

No. 781,665.

PATENTED FEB. 7, 1905.

C. F. KUSCH.
SECTIONALLY FOLDING DOOR.
APPLICATION FILED JUNE 24, 1904.

3 SHEETS—SHEET 1.

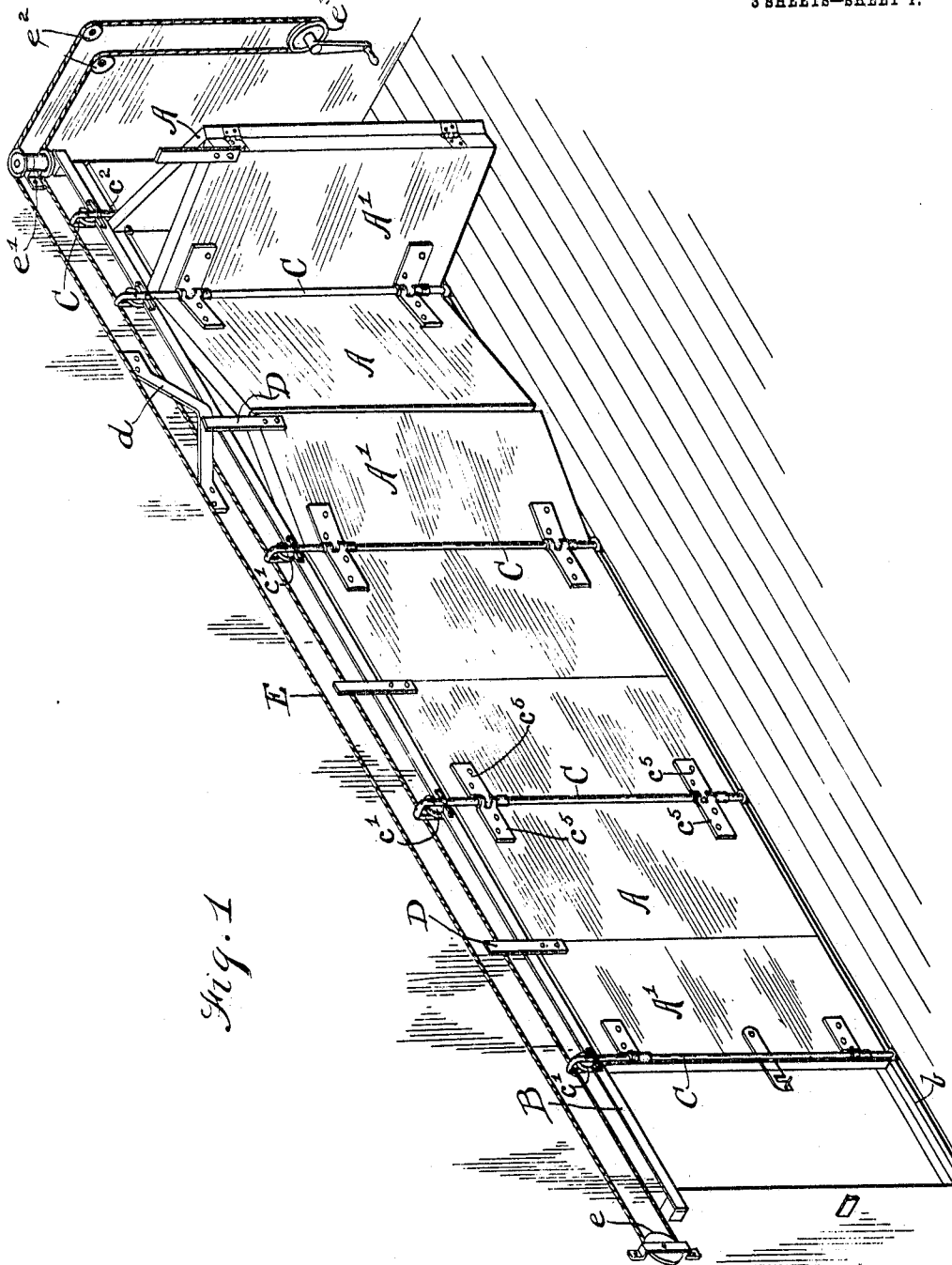


