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H. JERUM
DOOR CLOSING APPARATUS

2,140,913

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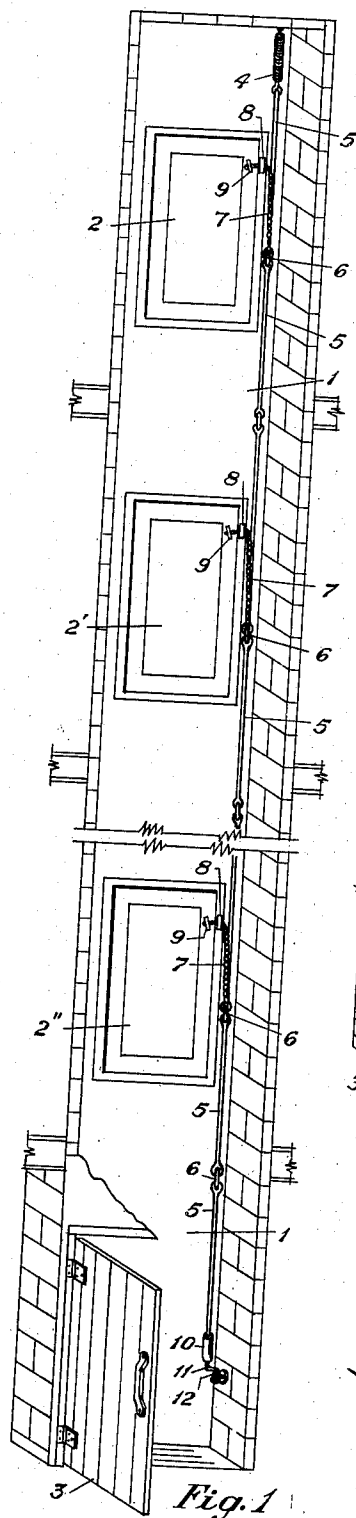


Fig. 1

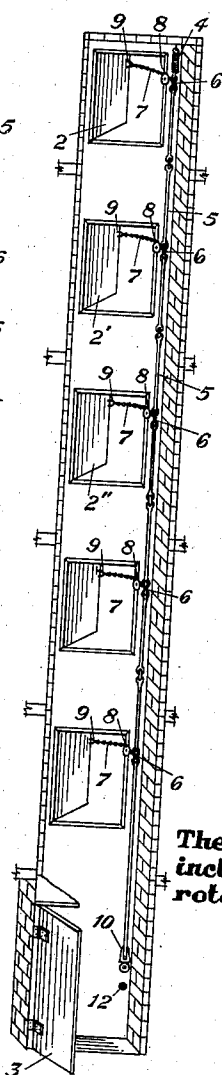


Fig. 2

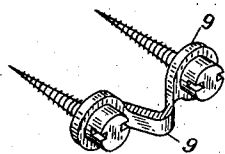


Fig. 4

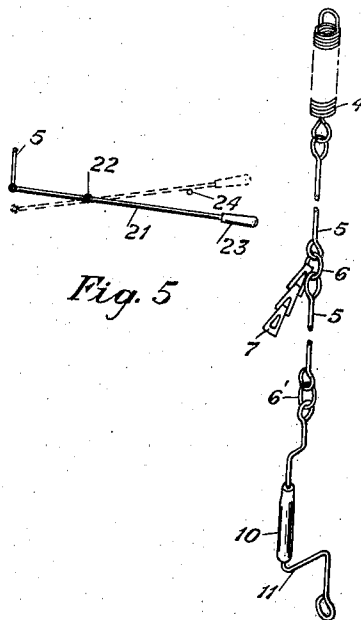


Fig. 3

Fig. 5

The door-check 34 includes means for rotating pulley 33

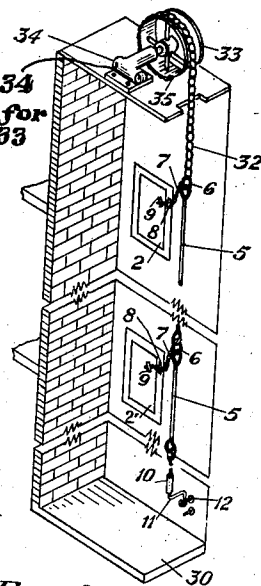


Fig. 6

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DOOR CLOSING APPARATUS

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2 Claims. (Cl. 268—18)

This invention relates to locking devices. More particularly, this invention relates to apparatus and devices for simultaneously locking a plurality of doors, or the like. Still more particularly, this invention relates to arrangements designed to permit a plurality of doors to be either opened simultaneously or closed simultaneously, or operated one at a time, at will, or in any selected or predetermined order.

