Sept. 2, 1958 W. D. RICH ET AL 2,849,764

SILO DOORSTEP AND LATCH DEVICE

Filed May 16, 1957

Fig. 1

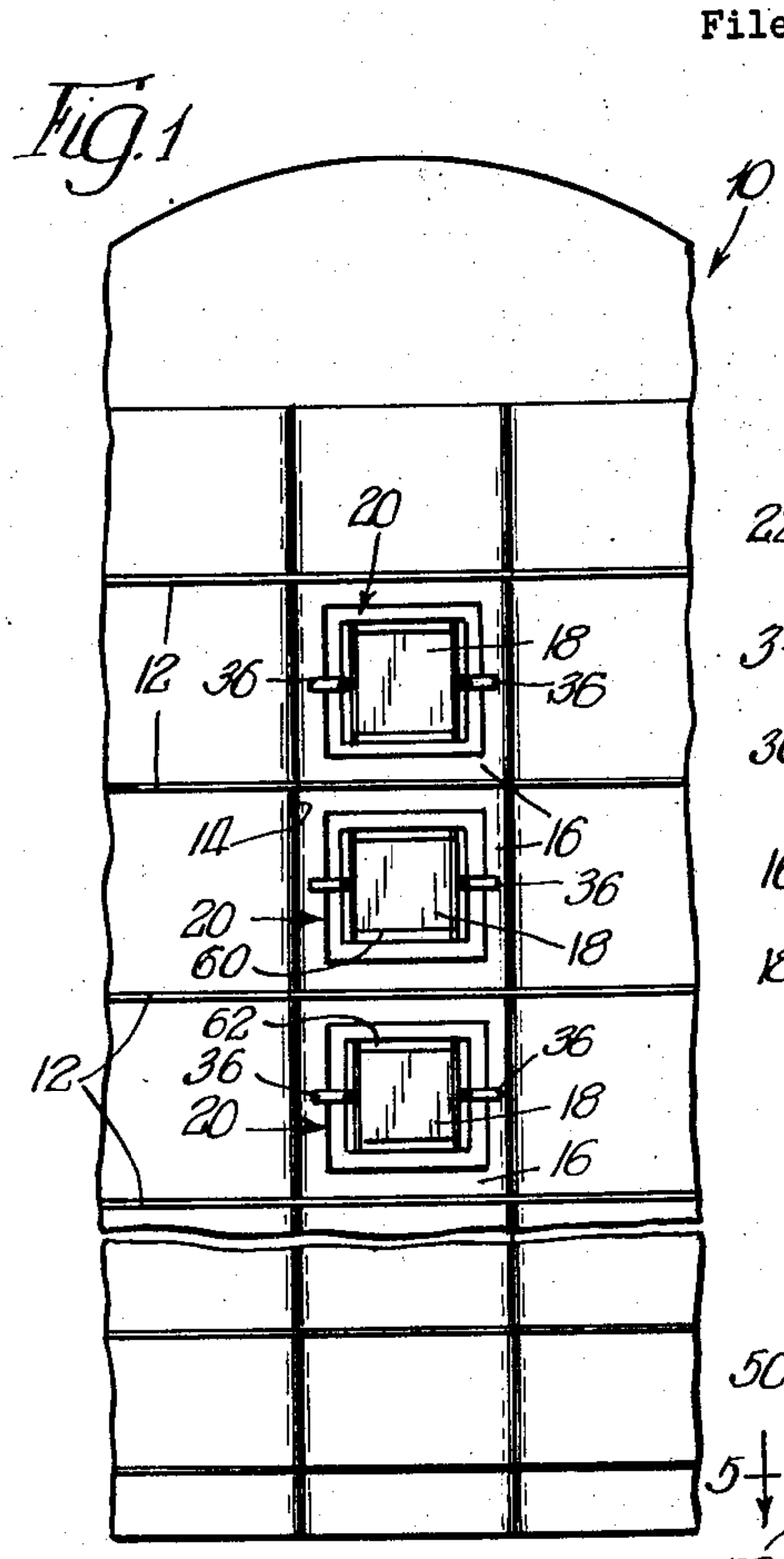


Fig. 2

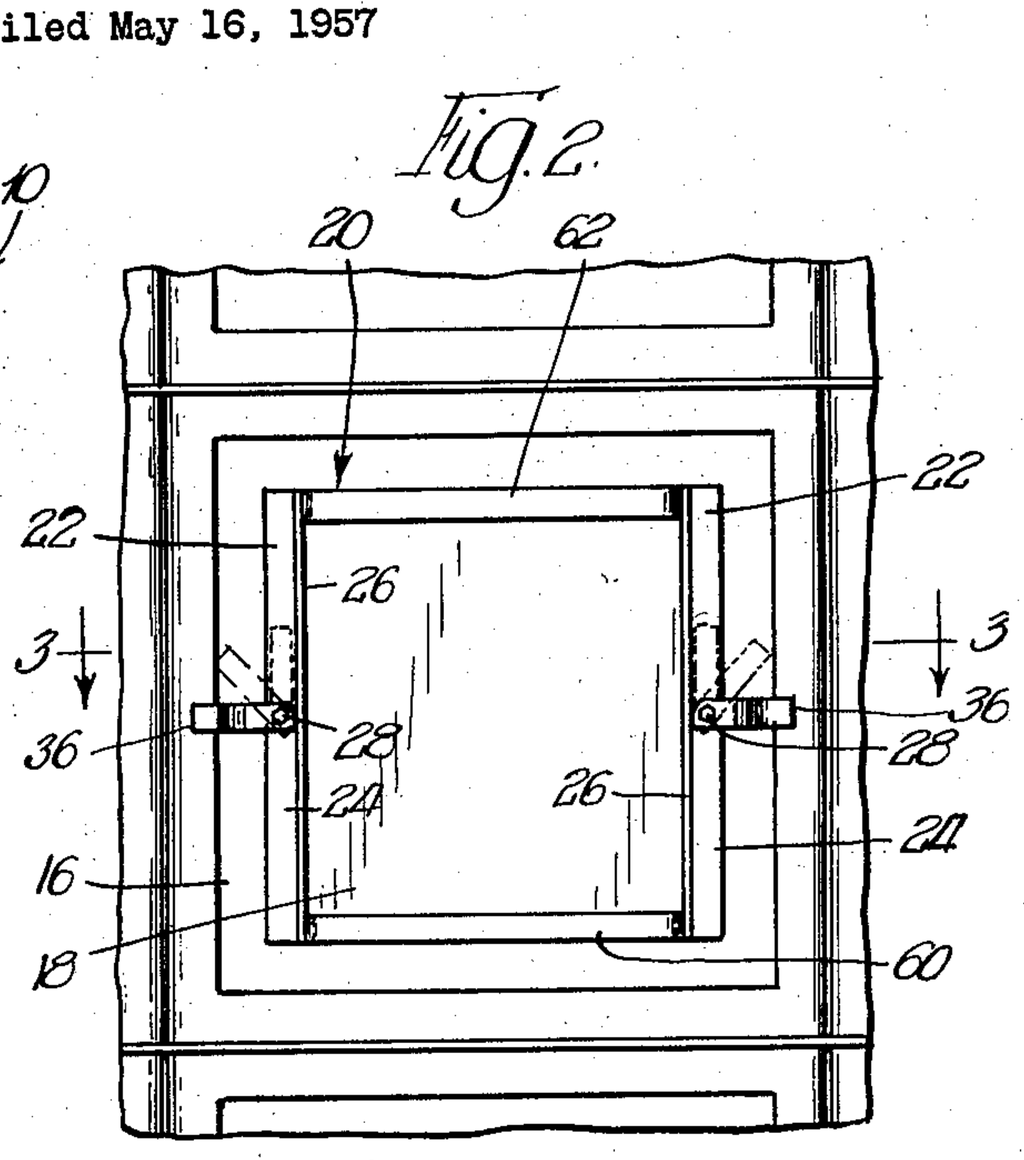


Fig. 4

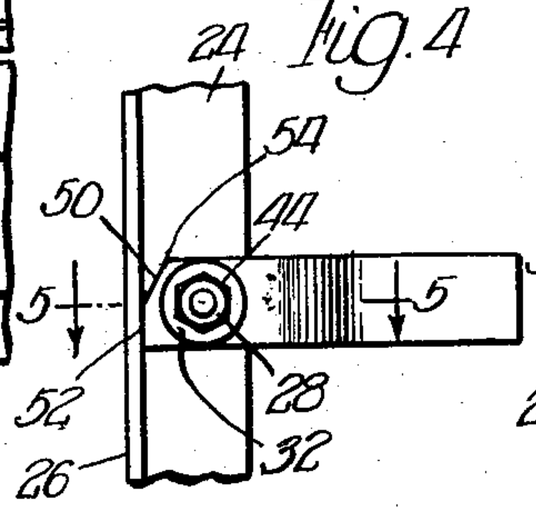


