W. R. HARRISON & A. C. JACOBY.

SILO.

APPLICATION FILED FEB. 18, 1909.

942,640. Patented Dec. 7, 1909.

Fig. 2.

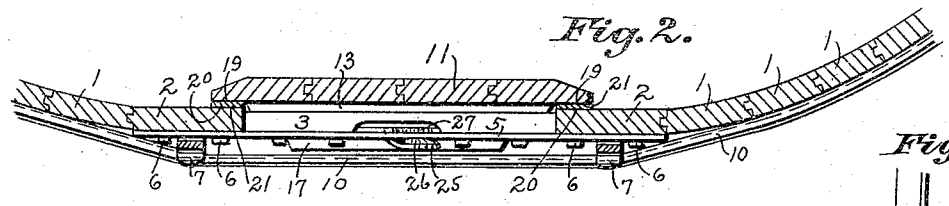
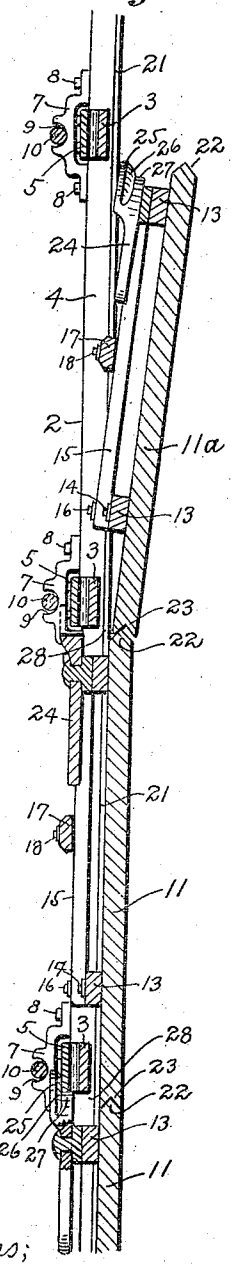


Fig. 3.



