July 19, 1927. 1,636,279

F. E. BESSLER

MOVABLE STAIRWAY LATCH

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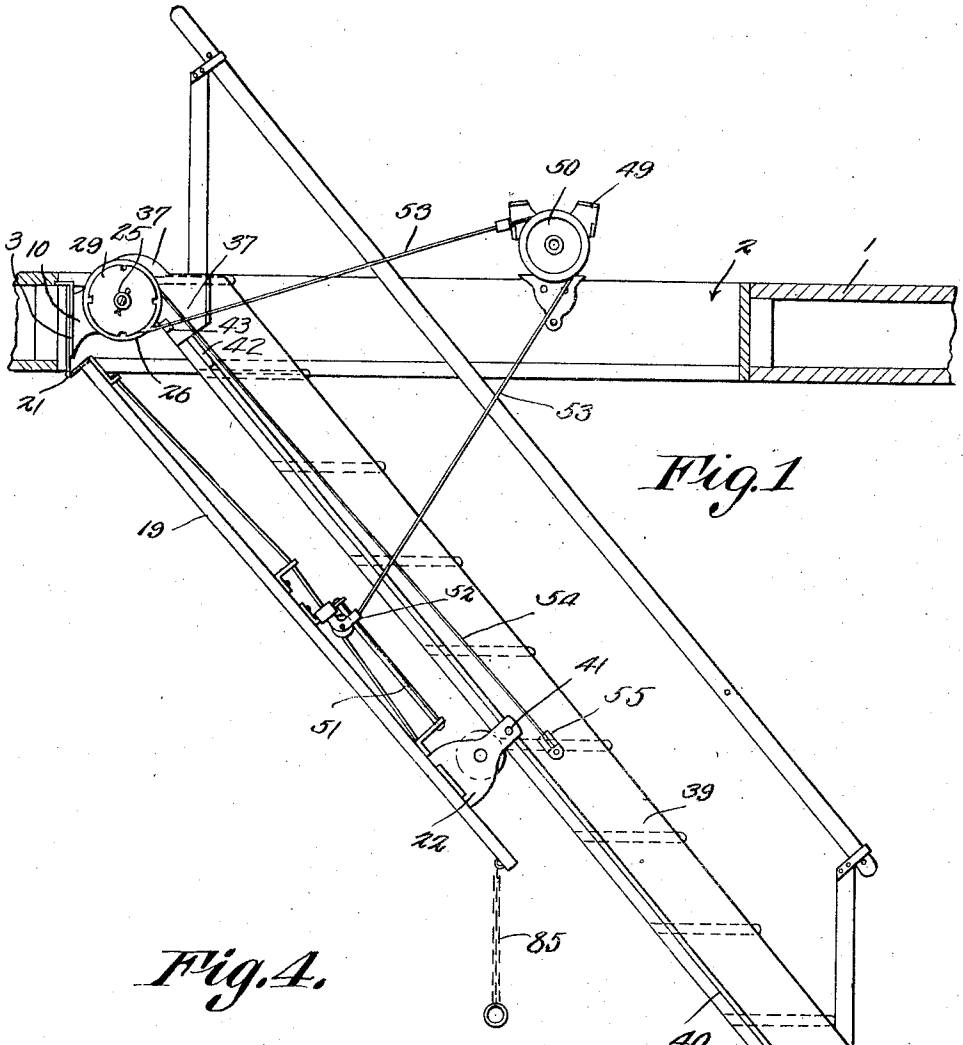



Fig. 1

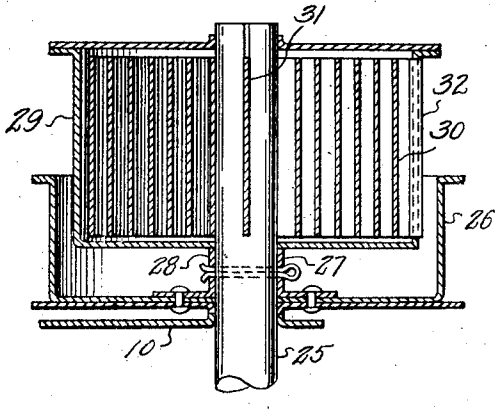



Fig. 4.

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Fig. 2.

