

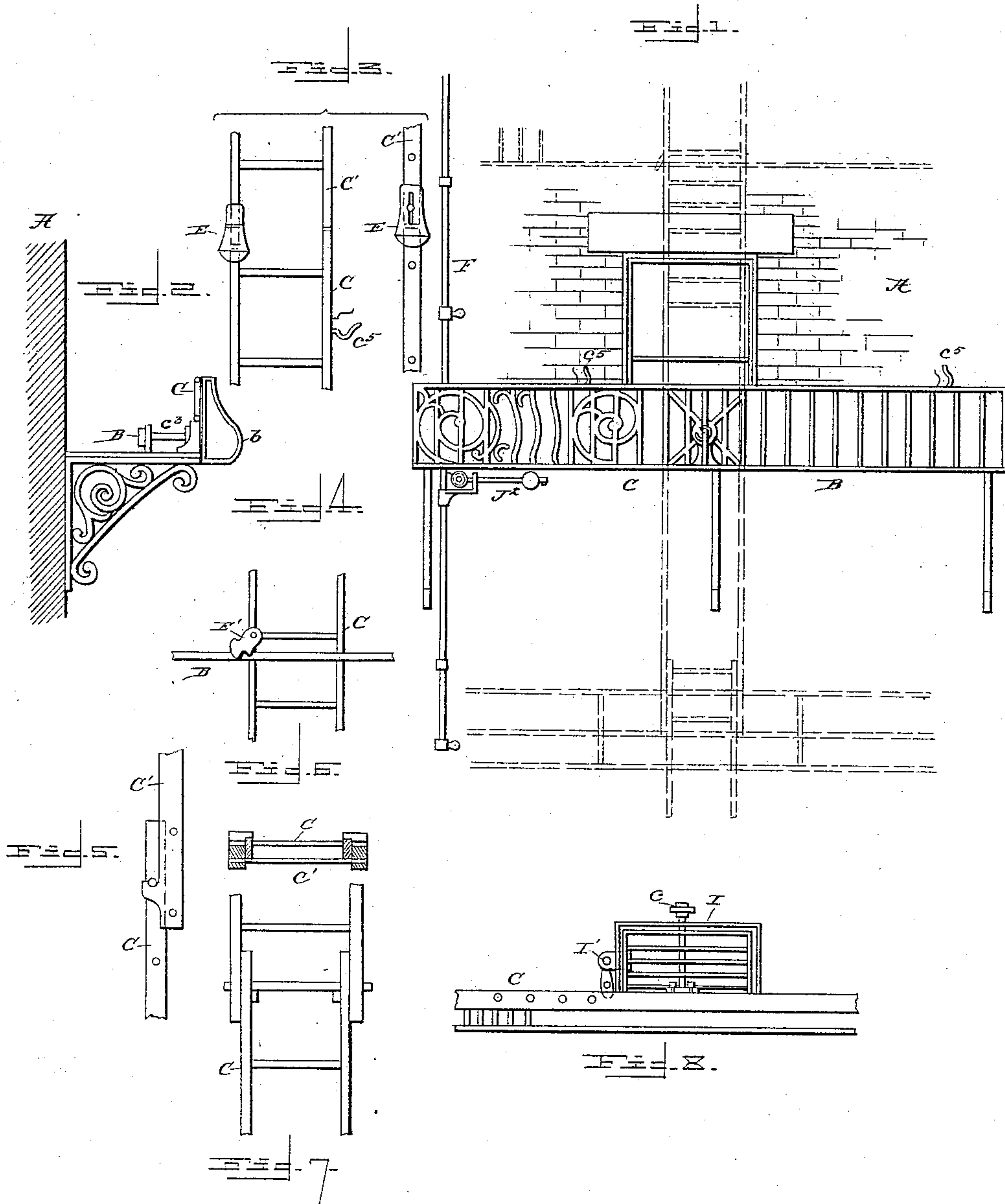
(No Model.)

5 Sheets—Sheet 1.

A. WOOD.  
FIRE ESCAPE.

No. 444,404.

Patented Jan. 6, 1891.



Witnesses  
N. H. Humphrey  
Benj. E. Cook

Alfred Wood Inventor  
Jewell S. Wright atty  
By ~~W. S.~~ Attorney  
E. B. Leonard

