

F. D. OGDEN, DEC'D.
J. E. OGDEN, ADMINISTRATOR.
DOOR AND MEANS FOR OPERATING SAME.
APPLICATION FILED NOV. 12, 1909.

974,699.

Patented Nov. 1, 1910.

4 SHEETS—SHEET 1.

Fig. 1,

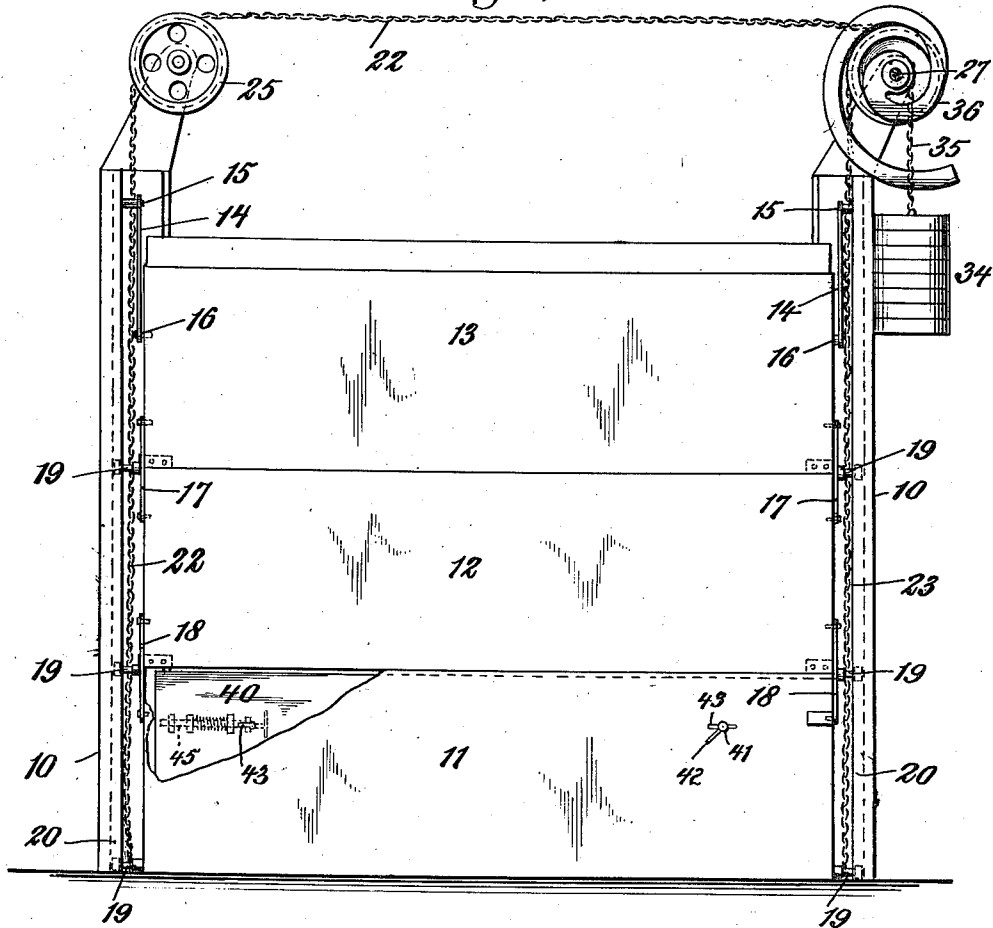
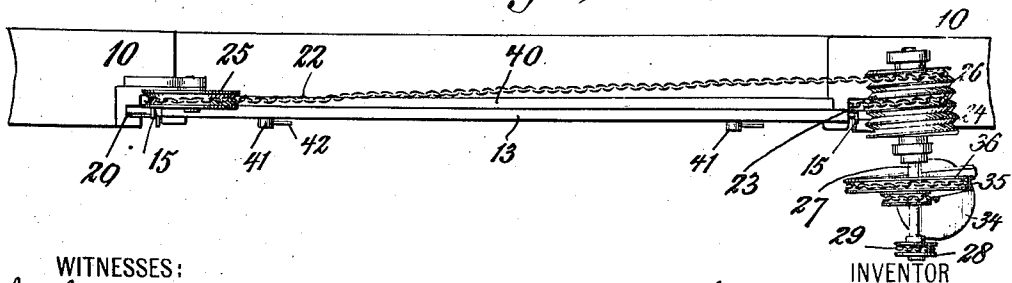