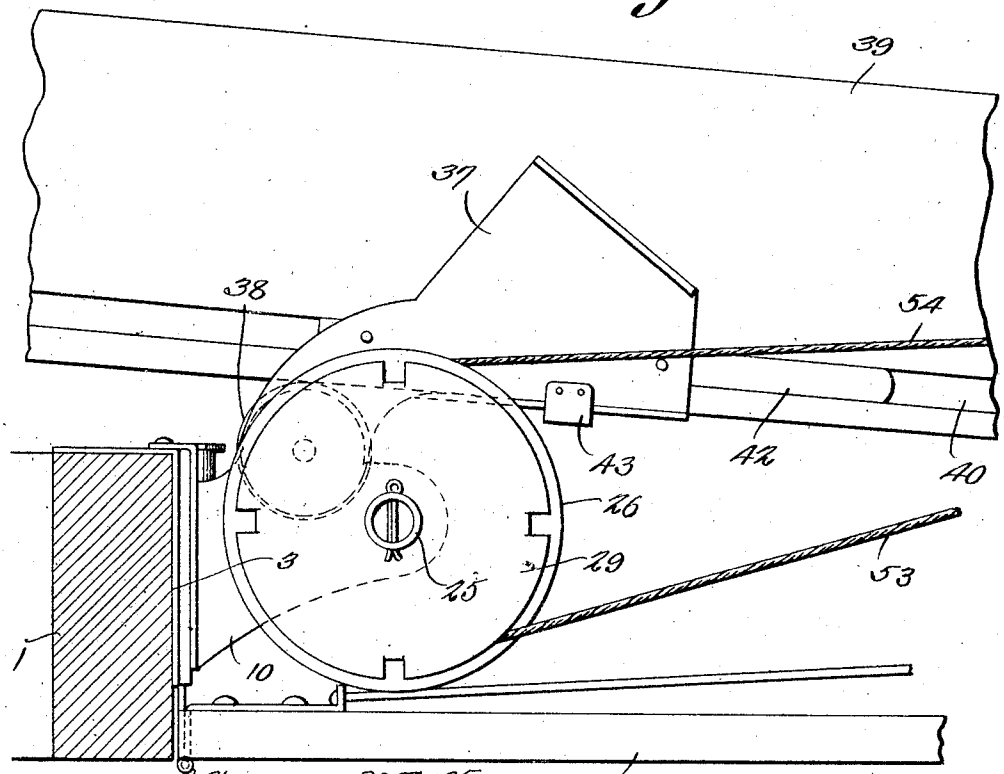
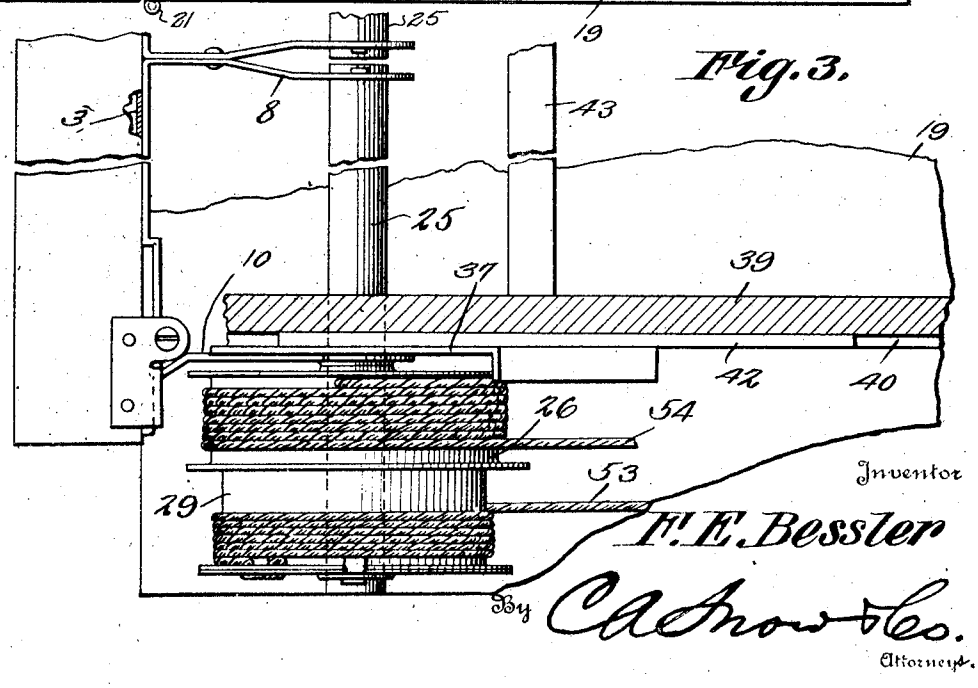



Fig. 3.




