Jan. 16, 1968 A. J. CHITWOOD ET AL 3,363,273

LOADING DOCK DOOR ENCLOSURE

Filed Oct. 23, 1965 3 Sheets-Sheet 1

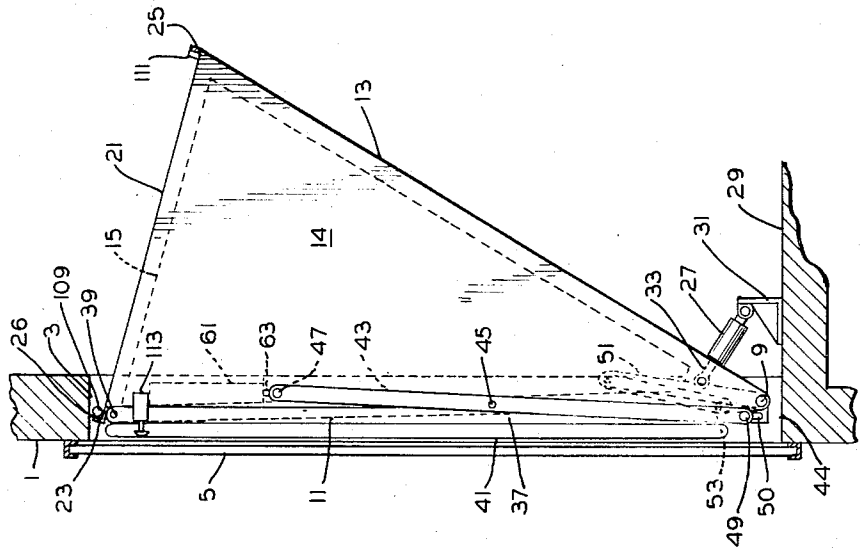


FIG. 2

