

April 9, 1968

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3,376,669

ACCESS DOOR

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2 Sheets-Sheet 1

Fig. 1

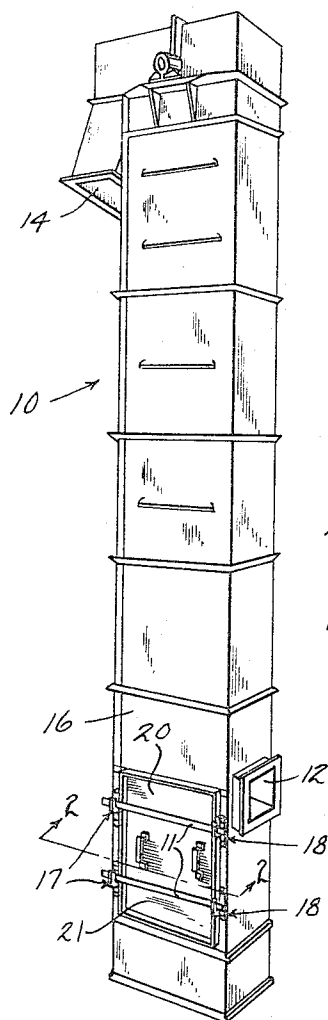
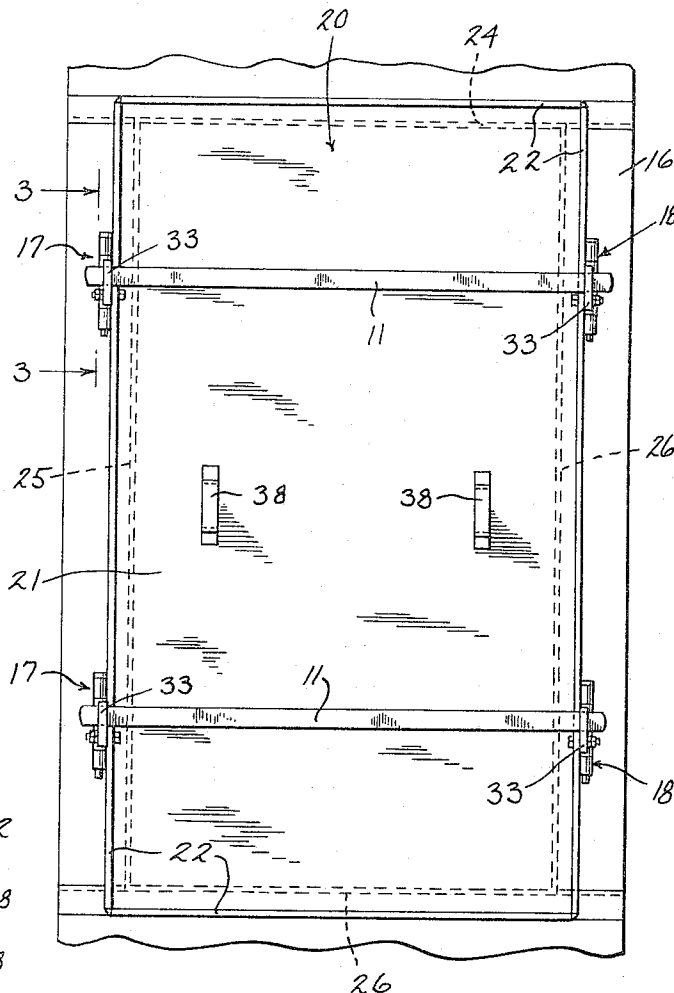


