

(No Model.)

I. H. ATHEY.  
FIRE ESCAPE.

No. 456,282.

Patented July 21, 1891.

Fig. 1.

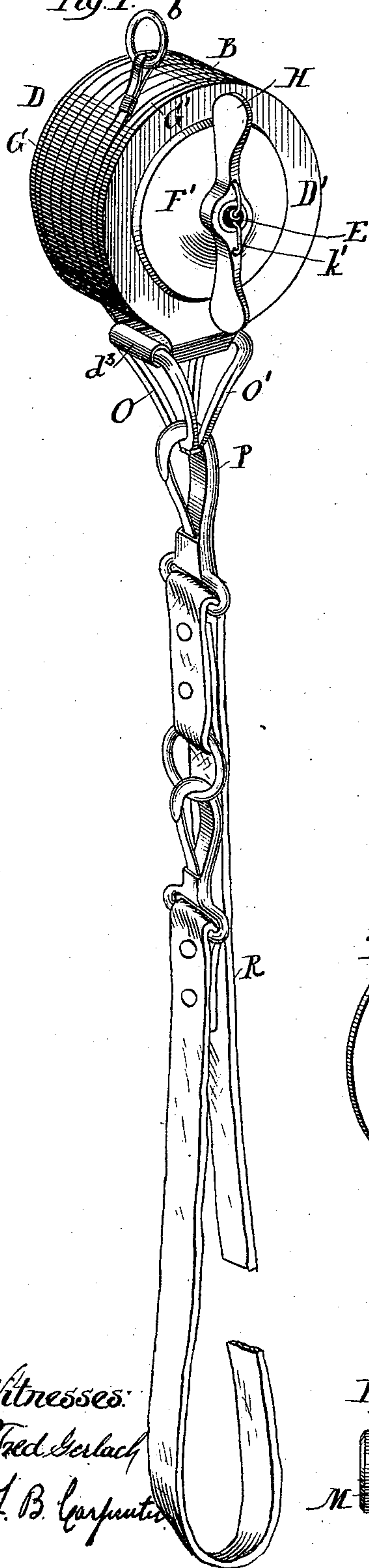


Fig. 2.

