

Jan. 7, 1941.

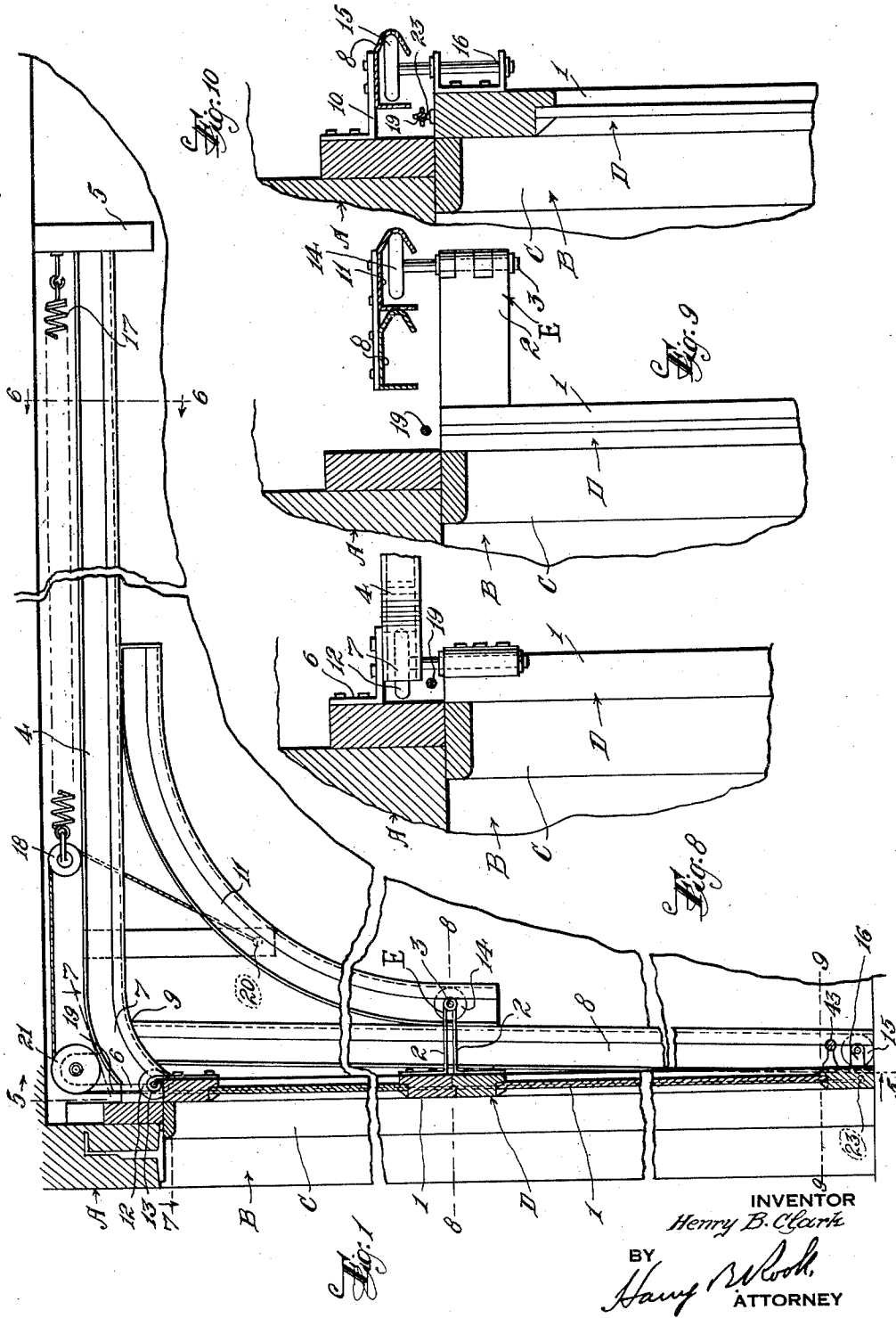
H. B. CLARK

2,227,571

TWO-SECTION OVERHEAD DOOR

Filed Sept. 16, 1939

7 Sheets-Sheet 1



INVENTOR

Henry B. Clark

BY

Harry Wood,  
ATTORNEY

Jan. 7, 1941.

