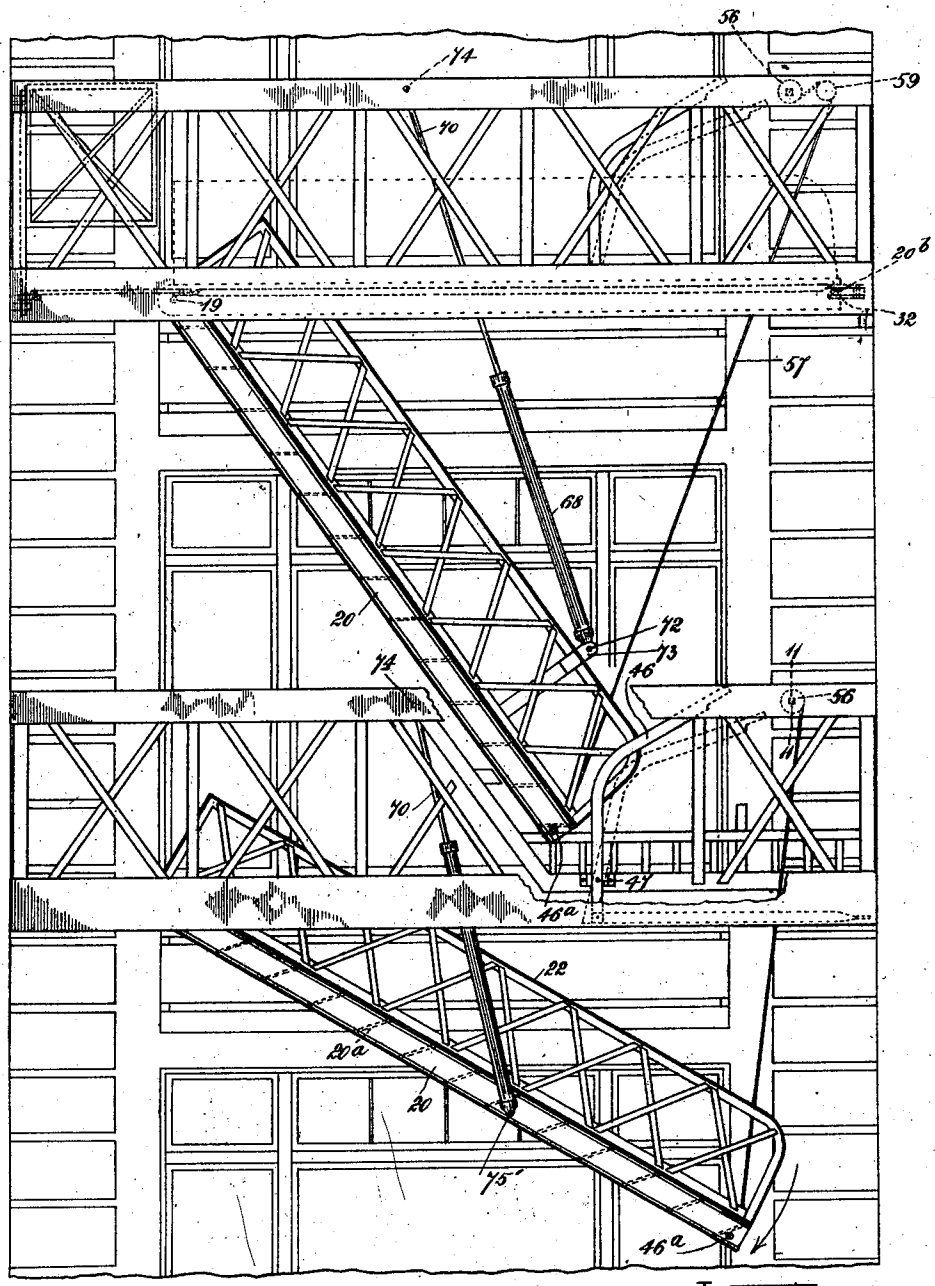
May 22, 1923. 1,455,928

C. F. MORRILL

FIRE ESCAPE

Filed April 19, 1918. 3 Sheets-Sheet 1

Fig 1



Inventor
Charles F. Morrill
by Wright Brown Quinby & May
Attys.

May 22, 1923. 1,455,928

C. F. MORRILL

FIRE ESCAPE

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Fig. 2.

