Sept. 26, 1933.

W. A. HOWARD

1,927,982

GRAIN DOOR

Filed Oct. 20, 1931

2 Sheets-Sheet 1

Fig. 1.

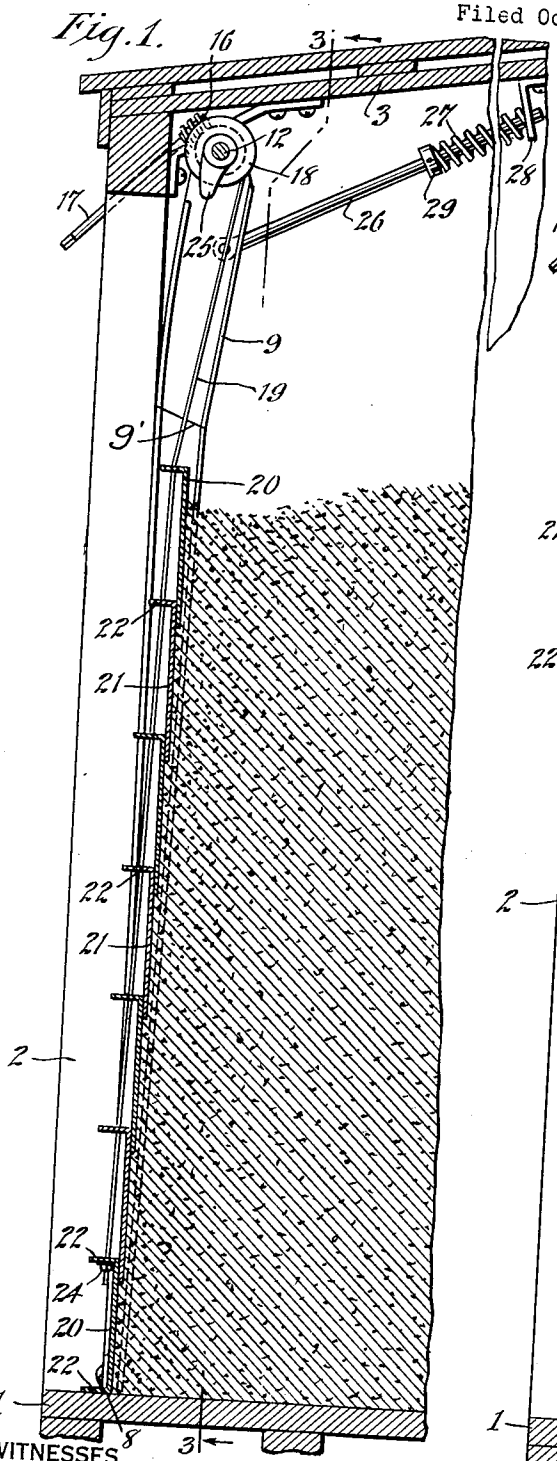


Fig. 2.