Fig. 2



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Fig. 3

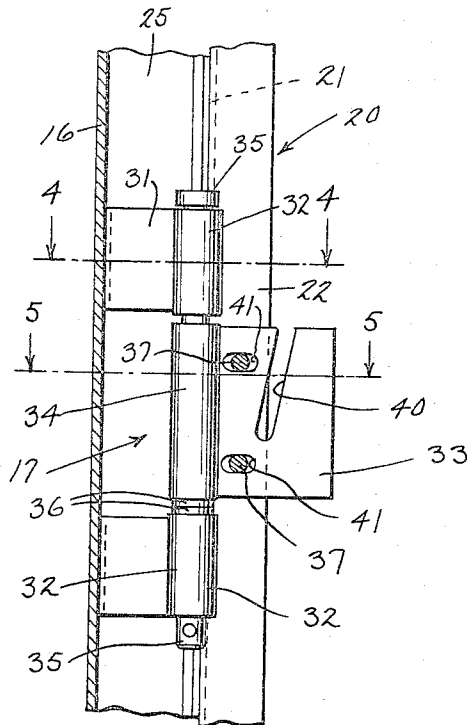


Fig. 4

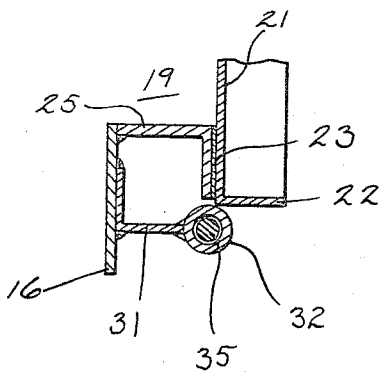
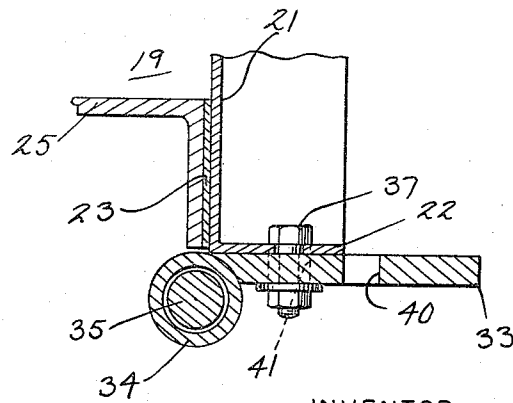


Fig. 5



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ACCESS DOOR

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ABSTRACT OF THE DISCLOSURE

The door is sealed and held in place by a pair of locking bars, each of which is received edgewise in slots in a pair of plates connected to the door frame adjacent opposite sides of the door. As each bar is forced into the slots, the edges of the door are engaged by the leading edge of the bar, thus forcing the door toward its frame. The door is held in place by virtue of the bar being wedged between the slot boundaries and the door edges. By mounting the slotted plates on hinges, the door may be pivotally opened to either side, depending on which set of hinged plates the door is fastened to.

Access doors are normally sealed and held in place with respect to their associated equipment housing by a series of bolts or lugs arranged about the periphery of the door. Although suitable for some applications, in instances where the door is relatively large, this simple arrangement is not satisfactory. The disconnecting and reconnecting of a large number of bolt type fasteners can be extremely time consuming, especially when the screwed elements have been damaged by repeated use and possibly abuse. Additionally, when the access door is heavy and/or the door is in a relatively awkward position, it is oftentimes difficult and even dangerous to handle the door upon removal and installation. Hinging of the door affords an expedient whereby some of these problems may be overcome; however, it is oftentimes difficult to adequately seal a hinged door. Furthermore, the opening of a hinged door necessitates the existence of specific clearances in the area of the door, which clearances are not normally known at the time of assembly of the equipment, so that it is difficult to decide the direction in which the door should be hinged to satisfy the spacing and clearance available at the installation site.

Accordingly, it is an object of the present invention to provide an access door that can be quickly and positively brought into and locked in sealing engagement with its intended abutment. A further object of the present invention is the provision of a door support arrangement whereby the door can be hinged and swung open to either side with relatively minor in situ alteration.