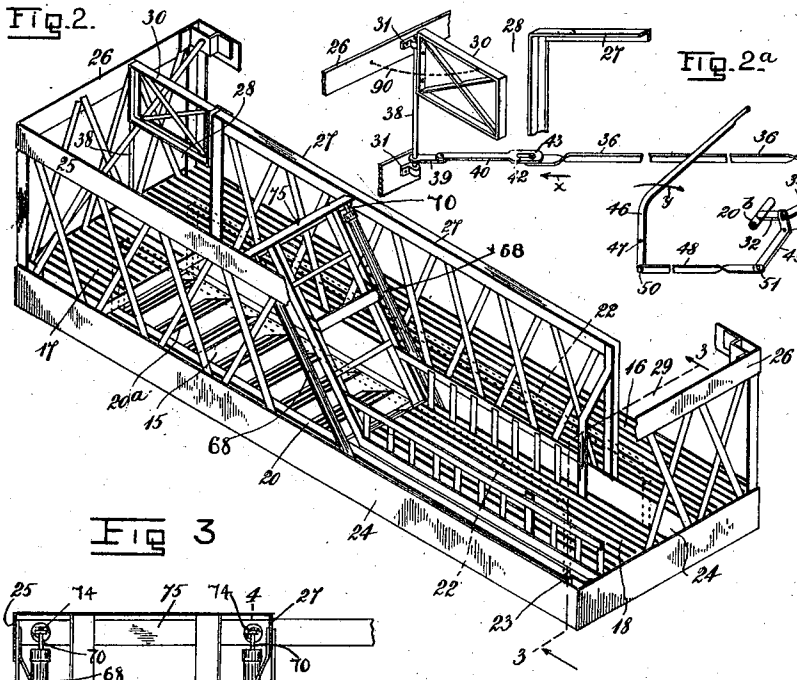


Fig. 2a

Fig. 3

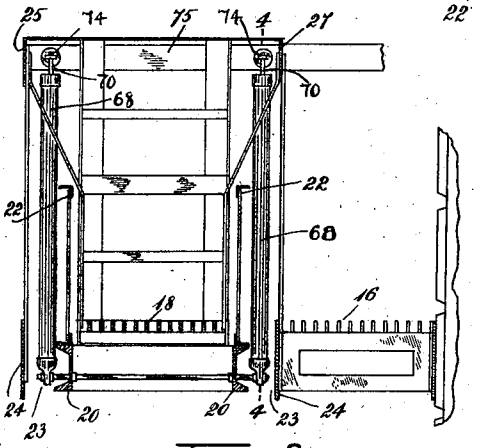


Fig. 4.

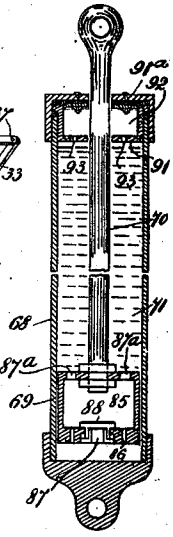


Fig. 5

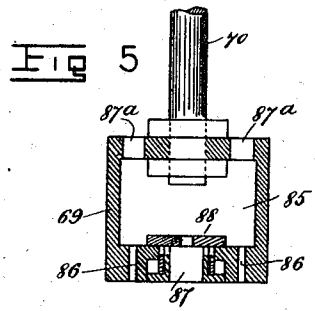


Fig. 6

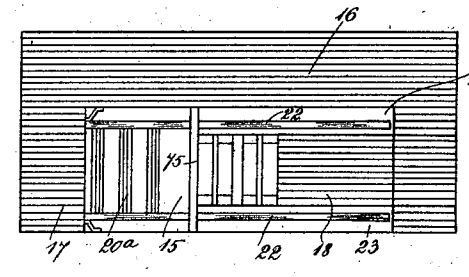
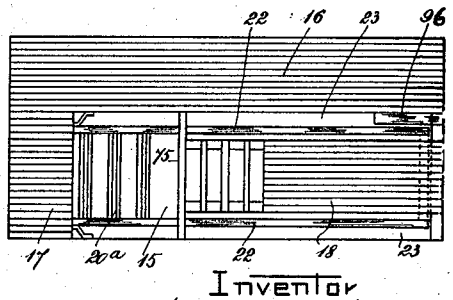


