No. 701,483. Patented June 3, 1902.

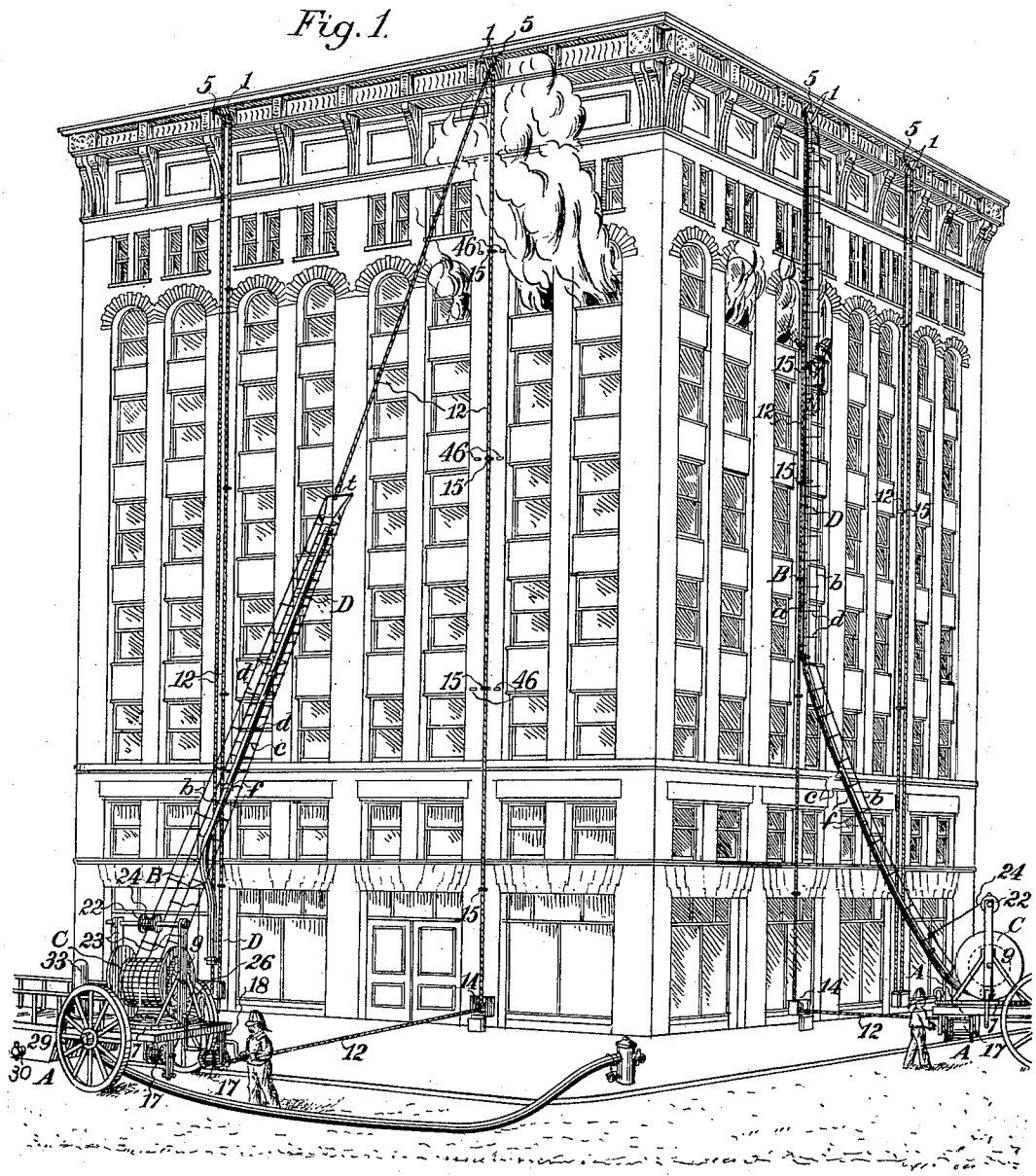
R. B. HEMMING.

FIRE ESCAPE APPARATUS.

(Application filed July 17, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses,

C. A. Brandau

M. Regner.

Inventor,

Robert B. Hemming

by Smith & Boone

his attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 701,483.

Patented June 3, 1902.