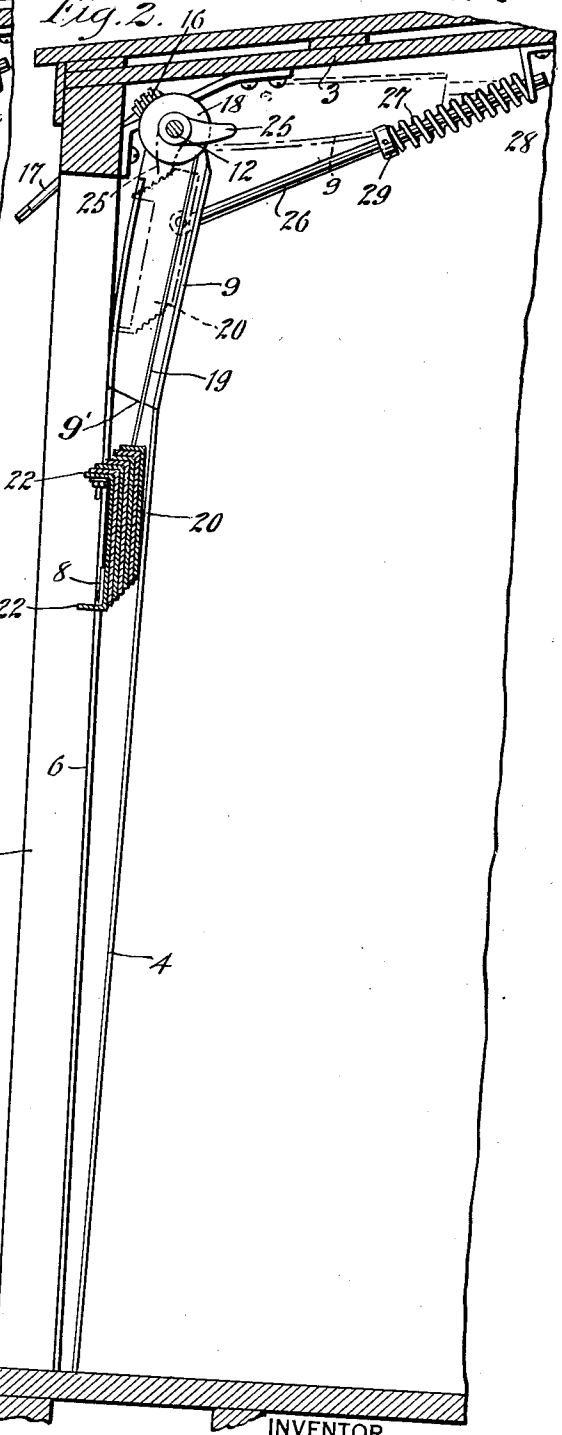
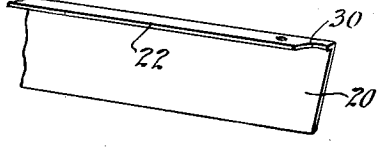


Fig. 4.



WITNESSES

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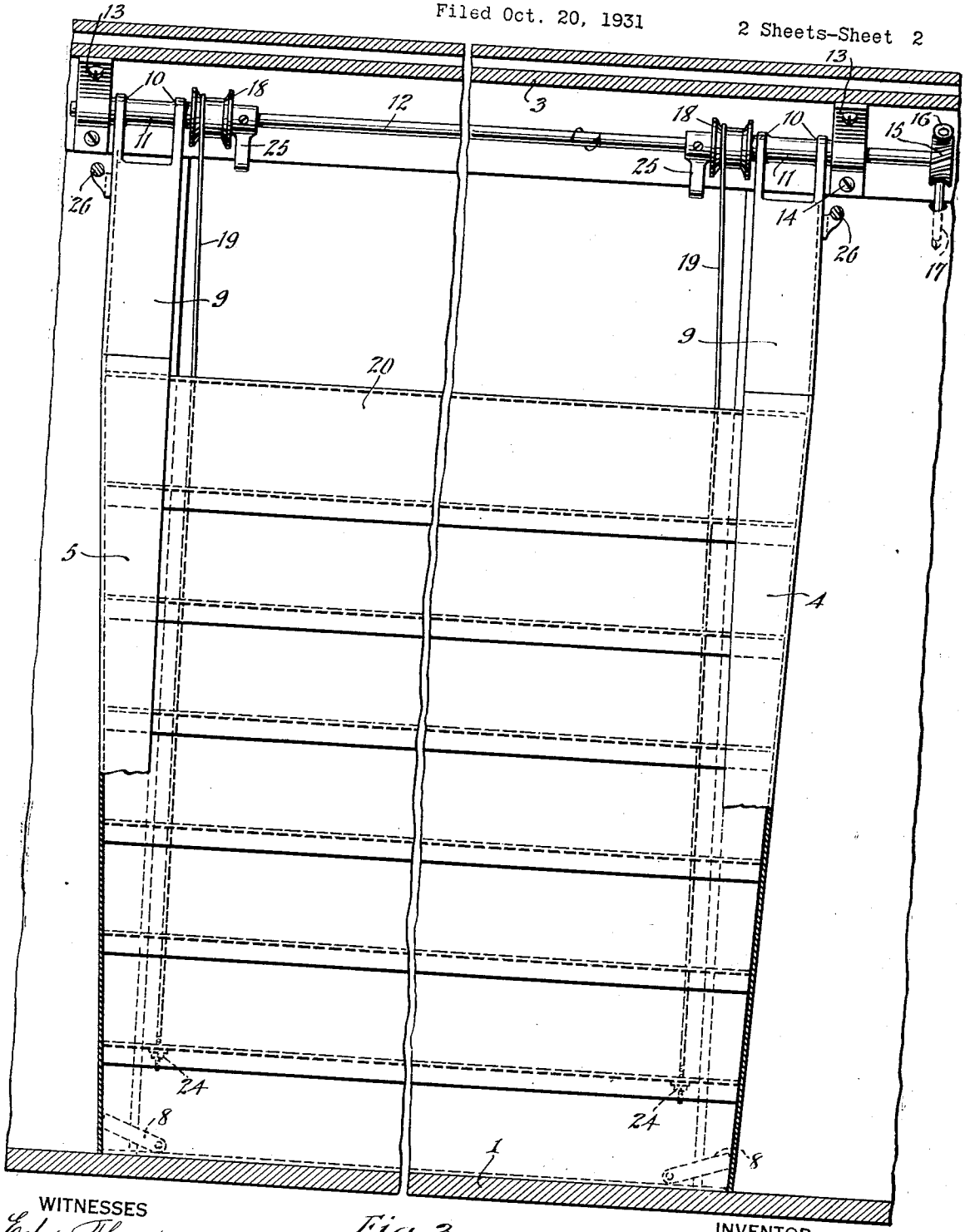


