Aug. 17, 1943. N. MICHELMAN 2,327,316

DOOR CONSTRUCTION

Filed Aug. 11, 1942 3 Sheets-Sheet 1

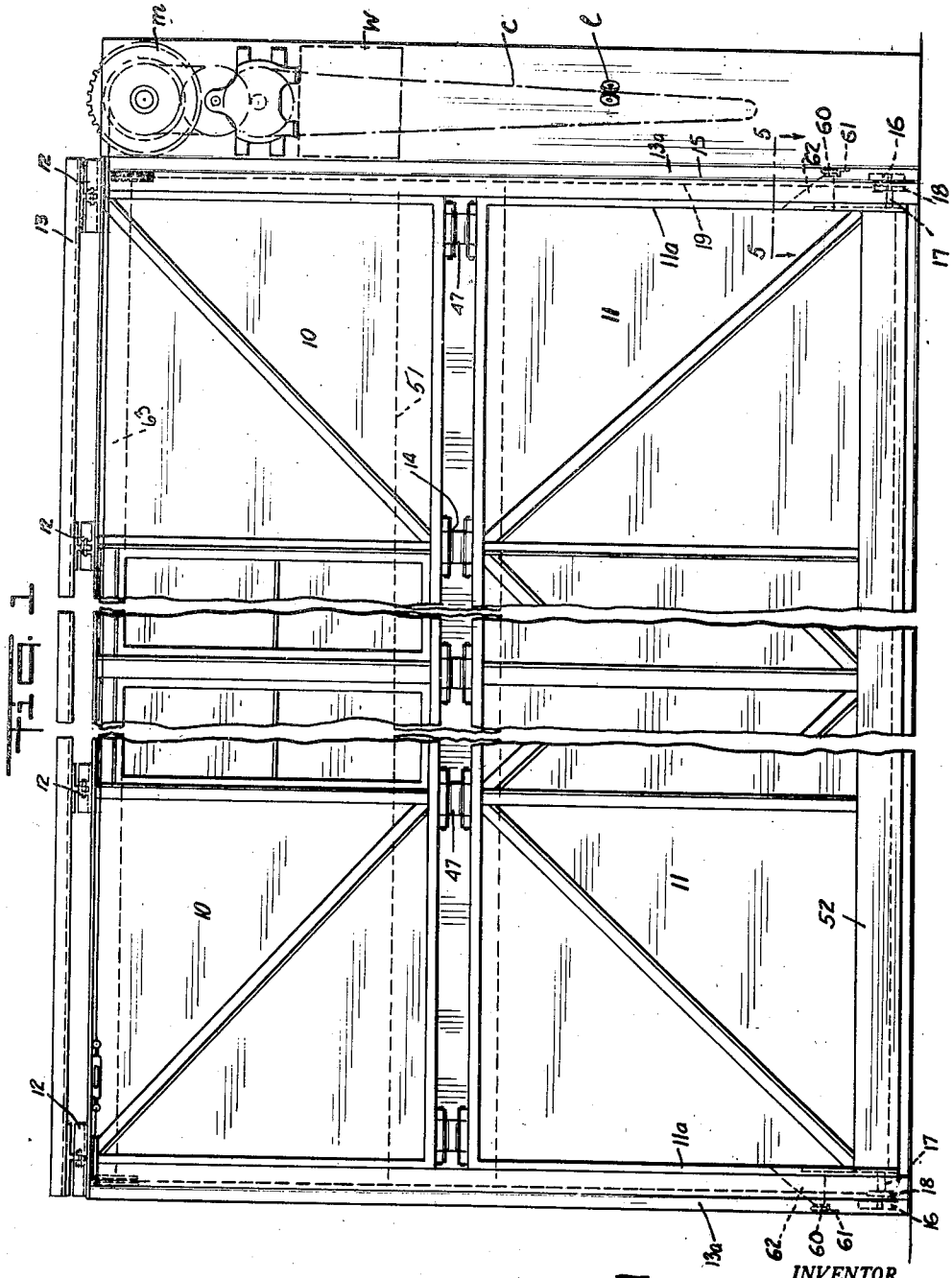


Fig. 1.