Fig. 1

Witnesses
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W. W. Withenbury

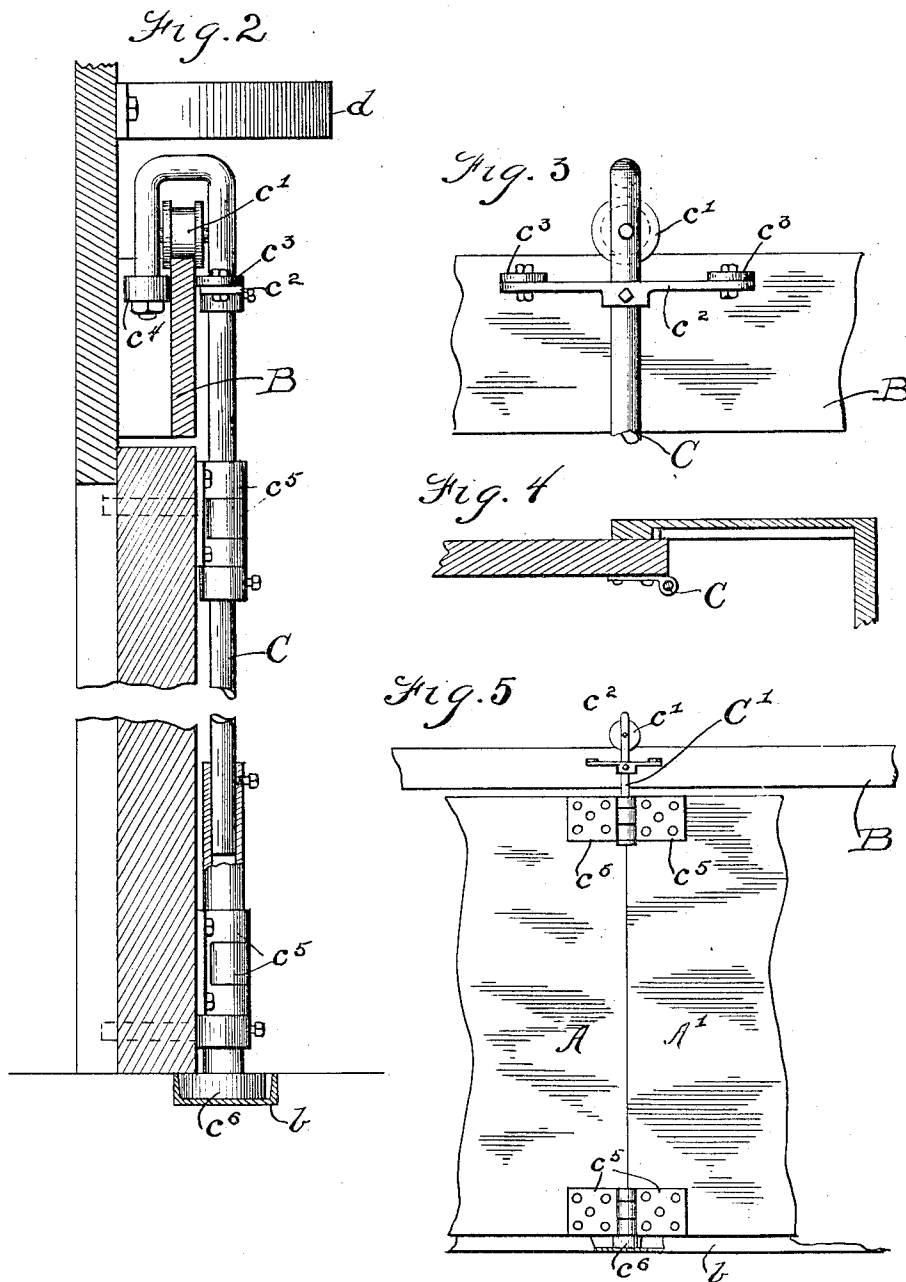
Inventor
Charles F. Kusch
by Charles F. Kusch Atty