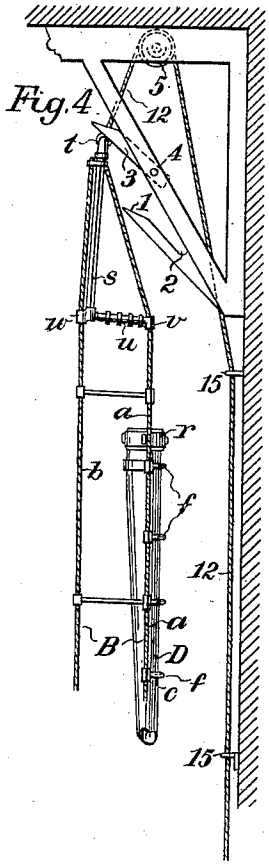
R. B. HEMMING.

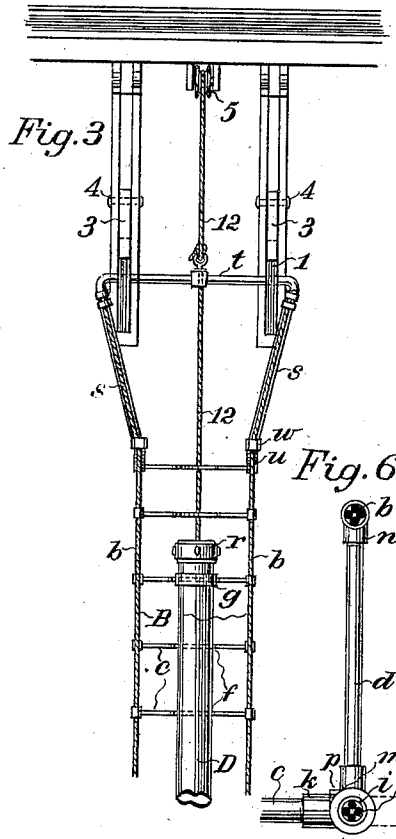
FIRE ESCAPE APPARATUS.

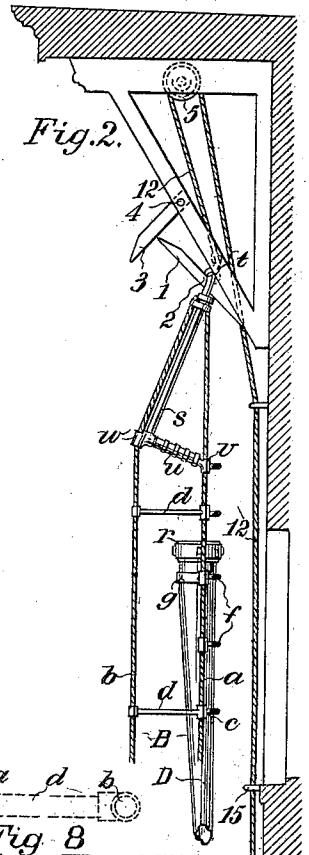
(Application filed July 17, 1899.)

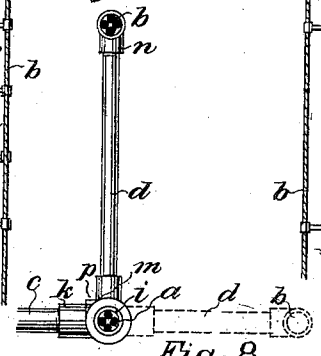
(No Model.)

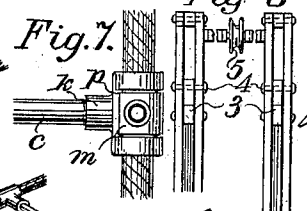
5 Sheets—Sheet 2.

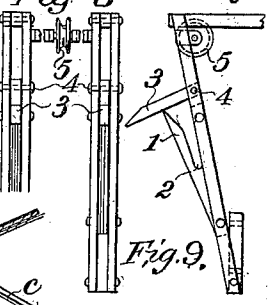


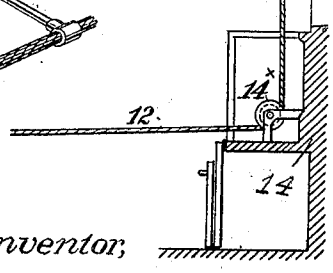












Witnesses,
E. A. Brandau
M. Regner.

