Nov. 28, 1933. F. E. BESSLER 1,936,929

DISAPPEARING STAIRWAY

Filed April 4, 1929 2 Sheets-Sheet 1

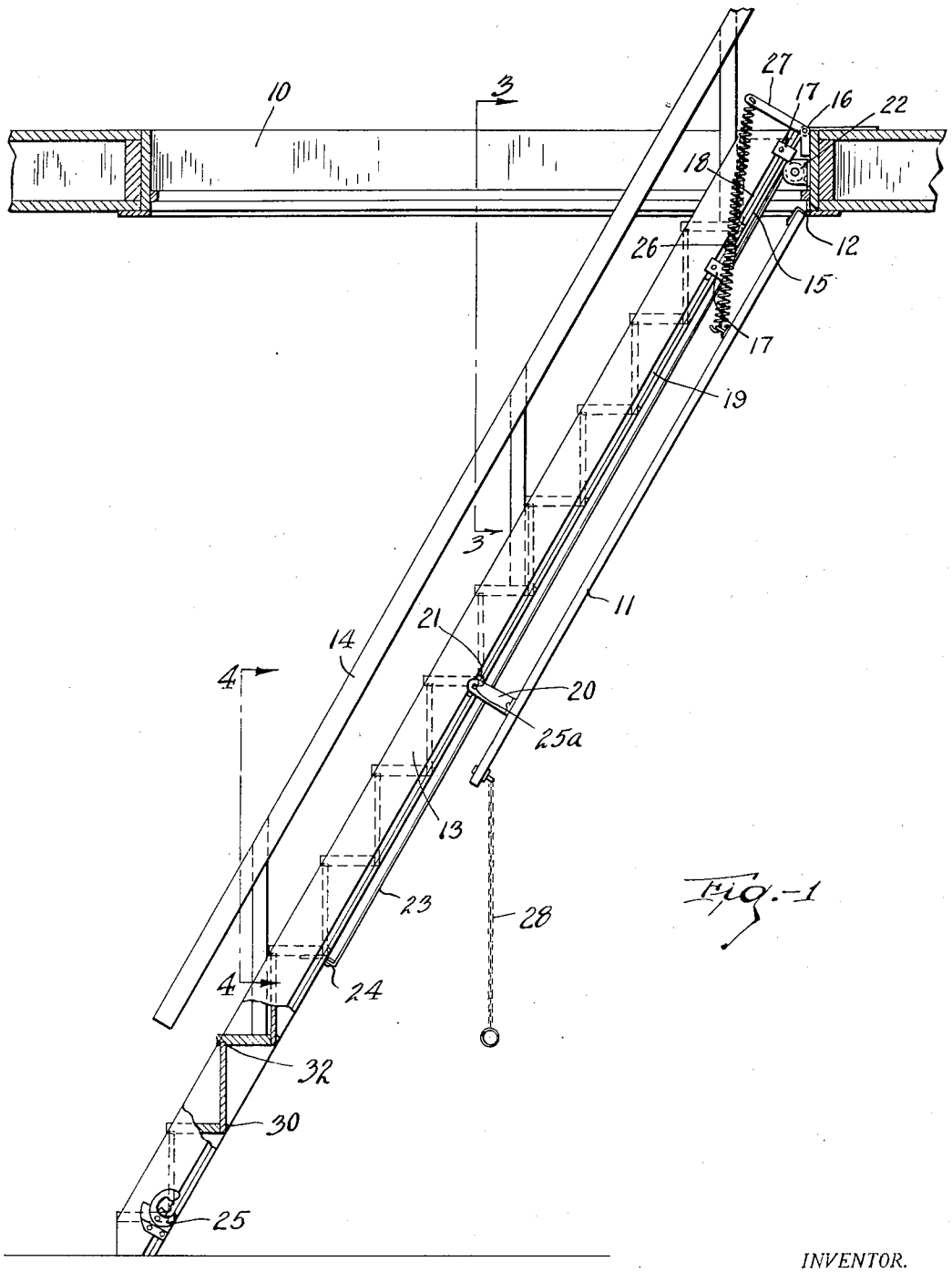