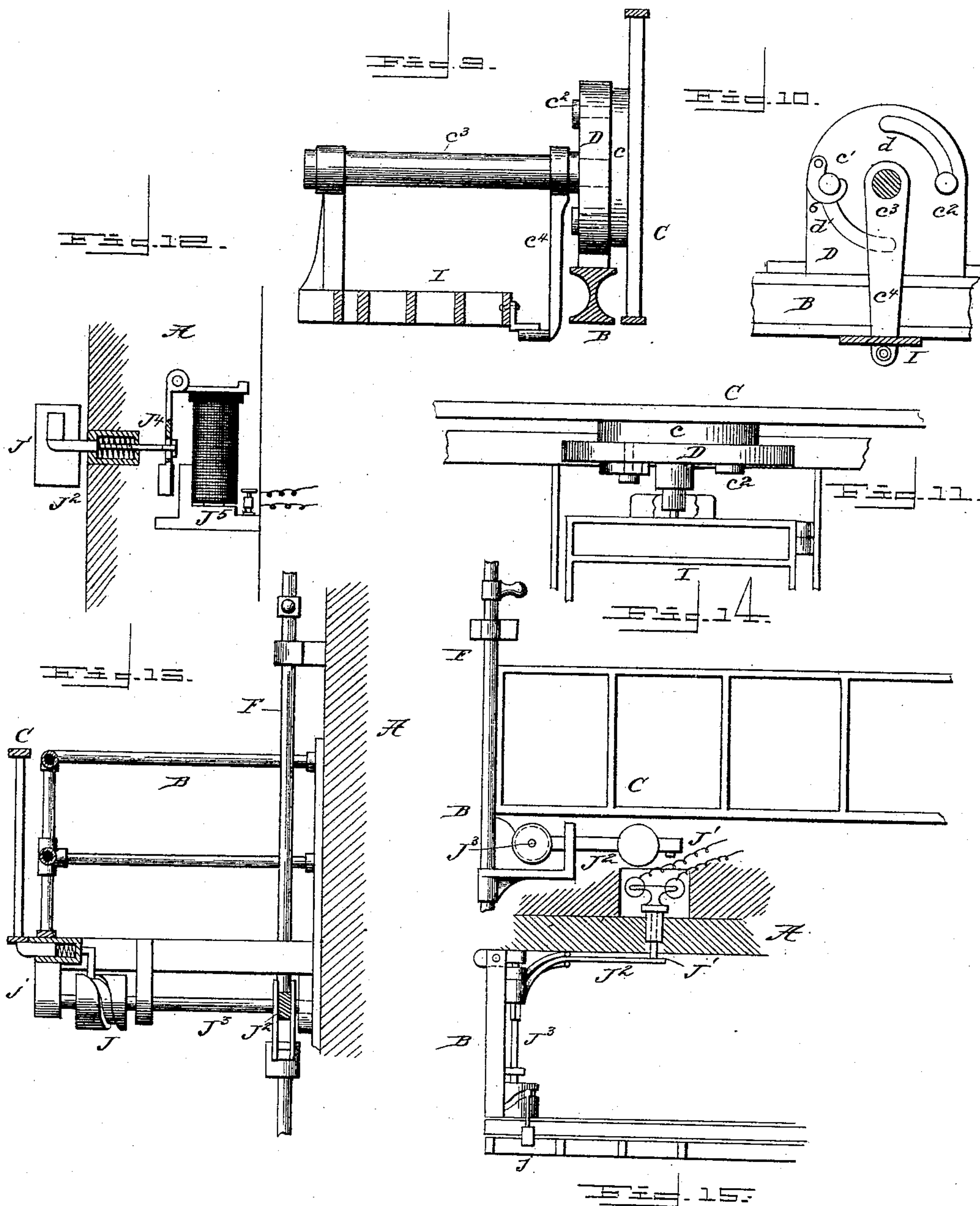
(No Model.)

5 Sheets—Sheet 2.

A. WOOD.  
FIRE ESCAPE.

No. 444,404.

Patented Jan. 6, 1891.



Witnesses

*W. H. Humphrey.*  
*Benj. E. Cowie*

Inventor

*Alfred Wood*  
*Newell S. Wright*  
By *Asso. Attorney*  
*E. O. Edward*

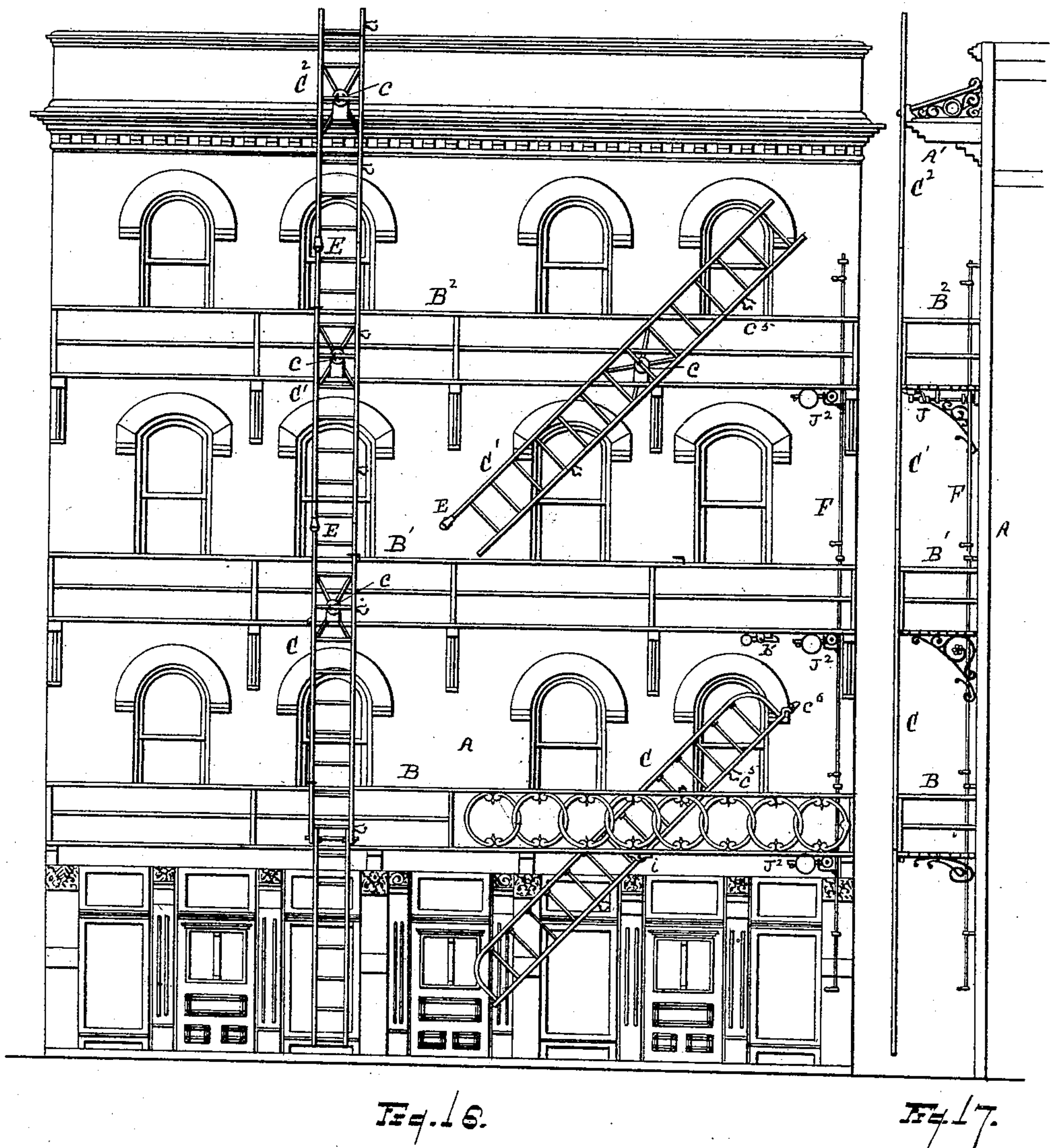
(No Model.)