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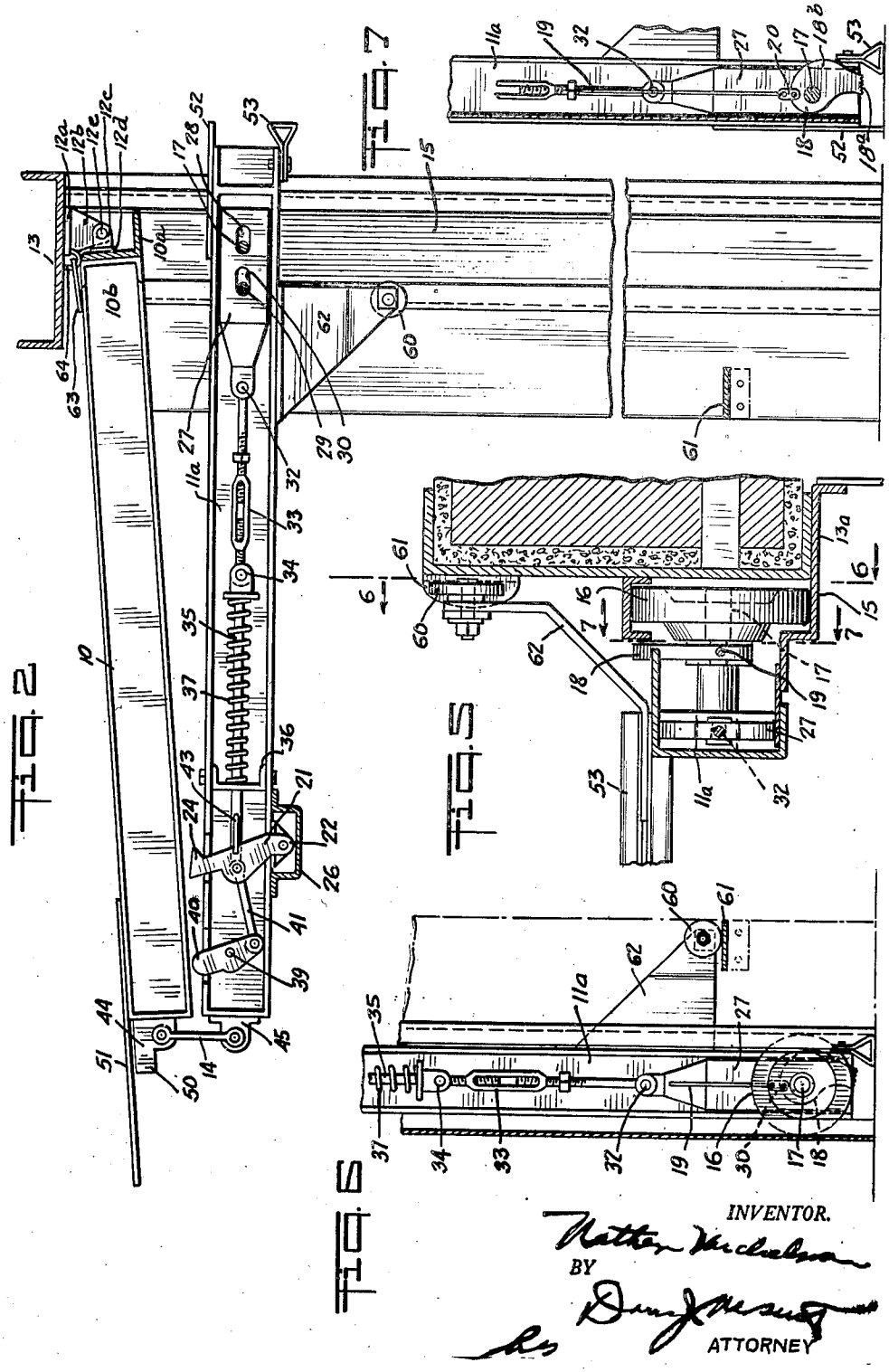