Inventor,
Robert B. Hemming
by Smith & Brown
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

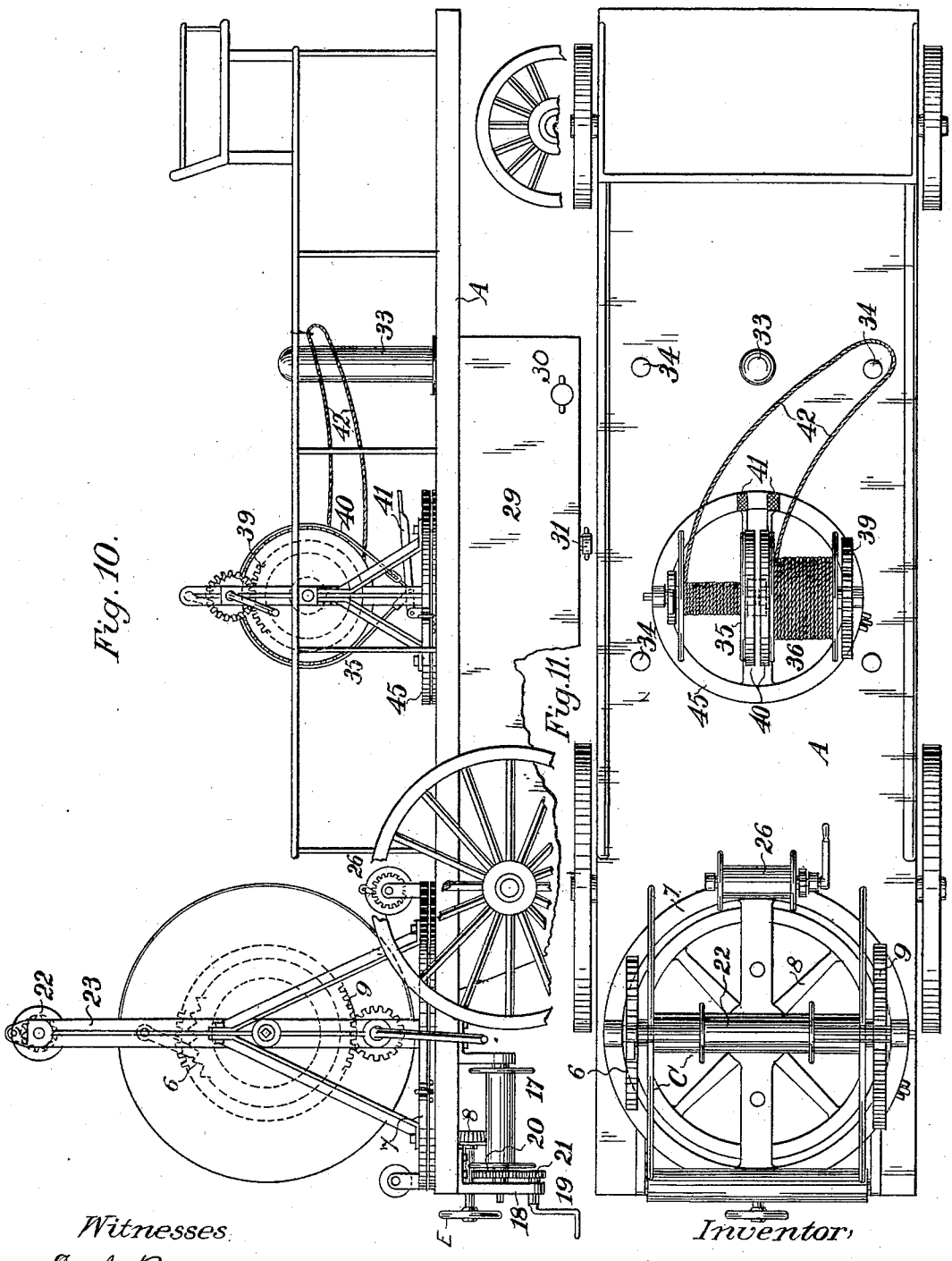
No. 701,483. Patented June 3, 1902.

R. B. HEMMING.

FIRE ESCAPE APPARATUS.

(Application filed July 17, 1899.)

(No Model.) 5 Sheets—Sheet 3.



Witnesses.

E. A. Brandau

M. Regner.

Inventor,

Robert B. Hemming

by Smith & Brown

his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 701,483. Patented June 3, 1902.