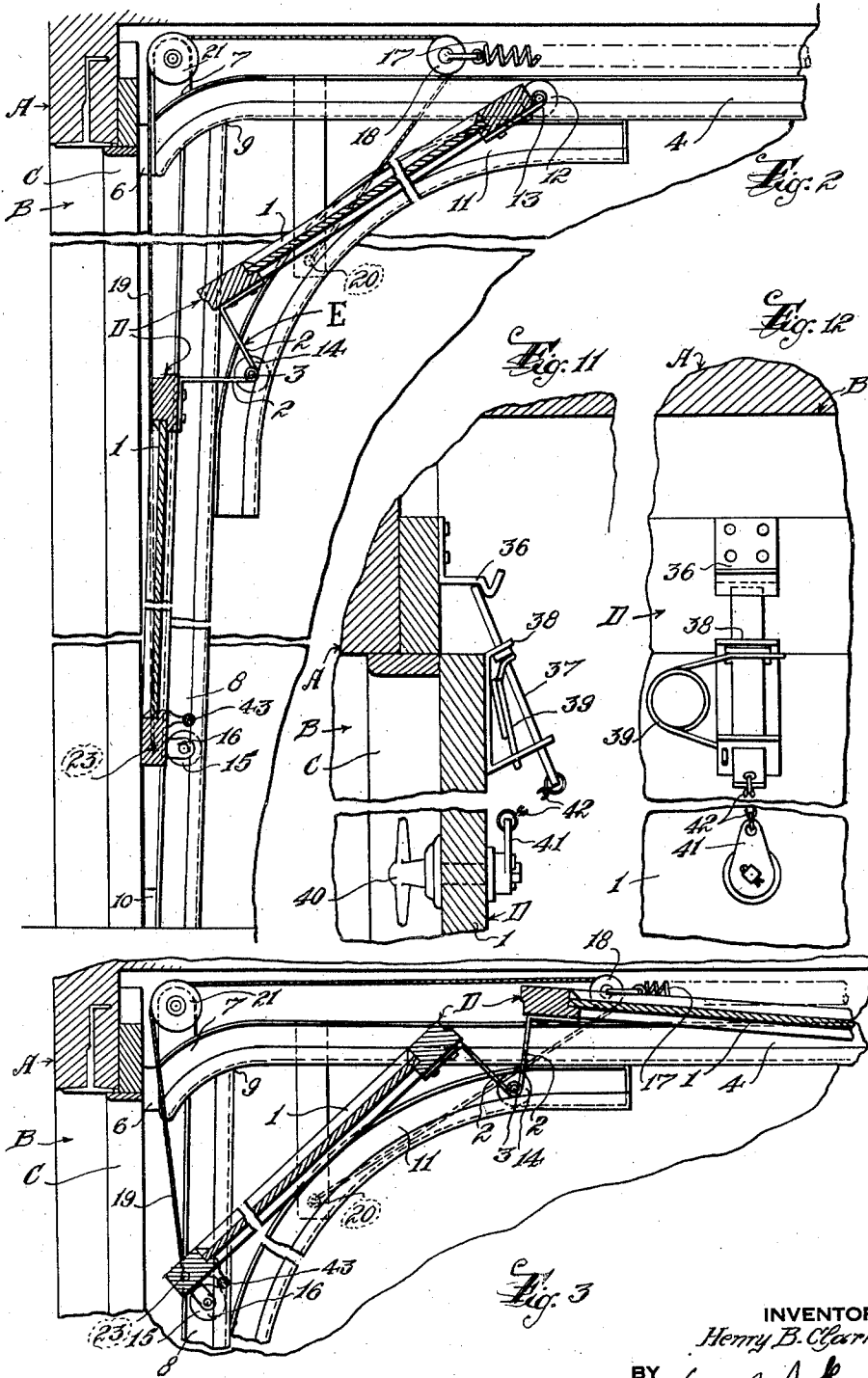
H. B. CLARK

2,227,571

TWO-SECTION OVERHEAD DOOR

Filed Sept. 16, 1939

7 Sheets-Sheet 2



INVENTOR  
Henry B. Clark  
BY  
Harry B. Clark  
ATTORNEY

Jan. 7, 1941.