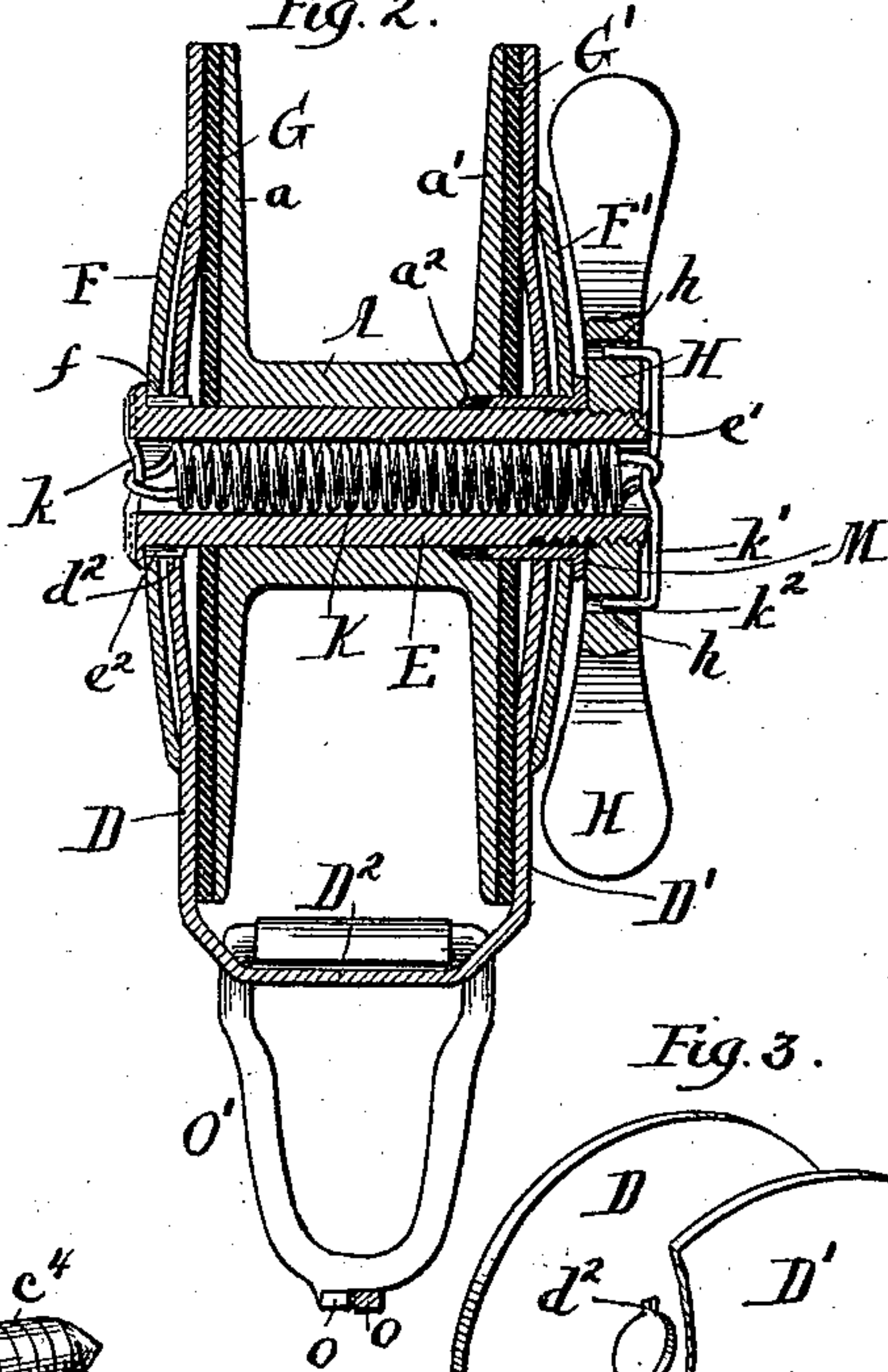


Fig. 4.

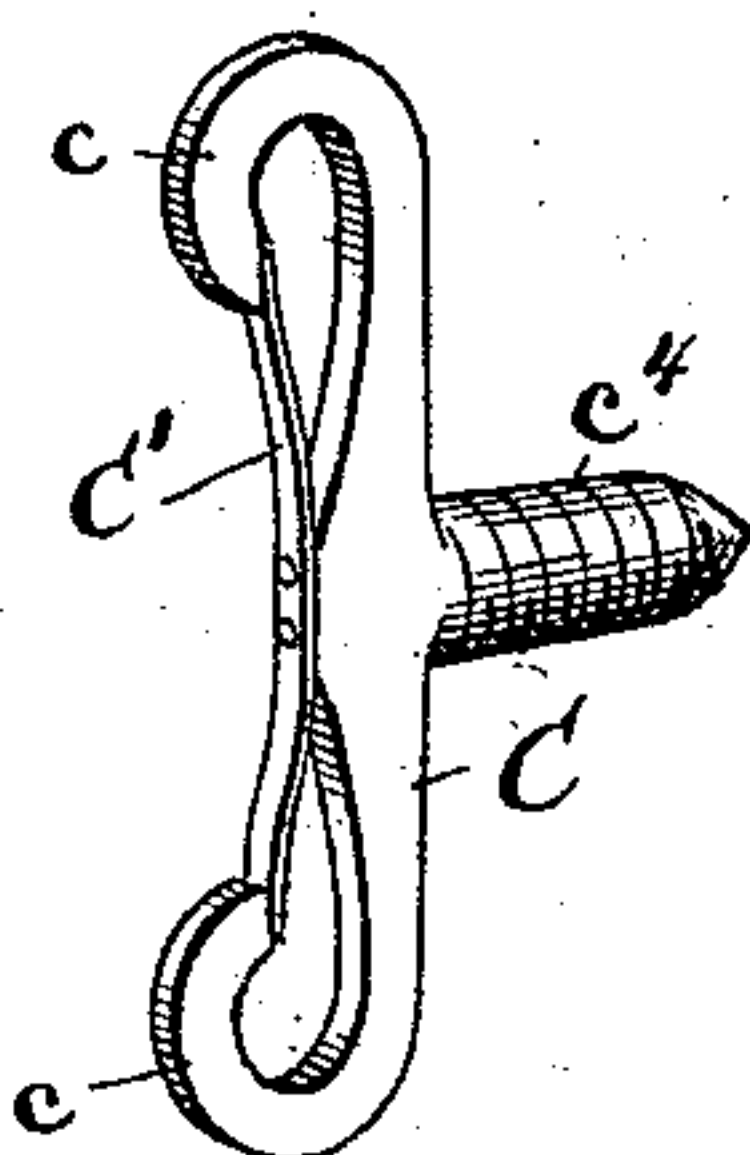


Fig. 3.