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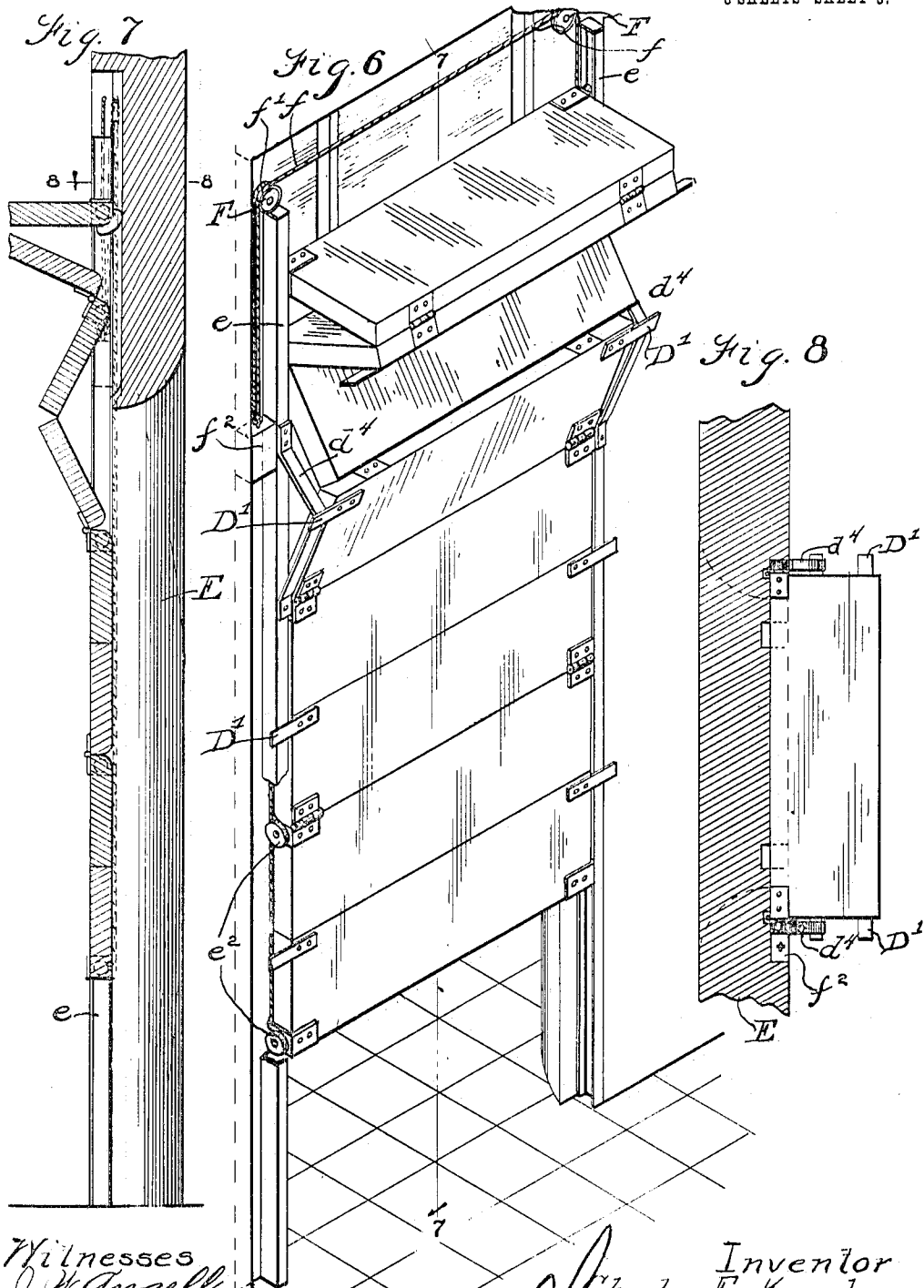
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UNITED STATES PATENT OFFICE.

CHARLES F. KUSCH, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK VOSS, OF CHICAGO, ILLINOIS.

SECTIONALLY-FOLDING DOOR.

SPECIFICATION forming part of Letters Patent No. 781,665, dated February 7, 1905.

Application filed June 24, 1904. Serial No. 213,964.

To all whom it may concern:

Be it known that I, CHARLES F. KUSCH, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sectionally-Folding Doors; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in sectionally-folding doors, and more particularly to a door adapted to expose large openings.

Heretofore in warehouses and other buildings requiring a wide or high door-opening it has been necessary, except in ordinary sliding doors, to leave considerable clear floor-space in front of the door to enable the same to be operated. In many situations ordinary horizontally-sliding doors cannot be used conveniently, inasmuch as no space to receive the doors when open can be provided. In such instances vertically-sliding doors are frequently used. Here again the room height may be such as to prevent the successful use of such doors.