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Fig. 5.

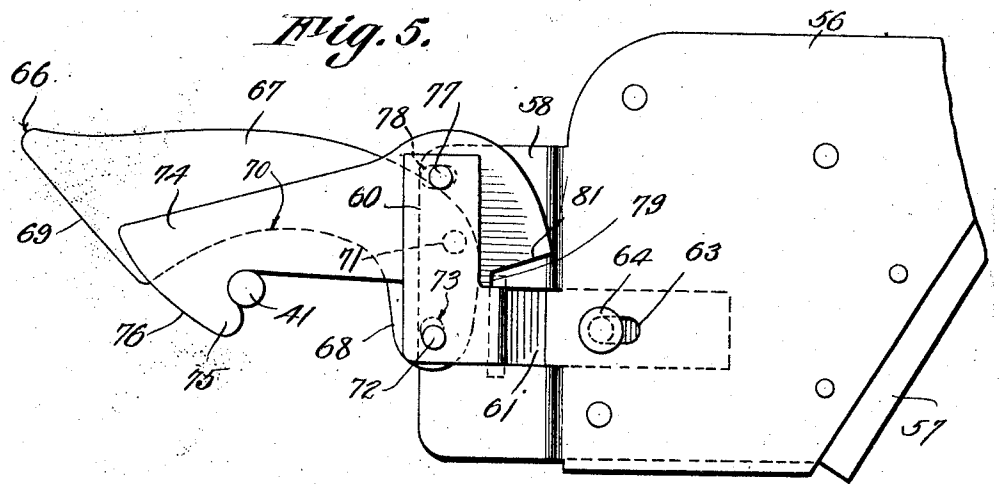
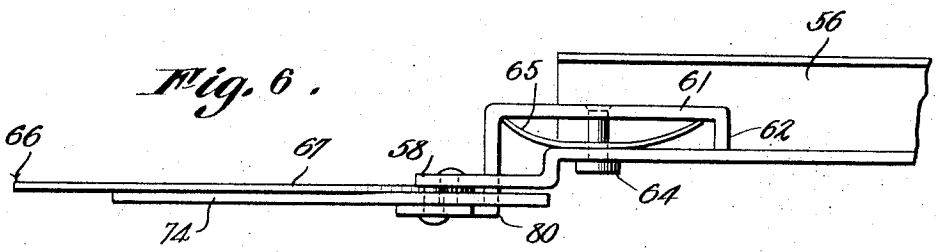



Fig. 6.



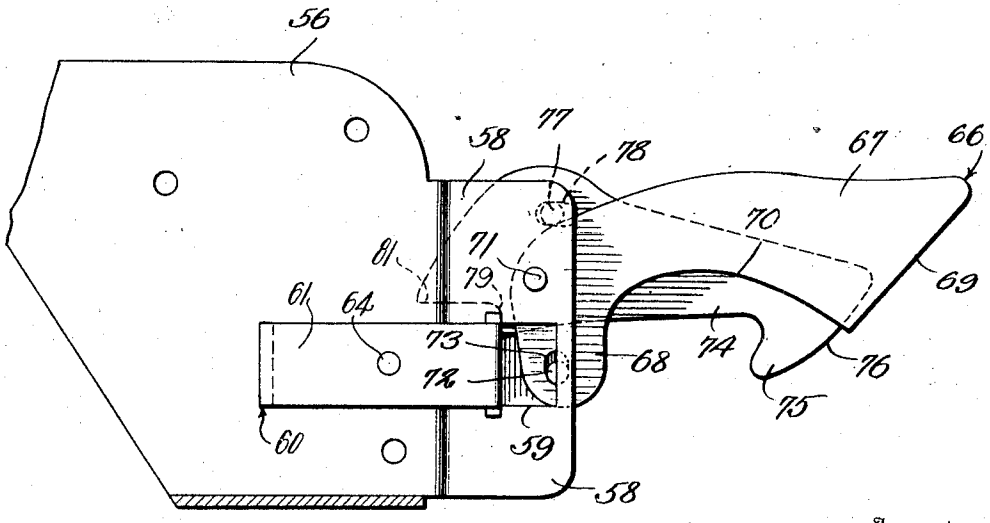




Fig. 7.