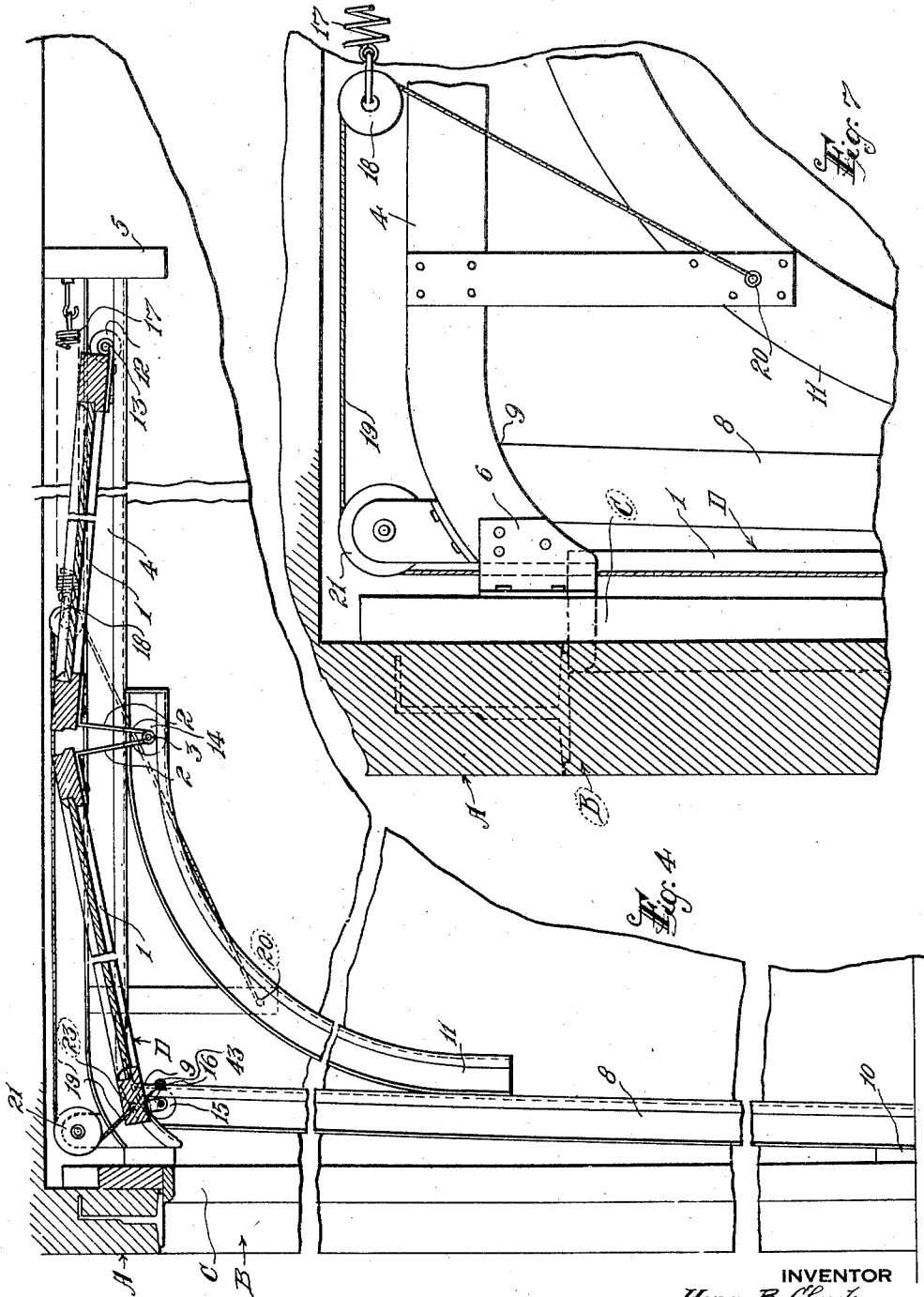
H. B. CLARK

2,227,571

TWO-SECTION OVERHEAD DOOR

Filed Sept. 16, 1939

7 Sheets Sheet 3



INVENTOR  
*Henry B. Clark*  
BY  
*Harry W. Cook*  
ATTORNEY

Jan. 7, 1941.