Fig. 2,



WITNESSES:

J. L. Hartmann
J. B. Graves

INVENTOR

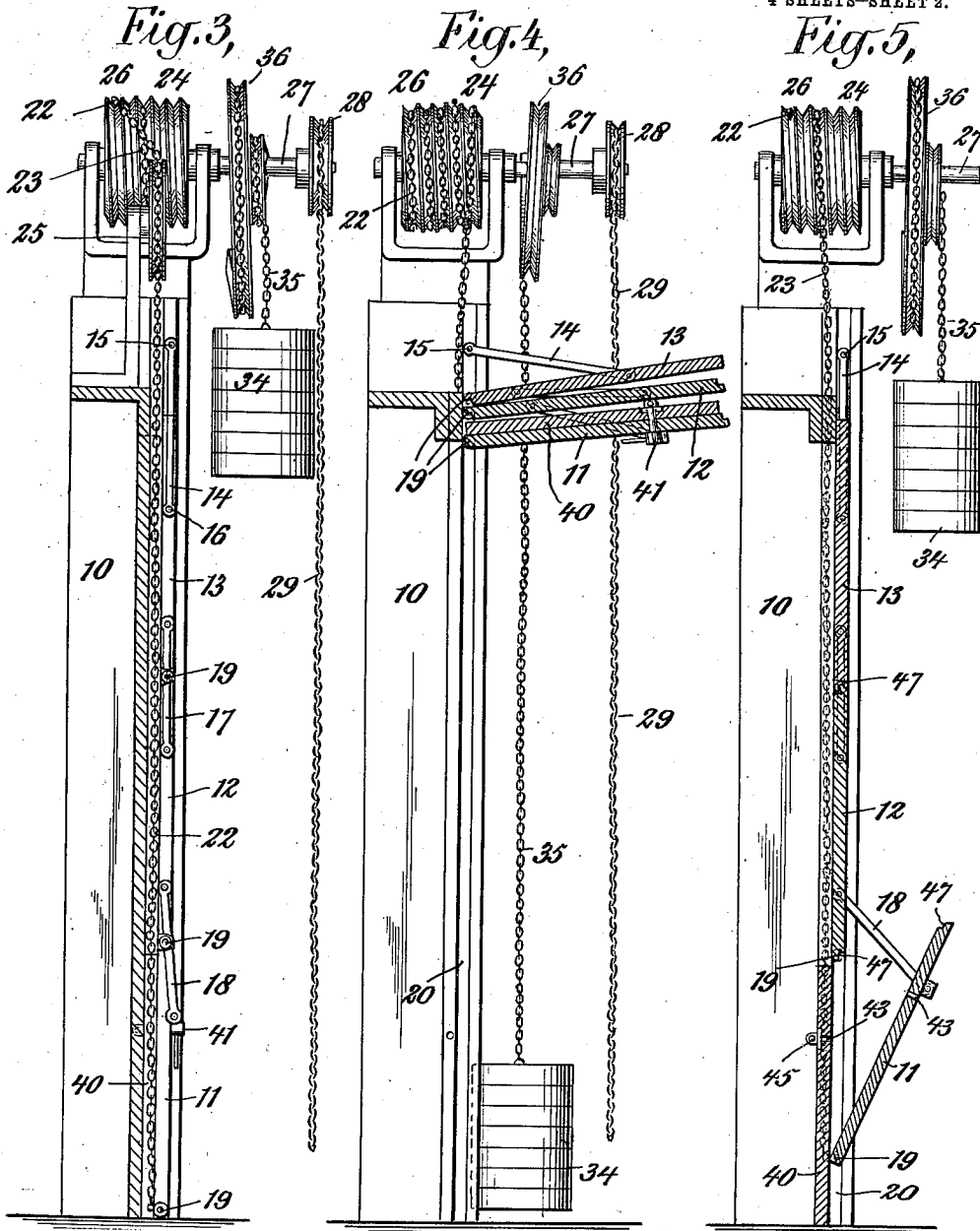
Fredric S. Ogden
BY
Chapman Raymond & Co.
ATTORNEYS

F. D. OGDEN, DEC'D.
J. E. OGDEN, ADMINISTRATOR.
DOOR AND MEANS FOR OPERATING SAME.
APPLICATION FILED NOV. 12, 1909.

974,699.

