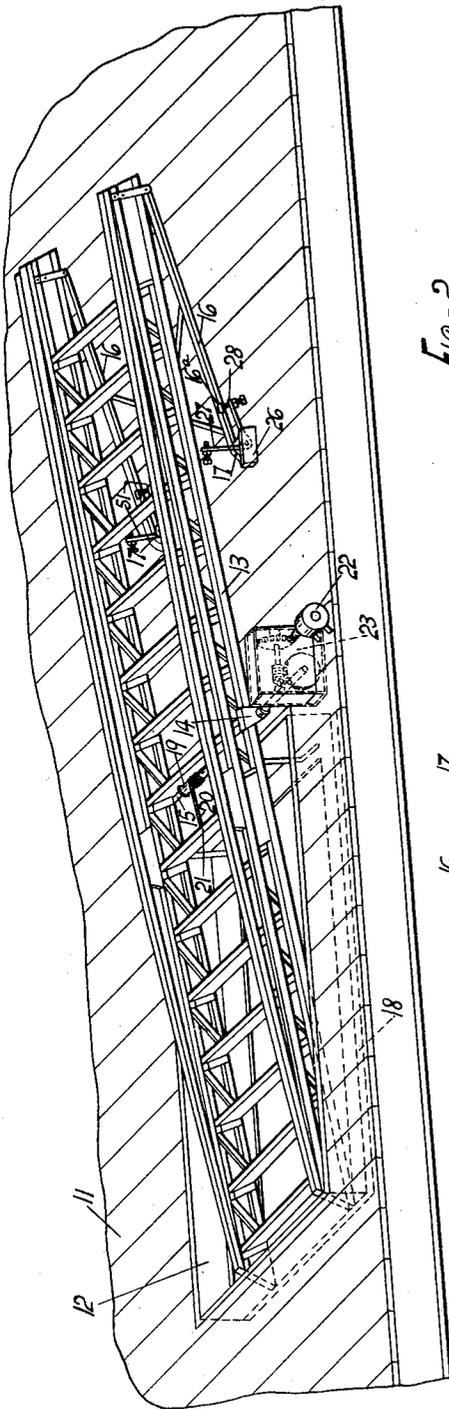


Fig. 2

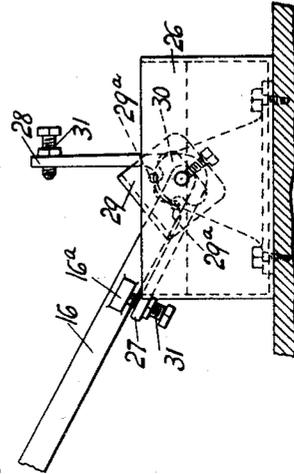


Fig. 3

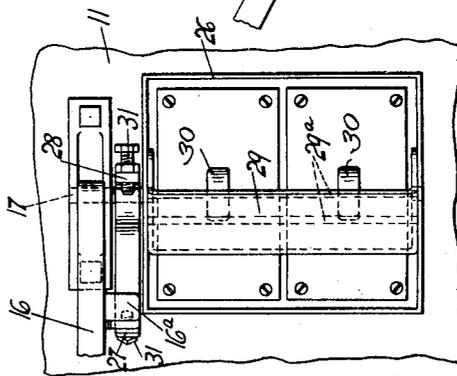


Fig. 4