Fig. 5

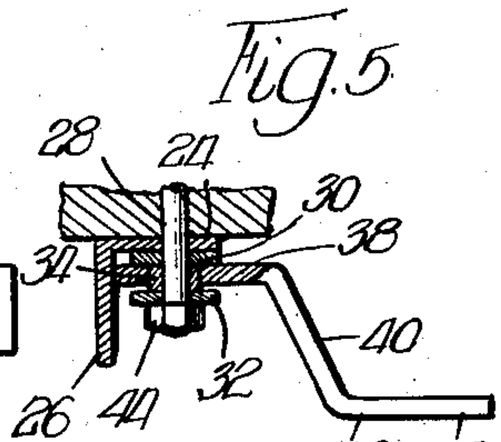
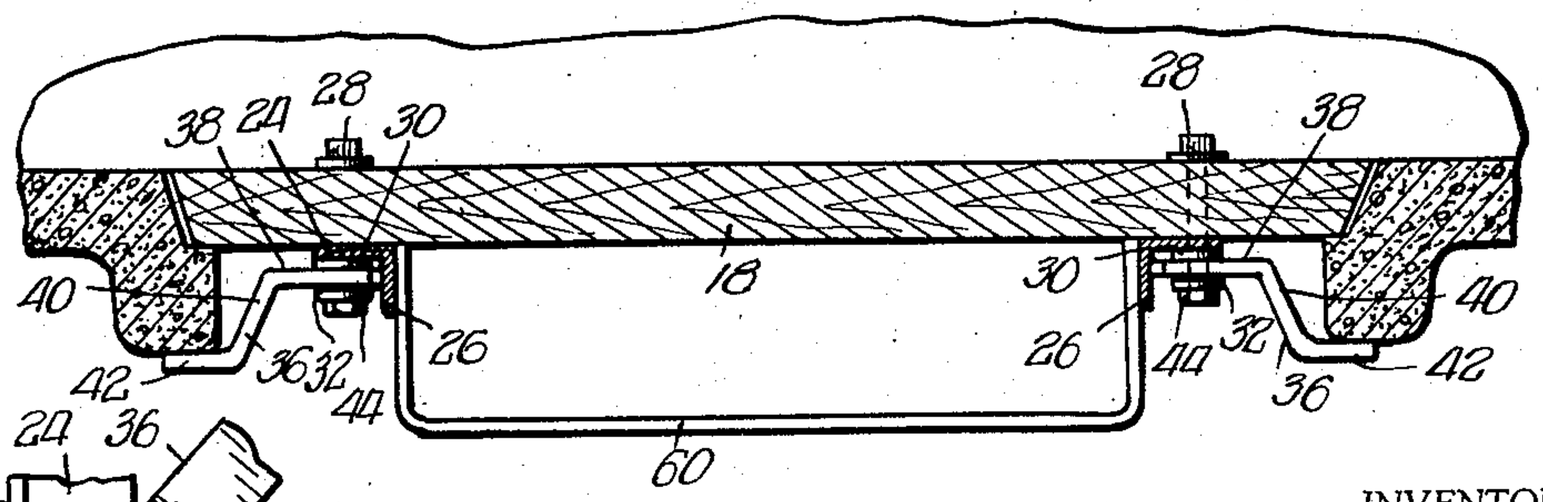