Fig. 7



Inventor

Charles F. Morrill

by Wright Brown Quinby & May

Attys

May 22, 1923. 1,455,928

C. F. MORRILL

FIRE ESCAPE

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Fig 8

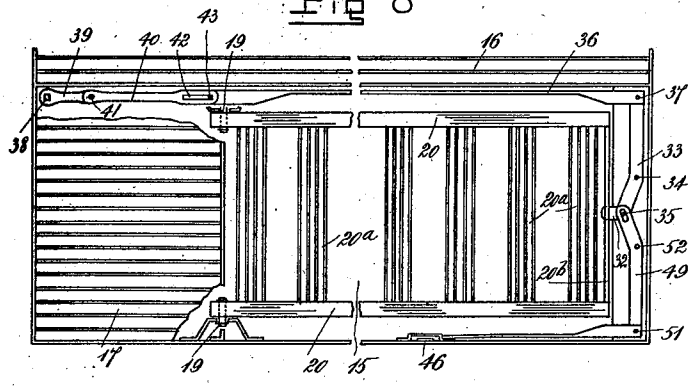


Fig 9

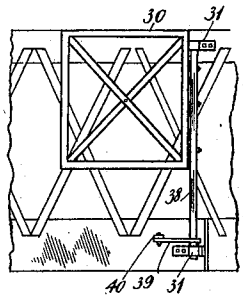


Fig 10

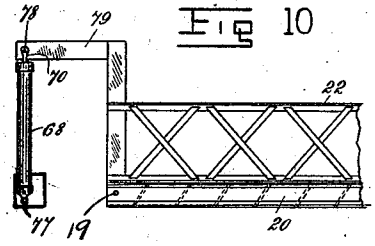


Fig 11

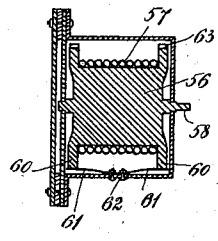


Fig 12

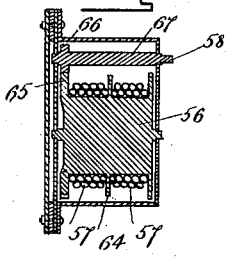


Fig 13

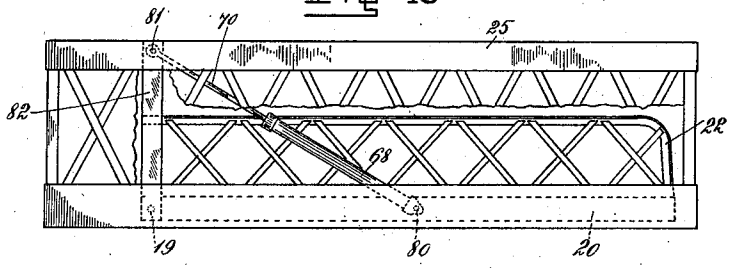
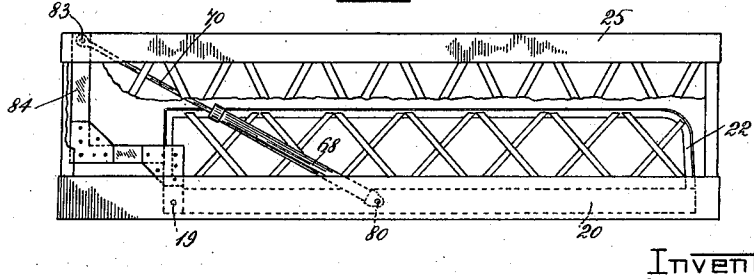


Fig 14



Inventor
Charles F. Morrill
by Wright Brown Quinby & May
Attys.

Patented May 22, 1923. 1,455,928

UNITED STATES PATENT OFFICE.

CHARLES F. MORRILL, OF BOSTON, MASSACHUSETTS.

FIRE ESCAPE.

Application filed April 19, 1918. Serial No. 229,546.

To all whom it may concern:

Be it known that I, CHARLES F. MORRILL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Fire Escapes, of which the following is a specification.

This invention relates to a fire escape comprising a vertical series or tier of horizontal balconies projecting from a building, and accessible through windows or other openings in the building wall, and stairways hinged to the balconies in suitable relation to openings constituting passageways through the balcony floors, the organization being such that the stairways, when not required for use, are arranged horizontally in, or slightly under, the balcony floors, and releasably confined, so that their swinging ends may be liberated to permit each stairway to swing downward, to permit persons to pass from a balcony to another below it, and from the lowest balcony to the pavement.

