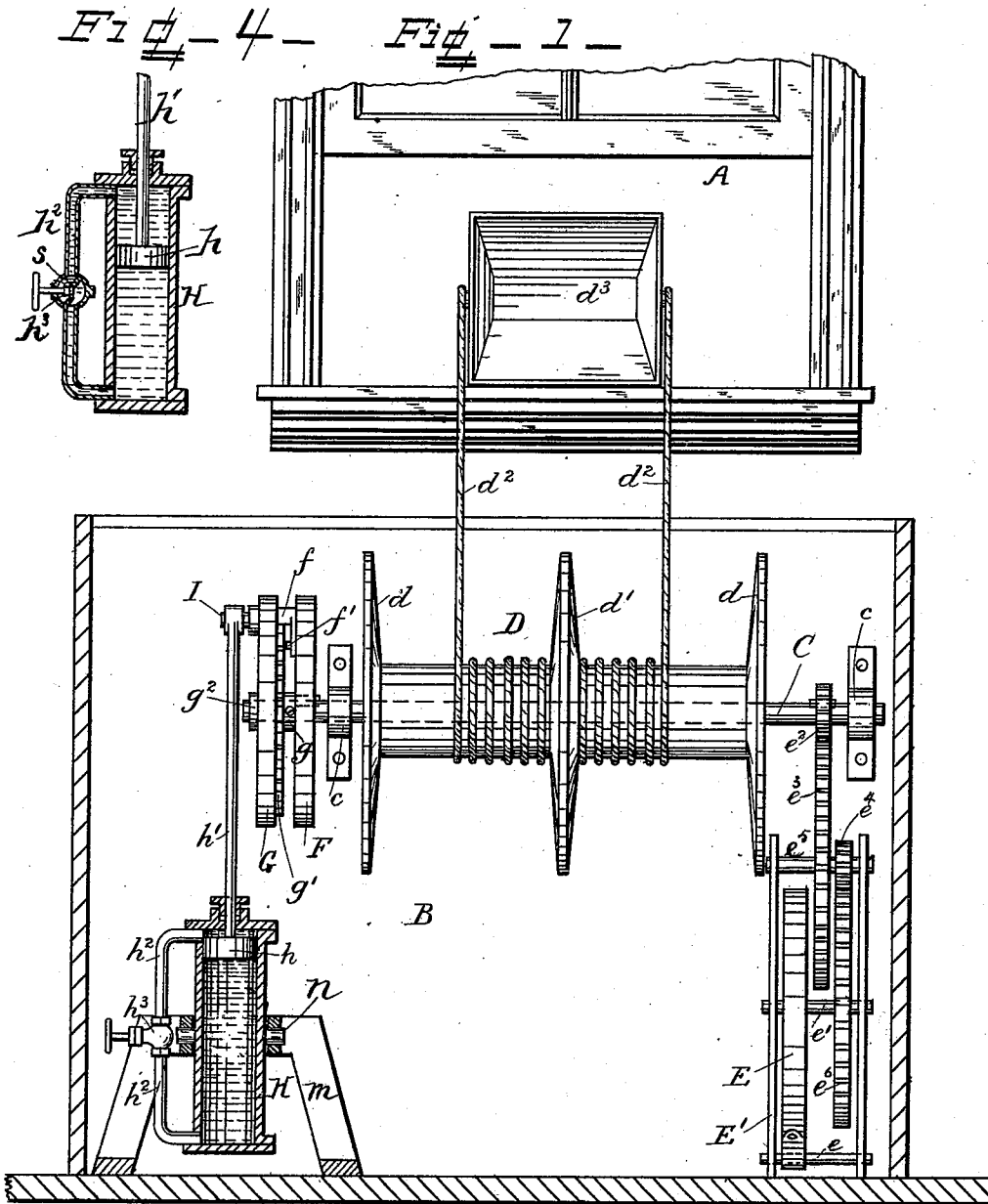


2 Sheets—Sheet 1.

No. 374,596.

Patented Dec. 13, 1887.



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(No Model.)

