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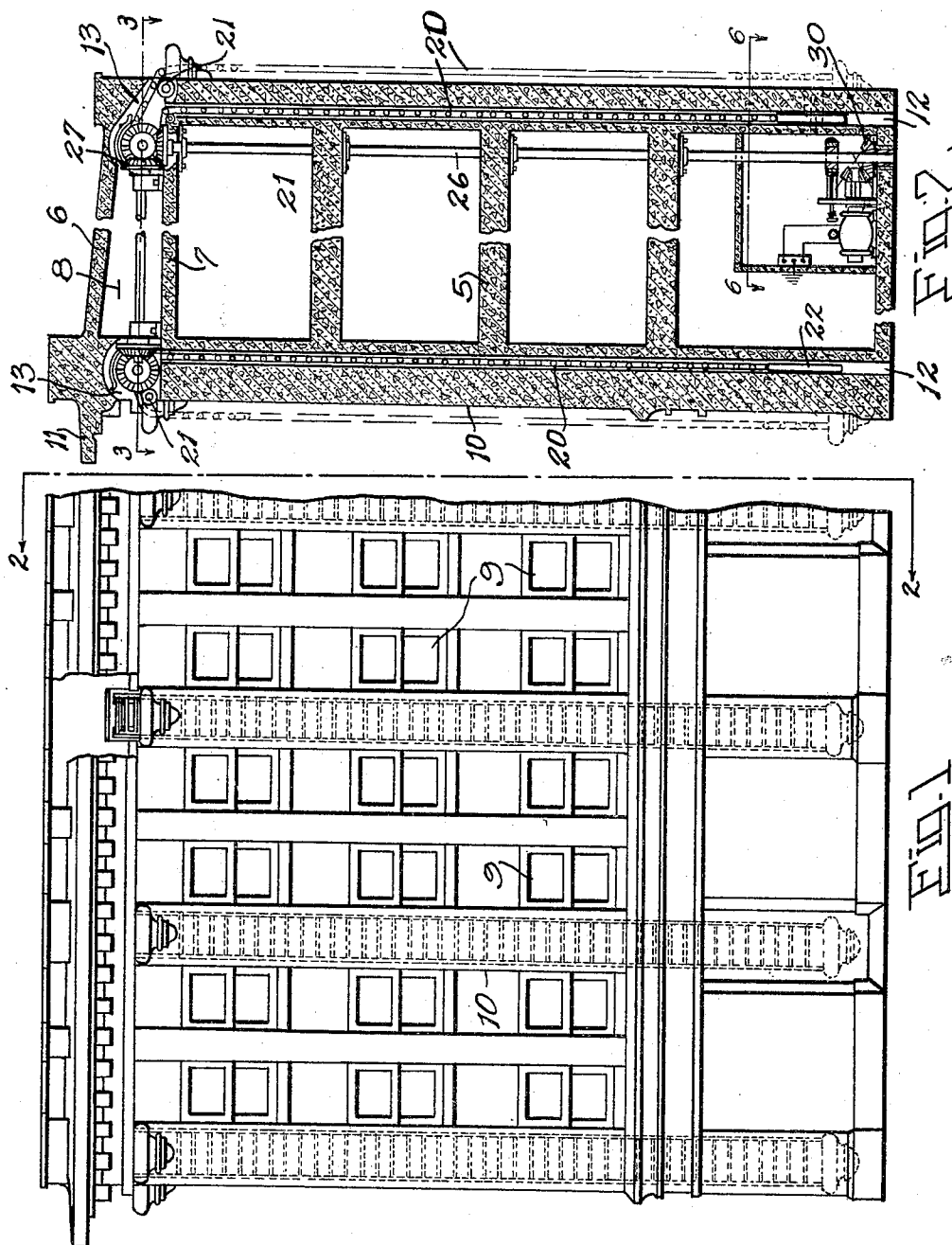
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1,902,230