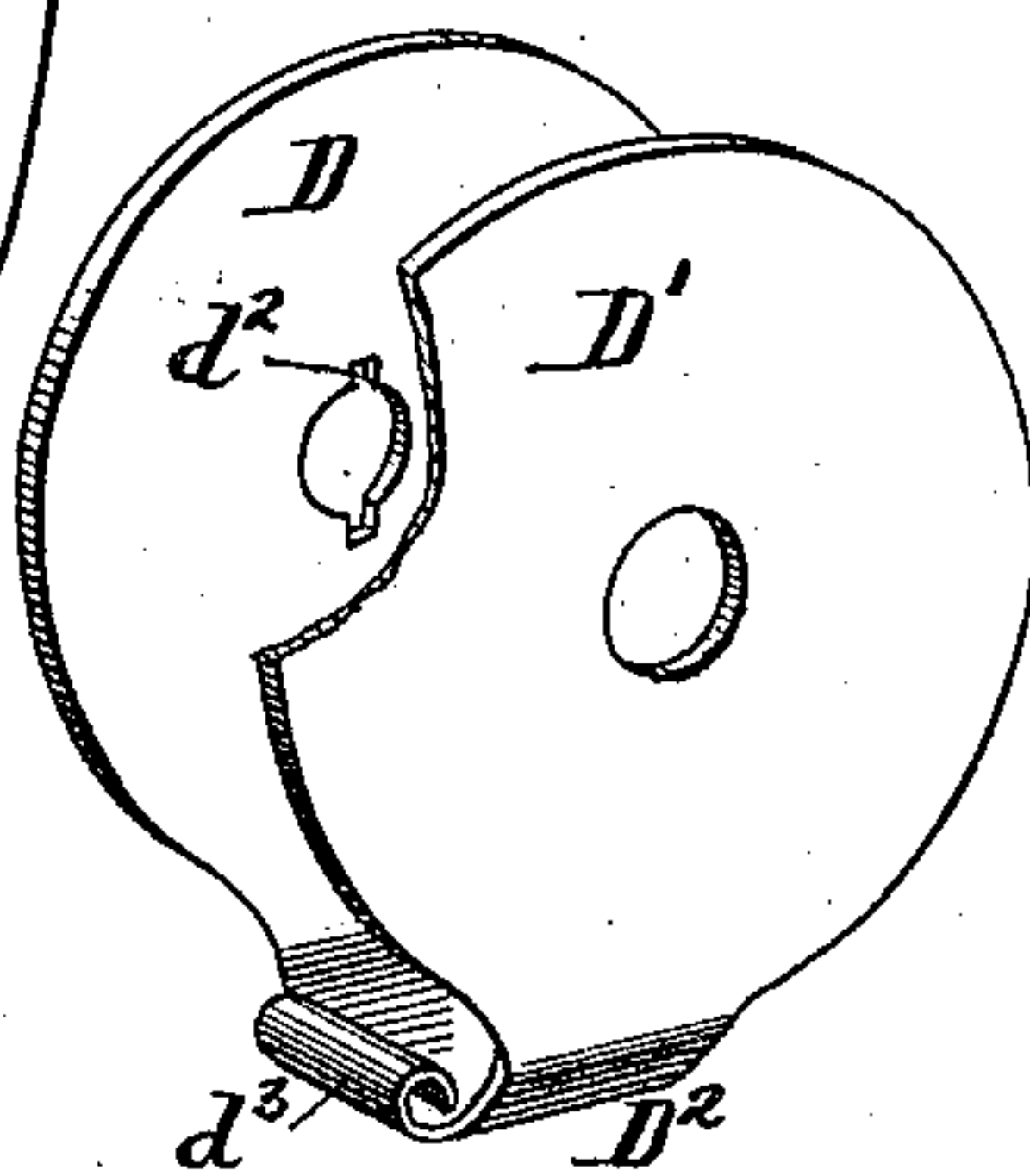


Fig. 8.

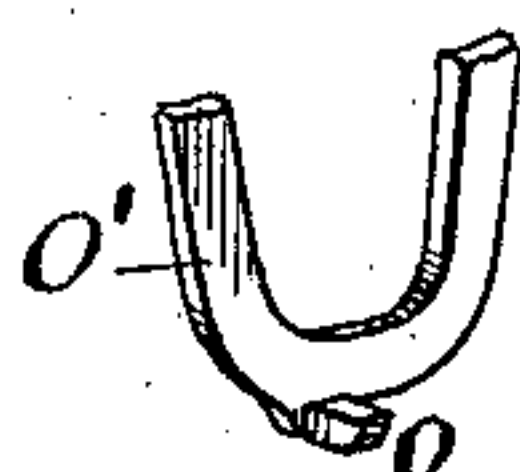


Fig. 7.