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# UNITED STATES PATENT OFFICE.

FRANK E. BESSLER, OF AKRON, OHIO.

## MOVABLE-STAIRWAY LATCH.

Application filed May 4, 1925. Serial No. 27,910.

The device shown in this application is of that general sort in which a stairway is mounted for reciprocation on a hinged panel, the panel being mounted to swing upwardly and downwardly with respect to a ceiling, and the present invention aims, particularly, to provide novel latch means for controlling the movement of the stairway on the panel, the latch means operating automatically and being applicable to other arts.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in elevation, a device provided with a latch which is constructed in accordance with the invention, the panel being swung downwardly, and the stairway being slid downwardly on the panel; Figure 2 is a fragmental elevation wherein the parts are shown as they will appear when the panel has been swung upwardly, and when the stairway has been retracted; Figure 3 is a fragmental plan showing a portion of the operating mechanism; Figure 4 is a sectional view showing a drum and attendant parts. Figure 5 is an elevation disclosing the latch mechanism; Figure 6 is a top plan of the latch mechanism; Figure 7 is an elevation wherein the opposite side of the latch mechanism from that depicted in Figure 5 appears.

The numeral 1 denotes a support or frame, which may be the ceiling of a room, the same having an opening 2. The numeral 3 designates a bracket secured to the frame 1, the bracket comprising a bifurcated bearing arm 8, and bearing arms 10.

The numeral 19 designates a panel mounted for vertical swinging movement, and hinged at 21 to the bracket 3. Standards 22 are mounted on the panel 19 near to the lower end thereof. Hollow shafts 25 are rotatable in the bearing arms 8 and 10. Drums 26 are provided and have hubs 27 receiving the shafts 25. The hubs 27 of the drums 26 are secured at 28 to the shafts 25. The drums 26 are hollow, and into the drums 26, other drums 29 project partially, the drums 29 abutting against the hubs 27 of the drums 26. The drums 29 are rotatable with respect to the shafts 25 whereon they are mounted. Coiled springs 30 are located within the drums 29. The outer ends of the coiled springs 30 are connected at 32 to the drums 29, the inner ends of the springs being connected, as shown at 31, to the shafts 25.

Brackets 37 are mounted to swing on the shafts 25. Wheels 38 are journaled on the brackets 37 and on the standards 22. The stiles of a stairway 39 are mounted to slide on the wheels 38. The stiles of the stairway 39 are supplied with longitudinal guide grooves 40. The standards 22 have keepers 41 which are received at their inner ends in the guide grooves 40. The parts 41 are called keepers, because they have a peculiar function in connection with the latch mechanism to be described hereinafter. The brackets 37 carry ribs 42 which are received slidably in the guide grooves 40 of the stairway 39. The brackets 37 are connected by a transverse tie 43 extended beneath the slidable stairway 39.

A standard 49 is mounted on the support or frame 1 and carries a pulley 50. There is a longitudinal track 51 on the panel 19, near to the lower end of the panel. A slide 52 is mounted for reciprocation on the track 51. A flexible element 53 is connected to the slide 52. The flexible element 53 is extended upwardly about the pulley 50 on the standard 49 and is wound about the drum 29. One end of a flexible element 54 is connected by an anchor 55 to the stairway 39. The flexible element 54 extends backwardly along the stairway 39 and is wound about the drum 26. The flexible elements 54 and 53, are wound, respectively, in opposite directions, about the drums 26 and 29. The structure described in this paragraph may be duplicated at each side of the panel 19.

On the lower end of one stile of the stairway 39 there is a casing or frame 56 which is shown in detail in Figures 5, 6 and 7 of the drawings, the casing carrying a buffer 57 which comes into play when the panel 19 is swung downwardly, and when the stairway 39 is slid downwardly on the panel, as shown in Figure 1. One side wall of the casing 56