One of the principal objects of this invention is to provide apparatus for maintaining all of the doors in one section or part of an apartment house, opening into a dumbwaiter shaft, securely closed until allowed to be opened by the superintendent or other employe of the building.

Another object of this invention is to provide a locking device for a plurality of dumbwaiter doors which shall be of simple and, therefore, inexpensive construction, yet easily installable and efficient in operation after installation.

A further object of this invention is the provision of an arrangement for simultaneously controlling the operation of a plurality of dumbwaiter or other doors, the arrangement including a plurality of lateral chains or cords or other flexible devices each associated with one of the doors to be controlled, means whereby all of the lateral chains will be simultaneously moved in one direction or allowed to move in another direction, and further including means for limiting the movement of these lateral chains.

This invention will be better understood from the detailed description following, when read in connection with the accompanying drawing, in which Figure 1 represents a diagram of a dumbwaiter or other shaft to which the invention has been applied; Fig. 2 shows a similar arrangement in which the various doors are all in their open positions; Fig. 3 shows the link and chain arrangement which may be employed in carrying out the features of one embodiment of the invention; Fig. 4 illustrates an arrangement for holding one end of a chain or the like; Fig. 5 illustrates a lever system which may be a part of this invention and Fig. 6 represents still another modification of this invention in which a plurality of doors may be simultaneously closed automatically.

Referring to Fig. 1 of the drawing, the reference character 1 designates a shaft or other vertical opening which may, for example, be one of the dumbwaiter shafts of an apartment house; 2, 2' and 2'' represent three of a plurality of openings at which doors, windows, or the like may be installed, hingeable doors being indicated

in the drawing by these reference characters, one for each story of the building, and 3 represents a main door which may be located, for instance, in the basement or cellar of the building. All of the doors 2, 2' and 2'' illustrated in the drawing, are preferably hingeable at one side, for example, the left side, but slidable doors may be employed, if desired.

Permanently suspended from a position at or near the roof or attic of the building, is a spring 4, preferably of circular and spiral construction, as shown. The lower end of this spring 4 is connected to a plurality of vertical bars or rods 5 which are arranged in tandem. Each of these bars or rods may, for example, be of circular cross-section, and the two ends of each of these bars may be shaped to form an eye. Thus, each bar would, for example, have two eyes, one at either end. The bars 5 may be made of metal such as iron, but it will be understood that any other non-flexible substance may equally well be employed in their construction.

The adjacent bars 5 are connected to each other by links 6 or other coupling elements which may, for example, be formed of copper or iron or other material, preferably a strong, but somewhat flexible and easily solderable material. Thus, a single coupling link 6 interconnects two of the adjacent vertical bars 5. It will be noted, moreover, that Fig. 1 of the drawing shows two of the bars 5 between adjacent doors 2 and 2', and two additional bars may be similarly located between any two adjacent doors. It will be understood, of course, that more than two such bars may be located between adjacent stories and, if desired, a single bar may replace the two illustrated in the drawing.

The reference character 7 designates each of a plurality of lateral chains. Each of these chains may include a plurality of links. One end of each chain may be connected to the link 6 which couples two of the adjacent bars 5, as shown. The other end of each chain passes through the opening of a support 8 which acts like a roller, one support 8 being preferably fastened permanently to the frame of each of the doors near its upper end. The other end of each chain is fastened or otherwise connected to a holder 9, each holder 9 being preferably permanently positioned and connected to the upper end of each of the doors controlled by the apparatus of this invention. While each element 7 is shown in the form of a chain composed of a plurality of links, this construction is, of course, by no means essential, for

the chain 7 may be replaced by a flexible cable or by any other equivalent flexible device.

The lowermost bar 5 is coupled to a handle or grip 10 which may be mounted upon a bar shaped so as to be readily controllable by the superintendent or other employee of the building upon the opening of the door 3. The lower end of the bar 11, upon which the handle 10 is positioned, may be moved so as to grip a fixed element 12 such as an eye-screw, a bolt, or the like, as shown in the drawing. Thus, when the bar 11 is caused to grip the eye-screw 12, for example, all of the vertical members 5 will be brought to their lowermost positions and the doors 2, 2' and 2'' will be simultaneously closed. Moreover, another eye-screw or bolt similar to the one designated 12 (but not shown) may be positioned somewhat above the element 12 so that the lower end of the bar 11 may be moved upward and fastened thereto to allow all of the vertical bars 5 to reach their uppermost positions while remaining in vertical alignment. Each or all of the various doors 2, 2' and 2'' may then be opened. A signaling circuit (not shown) may be employed for signaling from the basement to the apartments of the various tenants and the superintendent or operator in the basement may use this circuit to signal each or all of the tenants of the house—at one time or in any selected order—that the dumb-waiter doors may be opened, if desired.