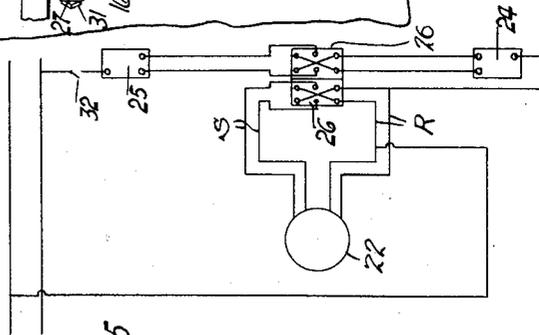


Fig. 5

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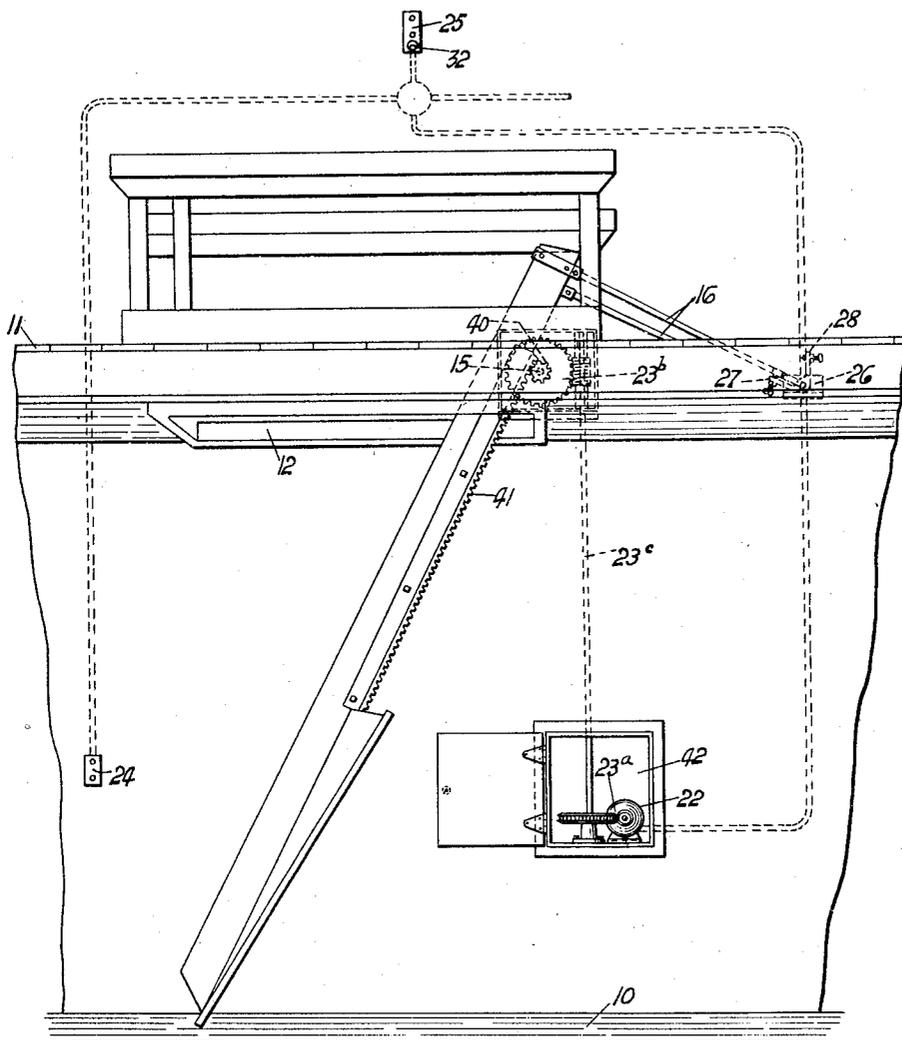