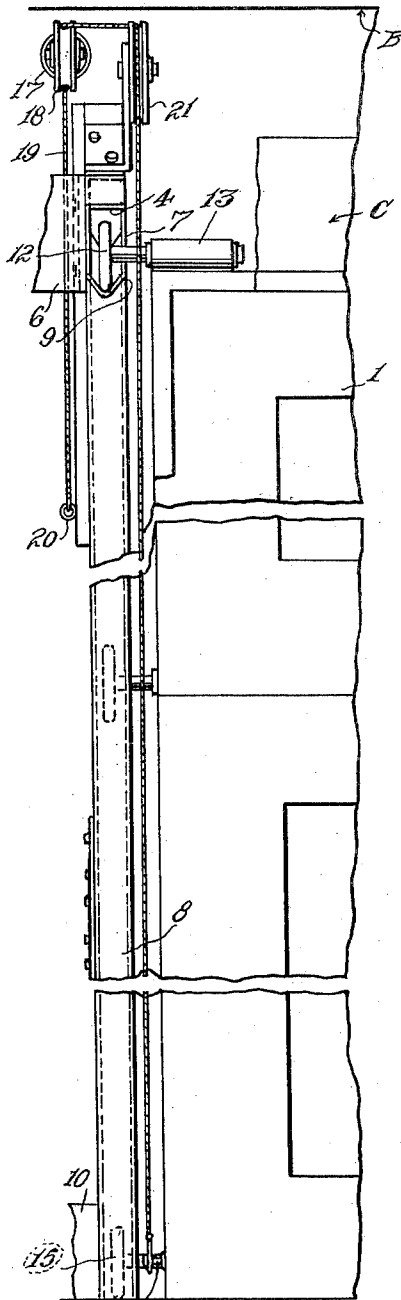
H. B. CLARK

2,227,571

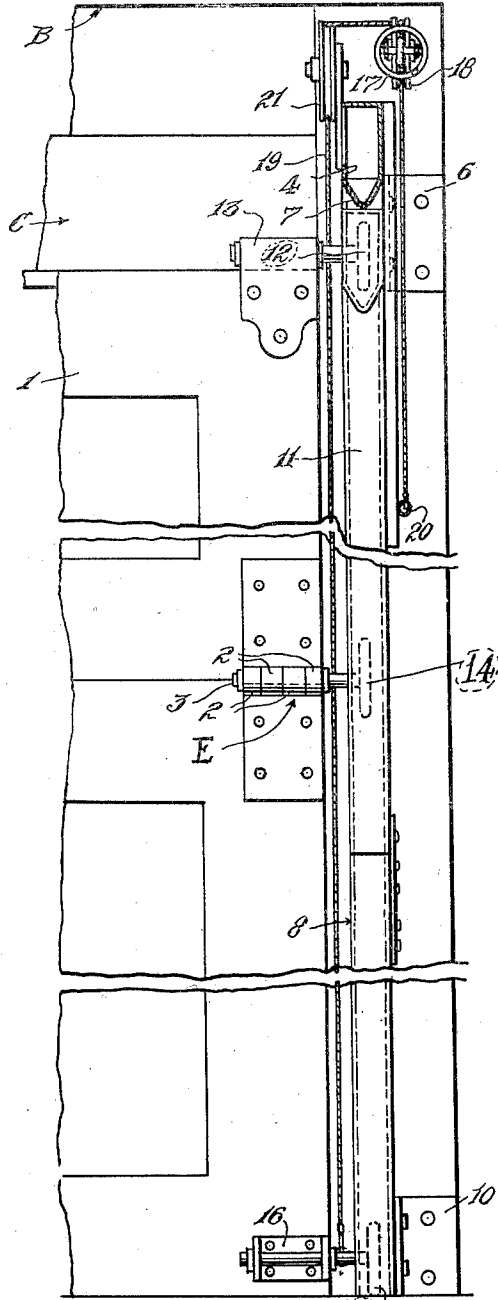
TWO-SECTION OVERHEAD DOOR

Filed Sept. 16, 1939

7 Sheets—Sheet 4



23 *Fig. 5*



*Fig. 6*

INVENTOR  
*Henry B. Clark*  
BY  
*Harry B. Cook*  
ATTORNEY







# UNITED STATES PATENT OFFICE

2,227,571

## TWO-SECTION OVERHEAD DOOR

Henry B. Clark, Elizabeth, N. J.