Fig.-1

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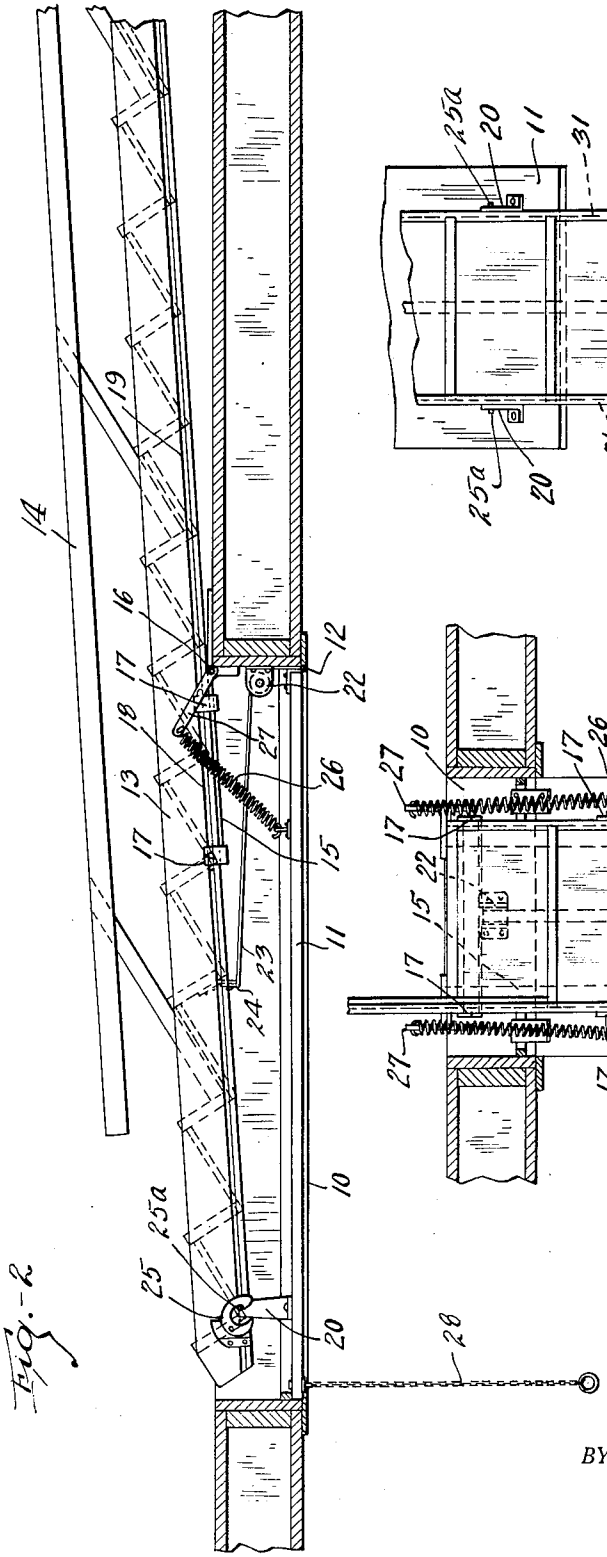