FIG. 2

FIG. 7

FIG. 5

FIG. 6

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DOOR CONSTRUCTION

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Fig. 3

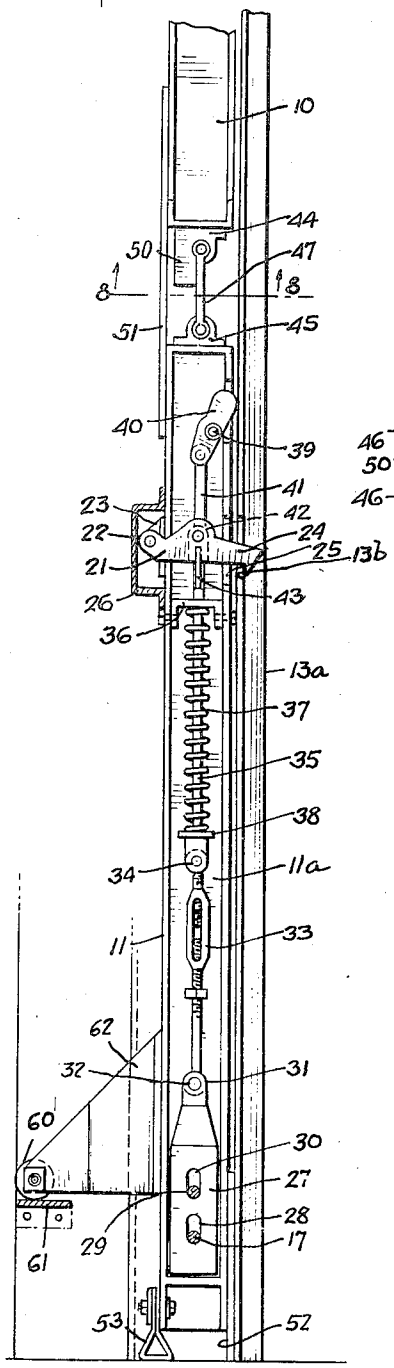


Fig. 8

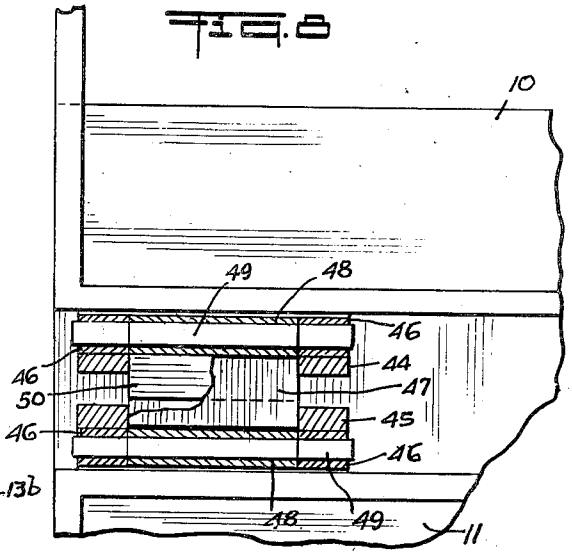
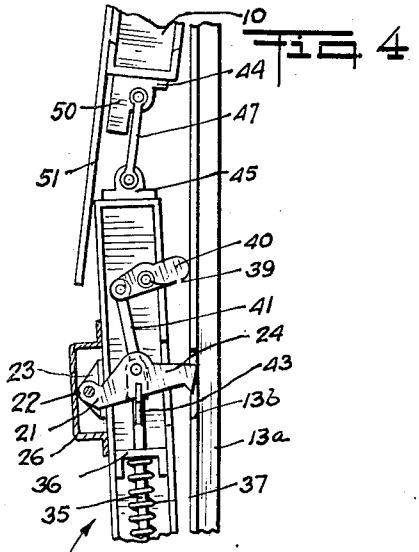


Fig. 4



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Patented Aug. 17, 1943

2,327,316

UNITED STATES PATENT OFFICE

2,327,316

DOOR CONSTRUCTION

Nathan Michelman, Brooklyn, N. Y.

Application August 11, 1942, Serial No. 454,473

14 Claims. (Cl. 160—190)

This invention relates generally to closures, as doors, in building constructions and is more particularly directed to improvements in sectional doors of the folding or so-called jack-knife types, which are elevated to open position above the doorway, as employed in wharves and other industrial buildings, where maximum clearance for affording ready access to loading platforms and storage space is essential.

While my invention, as will be manifest from the description thereof, may be advantageously employed in various other constructions, including garages and similar structures, I have elected to present it as it may be practiced in the construction and operation of wharves and industrial buildings. However, this is merely illustrative and is not to be construed, in any sense, as a limitation of the scope of utility of my invention.

Doors of the general type of my invention are largely used in industrial structures, especially in conjunction with the operation of loading platforms and other freight handling installations and the general object of this invention is to provide a jack-knife type of door of a simple and rugged construction which may be readily installed at a minimum of cost in existing as well as new structures, with accruing operational and security advantages which, heretofore, have not been obtainable in folding doors of the same general character.

More specifically, it is the primary object of this invention to provide a door construction of the "bi-fold" or so-called jack-knife type, comprising cooperating door sections hinged for elevation from a vertical closed position to an open position above the doorway, for storage in superimposed relation to project outwardly of the doorway, in the manner of a canopy, wherein the door sections in the termination of their descending movement will be impelled inwardly from a canted position relative to the doorway, into vertical alinement within the doorway jambs, in closure-forming position, thereby insuring dependability in operation and obviating any possibility of the door sections jamming or coming to rest within the doorway in a tilted position, so that they must be manually urged into alinement, as is of frequent occurrence in existing constructions.

An important object of my invention is to provide a sectional door construction, as aforesaid, wherein the door sections in their movement to closure-forming position, will be automatically locked or secured in such position, thereby eliminating supplemental manual or other locking operations now required in doors of similar types, and adding materially to the security of the closure against tampering from without.

Another important object of my invention is to provide a sectional door construction having the aforesaid characteristics and advantages, in which the door sections are automatically unlocked in the movement of one of the door sections from closed position, thereby expediting the clearance of the doorway for loading and unloading operations, and also permitting of the storage of goods immediately within the doorway, whereby their removal to the loading platform is facilitated. In connection with the automatic locking and unlocking of the door, it may be pointed out that where conventional manually operated door-locking media are employed, it is necessary to keep considerable floor space about the doorway cleared, to afford access to the locking media, for locking and releasing the door.

It is also an object of this invention to provide a jack-knife type of door, as aforesaid, which may be readily operated to open and closed positions, the lower door section, in the initiation of the movement of the door to open position, being impelled outwardly in a radial movement from its vertical closed position, thereby contributing to the overcoming of the forces of inertia and facilitating the operation of the door sections to open position.

Further, it is an object of this invention to increase the safety factor in the operation of doors of the jack-knife type, by providing a simple and efficient means adapted to function to arrest uncontrolled downward movement of the door sections, such as would result from the accidental release of the door sections from control of the operating mechanism, as would occur in the breaking of a cable or other mishap.

Other objects and advantages flowing from the practicing of my invention will become apparent as the description proceeds.

In the accompanying drawings, I have shown a preferred and practical embodiment of my invention, as it may be employed in industrial construction. However, my invention may take other forms, to meet different production and installation requirements, as will be evident, within the spirit and scope of this disclosure.