Patented Nov. 1, 1910.

4 SHEETS—SHEET 2.



WITNESSES:

J. C. Hartmann
F. B. Graves

INVENTOR

Frederic S. Ogden
BY
Chapman & Haywood
ATTORNEYS

F. D. OGDEN, DEC'D.
J. E. OGDEN, ADMINISTRATOR.
DOOR AND MEANS FOR OPERATING SAME.
APPLICATION FILED NOV. 12, 1909.

974,699.

Patented Nov. 1, 1910.

4 SHEETS—SHEET 3.

Fig. 6,

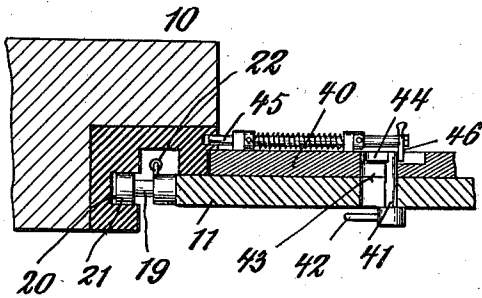


Fig. 7,

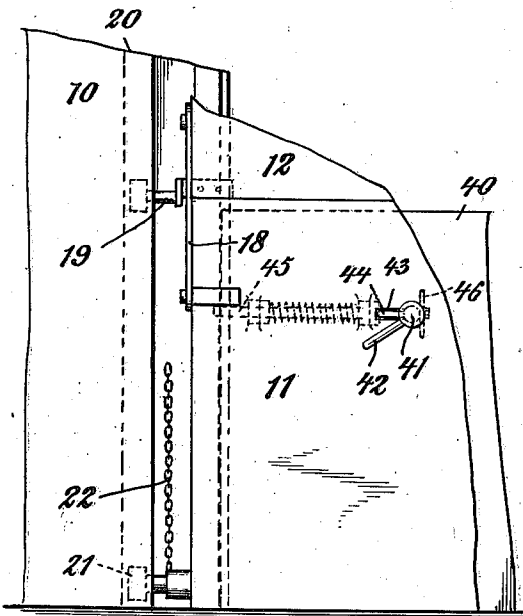
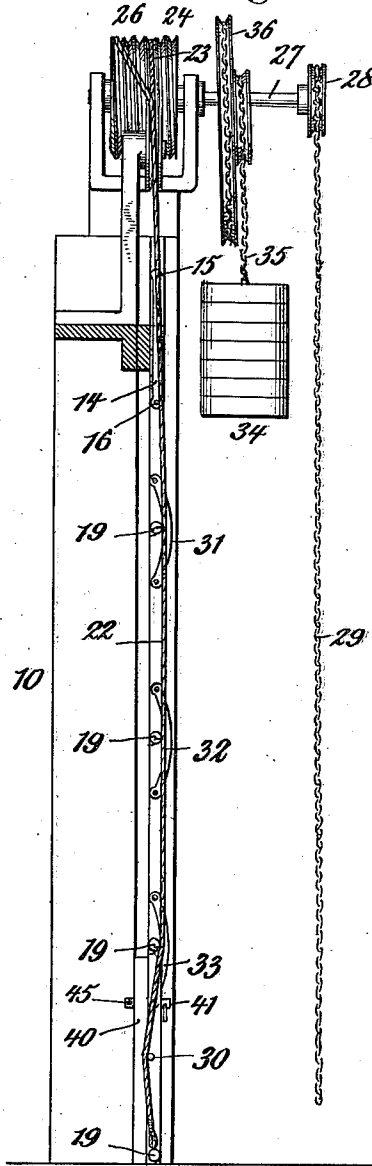


Fig. 8,



WITNESSES:

J. L. Hartmann
J. B. Graves.

INVENTOR

Frederic S. Ogden
BY
Chapman & Haywood
ATTORNEYS

F. D. OGDEN, DEC'D.
 J. E. OGDEN, ADMINISTRATOR.
 DOOR AND MEANS FOR OPERATING SAME.
 APPLICATION FILED NOV. 12, 1909.

974,699.