The support 8 which is affixed to the frame of each of the doors is approximately on the same level as the holder 9 to which the left-hand end of each corresponding chain is connected. The various supports 8 are closely adjacent to the vertical path of the bars 5. When these bars 5 have been allowed to move vertically upward, the tension on the various chains 7 will be considerably reduced. The doors 2, 2', 2'', etc. may then be opened almost to the fullest extent. It is one of the features of this invention to allow each link 6 to be moved upwardly to a point almost adjacent to the corresponding support 8 so that the tension on each chain may be eliminated and the corresponding door 2, for example, may at that time be opened. Another feature of the arrangement is to have the support 8 act as an abutment for the link 6 so that the door 2 may be opened only as widely as the link 6, striking the support 8, will then permit.

So it will be seen that the opening and closing of all the doors 2, 2' and 2'' may be controlled by the operator who may be located in the basement of the building. By opening the door 3, the operator may remove the bar 11, upon which the handle 10 is positioned, from the eye-screw, or bolt, or other support 12. The spring 4 will then act to move all of the vertical bars 5 in an almost straight line path upwardly until the various links 6 to which the right-hand ends of the chains are connected, are brought closely adjacent to the corresponding supports 8. When these positions have been reached, all of the various doors 2, 2' and 2'' may be simultaneously opened, or the operator may, if he wishes, control the sequence in which these doors are opened by signaling the various tenants in any desired order. Later on all of the doors may be simultaneously closed by the operator by merely applying pressure downward upon the handle 10 against the tension of spring 4 until the bar 11 is caused to grip the element 12.

It is to be noted that no apparatus is required to maintain all of the bars 5 always in vertical alignment. This is not required with an arrange-

ment of the type involved in this invention. However, if desired, eye-screws, or other devices, may be fastened to the wall of the shaft so that any possible lateral movements of the various bars, no matter how small, may be further restricted.

Fig. 2 shows an arrangement similar to that shown in Fig. 1, but here the various doors 2, 2', 2'', etc., are shown in their open positions. It will be noted that each link 6 which connects two adjacent vertical bars 5, and to which the right-hand end of the corresponding lateral chain 7 or cable is connected, is brought adjacent to the support 8 through which the chain or cable is allowed to move.

Fig. 3 shows the arrangement illustrated in Figs. 1 and 2, apart from the shafts in which the arrangement may be installed. It will be noted that the link 6 which joins two adjacent vertical bars 5, and to which the right-hand end of a corresponding chain may be connected, is of slightly different formation from the link 6' which couples the two adjacent bars 5 to which no such chain is connected. The former link is a little wider than the latter, and is made wider in order to allow the right-hand end of each chain to be moved upwardly along the link 6 until it is brought almost in contact with the lower end of the upper of the two steel bars 5.

Fig. 4 shows a perspective of the holder 9 which is permanently fastened to each of the various doors, and this holder is so shaped as to receive the enlarged end or link of the left-hand side of each lateral chain 7. Of course, if a cable is used in place of a chain, the cable may be fastened to this holder in any manner understood in the art.

It will be observed that the holder 9 includes two holes through which wood screws, bolts, or other fastening devices, may be passed. If wood screws are used, for instance, as shown, these may be provided with specially designed heads so that they may not be removed by the tenants. The wood screws shown in the drawing have heads which are grooved and are provided with two depressions so that the ordinary screw driver would be useless in applying pressure to these screws. Any other screw of irregularly shaped head may also be used. A specially designed screw driver alone could be used for removing these screws.

Fig. 5 shows one form of lever arrangement for controlling the movement of the various vertical bars 5. As shown in the drawing, the lower end of the lowermost bar 5 is coupled to the left-hand end of a lever 21 which is pivoted at 22 and is provided with a handle 23. When the lever is in the position shown in the drawing, the various bars 5 will be approximately in vertical alignment and in their uppermost positions, so that the various doors adjacent to the shaft may be opened. However, by moving the handle 23 upwardly to the position shown, for example, by the dotted lines, the vertical rods 5 will be returned to their lowermost positions and, if desired, the lever 21 may be pinned or held in position at a point such as 24. When so positioned all of the doors, of course, will be locked and will remain locked until the operator removes the lever 21 from the position shown in dotted lines. It will be understood, of course, that the lever may be of any desired length and the fulcrum 22 may be at some selected position at which the pressure applied to the spring at the uppermost end of the various rods 5 may be made to equal some predetermined value.