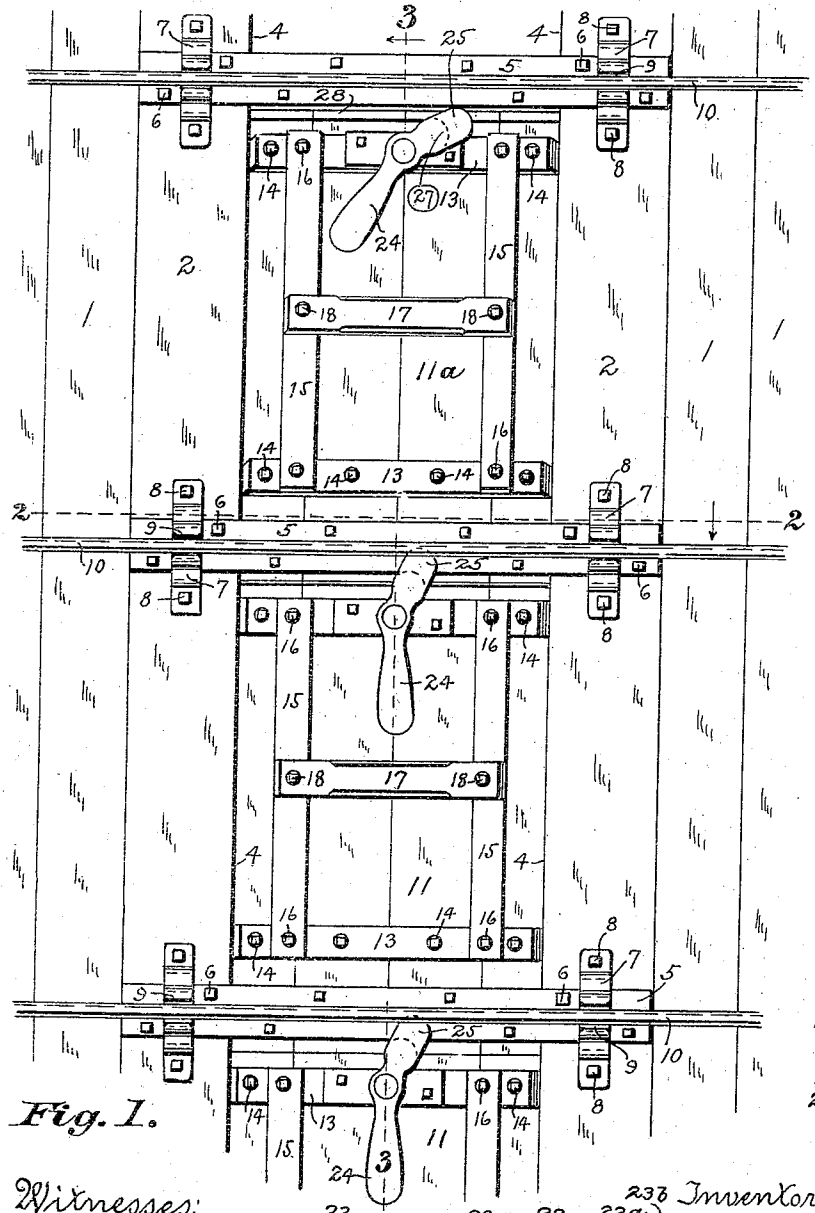


Fig. 1.

Witnesses;
Ruth A. Miller
Mary A. Cavanaugh

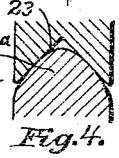


Fig. 4.

Fig. 5.

Fig. 6.

Inventors;
Williamson R. Harrison,
Albert C. Jacoby
By Harry Grease
Attorney

UNITED STATES PATENT OFFICE.

WILLIAMSON R. HARRISON AND ALBERT C. JACOBY, OF MASSILLON, OHIO; SAID JACOBY ASSIGNOR TO SAID HARRISON.

SILO.

942,640. Specification of Letters Patent. Patented Dec. 7, 1909.

Application filed February 18, 1909. Serial No. 478,702.

To all whom it may concern:

Be it known that we, WILLIAMSON R. HARRISON and ALBERT C. JACOBY, citizens of the United States, and residing at Massillon, in the county of Stark and State of Ohio, have invented a certain new and useful Improvement in Silos, of which the following is a specification.

The invention relates to the construction of silos, and to the arrangement and method of securing the doors therein; and the objects of the improvement are to provide a simple construction for the door frame of the silo, and a continuous series of doors which will form a complete and tight closure of the vertical opening of the silo, and means for securing and tightly clamping the side edge portions of the doors against the inner sides of the door jambs and for making tight joints between the end edges of the door sections. These primary objects of the improvement, thus set forth in general terms, and other important secondary benefits, are attained by the construction, mechanism and arrangement shown for a preferred embodiment of the invention in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a fragmentary elevation of a silo showing the vertical opening and several door sections therein; Fig. 2, a transverse section on line 2—2 of Fig. 1; Fig. 3, a vertical section on line 3—3 of Fig. 1; and Figs. 4, 5 and 6 are modified forms of the door joint.

Similar numerals refer to similar parts throughout the drawings.

The wall of the silo is made of a series of ordinary staves 1 which may be slightly curved to conform to the circumference of the silo and are tongued and grooved on their edges to form tight joints. Similar staves 2 constitute the door jambs on each side of the vertical opening, except that these staves are by preference formed flat and are joined at a slight angle to the contiguous staves, so that the door-jamb staves both lie in the same plane, as shown more particularly in Fig. 2.

The transverse braces 3 are provided at intervals in the vertical opening and abut the opposing edges 4 of the door jambs. These braces are formed or attached on the inner sides of the plates 5, the ends of which are extended and secured to the outer sides of the door jambs by means of the bolts 6. The brackets 7 are secured to the door jambs by the bolts 8, and these brackets are shaped to freely bridge over the ends of the brace plates, and are provided with the transverse grooves 9 which form sockets in which the hoop rods 10 of the silo are adapted to rest; by means of which construction and arrangement, the hoop rods can be applied and removed, and are independently supported, without affecting in any manner the freedom of the doors or the transverse braces.

The door sections 11 are preferably made of a number of vertical pieces tightly joined together and fastened to the cross braces 13 by means of the bolts 14; and the vertical bars 15 extending between and secured on the cross braces by means of the bolts 16, and the middle cross bar 17 extending between and secured on the vertical bars by the bolts 18, are preferably provided on the door. These cross bars form convenient handles for the door sections when the same are detached from the silo; and in conjunction with the hoop rods, form a ladder up the side of the silo.