Fig. 7

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5 Sheets-Sheet 5

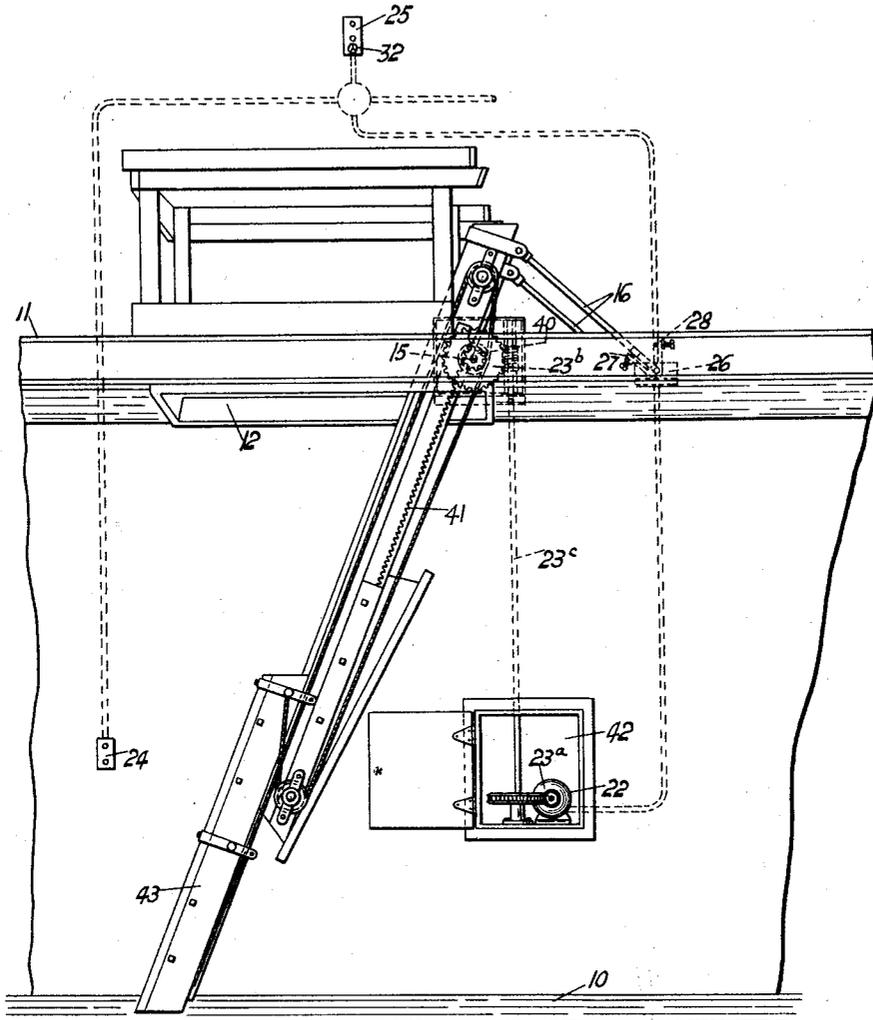


Fig. - 8

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UNITED STATES PATENT OFFICE

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DISAPPEARING STAIRWAY

Application filed January 19, 1929. Serial No. 333,551.

This invention relates to disappearing stairways of that type cooperating with a ceiling opening in a lower room to give access to an upper room.

form of the invention showing the stairway in position for use.

5 One purpose of the invention is to provide reversible power means, driving connections and controls for that style of stairway of this type which swings through the ceiling opening.

Referring to Figures 1 to 5, a lower floor 10 has access to an upper floor 11 through a ceiling opening 12. A stairway 13 of suitable construction is movable through opening 12, it being slidably mounted on brackets 14 hinged onto a shaft 15 extending across one end of opening 12 and being pivotally connected at its upper end to radius arm 16 for controlling movement of the stairway through the opening to and from the extended position shown in Figure 1. The radius arm 16 is pivoted at 17, 17 on the upper floor 11. The lower end of stairway 13 is provided on its under side with a panel 18 adapted to close opening 12 when the stairway is retracted as shown in Figure 2.

10 Another purpose of the invention is to provide a control device for this type of stairways which is adapted to be rendered inoperative by means on the upper floor to prevent access to said upper floor by an intruder, burglar, etc., from below.

60 For operating the stairway, shaft 15 has a cable drum 19 thereon on which is wound cable 20 connected to the stairway at 21 and shaft 15 is arranged to be driven in either direction by suitable reversible driving means such as a reversible motor 22, driving shaft 15 through reduction gearing indicated at 23, the installation of the motor and reduction gearing being shown on the upper floor 11 adjacent opening 12.

15 Another purpose of the invention is to provide in combination with a disappearing stairway giving access to an upper floor, switch means operable by extension of the stairway to a position of use for completing an electrical circuit to one or more lights on the upper floor and for disconnecting said lights from the circuit when the stairway is retracted.

20 The foregoing and other purposes or objects of the invention are attained in the stairways and control devices illustrated in the accompanying drawings and described below. It is to be understood that the invention is not limited to the specific forms thereof described and shown.