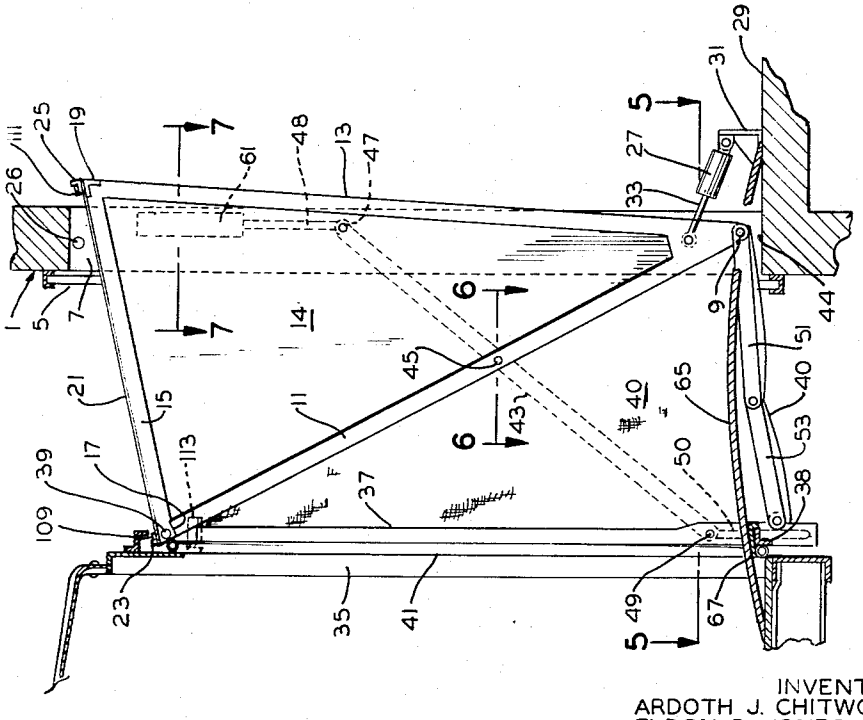


FIG. 1

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FIG3

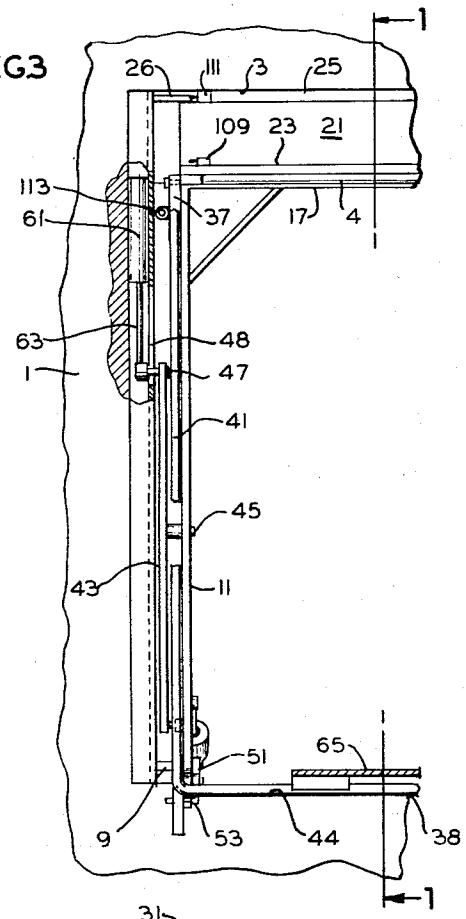
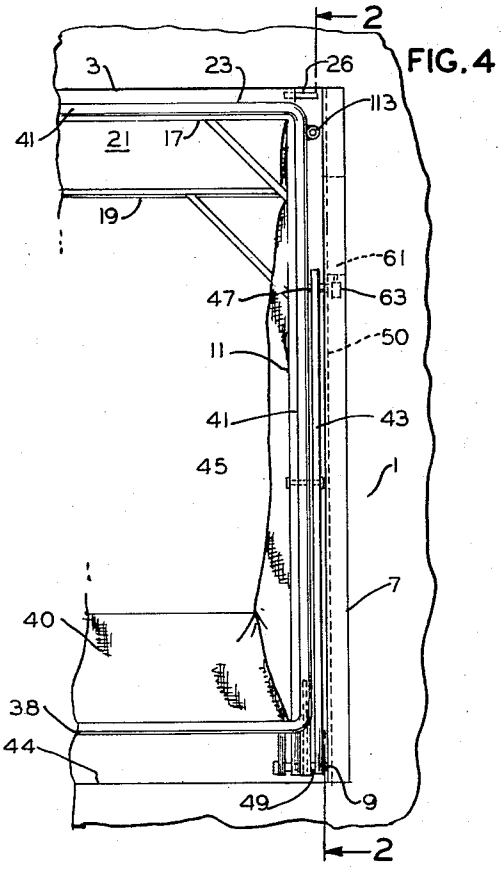