Fig. 6 shows a somewhat different embodiment

of this invention. In this case the various bars 5 are also in vertical alignment; they are connected at the lower extremity to an immovable eye-screw 12 or other connecting device which is, in this case, located, for example, in the basement or cellar of the building. The uppermost bar 5 is connected to a chain 32 which may be allowed to pass over a pulley 33, the outer surface or rim of which may be grooved to conveniently receive the chain 32. The other end of the chain 32 may, if desired, be permanently fastened to some selected point 35 along the surface or rim of the pulley 33. The pulley may be mounted on a fixed shaft which may be placed in the attic of the building, or it may be spaced either upwardly or downwardly with respect to the roof of the building. The shaft of the pulley may be coupled to a door-check 34, for example, of any well known type. The door-check 34 may be so mounted with respect to the axis of the pulley that under normal conditions a large and predetermined tension will be applied by the spring contained within the door-check (not shown) to the chain 32 and the bars 5 to which it is connected, this tension, of course, being taken up in the spring of the door-check.

In other words, the door-check 34 will normally tend to move the pulley in a counter-clockwise direction and will at the same time apply certain desired tension to the lateral chains 7 to which the various doors 2, 2', etc., are connected. The latter tension will, of course, be sufficient to maintain the various doors locked.

When it is desired that one or more of these doors be allowed to open, it will simply be necessary to rotate the pulley 33 in a clockwise direction through a predetermined angular distance. This may be accomplished by manipulating the handle 10 so as to move it vertically downwardly against the tension of the closing spring. The pulley 33 may then be locked or otherwise held temporarily in such a position. The tension of the spring of the door-check 34 will then be greatly modified and hence the various bars 5 will be moved to their lowermost positions so that the doors 2, 2', etc., may be opened by the tenants under the control of the superintendent, as already explained.

When it is desired that all of the doors be simultaneously closed, it is simply necessary to release pulley 33 from the effect of its holding device (not shown) and the door-check 34 will then move the pulley counter-clockwise into a position which will allow the spring to supply a large tension to vertically raise the various bars. When this occurs, of course, the lateral chains 7 will be brought also under considerable tension, and this tension will be sufficient to close the doors.

While the element 32 has been shown in the form of a chain, it will be understood that this element may be replaced by a cable or by any other pressure transmitting device or medium, preferably one which is flexible.

It will be understood also, that the door-check 34 may be replaced by a motor or any other rotary device, and if a motor is employed current may be supplied thereto by closing a switch (not shown) which may be located, for example, in the basement or cellar of the building so that it may be always under the control of the superintendent. Such a switch may be used to impart a rotary motion to the motor in one direction, and moreover, it may also be operated to reverse the direction of rotation of the motor

for the purposes already set forth hereinabove. This, of course, will be readily understood by those skilled in the art.

Although the pulley 33 and the rotary device 34 have been shown in Fig. 6 as mounted at or near the roof of the building, such a construction is by no means indispensable. This apparatus may be located in the basement or cellar of the building. In the latter instance, the chain 32 will connect the lowermost vertical bar 5 to the pulley 33, and the rotary device 34 will operate the pulley and effect the vertical displacement of the bars 5. The uppermost bar 5 may be fixedly connected to a stationary bar or eye-screw located at or near the roof and, if desired, a coil spring such as 4 of Fig. 1 may be interposed between the stationary bar or eye-screw and the upper end of the uppermost vertical bar 5.

The spring 4 of Figs. 1, 2 and 3 may be replaced by an ordinary pulley and counterweight, both of well-known type, the axis of the pulley being permanently positioned at or near the roof of the building. A chain may pass over the pulley and interconnect the counterweight and the upper eye of the uppermost bar 5. A similar arrangement may also be employed in Fig. 6, as will be understood.

Although this invention has been described particularly with reference to an apartment house, it will be understood that it is equally applicable to office buildings or other structures having multiple openings such as doors, windows or the like.

While this invention has been shown and described in certain specific forms merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied in many and other widely varied organizations, without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The combination of a door-check, a pulley coupled to the door-check, a plurality of doors spaced vertically from each other, an elongated member having a plurality of non-flexible elements coupled by links to each other, a plurality of lateral chains each connecting one of the doors to one of the coupling links, a flexible cord wound about the rim of the pulley, one end of the flexible cord being fastened to the pulley and the other end to the upper end of the elongated member, the lower end of the elongated member being vertically movable within predetermined limits, and means for rotating the pulley in either direction.

2. The combination of a pulley, a plurality of rotatable doors the axes of which are arranged vertically one above another, a flexible cord wound about the drum of the pulley, an elongated member composed of a plurality of iron bars linked to each other, one end of the elongated member being connected to one end of the flexible cord and the other end of the elongated member being movable within predetermined limits, resilient means for controlling the rotation of said pulley in one direction, each of the doors being coupled to one of the links of the elongated member, means for rotating the pulley in the other direction so as to change the position of the elongated member in a vertical direction, whereby the various doors may be operatively controlled, and means for preventing any relative vertical displacement of the elongated member.

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