FIRE ESCAPE

Filed Feb. 18, 1929

3 Sheets-Sheet 1



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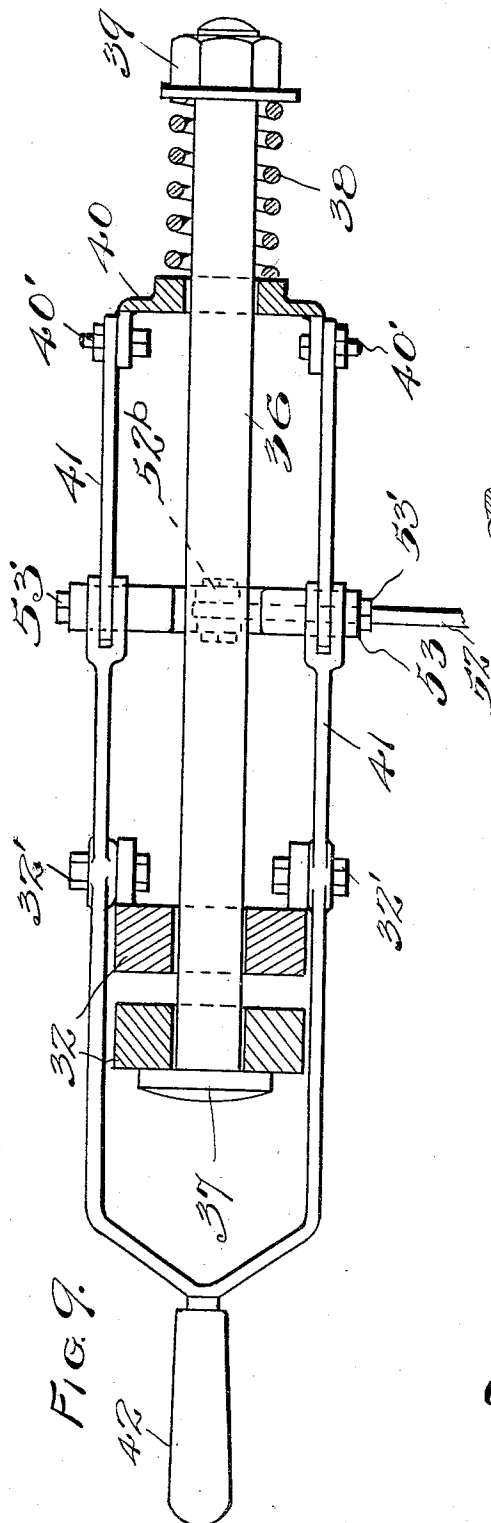
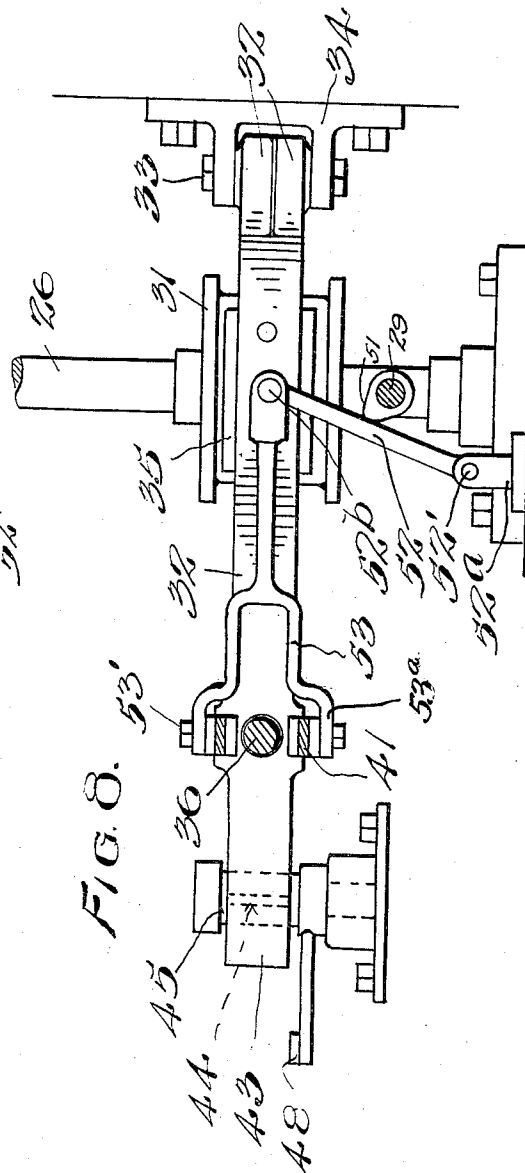
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UNITED STATES PATENT OFFICE