FIG. 4



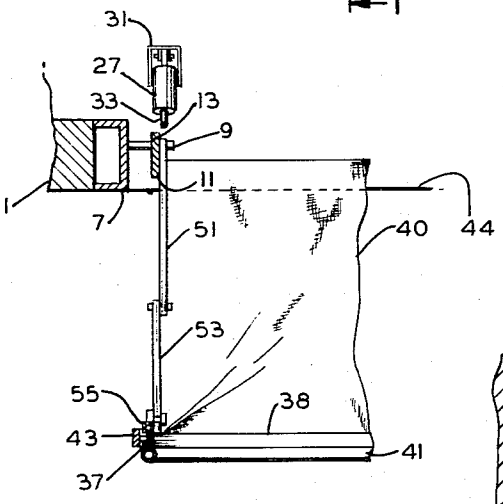


FIG. 5

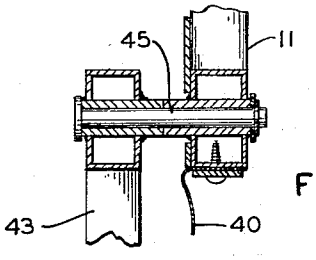


FIG. 6

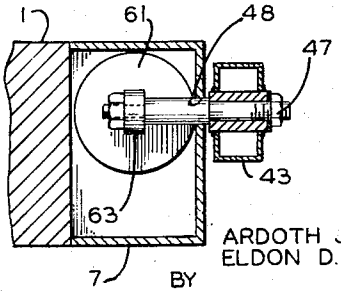


FIG. 7

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FIG. 8

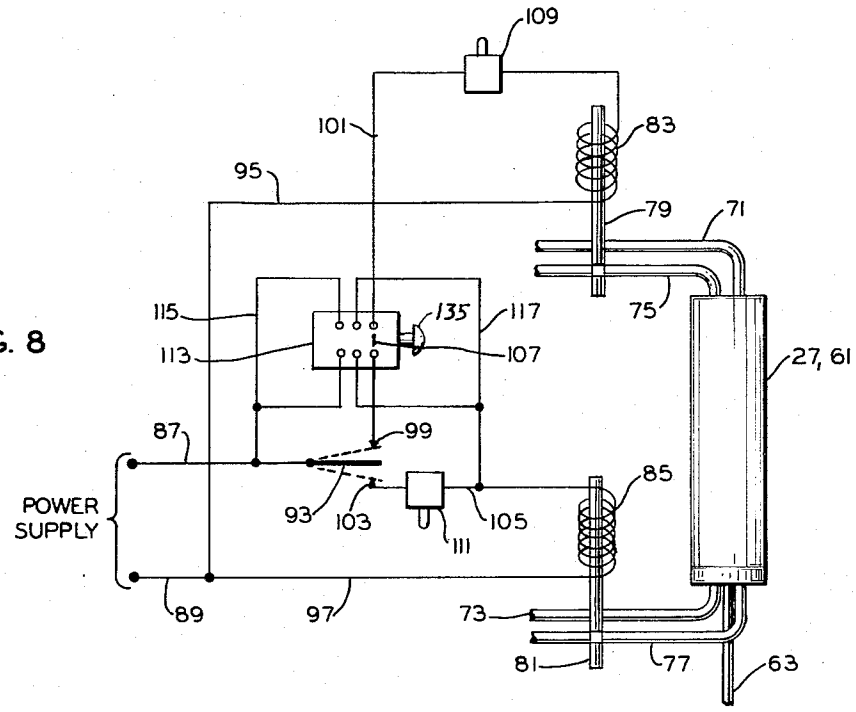
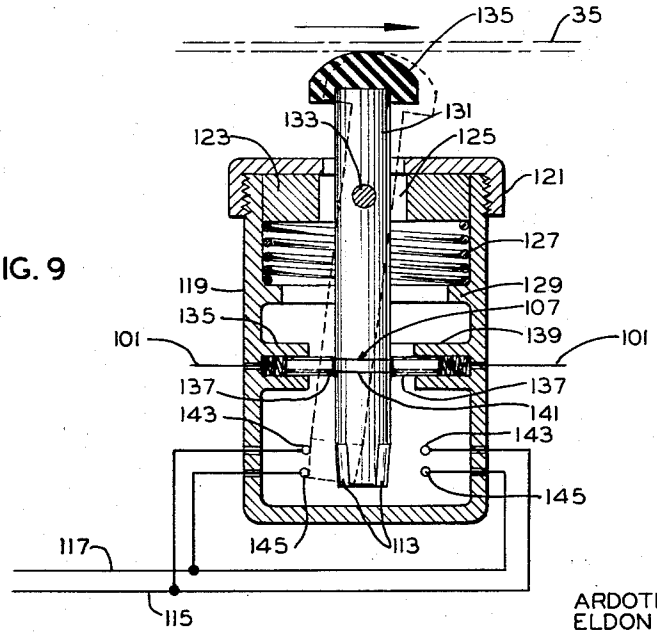


FIG. 9



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LOADING DOCK DOOR ENCLOSURE

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Filed Oct. 23, 1965, Ser. No. 503,164
17 Claims. (Cl. 14—71)

ABSTRACT OF THE DISCLOSURE

A retractable enclosure for loading dock door openings in building walls comprising a rigid hood having a top wall and inverted triangular side walls with their planes transverse of the building wall and pivoted to the wall at their lower apices on a horizontal axis coplanar with the wall, for swinging movements transversely of the wall from a position wholly within the wall to selected positions projecting from the wall, elements pivotally depending from the outer upper corners of the side walls and triangular fabric covers each secured along its converging margins to one of the depending elements and to the outer margin of a hood side wall to form, with the hood side wall, a completely closed side between the building wall and the adjacent wall of vehicle.