Among the chief objects of the invention are the following:

First, to provide a stairway having rigid upstanding hand rails at its opposite longitudinal edges extending substantially the entire length of the stairway.

Second, to enable a portion of the balcony floor to serve as a landing at the foot of a stairway hinged to the next upper balcony, and to receive portions of the fixed hand rails of the accompanying stairway when the latter is raised, a portion of the stairway being overlapped by said landing, and portions of the hand rails projecting through slots in the landing, when the stairway is raised, so that the hand rails are suitably housed, and the inner one of said hand rails is adapted to serve as a barrier to prevent passage between said landing and an adjacent portion of the balcony floor.

Third, to provide means for releasably securing the stairway in its raised position including a swinging gate controlling access to the head of the stairway, and acting, when opened by a person passing to the stairway, to release the stairway and permit its descent.

Fourth, to provide means operable by the descent of a stairway to automatically release the next lower stairway.

Fifth, to provide improved means for retarding the descent of the stairway, and sixth, to provide improved stairway-raising means adapted to give an audible signal when the stairway is descending, for the purpose of warning persons below the stairway.

To these and other related ends the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification,—

Figure 1 is a side elevation of a portion of a building equipped with a fire escape embodying the invention, two balconies being shown, the stairway of one balcony being fully lowered, and the stairway of the other balcony partly lowered.

Figure 2 is a perspective view including one balcony and the stairway hinged thereto.

Figure 2ª is a fragmentary perspective view, illustrating the means for releasably supporting a stairway in its raised position, and for retracting the supporting means to release the stairway.

Figure 3 is a section on the plane indicated by the line 3—3 of Figure 2, and an elevation of parts at the left of said line.

Figure 4 is a section on line 4—4 of Figure 3.

Figure 5 is an enlargement of a portion of Figure 4.

Figures 6 and 7 are somewhat conventional top plan views, including a balcony and a stairway hinged thereto, various details shown by Figure 2, being omitted.

Figure 8 is a top plan view of a balcony and a hinged stairway, the body of the gate and certain other parts being omitted.

Figure 9 is a fragmentary elevation looking toward the inner side of one of the end guard rails of the balcony, and showing the gate opened.

Figure 10 is a fragmentary elevation showing portions of the balcony, the stairway, and a modification of the retarding means shown by Figures 1, 2 and 3.

Figure 11 is a section on line 11—11 of Figure 1.

Figure 12 is a view similar to Figure 11, showing a modification.

Figures 13 and 14 are views similar to Figure 10, showing other modifications of the retarding means.

The same reference characters indicate the same parts in all of the figures.

My invention is preferably embodied in a balcony which is one of a vertical series or tier attached to the side of a building, and

has a horizontal floor in which is formed a relatively large opening 15, constituting a passageway through the floor. I prefer to subdivide the floor into three landings, all on the same level, and including an elongated landing 16 adjoining the building and extending the entire length of the balcony, a relatively short landing 17 at one end of the opening 15, and a longer landing 18 at the opposite end of said opening. These landings may be grids, composed of metal bars, or they may be of any other suitable construction.

To suitable fixed parts of the balcony I connect by hinge or pivot members 19 a stairway, which may consist of longitudinal side members or stringers 20 and treads 20^a, the hinge members being at the end of the opening adjacent to the platform 17.

I call the elongated landing 16 the reception landing, because persons using the fire escape step from the building first upon this landing. The landing 17 is at the head of the stairway, and is called, therefore, the stair-head landing, from which persons pass to the stairway. The landing 18 is at the foot of a stairway lowered from the balcony next above, and is called, therefore, the stair-foot landing, persons descending the last-mentioned stairway passing onto the landing 18. The length of the stairway is such that when the stairway is raised, a considerable portion of it projects under the landing 18. The reception landing extends from the stair-foot landing to the stair-head landing.

To provide for the safety of the users, I provide the stairway with rigid upstanding hand rails 22, which are fixed preferably to the stringers 20, and extend the entire length of the stairway. (To avoid confusion, I show the hand rails by dotted lines in Figure 2). The portion of the balcony which includes the landing 18, is provided with narrow elongated longitudinal slots 23, shown somewhat conventionally by Figures 6 and 7, these slots communicating with the opening 15, and being preferably formed between the longitudinal edges of the landing 18 and the longitudinal bars or chords 24 forming parts of the balcony structure. (See Figures 2 and 3).