2 Sheets—Sheet 2.

W. H. & J. D. GRAY & J. B. CHASTAIN.
FIRE ESCAPE.

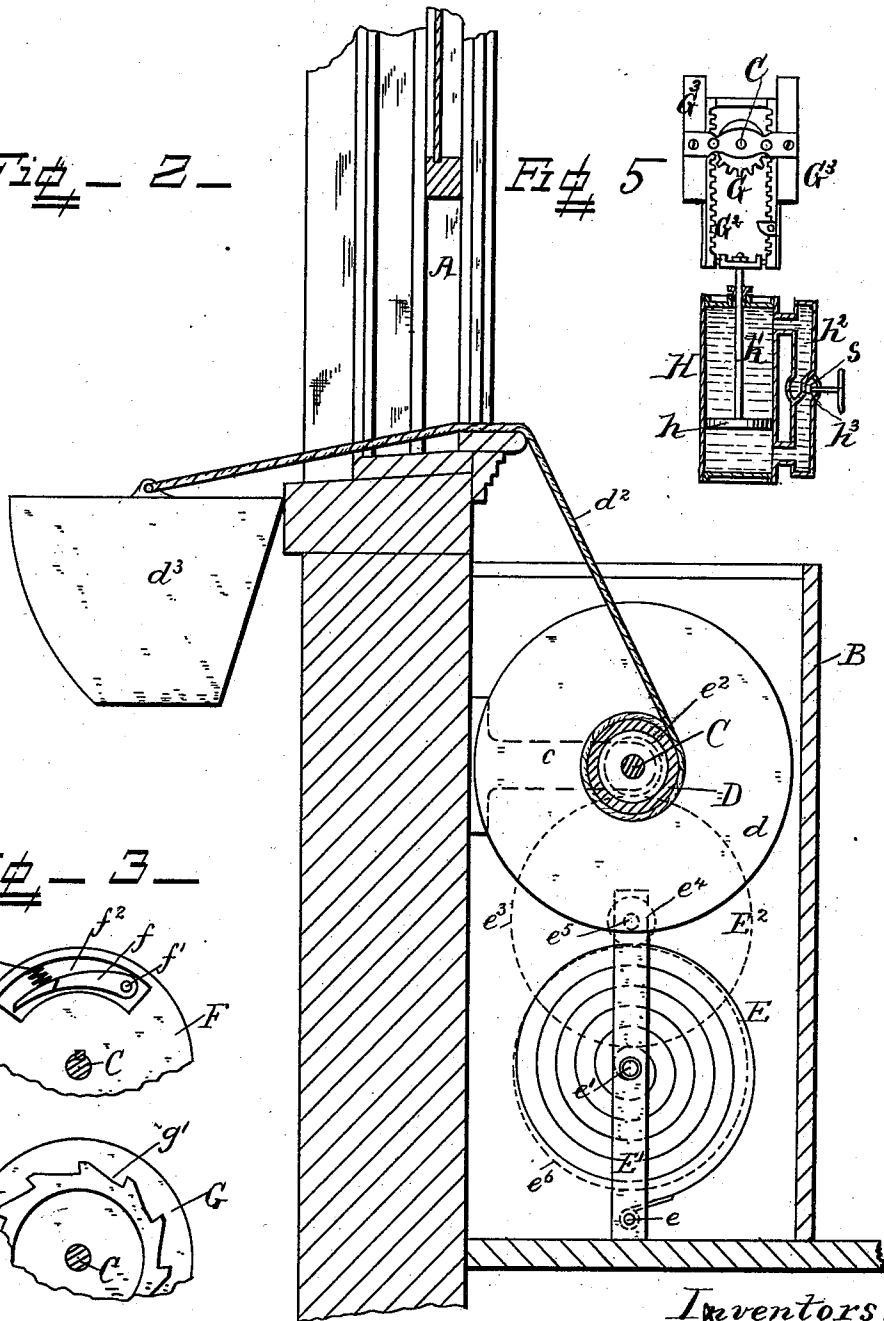
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Fig. 2—

Fig. 5—

Fig. 3—



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM H. GRAY AND JAMES D. GRAY, OF WEST FALLS, AND JAMES B. CHASTAIN, OF BALTIMORE, MARYLAND, ASSIGNORS OF PART TO JOSEPH S. LAWRENCE AND O. W. BENNETT, OF WASHINGTON, DISTRICT OF COLUMBIA, AND T. W. TONGUE, OF BALTIMORE, MARYLAND.

FIRE-ESCAPE.

SPECIFICATION forming part of Letters Patent No. 374,596, dated December 13, 1887.

Application filed April 5, 1887. Serial No. 233,697. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. GRAY and JAMES D. GRAY, residing at West Falls, in the county of Frederick, and JAMES B. CHASTAIN, of Baltimore, in the State of Maryland, citizens of the United States, have invented new and useful Improvements in Fire-Escapes, of which the following is a specification.