In the drawings:

Figure 1 is a rear elevation of a sectional door construction conforming to my invention.

Figure 2 is a side elevation of the structure of

Figure 1, showing the door sections raised to extreme open position, at the head of the doorway.

Figure 3 is a side elevation, showing the door sections in vertically disposed closure-forming position, a part of the upper door being broken away.

Figure 4 is a fragmentary side elevational view of the door sections, illustrative of the functioning of the mechanism for impelling the lower door section outwardly from closure-forming position, in the initiation of the door-raising movement.

Figure 5 is an enlarged longitudinal sectional view, taken on the line 5—5 of Figure 1.

Figure 6 is a vertical sectional view on the line 6—6 of Figure 5.

Figure 7 is a sectional elevation on the line 7—7 of Figure 5; and

Figure 8 is a fragmentary view in elevation, partly in section, of the two door sections and one of the interconnecting hinges.

Referring now to the drawings in detail, in which like characters of reference are employed to designate similar parts in the several views, the door or closure comprises an upper section 10 and a lower section 11, the upper section being hinged, as at 12, to the head of the doorway frame 13 for rotative movement upwardly and outwardly relative thereto. The hinge connections 12 may be of any preferred type. As herein shown, each hinge comprises a supporting member 12*a*, fixed to the head of the doorway 13, which embodies a dependent bearing portion 12*b* adapted to be entered in the bifurcated bearing 12*c* of the hinge element 12*d* secured to the top edge of the upper door section 10, the two bearings being interconnected for relative arcuate movement by a pin 12*e*.

The lower door section 11 is hinged along its top edge to the bottom edge of the upper door section, as generally indicated at 14, for rotative movement upwardly and inwardly relative to the upper door section, so that when the two door sections are conjointly elevated to extreme open position, they will be disposed outwardly of the doorway frame, in superimposed relation, in the manner of a canopy, as shown in Figure 2.

The aforesaid hinges 12 constitute the sole connection between the upper door section and the doorway frame, the movement of the upper section to and from open position being effected in response to the actuation of the lower door section, connected thereto, by the functioning of the door operating mechanism which, as herein shown and generally indicated at *m* is of a conventional type, utilizing a counterweight *w* for counterbalancing the variable load of the door sections in their movement to and from closure-forming position, in which latter position they are disposed in vertical alinement parallel to the side members 13*a* of the jamb of the doorway. In lieu of the counterweight type of operating mechanism illustrated, the door sections may be counterbalanced and their operation controlled by spring means, such as are shown in my co-pending application, Serial No. 421,272, filed December 2, 1941, or other suitable mechanism.

A guideway or track 15 is disposed in parallelism with each side member of the doorway frame, which is adapted to be traversed by a roller 16 mounted on a shaft 17 fixed to and projecting laterally from the bottom of the lower door section 11, as shown in Figures 1 and 5, in the movement of the door sections to open and closed positions, the fixed axis of rotation of said roller 16 defining the axis on which the lower door section is rotatable in the operation of the door or closure, as hereinafter explained.

Mounted on said shaft 17, inwardly of the roller 16, for relative rotative movement is a cam element 18, preferably of the configuration shown in Figure 7, to which the cable 19 leading from the operating mechanism *m* is connected by a link 20, said cam element thereby serving as the means of connection between the cable and the lower door section, the lifting effort, as will be obvious, being transmitted therethrough. The cam element 18, as shown, embodies a serrated nose 18*a* and an offset counterbalance portion 18*b*, tending to rotate said element, to reverse the position of said nose relative to the axis of said element, the cable 19 being connected to said cam element in alinement with the axis of rotation thereof, as aforesaid, so that normally, when the cable is in tension, the nose of said element is in a dependent position substantially in alinement with the axis of rotation of said element. Should the cable 19 snap or any other breakdown of the operating mechanism occur, that would release the door sections for uncontrolled descent, such descending movement will be arrested at its inception, as the cam element 18 is freed from the cable tension and rotates on the shaft 17, under the influence of its counterbalance portion 18*b*, to dispose the nose 18*a* thereof for engagement with a fixed surface of the door jamb, as the opposed flange of the guideway 15, in a jamming action, induced by the downwardly applied impulse effective thereon, to arrest the uncontrolled movement of the door sections and retain them in arrested position, until the cam element is released from braking position by the restoration of the cable or operating mechanism to a condition whereby the cable again functions to support the load through said cam element.

From the description thus far, it will be manifest that the door sections are operable from their vertical closure-forming position, in response to the actuation of the operating mechanism in one direction, to open position, the lower door section swinging inwardly on the hinge line 14, beneath the upper door section, as the rollers 16 traverse the guideway 15, the axis of rotative movement of the lower door section relative to the door frame and to the upper door section being defined by the shafts 17 at each end thereof. When the door sections are in extreme open position, as shown in Figure 2, the load is counterbalanced by the counterweight *w*, the operating mechanism, preferably, being locked against accidental operation by any suitable device. In the present showing, this takes the form of a so-called latch *l*, with which the operating chain *c* is engageable, as shown in Figure 1.