The invention comprises a retractable enclosure for loading dock door openings in building walls, having a rigid hood with side and top walls, pivoted at its bottom to the building wall to swing inwardly and outwardly of the opening therein and provided with flexible extensions of the side walls to close the gaps between the triangular side walls and the side of a railway car or other vehicle positioned adjacent the dock for loading or unloading.

The invention relates to loading dock door enclosures for the protection of freight and handlers during loading and unloading operations.

In many instances, railroad tracks adjacent warehouses, freight-houses and the like are spaced a sufficient distance from the building wall to provide a few feet of clearance between a car side and the building. This distance is commonly bridged by a deck plate, and for protection from the weather, awnings and other collapsible shield devices have been provided to enclose the sides and top of the building and car doors.

It accordingly is an object of the invention to provide an improved extensible loading dock door enclosure for mounting on a warehouse or other building in relation to the doorway of the warehouse or building and a railroad car or motor vehicle which will protect personnel and merchandise from inclement weather or temperature changes as from a cold storage warehouse and refrigerator car or truck.

Additional objects are to provide an extensible loading dock enclosure which can be operated manually or with electric, compressed air or hydraulic power; which has a pneumatic seal at car or truck to keep air, moisture or dust from entering the door enclosure, car or building; which has a lever arrangement that will cause top, sides and bottom of the enclosure to move out from the building an equal distance at all times; which will adjust itself to any irregularities there might be in the car side adjacent the door; which has a gutter along the top edge of the enclosure to drain rain or other liquid off the top to prevent it from entering the passageway; which will provide a seal around the warehouse door to keep out dust, wind, moisture or other foreign material while the enclosure is in use as a passageway protector; which will provide a safety barrier for the open door of the warehouse when the door enclosure is not in use; and which will fold to the warehouse door frame to enable the warehouse door to be closed when the enclosure is not in use.

The foregoing and additional more detailed objects and advantages are achieved by the structure described hereinafter and illustrated in the accompanying drawings, in which:

FIG. 1 is an interior side view of a door enclosure in extended position, along line 1—1 of FIG. 3.

FIG. 2 is an interior side view of the door enclosure in retracted position, along line 2—2 of FIG. 4.

FIG. 3 is a partial end elevation view of the door enclosure in extended position.

FIG. 4 is a partial end elevation view of the door enclosure in retracted position.

FIGS. 5–7 are fragmentary horizontal sectional views along lines 5—5, 6—6 and 7—7, respectively, of FIG. 1.

FIG. 8 is a schematic diagram of an electrical control circuit for the door enclosure operating mechanism.

FIG. 9 is a horizontal sectional view of the safety and limit switch incorporated in the circuit illustrated in FIG. 8.

The numeral 1 refers to the side wall of a warehouse or other building formed with a rectangular door opening 3, the latter being closable by an outside hung sliding door 5.

Upright door jamb members 7 are secured against the upright sides of door opening 3 and are provided near their lower ends with horizontal pivot pins 9. On the latter are journaled the bottom vertices of inverted substantially isoceles triangular enclosure sides comprising outer and inner frame legs 11 and 13 and frame top member 15, all covered by a rigid sheet 14 of weatherproof material such as plywood extending transversely of the general plane of the wall. At their upper ends, outer and inner frame legs 11 and 13 are connected respectively by frame cross members 17 and 19, and the rectangular top frame thus formed is covered by a sheet 21 to form, with sides 11, 15, a rigid weatherproof hood swingable through the door opening between the inside retracted position shown in FIG. 2 and a projected operating position as shown in FIG. 1. For limiting movement of the hood to these extreme positions, the inner and outer transverse margins of top sheet 21 are upwardly flanged as at 23 and 25 respectively and the upper ends of upright door jamb members 7 are provided with aligned horizontal pins 26 engageable with the inner and outer faces, respectively, of flanges 23 and 25 whereby to limit the swinging movement of the hood between an inner position in which outer legs 11 are within the door opening 3 and an outer position in which the inner legs 13 are within the door opening 3.