Our improvement is directed to that class of fire escapes in which a governor is provided for automatically controlling the unwinding descent of a lowering medium from the window of a dwelling to the ground for the escape of the occupants of the house in case of fire, and in which a spring-motor is provided for returning the lowering medium to the same window for the escape of other persons; and the object of our improvement is to provide, as a fixture of the room or apartment, a hydraulic piston-governor controlled by an external valved branch pipe, a lowering-drum device, and a winding return device for the lowering medium, whereby the governor device can be set to suit a given weight and the power of the spring which controls the return movement of the empty lowering device after the apparatus has been completed and tested, and thus render it certain that the descent of the loaded medium will be safely made and the empty medium quickly returned from the place to which the descent was effected. Such an adjustment is of the highest importance in such a fixed apparatus to afford its convenient and safe control. The provision which renders it convenient at any time to test the operation of the fixed apparatus under different loads to set it to suit a load of medium weight and the force of the spring without disturbing any part of the fixed apparatus renders the apparatus safe for use at any moment without regard to the specific weight of the person or persons using it.

Moreover, our improvement provides for a uniform descent of the lowering medium to avoid the irregular and jumping descent which a crank-governor connection would produce.

Our improved combination is especially ad-

vantageous, because it is rendered effective with a single fixed hydraulic governor-cylinder and a single piston-rod connection with the unwinding-drum and spring device.

The accompanying drawings illustrate our improved fire-escape.

Figure 1 is a vertical elevation of the cage or basket controlling apparatus, showing its piston-mercury-governor device in section and as applied to a basket or cage at the window of a dwelling. Fig. 2 shows a cross-section of the apparatus and its connected basket or cage in position to descend from the window of a dwelling, being controlled in such descent by the piston mercury-governor aforesaid. Fig. 3 shows the clutch-connections for the unwinding and winding device. Fig. 4 shows the piston mercury-governor device in section, and Fig. 5 shows the preferred governor-connection with the unwinding and winding device.

In the drawings we have shown the apparatus as applied for use at the window A of a dwelling, the box or casing B, containing the mechanism of the escape, being placed within the room below the window, and is suitably closed. This box or case may be made of any convenient form, secured upon the floor, or a receptacle for the mechanism may be built within the wall, as may be desired.

The shaft C of the winding and unwinding apparatus is journaled in bearings c, secured to the case B, to the wall, or to the floor of the building. This shaft has a double spool or drum, D, divided by end and middle disks, d d', for separating the ropes or chains d², which connect the drums with a basket or cage, d³, or other receptacle used as the means of escape from the window. A single drum and rope may be used if desired; but the double drum is preferred, as the two ropes keep the basket from twisting round.

E is a coiled spring, one end of which is secured to the spindle e', journaled in the said frame. A suitable train of spur-gearing connects the spindle e' with the winding and unwinding shaft C. This train of spur-gearing comprises the pinion e'', secured upon shaft C,

the wheel e^3 , and pinion e^4 , secured upon the spindle e^5 , journaled in the frame E' , of which the wheel e^3 gears into the pinion e^2 and the wheel e^6 , secured upon the spindle e^7 and gearing into the pinion e^4 .

F is a disk secured upon the shaft C and having a pawl, f , pivoted on a pin, f' , in a recess, f^2 , in its face, Fig. 3. The free end of the clutch-pawl projects outward beyond the face of the disk, and is constantly pressed out from disk by the spring f^3 .

G is a second disk journaled loosely between collars upon the shaft C in close proximity to the disk F , being separated from it only by the collar g . A ratchet-wheel, g' , is formed upon the face of the disk G and engages with the said pawl.

H is the governor-cylinder, secured to the box or floor. h is its piston, and h' its piston-rod. The opposite ends of the cylinder are connected by a branch pipe, h^2 , having a valve, h^3 , of any approved construction which is capable of being adjusted to permit the passage of mercury either way through it and of having its orifice or passage s made larger or smaller.

The piston-rod of the governor-cylinder is connected to the crank-pin I , projecting from the face of disk G , which is loosely mounted upon the spool-shaft.

The governor-cylinder and branch pipe are filled with mercury, oil, or water, and when anything is lowered in the basket and the drum and its clutch-connected disks are revolved the liquid is made to oscillate from one side of the piston to the other through the branch pipe and valve, and when this valve is adjusted so as to reduce the orifice through which the liquid flows it produces a retarding effect upon the lowering-basket, which reduces the speed of its descent and permits of any extent of variations from entire stoppage to a rapid fall. The weight of the basket and its contents in descending winds up the spring E , which in turn draws the basket up again when its contents have been removed. The governor is disconnected from the revolving mechanism during the ascent of the basket, but is automatically connected by means of the said clutch as soon as the basket arrives at the window or is stopped at any intermediate point.