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FIRE ESCAPE

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My present invention relates to improvements in fire escapes of the type associated with building structures and forming a permanent feature of the building. The invention may be physically embodied as a single unit, but it is preferably used as a system involving a plurality or multiplicity of fire escapes that are readily accessible to the occupants of a building for escape therefrom, and the fire escapes are also adapted for use by the firemen or fire fighters in effecting rescues, gaining access to the fire in a building, and for salvage purposes.

In carrying out my invention one or more exterior walls of the building are provided with one or more interior wells in which the separated fire escapes in the form of chain ladders are normally located, and means are provided whereby the chain ladders may be hoisted from the interior wells of the wall and lowered to the ground, or near the ground along the exterior face of the wall of the building. Thus a chain ladder may be lowered along the face of an exterior wall between two vertical rows of windows or other wall openings and in such close proximity thereto as to permit the occupants of rooms to step from window sills to the chain ladder after which they may descend to the ground in safety. After the ladders have been lifted from their wells and lowered along the exterior face of the wall they may be scaled by the firemen; and the ladders may also be used as carriers for lowering those who are unable to descend in the usual manner.

One or more walls of the building may be equipped with the fire escape system and the wells and ladders are located at convenient places for use. When in normal position the ladders are invisible, and as the remainder of the equipment is out of sight, the architectural appearance of the exterior of the building is not changed by the use of the system of escapes. A carrier is provided at the outer end of each chain ladder, and these carriers are fashioned in such manner as to blend with the style of the building and form ornamental features located preferably below the cornice of the building.

The chain ladders are counterbalanced, and

an electric motor or other suitable power, is used for lifting the ladders from their wells and lowering them along the exterior face of the wall, and of course, the same power is employed for returning the ladders to normal position after their emergency use. A manually operated control switch is used with the electric motor, or the motor can be controlled, electrically, within the usual automatic, electric, fire signaling system of the building.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully pointed out and claimed. In the accompanying drawings I have illustrated one complete installation of my fire escape system with the ladders operating in two opposed parallel walls of a building, and it will be apparent that the front, rear, or side walls of the building may be equipped with the fire escapes, all of which are controlled and operated simultaneously from a single source of control and power.

Figure 1 is a front elevation of a building, partly broken away for convenience of illustration, equipped with the system of fire escapes, the ladders being indicated in emergency position by dotted lines.

Figure 2 is a vertical sectional view, at line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view as at line 3—3 of Figure 2, taken just below the roof of the building.

Figure 4 is a detail sectional view at line 4—4 of Figure 3 showing a carrier at one end of a chain ladder, and Figure 5 is a sectional view of the carrier at line 5—5 of Figure 3.

Figure 6 is a horizontal sectional view at line 6—6 of Figure 2 showing the motor and control room with mechanism therein, and the brake applied.

Figure 7 is an enlarged, detail, top plan view of the automatic brake release, showing the brake in released position.

Figure 8 is an enlarged, detail elevation, with parts in section of the brake and its accessories.

Figure 9 is a detail view, partly in section, of the brake bolt and linkage, showing its relation to the brake levers.