5 Sheets—Sheet 3.

A. WOOD.  
FIRE ESCAPE.

No. 444,404.

Patented Jan. 6, 1891.



WITNESSES.  
Maxwell H. H. H.  
Chas. Mandelbaum.

INVENTOR.  
Alfred Wood.



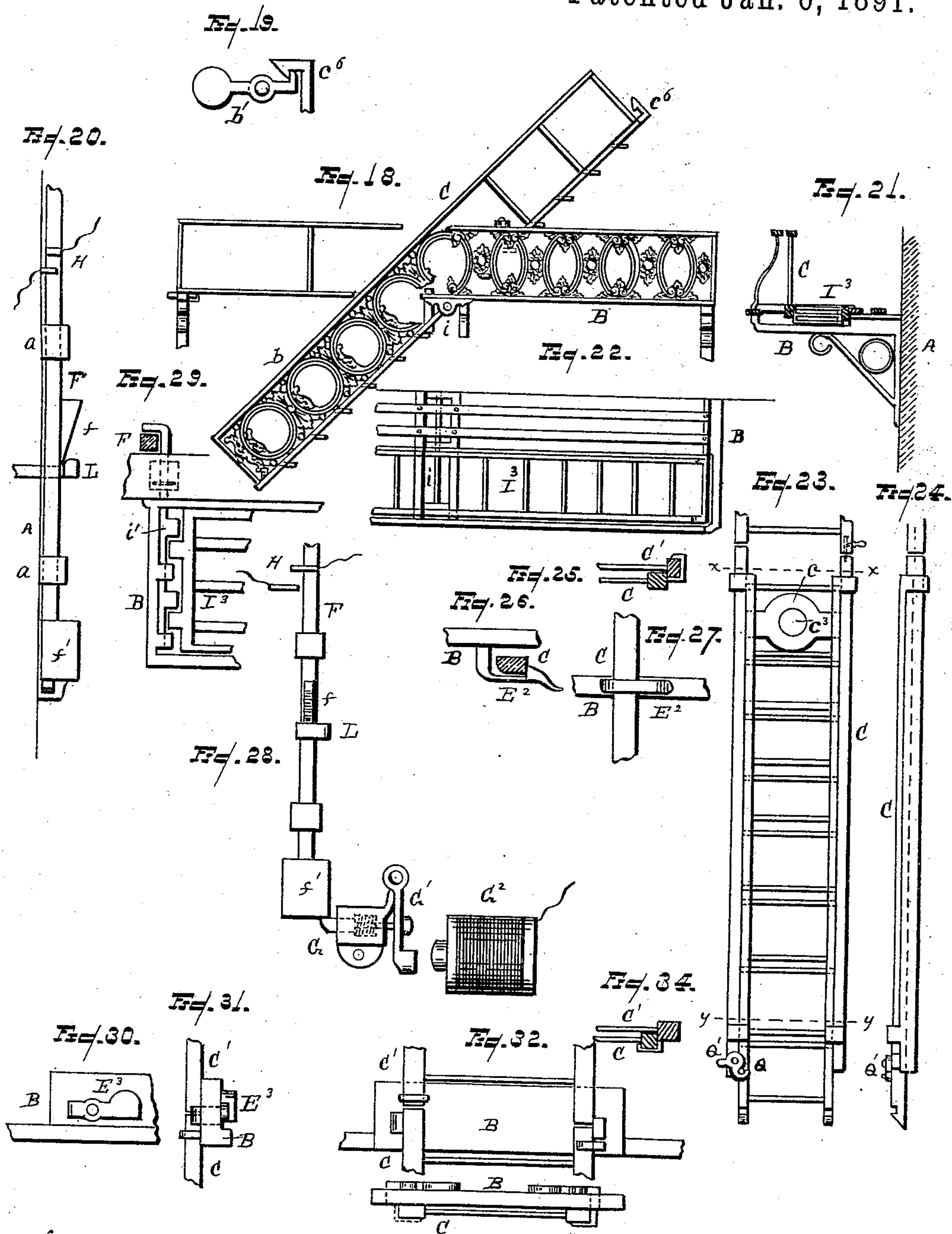
(No Model.)

