

F. SCHERRER.
FIRE ESCAPE.
APPLICATION FILED JAN. 12, 1909.

956,183.

Patented Apr. 26, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

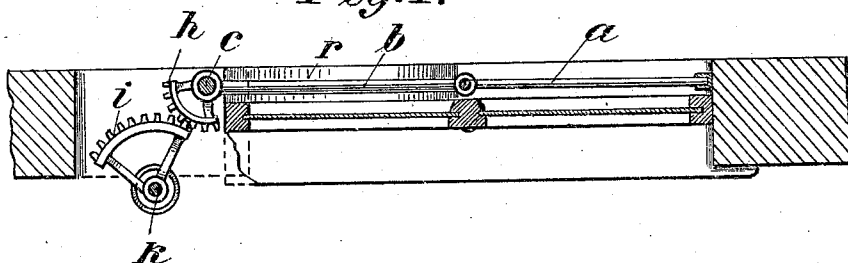
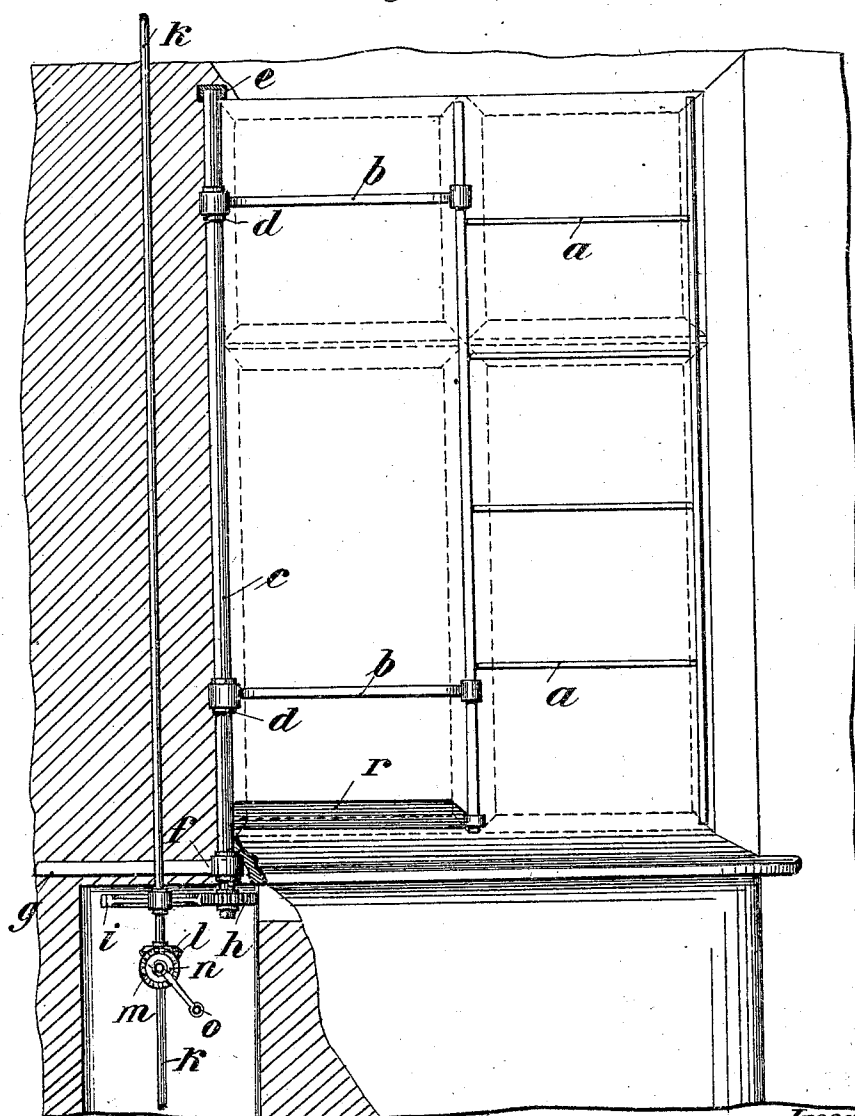


Fig. 2.



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2 SHEETS—SHEET 2.