Patented Nov. 1, 1910.

4 SHEETS—SHEET 4.

Fig. 9,

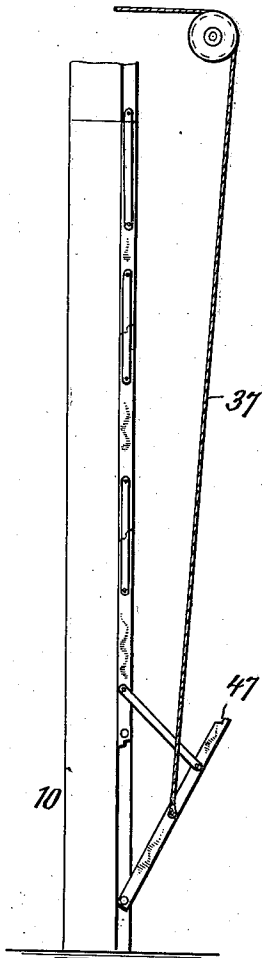
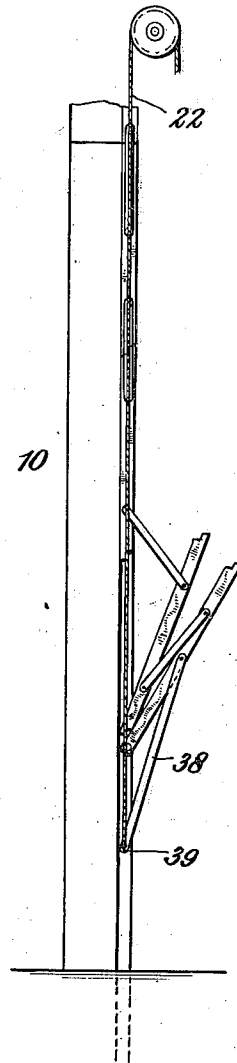


Fig. 10,



WITNESSES:

J. L. Hartmann
 F. B. Seares

INVENTOR

Frederic A. Ogden
 BY
 Chapin Raymond
 his ATTORNEYS

UNITED STATES PATENT OFFICE.

FREDRIC D. OGDEN, OF BAYONNE, NEW JERSEY; J. EDWARD OGDEN, ADMINISTRATOR OF SAID FREDRIC D. OGDEN, DECEASED, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PATENT APPLIANCE COMPANY, A CORPORATION OF NEW YORK.

DOOR AND MEANS FOR OPERATING SAME.

974,699.

Specification of Letters Patent.

Patented Nov. 1, 1910.

Application filed November 12, 1909. Serial No. 527,588.

To all whom it may concern:

Be it known that I, FREDRIC D. OGDEN, a citizen of the United States of America, and a resident of Bayonne, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Doors and Means for Operating Same, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates particularly to sectional doors, the sections of which are arranged to swing vertically and to be lifted above the doorway. This class of door is employed where doors of large size are required, as, for instance, in freight and warehouse sheds, docks, and steamship piers, railroad sheds and the like.

The objects of my invention are to reduce to a minimum the extent of the path through which the door moves while being opened and closed; to reduce to a minimum the space occupied by the door when partially or fully opened; to decrease the strain on the connecting elements between the several door sections while the door is being opened; to provide a weather-proof joint between the several door sections; to provide means for closing the lower portion of the doorway to prevent ingress or egress therethrough while the upper portion is opened for ventilating and other purposes; to permit the opening of the lower portion of the door without thereby opening the upper portion thereof, and generally to improve and simplify the construction of doors of this description and the operating means therefor.