70 For starting motor 22, single pole, double throw switches 24 and 25 are preferably employed one on each floor and being double acting so that the motor 22 can be started from each floor. In order to stop the motor as the stairway moves into its extended or retracted position and in order to reverse the motor connections as the motor is stopped, a pair of standard reversing switches 26, 26 are utilized and are arranged to be actuated by the radius arm 16 as it moves into its respective positions assumed when the stairway is extended or retracted. To this end, radius arm 16 is provided with a lug 16^a operable between a pair of arms 27 and 28 mounted in fixed angular relation on a pivoted bracket 29 (Figures 3 and 4) which is adapted to actuate the usual tumblers 30 of the reversing switches 26, 26 through the agency of rods 29^a on the bracket. In order that the motor control shall be adjustable to stop the motor when the stairway is completely ex-

25 Of the accompanying drawings, Figure 1 is a perspective view of one form of stairway installation embodying the invention shown in its position of use;

30 Figure 2 is a perspective view showing the stairway in its retracted position;

35 Figure 3 is a detail side elevation of the motor control switch;

40 Figure 4 is a detail plan of the motor control switch;

45 Figure 5 is a wiring diagram of the electrical connections;

50 Figure 6 is a perspective view of another form of stairway installation embodying the invention, shown in its position of use;

55 Figure 7 is a perspective view of still another form of stairway embodying the invention shown in its position of use; and

60 Figure 8 is a perspective view of a fourth

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tended or the panel completely closed, the arms 27 and 28 are provided with set screws 31, the ends of which are engaged by lug 16^a.

As shown in Fig. 5, the motor 22 is connected through switches 24 and 25 and reversing switches 26, 26 to power lines in such a way that either of switches 24 or 25 may be operated to extend or retract the stairway, the extending and retracting movements being controlled by reversing the motor connections as the motor is stopped, both stopping and reversing of the connections being accomplished by radius arm 16 operating switches 26 as said arm moves into its respective positions.

The motor control circuit is also preferably provided with a cut-out switch 32 on the upper floor. By this provision, access to the upper floor can be prevented by one desiring to be in seclusion or to keep out intruders, burglars, etc., this being accomplished by retracting the stairway and then opening switch 32.

In Figure 6 a quite similar installation is shown with similar parts designated by the same numerals as in Figures 1 to 5, there being two differences in construction to be noted. One is the provision of the extensible and retractible section 35 mounted on the lower end of the stairway 13 to permit use of a stairway of this type where the height of the lower room is comparatively greater or the ceiling opening and space for the stairway on the upper floor are small, this extensible section being operable by a drum 35^a on shaft 15 and cables 35^b so connected to the extensible section and drum as to move the extensible section downwardly as the stairway swings down and to move the extensible section up onto the upper section before the stairway moves through the ceiling opening. The other difference is that the motor 22 is placed in another location with part of the reduction 23^a at the motor and connected to the other part 23^b of the reduction at shaft 15 by means of shafting 23^c. Such arrangement of the drive may often be found necessary under certain conditions to be met in installation.

Figure 7 illustrates another form of this type of stairway in which, instead of a cable drum 19 on shaft 15 and cable 20 connected to the stairs, pinions 40 are mounted on shaft 15 and mesh with racks 41 on the under side of the stairway. Also the motor 22 is shown in a small wall closet 42 on the lower floor where it may easily be examined and cared for, reduction gearing 23^a and 23^b respectively in the motor closet and connected to shaft 15 being connected by shaft 23^c extended in this case downwardly in the wall of the building.

Figure 8 shows a similar installation with the only difference indicated being the use of

the extensible section 43 on the lower end of the stairway.

In the operation of all forms of the invention, the stairway is simultaneously extended or retracted by the drum and cable or pinions and racks and swung to and from a substantially horizontal position above the opening with the panel shut and an inclined position extending from the lower floor to the opening with the panel, of course, open. And in all forms of the invention, these operations are performed by the motor, controlled manually to start it, and automatically by the stairway to stop and reverse its connections at each operation of the stairway.

In Figures 1 and 2 there is further illustrated a switch 50 which may be operable by radius arm 16 in a manner similar to switches 26 by arms 51, 51 to establish an electrical circuit (indicated in dotted lines) to a light 52 on the upper floor when the stairway is extended to the lower floor and to disconnect the light when the stairway is retracted. It will, of course, be noted that this feature may be adapted to any type of disappearing stairway by operating the switch from one of the moving parts.

It will appear from the foregoing that the invention provides simple, effective means for automatically operating and controlling the operation of stairways of this type. It will also be apparent that modifications of the invention may be resorted to without departing from the spirit thereof and the scope of the appended claims.