To attain these and other objects, there is provided, according to the present invention, a closure for a rectangular access opening in an upright wall, which opening has a peripheral sealing surface. The closure includes a door panel and at least one door positioning assembly. The door panel is formed with outwardly projecting edges on its opposite sides, and a peripheral portion arranged for securement adjacent the peripheral sealing surface around the access opening. The door positioning assembly includes at least one pair of plates connected to and projecting outwardly from the wall, and disposed on opposite sides of the door panel adjacent the door panel edges. Each plate is formed with an inwardly sloping upright slot oriented at a slight angle with respect to the adjacent door panel edge. A locking bar extends across the door panel. The bar has portions thereof arranged to project into the slots along the lengths thereof. The slots are arranged relative to the door panel edges so that projection of the locking bar into the slots causes

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engagement of the bar with the door panel edges at a slight angle, whereby forcible movement of the bar within the slots and against the door panel edges creates a wedging action urging the door panel toward the opening and securing the peripheral portion of the door panel with respect to the peripheral sealing surface.

These and other objects and advantages will appear in the following detailed description of the invention having reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of a bucket elevator housing having incorporated therein an access door according to the present invention;

FIG. 2 is an enlarged plan view of the access door of FIGURE 1 taken along line 2—2 thereof;

FIG. 3 is a partial view taken along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary view taken along line 4—4 of FIG. 3; and

FIG. 5 is an enlarged sectional view taken along line 5—5 of FIG. 3.

In FIGURE 1 there is shown, as an example of the type of equipment in which the invention may be incorporated, a bucket elevator 10 enclosed within a housing 16 and having an inlet 12 at its lower end or "boot" and a discharge 14 at its upper end. Although not shown, it will be appreciated that the housing 16 encloses upper and lower sprockets which engage a chain to which are attached a series of buckets arranged to receive bulk material via inlet 12 and discharge the material through outlet 14. A removable door 20 covers an opening arranged at the side of the "boot" to afford access for purposes of cleaning, maintenance, etc. The door 20 is secured to the wall of the elevator 10 by means of locking bars 22, and may be pivotally opened in either lateral direction by means of the left side hinges 24 or the right side hinges 26, the details of which are discussed hereinafter.

Referring to FIGS. 2 through 5, the door 20 is formed of a rectangular plate 21 having outwardly projecting edges 22 about its periphery. The peripheral inner surface of the door plate 21 is arranged to engage or be sealed with a rectangular sealing surface attached to the housing 16. The rectangular sealing surface is formed by the coplanar legs of the parallel upper and lower angle members 24 and 26 and the parallel left and right angle members 25 and 27, all of which have their other legs welded to the housing 16. It should be noted that the angle members 24, 25, 26 and 27 collectively define a frame delimiting the access opening 19. A compressible sealing member or substance 23 is interposed between the sealing surface formed by the angle members and the inner surface of the door plate 21, so that the access opening 19 will be tightly sealed as the door 20 is urged toward the frame as will be described hereinafter.

The pairs of hinge assemblies 17 and 18 are identical except for being of opposite hand construction. As best shown in FIGS. 3 and 4, the hinge assembly 17 includes a pair of spaced upper and lower angle brackets 31 welded to the housing 16 and having aligned hinge tubes 32 welded to the outwardly projecting ends thereof. An outwardly projecting hinge plate 33 is connected with a tubular sleeve 34 at its inner side. The sleeve 34 is disposed between and in alignment with the tubes 32, the three tubular members being held in alignment by means of hinge pin 35, which passes through tubes 32 and sleeve 34. A pair of washers 36 may be provided between the lower end of the sleeve 34 and the upper end of the lower tube 32 to facilitate rotation of the sleeve 34 relative to the remaining portions of the hinge assembly 17.