In carrying out my invention I provide a plurality of vertically superposed door sections supported and pivotally connected together by suspension elements, and in connection therewith I employ means for successively lifting the sections, beginning at the lowermost section, the pivoted suspension elements causing the door sections to be swung from a vertical to a horizontal position while they are being so lifted. I employ vertical guideways for the lower end of the door sections, the door sections being provided with projections which enter and are guided along the said guideways, the said projections also constituting pivots upon which the door sections will swing. Because of the fact that the door sections

are successively lifted, it follows that a progressively greater strain will be imposed upon the lifting means, and to counterbalance this strain and to counterbalance the weight of the door I preferably employ a counterbalancing means which applies a variable counterbalancing force to the door substantially proportionate to the lifting resistance. I also employ an auxiliary door section which may be lifted with the lowermost section of the main door, or may be left in the doorway to close the lower portion thereof when the main door is operated, at will.

My invention also consists in many novel details of construction and combinations of parts such as will be fully pointed out, the same including a means whereby an initial transverse force is applied to the door to break joint when power is first applied to open the door, whereby the tendency to a locked joint, due to the relative position of the connecting suspensive elements, is avoided.

In order that my invention may be thoroughly understood, I will now proceed to describe an embodiment thereof, having reference to the accompanying drawings illustrating the same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a front view of a door and door-operating mechanism constructed in accordance with my invention. Fig. 2 is a top view of the same. Fig. 3 is a view in vertical section thereof upon the line 3—3 of Fig. 1, the door being shown in this view as entirely closed. Fig. 4 is a view in vertical transverse section through the door and doorway, the door being shown as entirely opened. Fig. 5 is a vertical transverse sectional view through the door and doorway showing the lower main section of the door as partially opened, the upper main sections as entirely closed, and the auxiliary section as in place in the doorway. Figs. 6 and 7 are detail views of one form of the means for removably securing the auxiliary door section to the main door, and for securing the auxiliary door section in the doorway when it is detached from the main door. Fig. 8 is a view in vertical transverse section through the doorway, and in side elevation of the door and its operating means, showing a slightly

modified structure. Figs. 9 and 10 are detail transverse sectional views showing slight modifications of the structure.

Referring first to the construction shown in the first seven figures, the doorway is shown as provided with a suitable framing 10, and the door fitted thereto comprises three superposed sections 11—12—13. The section 13 is suspended from the doorway framing by means of links 14 which are pivotally connected at their upper ends 15 to points stationary with the doorway framing, and at their lower ends 16 to the side edges of the door section 13 intermediate the top and bottom thereof. The sections 12 and 13 are connected together by means of suspension elements 17 pivoted at their opposite ends to the sections 12 and 13 respectively, and the sections 11 and 12 are similarly connected together by means of suspension elements 18. The suspension elements 14—17 and 18 are shown as rigid links, the same being a convenient form thereof, but it is not necessary that they be rigid for the reason that they are always under tension. The lower end of each door section is provided with projections 19 which enter in, and are guided by, suitable guideways 20 in the framing 10. These projections constitute guides which, in their movements along the guideways, guide the lower end of the door sections in their upward movement and at the same time constitute pivots about which the door sections may swing, as will be presently explained. These projections may be conveniently provided with anti-friction rollers 21 to reduce the friction in the movements thereof along the guideways.

The lifting means includes two chains 22—23, the lower ends of which are secured to the lower end of the door section 11, conveniently to the projections 19. The chain 23 passes directly over a winding drum 24, the end of the chain being conveniently connected to the said winding drum,—while the chain 22 passes over a direction pulley 25 and thence to a winding drum 26 secured to rotate with the winding drum 24. The two winding drums may be conveniently mounted upon the said shaft 27, which shaft may be conveniently provided with any suitable means by which it may be rotated for the purpose of rotating the drums and winding up the chains 22—23 thereon to lift the door. The winding means here shown is a sprocket wheel 28 which is secured fast upon the shaft 27 and an endless chain 29 suspended therefrom, the free end thereof hanging down in a position convenient to be reached by an operator.

In Figs. 1 and 3 the door is shown as completely closed; when it is desired to open the same the shaft 27 will be rotated by the operating means in a direction to lift the

chains 22—23,—the lower end of the door section 11 will thereby be lifted, and in Fig. 5 the door is shown with the lower door section as so partly lifted. The connecting elements 18 will cause the door section 11 to swing from a vertical toward a horizontal position. After the lower door section has been raised to an extent sufficient for the lower end thereof to reach and abut against the lower end of the door section 12, continued lifting movement will carry the two sections 11 and 12 upward together, the door section 12 moving outward toward a horizontal position and carrying with it the door section 11. Thereafter the door section 13 will be picked up and similarly moved until finally the three door sections will assume a substantially horizontal position above the doorway, as is shown in Fig. 4.