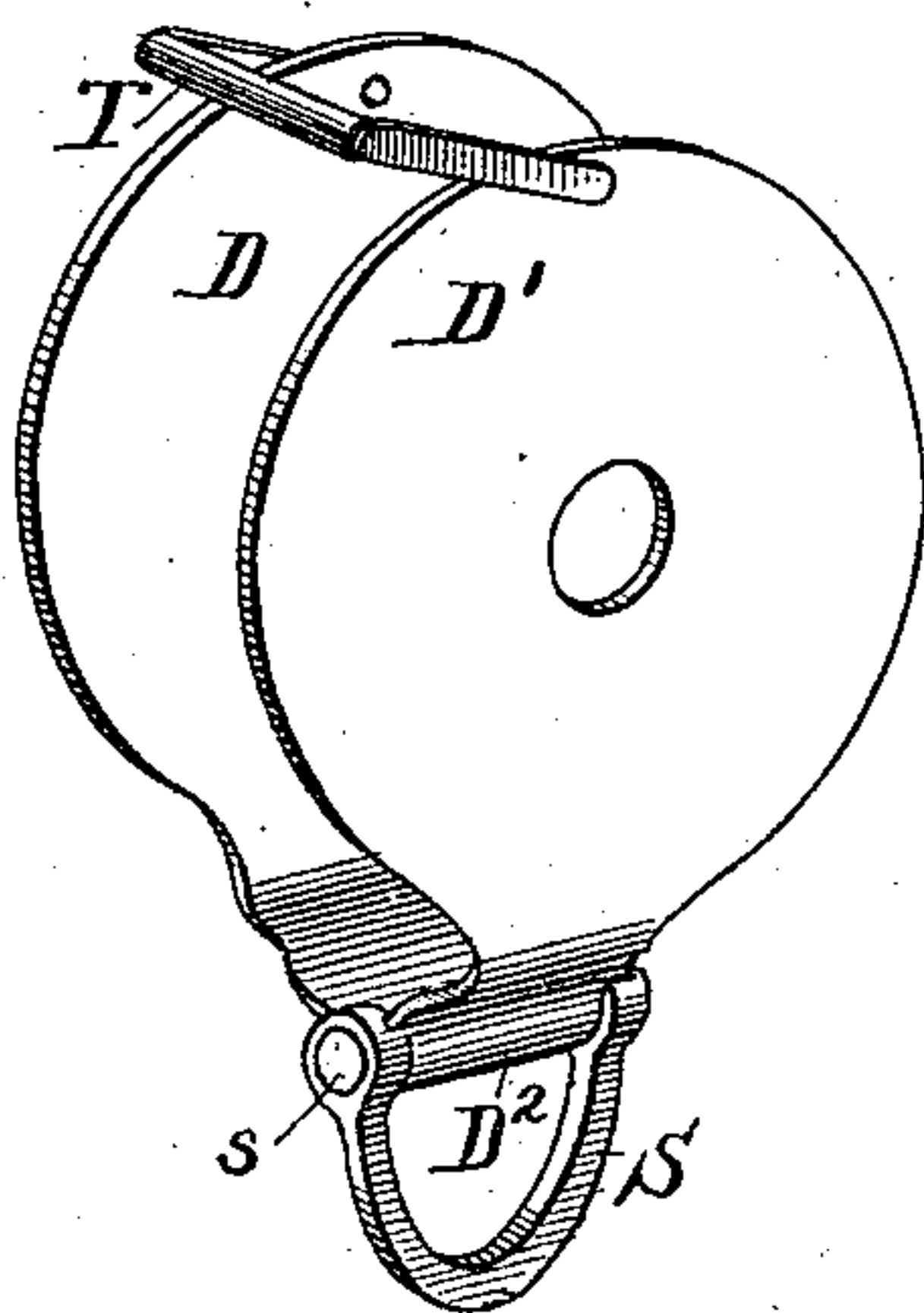


Fig. 6.

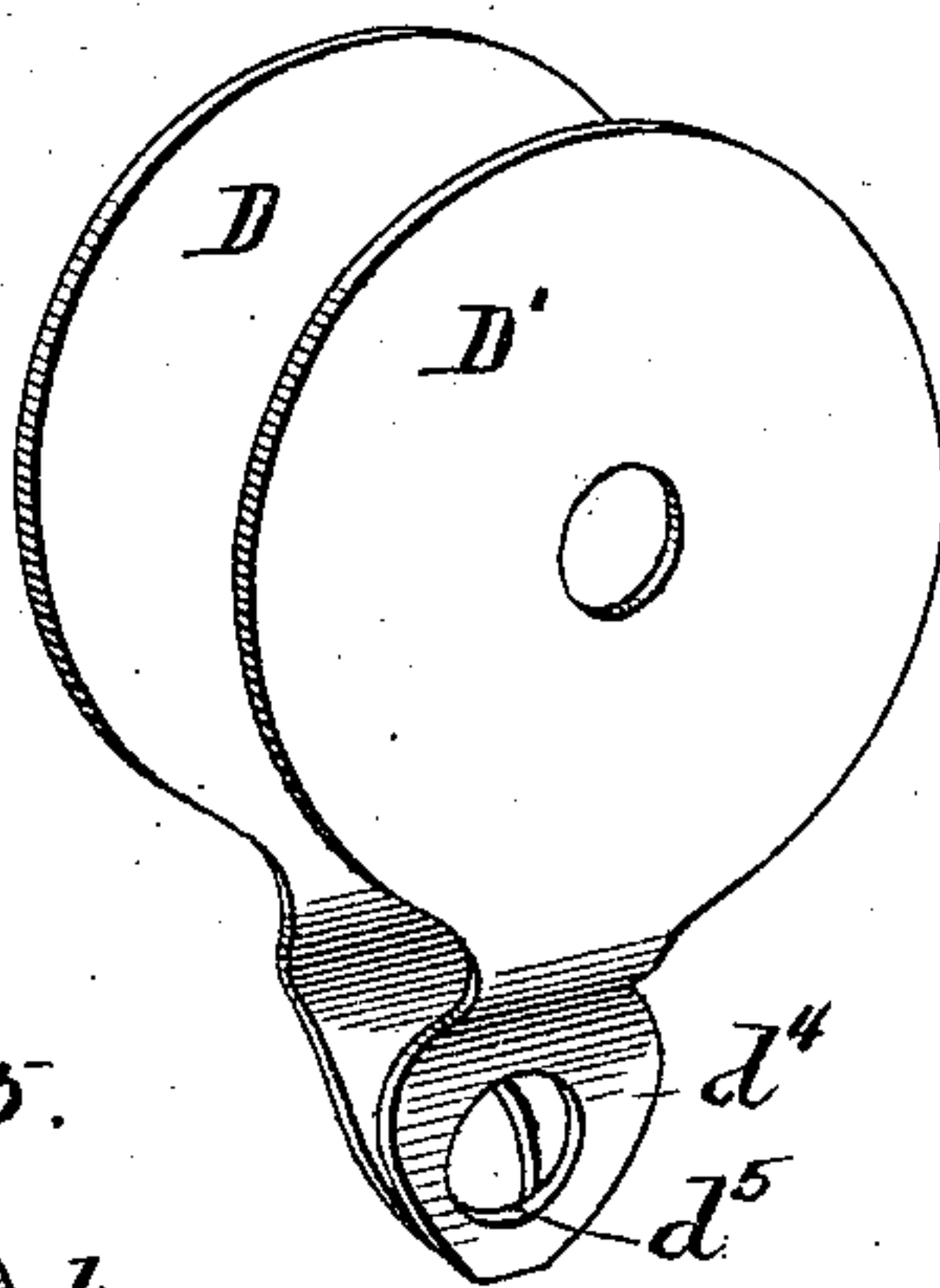


Fig. 5.