Application September 16, 1939, Serial No. 295,231

7 Claims. (Cl. 20-20)

This invention relates in general to doors of the so-called overhead type. These doors usually include a plurality of panel sections hingedly connected at their edges on horizontal axes so that the panel sections may be arranged in a common plane in a door opening for closing the door and may pivotally relatively move to permit raising of the panel sections and movement thereof from the vertical plane into a horizontal plane overhead for opening the doors, the panel sections being mounted on rollers running in tracks.

Doors of this type most generally include three or more panel sections, and are expensive to manufacture and install, as well as being heavy and difficult to operate. Two-section overhead doors have been proposed, for example as shown in Patent No. 1,629,973 dated May 24, 1927, but such doors are objectionable in that the panel sections swing inwardly of the door opening in folded relation so that the operator, if standing near the door, may be struck by the inwardly swinging sections. Furthermore, such two-section doors are difficult to operate, especially because substantially the whole weight of the door must be elevated in opening the door. Heretofore, as far as known to me, no two-section overhead door has been mounted to move on tracks so that the two-section door may be operated in a manner similar to the operation of the more common door having three or four sections.

Therefore, a prime object of my invention is to provide a two section overhead door which shall embody novel and improved features of construction whereby the two sections can be moved from a common vertical door-closing position upwardly to an approximately horizontal door-opening position, and vice versa, without objectionable projection of the sections laterally from or through the door openings.

Another object is to provide such a two-section overhead door which shall embody novel and improved features of construction whereby the door can be opened and closed with a minimum expenditure of energy by the operator and without danger to the operator from being struck by the door during its movement from open to closed positions, and vice versa.

Other objects are to provide an overhead door of the general character described which shall be light in weight, simple and inexpensive in construction and easy to operate, and to obtain other advantages and results as will be brought out by the following description when read in conjunction with the accompanying drawings, in which

Figure 1 is a vertical sectional view through an overhead door construction embodying my invention, illustrating the door in closed position.

Figure 2 is a similar view showing the door partially opened.

Figure 3 is a like view showing the door in further open position.

Figure 4 is a view similar to Figure 2 showing the door completely opened.

Figure 5 is a fragmentary front elevational view of one side of the door viewing the same from the line 5-5 of Figure 1.

Figure 6 is a vertical sectional view on the line 6-6 of Figure 1 showing the door in rear elevation.

Figure 7 is a side elevational view on an enlarged scale of the outer side of the upper portions of the tracks.

Figures 8, 9 and 10 are horizontal sectional views on the lines 8-8, 9-9 and 10-10 respectively of Figure 1.

Figure 11 is a side elevational view of a lock for locking the door in closed position.

Figure 12 is a rear elevational view of the lock.

Figure 13 is a view similar to Figure 1 showing a modification of the invention, illustrating the door in closed position.

Figure 14 is a similar view showing the door in open position.

Figures 15, 16 and 17 are horizontal sectional views on the respective lines 15-15, 16-16 and 17-17 of Figure 13.

Figure 18 is a fragmentary rear elevational view of the lower corner of the door with portions broken away and shown in section.

Figure 19 is a vertical sectional view on the line 19-19 of Figure 18.

Figure 20 is a similar view on the line 20-20 of Figure 18.

Figure 21 is a composite fragmentary perspective view of the means for connecting the cable to the door and the door to one of the vertical guides.

Figure 22 is a view similar to Figure 1 showing another modification of the invention illustrating the door closed.

Figure 23 is a similar view showing the door partially open.

Figure 24 is a fragmentary elevational view of the inner side of the door viewing the same from the line 24-24 of Figure 22.

Figures 25, 26 and 27 are horizontal sectional views on the lines 25-25, 26-26 and 27-27 of Figure 22.



Figure 28 is a vertical sectional view on the line 28--28 of Figure 22, and

Figure 29 is a fragmentary perspective view of the bracket for connecting the cable to the door.