Fig. 3



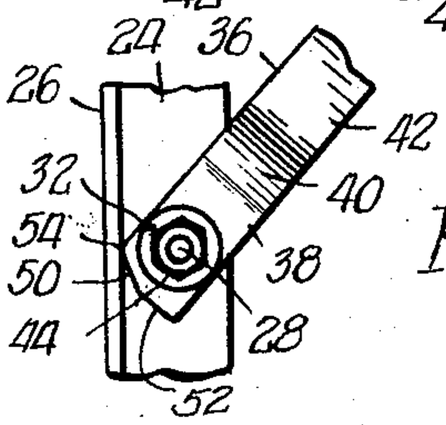


Fig. 6.

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SILO DOORSTEP AND LATCH DEVICE

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Application May 16, 1957, Serial No. 659,572

4 Claims. (Cl. 20—68)

Our invention relates to a silo doorstep and latch device, and more particularly, to silo door hardware that latches the door in place in the silo doorframe and provides steps or foot and hand holds that permit one to climb from one silo door to another up and down the silo.

Silos are conventionally provided with a continuous doorway extending vertically substantially from the top to the bottom of the silo. The doorway is closed by a plurality of doors mounted in doorframes positioned one above the other, the doors being removed or added one by one as the silo is emptied or filled with grain or the like.

Silo doors are conventionally designed to open from the inside of the slio, and are provided on their outwardly facing sides with latch devices that hold them in the doorway when the level of the grain or the like is below the level of the door. The latching devices conventionally engage the outer surfaces of the doorframes, and to remove the door, one releases the latching device of the door, pushes the door inwardly, and then tilts it as required to withdraw the door from the doorway. On replacement of the door, the operation is reversed.

Latching devices conventionally employed on silo doors are ordinarily so arranged that they may provide one or more steps that serve as foot and hand holds. The latching devices of all the slio doors thus form a ladder that permits one to climb to the top of the silo.

Conventional silo doors are so designed that their outer surfaces are spaced inwardly of the outer surface of the doorframes. This means that the latching devices must be so designed, and secured to the doors in such a manner, that the latching elements will engage the outer surfaces of the doorframes or other silo structures. In accordance with conventional designs, much of the structure forming the latching devices is spaced from the door, which results in considerable twist being applied thereto when supporting the climber. Moreover, conventional latching devices do not include sufficient bracing structures, and thus it frequently happens that the weight of the climber tends to tear them away from the door.

A principal object of the invention is to provide a doorstep and latching device for silo doors which is secured flush against the door and provides adequate bracing for the step forming members.

A further object of our invention is to provide an improved latch device for silo doors.

Another object of the invention is to provide a silo doorstep and latching device which is composed of few and simple parts, is economical of manufacture, and is highly efficient and safe in use.

Other objects, uses, and advantages will be obvious or become apparent upon a consideration of the following detailed description and the application drawing.

In the drawing:

Figure 1 is a diagrammatic elevational view illustrating a silo to which my invention has been applied;

Figure 2 is an enlarged elevational view of a silo door and doorframe of the type shown in Figure 1, illustrating a preferred embodiment of the invention;

Figure 3 is a cross-sectional view along line 3—3 of Figure 2;

Figure 4 is an enlarged fragmental view of one of the latching pawls or arms shown in Figure 2;

Figure 5 is a diagrammatic cross-sectional view approximately along line 5—5 of Figure 4, partially in plan; and

Figure 6 is a view similar to that of Figure 4 illustrating the supplemental latching position of the latching pawl or arm.

Reference numeral **10** of Figure 1 generally indicates a silo of the type to which our invention may be applied. Silo **10** may be formed from concrete staves and encircled by spaced hoops **12** in accordance with the disclosure of Patent No. 2,120,838 granted to Rollie A. Lawrence. The silo **10** is conventionally provided with a vertically extending doorway **14** in which a plurality of reinforced concrete doorframes **16** are mounted. Each doorframe **16** receives a treated wood door **18** of conventional design, and the respective doors **18** in accordance with my invention are provided with doorstep and latching devices **20**.