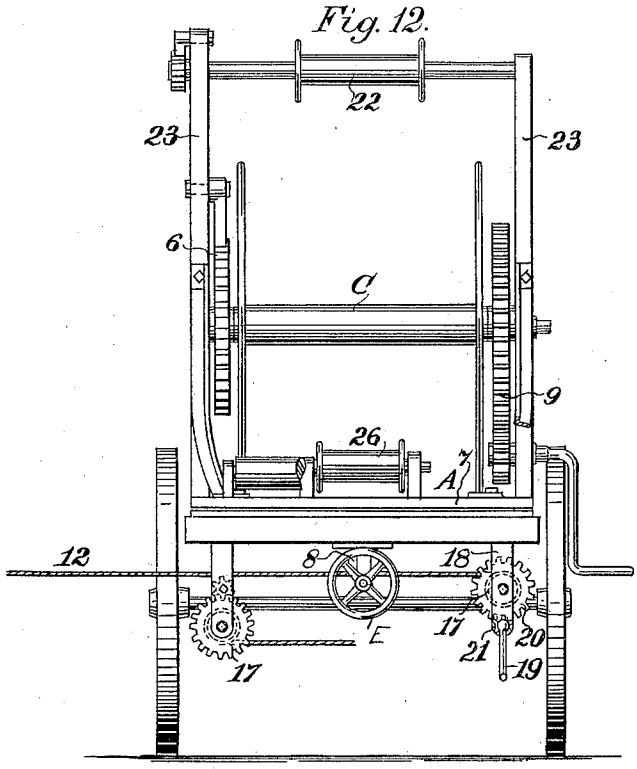
R. B. HEMMING.

FIRE ESCAPE APPARATUS.

(Application filed July 17, 1899.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 12.



Witnesses,
E. A. Brandau
M. Regner.

Inventor,
Robert B. Hemming
by Dmitry & Osborn,
his attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 701,483. Patented June 3, 1902.

R. B. HEMMING.

FIRE ESCAPE APPARATUS.

(Application filed July 17, 1899.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 15.

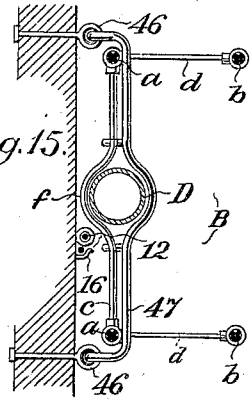


Fig. 13.

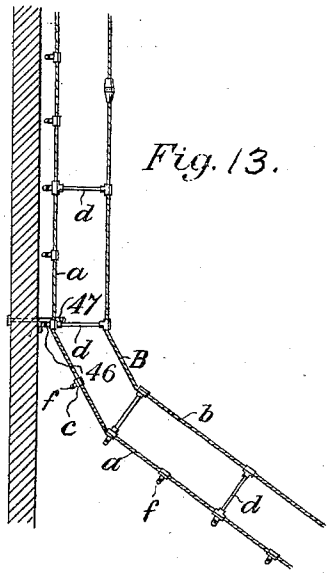


Fig. 16.

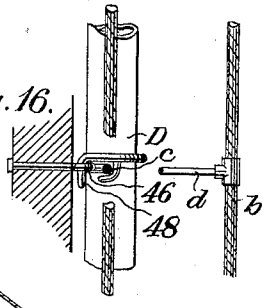
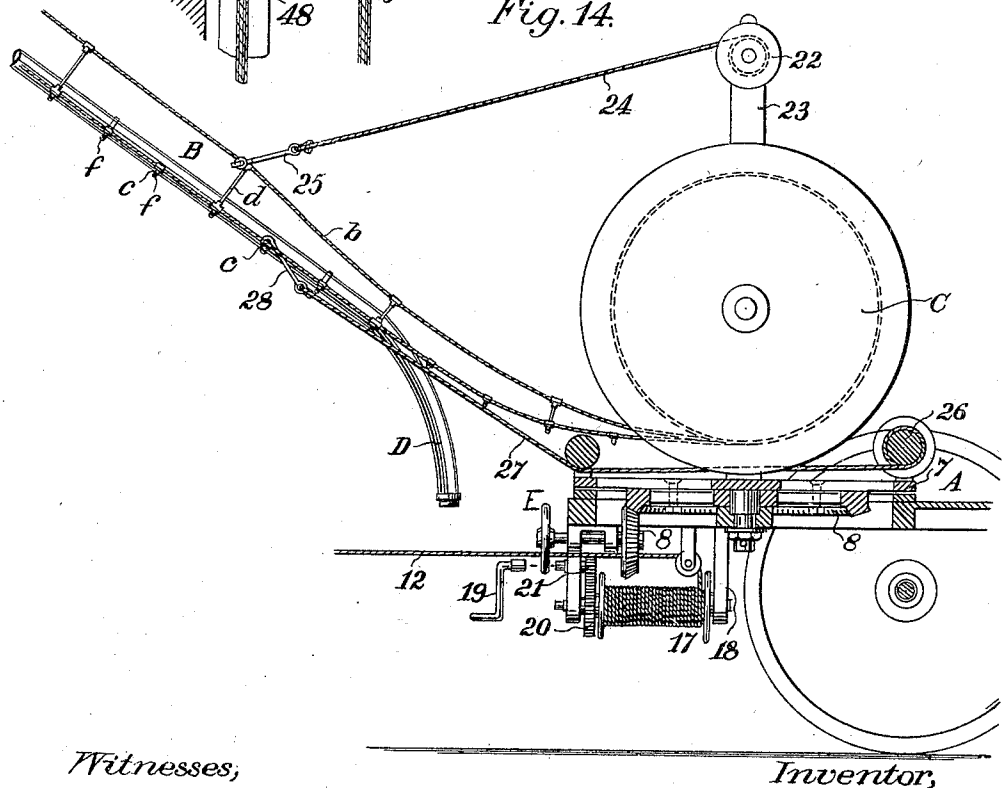