The piston-rod may be connected in any suitable way to the crank-pin to allow the latter to revolve without lateral strain upon the piston-rod; but I prefer to mount the cylinder near the middle of its length upon trunnions n , fixed in a support, m , so that the movement of the piston-rod oscillates the cylinder to conform to the circle described by the crank-pin. The preferred piston-connection, however, for this purpose is shown in Fig. 5, because it will allow of a more uniform descent of the basket to the ground. It is the well-known rack and segmental pinion for converting a reciprocating into a rotary motion, and consists of a mutilated or segmental pinion, G ,

which is fitted loosely upon the drum-shaft C in the place of the clutch-disk G , (shown in Fig. 1,) and engages alternately with the opposite sides of the double rack G^2 , attached to the piston-rod of the governor-cylinder. In this modification the rack will work in fixed guides G^3 and the segmental pinion will form a part of the clutch-connection with the drum-shaft. In this plan the loose mutilated pinion of Fig. 5 is provided with a ratchet-wheel like that shown at g' in Fig. 3, and the device in Fig. 5 is a substitute for the wrist-pin connection in Fig. 1 and for the oscillation of the governor-cylinder.

It will be understood that the force of the spring may be sufficient to hold the empty basket or cage at the window while being filled, or until it is sufficiently weighted to overcome the force of the spring, so as to allow it to descend; but the basket may, after being thrown out of the window or other place, be held in position while being filled by a hook or rope connected with the case of the drum-winding apparatus or with the window-sill.

Instead of the ratchet device shown for connecting and disconnecting the winding function of the drum, we may use any of the well-known clutch devices for connecting the hydraulic cylinder-governor with the drum-shaft.

An important matter of our improvement is that there is absolute safety in the descent of the basket to its occupants, because its descent is controlled by the stroke of a piston working in a cylinder filled with mercury, which is forced by said piston from one end of the cylinder into its other end through a passage external to the piston-cylinder, which permits the mercury to pass by the force of the piston in such manner as to hold the piston from any sudden movement and cause it to operate the unwinding-drum device with a movement which winds up the spring, so that the force of the latter must constantly increase as the basket nears the ground, and therefore prevents all shock in striking the ground. In fact, the winding action of the spring tends to bring the basket to a stop on reaching the ground. In the return of the basket to the window, the unwinding of the spring constantly lessens its force, and therefore slows the ascent at the stopping-point. The force of the spring, however, must be sufficient to elevate the basket, which may be comparatively light, and to overcome the resistance of the clutch device.

We claim—

1. In a fire-escape, the combination of the drum device, a lowering medium connected therewith, and a coiled spring wound up by the action of the unwinding device, with a single cylinder, H , containing liquid supplemented by a branch pipe, h^2 , communicating with each end of the cylinder, having a valve, h^3 , to control the flow of the liquid through it into the opposite ends of said cylinder, the

piston, the double rack G^2 , connected therewith, the segmental pinion G , loosely mounted on the shaft of the unwinding-drum, and a clutch-connection for said pinion and drum device, substantially as described.

2. In a fire-escape, the combination of a basket or cage, a drum, and connecting-ropes, with a train of gearing and a coil-spring motor therefor connected to one end of the drum-shaft, and a governor consisting of a cylinder provided with a branch pipe or passage-way connecting its opposite ends, filled with mercury, and having a valve for regulating the size of said passage, and a piston working within said cylinder, having a clutch-connection with the other end of said drum, whereby to retard its unwinding action, substantially as described.

3. The combination, in a fire-escape, of the double-drum device, a single cylinder containing mercury, having an external valve-controlled branch pipe, h^2 , a piston having a double rack, G^2 , the loose mutilated pinion G ,

a clutch-connection for the latter and the drum, a coiled spring, and a train of gear connecting said spring, drum, and governor, all connected together and mounted within a fixed wall-casing of the house, substantially as described.

4. The combination, with the fixed casing B , of the double drum, the single hydraulic governor-cylinder device, a clutch-connection for the latter with one end of said drum, a coiled spring, E , and a train of gearing connecting said spring with the other end of said drum and with the governor device, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

WM. H. GRAY.
JAMES D. GRAY.
JAMES B. CHASTAIN.

Witnesses:

A. E. H. JOHNSON,
WM. R. MACKRILLE.