Fig. 3.

WITNESSES

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Patented Sept. 26, 1933 1,927,982

UNITED STATES PATENT OFFICE

1,927,982

GRAIN DOOR

Warren A. Howard, Hastings, Nebr.

Application October 20, 1931. Serial No. 569,995

7 Claims. (Cl. 189—60)

This invention relates to grain doors for freight cars and the like, the object being to provide an improved construction which may be permanently mounted in the car and may be moved readily to operative or inoperative position.

Another object of the invention is to provide an improved grain door for cars wherein the door is made up of a plurality of independent overlapping elements capable of being individually moved when the door is being opened.

A further object, more specifically, is to provide a grain door for cars wherein a plurality of substantially L-shaped overlapping metal plates are used to form the door and means associated therewith for pulling up and nesting these plates, the structure being such that the plates may be swung to one side after having been nested so that the car may be used for other purposes than shipping grain without removing the door from its connection with the car.

In the accompanying drawings,

Figure 1 is a transverse sectional view through part of a freight car and door disclosing an embodiment of the invention.

Figure 2 is a view similar to Figure 1 but showing the door in its upper and nested position.

Figure 3 is a sectional view through Figure 1 approximately on line 3—3, the load in the car being eliminated.

Figure 4 is a detailed perspective view of one end of one of the door members shown in Figure 1.