5 Sheets—Sheet 4.

A. WOOD.  
FIRE ESCAPE.

No. 444,404.

Patented Jan. 6, 1891.



WITNESSES  
Maxwell H. G. G. G.  
Cheri Mandelbaum.

INVENTOR.  
Alfred Wood

(No Model.)

5 Sheets—Sheet 5.

A. WOOD.  
FIRE ESCAPE.

No. 444,404.

Patented Jan. 6, 1891.

Fig. 35.

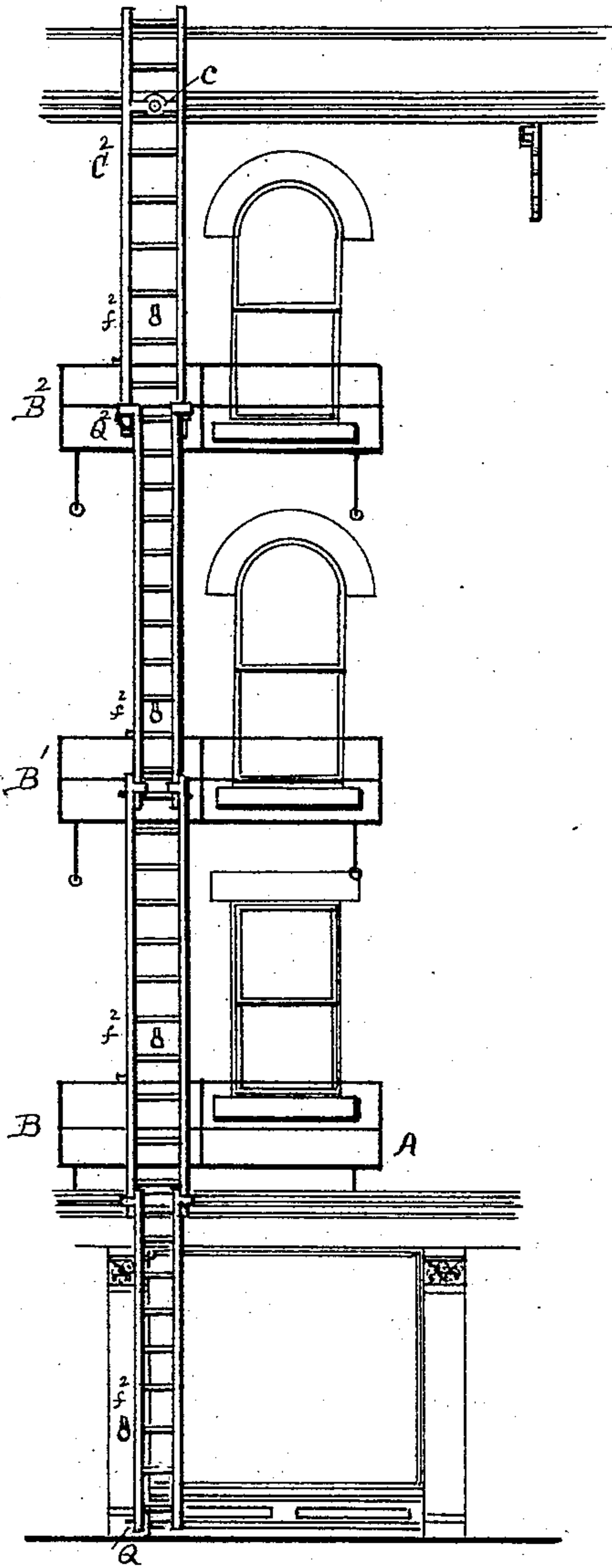


Fig. 36.