Referring to Figure 2, devices **20** each comprise a pair of vertically disposed, spaced apart angle bars **22** secured to the door **18** so that flanges **24** thereof are flush against the outer surface of the door and project away from each other, and flanges **26** project outwardly of the door. The flange **24** of each bar **22** receives a bolt **28** at approximately its mid-point. Bolts **28** each carry washers **30** and **32** as well as a spacing sleeve **34** which in turn carries a substantially Z-shaped latching pawl or arm **36**. The segment **38** of each pawl or arm **36** is formed with a perforation sufficiently large to loosely receive a sleeve **34**, while segment **40** of each separates a segment **42** from a segment **38** sufficiently so that segments **42** engage the outer surface of the doorframe as indicated in Figure 3 when the arms are in a horizontal position.

A nut **44** received on each bolt **28** secures the respective bars **22**, washers **30** and **32**, sleeves **34**, and pawls or arms **36** to the door, though sleeves **34** being longer in length than the thickness of the segments **38**, arms **36** will be mounted for pivotal movement on the respective bolts **28**.

In the illustrated embodiment, as indicated in Figures 4 and 6, the segment **38** of each arm **36** at its inner end includes an extension which is trimmed at one corner thereof as at **50** to provide an abutment surface **52** and a supplementary abutting corner **54**. The bolt **28** of each angle bar **22** is preferably so positioned with respect to the flange **26** thereof that the pivotal movement of the pawl or arm **36** is limited to that between a substantially vertical position and a substantially horizontal outwardly extending position (see Figure 2). In the horizontal position, the abutting surface **52** of the respective arms **36** is in contact with an adjacent flange **26**.

The respective corners **54** are preferably proportioned with respect to the axes about which arms **36** pivot so that as an arm **36** moves downwardly about its bolt **28** to the horizontal position, its corner **54** will contact the adjacent flange **26** in the manner indicated in Figure 6. The respective corners **54** thus serve as supplemental stops which hold the respective latching arms **36** in the intermediate dotted line positions indicated in Figure 2 until the person handling the door moves the latching

pawl or arm **36** to free corner **54** from the flange **26**, whereupon the pawl or arm will drop to the horizontal position. It will be found that this can be done when most resilient metals are employed for making members **26** and **36**.

However, the cooperation above described between the latching arms and flanges **26** may be eliminated so long as means are provided to insure that the arms remain in firm engagement with the doorframes **16** in performing their latching functions.

A U-shaped member **60** is secured between the lower ends of bars **22** as by being welded to the flanges **26** thereof, and an upper U-shaped member **62** is secured to the bars in like manner. The members **60** and **62** are identical and form the steps of the device, and their vertical spacing is preferably consistent with the spacing between steps of adjacent doors; this may be accomplished by spacing members **60** and **62** along the lengths of bars **22** as required to provide the desired spacing. The framing elements forming devices **20**, namely, bars **22** and members **60** and **62**, are preferably preassembled with members **60** and **62** being welded or otherwise affixed to flanges **24**.

A device **20** may be secured to a door **18** solely by the bolts **28** that pivotally mount latching pawls or arms **36** to bars **24**. If desired, however, additional bolts or other securing means may be applied to the flanges **24** of members **22**.

The latching arms or pawls **36** are both shown in latching position (the full line illustration thereof) in Figure 2. When it is required to remove a door **18**, one merely has to pivot the arms or pawls **36** to the dotted line vertical position, push the door inwardly of the doorframe, and then tilt same as is necessary to remove the door from the silo. The supplemental stops formed by corners **54** prevent the arms or pawls **36** from moving downwardly beyond the dotted line angled positions indicated in Figure 2, which insures that they will not interfere with the removal of the door from the doorframe.

When it is desired to replace the door, one pushes the latching arms or pawls **36** to the dotted line vertical position and then tilts the door as required to insert same into the silo through the opening in the doorframe and then place same in position in the doorframe. Again, the corners **54** insure that the arms or pawls **36** do not move downwardly beyond the dotted line angled position of Figure 2, which insures that they will not interfere with the replacement of the door in the doorframe. Latching arms or pawls **36** are then pivoted to their illustrated horizontal positions to bring their segments **42** into contact with the outer surface of the doorframe in the manner indicated in Figure 3.