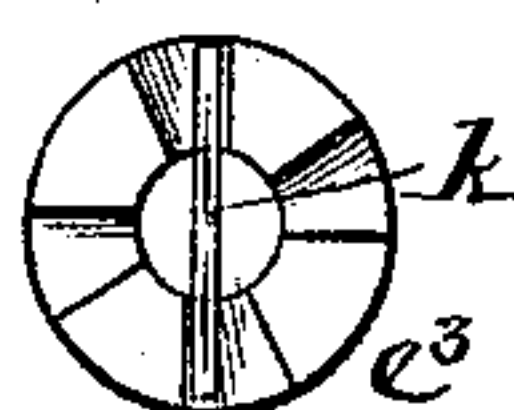


Fig. 10.

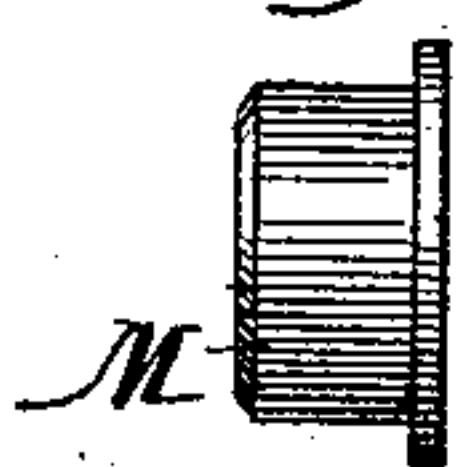
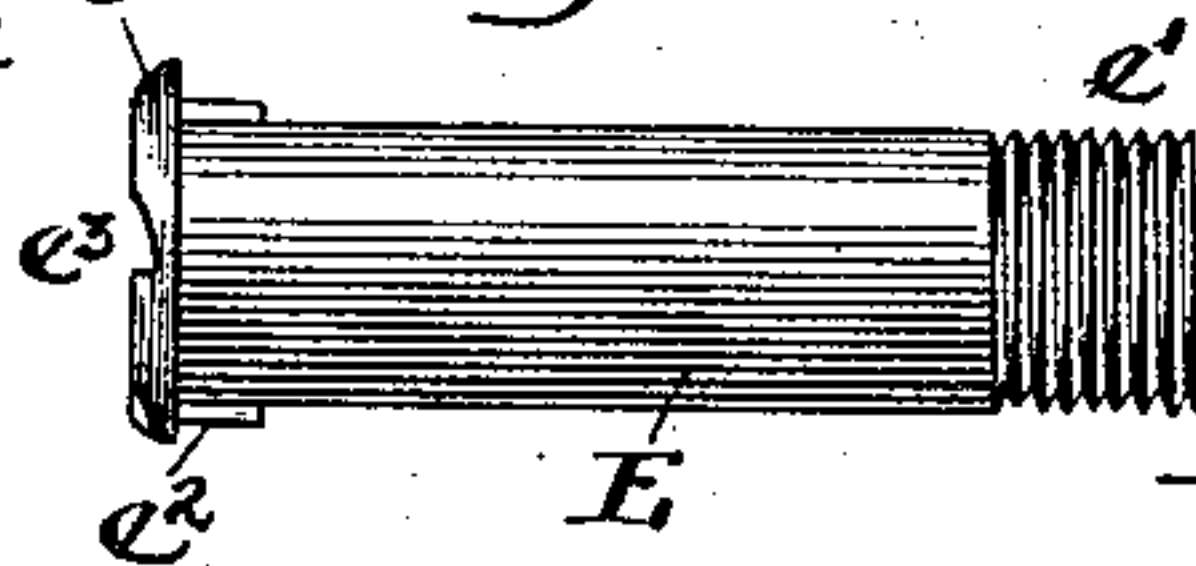


Fig. 9.



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# UNITED STATES PATENT OFFICE.

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## FIRE-ESCAPE.

SPECIFICATION forming part of Letters Patent No. 456,282, dated July 21, 1891.

Application filed December 16, 1890. Serial No. 374,894. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC H. ATHEY, residing at Chicago, in the State of Illinois, have invented certain new and useful Improvements in Fire-Escapes, of which the following is hereby declared to be a full, clear, and exact description sufficient to enable others skilled in the art to which such invention appertains to make and use the same.

My present invention has relation to that class of portable fire-escapes wherein the sustaining tape, cord, or wire is carried by a reel journaled within a suitable supporting-frame that is furnished with means whereby the user of the fire-escape can control the revolution of the reel and the consequent speed at which his descent shall be made. An example of this type of fire-escapes is illustrated in Letters Patent No. 402,053, granted to me April 23, 1889.