Fig. 2

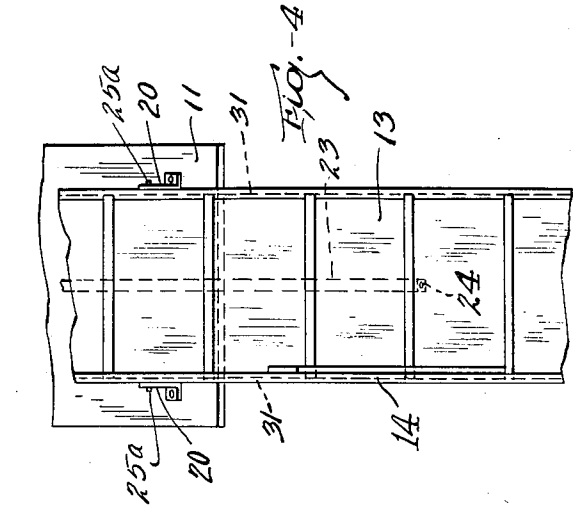


Fig. 4

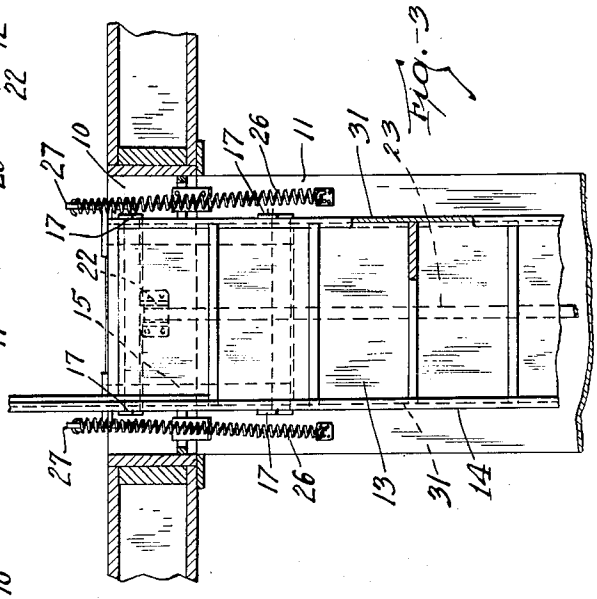


Fig. 3

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Patented Nov. 28, 1933 1,936,929

UNITED STATES PATENT OFFICE

1,936,929

DISAPPEARING STAIRWAY

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Application April 4, 1929. Serial No. 352,555

2 Claims. (Cl. 228—50)

This invention relates to disappearing stairways for cooperation with a ceiling opening between floors or the upper floor and a roof of a building.

The general purpose of the invention is to provide an economical stairway construction which is substantially self-balancing whereby a minimum of operating and control devices are required and yet which can be installed in any building regardless of the usual variations in floor to floor dimensions without affecting the required ceiling opening for providing effective head room and which will be easily and safely operable.

A further purpose of the invention is to provide a stair structure of this type which will not be subject to swaying and can be safely used as an ordinary fixed stairway.

The foregoing and other purposes of the invention are attained in the stairway installation illustrated in the accompanying drawings and described below. It is to be understood that the invention is not limited to the specific form thereof shown and described.

Of the accompanying drawings,

Figure 1 is a side elevation, partly in section, of a stairway installation embodying the invention, the stairway being in its position of use;

Figure 2 is a similar view showing the stairway in its disappeared position;

Figure 3 is a front elevation of the stairway on line 3—3 of Figure 1; and

Figure 4 is a front elevation thereon on line 4—4 of Figure 1.

Referring to the drawings, the numeral 10 designates a ceiling opening between lower and upper floors of a building with which a panel 11 is adapted to cooperate to close the same, panel 11 being hinged at one end of said opening at 12.

A stair structure 13 which may be provided with a handrail 14 is slidably and pivotally mounted at the end of opening 10 above the panel hinges as by providing an arm structure 15 pivoted at 16 on the upper edge of the opening 10 and securing fittings 17, 17 on said arm on which are mounted blocks 18, 18 engaged in grooves 19 in the outer sides of the stairway stringers. The stairway 13 is also slidably mounted on brackets 20 adjacent the free end of the panel, swiveled blocks 21 on said brackets engaging in grooves 19 to slidably mount the stair structure and permit the slight relative angular movement of the stairway and panel due to their swinging about their respective pivots in operating the stairway.

The star structure accordingly is slidable between a retracted position on the panel 11 (Figure 2), permitting opening and closing of said panel, and an extended position in which it reaches the lower floor when the panel 11 is open (Figure 1). In order to counterbalance the stair structure when extended, a spring drum 22, which may be of the type indicated by numeral 29 in Bessler Patent No. 1,636,280, granted July 19, 1927, is mounted adjacent the pivot 16 for the stairway supporting arm 15 and the hinges 12, it being shown herein mounted on the end of the opening 10 between the pivot 16 and the hinges 12, preferably centrally of said end, and a flexible element wound on the spring drum, such as a tape 23, is connected at its free end to the stair structure as indicated at 24.

As a safety measure, one or more latches 25 of a suitable design are arranged on the lower end of the stair structure to latch it in its retracted position on the panel to the bracket 20 in engagement with pin 25^a.