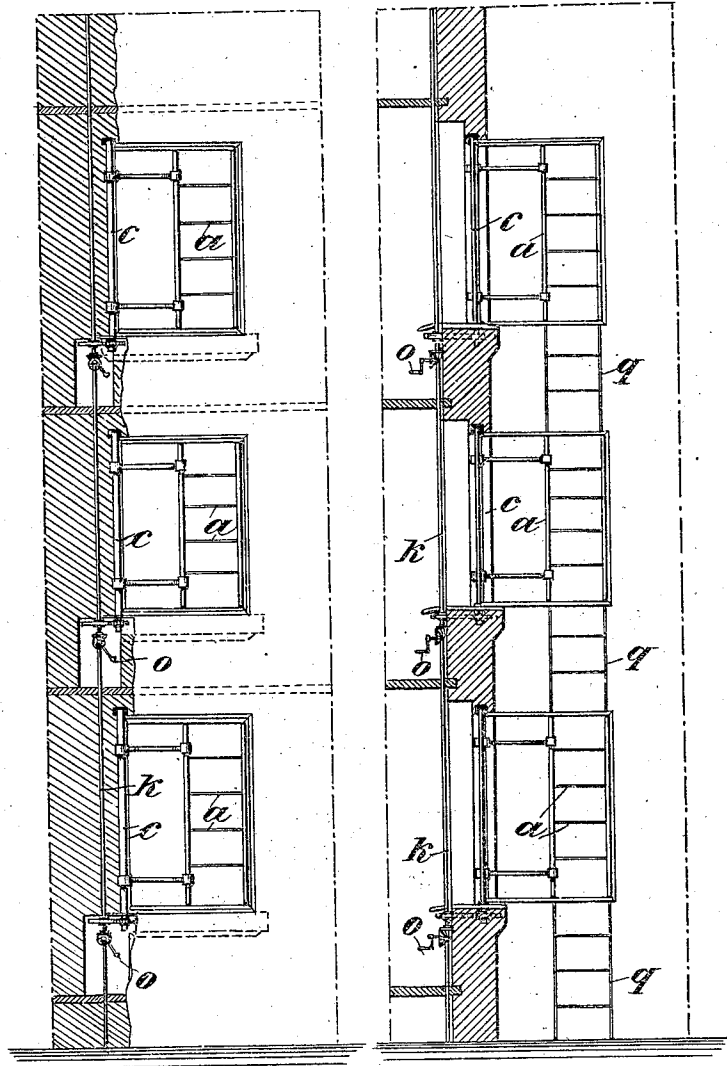


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANZ SCHERRER, OF WILMERSDORF, NEAR BERLIN, GERMANY.

FIRE-ESCAPE.

956,183.

Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed January 12, 1909. Serial No. 471,889.

To all whom it may concern:

Be it known that I, FRANZ SCHERRER, engineer, a citizen of Germany, subject of the King of Prussia and Emperor of Germany, residing at Wilmersdorf, near Berlin, in the Kingdom of Prussia and Empire of Germany, have invented certain new and useful improvements in Fire-Escapes, of which the following is a full, clear, and exact description.

This invention relates to improvements in the fire escapes described in the specifications of my British Letters Patent Nos. 11,275/1894, 20,140/1896, 24,498/1901 and 14,894/1905. The results obtained with fire escapes constructed in accordance with the patents just referred to, when submitted to a practical test, while quite satisfactory with respect to their efficiency and readiness for use, have notwithstanding shown that certain detail improvements may advantageously be made.

In fire escapes of the kind in question as heretofore constructed all the parts are arranged on a single swinging shaft that runs up through the entire height of the building. This has rendered it necessary to carry this shaft on the outside throughout the whole front of the building or to cause it to pass through parts thereof. The drawbacks to this arrangement consist on the one hand in the additional expense involved in carrying the shaft through the perforations in the front, the amount of which varies with the height of the building and the material, and may be very considerable and on the other hand in the dimensions of the shaft and in the considerable expenditure of power requisite for swinging it out. An additional defect is the facility with which dirt can accumulate in the guides and the difficulty of getting rid of it. To determine the dimensions of the shaft it is, moreover, necessary to take into account not only the weight of the persons who may use the escape, but also the weight of the shaft itself, and the resistance which arises when swinging it outward, the amount of which is determined by the above mentioned weights and the weight and co-efficient of friction of the rotating mechanism employed. Now it is desirable that these defects should be eliminated or at least reduced as far as possible.