The object of my present invention is to provide improved means for controlling the movements of the reel, whereby the paying out of the tape, and consequently the speed of the descent of the user of the escape, can be determined with uniformity and ease, and whereby the possibility of a too-rapid descent shall be automatically guarded against.

A further object of my invention is to improve in various particulars the details of construction of the fire-escape, and thereby produce an escape that shall be more simple, durable, and effective in construction than any with which I am familiar.

With these several objects in view my invention consists in the various novel features of construction hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a perspective view of a fire-escape embodying my invention. Fig. 2 is a view in vertical transverse section through the reel and sustaining-frame illustrated in Fig. 1, the wire tape being omitted from the reel. Fig. 3 is a detail perspective view of the sustaining-frame. Fig. 4 is a detail perspective view of the screw whereby the end of the tape will be attached to the building. Fig. 5 is a detail end view of the hollow screw or axle for the

reel. Fig. 6 is a detail perspective view showing a modified form of supporting-frame. Fig. 7 is a perspective view of a further modified form of supporting-frame. Fig. 8 is a detail perspective view of the lower portion of one of the suspension links. Fig. 9 is a detail side view of the screw-axle. Fig. 10 is a detail side view of the thimble for the axle.

A designates the reel whereon is wound the suspension-tape B. By preference I employ a flat tape formed of aluminium or of tough steel, as I have found that from either of these metals a small and light tape of great tensile strength can be formed. The tape will be of any desired length, and at one end it is securely attached to the central portion of the reel A, while the opposite end is furnished with a ring *b*, whereby the tape can be conveniently attached to the attachment-screw C when this screw has been securely embedded in the window-casing or other convenient point from which the descent is to be made.

The reel A is sustained between the side plates D and D' of the supporting-frame, these side plates being preferably formed from sheet-steel and being by preference connected together at their bottoms by the integral tie-plate D<sup>2</sup>. The side plates D and D' of the sustaining-frame are preferably of a size corresponding with the end plates *a* and *a'* of the reel, so as to more effectively exert a pressure throughout the entire surface of the end plates. The tie-plate D<sup>2</sup>, by which the side plates D and D' are united, is sufficiently elastic to permit these plates to be readily forced inward under the action of the pressure mechanism whereby the revolution of the reel is controlled, as will presently more fully appear. Between these side plates of the supporting-frame the reel A is sustained, being journaled upon an axle or screw E, that passes through the reel and through the side plates D D' of the supporting-frame, and as well also through the pressure plates or caps F and F', that bear upon the outer faces of the side plates D and D'. By preference I interpose between the side plates D and D' of the supporting-frame and the end plates *a* and *a'* of the reel the friction-pads G, of



leather or other suitable material, these pads being preferably connected to the side plates D and D' by cement or light rivets.

While I regard the employment of the pads G G' as highly desirable because of the better frictional bearing afforded thereby, still I do not wish my invention to be understood as necessarily restricted thereto, since the side plates D D' of the supporting-frame might bear directly upon the end plates  $a a'$  of the reel, although I do not deem such construction as desirable.

In the preferred form of my invention the pressure-plates F and F' are concaved or dished, as shown, the purpose of this construction being to cause these plates to exert a more effective pressure toward the outer portion of the side plates D D' of the supporting-frame and at the same time to give an elasticity to such plates which will tend toward a more uniform and effective action of the reel when pressure has been applied to control the paying out of the tape as the user of the escape makes his descent. By preference, also, and for like reason the side plates D D' of the supporting-frame are concaved or dished about their central portions, as more particularly seen in Fig. 2 of the drawings.

The axle E in the preferred form of my invention is a hollow screw provided at one end with a flanged head  $e$ , that bears against the pressure plate or cap F, and provided at its opposite ends with screw-threads  $e'$ , whereon will work the hand-nut H. The head end of the axle E is furnished with one or more ribs or splines  $e^2$ , that enter corresponding notches  $f$  and  $d^2$ , formed, respectively, in the cap F and the side plate D of the supporting-frame about their central perforations, the purpose of these splines and notches being to guard the axle against rotation, as will presently more fully appear. Through the central opening of the axle E extends a coiled spring K, one terminal of which is attached to a cross-bar  $k$ , that rests upon the head  $e$  of the axle, while the opposite terminal of this spring is attached to a cross-bar  $k'$ , that rests upon the hand-nut H or the opposite end of the axle. By preference the cross-bar  $k'$  is furnished with bent ends  $k^2$ , that enter perforations  $h$ , formed in the nut H, the purpose of which arrangement will hereinafter more fully appear. In order to protect the threaded portion of the axle E from wear and insure a more easy and accurate working of the parts, I prefer to place upon this axle a thimble M, having a flanged end  $m$ , this thimble being located between the threaded portion of the axle E, the pressure-plate F', the side plate D' of the supporting-frame, the friction-pad G', and the end plate  $a'$  of the reel. In order to allow for the inward movement of this thimble, the bore of the reel is countersunk or enlarged, as at  $a^2$ , as more particularly seen in Fig. 2 of the drawings.