It is therefore an object of my invention to provide a sectional sliding door comprising a plurality of relatively narrow sections arranged to fold into small space at one side or at the top of the door-opening, as preferred, and provided with means to cause the same to fold automatically at a given point in the travel or slide of the same.

It is also an object of my invention to provide a construction in which freight or other articles may be piled close to the door without interfering with the operation of the door and in which the parts are so constructed and assembled as to afford a very simple construction of great strength and durability and affording an efficient closure for the door-opening.

The invention consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a perspective view of a device embodying my invention, illustrating a horizontally-sliding door. Fig. 2 is an enlarged vertical section illustrating the means for supporting the doors. Fig. 3 is a similar face view of one of the hangers and the track therefor. Fig. 4 is an enlarged detail in horizontal section illustrating a convenient construction of the door. Fig. 5 is a slightly-modified face view of a horizontally-sliding door. Fig. 6 is a perspective view of a vertically-sliding and folding door. Fig. 7 is a section taken on line 7 7 of Fig. 6. Fig. 8 is a section on line 8 8 of Fig. 7.

As shown in said drawings, referring first to Figs. 1 to 5, inclusive, a wide doorway, such as is common in elevators, warehouses, and the like, as shown, closed by a sliding laterally-folding door comprising a plurality of narrow sections A and A' of any suitable material and which, as shown, is adapted to slide into a very small space at one or both ends of the door-opening. Said door is supported upon a horizontal track B, located above the door-opening and projecting outwardly above a channel or other suitable track in the floor. Said door-sections are hinged together along their length, alternate sections being hinged to fold outwardly and inwardly, respectively, as shown in Fig. 1, and, as shown, hangers are provided at alternate joints in said door adapted to support the door upon said track B and in engagement with the channel or other lower track b. Said hangers in the construction illustrated in Figs. 1, 2, and 3 each comprise a rod or bar C, bent at its upper end to hook over the track B and having journaled in the hooked upper end thereof a roller c', which engages on said track. A bracket c² is secured on said hanger and extends parallel with the track and is provided on each end with a roller c³, which bears against the outer face of the track and coacts with a corresponding roller c', carried on the downturned upper end of said hanger which engages behind said track, as shown in Fig. 2. Said hanger C serves as a pintle for the hinge between adjacent door-sections, and as shown, passes through the interfitting knuc-

kles of the hinge-leaves or straps c^5 , which are rigidly connected by screws, bolts, or other suitable means to the adjacent door-sections, and, as shown, one of said hangers is similarly engaged along the edge of each end door-section. The intermediate meeting edges of the door-sections are hinged to enable said edges to swing inwardly, as shown in Fig. 1, and a striking plate or bar D is rigidly secured at the upper end of one of said sections adjacent said inwardly-swinging joints and projects above the same in position to engage the guide d , which comprises a strap or bar of metal or other suitable material bent to afford an inwardly and rearwardly directed bracket which projects into the path of said striking-bars D and acts to start the inward movement of the hinged edges of the door-sections intermediate the hangers. Means are provided for operating said doors, however great the horizontal width of the door-opening, from a single source of power. For this purpose an endless cable E is trained about a sheave e , secured at one side the door-opening and above the same and about friction-rollers or sheaves e' , e'' and extends downwardly and is trained about the drum of a winch e^3 , thus affording an endless belt which is connected with the hanger for said door-section A' most remote from the winch, so that when it is desired to open the doors rotation of the crank or winch acts to draw the door-sections along the track B and the track b at the bottom of the same. As the striking plates or bars D engage a guide d , the inwardly-bending sections of the door are successively forced inwardly, folding the sections successively in the lateral space reserved for that purpose. In the construction illustrated in Fig. 5 the hanger affords the pintle for the upper hinge constructed as before described and a separate pintle is provided at the lower end of the door for the lower hinge and the roller e^6 . Said roller tracks in said channel as before described.