When the stairway is raised, considerable portions of the hand rails enter the slots 23 and project above the landing 18.

It will be seen that the slots 23 permit the employment of rigid hand rails on the stairway, and at the same time permit the employment of a stair-foot landing 18, of suitable length and capacity.

One of said hand rails serves, as hereinafter described, as a barrier between the reception landing 16 and the stair-foot landing 18, when the stairway is raised. The balcony, which is provided with the usual outside guard rails 25, and end guard rails 26, is provided with a relatively short guard rail or fixed barrier 27, at the outer edge of the reception landing 16. The ends of said barrier are separated from the end guard rails 26, by transverse passageways 28 and 29 (Figure 2). The passageway 28 connects one end of the reception landing 16 with the stair-head landing 17, and the passageway 29 connects the opposite end of the reception landing with the stair-foot landing 18.

A swinging gate 30 (see Figure 2^a), hinged at 31, to the balcony, controls access to the head landing 17, and constitutes an element of means for releasing the swinging end of the stairway.

32 (Figures 2^a and 8) represents a movable bolt or detent, supported by the balcony and adapted to engage a member, such as a cross-bar 20^b, on the swinging end portion of the stairway, and support the stairway in its raised position. Connections are provided between the detent and the gate 30, whereby the detent is retracted and caused to release the stairway when the gate is opened, said connections extending horizontally along the reception landing 16. Figures 2^a, 8 and 9 show a suitable embodiment of connections for this purpose, said connections including a horizontal two-armed lever 33 fulcrumed at 34 on the balcony, one arm of said lever being connected, as by a pin 35, with the detent, an elongated rod 36, one end of which is pivoted at 37 to the other arm of said lever, an upright rock-shaft 38 forming a part of the gate and coaxial therewith, an arm 39 attached to said rockshaft, and a link 40, one end of which is pivoted at 41 to the arm 39, the other end of said link having a slot 42 which receives a pin 43 on the rod 36. The gate 30 normally obstructs the passage 28, so that a person passing from the landing 16 to the landing 17 must open the gate. This movement of the gate causes the retraction of the detent 32 through the described connections, so that the stairway is released and swings downward to a position permitting a person on the landing 17 to descend by the stairway through the opening 15 in the balcony floor, to the balcony next below, or to the ground, if the balcony is the lower one of the series. The location of the detent 32 at the swinging end of the stairway enables the detent to be freely withdrawn from its supporting position by the opening of the gate, the downward pressure of the stairway on the detent being much less than would be the case if the detent were located relatively near the axis of the stairway.

Until the stairway is released and lowered, the stairway hand rails 22 project through the slots 23 and above the balcony floor. The inner hand rail extends across a

considerable portion of the passageway 29, as indicated by Figure 2, and therefore acts as a barrier to prevent a person on the reception landing from passing therefrom onto the landing 18. In other words, the inner hand rail indicates to a person, who has emerged from the building onto the reception landing, that his proper course is not through the passageway 29, but is through the passageway 28, where the gate 30 is located. To make plain the proper course or direction to be taken by a person on the landing 16, I may so arrange the gate 30 that when in the normal position occupied when the detent 32 is operative, the gate is somewhat ajar, or partly open, as indicated by Figure 2ª. The person, therefore, naturally walks toward the passageway 28, and in passing through the latter, fully opens the gate and causes the retraction of the detent, the gate when in its normal position, serving as a direction indicator.

To enable the detent 32 on any balcony to be retracted by the descent of the stairway hinged to the balcony next above, I provide an upright two-armed operating lever 46 which is fulcrumed at 47 to a fixed support on the balcony, and has a curved upwardly projecting upper arm normally standing in the path of a stairway swinging downward from an upper balcony, and a shorter downwardly projecting lower arm connected with the detent 32, the arrangement being such that when the upper arm of the operating lever 46 is struck by a pin 46ª on a descending stairway, the lever is moved from the full line to the dotted line position shown by Figure 1, and is thus caused to retract the detent and release the raised stairway on the balcony below the descending stairway.