has an offset wing 58 wherein an opening 59 is fashioned. The numeral 60 designates a slide having, as shown in Figure 6, a U-shaped arm 61, which extends inwardly through the opening 59, one end 62 of the arm 61 bearing on the inner surface of the casing 56. One part of the arm 61 forms a shoulder 80 which has functions which will be explained hereinafter. There is a slot 63 in the casing 56, wherein operates a rivet 64 or like projection, carried by the arm 61. A spring brake 65, of curved form, is carried in its intermediate portion on the projection 64, the curve of the spring 65 bearing against one side wall on the casing 56, and the ends of the spring bearing on the part 61 of the slide 60. The spring brake 65 operates to hold the slide 60 in any position to which it may have been moved, either to the right or to the left in Figure 6. The numeral 66 designates a bell crank lever comprising a long or first arm 67 and a short or second arm 68. The long arm 67 of the bell crank lever 66 has an inclined end edge 69 and an inclined lower edge 70 disposed at an angle to each other. The bell crank lever 66 is fulcrumed on a pin 71 carried by the wing 58 of the casing 56. There is a pivot element 72 on the slide 60, and this pivot element is received movably in an elongated slot 73 formed in the short arm 68 of the bell crank lever 66. The result of this construction is that when the bell crank lever 66 is swung upwardly or downwardly, reciprocating movement will be imparted to the slide 60, to the right or to the left in Figure 5. The numeral 74 designates a latch having a hook 75 and a beveled end 76. The latch 74 is mounted to swing on the pin 71 which forms a fulcrum for the bell crank lever 66. The slide 60 carries a pin or projection 77 received in a slot 78 formed in the latch 74. The latch 74 has angularly disposed edges 79 and 81. The edge 79 cooperates with the shoulder 80, hereinbefore alluded to, to limit the downward swinging movement of the hook end 75 of the latch 74, and the edge 81 cooperates with the upper end of the shoulder 80, to limit the upward swinging movement of the hook end 75 of the latch. These details will be understood readily when Figure 5 of the drawings is noted. It may be remarked at this point that the hook 75 of the latch 74 is adapted to cooperate with and engage the outer end of the keeper 41 carried by the standard 22 on the panel 19.

The general operation of a stairway of the class described is understood by those skilled in the art, but it may be stated that the panel 19 is swung downwardly, by any suitable means shown at 85, the stairway 39 being slid downwardly on the panel into the position shown in Figure 1. When the panel 19 is swung downwardly, the flexible element 53 is unrolled from the drum 29, the drum 29 rotates with respect to the shaft 25, and the spring 30 is put under increased tension. When the stairway 39 slides downwardly on the panel 19, the flexible element 54 rotates the drum 26 in an opposite direction to that in which the drum 29 was rotated, the shaft 25 being rotated accordingly, and further tension being put into the spring 30, because the inner end of the spring 30 is connected as indicated at 31 to the shaft 25. The result is that when the panel 19 is swung downwardly, and when the stairway 39 is slid downwardly, as shown in Figure 1, there is considerable tension in the spring 30, so that the spring will react, to aid in the upward swinging movement of the panel 19, by way of the flexible element 53, and to aid in the backward sliding movement of the stairway 39, by way of the flexible element 54, when the operator attempts to slide the stairway 39 backwardly and to swing the panel 19 upwardly.

Referring, now, to the operation of the latch mechanism shown in Figures 5, 6 and 7, let it be supposed that the parts are arranged as shown in Figure 5, the hook 75 of the latch 74 being engaged with the keeper 41, the panel 19 being swung upwardly from the position shown in Figure 1, and the stairway 39 being slid backwardly, the panel 19 being closed with respect to the opening 2 in the frame 1. Referring to Figure 5, suppose that the panel 19 has been swung downwardly somewhat, and that the stairway 39 has moved a little way to the left. What causes this movement to the left will be explained hereinafter, but let it be assumed at this place that the aforesaid movement to the left actually occurs. As the stairway 39 moves to the left, the short arm 68 of the bell crank lever 66 strikes the keeper 41 on the standard 22 of the stairway 39. The lower end of the short arm 68 of the bell crank lever 66 moves to the right in Figure 5, the long arm 67 of the bell crank lever swings downwardly, and the slide 60 is carried to the right, because the bell crank lever 66 is fulcrumed at 71 on the wing 58 of the casing 56, the lower end of the arm 68 of the bell crank lever being connected to the slide 60 by the element 72. When the slide 60 moves to the right in Figure 5, as above explained, it is held in the position to which it has been moved, due to the action of the spring brake 65. When the slide 60 moves to the right, the latch 74 is raised, and the hook 75 is carried upwardly out of the path of the keeper 41, because the pin 77 of the slide 60 is engaged in the slot 78 of the latch 74 above the point wherein the latch is fulcrumed on the pin 71. The stairway

39 can now slide to the right in Figures 1 and 5, that is, downwardly on the panel 19.