In Figs. 6, 7, and 8 a vertical sliding and folding door is shown, which is adapted to be folded at the top of the door-opening. In these figures E indicates frame members of the door-opening, on each side of which is rigidly secured a vertical inwardly-facing channel e , near the upper end of which is pivotally secured the upper margin of the upper door-section, as shown in Fig. 6, which is so connected therewith as to admit of the joints formed by the hinge connection with the next adjacent section to swing outwardly, as shown in the drawings. The door-sections are hinged together, as before described, on alternate sides of the door, and at every alternate joint the pintle of the hinge is provided at its outer ends with a roller e^2 , which tracks in said channels at each side the door and serve to hold the joints of alternate sections in alignment with the plane of the door, while the sections themselves are adapted to swing out-

wardly and fold as before described. Striking-plates D' are provided on the meeting edges intermediate the hinges similar to the striking-plate D, before described, and which engage with an inclined guide d' , which forces the joints formed by the hinged sections outwardly, starting the folds. Journaled at the top of the door-opening above said channels are sheaves F, over which extend cables f, f' , which at one end connect with the lowermost section of the door on each side thereof and at their other ends are connected with a counterweight or weights f^2 , which when the door is released at the bottom aid in elevating and folding the sections of the door, exposing the entire door-opening.

The operation is as follows: With either construction described movement of the door toward its folding position acts to successively fold said sections, as shown in Figs. 1 and 6, the striking-plates starting the fold by sliding outwardly over the guides d and d' , while in the one instance the winch and in the other gravity acts to continue the upward folding operation until the entire door-opening has been exposed or so much thereof as may be required.

Obviously from this construction the door may be made of any width or length and may be quickly opened to its entire extent by the device described. Furthermore, said sections may be of any desired width, and when the door is opened are folded in exceedingly small space, leaving the floor clear.

Obviously the hinges may be of any desired type and the hangers may assume other forms than herein described and various means for applying force to the door for opening the same may be used and many details of construction may be varied without departing from the principle of my invention.

I claim as my invention—

1. A door comprising upper and lower ways, a plurality of sections hinged to fold oppositely, a pintle forming a part of the hinge for said sections, a roller on the upper end thereof adapted to track on the inner side of the upper way and means adapted to hold said pintle from turning.

2. A door comprising upper and lower tracks, a plurality of door-sections hinged together to fold oppositely, a roller at alternate joints adapted to engage the lower track, a pintle forming part of the hinge at said joints and extending above the door-sections, rollers thereon adapted to track on the top and inner side of the upper track and means engaging the track laterally of said pintle acting to hold the same in operative position.

3. A door comprising a plurality of oppositely-folding sections, upper and lower tracks therefor, a pintle at opposite joints, a roller on the lower end of said pintle adapted to engage the lower track, a hooked upper end on

said pintle, a roller journaled thereon adapted to engage the upper track, a laterally-directed arm on said pintle and rollers thereon adapted to engage said track laterally of the pintle.

5 4. A folding door comprising relatively narrow sections hinged at their edges and adapted to fold oppositely, oppositely-disposed ways at the door-opening, means at alternate hinged joints of the door engaging in said ways and
10 acting to confine the sections from movement except along the ways, an upwardly-directed striking-plate at intermediate hinged joints, an outwardly-directed angular guide projecting into the path of said striking-plate and adapted
15 to force the same outwardly and operating means acting to move said door to its open and closed position.

5. The combination with a track above and below a door-opening and a door therefor
20 comprising laterally-slidable mutually-hinged narrow sections supported at alternate joints on said tracks, of a striking-plate secured on said door at alternate joints, a guide secured above the door-opening and acting to force the
25 striking-plates outwardly starting the fold, and a cable and winch acting to move said door to its open and to its closed position.

6. In a device of the class described the combination with a plurality of oppositely-folding

door-sections, a hanger pivotally engaged in 30 the hinges of alternate joints, an intumed end thereon, a roller journaled in said end and a roller carried at each side thereof adapted to engage the track and prevent said hanger from turning.

7. A sectional door comprising a plurality 35 of oppositely-hinged sections, a track above and below the same, guide-pulleys carried on alternate joints on the door, engaging the tracks, striking-plates on the joints intermediate 40 those provided with guide-pulleys acting to start the fold and a winch acting to move said door to its open or to its closed position.

8. In a device of the class described the combination with a plurality of ways, of a plural- 45 ity of door-sections, a pintle forming a part of the hinge for alternate sections and projecting above and below the same, a hooked upper end on said pintle, a roller journaled therein and a roller on the end of said hook adapted to en- 50 gage on the inner side of one of said ways.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

CHARLES F. KUSCH.

Witnesses:

W. W. WITTHENBURY,
HJALMAR S. RUDD.