For extending and retracting the hood, a double acting fluid (pneumatic or hydraulic) cylinder 27, or other linear motion power device, may be pivotally mounted on the building floor 29 by means of a suitable bracket 31, with its piston rod 33 connected to the lower portion of enclosure side frame 11, 31, 21. Thus, by energizing cylinder 27, hood 11–25 can be swung from its retracted position (FIG. 2) wholly within the building, to its extended position (FIG. 1) with its outer flange 23, which also serves as a rain gutter, abutting the side wall of a freight car. Conventional limit switches (not shown) may be utilized to deenergize these devices when the limit of movement in either direction is reached.

In order to completely close the sides of the gap between building wall 1 and car wall 35, a face plate comprising upright bars 37, pivotally supported at their upper ends, at 39, from the intersections of outer side frame legs 11 and top members 21, and a bottom cross bar 38 is provided. The triangular space defined by bars 37 and side frame members 11, and a line connecting their lower extremities, when the hood is fully extended, is covered by

a flexible sheet **40** of weatherproof fabric, such as canvas, which also extends across the bottom of the enclosure, where it is secured along its inner margin to the building door threshold **44** and along its outer margin to faceplate bottom cross bar **38**.

To provide a weather seal where the enclosure abuts car side **35**, a resilient gasket **41** is secured to the outer faces of faceplate side bars **37**, bottom cross bar **38** and hood frame cross member **17**, and may be hollow and inflatable to assure close contact with the car side irrespective of irregularities herein.

To provide for positive projection and retraction of faceplate bars **37** and flexible sheets **40** in accordance with movements of hood **11–25**, diagonal bars **43** are pivotally connected intermedite their ends to outer side frame legs **11** intermediate the ends of the latter, by pivot pins **45** (FIG. 6) and the upper and lower ends of bars **43** are provided with horizontally elongated pins **47** and **49** which extend, respectively, into vertical slots **48** in door jamb side members **7** and into vertical slots **50** in the lower ends of bars **37**. With this arrangement, as hood **11–25** is moved outwardly, pin **47** moves downwardly in slot **48**, and the outward movement of side frame member **11** causes corresponding outward movement of the lower end of bar **43** which is accommodated by movement of lower pin **49** in slot **50** on bar **37**, and faceplate bar **37** is pushed outwardly at its lower end to a position always parallel with the building wall **1**, and into engagement with the car side, compressing the gasket **41** into sealing engagement with the latter.

Additionally support for the bottom of faceplate **37**, **37**, **38** is provided by a pair of hinged links **51**, **53** at each side of the enclosure, with their inner ends pivotally connected to the door jamb by pins **9** and their outer ends pivotally connected to the lower ends of faceplate bars **37**.

The bottom of the gap between the building and car is bridged by a suitably cambered deck plate **65**. To assure that the deck plate will be retracted simultaneously with the enclosure, downwardly open channel members **67** are secured to the underside of the deck plate and overlie enclosure faceplate bottom cross bar **38**.

If desired, operating cylinders **27** can be eliminated and replaced by vertical fluid cylinders **61** or other linear motion power device mounted inside door jamb members **7** above slots **48**, with their piston rods **63** connected to pins **47**, so actuation of cylinder **61** will cause vertical movement of pins **47** in slots **48** and corresponding movement of bars **43**, with resultant projection or retraction of the enclosure.