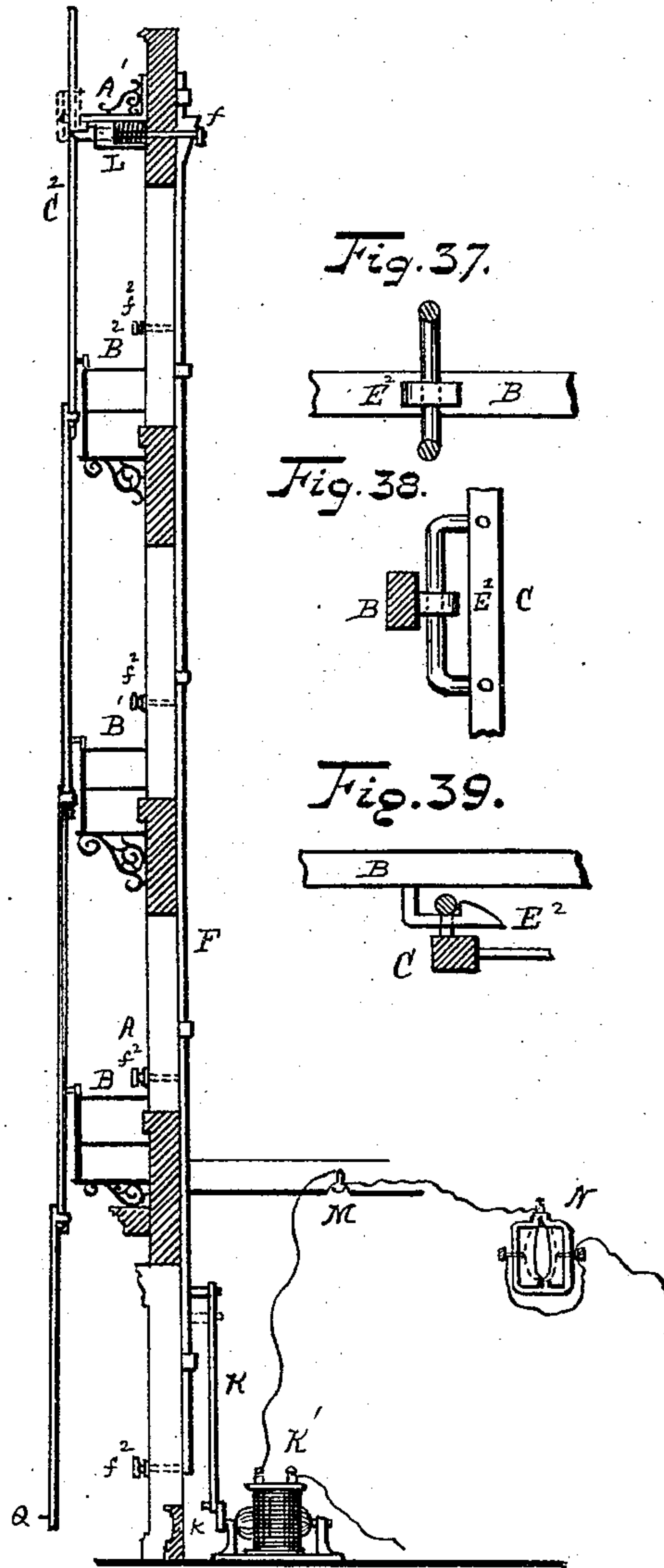


Fig. 37.

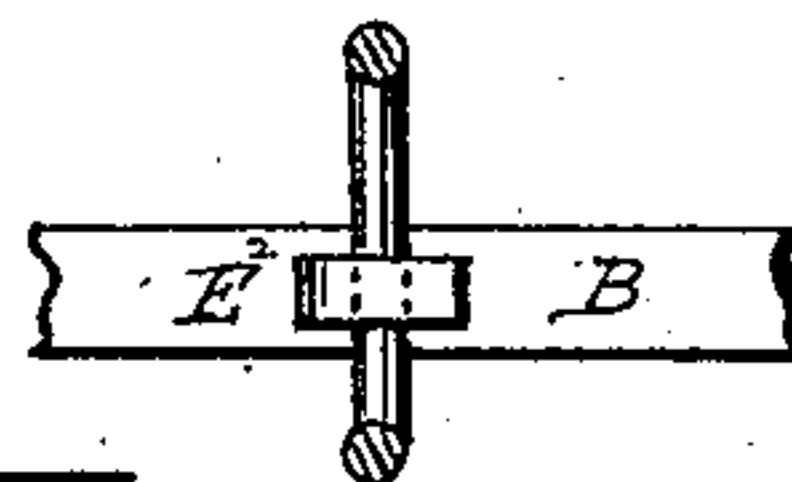


Fig. 38.

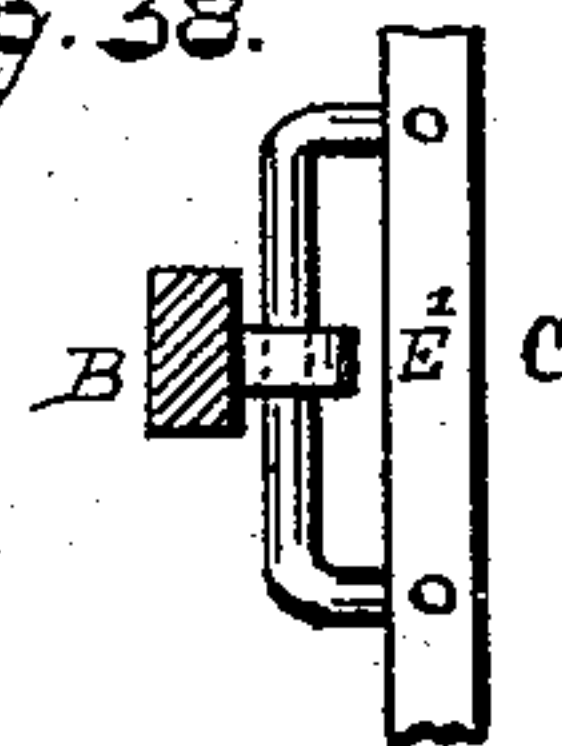
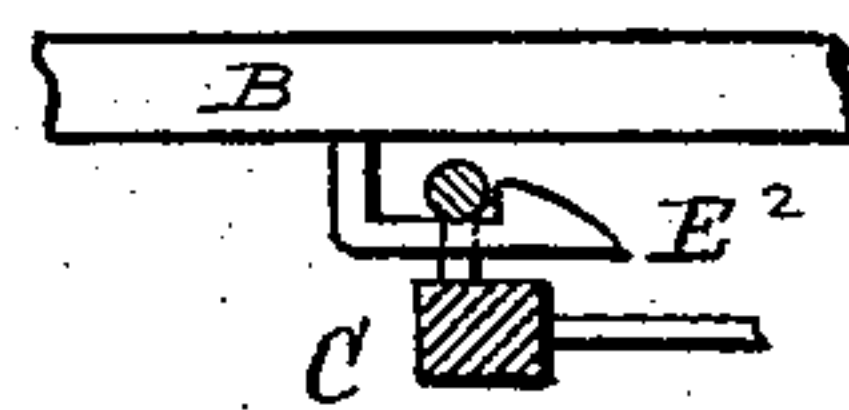


Fig. 39.



Witnesses.  
Maxwell H. Gylls.  
Chas. Mandelbaum.

Inventor.  
Alfred Wood



# UNITED STATES PATENT OFFICE.

ALFRED WOOD, OF DETROIT, MICHIGAN.