The door sections are formed flat on their outer sides and are made wider than the vertical opening of the silo so that the outer side faces 19 on the edge portions will overlap corresponding faces 20 on the normal inner sides of the door jambs, which latter faces are preferably provided with bands of felt 21 or other suitable resilient packing. The length of each door section is made the same as the vertical distance between the transverse braces of the vertical opening, and the joints between the ends of the doors are preferably located at or just below the lower edges of the respective braces. This joint is made by beveling the whole of the contact faces of the upper edge of each section in the form of an inverted V tongue 22 as in Figs. 3 and 5 or an inverted U tongue 22^a as in Figs. 4 and 6; and a corresponding groove 23 is provided in the lower edge of each section either as an inverted V with straight sides as shown in Figs. 3 and 4, or with convexly curved sides 23^a as in Fig. 5, or as an inverted U as 23^b in Fig. 6; by means of which beveled tongues and grooves a tight joint is always made between the ends of the sections.

In use, the door sections are placed in position from below upward as the silo is

filled, and the lower edge of each door is placed approximately in proper position on the upper edge of the lower section with the upper end of the upper section inclined slightly inward, as shown for the section 11ª in Figs. 1 and 3. The mere weight of the upper section causes a tight joint to be formed between the end edges and also wedges the lower edge of the upper section outward toward the door jambs. The shape of the beveled tongues and grooves permits the upper section to be rotated thereon, so that when the upper end thereof is drawn outward, the side edge portions of the upper section are clamped against the felt bands on the inner sides of the door jambs, when the felt bands are used, or directly against the inner sides of the door jambs when the felt bands are not used. The doors can be placed in this position and held by manual means until sufficient silage is filled behind the doors to hold them, whereupon a complete and tight closure of the opening is effected; but positive means for clamping the door in its closed position are preferably provided, as follows: The lock levers 24 are pivoted on the respective door sections, preferably on the upper brace thereof, and these levers are provided with the arms 25 which are adapted to engage the outer side of the brace plates when the doors have been placed approximately in proper position, and the contact faces 26 of these arms are preferably inclined or rounded, so that by a rotation of the levers the beveled faces of the arms acting against the brace plates will serve to draw the upper ends of the doors outward and to positively clamp the side edges thereof against the felt packing bands, or directly against the inner sides of the door jambs, as before described. The lock levers are also provided with the cam shoulders 27 which are adapted to operate against the lower edges of the brace plates, whereby the respective door sections are positively forced downward at the same time their upper ends are drawn outward, which serves to tightly close the lower end joint by the wedge action of the contact faces of the tongue and groove which are beveled downward and outward. The same wedge action also serves to force the lower end of the door outward to bring its side edge portions against the felt packing, so that by a single operation of the lock lever the side edges of the door are clamped tightly against the inner sides of the door jambs throughout the whole length of the section, and the lower end joint of the door is tightly closed.

In order to obtain a tight clamping of the side edges of the doors against the jambs, it is desirable that the middle portions of the doors should not come in contact with the transverse braces or any other part of the door frame. When the felt packing bands are used on the door jambs, they will, of course, cause the doors to stand inward a short distance from the transverse braces; but to insure an absolute freedom from contact, the braces are preferably made of less thickness than the door jambs so that the inner sides of the braces will be located slightly outside the line of the inner faces of the jambs, as shown in the drawing. By locating the upper end edge of each door below the lower edge of the adjacent transverse brace, the interval 28 permits any silage which may fall upon the upper edge of the door to freely escape, and the inverted U or V-shaped edge or tongue serves to shed the silage and to prevent the lodgment of any materials thereon, thereby always insuring a clean joint and therefore a tight joint.

It is evident that by convexing the contact faces of the tongued edge with reference to the corresponding faces of the grooved edge, or by convexing the contact faces of the grooved edge with respect to the corresponding faces of the tongued edge, the joint will be more readily and tightly closed and sealed, and there will be less tendency to split the grooved end by the pressure of contact along its extreme edges. Furthermore, it is manifestly not essential to operate the lock levers against the transverse braces, but such use of the braces is preferred because they are the most available portion of the door frame for the particular purpose.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A silo having a vertical opening with door jambs on each side, a series of transverse braces extending between the jambs and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, the adjoining end edges of the doors being shaped substantially as V tongues and grooves, and a lever provided with an arm and a cam on each door adapted to operate on the adjacent brace to force the door outward and downward.