The actuation of the operating mechanism in the opposite direction, controls the movement of the door sections to closed position, the lower section swinging away from the upper door section in a downward movement, as the rollers 16 traverse the guideway 15, producing a concurrent inward movement of the upper door section on its hinge line 12, this opposite arcuate movement of the hingedly connected door sections continuing until the lower door section reaches its limit of downward movement, when it is impelled inwardly in an arcuate movement from an outwardly canted position relative to the doorway,

to its ultimate vertical position therewithin, inducing a corresponding movement of the upper door section to complete the closure-forming operation, both door sections being then vertically alined between the door jambs, as shown in Figure 1. The door-alining impulse is generated in a lever-like inward movement of the canted lower door section on a fulcrum formed by the impinging engagement of the rollers 60 with fixed stops 61 disposed on the respective door jambs 13a, in the path of movement of said rollers, as the door section descends, as clearly shown in Figures 5 and 6. The rollers 60, as herein shown, are mounted on arms 62 fixed to the lower door section 11 and projecting forwardly and laterally of each end thereof, the stops 61 taking the form of angle pieces or brackets welded or otherwise rigidly secured to the door jambs in suitably spaced relation to the floor line to attain the desired result.

For preventing manipulation of the door sections from without, when they are in closure-forming position, means are provided for automatically locking the lower door section in engagement with the door frame, as it is impelled into its final vertical position between the jambs, the lower door section when thus locked in closure-forming position, serving to retain the upper door section in similarly functioning position, in alinement therewith. The aforesaid locking means are also automatically displaceable from engagement with the door frame, in the initiation of the upward movement of the lower door section toward open position, means being provided in cooperation therewith to impel the lower door section outwardly on its axis of rotation, this outward movement being communicated to the upper section to cant the latter from its vertical position and facilitate the continued movement of both door sections to storage position, at the head of the doorway, in the manner heretofore described.

In the present embodiment, the means for locking the lower door section in engagement with the doorway jamb 13a comprises a latch plate 21 disposed transversely of the end-forming channel member 11a of the frame of said lower door section, one end of said plate extending through the outer flange of said channel member, which may be slotted or cut away for the purpose, for pivotal connection, as at 22 to the bracket 23 mounted on the anterior surface of said flange. The other end of said latch plate embodies a nose 24, undercut as at 25, which similarly extends beyond the opposite flange of said channel member 11a, for engagement with the base of a slot 13b provided in the jamb 13a of the doorway, in the relative rotative movement of said plate, parallel to the web of the channel member, on its fulcrum 22, as hereinafter described. The bracket 23 and the associated end of the latch plate 21, preferably are enclosed in a housing 26 fixed to the outer flange of the channel member 11a to protect the latch against tampering from without.

Slidably mounted between the flanges of the channel member 11a, in juxtaposition to the bottom of the lower door section, is a plate 27 slotted as at 28 for the reception of the aforesaid shaft 17 which is fixedly supported from said channel member 11a for movement therewith, in the functioning of the roller 16 and said cam element 18, mounted thereon, as heretofore described. A pin 29, likewise fixed to the channel member 11a, projects within a second slot in said plate 27, in vertical alinement with the slot 28 therein, the upper end of said plate embodying a clevis 31 for the reception of a pin 32 connecting it to the lower end of the turnbuckle 33, the upper end of which is similarly connected, as at 34, to the rod 35. The rod 35 is reciprocable in a bearing provided by the bracket 36, a compression spring 37 embracing said rod being interposed between and connected to said bracket and the collar 38 at the lower end of the rod 35.

Pivotally mounted on the web of the channel member 11a as at 39, adjacent the top edge of the lower door section, is a lever or so-called impulse arm 40 which is connected by a link 41 to the upper end of the rod 35 for rocking movement on its fulcrum 39, said rod 35, adjacent the upper clevis end 42 thereof, to which said link 41 is pivoted, embodying an offset or lateral projection 43, the upper end of which is slotted for the reception of the latch plate 21, the actuation of which is controlled thereby, in response to reciprocatory movement of the rod 35 as hereinafter explained.

With the door sections vertically disposed in closure-forming position, as shown in Figure 3, it will be observed that the shaft 17 and the pin 29 are in engagement with the lower ends of the respective slots 28 and 30 of the plate 27, the spring 37 being in tension, with the nose of the latch plate 21 in door-locking engagement with the slot 13b of the doorway jamb 13a; also that the free end of the impulse arm 40 is in abutment with the opposed flange of the jamb, it being obvious that the flange of the channel member 11a is interrupted in the area of said arm, to provide for such engagement with the doorway jamb.

When the upward movement of the lower door section is initiated, in response to the actuation of the operating mechanism, the shaft 17 and the pin 29 are displaced upwardly within the respective slots of the plate 27, the resultant reaction of the compression spring 37 effecting longitudinal movement of the plate 27 and connected rod 35, to lift the latch plate 21 bearing upon the offset actuator 43, on said rod, out of engagement with the cooperating slot 13b of the doorway jamb. The continuing upward movement of said rod 35, under the impulse generated by the reaction of the spring 37, as aforesaid, thereupon becomes effective upon the arm 40, through the link 41, to cant said arm on its pivot 39 in abutting engagement with the doorway jamb, the lower door section being impelled outwardly thereby, in a rotative movement on the axis of rotation of said rollers 16, in traversing engagement with the guideway 15. As the lower door section is tilted outwardly, the upper door section 10, hinged thereto, is likewise urged outwardly, the continuing upward travel of the rollers 16 along the guideways 15, conjointly actuating the two door sections to their extreme open position, as heretofore described.