From the foregoing it will be seen that the several sections are lifted successively so that if it is required to only open the lower portion of the doorway the door can be lifted to a corresponding degree, without thereby causing any operation of the upper portion thereof.

In order to prevent a locked joint when the door is completely closed, I provide a means whereby a force is initially imparted to the lowermost door section at the beginning of the lifting movement thereof. This may be done in a variety of ways, and in the construction shown in the first five figures I have so disposed the connecting elements 18 that they are at an angle to the line of strain of the lifting chains (see particularly Fig. 3). By this means a certain proportion of the lifting force applied to the chains is resolved into a horizontal component which acts to give the requisite initial transverse force to "break joint."

It may be noted that the weight of the door sections as they are successively lifted, which is transferred through the connecting elements to the sections above them, is sufficient, as the sections swing outward, to slightly move the succeeding sections outward just before the lower ends of the preceding sections reach the point of abutting with the lower ends of the succeeding sections and that this acts to successively break joint in the succeeding sections above the lowermost section. In the modification shown in Fig. 8 I have shown the same result as accomplished by deflecting the lifting chains behind laterally extending studs 30 which project from the edges of the lowermost door section. Tension applied to the chains in this instance tends to straighten out the chains, the effect of which is to apply the requisite transverse force to the lowermost door section for the purpose stated.

While I have shown and described the foregoing means for "breaking joint", the

same is not claimed herein as this feature constitutes a portion of the subject matter of another application filed co-incidentally herewith and for which Letters Patent have since issued, the same being numbered 962,404 and dated June 21, 1910.

In Fig. 9 I have shown the lifting chains 37 as disposed at a slight angle to the vertical, which will also have the effect of accomplishing the same result, and in this figure I have also shown the chains as connected to points intermediate the upper and lower edges of the lower door section instead of at the lowermost portion.

In Fig. 10 I have shown the lowermost door section as provided with braces 38 which are pivotally connected at their upper ends to the lowermost door section, and at their lower ends are provided with guide studs 39 for engagement with the guideways 20; and in this figure I have shown the chains as connected with the studs 39 instead of directly with the lowermost door section.

It may be noted that the term "chains" has been applied to the lifting elements. In Figs. 1 to 5 inclusive these elements are shown as chains, while in Figs. 8 and 9 they are shown as flexible cords. It will, of course, be understood that the term "chains" is used in a generic sense to cover any suitable lifting elements. It may also be noted that in Fig. 8 I have shown the connecting elements 31—32 and 33 as curved links, the same being curved to avoid the projections 19 at the lower end of the door sections. In Figs. 1 to 5 inclusive the projections have an offset portion which receives the links whereby the same result is obtained, and, of course, it is obvious that these various parts may be arranged in any suitable manner to avoid each other such as would necessarily occur to a designer. It may also be noted that the door in the construction shown in Fig. 8 includes four sections, while the door in the construction shown in Fig. 5 shows three sections. Any number of sections may, of course, be employed in accordance with the height of the doorway and the desired height or depth of the sections.

Because of the fact that the door sections are lifted successively it follows that the weight to be lifted will vary, and I thereby preferably provide a counterbalancing means to counterbalance the door which acts with a variable counterbalancing force substantially proportionate to the varying weight to be lifted. I have shown a simple form of such counterbalancing means in the drawings comprising a weight 34 suspended from a chain 35 which is wound around a drum 36 of scroll-like form. The drum 36 is mounted fast upon the shaft 27 and interposes a varying leverage which, properly designed, will vary the effective counterbalanc-

ing force upon the door proportionate to the weight to be lifted. It is obvious that this is but one of many forms of means which may be employed for the same purpose.