Specifically describing the illustrated embodiment of the invention the reference character A designates the wall of a building which has a door opening B at the inner edge of which is the usual door stop or jamb C against which the door D abuts when the door is in closed position.

The door comprises two substantially identical panel sections 1, of such dimensions that together, when they are disposed in a common vertical plane, will close the door opening as shown in Figure 1. The adjacent edges of the two sections 1 are hingedly connected on their inner sides by hinges E each comprising two hinge sections 2 that are connected by a pintle 3 and each of which is rigidly connected to one of the door sections.

Within the door opening and adjacent the top of each side thereof is a horizontal track 4 that is connected by suitable brackets 5 and 6 to the ceiling and wall of the building, the forward ends of the tracks 4 being curved downwardly at 7 to a point adjacent the top of the door opening.

Also, within the door opening and at each side thereof is mounted a vertical track 8 extending the full height of the door opening and secured at its upper end to the corresponding horizontal track 4 as at 9 and having its lower ends secured to the wall A as by a bracket 10.

An arcuate track 11 traverses the angle between the horizontal and vertical tracks 4 and 8 and extends from a point slightly below the hinged edges of the door sections when the door is closed to a point intermediate the length of the horizontal track 4, said arcuate track being connected to and supported by the horizontal and vertical tracks, but being shown as discontinuous with and disposed inwardly of both thereof.

Guide means slidably support the upper end of the top section of the door, the hinged edges of both sections and the lower end of the bottom section in said horizontal, arcuate and vertical tracks, respectively, whereby the door sections can be moved from a common vertical door-closing position as shown in Figure 1 to an approximately horizontal overhead door-opening position shown in Figure 4, and vice versa. This guide means comprises rollers 12, each journaled in a bracket 13 at each side edge of the top of the upper section of the door, said rollers being movable along the corresponding horizontal tracks 4. A roller 14 is also journaled on the pintle 3 of the hinge E at each side edge of the door, and moves in the arcuate track 11, while each of two other rollers 15 is journaled on a bracket 16 at each side edge of the bottom of the lower door section and moves in the corresponding vertical track 8.

The radius of the arcuate track 11 is related to the vertical and horizontal tracks and to the height of the door sections 1 so that the intermediate guide roller 14 and either of the upper guide roller 12 and bottom guide roller 15 shall not be disposed at the same time in the straight track portions beyond opposite ends of the arcuate portion, whereby there is no possibility of the door sections becoming jammed in the tracks during opening or closing of the doors. In other words, the radius of the arcuate track 11 is of a length of the order of from approximately one-third to approximately one-half of the height of the door opening B. With this structure, the

door sections 1 are disposed at wide obtuse angles to each other throughout their movements between said vertical door-closing position and the horizontal door-opening position, so that the upper section can be continuously and freely actuated in both directions by force applied to the lower section to move the latter upwardly and downwardly. It will be observed that should the lower section assume an acute angular relation or a narrow obtuse angular relation to the upper section, it would be practically impossible, or at least difficult to move the two sections together in tracks in either direction by force applied to either section. This can be more clearly visualized from a study of Figures 2 and 3 which show the door sections in different intermediate positions between the door closing and door opening positions.

With this construction, to open the door from the closed position shown in Figure 1, it is merely necessary to exert a slight lifting force on the lower section which will cause the rollers 7 at the top of the upper section to follow the horizontal tracks 4 rearwardly, and at the same time will cause the rollers 14 and 15 to follow the arcuate and vertical tracks respectively, until the two sections are brought into approximately horizontal overhead position as shown in Figure 4. To close the door, a downward pull is exerted on the lower section, whereupon the two sections descend along their respective tracks until the sections reach their common vertical door-closing position shown in Figure 1.

It is desirable to counter-balance the weight of the door, and for this purpose I may provide any suitable means such as a spring 17 at each side and inwardly of the door opening having one end connected to a fixed support such as the bracket 5, and having a pulley 18 connected to its other end over which passes a cable 19 one end of which is connected to a fixed support, for example one of the tracks, at 20. The cable then passes over an idler pulley 21 mounted on the horizontal track and has its other end connected to a stud 23 at the side edge of the bottom of the lower section. With the springs 17 of proper strength it has been found that the door may be raised and lowered by a slight expenditure of manual energy by the operator, and the springs may have considerably less tension than would be required to counterbalance a three-section door of the same weight as my two-section door.