When the door sections are lowered to assume their closure-forming positions, it will be evident that in the termination of the downward movement of the lower door section, the shaft 17 and pin 29 will engage the lower ends of the slots 28 and 30, respectively, of the plate 27, to draw the plate 27 and the connected rod 35 downwardly in opposition to the spring 37, which is thus placed in tension, the downward movement of said rod, as the lower door section is impelled into vertical position, in sequence, rocking the impulse arm 40 inwardly and permitting the

latch plate to drop in following engagement with the actuator-projection 43 on said rod, to enter the nose of said latch plate in locking-engagement with the cooperating slot 13b of the doorway jamb, the movements of the parts being the reverse of those previously described in the elevation of the door sections.

As previously pointed out, when the lower door-section is locked in closure-forming position, the upper door section is retained in its closure-forming position thereby, the hinge connection between the two functioning as a virtual continuation of the two sections when they are vertically disposed in closed position.

A preferred form of hinge for connecting the two door sections for relative rotative movement, as shown in detail in Figure 8, includes a bearing member 44 adapted to be fixed to the bottom edge of the upper door section and a second bearing member 45 secured to the top of the lower door section, each of these members embodying laterally spaced apertured lugs 46 between which a plate or leaf 47 provided with bearings 48 at each end is mounted, the plate being connected to the respective members 44 and 45 by suitable pins 49 entered in said apertured lugs and the bearings 48 of the plate 47 alined therewith. As will be evident, the plate 47 and the respective bearing members 44 and 45 are rotatable with relation to each other, rotative movement of the plate or leaf 47 in a direction outwardly of the connected door section, however, being prevented by the abutment 50 formed on the bearing member 44, with which the plate 47 is engaged when the plate and the door sections are vertically disposed in the closure-forming position of the assembly. By so limiting the direction of movement of the plate 47 with relation to the door sections, lost motion is eliminated between the connected sections, in the operating of the door, lifting effort applied to the lower door section becoming immediately effective upon the upper door section, thereby insuring more rapid and efficient operation and obviating jamming which is not infrequent in the breaking out of the door sections, where other types of hinges are used for their interconnection.

To cover the gap between the two door sections, as connected by the hinges just described, an apron 51 is fixed to the face of the upper door section, as by bolting or other means for overlapping engagement with the face of the lower door section, while a similar apron 52 is fixed to the inner face of the lower door section 11 for abutting engagement with the interior floor of the loading platform or the like. A weather-proof bumper of resilient material, preferably rubber, is disposed longitudinally of the bottom of the outside of the lower door, as indicated at 53, suitable weatherstripping (not shown) being provided between the door sections and the doorway jambs to render the construction stormtight. To insure a stormtight seal at the headline of the doorway, the top edge-forming member of the upper door section 10 is preferably L-shaped in cross section, the depth of the flange 10a thereof which is disposed parallel to the inner face of the door section, approximating the height of the clearance between the top of the upper door section, as defined by the flange 10b of said member and the opposed surface of the head of the doorway, so that when the upper door section is in vertical closure-forming position, the edge of said flange 10a will be disposed in proximity to or abut upon the head 13 of the doorway, behind or inwardly of the hinges 12. A weatherproof plate 63 extends across the top of the upper door section 10 and is swingably suspended from the head 13 of the doorway on the outer side of the hinges 12, as by the U-bolts 64 for abutting engagement with the exterior surface of the door section, it being obvious that said plate will move in conformity with the movement of said door section to and from closure-forming position.

While I have described but one latch plate and cooperating impulse arm, it will be understood that similar assemblies are associated with each of the end-forming channel members of the lower door frame, the door sections being of any preferred construction, it being obvious that the end-forming members of the upper door need not necessarily be channel sections. As herein shown, the door sections are of a conventional sheet metal design, the frames of the sections being reinforced by the customary diagonal bracing members, with lights centrally located in the upper door section, as shown in Figure 1.

It will be manifest that in presenting my invention, I have confined it more or less to the specific embodiment herein shown. However, various changes in the structural details thereof may be effected, as well as in the cooperation of the elements of the assembly, in attaining my objectives, as hereinbefore set forth, within the scope of the appended claims.

I claim:

1. A door comprising an upper section pivotally mounted at its top for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower section hinged at its top to said upper section for upward and inward swinging movement relative to said upper section from a vertically disposed closed position to an open position, means connected to said lower door section for conjointly actuating both of said door sections to open and closed positions, means carried by said lower door section for automatically locking the lower door section in vertically disposed closed position in response to the movement of said lower door section to closed position, said upper door section being retained in closed position thereby, said locking means being rendered non-effective in an initial upward vertical movement of said lower door section, and means automatically functioning in the continuing upward movement of said lower door section to swing said lower door section outwardly and simultaneously cant said upper door section for conjoint upward movement of the two door sections to open position.