2. A silo having a vertical opening with door jambs on each side, a series of transverse braces extending between the jambs and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, the adjoining end edges of the doors being shaped substantially as V tongues and grooves, and a lever on each door adapted to operate on the adjacent brace to draw the door outward.

3. A silo having a vertical opening with a frame including door jambs and transverse braces and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, the adjoining end edges of the doors being shaped sub-

stantially as V tongues and grooves, and a lever provided with an arm and a cam on each door adapted to operate on the frame to force the door outward and downward.

4. A silo having a vertical opening with a frame including door jambs and transverse braces, and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, the adjoining end edges of the doors being shaped substantially as V tongues and grooves, and a lever on each door adapted to operate on the frame to draw the door outward.

5. A silo having a vertical opening with door jambs on each side, a series of transverse braces extending between the jambs and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being tongues and grooves on the adjoining end edges of the doors, and a lever provided with an arm and a cam on each door adapted to operate on the adjacent brace to force the door outward and downward.

6. A silo having a vertical opening with door jambs on each side, a series of transverse braces extending between the jambs and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being tongues and grooves on the adjoining end edges of the doors, and a lever on the upper end of each door adapted to operate on the adjacent brace to draw the door outward.

7. A silo having a vertical opening with a frame including door jambs and transverse braces, and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being tongues and grooves on the adjoining end edges of the doors, and a lever provided with an arm and a cam on each door adapted to operate on the frame to force the door outward and downward.

8. A silo having a vertical opening with a frame including door jambs and transverse braces, and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being tongues and grooves on the adjoining end edges of the doors, and means on each door adapted to operate on the frame to force the door outward and downward.

9. A silo having a vertical opening with door jambs on each side, a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being joints between the end edges of the doors including contact faces beveled downward and outward, and a lever provided with an arm and a cam on each door adapted to operate on the adjacent brace to force the door outward and downward.

10. A silo having a vertical opening with door jambs on each side, a series of transverse braces extending between the jambs and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being joints between the end edges of the doors including contact faces beveled downward and outward, and a lever on the upper end of each door adapted to operate on the adjacent brace to draw the door outward.

11. A silo having a vertical opening with a frame including door jambs and transverse braces, and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being joints between the end edges of the doors including contact faces beveled downward and outward, and a lever provided with an arm and a cam on each door adapted to operate on the frame to force the door outward and downward.

12. A silo having a vertical opening with a frame including door jambs and transverse braces, and a series of doors having side edge portions adapted to bear against the inner sides of the jambs, there being joints between the end edges of the doors including contact faces beveled downward and outward, and means on each door adapted to operate on the frame to force the door outward and downward.

13. A silo having a vertical opening with door jambs on each side and a series of doors made wider than the opening and adapted to bear against the inner sides of the jambs, the whole of the contact faces of the end edges of the doors being shaped substantially as V tongues and grooves.

14. A silo having a vertical opening with door jambs on each side having flat inner faces in the same plane, and a series of doors made wider than the opening and adapted to bear against the inner sides of the jambs, with joints between the end edges of the doors including contact faces beveled downward and outward.

15. A silo having a vertical opening with door jambs on each side and a series of doors made wider than the opening and adapted to bear against the inner sides of the jambs, with joints between the end edges of the doors including contact faces beveled downward and outward.

16. A series of doors for the vertical opening of a silo having joints between the end edges of contiguous doors including a beveled tongue on the one and a beveled groove in the other, the contact faces of the one being convexed with reference to the corresponding faces of the other.

17. A series of doors for the inner sides of the vertical opening of a silo with joints between the end edges of the doors including contact faces beveled downward and outward.

18. A silo having a vertical opening with

door jambs on each side, transverse braces in the opening having extension plates attached on the outer sides of the jambs, brackets on the jambs bridging the brace plates, and hoops around the silo resting in the brackets.

19. A silo having a vertical opening, a series of hoops extending across the opening, and a series of doors closing the opening and having cross bars thereon intermediate the hoops, whereby a ladder is formed by the hoops and the bars.

WILLIAMSON R. HARRISON.
ALBERT C. JACOBY.

Witnesses:
HARRY FREASE,
JOSEPH FREASE.