As here shown, the shorter arm of the operating lever 46 is connected with the detent 32 by a rod 48 pivoted at 50 to said shorter arm, and a horizontal two-armed lever 49 similar to the lever 33, and fulcrumed at 52 to the balcony, one arm of the lever 49 being pivoted at 51 to the rod 48, and the other arm connected with the detent by the pin 35.

The operating lever 46 is relatively near the detent 32, and may be manually moved to project the detent into stairway-confining position.

The stairway may be raised to its concealed horizontal position by means of a drum 56, journaled in fixed supports on the balcony and above the balcony floor, and a cable 57, attached at one end to the drum, and at the other end to the swinging-end portion of the stairway. The drum may be manually rotated by means of a key or crank, engaged with a squared trunnion 58 attached to the drum. The cable may pass to the drum over a loose sheave 59, as shown at the upper portion of Figure 1, or directly to the drum, as shown at the lower portion of said figure.

To enable the drum to serve as a member of an alarm, adapted to give an audible signal when the stairway is descending, and thus warn persons under the stairway, I provide an alarm which is preferably a rattle, including an annular flange 60 (Figure 11) on the drum, having a toothed or corrugated periphery, and a resilient member 61, attached at 62 to a fixed support, which may be the housing of the drum and attached to cooperate with the flange 60 in producing a rapid succession of clicking sounds, the flange 60 being provided with teeth or corrugations 63, as shown at the upper portion of Figure 11. The alarm preferably includes two members 60, and two members 61. The connection of the cable 57 to the swinging end of the stairway ensures a protracted rotation of the drum, and a protracted alarm when the stairway is descending.

If desired, two cables 57 may be employed, as indicated by Figure 12, the portions of the cables coiled on the drum being separated by a flange 64 on the drum.

Figure 12 shows the drum provided with a flange 65, the perimeter of which is provided with gear teeth engaging the teeth of a small gear or pinion 66 attached to a shaft 67, journaled in the drum housing, and provided with a squared end 58, to engage an operating key.

To retard the downward movement of the stairway, I provide retarding means, including as elements a cylinder 68 (Figure 4), a piston 69 therein, a rod 70 attached to the piston, and a charge of liquid 71 in the cylinder, said charge being slowly transferable from side to side of the piston. The cylinder, piston, and piston-rod constitute a telescopic structure, one end of which is pivotally connected to the stairway, and the other to a fixed part of the balcony, said structure being elongated by a downward movement of the stairway and the liquid charge being operative; during such elongation to retard the downward movement.

In the embodiment of the invention shown by the upper portion of Figure 1, the lower end of the cylinder 68 is pivoted at 72 to a bracket or ear 73 attached to the stairway and projecting above the hand rails thereof, the piston-rod 70 being pivoted at 74 to a fixed support, such as a cross-bar 75 on the balcony. As shown at the lower portion of Figure 1, and by Figures 2 and 3, the piston is pivoted at 75′ to the base portion of the stairway, the piston-rod 70 being pivoted at 74, as above described.

In the embodiment of the invention shown by Figure 10, the cylinder 68 is pivoted at 77 to a fixed support on the balcony, and the

piston-rod is pivoted at 78 to an arm 79 attached to, and movable with, the stairway.

In the embodiment of the invention shown by Figure 13, the cylinder 68 is jointed at 80 to a fixed support on the balcony to swing in the directions required by the swinging movements of the stairway, and the piston-rod 70 is pivoted at 81 to an arm 82 attached to the stairway.

In the embodiment of the invention shown by Figure 14, the cylinder is pivoted at 80 to the balcony, and the piston-rod is pivoted at 83 to an arm 84 attached to the stairway.

In each embodiment of the invention, the cylinder and piston-rod are permitted to swing freely to conform to movements of the stairway. As shown by Figure 4, the piston 69 is hollow and has a chamber 85, the portions of the piston forming ends of said chamber being provided with relatively small orifices 86, permitting a slow movement of liquid charge 71 through the piston. One end of the piston is provided with a relatively large orifice 87, having a check-valve 88 adapted to be opened by liquid pressure, to permit the liquid to pass rapidly through the orifice 87 in one direction, and to be closed to prevent the passage of liquid in the opposite direction. When the stairway is in its raised position, the piston is at one end of the cylinder, as indicated by Figure 4. A downward movement of the stairway causes a relative movement of the cylinder and piston, and a retarded movement of the liquid through the passages 86, so that the downward movement is suitably retarded. When the stairway is rising, the valve 88 opens and permits a rapid passage of liquid in the opposite direction, so that the upward movement of the stairway is practically unopposed, the liquid passing through relatively large orifices 87^a from the chamber 85.