The present invention differs in principle from the inventions described in the patents

above referred to in so far as the main strains due to rotation and support, are distributed between two different constructional parts, the supporting or the bending strain being borne by the swinging or supporting shafts, and the strain due to the rotary movement by the rotatory shaft.

The supporting shaft no longer consists, as heretofore usual, of a single piece extending throughout the entire height of the building, but is divided into several parts which are mounted outside the front in the window apertures of each floor. The calculation of the cross-section takes account only of the bending strains due to the weight of the ladder itself and that of the persons assumed to be standing thereon, the rotary or torsional strain being neglected as immaterial.

The torsional strain is transmitted to the rotatory shaft by rotary mechanism such, for instance, as a crank and a pair of bevel wheels in such manner that this shaft forms a central guide for all the parts of the escape. While it was formerly impracticable so to arrange the combined swinging and rotary shaft in the recesses provided in the front of the building as to render it accessible this can easily be effected in the case of an escape made in accordance with this invention. The rotary shaft is guided in the interior of the building as a single member passing through the entire height of the building, the perforations in the ceilings for its passage being preferably constructed as dust-proof guides. If the rooms are exceptionally high it is advantageous to provide in their interiors additional bearings secured to the wall. By means of this arrangement the rotary shaft can be better protected against rust and against pollutions of a coarser kind, while on account of its accessibility, it can, moreover be easily controlled in a very simple manner, this heretofore being either not at all or only to a very limited extent possible.

A further essential feature of this invention consists in the fact that the rotary shaft is subjected only to torsional strain as the bearing strains which arise are so greatly reduced by bearings that they may be neglected. The weight of the separate parts of the escape is comparatively small, and the resistance due to the swinging and rotating parts becoming dirty can be considerably reduced by suitable construction and by pro-

protective devices against pollution, and also, in consequence of their accessibility, by cleansing, with the result that only the force exerted on the crank need be taken into consideration, possibly with a comparatively low co-efficient of safety. From this calculation there results, therefore, a small diameter for the rotary shaft, involving but slight expense for mounting, perforation of the ceilings, material and the like. The ladder itself, moreover, is improved.

In the constructional forms heretofore adopted the mechanism for releasing the filling or intermediate parts of the ladder, by means of which a connection is formed between the parts arranged in the apertures of the windows, is attached to the upper portion of these intermediate parts. This gives rise to the disadvantage of having to make the intermediate parts unnecessarily long, that is to say, of using much dead weight for the purpose both of establishing the connection between the window parts of the escape, and of rendering them capable of being put into and out of engagement. In accordance with this invention however the intermediate parts need only be of the length actually requisite to enable them to fill up the intervening spaces between ladders and to be properly attached and guided. This is effected by attaching the device for putting the intermediate pieces into and out of engagement on the lower portion of the window ladder sections.

The foregoing considerations show clearly that this invention is essentially different from the constructions described in the earlier patents and constitutes an important improvement thereon.

The accompanying drawings illustrate an example of apparatus in accordance with this invention wherein—

Figure 1 is a horizontal section, Fig. 2 is an elevation from within, Fig. 3 is a view of the entire construction viewed from within the building with the ladder sections swung inward, and Fig. 4 a vertical section with a view of the ladder sections swung outward and made ready for use.

The ladder sections or portions *a*, which are arranged in the outer sides of the window apertures are supported by arms *b* attached to a swinging shaft *c* by means of collars *d*. The swinging shaft *c* is of a length corresponding to that of the window aperture, and is held in position at its upper end by means of an end-bearing *e* and at its lower end by a bearing *f*, which is arranged between collars *d'* on the shaft *c* and is secured to the wall by means of an arm *g*. To the lower end of the shaft *c* there is keyed a toothed wheel segment *h*, or, it may be, a complete pinion, which as a protection against rust, is made of phosphor bronze,

and which engages with a corresponding toothed segment or spur wheel *i*. This spur wheel or segment *i* is keyed to a rotatable shaft *k*, that runs through the entire height of the building and is arranged in the interior thereof and is supported by bearings not shown in the drawing. To the shaft *k* there is keyed a bevel wheel *l* with which there engages the bevel wheel *m* of the rotating mechanism comprising the shaft *n*, its bearing, and the hand actuated crank *o*.