In the preferred embodiment of my inven-

tion the tie-plate D<sup>2</sup>, that connects the side plates D D' of the supporting-frame, is furnished with upturned portions  $d^3$ , that constitute eyes or seats to receive and retain the suspension-links O and O'. In order to brace the links O and O', each of them is formed with an inwardly-extending lug  $o$ , adapted to bear against the bottom of the opposite link. By this means, when the links O and O' are together, as seen in Fig. 1, and the hook P of the body-strap R has been engaged therewith, the lugs  $o$  upon the links will cause an interlocking of these links, and consequently will cause the weight of the user of the escape to be better sustained thereby—that is to say, when strain is thrown upon the hook P in straight downward direction such strain will be borne equally by the links O O', and if strain be toward one or the other of the links it is obvious that, inasmuch as the lug of each link passes beneath the end of the opposite link, the slipping of the ends of the links past each other is guarded against, and consequently the strain upon either link is braced by the resistance of the opposite link.

The operation of the construction hereinbefore described will be seen to be as follows: If it is desired to employ the escape in making a descent, for example, from the window of a burning building, the user of the escape will first pass the ring  $b$  of the tape over one of the hooked ends  $c$  of the attachment-screw C, and when so connected the ring will be guarded against slipping therefrom by means of a spring C', each end of which serves to guard one of the hooks  $c$  of the screw. The body-strap R will then be fastened about the body of the user beneath the arms, and the descent will be begun. It will be found that the coiled spring K, by reason of the pressure which it normally exerts upon the hand-nut H, will turn and force this nut against the flanged end of the thimble M, and consequently will cause the cap-plates F F' to bear upon the side plates D D' of the supporting-frame and to force these tie-plates and the friction-pads G G' against the ends  $a a'$  of the reel with a pressure corresponding to the force of the coiled spring K. Hence it is manifest that even if the user of the escape should neglect to turn the hand-screw H the coiled spring K, by reason of its pressure upon the parts, as above indicated, will prevent such an extremely rapid movement of the reel A as would be disastrous. Moreover, the force of the coiled spring thus tending to turn the hand-nut H in forward direction will guard against the user mistaking the proper direction for the turning of the nut to check the movement of the reel, since any backward turning of the nut tending to loosen the reel would be at once indicated by the resistance of the spring. It will be observed that the coiled spring K, by reason of its connection to the end  $e$  of the axle E through the medium of the rod  $k$ , can have its force or ten-



sion adjusted by merely turning this rod about the notched or toothed face  $e^3$  of the head  $e$  of the axle, and in this way the tension of the spring can be adjusted to suit the weight of the person for whom the escape is especially designed—that is to say, if the cross-bar  $k$  is in the position seen in Figs. 2 and 5 of the drawings, the tension exerted by the coiled spring is suitable for a person of medium weight, and if it is desired to set the spring for a very heavy person it is only necessary to turn the cross-bar  $k$  one or two additional revolutions, thereby winding the coiled spring and increasing its tension upon the hand-nut  $H$ , and by so much increasing the pressure exerted by this nut upon the pressure-plates  $F F'$  to check the movements of the reel  $A$ . If the user of the escape desires to effect a more rapid ascent than is permitted by the hand-nut  $H$  when controlled by the spring  $K$ , it is only necessary for him to turn backward the hand-nut against the force of this spring; or, if he desires to effect a more gradual descent, it is obvious that he can by turning forward the hand-nut  $H$  increase the pressure upon the pressure-plates  $F$  and  $F'$  and upon the reel until the movement of the reel is more or less checked or completely arrested, if desired.

My purpose in mounting the cross-bar  $k'$  upon the hand-nut  $H$  in the manner shown is to permit this nut to be forced inwardly after the cross-bar  $k'$  has come to rest upon the end of the axle  $E$ , and yet maintain the tension of the spring, and it is plain that when the hand-nut  $H$  is turned to effect an increased checking or arresting of the movement of the reel  $A$ , so that this nut passes below the end of the axle  $E$ , the cross-bar  $k'$  will rest upon the end of the axle; but the bent ends of the cross-bar will still be retained within the perforations of the hand-nut, and consequently the tension of the coiled spring  $K$  will always be maintained. This feature of employing a spring for the purpose of moderating the movements of the reel I regard as of very great importance, and, while I have shown what I regard as the best form of spring for such purpose, I do not wish my invention to be restricted thereto, since it is manifest that various other forms of springs might be employed without departing from the broad spirit of my invention.

As the hand-nut  $H$  is turned to produce a pressure upon the plates  $F$  and  $F'$ , and through these plates and intermediate parts upon the end plates of the reel  $A$ , it will be seen that the initial pressure of the plates  $F$  and  $D'$  will be exerted through their outer portions on account of the concaved or dished shape of the plates, and as this pressure is delivered at the greatest point from the center of revolution of the reel it will obviously be much more effective than if delivered at a point nearer the center of revolution.