In order to provide means for closing the lower portion of the doorway when the main door above described has been opened, so that the main door may be opened for ventilating and other purposes while ingress and egress is prevented through the doorway, I have provided an auxiliary door section 40. This door section, which may be, say, six feet in height in a doorway twenty feet in height, is provided with means by which it may be secured in position in the doorway when the main door is lifted, or whereby it may be released from engagement with the doorway framing and lifted with the main door, at will. This means conveniently comprises a couple of studs 41 provided with operating handles 42, the studs being mounted in the lowermost main door section 11 and adapted to be received within suitable openings 43 in the door sections, the said studs being provided with projections 44 at their inner ends for engagement with the rear face of the auxiliary door section. The openings 43 will be slotted so as to receive the projections 44 when the studs are inserted, but upon turning the studs the said projections will be moved out of register with the slotted portions of the openings and so will act to lock the main and auxiliary door sections together. When the sections are so locked together the auxiliary door section will be lifted with the main door section, as is shown in Fig. 4; while the studs are turned so as to release the auxiliary door section the auxiliary door section will be left in place in the doorway when the main door sections are lifted, as is shown in Fig. 5. Suitable bolts 45 are provided for bolting the auxiliary door section in place in the doorway framing when it is desired that the same shall remain stationary when the main door is lifted, and these bolts may be conveniently provided with projections 46 by means of which they may be automatically released when the studs are operated to secure the main and auxiliary door sections together. These projections 46 are arranged in the path of movement of the projections 44 of the studs 41 so that when the studs are turned the engagement of the projections 44 with the projections 46 will withdraw the bolts. By this means the bolts will be automatically withdrawn from engagement with the doorway framing when the auxiliary door section is secured to the main door section, and will be correspondingly secured to the doorway framing when released from engagement with the main door. I preferably rabbet the edges of the door sections as is shown at 47, the corresponding upper and lower edges of the adjacent door

sections being oppositely rabbeted so that they will fit together as is shown. This form of joint is weather-proof and is permitted by the fact that the door sections move slightly in a transverse direction before they move substantially upward.

Among the many advantages following from the invention above described are: The door sections in their movements to open and close the doorway occupy an exceedingly small path so that but little room is taken up for their operation in the building or structure where they are arranged; when at the top of the doorway in the fully open position they take up but a very small space and they require almost no head room; the door may be opened to any degree and will remain in any position in which it is adjusted; the lower portion of the door may be opened while the upper portion remains closed, thereby permitting hand trucks or other small objects to be moved through the doorway without it being necessary to open the upper portion of the doorway, and under the same conditions people may pass freely in and out; the improved form of joints rendered possible by the construction and arrangement of the parts renders a sectional door wind and weather-proof; the construction and arrangement of the parts including the operating mechanism renders it unnecessary for an attendant to manually push the sections transversely when first opening the door as is common in sectional doors, and it may be noted that the peculiar arrangement of these parts is applicable to styles of sectional doors other than those in which the sections are lifted successively; the strain on the connecting elements is relatively small and is longitudinal there-through instead of being transverse thereof as is common in other styles of sectional doors; the height of a door section is in no way dependent upon the height of any adjacent door section, whereby all the sections may be of uniform height if desired, or the same may be varied, if preferred; and generally, the construction is a simple and inexpensive one to manufacture, unlikely to get out of order, and simple and easy to operate.

Of course it must be understood that the term "door" herein employed must not be construed in a limited sense, as obviously windows, transoms, screens, covers, partitions, and the like may be similarly operated and are properly included in the broad aspect of my invention.

What I claim is:

1. In a multi-section door, the combination with a plurality of swinging door sections, of means for successively lifting each section and simultaneously swinging its upper end outwardly.

2. In a multi-section door, the combination with a plurality of pivoted door sec-

tions, of vertical guideways for the said pivots, and means for raising and simultaneously swinging on its pivots each section successively while the pivots are guided in the guideways.

3. In a multi-section door, the combination with a plurality of vertically superposed door sections arranged to lie when closed substantially in a plane, of means for lifting and simultaneously swinging the sections successively from a position in the said plane to a position substantially horizontal thereto.

4. In a multi-section door, the combination with a plurality of vertically superposed door sections and connecting elements pivotally connecting the sections together, of means coöperating therewith for lifting and simultaneously swinging the sections successively.