The entire rotating and swinging mechanism which is duplicated for each floor, is arranged beneath the window ledge in enlarged window recesses. When building new houses provision should be made in the plan for this enlargement of the window recesses; in older buildings, it can easily be effected, where necessary, by cutting away the masonry. To keep the toothed gear clean and to prevent it from inflicting injury, it is surrounded with a covering of wood or sheet metal not shown in the drawings.

In order to reduce the resistances to a minimum it is necessary from time to time to cleanse the guides, bearings and wheels.

The arrangement described, as shown in Figs. 3 and 4, is provided on each floor of the building.

The apparatus is put in position for use by rotating either of the cranks *o*, one of which is to be found on each floor. By the rotation of a crank one of the pairs of bevel wheels *m, l* and the shaft *k* are caused to rotate, thereby operating all the pairs of toothed wheels or segments *i, h* which rotate the shafts *c* and swing the ladder sections *a* outwardly, see Fig. 4. The sections *a* of the ladder which support the intervening parts *q* are provided at their lower ends with releasing devices not shown in the drawings, which after the sections *a* have been swung out, effect by means of any suitable mechanism the release of the parts *q* and their connection with the sections *a*.

The sections *a* are provided with landings *r* which connect the window ledges with the steps of the ladder and facilitate climbing on to the steps (Fig. 2). After the parts *q* have been moved back into position on the ladders *a* the swinging back of these ladders is effected by rotating either of the cranks in the reverse direction.

What I claim is:

1. A fire escape comprising a number of ladders each independently hinged in a window opening of a vertical series and adapted to be swung outwardly beyond the front wall of the building, and means within said building on each floor thereof for operating all of said ladders simultaneously.

2. A fire escape comprising a number of ladders each independently hinged in a win-

dow opening of a vertical series, said ladders adapted to be swung outwardly from the front of a building, a vertical shaft within said building extending throughout its height, means between said vertical shaft and each ladder shaft within the window opening for swinging said ladders when the vertical shaft is rotated, and means on each floor of the building for rotating said vertical shaft to cause simultaneous movement of the ladders.

3. A fire escape comprising a series of ladders each ladder separately hinged in vertically disposed window openings of a building, a secondary ladder movably connected to the bottom of each swinging ladder and adapted to close the spaces between them when swung outwardly from the front of the building, and means within the building and on each floor for simultaneously operating the swinging ladders.

4. A fire escape comprising a plurality of ladders, each attached to a separate vertically disposed shaft and pivotally mounted in a vertical series of window openings of a building, a vertically disposed rotary shaft within the building and extending throughout its height, said shaft having a bearing in the ceiling of each room through which it passes, gearing between the vertical shaft and each ladder supporting shaft, and means on each floor of a building for rotating the

vertical shaft and causing a simultaneous swinging of said ladders.

5. A fire escape comprising an independent shaft pivotally mounted in each window of a vertically disposed series, arms attached to each of said shafts, a ladder supported by the arms of each shaft, a secondary ladder attached to the bottom of each primary ladder and adapted to be raised and lowered, and means within the building provided with said windows for simultaneously swinging said ladders into and out of the window openings.

6. A fire escape comprising a plurality of swinging ladders mounted on independent shafts in the window openings of a building, said windows being disposed one above the other on each floor thereof, a vertical shaft within the building and extending throughout its height, a gear wheel on the shaft of each ladder, a series of gear wheels on the vertical shaft in engagement with the aforesaid gear wheels, and means on each floor of said building for turning said vertical shaft, and simultaneously operating the ladders.

In witness whereof, I subscribe my signature, in presence of two witnesses.

FRANZ SCHERRER.

Witnesses:

ALBERT GRÜNFELD,
PAUL SIEBERT.