In order that the general arrangement and utility of parts may readily be understood I have illustrated a conventional, four-story building structure comprising the upright walls 1, 2, 3 and 4, and floors 5. Between the roof 6 and the ceiling 7 of the upper floor, a space 8, or loft, is provided for the operating parts of the system of fire escapes. The usual windows are illustrated as 9, and they are arranged in double vertical rows between adjoining pilasters 10 of the building front. The cornice 11, in addition to its usual functions, affords a covering or protection for the equipment, and as best seen in Figure 2, the walls that are to be equipped with the chain ladders are provided with a number of vertical wells 12, extending from the foundation of the building through the ceiling 7 of the top floor. At the top of each well, an opening 13 is provided in the vertical wall, said opening communicating at one side with the loft 8 and at the other side with the atmosphere at the exterior of the building.

In the loft 8, which forms a housing, are arranged a number of line shafts as 14, 15 and 16, journaled in suitable bearings 17, and connected to revolve together by bevel gear couples 18. In each opening 13 a pair of sprocket wheels or a double sprocket wheel 19 is mounted on these shafts, and the ladders or ladder chains 20 are suspended or supported on these sprocket wheels so that the wheels, when turned with their shafts, will lift the chains out of the wells and lower them alongside the pilasters 10 of the building, to dotted positions in Figures 1 and 2. By a reverse movement of the shafts, of course the chains are lifted from the front or exterior of the building and lowered into the wells, the chains or chain ladders being at all times in extended position. Guide rollers or idlers 21 are provided for guiding the chains or chain ladders to position so that they will clear the face of the pilaster, but yet be sufficiently close to the wall to permit an occupant of a room to step from a window sill to the ladder, or vice versa.

The end of the chain ladder that remains in the well is provided with a counterweight 22 and the exterior end of the chain ladder is provided with a carrier 23 to counterbalance the weight. The carrier is attached to the end of the chain as by bolts 24 and it is provided with a false bottom or grating 25. The carrier and the weight hold the chain ladder taut and in position ready for use at all times, and the carrier, which may have a capacity for one or more occupants forms an ornamental feature, when in normal position at the head of a pilaster, of the building. The carrier may alternately be lowered and raised by the use of the chain ladder and its operating means, and it thus affords a means for rescue and escape as well as for salvaging and fire fighting.

The three driven shafts 14, 15 and 16 are driven from the vertical operating shaft 26, which is provided with suitable bearings and a bevel gear couple 27, Figure 3, transmits power from the operating shaft to the driven shafts. The lower end of the operating shaft is located in the motor and control room and the electric motor 28, which is reversible, drives this operating shaft through the motor shaft 29 and a gear couple 30.

The shafts are always "in gear" or coupled, and the shafts, together with the ladder chains or chain ladders on the sprocket wheels, are held stationary by a friction brake device that includes a brake drum 31 on the upright operating shaft 26, and a pair of brake levers 32 pivoted at 33 on a bracket 34 and provided with shoes 35 that engage the periphery of the drum at diametrically opposite points as best seen in Figure 7. The shoes are normally held in frictional contact with the drum to hold the moving parts in stationary positions, and a brake-bolt 36 which is passed through complementary holes in the free ends of the brake levers has a head 37 at one end engaging an outer face of one of these levers. A spring 38 is coiled about the other end of the bolt and located between a tension nut 39 on the threaded end of the bolt and a slide washer 40 on the bolt. Thus, one lever is positively held by the bolt head and the other lever is also positively held by two pairs of toggle links 41, pivoted to the slide washer 40 at 40' and to the adjoining brake lever 32 at 32' which is fastened to the bifurcated end of the handle 42 as shown in Figure 9. When the links are alined with the bolt the levers hold the shoes on the drum to prevent its rotation, and the spring holds these links in alinement. When the links are flexed, as by moving the yoke handle 42 which forms an extension of the links, the friction shoes are released so that the drum may turn therein.