For controlling the operation of the door enclosure, the electrical circuit shown in FIG. 8 is provided. Fluid pressure cylinders **27** or **61** have fluid inlets at one end, conduits **71** and **73** communicating with the output side of a hydraulic pump (not shown) and outlet conduits **75** and **77** at their other end communicating with the input side of the hydraulic pump. Conduits **71** and **75** include a valve **79** which normally maintains outlet conduit **75** open and inlet conduit **71** closed. Conduits **73** and **77** include a similar valve **81**. Valves **79** and **81** form the armatures of solenoid coils **83** and **85**, which, when energized lift valves **79** and **81** to the upper position opening inlet conduits **71** and **73** and closing outlet conduits **75** and **77**, so that when solenoid **83** is energized, fluid is admitted through conduit **71** to cylinder **61**, forcing piston **63** downwardly to project the enclosure, and when solenoid **85** is energized, fluid is admitted through conduit **73** to cylinder **61**, forcing piston **63** upwardly to retract the enclosure.

Power supply lead **87** is connected directly to manual normally open double throw switch **93**, and power lead **89** is connected by lines **95** and **97** directly to one end of solenoid coils **83** and **85**, respectively. One terminal **99** of switch **93** is connected by line **101** to the other end of coil **83**, and the other terminal **103** of switch **93** is connected by line **105** to the other end of coil **85**, so that the circuits through the coils may be selectively alternatively closed and opened manually by means of switch **93**.

Line **101** includes, in series, between switch terminal **99** and coil **83**, normally closed limit switches **107** and **109**, and line **105** includes a normally closed limit switch **111**, switches **100** and **111** being mounted respectively on outer and inner top flanges **23** and **25** of the enclosure, for actuation to open position by stop pin **20** when the enclosure reaches its extreme projected and retracted positions, whereby to prevent further application of hydraulic power to cylinder **61**.

In order to reduce damage to the car or the enclosure if a switch crew inadvertently moves the car while the enclosure is in the extended, car-engaging position shown in FIG. 1, safety switches **113**, best shown in FIG. 8, are mounted on faceplate upright member **37**, and are arranged, as will be described below, to close if the car begins to move when the faceplate engages it. Switch **113** is in series with a shunt **115**, **117** around manual switch **93** and limit switch **111** to line **105** through the retracting solenoid coil **85** so that, if the car begins to move the retracting circuit will be energized even though switch **93**, **103** is open, and the gasket **41** will be pulled away from the car side, and deck plate **65** will be retracted from the car door.

Switch **113** is contained in a cylindrical housing **119** of dielectric material, closed at its outer end by closure **121**. A disk **123** centrally apertured as at **125** is slightly biased outwardly against closure **121** by coil spring **127** seated against annular shoulder **129** in housing **119**. Rocker arm **131** of dielectric material is elongated lengthwise of housing **119** and is pivoted, on vertical axes, through pin **133** to disk **123**. At its outer end arm **131** is provided with a cap **135** of rubber or similar material, with a grooved arcuate surface adapted for frictional engagement with car side wall **35**.

Inwardly of shoulders **129** switch **107** is formed as follows: Line **101** is connected to spring-loaded contact plungers **137**, mounted in cylinder **139** on the inside of the housing on both sides of rocker arm **131**, and the rocker arm contains a conductor **141**, aligned with plungers **137** when rocker arm **131** is in its extended position, but disaligned when the rocker arm is forced inwardly by engagement of cap **135** with a car side, thus breaking the circuit through line **101** and projection coil **83**. At its inner end the rocker arm side is slightly tapered and fitted with conductor plates forming switch **113**. Spaced from rocker arm **131** on both sides of the latter when it is maintained in its normal centered position by spring-loaded plungers **137**, are spaced contacts **143** and **145**, or shunt wires **115** and **117**, respectively, so that when rocker arm **131** is depressed by engagement with car side **35**, if the car begins to move, arm **131** will pivot about pin **133** and one of the switch conductor plates **113** will engage contacts **143** and **145** on one side of the rocker, closing the circuit through retraction coil **85**. The length of travel of the contactor plate of safety switch **113** is such that switch **113** will remain closed until deck plate **67** is clear of the car side, after which switch **113** will open, when rocker arm cap **135** disengages from the car side and the rocker arm returns to its normal centered position. Further inward movement of the enclosure can be initiated by manual switch **93**.