What is claimed is:—

1. A disappearing stairway for use in a ceiling opening between a lower floor and an upper floor, said stairway comprising pivoted brackets adjacent one end of the opening, a stair structure slidable on the brackets, driving means including a reversible motor in an electrical circuit for sliding the stair structure on the brackets, a radius rod pivotally connected to the upper end of the stairway and pivotally mounted on the upper floor, a manually operable switch on each floor arranged in said circuit for starting the motor, an automatic switch for stopping the motor and reversing its connections, and means operable by the radius rod to actuate said switch as the stairway moves into its extended and retracted positions.

2. A disappearing stairway for use in a ceiling opening including a pivotally supported slidable stair structure, means for sliding the stair structure including a reversible motor in an electric circuit, radius arm means for causing the stair structure to pivot about its support as it is slid from a retracted position extending horizontally above the ceiling opening to a position of use extending upwardly at an inclination from the lower floor to the ceiling opening, switch means in the electrical circuit for starting

the motor, and switch means in the electric circuit controlled by the radius arm for stopping the motor and reversing its connections as the stairway moves into its retracted position and into its position of use.

3. A disappearing stairway for use in a ceiling opening between a lower and an upper floor, said stairway comprising pivoted brackets adjacent one end of the opening, a stair structure slidable on the brackets, reversible driving means for sliding the stair structure on the brackets, a radius rod pivotally connected to the upper end of the stairway and pivotally mounted on the upper floor, means for starting the driving means, and means actuated by the radius rod for stopping the driving means and setting it in reverse as the stairway moves into its extended and retracted positions.

4. A disappearing stairway for use in a ceiling opening including a pivotally supported slidable stair structure, means for sliding the stair structure including reversible driving means, radius arm means for causing the stair structure to pivot about its support as it is slid from a retracted position extending horizontally above the ceiling opening to a position of use extending upwardly at an inclination from the lower floor to the ceiling opening, means for starting the driving means, and means actuated by the radius rod for stopping the driving means and setting it in reverse as the stairway moves into its retracted position and into its position of use.

5. In a disappearing stairway installation comprising a stair structure pivotally and slidably mounted to move through a ceiling opening to a position of use on the lower floor and having a panel on the lower portion for closing the opening when retracted, reversible power means for actuating the stairway, and means operable by movement of the stairway for stopping the power means and setting it in reverse when the stairway is moved into its position of use and into its retracted position.

6. In a disappearing stairway installation including a stairway movable in cooperation with a ceiling opening between lower and upper floors, driving means for operating the stairway between its retracted position and its position of use, means on each floor for starting operation of the driving means, and means on one floor for rendering the driving means inoperative from the other floor when desired.

7. In a disappearing stairway installation including a stairway movable in cooperation with a ceiling opening between lower and upper floors, a motor in an electrical circuit for operating the stairway between its retracted position and its position of use, a switch on each floor for starting operation of the motor, and a cut-out switch on one floor

arranged in said circuit for rendering the starting switch inoperative from the other floor when desired.

8. In a disappearing stairway installation including a stairway movable in cooperation with a ceiling opening between lower and upper floors, a motor in an electrical circuit for operating the stairway between its retracted position and its position of use, a switch on each floor for starting operation of the motor, and a cut-out switch on the upper floor arranged in said circuit for rendering the starting switch inoperative from the lower floor when desired.

9. A disappearing stairway for cooperating with a ceiling opening between lower and upper rooms of a building, an electric light in the upper room, radius arms pivotally attached to one end of said stairway, and a toggle switch operable by one of said radius arms upon movement of the stairway to a position of use to establish an electrical circuit to said light and operable by movement of the stairway to its retracted position to disconnect the light from said circuit.

10. A disappearing stairway for cooperating with a ceiling opening between lower and upper rooms of a building, an electric light in one of said rooms, a toggle switch, radius arms pivotally attached between one end of said stairway and said toggle switch, a V bracket pivoted to the switch end of one of said radius arms and adapted upon movement of the stairway to a position giving access to said room to throw said toggle switch to establish an electrical circuit to said light and operable by movement of the stairway to its retracted position to throw said toggle switch to disconnect the light from said circuit.

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