The shoes may also be released from the drum by spreading the free ends of the levers from the position as shown in Figure 6, where these free ends are shown as complementary jaws 43 with notches 44 in them. An angular, rotatable shank 45 extends upwardly between these jaws and the shank has a handle 46 by means of which the shank can be turned through the arc of a circle as indicated by dotted lines in Figure 6. Thus when the handle is turned either to the right or to the left a pair of corners of the angular shank, spread the jaws apart similar to a cam action, and when the major, cross sectional diameter of the shank is located transversely of the jaws they are spread apart to release the shoes from the drum. In this diagonal position of the shank its opposite corners are seated in the notched jaws to retain the shank against turning, and the tension of

the spring, through the linkage, holds the opened jaws clamped against the shank.

It will be understood that the spring 38 is at all times under tension, and that it exerts its tension to hold the linkage alined when the brake is applied as in Figure 6, and it also exerts its tension to hold the linkage out of alignment when the brake is released, as in Figure 7. As indicated in Figure 8 a yoked link 53 is provided with shoulders 53a which prevent excessive flexing of the linkage, and these shoulders act as stops for the linkage 41, 41. These stops permit the necessary flexing of the linkage, but they prevent such excess flexing as would permit total expansion of the spring 38.

This lever 46, which is the operating lever for the equipment, is accessible through an opening in the wall of the motor and control room, which is usually closed by a hinged door 47, and the operating lever may readily be reached by an authorized person in case of emergency.

The operating lever, in addition to releasing the brake shoes also controls the electric motor, and for this purpose the shank has a movable switch member 48 (shown in neutral position in Fig. 6) adapted to alternately or selectively engage and contact with stationary contact members 49 and 50 of the electric control switch.

The stationary switch members are located in an electric circuit for the motor, and in some instances this circuit can be in series with the usual electric fire signal system of a building. When so arranged and the motor is automatically started by the automatic action of a circuit maker or circuit breaker, the brake shoes are also automatically released from the brake drum.

For this automatic action I employ the cam device of Figures 7 and 8, which includes a cam 51 on the motor shaft 29 that is located in position relative to a cam lever 52 in order that the first turn of the motor shaft will cause the cam to swing the cam lever away from the motor shaft. The cam lever, which is pivoted at one end 52' to a bracket 52a, is also pivoted at 52b to a yoke-link 53, and this yoke-link is pivoted at 53' to the toggle links 41 intermediate their ends. It will be apparent that the cam mechanism, through the yoke-link, will flex the toggle links, releasing the brake shoes from the drum. After the cam swings the cam lever and flexes the links, the spring holds the links flexed, and in that manner the cam lever is held out of the path of the cam as it continues to turn with the motor shaft when the latter operates the chain ladders.

Thus the chain ladders may be operated by manual control of the operating lever 46, and the brake device may be re-set by use of the handle 42 and the operating lever 46.

The reversible motor is controlled by the

operating lever 46 for lifting the chains or chain ladders from the wells and lowering them outside the wall and vice versa, and of course the movement of the ladders is controlled by the operating lever so that the ladders may be stopped where desired and moved in either direction. Under the automatic control of the ladders, an automatic cut-out switch for the motor is employed to stop the movement of the ladders at a predetermined point, or mechanical means may be employed for limiting the downward movement of the chain ladders both in the wells and down the front of the building.

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

In a fire escape as described, the combination with an operating shaft having a brake drum thereon, an electric motor and transmission mechanism between the motor and said shaft, a pair of pivoted brake levers having shoes engaging the drum, a bolt engaging one of the levers, linkage connected to the other lever and a spring on the bolt for holding the linkage in alinement, means connected with the linkage and actuated by the transmission mechanism for releasing the brake shoes, manually operated means for spreading the free ends of the levers to release the brake shoes, a motor circuit and a switch therein, and electrical connections controlled by the manually operated means for closing the motor switch when the brake shoes are released.

In testimony whereof I affix my signature.
OTTO C. N. GUNDERSEN.