2. A door comprising an upper section pivotally mounted at its top for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower section hinged at its top to said upper section for upward and inward swinging movement relative to said upper section from a vertically disposed closed position to an open position, means connected to said lower door section for conjointly actuating both of said door sections to open and closed positions, means carried by said lower door section automatically effective in response to the movement of said lower door section to closed position, to retain both of said door sections in alinement in vertically disposed closed position, said retaining means becoming non-effective in a predetermined initial upward vertical movement of said lower door section and means automatically functioning when said retaining means

become non-effective to impel said lower door section outwardly and induce a like directional movement of said upper door section, in the continuing upward movement of said lower door section, for the ultimate disposition of both door sections in open position.

3. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions and fixed means on said lower door section engageable with said doorway in the termination of the downward movement of said lower door section to closed position, to retain both of said door sections in alinement in vertically disposed door-way closing position.

4. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions and fixed means on said lower door section engageable with said doorway in the termination of the downward movement of said lower door section to closed position, to retain both of said door sections in alinement in vertically disposed door-way closing position, said retaining means being displaceable from engagement with said doorway in an initial upward movement of said lower door section, to permit of the conjoint movement of both of said door sections to open position.

5. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions, means in pivotal engagement with said lower door section engageable with said doorway in response to the impelled inward movement of said lower door section to vertical position, to retain both of said door sections in alinement in vertically disposed doorway closing position, said retaining means being displaceable from engagement with said doorway in an initial upward movement of said lower door section, and means carried by said lower door section automatically operable in response to the continuing upward movement of said lower door section to engage said doorway to impel said lower door section outwardly and cant said upper door section, for ultimate disposition of both of said door sections in open position at the top of said doorway in the termination of the conjoint upward movement of the door sections.

6. The combination with a doorway, of a closure therefor, comprising a door having an upper door section hinged at its top to the head of said doorway for relative upward and outward rotative movement from a vertically disposed closed to an open position, a lower door section hinged at its top to said upper door section for upward and inward rotative movement relative to said upper door section, from a vertically disposed closed position to an open position, a guideway incorporated in said doorway, means carried by said lower door section formed to traverse said guideway in the movement of said lower door section to open and closed positions, operating mechanism connected to said lower door section, for effecting the conjoint movement of both of said door sections to open and closed positions, means carried by said lower door section engageable with said doorway in the terminal portion of its downward movement effective to retain both of said door sections in closed position, said retaining means being displaceable from engagement with said doorway in the initiation of the upward movement of said lower door section toward open position, and means operable in sequence to the displacement of said retaining means from doorway engaging position, to abut said doorway and tilt said lower door section outwardly on the axis defined by said guideway-traversing means in engagement with said guideway, in the continuing upward movement of said lower door section, the tilting of said lower door section effecting a like directional movement of said upper door section for the conjoint movement of the two door sections to open position, in the continuing operation of said controlling mechanism.

7. The combination with a doorway, of a closure therefor, comprising a door having an upper door section hinged at its top to the head of said doorway for relative upward and outward rotative movement from a vertically disposed closed to an open position, a lower door section hinged at its top to said upper door section for upward and inward rotative movement relative to said upper door section, from a vertically disposed closed position to an open position, a guideway incorporated in said doorway, means carried by said lower door section formed to traverse said guideway in the movement of said lower door section to open and closed positions, operating mechanism connected to said lower door section, for effecting the conjoint movement of both of said door sections to open and closed positions, means carried by said lower door section engageable with said doorway in the terminal portion of its downward movement effective to retain both of said door sections in closed position, said retaining means being displaceable from engagement with said doorway in the initiation of the upward movement of said lower door section toward open position, and means operable in sequence to the displacement of said retaining means from doorway engaging position, to abut said doorway and tilt said lower door section outwardly on the axis defined by said guideway-traversing means in engagement with said guideway, in the continuing upward movement of said lower door section, the tilting of said lower door section effecting a like directional movement of said upper door section for the conjoint movement of the two door sections to open position, in the continuing operation of said controlling

mechanism, and a device carried by said lower door section and connected to said operating mechanism adapted to engage said doorway to arrest downward movement of said door sections upon said operating mechanism becoming non-effective in controlling the movement of said door sections to or from open position.

8. A door construction comprising an upper door section adapted to be hinged along its top edge to the head of a doorway for relative rotative movement upwardly and outwardly from a vertically disposed closure-forming position to an open position, a lower door section, means for connecting said lower door section to said upper door section for upward and inward rotative movement relative to said upper door section from a vertically disposed closure-forming position to an open position and means at the bottom of said lower door section adapted to traverse a guideway associated with a doorway frame; said connecting means comprising a plurality of hinges, each including a bearing member fixed to the bottom edge of the upper door section, a second bearing member fixed to the top edge of said lower door section in alinement with the bearing member on the upper door section, and a plate-like element having bearings formed at its opposite ends entered between the respective bearing members and a pin connecting said bearing member and said plate for pivotal movement, the respective door sections being oppositely rotatable as aforesaid, relatively to said plate-like element, said lower door section being rotatable on the axis of said guideway traversing means.