As the stairway 39 slides downwardly, the inclined edge 70 of the long arm 67 of the bell crank lever 66 slides over the keeper 41. This operation causes the long arm 67 of the bell crank lever to swing upwardly, and causes the short arm 68 of the bell crank lever to swing to the left in Figure 5, thereby moving the slide 60 to the left, because the short arm 68 of the bell crank lever is connected at 72 to the slide. When the slide 60 moves to the left in Figure 5, as above described, the pin 77 on the slide 60 is carried to the left in the slot 78 of the latch 74, thus permitting the hook end 75 of the latch to swing downwardly, the latch swinging on its pivotal mounting 71. The parts 66 and 67 are now in the condition of Figure 5, but the lower end of the stairway 39 has been drawn downwardly as in Figure 1, away from the keeper 41.

When the stairway 39 is pushed upwardly, the keeper 41 traverses the edge 76 of the latch, the latch 74 swinging upwardly and then dropping downwardly so that the hook 75 engages the keeper 41 to hold the stairway in the position to which it has been slid, upwardly and backwardly, on the panel. The latch 74 can swing, as aforesaid, to engage with the keeper 41, because the latch has the slot 78 which receives the pin 77, relative movement between the latch and the slide 60 thus being possible. If it happens that, accidentally or otherwise, the long arm 67 of the bell crank lever 66 has been swung downwardly from the position of Figures 1 and 5, before the stairway 39 has been slid backwardly on the panel 19, then the edge 69 of the long arm 67 of the bell crank lever 66 will first engage with the keeper 41 and restore the parts to the position of Figure 5, so that the latch 74 can engage with the keeper 41, as hereinbefore described, upon the upward and backward movement of the stairway 39. The general construction of the latch mechanism is such that it will hold the stairway 39 against downward sliding movement, after the stairway has been slid upwardly on the panel, the latch mechanism automatically releasing itself from the keeper 41 when the downward swinging movement of the panel 19 is begun.

It has been stated hereinbefore that the stairway 39 has a slight backward or upward movement, in order to enable the keeper 41 to engage the arm 68 of the bell crank lever 66, when the panel 19 is started downwardly. The way in which this movement is brought about, will now be explained.

Suppose that the panel 19 is closed, and that then the panel 19 is started downwardly. As soon as the panel 19 starts to swing downwardly, the flexible element 53, the drum 29, the spring 30, the shaft 25, the drum 26, and the flexible element 54 impart the very slight backward movement to the stairway 39 which is necessary to cause the short arm 68 of the bell crank lever 66 to engage the keeper 41, as hereinbefore explained. Recalling that the latch mechanism is practically full-sized in Figure 5, and comparing Figure 5 with Figure 1, it will be obvious that the backward movement of the stairway 39 is comparatively slight. The stairway 39 does not tend to slide downwardly and interfere with the operation above described, for the reason that the stairway is carefully balanced with respect to the hinged connection 21 which carries the panel 19, it being necessary, therefore, to swing the panel 19 downwardly, to a considerable degree, before the downward sliding movement of the stairway 39 begins.

Having thus described the invention, what is claimed is:—

1. In a device of the class described, a frame, a latch pivoted to the frame and having a hook, a bell crank lever fulcrumed on the frame and comprising first and second arms, the first arm having a longitudinal cam edge, a friction slide cooperating with the frame, a connection between the slide and the latch, a connection between the slide and the bell crank lever, a keeper and means for supporting the keeper for engagement with the hook, the second arm of the bell crank and the keeper being relatively movable in one direction to cause engagement between the keeper and the second arm of the bell crank lever, and being relatively movable in an opposite direction to cause engagement between the longitudinal cam edge and the keeper.

2. A device of the class described, constructed as set forth in claim 1, and further characterized by the fact that the first-specified connection is a lost-motion connection, the latch having an inclined end edge wherewith the keeper engages when relative movement in the first-specified direction takes place, with the keeper external to the hook.

3. A device of the class described, constructed as set forth in claim 1, and further characterized by the fact that the first arm of the bell crank lever has an inclined end edge wherewith the keeper engages when relative movement in the first-specified direction takes place, with the keeper external to the hook.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

FRANK E. BESSLER.