It will be observed that the weight of the upper portion of the stair structure 13 which extends beyond pivot 16 when the stairway is retracted counterbalances the weights of the lower portion of the stair structure, the arm 15 and the panel. Whether or not it completely counterbalances such parts depends upon the required length of the opening 10, and consequently the panel 11, as compared with the required length of stair structure to reach from floor to floor when extended in a particular installation. In order that the stairway will operate properly under all conditions, therefore, it is preferred to utilize means such as coil springs 26, 26 tensioned between suitable supports, such as arms 27, 27 on the upper edge of the opening 10 and the panel 11, arms 27 preferably reaching out over opening 10 as shown to obtain a desirable mechanical advantage in the application of the tension forces of the spring to the panel to insure that the panel will shut and carry the stair structure up with it when the stairway is retracted onto the panel.

To operate the stairway to its extended position (Figure 1) a chain 28 which may be suspended from the free end of the panel 11 is pulled downwardly, the latch 25 released and the stair structure pulled down to the lower floor. To disappear the stairway, the stair structure is pushed up onto the panel, the spring drum 22 relieving the operator of most of the weight thereof and it automatically latches in its retracted position. The weight of the upper portion of the stairway plus the force of the springs 26 where required is sufficient to pull the panel

11 shut, swinging the stairway up into the ceiling opening with it. The installation, of course, is so counterpoised that this action will be positive and yet not so forcible as to slam the panel. The weight of the stairway when being operated is carried by the upper floor whereby the stairway is more easily operable than balanced stairways heretofore used and the panel hinges are not required to carry the weight of the stairway.

It has been found that the stairways of this type as previously employed have a tendency to sway when in use which causes persons to be somewhat timid in using the stairway and may cause someone to lose his balance. It is also true that stairways with "open" treads are somewhat dangerous and have other undesirable features. It has been found that by securing a riser to each lower tread as by screwing it to the back edge thereof at 30 and rabbeting or otherwise interlocking it with or securing it to the stringers as at 31 (Figure 3) and also rabbeting it into or otherwise securing it to an upper tread as at 32 a strong, non-swaying stair structure is provided in which the disadvantages of "open" treads are also overcome.

It will be apparent from the foregoing that a simple, inexpensive and strong disappearing stairway construction has been provided by the invention. Obviously modifications thereof may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:—

1. A disappearing stairway comprising means providing a frame for a ceiling opening between floors of a building, a closure panel hinged at the lower part of one end of said frame, stairway supporting means hinged at said end of the frame above the panel, a support for the stairway toward the free end of the panel, a stairway structure slidably mounted upon said hinged support and slidably mounted upon the support on the panel whereby the stairway is movable between extended positions and retracted positions on the panel and in the latter position is capable of swinging with the panel in cooperation with said ceiling opening, bracket means on said end of the frame at each side of the stair structure and extending outwardly over the opening toward the other end thereof, springs attached to the outer ends of said brackets and to the panel at each side of the stair structure, a spring drum mounted on said frame beneath the stairway support thereon and centrally of said end of the frame, and a flexible element extending from said spring drum and attached to the stairway, said springs counter-balancing the weight of the stairway and panel when the stairway is retracted to hold the panel shut and said spring drum counter-balancing the weight of the stairway when the panel is swung downwardly, the yielding action of the springs and spring drum being independent of each other.

2. A disappearing stairway comprising means providing a frame for a ceiling opening between floors of a building, a closure panel hinged at the lower part of one end of said frame, stairway supporting means hinged at said end of the frame above the panel, a support for the stairway toward the free end of the panel, a stairway structure slidably mounted upon said hinged support and slidably mounted upon the support on the panel whereby the stairway is movable between extended positions and retracted positions on the panel and in the latter position is capable of swinging with the panel in cooperation with said ceiling opening, tension spring yielding means extending between upper side margins of the panel and said end of the frame so as not to extend substantially above the stair structure at the sides thereof into the space between the extended stair structure and the opposite end of said frame and tending to urge the panel shut, spring drum yielding means located beneath the stair structure tending to hold the stair structure retracted on the panel, the two yielding means being independent of each other, the former counter-balancing the weight of the panel and stair structure in the swinging movement thereof when the stair structure is retracted on the panel and the latter counter-balancing the weight of the stair structure in its lengthwise movement when being extended and retracted.

FRANK E. BESSLER.