Referring to the accompanying drawings by numerals, 1 indicates a freight car of any desired kind constructed in the usual way with the door opening 2 and a roof 3. The car around the door opening 2 is provided with reinforcing beams in the usual manner and such structure does not form any part of the present invention except in combination. Connected to the side beams of the doorway are guides 4 and 5. Each of the guides taper from the top to the bottom and are formed substantially U-shaped in cross section with one leg of the U, namely, leg 6 secured to the car by suitable wood screws or other means as desired. The guides 4 and 5 are preferably made from metal with latch 8 positioned to bear against the bottom of the guides (Figure 3). As shown in particular in Figure 2, the guides 4 and 5 flare upwardly and coact with swinging guides 9, there being a swinging guide for each of the tapered guides 4 and 5. The respective guides are inclined at 9' so that the swinging guides 9 may swing upwardly and downwardly readily and when swung downwardly will register with the tapering stationary guides. The respective swinging guides 9 are each provided with a pair of ears 10 (Figure 3), said ears being preferably connected by sleeve 11 and said ears and sleeves being rotatably mounted on a shaft 12 carried by suitable brackets 13. Shaft 12 extends only far enough beyond the brackets 13 to accommodate a bearing which holds the worm gear 15 and the worm 16 meshing therewith. The worm 16 carries a shaft 17 which extends to a point exteriorly of the car and projects any desired distance from the car so that a power member or hand crank may be connected therewith to actuate shaft 12 and parts associated therewith. Pulleys 18 are rigidly secured to shaft 12 and on the respective pulleys, the cables 19 are adapted to be wound and unwound as the door members are raised and lowered. As indicated particularly in Figure 1, the various door members 20 are L-shaped in cross section, namely, are provided with a flat body 21 and a right angle flange 22 adapted to bear against the leg 6 of the guide. The lowermost door member 20 is provided with a top and bottom flange 22, the bottom member 20 accommodating the catches 8 which are pivotally connected thereto by a suitable screw or bolt and are adapted to swing to a position against the bottom of the guides 4 and 5. In this way the lowermost door member 20 is held against the floor of the car and consequently the other door members are properly held in place. The cables 19 extend rather loosely through all of the flanges 22 except the lowermost flange. A nut or other abutment 24 is connected to the lower end of the cable, which cable is flexible but at the lower end is threaded for receiving a nut so that a slight adjustment may be secured at this point. All the door members are slidable on the cable so that when the car is filled as shown in Figure 1 and it is desired to empty the same, the cables are pulled upwardly as hereinafter described until the lowermost door member 20 has been moved upwardly for substantially its full width, catches 8 having been previously released manually. By thus raising the lowermost door member, the pressure of the grain is relieved by a part thereof flowing out. If desired, the remaining door members may be moved upwardly one at a time so that the doorway will be fully opened and the door members will be nested as shown in Figure 2. The car may then be completely emptied and again filled with grain if desired. If preferred, however, the door members may be moved further upward and

swung out of the way so that the car could be used for other purposes.

Connected with shaft 12 are cams 25, said cams being preferably integral with the pulleys 18, and consequently rotate therewith. As pulleys 18 are rotated for moving the door members 20 up to the nested position shown in Figure 2, cams 25 will rotate but will perform no useful function. However, as shaft 12 is further rotated, the nested door members 20 will be moved up to the dotted position shown in Figure 2 and as soon as they are moved sufficiently far for the cams 25 to strike the flange of the uppermost door member, said cams will swing the nested door members and the swingable guides to the upper dotted position shown in Figure 2. This movement is carried out against the action of the rod 26 and spring 27 which spring acts on the bracket 28 and on the abutment 29. Incidentally, it may be seen that the rod 26 and spring 27 act in a double capacity of resiliently holding the swingable guides 9 in the lower position and also act to retain these same members in their elevated position against the roof 3. The two permanent U-shaped guides 4 and 5 are fastened to the beams of the car door by screws or bolts at a desired angle, the same being usually 4 or 5 degrees. This allows the guides to be further apart at the top in relation to each other than at the bottom. The various plates 20 are all cut at the same angle as illustrated particularly in Figure 4, each individual plate being wider at the top than at the bottom and each lower plate being shorter than the one above, as illustrated particularly in Figure 3. When the plates are all nested as shown in the upper part of Figure 2, each one is slightly shorter than the one above and as the cable lowers the nested plates down through the permanent guides 4 and 5, it will only lower the nested structure to where the ends of the top plate come into flush constact with the corresponding angle of the U-guides. As the cable continues to lower the remaining plates the upper plate is left in its natural position with its ends resting against the bottom of the respective guides 4 and 5, the second plate comes to a stop at a proper distance below with its ends raised against the bottom of the guides and so on till the lower flange of the lowest plate comes in contact with the bottom of the car whereupon the catches 8 are manually put into locked position and a complete car grain door is presented in operative position and is grain proof at the ends and with no side play of the individual plates in the U-guides. As soon as the plates have been thus lowered and catches 8 applied, the car is ready for loading. The loading is accomplished after the complete door has been dropped into position, said loading taking place usually by means of a spout that goes over the top plate of the door as there is always an open space between the top plate of the door and the roof of the car.