For ensuring tight abutment of the door sections with the jamb or stop C, the rollers 12 follow the downwardly curved ends 7 of the horizontal tracks 4 to bring the upper section of the door into tight abutment with the stop C, and the vertical tracks 8 are inclined downwardly and outwardly so as to guide the lower end of the door into tight abutment with the stop.

A modification of the invention is shown in Figures 13 to 21 inclusive which is in general similar to that hereinbefore described. The main difference between this modified construction and the construction hereinbefore described is in the vertical tracks 24 which are in the form of a strip of metal instead of a channel track, and instead of the rollers 15 at the bottom end of the door, shoes 25 are provided to follow the track 24.

As shown, each shoe comprises an approximately channel-shaped member which has a keyhole slot 26 in its base through which removably projects a pin 27 of a diameter corresponding to the larger end of the keyhole slot. The pin also has a circumferential groove 28 of a

diameter corresponding to the smaller end 29 of the keyhole slot so that when the edges of the portion 29 of the slot are disposed in the groove 28, the pin is held against axial movement out of the slot. The pin is screw threaded at 30 into a block 31 secured in a recess 32 in the lower corner of the door and projects from the side edge of the door. The end of the cable 19 of the counter-balancing mechanism is connected to the shoe 25 as clearly shown in Figures 18 and 21.

When the parts of the door are assembled, one flange 33 of the shoe is disposed at one side of the vertical track 24 while the pin 27 is disposed at the other side of the track, and accordingly the shoe and pin 27 guide the lower end of the lower section of the door along the vertical track 24 during opening and closing movements of the door. Preferably at least the lower portion of the vertical track 24 is inclined downwardly and outwardly at 34 so as to direct the lower end of the lower section of the door into tight abutment with the stop C in the door opening.

With this construction, the length of the sections of the hinge 35, corresponding to the hinge E, may be less than the length of the sections of the hinge E, because the arcuate track 11 may be disposed closer to the door stop C.

In this form of the invention, the downwardly curved ends 7 of the horizontal track 7 are omitted as shown in Figures 13 and 14 although they may be utilized if desired.

Any suitable locking mechanism may be utilized with the door, but one form is illustrated in Figures 11 and 12 and includes a keeper lug 36 secured to the wall above the door opening, and a latch bolt 37 to cooperate with said keeper lug and slidable in a bracket 38 secured to the upper portion of the inner side of the upper door section. The bolt 37 normally is influenced into position to engage the keeper lug by a spring 39, and may be operated to disengage the bolt from the keeper lug by a knob 40 rotatably mounted in the door section and having a crank arm 41 connected by a flexible connector 42 to the bolt. If desired, the knob may have a key controlled lock for locking the knob against rotation. In addition to serving as an operator for a lock, the knob 40 may also serve as a gripping member to lift the door sections in opening the door.

For initiating downward movement of the door sections into closed position, the lower section may have a suitable handle 43.

A further modification of the invention is shown in Figures 22 to 29 inclusive, which is in general the same as that shown in Figure 1, the main difference between the two forms of the invention being in the track structure. In this modification a track structure is arranged at each side of the door opening and includes a horizontal track 45 extending rearwardly from the top at each side of the door opening in a manner similar to the horizontal track 4 of the structure shown in Figure 1. At each side of the door opening is a second track structure which includes a vertical portion 46 and an arcuate portion 47 that traverse the angle between said vertical portion and the horizontal track 45. A roller 48 is journaled at each side edge of the top of the section of the door, said rollers being movable along the horizontal tracks 45. A roller 49 is also journaled coincident with the hinged joint between the door section D at each side of the door, while each of two other rollers 50 is journaled at each side edge of the bottom of the lower door section, the rollers 49 and 50 being

mounted to move in the vertical and arcuate portions 46 and 47 of the second track structure.

For counterbalancing the weight of the door, a spring 51 corresponding to the spring 17 may be provided at each side and inwardly of the door opening with one end connected to a fixed support and having a pulley 52 connected to its other end over which passes the cable 53, one end of which is connected to a fixed support as at 54 while the other end passes over an idler roller 55 and is connected to a bracket arm 56 at the side edge of the bottom of the lower section of the door.