If the plates  $F F'$  were simple flat plates and the side plates  $D$  and  $D'$  of the supporting-

frame were not concaved, as shown, then the pressure exerted by the screw-axle  $E$  would be greater adjacent the point of application than at a greater distance therefrom unless these plates were made of such increased size and weight as to render the apparatus very cumbersome and bulky. Moreover, by forming the pressure-plates  $F$  and  $F'$  concaved or dished, as shown, a more gradual and elastic action of these plates is secured, the pressure being applied, as above stated, first adjacent the outer ends of the plates, and then as the plates are compressed upon the concaved portion of the side plates  $D$  and  $D'$  until a gradual checking or arrest of the movements of the reel  $A$  is effected. It will be observed that as the hand-nut  $H$  is turned to effect the arrest or checking of the reel  $A$  the force of this spring will be exerted upon the flanged end of the thimble  $M$ , and the thimble will thus be forced inward along the expanded bore of the axle  $E$ . This thimble  $M$  not only serves to protect the threads of the axle against wear, which would occur if the side plate  $D'$  of the supporting-frame and the pressure-plate  $F$  were allowed to bear directly thereon, but by reason of the bearing of the hand-nut  $H$  upon the head of the thimble an easier action of the hand-nut is allowed. Any simple form of instrument—such, for example, as a pair of nippers or a small pronged wrench or key—may be used for shifting the cross-bar  $k$  to adjust the tension of the coiled spring  $K$ .

The attachment-screw  $C$  has its threaded shank  $c^4$  furnished with a gimlet-point, so that the shank can be readily inserted into the window-casing or other convenient part of the wood-work of the building, and the hooked ends  $c$  of this shank not only afford a ready means whereby the shank may be firmly screwed to place, but when the flat edges of these ends are brought to bear upon the wood-work they serve as fulera to sustain the weight of the user of the escape as the descent is being made, and thus in great measure relieve the tendency to withdraw the screw-shank from the wood. The employment of the spring  $C'$  for retaining the attachment ring or loop of the tape against displacement is also a desirable feature; but the precise shape of this spring may be varied without departing from the invention.

The use of an attachment-screw such as that illustrated is particularly advantageous in that it enables the free end of the tape  $B$  to be attached at such distance above the bottom of the window that the sharp bend of the tape over the window-sill is avoided, and, moreover, the user of the escape is allowed to place his weight upon the tape from the outset and without the necessity of first paying out a portion of the tape and then dropping until the slack of the tape is taken up, as would be necessary if the end of the tape were attached to the window-sill or to any fixed article of furniture within the room upon a line or below the window-sill.



The details of construction above set out may be varied within wide limits without departing from the scope of my invention. Thus, for example, in Fig. 6 of the drawings I have illustrated a modified form of the supporting-frame. In this construction the side plates D D' of the supporting-frame are furnished with downwardly-depending plates  $d^4$ , perforated, as at  $d^5$ , to receive the catch or snap-hook P of the body-strap or to receive suitable intermediate links, if desired. These downwardly-extending portions  $d^4$  may be formed integral with each other and with the side plates, if desired.

In Fig. 7 a further modified form of supporting-frame is illustrated. In this construction the side plates D D' of the frame are connected together by a tie-plate D<sup>2</sup>, formed integral with such side plates and constituting a seat adapted to receive the cross-bars of a link S, to which the snap-hook P of the body-strap may be conveniently attached. When this form of supporting-frame is employed, I prefer to provide at the top of the frame a swinging guide-bar T, against which the tape B will bear as it is being paid out, the effect of this guide-bar being to give a steadier movement to the tape during the descent of the user of the escape than would be possible if the tape passed from the reel in a line corresponding with the line of the strain exerted upon the body-strap.

Other changes in the details of construction will readily occur to those skilled in this class of devices.

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

1. A fire-escape comprising a supporting-frame, a reel contained between the side plates of said frame, concaved or dished pressure-plates upon the outside of said frame, and suitable means for exerting pressure upon said plates and through them to the sides of the frame and ends of the reel, substantially as described.

2. A fire-escape comprising a supporting-frame having concaved or dished end plates, a reel sustained between the side plates of said frame, concaved or dished pressure-plates upon the outside of said frame, and suitable means for exerting pressure upon said plates and through them to the sides of the frame

and ends of the reel, substantially as described.

3. A fire-escape comprising a supporting-frame, a reel carried by said frame, a threaded axle extending through said reel and frame, suitable pressure mechanism, and a movable thimble for protecting the threaded portion of said axle, substantially as described.

4. A fire-escape comprising a supporting-frame, a reel carried by said frame, a threaded axle or screw, a threaded adjusting hand-nut, and a spring for holding said nut in working position to exert a nominal pressure upon the reel-heads, substantially as described.

5. A fire-escape comprising a supporting-frame, a reel carried by said frame, a hollow threaded axle or screw, a threaded adjusting-nut, and a spring passing through said hollow axle for holding said nut in working position, substantially as described.

6. A fire-escape comprising a supporting-frame, a reel carried between the side plates of said frame, pressure-plates upon the outside of said frame, a hollow screw passing through said reel, said frame, and said pressure-plates, a threaded adjusting-nut for said screw, and a coiled spring passing through said hollow screw and attached to said nut, substantially as described.

7. A fire-escape comprising a supporting-frame, a reel carried by said frame, a threaded hollow axle or screw, a threaded adjusting-nut, and a spring passing through said hollow axle or screw and adjustably connected thereto and connected also to the said nut, substantially as described.

8. A fire-escape comprising a reel and a supporting-frame for said reel, said frame having a cross-plate at its bottom formed in piece therewith and provided with eyes for loops, said eyes extending in the direction of the length of the reel, and suitable loops within said eyes, substantially as described.

9. In a fire-escape of the kind described, the combination, with the supporting-frame and the body-strap, of connecting-loops provided at their bottom with interlocking lugs, substantially as described.

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Witnesses:

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T. B. CARPENTER.