9. A door construction comprising an upper door section adapted to be hinged along its top edge to the head of a doorway for relative rotative movement upwardly and outwardly from a vertically disposed closure-forming position to an open position, a lower door section, means for connecting said lower door section to said upper door section for upward and inward rotative movement relative to said upper door section from a vertically disposed closure-forming position to an open position and means at the bottom of said lower door section adapted to traverse a guideway associated with a doorway frame; said connecting means comprising a plurality of hinges, each including a bearing member fixed to the bottom edge of the upper door section, a second bearing member fixed to the top edge of said lower door section in alinement with the bearing member on the upper door section, and a plate-like element having bearings formed at its opposite ends entered between the respective bearing members and a pin connecting said bearing member and said plate for pivotal movement, the respective door sections being oppositely rotatable as aforesaid, relatively to said plate-like element, said bearing member fixed to said upper door section embodying a stop for engagement by said plate-like element to limit outward rotative movement of said element, whereby in the initiation of the movement of the door sections to open position, an outward movement of said lower door section on the axis of said guideway traversing means, will produce a corresponding outward movement of said upper door section, canting effort being transmitted from said lower door section through said element engaged with said stop to the upper door section.

10. The combination with a doorway, of a closure therefor, comprising a door having an upper door section hinged at its top to the head of said doorway for relative upward and outward rotative movement from a vertically disposed closed to an open position, a lower door section hinged at its top to said upper door section for upward and inward rotative movement relative to said upper door section, from a vertically disposed closed position to an open position, a guideway incorporated in said doorway, means carried by said lower door section formed to traverse said guideway in the movement of said lower door section to open and closed positions, operating mechanism connected to said lower door section, for effecting the conjoint movement of both of said door sections to open and closed positions, means carried by said lower door section engageable with said doorway in the terminal portion of its downward movement effective to retain both of said door sections in closed position, said retaining means being displaceable from engagement with said doorway in the initiation of the upward movement of said lower door section toward open position, and means operable in sequence to the displacement of said retaining means from doorway engaging position, to abut said doorway and tilt said lower door section outwardly on the axis defined by said guideway-traversing means in engagement with said guideway, in the continuing upward movement of said lower door section, the tilting of said lower door section effecting a like directional movement of said upper door section for the conjoint movement of the two door sections to open position, in the continuing operation of said controlling mechanism; and means for arresting the downward movement of said door sections, when such movement is not controlled by said operating mechanism.

11. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions, and means movable with said lower door section, formed for engagement with said doorway in the termination of the descending movement of said door section in canted relation to said doorway, to impel said lower door section inwardly into vertical position within said doorway and produce a concurrent like directional movement of said upper door section, to simultaneously dispose both of said door sections in vertical alinement in closure-forming position, and means carried by said lower door section automatically engageable with said doorway in response to the impelled movement of said lower door section to vertical position, to retain both of said door sections in closure-forming position.

12. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mecha-

nism for controlling the conjoint movement of both of said door sections to open and closed positions, and means movable with said lower door section adapted for engagement with said doorway to impel said lower door section into vertical position within said doorway, at the termination of the movement of the two door sections from open to closed position and produce a concurrent like directional movement of the upper door section, to simultaneously locate both of said door sections in vertical alinement in closure-forming position.

13. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and downward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions, means movable with said lower door section formed for engagement with said doorway in the termination of its descending movement in outwardly canted relation to said doorway, to impel said lower door section inwardly into vertical position within said doorway and produce a concurrent like directional movement of said upper door section to simultaneously dispose both of said door sections in vertical alinement in closure-forming position, means in pivotal engagement with said lower door section engageable with said doorway in response to the impelled inward movement of said lower door section to vertical position, to retain both of said door sections in alinement in vertically disposed doorway closing position, said retaining means being displaceable from engagement with said doorway in an initial upward movement of said lower door section, and means carried by said lower door section automatically operable in response to the continuing upward movement of said lower door section to engage said doorway to impel said lower door section outwardly and cant said upper door section, for ultimate disposition of both of said door sections in open position at the top of said doorway in the termination of the conjoint upward movement of the door sections.

14. The combination with a doorway, of a closure therefor, comprising a door having an upper section hinged to the top of said doorway for upward and outward swinging movement from a vertically disposed closed position to an open position, a lower door section hinged at its top to said upper door section for upward and inward swinging movement relative to said upper door section, from a vertically disposed closed position to an open position, operating mechanism for controlling the conjoint movement of both of said door sections to open and closed positions, a forwardly projecting arm fixed to said lower door section, at each end thereof and offset laterally therefrom, each of said arms having a roller mounted thereon, and a stop disposed at each side of said doorway in the path of movement of the respective roller in the descent of said lower door section in outwardly canted relation to the doorway, said rollers being adapted to impinge upon said stops to rock said lower door section inwardly from said canted position to a vertical position within said doorway, the inward arcuate movement of said lower door section producing a concurrent like directional movement of said upper door section, to effect the simultaneous vertical alinement of the two door sections in closure-forming position.

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