Operation of the door enclosure is as follows: While not in use, the enclosure is in the retracted position shown in FIG. 2, and the warehouse door **5** is closed. When it is desired to transfer lading between a car and the building, door **5** is opened and switch **93** is thrown to engage contact **99**, thus energizing solenoid coil **83** and admitting fluid to the enclosure extending end of power cylinders **27** or **61**. If power cylinder **27** is utilized, outward movement is imparted directly to the rigid hood **11–25**. As the latter swings outwardly on pivot **9**, the pivotal connection at **45** of hood side frame member **11** with bar **43**, and the pivotal connection at **47** of the latter to the door frame slot **48**, causes the lower end of bar **47** to swing outwardly and upwardly in slot **50** of faceplate side member **37**, thus urging the faceplate outwardly in parallel rela-

tion with the building wall until inflatable gasket **41** engages the car wall, at which time plunger **131** breaks the circuit through switch **107** to solenoid **83**, causing valve **79** to close cylinder input conduit **71** and open discharge conduit **75**, thus terminating the extension stroke of the piston. The gasket may then be inflated to close any gap between it and depressions in the exterior surface of the car wall around the door.

If jamb-mounted vertical cylinders **61** are utilized to project the enclosure, when energized, they urge pins **47** downwardly in slots **48** thus causing downward and outwardly pivotal movement of bars **43**. The pivotal connection of the latter with enclosure side frame members **11** causes the latter to swing outwardly through the door opening about pivot pins **9**, and the outer swinging movement of the lower end of bar **43**, accommodated by upward movement of pin **49** in slot **50**, causes faceplate **37**, **38** and its gasket to move outwardly until plunger **131** engages the car side and thus breaks the circuit, via switch **107**, through solenoid **83**, after which the gasket may be inflated to effect an improved seal.

Deck plate **65** may then be placed across the gap between the building and car floors, with channel **67** overlying the faceplate bottom cross bar **38** so that when the enclosure is retracted, the deck plate will also be retracted from the car door.

While the enclosure and deck plate are in the car-engaging position, if the car is moved, the car side will cause rocker-plunger **131** to pivot about pin **133**, closing the circuit across contacts **143** and **145**, and energizing retraction solenoid **85** to admit fluid to the retraction end of cylinders **27** or **61**, thus retracting the enclosure from engagement with the car side and preventing damage to the structure.

After loading or unloading of the car is completed, cylinders **27** or **61** are reversed by throwing switch **93** into engagement with contact **103** to reverse the movement of the parts and cause a retraction of the enclosure to the position shown in FIG. 2, from which further inward movement is provided by the engagement of hood roof outer flange **23** with jamb-mounted pins **26**, the retraction stroke of the pistons being terminated by engagement of limit switch **109** with pin **26**.

The details of the door enclosure disclosed herein may be varied substantially without departing from the spirit of the invention, and the exclusive use of those modifications as come within the scope of the appended claims is contemplated.

What is claimed is:

1. An enclosure for loading dock door openings in building walls comprising a rigid hood portion having a rigidly defined top wall of rectangular plan and spaced rigidly defined side walls of triangular shape secured along their upper sides to the sides of said top wall with their planes transverse of the building wall and pivoted at their bottom vertices to the building wall for swinging movements transversely of the wall from a position wholly within the opening to positions projecting outwardly from the building wall, flexible sheets attached to the outer edges of said triangular side walls to form triangular outer extensions thereto, and means for maintaining the outer edges of said sheets substantially vertically aligned with the outer extremity of said hood.

2. A loading dock door enclosure according to claim **1** in which said means comprises rigid vertically elongated elements pivotally depending from the outer upper corners of said hood for swinging movement transversely of the general plane of the wall, the outer edges of said flexible sheets being attached to said depending elements.