It will therefore be noted that there are no stops on the inside of the U-guides, but the plates are stopped in their correct position with the bottom of each plate overlapping the plate below at the back of the right angle flange and the U-guides are permanently connected to the car beam at an angle as for instance a four or five degree angle, the plates being cut at the same angle so that said ends will rest against the bottom of the respective U-guides. It will also be noted that the distance from one guide to the other is shorter at the bottom than at the top, therefore as the nested plates are lowered, the longer top plate comes into position first and so on, each respective plate comes into position until the shortest or bottom plate comes in contact with the floor of the car.

By providing the parts of metal, they occupy a small space and yet are sufficiently strong to support any grain to be shipped. Also the structure disclosed is such that the door may be used over and over instead of torn up and thrown away as the common practice with the wood doors now in use.

As illustrated in Figure 3, it will be seen that the various door members 20 are longer from the bottom to the top so that the complete structure is a tapering structure. This tapering structure will prevent the top door member 20 from moving downwardly below where it should and consequently when the nested door members are lowered they will all automatically assume substantially their correct positions as the ends of the flanges 22 will rest against the bottoms of the U-shaped guides 4 and 5. As shown in Figure 4, three or four of the lowermost flanges 22 are cut away at 30, thus allowing the door members to overlap somewhat the leg 6 and thus permit themselves to be properly arranged in the smaller end of the respective guide members 4 and 5. Also, this arrangement prevents any unnecessary use of space which is desired for the grain being shipped.

I claim:

1. A grain door comprising a plurality of nestable door members the lowermost of which is a certain length and the others progressively longer, guides tapering from the top to the bottom positioned to engage the ends of said door members when the door members are in a closed position, said guides acting as supports for said door members, the door members and the guides being so relatively sized that when the door members are all closed they will overlap while being supported by the guides, a plurality of flexible cables extending through said door members, a drum means for winding said cables, a rotatable member for actuating said drum means for raising said door members, all of said door members being slidable on said cables except the lowermost whereby when said cables are wound on said drum means, said lowermost door member will be raised and in turn will raise the remaining door member as said cables are wound and power operated means for actuating said rotatable member.

2. A grain door for a car including a door structure formed of a plurality of overlapped plates, each plate having a right angle flange, said flanges having a plurality of aligned apertures, a pair of inclined guides for guiding the movement of said plates vertically, said guides being positioned and proportioned in respect to said plates so as to engage the ends of the plates and support the plates when the plates are in their overlapped lowered position, a cable loosely extending through each series of aligned apertures, means for connecting said cables to the lowermost plate, and means for winding said cables for lifting said plates, said means including a rotatable shaft and power actuated means connected with said shaft for rotating the same.

3. A grain door including a plurality of overlapping plates, a pair of converging guides divided into upper and lower sections for engaging and supporting said plates at different heights

when the plates are in their closed position, means for successively raising and nesting said plates, and means for swinging said nested plates and said upper section to a position against the roof of the car to which the door is attached.

4. A grain door for cars including a door member having a plurality of overlapping nestable plates, a pair of stationary guides for guiding said plates, a pair of swinging guides acting as elongations of said stationary guides, means for raising and nesting all of said plates in said swinging guides, and a power member for swinging said swinging guides upwardly to a position adjacent the roof of the car.

5. A grain door for a car including a plurality of nestable plates, guides engaging said plates at the respective ends for guiding the plates in a vertical movement, flexible means for raising and moving said nesting plates, a pair of swinging guides arranged in alignment with the first mentioned guides, means for actuating said flexible means for causing the nested plates to move into the swinging guides and power operated cam means engaging said plates for swinging the plates and swinging guides upwardly toward the roof of the car.

6. A grain door for a car including a plurality of plates, means for raising and nesting the plates, means for swinging the nested plates to a position near the top of the car, and spring actuated means for resiliently holding the nested plates against the top of the car.

7. A grain door for a car including a plurality of overlapping plates, flexible means for raising and nesting said plates, a rotatable shaft, drums carried by said shaft for winding said flexible means, a swinging guide, said flexible means being adapted to move said plates into said swinging guide, cams carried by said shaft for swinging said guide and nested plates upwardly toward the top of the car, a worm wheel connected to said shaft, a worm meshing with said worm wheel and an actuating shaft extending from said worm to a point exteriorly of the car.

WARREN A. HOWARD.