Fig. 14.



Witnesses,
E. A. Brondau
M. Regner.

Inventor,
Robert B. Hemming
by Smith & Osborn
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT B. HEMMING, OF OAKLAND, CALIFORNIA.

FIRE-ESCAPE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 701,483, dated June 3, 1902.

Application filed July 17, 1899. Serial No. 724,036. (No model.)

To all whom it may concern:

Be it known that I, ROBERT B. HEMMING, a citizen of the United States of America, residing in Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Fire-Escape Apparatus, of which the following is a specification.

This invention relates to improvements made in apparatus for removing persons and valuables from burning buildings and for giving the firemen access to the upper stories from the outside; and the invention includes a novel construction of rope ladder and means permanently attached to a building for raising and lowering the ladder and for attaching it to the top of the building; also, a novel construction of truck and reel for carrying the ladder and means for maintaining tension on the ladder when it is made fast to the building; also, a novel construction of flexible ladder and fire-hose and reel whereby the hose is wound and unwound, raised, and lowered with the ladder.

Incidentally the invention embraces a portable hoisting-gear for lowering persons or articles from the upper stories of a building to the street during a fire and means for attaching the same to and detaching it from the top of a building.

The following description explains at length the nature of the said improvements and the manner in which I proceed to construct and operate a portable fire-escape apparatus in accordance therewith, reference being had to the accompanying drawings, forming part thereof.

Figure 1 of the drawings is a view in perspective of a building, showing the means for raising a flexible ladder and attaching it to the building. In this figure is represented one ladder attached to the building and another ladder in the act of being raised to position. Fig. 2 is a side elevation, on an enlarged scale, of the permanently-fixed clutches on the building, that constitute the means of attaching and making fast the upper end of the ladder to the building. This view shows also the running-cable and the building and the upper end of the ladder seized and locked in the clutches. Fig. 3 is a front view of Fig. 2. Fig. 4 is a side view of the permanently-fixed clutches, illustrating the operation of the parts when the ladder is being disengaged from the clutches to lower it to the ground. Fig. 5 is a perspective view of a section of the rope ladder. Fig. 6 is an enlarged detail in elevation of the joint connecting one of the rounds and the standards to the ropes of the ladder. Fig. 7 is a top view of the joint shown in Fig. 6. Figs. 8 and 9 are front and side views, respectively, of the automatic clutches. Fig. 10 is a side elevation, and Fig. 11 a plan, of the truck. Fig. 12 is an elevation taken from the rear end of the truck. Figs. 13 and 14 are details in side elevation and partly in longitudinal section of the reel and flexible ladder, illustrating the manner of carrying the ladder away from the face of the building and of maintaining it under tension. Fig. 15 is a horizontal section through the ladder and the wall of the building, taken transversely across the ladder above the clamp-iron. Fig. 16 is a vertical section showing details of the fastening, Fig. 15.

The complete apparatus embraced in this invention includes portable parts or features mounted on a wheeled truck A for convenience in handling and transporting from place to place and stationary or permanently-placed parts or features provided on and attached to the front of every building as a means of raising and lowering the ladder and making it fast to a building from a point of suspension at a distance from the street.

The apparatus is of such character that it is available and can be operated expeditiously within the lines of overhead electric wires in narrow streets and contracted quarters of cities where the ordinary fire-ladders cannot be brought into service until the wires are cut or removed from their poles in front of a building.