## FIRE-ESCAPE.

SPECIFICATION forming part of Letters Patent No. 444,404, dated January 6, 1891.

Application filed May 15, 1888. Serial No. 274,014. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED WOOD, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have  
5 invented a certain new and useful Improvement in Fire-Escapes; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to  
10 make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain new and useful improvements in fire-escapes; and it  
15 consists of the devices, appliances, and their combinations, as more fully illustrated in the drawings, and hereinafter specified, and pointed out in the claims.

In the drawings, Figure 1 is a front elevation  
20 of features of my invention; Fig. 2, an end elevation. Fig. 3 shows in front and side elevation a means of engaging the adjacent ends of a series of ladders. Fig. 4 illustrates a means of locking a ladder in a vertical position.  
25 Fig. 5 is a modification in side elevation. Fig. 6 is a sectional view; Fig. 7, a front elevation. Fig. 8 is a view in plan showing the trap in the balcony. Fig. 9 is a cross-section of a portion of a balcony, showing  
30 features in side elevation. Fig. 10 is a rear elevation of the said features; Fig. 11, a plan view thereof. Fig. 12 illustrates a releasing device; Fig. 13, an end elevation. Fig. 14 is a front elevation showing the supporting and  
35 releasing mechanism; Fig. 15, a view of the same in plan with parts in section. Fig. 16 is a front elevation showing the device engaged upon a building. Fig. 17 is an end elevation of the same. Fig. 18 is a front elevation  
40 of a modification; Fig. 19, a view in detail of a fastening device. Fig. 20 is a view of the operating-bar; Fig. 21, an end view of the mechanism shown in Fig. 18. Fig. 22 is a plan showing a portion of the balcony-floor,  
45 constructed to form a swinging ladder also. Fig. 23 is a front view of an extension-ladder; Fig. 24, a side view of the same. Fig. 25 is a section across the extension-ladder across the line  $x x$ , Fig. 23. Fig. 26 is a horizontal  
50 section and plan, and Fig. 27 a front elevation of the same, illustrating a fastening device. Fig. 28 shows a means of operating the

operating-rod. Fig. 29 is a plan view illustrating a supporting and releasing device where a portion of the balcony-floor serves  
55 also as a ladder. Figs 30, 31, 32, and 33 are different views of a modified form of the locking device to hold the ladders when swung into position for use. Fig. 34 is a section  
60 across Fig. 23 along the line  $y y$ . Fig. 35 is a front view showing an extensible ladder in position for use. Fig. 36 is a side view of the same, showing the building in section and the releasing mechanism. Fig. 37 is a detail  
65 view of a fastening device; Fig. 38, a side view of the same, and Fig. 39 a view in plan and showing a portion of the ladder in section.

My present invention is designed in some of its features as an improvement upon a fire-escape for which an application was filed  
70 June 10, 1887, by Alexander Clarke, Serial No. 240,907, while in other respects it embraces also features entirely distinct in their character, and whereby a fire-escape of superior utility, safety, efficiency, and tasteful  
75 appearance is provided, readily operative, and not liable to get out of order.

I carry out my invention as follows:

A represents a building; B B' B<sup>2</sup>, &c., a series of balconies engaged thereupon in any  
80 suitable manner.

C C' C<sup>2</sup>, &c., represent a series of ladders. Each ladder has an oscillatory engagement intermediate its ends, and preferably to one side the middle of the ladder, either upon the  
85 balcony or upon the building direct.

I would have it understood that I contemplate the oscillatory engagement of the ladder upon the side of a building either with or without a balcony. Where a balcony is employed, the respective ladders engaged there-  
90 with may form an integral part of said balcony—as, for instance, when in place constituting the balustrade or the flooring of the balcony, as may be preferred; or the respective  
95 ladders may be auxiliary to the balcony proper. My invention contemplates, also, either a single ladder thus engaged upon the balcony or building or an extensible ladder; and also, if desired, a double ladder, where-  
100 by a succession or series of ladders may be let down for use or be turned up against the building or balcony, so as to present a neat and ornamental appearance. Thus in Figs.



16 and 17 I have shown the upper ladder  $C^2$  engaged upon the building direct, and having an oscillatory engagement therewith intermediate the ends of the ladder, while the ladders below are engaged upon balconies, the lower ladder of the series at the left being an extensible ladder. The upper ladder at the right is shown as forming the balustrade of a balcony and as swung into an inclined position. The lower ladder at the right, Fig. 16, is shown as constituting the flooring of the balcony, the same being tilted at a desired angle. In this instance, also, as in Fig. 18, the ladder may consist of both the flooring of the balcony and the balustrade, or front either separate or integral with the balcony proper, thus forming by the aid of the front a hand-railing for the floor-ladder, or the floor and front, though so connected and simultaneously operated may form a double ladder, one of which may be appropriated by the firemen and the other by the inmates seeking to escape from the building.

To provide for an oscillatory movement of the ladder upon the balcony or building, the ladder may be provided with a hub  $c$ , having arms  $c'$   $c^2$ , said arms being engaged in a cam-plate or disk  $D$ , suitably supported upon the balcony or building and constructed with annular or cam grooves  $d$   $d'$ , to permit the ladder to swing over a desired distance.

$c^3$  is a journal suitably supported.