With this construction, to open the door from the closed position shown in Figure 22, a slight lifting force is exerted on the lower section which will cause the rollers 48 to follow the horizontal tracks 45 rearwardly and at the same time will cause the rollers 49 and 50 to follow the vertical and arcuate portions 46 and 47 of the track structure until the two sections are brought into approximately horizontal overhead position as shown in Figure 23. To close the door a downward pull is exerted upon the lower section whereupon the two sections descend along their respective tracks and the sections reach their common vertical door-closing position.

The radius of the arcuate portion 47 of the track structure is of the same order as the radius of the arcuate track 11 of Figure 1, being, for example of a length approximately from one-third to one-half the height of the door opening B in which the door is mounted.

It will be understood by those skilled in the art that the details of structure of the invention may be modified or changed without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim is:

1. The combination with a wall having a door opening, of a door comprising two sections hingedly connected on a horizontal axis at adjacent edges to close said door opening when in a common vertical plane, a horizontal track extending rearwardly from the top at each side of the door opening, a vertical track at each side of the door opening, an arcuate track traversing the angle between said vertical and horizontal tracks, upper guide means mounted on the upper section adjacent each end of the top edge thereof and slidably mounted in the corresponding said horizontal track, intermediate guide means connected to said sections adjacent each end of the hinged edges of said sections and slidable in the corresponding said arcuate track, and bottom guide means connected to the lower section adjacent each end of the bottom edge thereof and slidable in the corresponding said vertical track, whereby said door sections can be moved from a common vertical door-closing position upwardly to an approximately horizontal overhead door-opening position and vice versa.

2. The combination set forth in claim 1, wherein said vertical tracks extend the full height of the door opening and the last-mentioned guide means travels the full length of said vertical tracks.

3. The combination set forth in claim 1, wherein the radius of said arcuate track is related to said vertical and horizontal tracks and to the height of said door sections so that said intermediate guide means and either of said upper and bottom guide means shall not be disposed at the same time in said vertical or horizontal tracks beyond opposite ends of said arcuate track.

4. The combination set forth in claim 1 where-

in said arcuate track is discontinuously related to each of said horizontal and vertical tracks and disposed inwardly of both thereof.

5. The combination with a wall having a door opening, of a door comprising two sections hingedly connected on a horizontal axis at adjacent edges to close said door opening when in a common vertical plane, a horizontal track extending rearwardly from the top at each side of the door opening, guide means at the top of each side edge of the upper section of the door slidable in said horizontal track, a vertical track at each side of the door opening, guide means adjacent the bottom of each side edge of the lower section of the door slidable along said vertical tracks, an arcuate track at each side of the door opening extending from a point below the hinged edges of said door sections upwardly and inwardly to a point intermediate the length of the corresponding said horizontal track, and guide means approximately coincident with said hinged edges at each end of the door sections slidable along said arcuate track.
6. The combination set forth in claim 1 wherein the forward ends of said horizontal tracks curve downwardly and terminate at a point adjacent the top of the door opening, and said vertical track is inclined outwardly and downwardly, whereby to cause said door to tightly abut the inner side of said wall at the top and sides of said door opening.

7. The combination with a wall having a door opening, of a door comprising two sections hingedly connected on a horizontal axis at adjacent edges to close said door opening when in a common vertical plane, a horizontal track structure extending rearwardly from the top at each side of the door opening, a second track structure at each side of the door opening beneath the corresponding horizontal track structure including a vertical portion and a curved portion that traverses the angle between said vertical portion and said horizontal track, upper guide means slidably supporting the upper end of the top section of the door in said horizontal track, intermediate guide means approximately coincident with said hinged edges of said sections at each side edge of the door sections, and lower guide means adjacent the bottom of each side edge of the lower section of the door, both said intermediate and lower guide means being slidably mounted in said second track structures, the radii of said curved portions of the second track structures being of a length of the order of from approximately one-third to approximately one-half of the height of the door opening, whereby said door sections can be moved from a common vertical door-closing position upwardly to an approximately horizontal overhead door-opening position and vice versa.

HENRY B. CLARK. 30