As shown in Figs. 1, 2, 3, 4, and 5, the ladder B is constructed of parallel ropes *a a b b*, united together by rounds *c* of rigid bars, and side bars or standards *d* set at intervals apart. The bars *c* form the rounds of the ladder and also a cradle or support along the middle for the sections of fire-hose D, for which purpose the middle portion of each round is bent or formed with an offset *f* to accommodate the curve of the hose when it is filled with water. The sections of hose are

kept in place and their weight supported when the ladder is raised by means of band-clamps *g*, secured to the hose at the coupling and made fast to the ladder-rounds. The standards *d* are attached to the side ropes *a* by a coupling composed of a sleeve having a thimble *i*, fitting tightly on the rope, and a screw-threaded socket *k*, in which the end of the round is fixed. The foot of the rod *d* is joined to the sleeve by a knuckle *m*, fitted on the thimble to make a quarter-revolution and having a socket for the lower end of the rod. The upper end of the rod terminates in an eye *n*, through which the outer rope *b* is fitted to render freely while in a state of tension. The shoulders *p p* on the knuckles form stops that limit the movement of the knuckle to an arc of ninety degrees, so that the rod may assume either an upright position at right angles to the round or a horizontal position in line with the round; but it cannot be turned beyond those points. When the ladder is stretched or suspended for use, these standards assume the perpendicular position, bringing the outer ropes *b* over and parallel with the inner ropes *a*, thus forming hand ropes or railings along the sides of the ladder. On the other hand, when the ladder is laid around the reel C the standards turn out in a line with the rounds, and the ladder is opened flatwise and lies in close coils on the reel. Screw-couplings b^2 are provided on all the ropes at intervals of length, dividing the ladder into sections of any desired length, at which points the ropes may be separated for the purpose of introducing an additional section to increase the length of the ladder or for connecting the ladders of two trucks together to furnish a greater length for reaching a higher point than it is possible to reach with either ladder singly. This construction provides a flexible ladder of great tensile strength combined with extreme lightness, as wire ropes of relative small diameter and light weight can be employed for the side ropes and hand-ropes, and the rods for the rounds and the standards can be made of tubular metal.

The ladder is made fast at one end to the reel and is provided on the outer or free end with a stiff frame composed of rigid side bars *s s* and a cross-bar *t*, by which the ladder is attached to suspension hooks or clutches under the eaves or cornices or some other point on the front of the building at or near the highest story. The side bars of this bail have the lower members *u* bent to stand outward at right angles, and on the ends of these members are eyes *v*, through which the side ropes are carried and made fast to the side bars near the bail *t*, while the hand-ropes *b* are carried through similar eyes *w* at the angle and carried along the side bars, to which they are secured. This frame is made to serve the double function of keeping the two sets of ropes *a a* and *b b* in position parallel and over each other and of making fast the ropes to the clutches provided on the building-front in such manner that the hand-ropes are kept apart and directly over the side ropes of the ladder.

The clutches or fastening devices on the outside of the building are permanently fixed in position at or near the roof and generally under the eaves or cornice where such parts project sufficiently from the face of the building to permit the clutches to be set the required distance beyond the line of the window-caps, moldings, and other projections to allow the ladder to swing clear of them in engaging or disengaging the clutches, as shown in Figs. 2, 3, 4, 8, and 9. The parts of this clutch or fastening consist of a stationary block 1, having an outwardly-standing horn and a deep recess or seat 2 at the bottom of the angle, a gravity latch or guard 3, pivoted at 4 and resting on the point of the hook, with an inclination forward and downward over the hook, so as to overhang the recess or opening in the hook, and a sheave 5, mounted to run loosely in bearings above the hook and perpendicularly over the bottom of the recess, in which the cross-bar on the end of the ladder is seated when the bail is set in the clutches. Two of these hooks and their latches, forming the complete clutch, are secured in place at proper distance apart to seize and carry the bail at the outer points near the bend or angle where the side bars *s* join the bail *t*, and the sheave 5 is set midway between the clutches, so as to bring the running cable 12 directly over the center of the bail *t*. The cable 12 is passed around the sheave and both ends are carried downward against the face of the building to the ground or lowest story to a box 14, in which the ends of the rope are confined. This box is conveniently accessible from the street and is kept closed and locked to prevent the rope from being drawn through the sheave by mischievous persons. Guide rings or eyes 15, fixed at intervals apart down the front of the building, confine one side of the rope closely against the building, and spring-clips 46 alongside the guides serve to hold in the other or return side of the cable. These points of attachment being placed at intervals apart in the length of the cables hold them from being blown out or swinging in the wind, and at the same time they allow one side of the cable to be detached clear of the building from the sheave 5 to the street below when the ladder is to be hoisted. At such time both ends of the cable are freed from the box 14, and while the end of the free side is made fast to the bail *t* on the end of the ladder the other end of the cable being passed under the end of the sheave $14^{\times}$ in the box is attached to a windlass, by which power sufficient to raise the ladder up to the clutches is applied to the cable. The same truck that carries the ladder and its reel is provided with a hoisting-gear for this purpose, consisting of a flanged roller 17, suspended in brackets 18 from the under side