The hinge plate 33 (and each of the similar hinge plates in all the hinge assemblies) is formed with a downwardly and inwardly sloping slot 40. The slots 40 of the

hinge assemblies disposed on opposite sides of the door 20 are arranged relative to the door panel edges 22 so that projection of a locking bar 11 into the slots 40 along the lengths thereof urges the door 20 into engagement with the door frame. It will be appreciated that the forcing of the locking bar 11 into the slots 40 against the edges 22 creates a wedging action whereby the door 20 is secured relative to the door frame surrounding the access opening 19. This locking action may suitably be effected by pounding the bar 11 into the slots 40, and the door 20 can be released simply by forcibly removing the bar 11 from the slots 40. In relation to the locking action of the bar 11, it will be appreciated that the compressible sealing substance 23 materially aids in creating a tight seal between the door 20 and the door frame.

Each hinge plate 33 is also formed with a spaced pair of slotted holes 41, the holes 41 being elongated in a direction perpendicular to the plane of the door 20. If it is desired that the door swing open on the hinge assembly 17, the left-hand edge 22 of the door 20 may be fastened to the hinge plates 33 of the hinge assembly 17 by means of bolts 37 which pass through suitable holes in the door edge 22 and the slotted holes 41. If, on the other hand, it is desired that the door swing open on the hinge assembly 18, the door would be similarly fastened only to the hinge plates 33 of the hinge assembly 18. Thus, it will be appreciated that after the door 20 is mounted, it may be opened to either side merely by attaching the side of the door to the pair of hinge assemblies about which the door is to be rotated. The slotted holes 41 allow for adjustment of the position of the bolts 37 depending on the ultimate position of the door 20 in the sealed condition. Practically, the position of the bolts 37 is most readily established by sealing the door 20 in position by means of the locking bars 11. The bolts 37 on the side of the door 20 about which it is to be pivoted can then be tightened. Readjustment can then thereafter be accomplished merely by loosening bolts 37 and retightening them with the door 20 in the sealed position.

A pair of handles 38 are provided on opposite sides of the door panel 20 to facilitate handling of the door and its opening in either direction.

The foregoing description of the invention and of the manner and process of making and using it sets forth the best mode or modes of carrying out the invention as presently contemplated. The following claim or claims particularly point out and distinctly claim the subject matter which is regarded as the invention.

What is claimed is:

1. In combination with a peripheral sealing surface of an access opening in an upright wall, a closure for said opening comprising a door panel having outwardly projecting edges on opposite sides thereof, said door panel having a peripheral portion arranged for overlapping securely adjacent said sealing surface, compressible seal means disposed between said peripheral sealing surface and said peripheral portion of said door panel, and

a door positioning assembly including a pair of plates connected with said wall and projecting outwardly therefrom and disposed on opposite sides of said door panel adjacent said edges, each of said plates being formed with an inwardly sloping upright slot, and a locking bar extending across said door panel, said locking bar having a portion thereof arranged to project into said slots along the lengths thereof, said slots being arranged relative to said door panel edges so that projection of the locking bar into the slots causes engagement of the bar with said edges at a slight angle thereto, whereby forcible movement of the bar within said slots and against said edges creates a wedging action urging said door panel toward said opening and securing said peripheral portion of the door panel with respect to said peripheral sealing surface, said door positioning assembly further including a hinge mounting one of said plates to said wall, and means for securing said one plate to its adjacent door edge, whereby said door panel is pivotally mounted on said hinge.

2. The invention according to claim 1 wherein said slots are open at their upper ends, and are oriented at a slight angle with respect to said edges of said door panel.

3. The invention according to claim 1 wherein said door positioning assembly further includes a pair of hinges mounting said plates to said wall, and means for securing either of said plates to its adjacent door edge, whereby the door panel may be pivotally supported on either of said hinges.

4. The invention according to claim 3 wherein said slots are open at their upper ends, and are oriented at a slight angle with respect to said edges of said door panel.

5. The invention according to claim 4 wherein said access opening and said door panel are generally rectangular in shape, and a pair of said door positioning assemblies are arranged adjacent said door panel at spaced locations along its height.

6. The invention according to claim 2 wherein said door positioning assembly further includes a pair of hinges mounting said plates to said wall, and means for securing either of said plates to its adjacent door edge whereby the door panel may be pivotally supported on either of said hinges.

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