When a series of ladders are swung into line, any desired means may be employed for locking their adjacent ends together—as, for instance, a sliding sleeve  $E$ , Figs. 3 and 16; or the ladder may be provided with a latch  $E'$  to engage a stop  $e$  upon the balcony, as shown in Fig. 4; or the balcony may be provided with a spring-catch  $E^2$ , as shown in Figs. 26 and 27; or, as shown in Figs. 30, 31, 32, and 33, a weighted pivoted latch  $E^3$  may be arranged to lock the adjacent ladder. To facilitate the locking of the ladders, their side rails may be of uneven length, so that the upper and lower ends swung adjacent to each other may more conveniently engage the fastening device.

In Fig. 1 the ladder is shown as folded up in full lines and as let down in dotted lines.

I do not limit myself to any particular means for supporting the ladder when folded up, nor for releasing it in case of need. I have accordingly shown various methods adapted to these ends. Thus  $F$  represents an operating-rod, which may extend along the surface of the building and which may be provided with a suitable number of wedge-shaped cams or projections  $f$ , the rod having a reciprocatory movement in guides  $a$ , in which it is held in place. This rod may be weighted, as shown at  $f'$ , so as to descend by its own gravity whenever released. The operating-rod may be supported in its normal position by any suitable device—as, for instance, by a latch or draw-bolt  $G$ , and which may be withdrawn either automatically or by

hand, as may be desired. It may be arranged to be withdrawn by an electrical device, for instance, automatically, while at the same time it is free to be operated by hand.

As shown in Fig. 28, for example, the draw-bolt is engaged with an armature  $G'$ , adjacent to a magnet  $G^2$ . It will at once be obvious that when the circuit is closed the bolt will be withdrawn. By the descent of the operating-bar a circuit may also be closed communicating with an alarm. Such a construction for closing a circuit for this purpose is indicated at  $H$ , Fig. 28.

My invention contemplates as one of its features to provide the various balconies, respectively, with a trap  $I$ , which shall be simultaneously operated with the operation of the ladder. This may be accomplished in a variety of ways, and I do not confine myself to any particular method. As shown in Fig. 8, the trap may be supported by a draw-bolt  $I'$ , so constructed as to be knocked out of position as the ladder falls, so as to permit of the descent of the trap.

As shown in Figs. 9, 10, and 11, the journal  $c^3$  of the hub  $c'$  engaged in the slotted plate  $D$ , may be provided with a crank-arm  $c^4$ , arranged to engage and support the trap when the ladder is folded. It will be seen that as the ladder is permitted to oscillate the crank-arm will be disengaged from the trap. So, also, in an analogous manner the balcony-flooring  $I^3$  may be supported, or a portion thereof, so as to constitute a folded ladder arranged to be swung down to form a ladder either independently or in connection with a portion of the balcony front or balustrade. In such a case the floor may be suitably journaled upon the balcony intermediate the ends, as shown at  $i$ , Figs. 16 and 18, for instance. It may be supported in a folded position in any proper manner, as upon a sliding latch or bar  $i'$ , Fig. 29, engaged at one end with the operating-rod  $F$ , so that a cam  $f$ , riding along said latch or bar, will withdraw it and allow the floor to swing into position to constitute a ladder.

Where one or more ladders are engaged, as herein described, upon a building without connection upon a balcony, any suitable intervening support or bracket may be employed, as indicated at  $A'$ , Figs. 17 and 36. The ladders may be provided with any suitable hose-support, as indicated at  $c^5$ , Figs. 1 and 3. A double ladder may also be readily provided by constructing the balcony with an oscillatory balustrade  $b$ , and also with an auxiliary ladder in the rear thereof, both being constructed to oscillate together. Such a construction is shown in Figs. 2 and 18. In this case one party might descend on the front and another on the rear ladder, or a person might descend between the two ladders upon one or the other, avoiding danger. This double ladder is a matter of great convenience and importance.

My invention contemplates, as already



mentioned, an extensible ladder having an oscillatory engagement upon a balcony or building. Thus, as shown in Figs. 16, 17, 23, and 24, the lower ladder of a series may consist of an extension-ladder the more conveniently to reach the ground. It is obvious, also, that a single extensible ladder might be engaged, as described, upon a building, especially on buildings of certain heights. Such a construction is more fully shown in Figs. 35 and 36.

I do not confine myself to the construction of a series of ladders arranged to be brought into vertical line, as when the floor of a balcony has an oscillatory movement, whether with or without an additional railing or front, it may simply be dropped to a desired angle; nor do I confine myself to providing each balcony with a ladder of this description, as ladders of various lengths may be employed. Should they reach to the balcony above and below, it would be necessary to only provide every other balcony with a ladder, the ladders meeting at the intermediate balcony; or the ladders may meet intermediate two adjacent balconies. However this may be, when swung into position they are so locked as to be firmly held from swaying or disengagement. At the same time when the need is over they may be readily returned to normal position by hand and set for further use. When an extensible ladder has thus an oscillatory engagement upon the upper portion of a building, the same may engage suitable fastening devices upon the various balconies beneath to hold its various sections from swaying. The various sections of an extensible ladder may have any suitable engagement with each other, and any proper mechanism may be employed to release the various sections as the ladder is swung into active position.

Where a ladder such as is shown in Fig. 16 at the lower right-hand balcony is employed, the ladder may be provided with a hook  $c^6$ , and the balcony above with a latch  $b'$  to engage therewith and hold the ladder firmly in position. This construction is shown in detail in Fig. 19. The hook is also shown in Fig. 18.