of the truck-frame, and a hand-crank 19, which is geared into the roller by a spur-wheel 20 and pinion 21 for power. Where speed is required in paying out or taking in the cable, the hand-crank is shifted from the pinion-shaft directly to the roller-shaft. Usually two of these rollers are placed on the truck, one at each side, for operating the cable 12 from either side of the truck. In addition to these rollers the truck is provided with tension devices for taking up slack in the side ropes and the hand-ropes to throw tension on the ladder when it is to be carried at an angle from the building downward to the truck, as illustrated on the right-hand side of Fig. 1. These tension devices consist of a winding-roller 22, carried in bearings 23 above the ladder-reel, and a rope 24, wound on the roller and having a pair of grapple-hooks 25 on the end to seize the hand-ropes. A similar roller 26, mounted on the turn-table and having a rope 27 with hooks 28 to seize the side ropes of the ladder at one of the rounds, is used to produce tension on the side ropes under varying conditions where the ladder is carried away from the building in a slanting position.

The reel C is mounted on a turn-table 7 for convenience in operating the reel either from the end of the truck or from either side, and a hand-wheel E is geared into the revolving ring by bevel-gears 8 for turning the same. The reel is controlled by a pawl and ratchet 6, and power is applied to wind up and unwind the ladder by hand-cranks and gearing 9. Between the front and rear wheels a water-tank 29 is arranged for a ballast to anchor or weigh down the truck when it is set in position for raising the ladder. This tank is located as nearly under the reel as the construction of the truck will allow. It is provided with couplings 30 on the sides to make connection with a hose from a hydrant, and it is emptied through a waste-outlet 31 in the bottom. The tank thus forms a ready and convenient means of loading or anchoring the truck when the ladder is to be used, and at the same time the truck is quickly lightened by emptying the tank.

Provision is made also for connecting short stand-pipes 33 to the top of the tank for the purpose of equalizing the load in the tank when the truck is required to stand on a heavy grade or an inclined position. For this purpose the top of the tank is provided with couplings 34, closed by screw-caps to which stand-pipes may be connected by removing the caps and screwing the pipe to the couplings. One of these stand-pipes is shown in the top of the tank at 33, Figs. 10 and 11.

Room on the truck-platform over the tank is afforded for an auxiliary windlass carrying a hoisting-cable, which I sometimes provide for use on the apparatus for operation in connection with the fixed clutches on the building and the running-cable attached to the building. This auxiliary windlass consists of two separate reels or drums 35 36, each provided with a hand-crank and gearing 39 for winding up the cable and each having a strap-brake 40, with an operating foot-lever 41, for controlling the speed of the drum in unwinding. The cable being of considerable length has one end attached to one drum and the other end to the other drum, so that by paying off from one drum and winding up on the other the cable can be made to travel through a pulley or loop. Then by attaching the bight of this cable to the running-cable 12 it may be drawn up to any point above the ground or even raised up to the clutches at the top and made fast thereto by means of a bail $S^{\times}$, like that on the end of the ladder. This hoisting device is mounted on a turn-table 45 on the truck for convenience in turning the drums to work from either side or lengthwise of the truck.