It thus will be seen that we have provided a silo doorstep and latching device which is composed of the simplest of elements, and yet which is secured to the silo door in a manner that will best resist forces that are imposed upon it. The members **22**, **60**, and **62** form a substantially quadrilateral framework that in effect is secured flush to the outer surface of the door, and the relatively long length of the members **22** above and below bolts **28** means that the device **20** is adequately braced against any twisting forces that are imposed upon it by a climber applying weight to the members **60** and **62**. The angled segments **40** of latching arms or pawls **36** permit the devices **20** to latch the door in place in spite of the fact that the members **22** are secured flush against the outer surface of the door.

The foregoing description and the drawing are given merely to explain and illustrate our invention, and the invention is not to be limited thereto except insofar as the appended claims are so limited, since those skilled in the art who have our disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

We claim:

1. A silo doorstep and latch device comprising a pair of spaced vertically disposed angle bars positioned against the outer surface of the door with adjacent flanges extending normally of the door and opposed flanges flush with the door, upper and lower substantially U-shaped step members fixed between said adjacent flanges, with the legs of said step members being substantially perpendicular to the door, said bars and said step members forming a generally quadrilateral framework, a bolt positioned adjacent the midpoint of each bar securing said framework flush against the silo door, said bolts each pivotally mounting a latch arm, stop means limiting the pivotal movements of the respective arms to that between a substantially vertical upwardly extending position and a substantially horizontal position wherein the arms extend outwardly of the framework sufficiently to latch the silo door against removal, and supplemental stop means for each of said arms, said supplemental stop means stopping the downward pivotal movement of said arms at a position intermediate the said vertical and horizontal positions, said supplemental stop means being releasable to permit said arms to move to said horizontal positions.

2. A silo door step and latch device comprising a pair of spaced vertically disposed angle bars positioned against the outer surface of the door with adjacent flanges extending normally of the door and opposed flanges flush with the door and extending away from each other along the plane of the door, upper and lower substantially U-shaped step members fixed between said adjacent flanges, with the legs of said step members being substantially perpendicular to the door, said bars and said step members forming a generally quadrilateral framework that is adapted to be positioned flush against the silo door, a bolt positioned adjacent the midpoint of each bar securing said framework flush against the silo door, said bolts each pivotally mounting a latch arm, and stop means for each of said latch arms for limiting the pivotal movements of the respective arms to that between a substantially vertical upwardly extending position and substantially horizontal position wherein the arms extend outwardly of the door sufficiently to latch the silo door against removal, said flanges of said bars comprising said stop means, and said arms each including an extension proportioned to engage said flanges, respectively, to hold said arms in said substantially horizontal position, said latch arms engaging said flanges respectively to position same in said substantially vertical positions.

3. A silo doorstep and latch device comprising a generally quadrilateral framework adapted to be secured flush to the silo door, said framework including a pair of spaced steps positioned adjacent the top and bottom thereof, a latching arm pivotally secured adjacent the midpoint of each side thereof, and stop means for each of said latching arms for limiting the pivotal movements of the respective arms to that between a substantially vertical upwardly extending position and a substantially horizontal position wherein the respective arms extend outwardly of the framework sufficiently to latch the silo door against removal, said stop means being carried by said framework and respectively interposed in the paths of movement of the respective latching arms.

4. In a silo door adapted to be received in a doorframe of a silo, a doorstep and latch device therefor comprising a pair of spaced vertically disposed bars, upper and lower step members fixed between said bars in spaced apart relation, said bars and said step members forming a generally quadrilateral framework that is adapted to be positioned flush against the silo door, a latch arm pivotally mounted adjacent the midpoint of each bar, stop means for each of said latch arms for limiting the pivotal movements of the respective arms to that between a substantially vertical upwardly extending position and a sub-

stantially horizontal position wherein the respective arms extend outwardly of the framework sufficiently to latch the silo door against removal, said stop means being carried by said bars respectively and interposed in the path of pivotal movements of the respective latch arms, and means for securing said framework flush against the silo door.

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