At one end of the cylinder 68 is an outer head 91^a and an inner head 91, said heads being spaced apart and forming a chamber 92. The inner head is provided with small orifices 93. In case the charge of liquid is reduced by evaporation, or otherwise, so that it does not entirely fill the cylinder to the head 91^a, the chamber 92 receives liquid slowly through the orifices 93 at the commencement of the downward movement of the stairway, so that a quick, downward starting movement is prevented.

I prefer to employ as the liquid charge a body of oil, chemically treated to prevent it from becoming viscous by evaporation, and from having its fluidity decreased objectionably by a low temperature. The liquid charge is practically incompressible, so that it does not act like compressed air, as an elastic cushion, but causes the stairway to descend at a slow and unchanging rate, without fluctuations.

A suitable stop such as a flexible tether 90, may be employed to prevent the gate from swinging to position to fully close the passageway 28, as shown by Figure 2^a. As shown by Figure 7, the balcony floor may be provided with rigid plate 96, projecting into the inner slot 23, and constituting a threshhold on which persons passing through the passageway 29 may step.

The object of the slot 42 in the link 40, is to permit the displacement of the operating or releasing lever 46 by a descending stairway and the retraction of the detent 32 thereby, without strain on or injury to the connections between the detent 32 and the gate 30, said slot permitting movement of the rod 36 in the direction of the arrow x (Figure 2^a) without moving the gate, when the lever 46 is moved by a descending stairway in the direction of the arrow y.

It will now be seen that the opening of a gate 30 on any balcony, causes the release of the stairway on that balcony and of the stairways on the lower balconies, the stairways after the first being successively and automatically released.

I claim:

1. A fire escape comprising a balcony having a relatively large opening constituting a passageway through the balcony floor, said floor including a stair-foot landing located at one end of said opening and provded with spaced apart narrow elongated slots, and a stairway hinged to the balcony at one end of said opening, and provided with fixed upstanding hand rails, adapted to enter said slots when the stairway is raised, the stairway being elongated so that, when raised, one end portion projects under said landing, portions of its hand rails projecting through said slots.

2. A fire escape comprising a balcony having a relatively large opening constituting a passageway through the balcony floor, said floor including a stair-foot landing located at one end of said opening, provided with spaced apart narrow longitudinal slots, a stair-head landing at the opposite end of said opening, and a reception landing forming the inner portion of the floor, the balcony being provided with a longitudinal barrier at the outer edge of the reception landing, and with transverse passages at opposite ends of said barrier, connecting the reception landing with said foot and head landings, and a stairway hinged to the balcony at one end of said opening, and provided with fixed upstanding hand rails adapted to enter said slots when the stairway is raised, one of said rails obstructing the transverse passage communicating with the stair-foot landing.

3. A fire escape comprising a balcony having an opening constituting a passageway through the balcony floor, said floor including a stair-head landing, at one end of said

opening, a stair-foot landing at the opposite end of the opening, and a reception landing forming the inner portion of the floor and extending from the stair-head landing to the stair-foot landing, a contracted passageway being provided between the reception landing and the stair-head landing, a stairway hinged at one end to the stair-head landing, and adapted to swing downward by its own weight, a movable detent on the stair-foot landing adapted to engage the swinging end of the stairway and support the same against downward movement, a swinging gate controlling access to the stair-head landing, and connections between the gate and detent, operative by the opening of the gate to retract the detent and release the stairway, the detent being enabled, by its location at the swinging end of the stairway, to be freely withdrawn from its supporting position by the opening of the gate.

4. A fire escape substantially as specified by claim 3, the gate connections and detent being relatively arranged so that the gate is held partly open when the detent is engaged with the stairway, so that the gate serves as a direction indicator.