In Figs. 13, 15, and 16 I have illustrated a means of securing the ladder to the front of the building at different points, so as to hang perpendicularly against or in close relation to the face of the building and to furnish a point of fastening, from which the remaining portion of the ladder running down to the reel may be carried away from the building and maintained in a slanting position under greater or less tension. For this means in the front of the building eyebolts or staples 46 are fastened in the wall at each story in pairs or sets on either side of the permanently-set running-cable 12, and a clamping-iron 47, shaped to lie across the side ropes of the ladder and provided with downwardly-bent ends 48 to fit the eyes, is used to lock the ladder to the building, the distance between the bent arms or members being equal to the distance on a horizontal line between the eyes of each pair, so that by drawing the ladder perpendicularly toward the wall at any point where a pair of these eyes may be located and then hooking into the eyes the ends of the clamp previously placed across the side ropes above one of the rounds the ladder is secured to the face of the building. This fastening is unshipped and detached from the wall simply by drawing up the ladder before lowering it, by which movement also the bail on the upper end of the ladder is automatically disconnected from the clutches and the ladder is ready to be lowered to the ground. This operation is quickly effected from the street by hauling on the cable 12. As thus constructed and arranged for operation the clutches and running-cables are located on the front of a building at intervals apart and extending from the eaves or cornice down to the ground, the clutches and their sheaves being supported clear of the face of the building by brackets to allow the ladder to clear the projecting caps and moldings where such exist and to throw the line of draft of the running-cable perpendicularly over the recess of the clutches. This position of the sheave should be such that the cross-bar of the bail in sliding upward against the outer

face of the inclined hook will be drawn inwardly with sufficient strain as it strikes the latch and passes over the point of the hook to cause the bail to drop with certainty into the recess of the hook. In like manner the bail in its upward movement as it is drawn out of the recess is caused to hug the inclined arm or member of the bracket overhanging the hook, and thereby readily raise and ride over the latch and allow the outer end of that piece to drop again and cover the horn of the hook after the bail has passed over the hook and before the rope is slackened to lower the ladder. Then the opening of the hook being closed by the guard 4, the bail will slip off the point of the guard, and thus be freed from the hook. In this manner the clutch operates automatically to engage and disengage the bail or fastening means on the end of the ladder.

Having thus fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A fire-escape apparatus including a wheeled truck, a reel, a rope ladder composed of side ropes, hand-ropes, spaced ladder-rounds and standards carrying the hand-ropes; in combination with a running-cable permanently affixed to the building, a sheave and a clutch device placed in relation to the sheave, for operation as described.

2. In a fire-escape apparatus a rope ladder composed of side ropes, rounds joining the side ropes together at intervals apart, standards attached to the side ropes by hinged connections that permit movement of the standards in a quarter-circle, and hand-ropes supported by said standards, as described.

3. In a fire-escape apparatus the combination with a wheeled truck, a reel mounted thereon, a rope ladder wound on the reel having side ropes and hand-ropes and connecting rounds and standards; of means for attaching the end of the ladder to a building at a point higher than the truck, means for securing the ladder perpendicularly against the face of the building at a point below the said point of attachment to the building, and tension devices for maintaining tension on the side ropes and the hand-ropes, as described.

4. In a fire-escape apparatus the combination, with a wheeled truck, a reel, a flexible ladder wound on said reel having means for clamping and carrying sections of fire-hose thereon; of a running-cable permanently affixed to the face of a building and extending downward from a sheave at the top and a clutch device located with relation to the sheave as described, as a means of raising the ladder up to and suspending it from the clutch.

5. In a fire-escape apparatus the combination, with a flexible ladder adapted to be wound on a reel; of a bail on the end of the ladder and a clutch device on the building adapted to seize the bail and comprising a stationary hook and an inclined guard overhanging the point of the hook.

6. The combination on a building-front of a clutch device composed of a stationary hook projecting outwardly from the building, an inclined gravity-guard overhanging the point of the hook, and a running-cable extending from a sheave above the hook downward along the face of the building.

7. In a fire-escape apparatus, a flexible fire-ladder composed of side ropes, hand-ropes rigid rounds joining the side ropes at intervals, standards supporting the hand-ropes and connected to the rounds by hinged joints and means for clamping sections of fire-hose to the ladder-rounds.

8. A fire-escape apparatus including a wheeled truck, a flexible ladder, a reel for the ladder, tension devices adapted to apply tension to the ropes of the ladder, winding-rollers mounted on the truck, and means attached to a building for raising and securing the end of the ladder to a point of suspension above the street, comprising a sheave, a running-cable extending over the sheave and down to the ground, and adapted for connection with the winding-roller, and a clutch device located below the sheave and constructed to seize and fasten the end of the ladder to the building, as described.

9. The combination with a truck and a reel mounted thereon, of pliable hose-carrying sections formed of parallel cables united by rigid cross-bars, hose-sections detachably secured to the cross-bars, and coupling devices on the ends of the cable-sections and the hose-sections for joining the same together to increase or reduce the length thereof, said cable-sections forming both a ladder and a carrier for the hose being adapted to wind upon and be unwound from the reel.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

ROBERT B. HEMMING. [L. S.]

Witnesses:
EDWARD E. OSBORN,
M. REGNER.