A very satisfactory means of supporting the ladders and releasing the same is illustrated in Figs. 12, 13, 14, and 15, in which the ladder is immediately supported upon a spring-latch  $j$ , engaged at one end with a cam-cylinder  $J$ , mounted upon a rotary spindle  $J^3$ , engaged with the balcony. A weighted lever or arm  $J^2$  is engaged with the spindle at its inner end, supported in its normal condition by a spring-latch  $J'$ , connected with an armature  $J^4$ , acted upon by a magnet  $J^5$  when the circuit on which it is located is closed. It will be obvious that when the armature is attracted to the magnet the latch  $j'$  will be withdrawn and the weighted lever will be free to fall, giving sufficient rotation to the cam-cylinder to withdraw the latch  $j$  from the

ladder. The circuit in which the magnet is placed may be closed by a thermostat or analogous device.

In Fig. 36 I have shown the operating-rod united by a connecting-rod  $K$  with the crank-arm  $k$  of an electric motor  $K'$ . The circuit in which it is placed may likewise be closed by a thermostat or analogous device, when it will be evident that the operating-rod  $F$  will be forced downward to release the ladders, whether constituting the flooring or other part of the balcony or engaged upon the building. In this case a spring-latch  $L$  may be engaged with the several balconies or with the bracket  $A'$ , and with the operating-rod in such a manner that it will be retracted by the adjacent cam  $f$ . At the same time the operating-rod may be left free to be operated by hand. Thus an arm  $f^2$  may be so located as to be conveniently accessible at any or every story of the building.

Where the ladder swings in a plane parallel to the plane of the front of the building, it is immaterial to the fundamental principle of my invention whether the ladder be engaged upon a balcony or upon the building direct, as in either case the balcony or building serves as a suitable support therefor. The ladder may be engaged upon the cornice.

In Fig. 18 a portion of the ladder is ornamented, the opposite end being without ornamentation to illustrate two styles of construction. A ladder and a flooring so connected, and as heretofore described, may be swung either into a vertical or angular position, as may be desired.

An ordinary mercurial thermostat may be employed to close the electric circuit for releasing the ladders, as indicated in Fig. 36 at  $M$ ; or I contemplate the employment in lieu thereof of a metallic thermostat, indicated in the same figure at  $N$ , of novel construction, and which I design shall form the subject-matter of a separate application.

Where an extensible ladder is used, the lower ladder may be provided with a fastening device of any suitable form—as, for instance, said ladder may be provided with a supporting-pin  $Q$ —the foot of an adjacent ladder being provided with a latch  $Q'$ , so constructed as to strike against any suitable stop or arm, as at  $Q^2$ , thereby tilting the latch and releasing the lower ladder, and with it the series. This construction is shown in Figs. 23, 24, and 35.

Both the double ladder and the extensible ladder herein described may come under the one head of a multiple ladder.

What I claim is—

1. The combination, with a building or with a balcony engaged thereupon, of a ladder having a fixed oscillatory connection therewith, the arrangement being such that the plane of the ladder swings in a plane parallel with the front of the building, and an electric device to release said ladder from its folded position, substantially as set forth.



2. The combination, with a building or with a balcony engaged thereupon, of ladders connected therewith, the one provided with a hub and the other with a slotted plate engaged with the hub, substantially as described. 5
3. The combination, with a balcony, of a ladder having a fixed oscillatory connection therewith, the arrangement being such that the plane of the ladder may swing in a plane 10 parallel with the front of the building, and a trap, said trap arranged to be opened simultaneously with the release of the ladder from its folded position, substantially as set forth.
4. The combination, with the balcony, of a 15 flooring and balustrade connected together and having an oscillatory engagement intermediate their ends with said balcony, the flooring constructed to form a ladder when swung into proper position, substantially as 20 set forth.
5. The combination, with a balcony, of a flooring and a railing connected with said flooring, said flooring and railing having an oscillatory connection with the balcony inter- 25 mediate their ends, substantially as described.
6. The combination, with a balcony, of a flooring and a railing connected therewith, said flooring and railing forming a double ladder and having an oscillatory engagement 30 upon the balcony, substantially as described.
7. The combination, with a building or with a balcony engaged thereupon, of a double ladder consisting of a front and a rear ladder, said double ladder having an oscillatory en- 35 gagement upon a balcony or building and said front ladder forming the balustrade of the balcony, substantially as described.
8. The combination, with a balcony or building, of an extensible ladder having a fixed 40 oscillatory connection therewith, the construction being such that the plane of the ladder swings in a plane parallel with the front of the building, and fastening devices to hold the ladder in position when extended, substantially as set forth. 45
9. The combination, with a balcony or building, of one or more ladders having a fixed oscillatory connection therewith, the arrangement being such that the plane of the ladder 50 swings in a plane with the front of the building, fastening devices to hold the ladder in a folded position, and an operating-rod to release the fastening devices, substantially as set forth.
10. The combination, with a balcony, of a 55 ladder flooring, the said flooring having an oscillatory engagement intermediate its ends with the balcony and constructed to form a ladder when swung into position, substantially as set forth. 60
11. The combination, with the balconies of a building, of a series of ladder floorings, each having an oscillatory engagement upon the balcony intermediate its ends, the construction being such that the series of floorings, 65 when swung into a proper position, will form a continuous ladder, substantially as set forth.
12. The combination, with the balconies of a building, of a series of ladder floorings, each having an oscillatory engagement upon the 70 balcony intermediate its ends, the said series being constructed to form a continuous ladder when swung into proper position, and fastening devices for holding them in said position, substantially as set forth. 75
- In testimony whereof I sign this specification in the presence of two witnesses.
- ALFRED WOOD.
- Witnesses:  
N. S. WRIGHT,  
D. W. MILLER.