5. A fire escape comprising a balcony having an opening constituting a passageway through the balcony floor, said floor including a stair-head landing, at one end of said opening, a stair-foot landing at the opposite end of the opening, and a reception landing forming the inner portion of the floor and extending from the stair-head landing to the stair-foot landing, a stairway hinged at one end to the stair-head landing, and adapted to swing downward by its own weight, a movable detent on the stair-foot landing adapted to engage the swinging end of the stairway and support the same against downward movement, a swinging gate controlling access to the stair-head landing, connections between the gate and detent extending horizontally along the reception landing and operative by the opening of the gate to retract the detent and release the stairway, an upright two-armed lever fulcrumed on the balcony and having an upwardly projecting longer arm normally located in the path of a stairway swinging from a higher balcony, and a downwardly projecting shorter arm, said lever being displaceable by the last-mentioned stairway, and connections between said shorter arm and the detent adapted to retract the detent when the lever is displaced from its normal position.

6. A fire escape substantially as specified by claim 5, the said connections between the detent and the gate including a slot in one member of the connections and a pin in another member, movable in the slot, to permit the retraction of the detent by the said two-armed lever without movement of the gate.

7. A fire escape comprising a balcony having an opening constituting a passageway through the balcony floor, said floor including a stair-head landing, at one end of said opening, a stair-foot landing at the opposite end of the opening, and a reception landing forming the inner portion of the floor and extending from the stair-head landing to the stair-foot landing, a stairway hinged at one end to the stair-head landing, and adapted to swing downward by its own weight, a movable detent on the stair-foot landing adapted to engage the swinging end of the stairway and support the same against downward movement, a swinging gate controlling access to the stair-head landing, said gate having a shaft which is rocked by swinging movements of the gate, an arm fixed to said shaft, an upright two-armed lever fulcrumed on the balcony and having an upwardly projecting longer arm normally located in the path of a stairway swinging from a higher balcony, and a downwardly projecting shorter arm, a pair of two-armed horizontal levers fulcrumed on the balcony adjacent to the detent, said levers having shorter inner arms and longer outer arms, the inner arm of each lever being connected with the detent, a rod connecting the outer arm of one of said horizontal levers with the shorter arm of said upright lever, to impart movement from the latter to the detent, and connections between the outer arm of the other horizontal lever and the gate rockshaft arm, to impart movement from the gate to the detent, said connections including an elongated rod extending along the reception landing, and a link connecting said rod with the rockshaft arm, a slot and pin connection being provided between said rod and link whereby movement of the detent by said upright lever is permitted without movement of the gate.

8. In a fire escape in combination, a balcony having an opening constituting a passageway through the balcony floor, a stairway hinged at one end to the balcony at one end of said opening, and adapted to swing downward by its own weight, confining means adapted to releasably engage and support the swinging end portion of the stairway, when the latter is raised, and means for retarding a downward movement of the stairway, said means including as elements a cylinder, a piston therein, a piston-rod, and a charge of liquid in said cylinder, transferable from side to side of the piston, said cylinder, piston and rod constituting a telescopic device connected at one end to a fixed part of the stairway structure, and at the other end to a fixed part of the balcony structure, and adapted to be elongated

by a downward movement of the stairway, said device and the charge of liquid being operative to retard the said downward movement.

9. A fire escape comprising a balcony, the floor of which includes a stair-head landing, an elongated stair-foot landing, said landings forming opposite ends of a passageway through said floor, the stair-foot landing being narrower than the stair-head landing and spaced from adjacent portions of the balcony structure by narrow hand-rail-receiving openings communicating with said passageway, and a stair-way hinged to the balcony at the end of said passageway formed by the stair-head landing, and provided with fixed upstanding hand-rails, the stairway projecting under the stair-foot landing, and its hand-rails being arranged to project into said hand-rail-receiving openings when the stairway is raised.

10. In a fire escape, in combination, a plurality of balconies, each having a passageway in its floor; a plurality of stairways hinged in said passageways, and adapted to swing downward by their own weight, each balcony and the accompanying stairway serving one floor of a building; detents on the balconies for releasably securing the stairways thereof in raised positions, each balcony being provided with means for guiding a person from the building to the stair-head of that balcony, and with detent-displacing means operable by a person whose entrance to the stair head is guided by said means to release the stairway; and automatic detent-displacing means on each balcony below the uppermost, operable by the downward movement of the stairway on the next balcony above; the arrangement being such that when a person reaches the stair-head of any balcony above the lowest, the stairways of that and the succeeding lower balconies are successively and automatically released.

In testimony whereof I have affixed my signature.

CHARLES F. MORRILL.