5. In a multi-section door, the combination with a plurality of vertically superposed door sections, of means including connecting elements pivotally connecting the sections together for successively moving the door sections from their vertically superposed positions to positions side by side, and from a substantially vertical to a substantially horizontal position.

6. In a multi-section door, the combination with a plurality of door sections and vertical guideways for guiding the lower ends of the said door sections, of connecting elements for pivotally connecting the said door sections together, and means for raising the lower ends of the door sections successively, the connecting elements coöperating at such times with the lifting means to swing the door sections from a substantially vertical to a substantially horizontal position.

7. In a multi-section door, the combination with a doorway framing, a plurality of vertically superposed door sections, and vertical guideways for guiding the lower ends of the said door sections, of suspension elements pivotally connected at their upper ends to a portion stationary with respect to the said door framing, and at their lower ends to the upper said door section, connecting elements pivotally connected at their opposite ends to adjacent door sections respectively, and means for raising the lower ends of the door sections successively, the said connecting and suspension elements coöperating with the lifting means to swing the door sections from a substantially vertical to a substantially horizontal position during the said lifting operation.

8. In a multi-section door, the combination with a plurality of swinging door sections so connected that independent movements thereof relatively to each other are permitted, suspension elements pivotally connected at their opposite ends to adjacent

door sections, forming such connections, and means for cooperating therewith to move said door-sections from a vertical position in the same vertical plane to a horizontal position in substantially parallel planes.

9. In a multi-section door, the combination with a plurality of vertically superposed swinging door sections so connected that independent movements thereof relatively to each other are permitted, suspension elements pivotally connected at their opposite ends to adjacent door sections, forming such connections, and means cooperating therewith for successively lifting the said door sections to a position side by side and for swinging them from a vertical position in the same vertical plane to a horizontal position in substantially parallel lines.

10. In a multi-section door, the combination with a plurality of swinging door sections, of means connecting the sections together, and means cooperating therewith for raising and swinging the lowermost door section, from a substantially vertical toward a substantially horizontal position prior to the opening of the sections above it.

11. In a multi-section door, the combination with a plurality of swinging door sections, of connecting elements pivotally connected at their opposite ends to adjacent door sections whereby the door sections are connected together in free swinging relation and can have limited movements independently of each other, suspension elements for suspending the upper door section from a stationary part, vertical guideways for the lower ends of the said door sections, and means cooperating with the said suspension and connecting elements for lifting the said door sections and swinging them to a horizontal position.

12. In a multi-section door, the combination with a plurality of swinging door sections of equal height, means connecting the several sections together, and means cooperating therewith for successively lifting each section and simultaneously swinging its upper end outwardly whereby the said sections are swung from vertical positions

in the same vertical plane toward horizontal positions in substantially parallel planes.

13. In a multi-section door, the combination with a plurality of overlapping swinging door sections, of means connecting the door sections together, and means cooperating therewith for successively lifting each section and simultaneously swinging its upper end outwardly whereby the said sections are swung from vertical positions in the same vertical plane toward horizontal positions in substantially parallel planes.

14. In a multi-section door, the combination with a plurality of swinging door sections, and means for successively lifting each section and simultaneously swinging its upper end outwardly, of counterbalancing means arranged to apply a variable force to aid in lifting the door sections.

15. In a multi-section door, the combination with a plurality of swinging door sections, and means for successively lifting each section and simultaneously swinging its upper end outwardly, of counterbalancing means for applying a variable counterbalancing force to aid in lifting the door sections, substantially proportionate to the progressively increased weight to be lifted.

16. In a multi-section door, the combination with a plurality of swinging door sections, and means for successively lifting each section and simultaneously swinging its upper end outwardly, of a counterbalancing weight for the door, and intermediate means for varying the lifting force applied thereby.

17. In a multi-section door, the combination with a plurality of swinging door sections, and means for successively lifting each section and simultaneously swinging its upper end outwardly, of a counterbalancing weight for the door, and intermediate means for varying the lifting force applied thereby, proportionate to the progressively increased weight to be lifted.

FREDRIC D. OGDEN.

Witnesses:

M. KEMPE,
A. FINN.