3. An enclosure for loading dock door openings in building walls comprising a rigid hood portion having a rigidly defined top wall of rectangular plan and spaced rigidly defined side walls of triangular shape secured along their upper sides to the sides of said top wall with their planes transverse of the building wall and pivoted at their bottom vertices to the building wall for swinging movements transversely of the wall from a position wholly within the opening to positions projecting outwardly from the building wall, and flexible sheets attached to the outer edges of said triangular side walls to form triangular outer extensions thereto, rigid vertically elongated elements pivotally depending from the outer upper corners of said hood for swinging movement transversely of the general plane of the wall, the outer edges of said flexible sheets being attached to said depending elements, and a bar pivotally connected intermediate its ends to the outer margin of one of said hood side walls intermediate the ends thereof and pivotally and vertically slidably connected to the building wall at its upper end and to one of said depending elements at its lower end whereby to cause said depending element to be maintained parallel to the general plane of said wall irrespective of the position of said hood transversely thereof.

4. A loading dock door enclosure according to claim **3**, including a horizontal element connecting said depending elements at their lower ends to form a faceplate engageable with wall structure of an adjacent vehicle and a substantially horizontal bottom of flexible material extending between said horizontal element and the bottom of the building door opening.

5. A loading dock door enclosure according to claim **3**, including power means for swinging said hood between its retracted and extended positions.

6. A loading dock door enclosure according to claim **5** in which said power means is a linear movement power device mounted on the building and pivotally connected to said hood.

7. A loading dock door enclosure according to claim **5** in which said power means comprises a vertically operable linear movement device fixed to said building and pivotally connected to the sliding pivotal connection of said bar to said wall for moving said pivotal sliding connection vertically relative to said wall and thereby cause swinging movements of said hood and of said faceplate relative to said hood.

8. A loading dock door enclosure according to claim **4**, including a resilient gasket on the face of said faceplate to form a seal against the wall of an adjacent vehicle.

9. A loading dock door enclosure according to claim **5** in which said gasket is hollow and inflatable.

10. A loading dock door enclosure according to claim **3** in which a horizontal bottom member connects said depending elements, there being a deck plate for bridging the gap between the building on which the enclosure is mounted and an adjacent vehicle, said deck plate being provided adjacent its end remote from the building with a downwardly open channel embracing said faceplate bottom member.

11. A loading dock door enclosure according to claim **1** in which said hood top is provided with upwardly extending flanges along both its margins parallel to the building wall and there is a projection on said building wall into the door opening therein engageable with both said flanges to limit swinging movements of said hood to extreme retracted and projected positions, said projection being spaced inwardly from the outer surface of the building wall.

12. A loading dock door enclosure according to claim **5**, including a pair of hinged links pivotally connecting the bottom of said faceplate to the building wall at the bottom of the door opening at each side thereof.

13. A loading dock door enclosure according to claim **5** including means for deenergizing said power means when said faceplate abuts the side of a vehicle.

14. A loading dock door enclosure according to claim **13** in which said deenergizing means comprises a member resiliently mounted on said door enclosure for engagement with the side of a vehicle when the faceplate abuts the vehicle side and movable normal to said faceplate upon engagement with the vehicle side, and a switch normally closed by said resiliently mounted member when

the latter is extended and opened when the latter is compressed by engagement with the car side.

15. A loading dock door enclosure according to claim **5** including means for energizing the retracting power means if a car engaged by said faceplate is moved.

16. A loading dock door enclosure according to claim **13** in which said energizing means comprises spaced electrical contacts, a member pivotally mounted on the enclosures for horizontal movement in an arc generally transverse of the enclosure, means biasing said pivotally mounted member against a vehicle side when the faceplate is in engagement therewith, said pivotally mounted member including a closure for said switch engageable with said contacts when said pivotally mounted member is moved by movement of the vehicle.

17. A loading dock door enclosure according to claim **1**, including an electrical circuit, for controlling the projection and retraction of the enclosure, comprising a source of power, a manual normally open switch, separate electrical devices for projecting and retracting the enclosure, conduit means between said power source and said normally open switch, a first conductor leading from said

manual switch to the device for projecting said enclosure and including a normally closed switch, means operable to open said switch when the enclosure engages the side of a vehicle, a second conductor leading from said manual switch to said enclosure retraction device, a normally open shunt circuit around said manual switch from said conducting means to said enclosure retraction device, and means responsive to movement of the vehicle for closing said shunt circuit to energize said retraction device.

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