



No. 713,481.

Patented Nov. 11, 1902.

S. E. McKINNEY.  
GRAIN DOOR FOR CARS.

(Application filed Feb. 24, 1902.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 3.

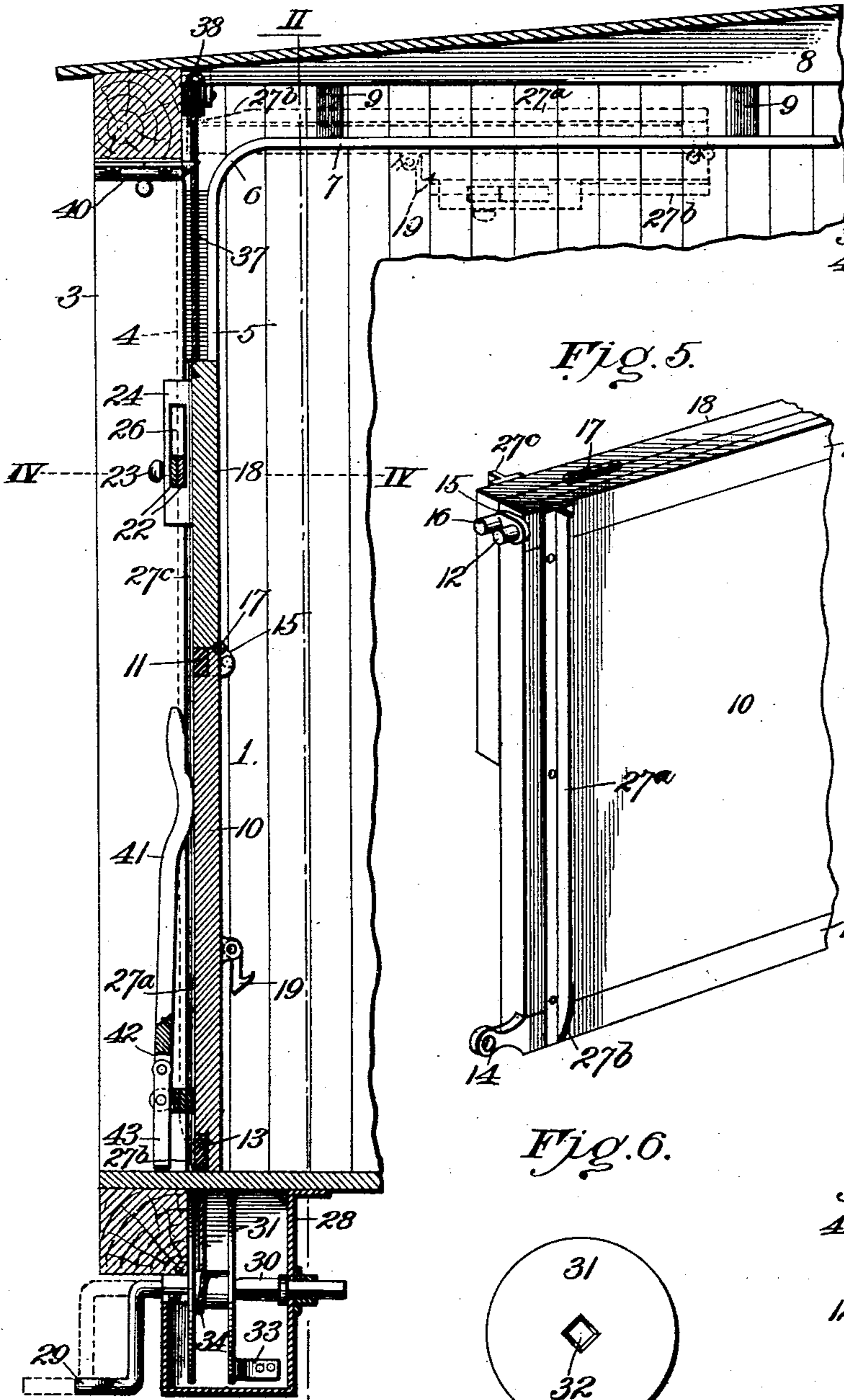


Fig. 5.

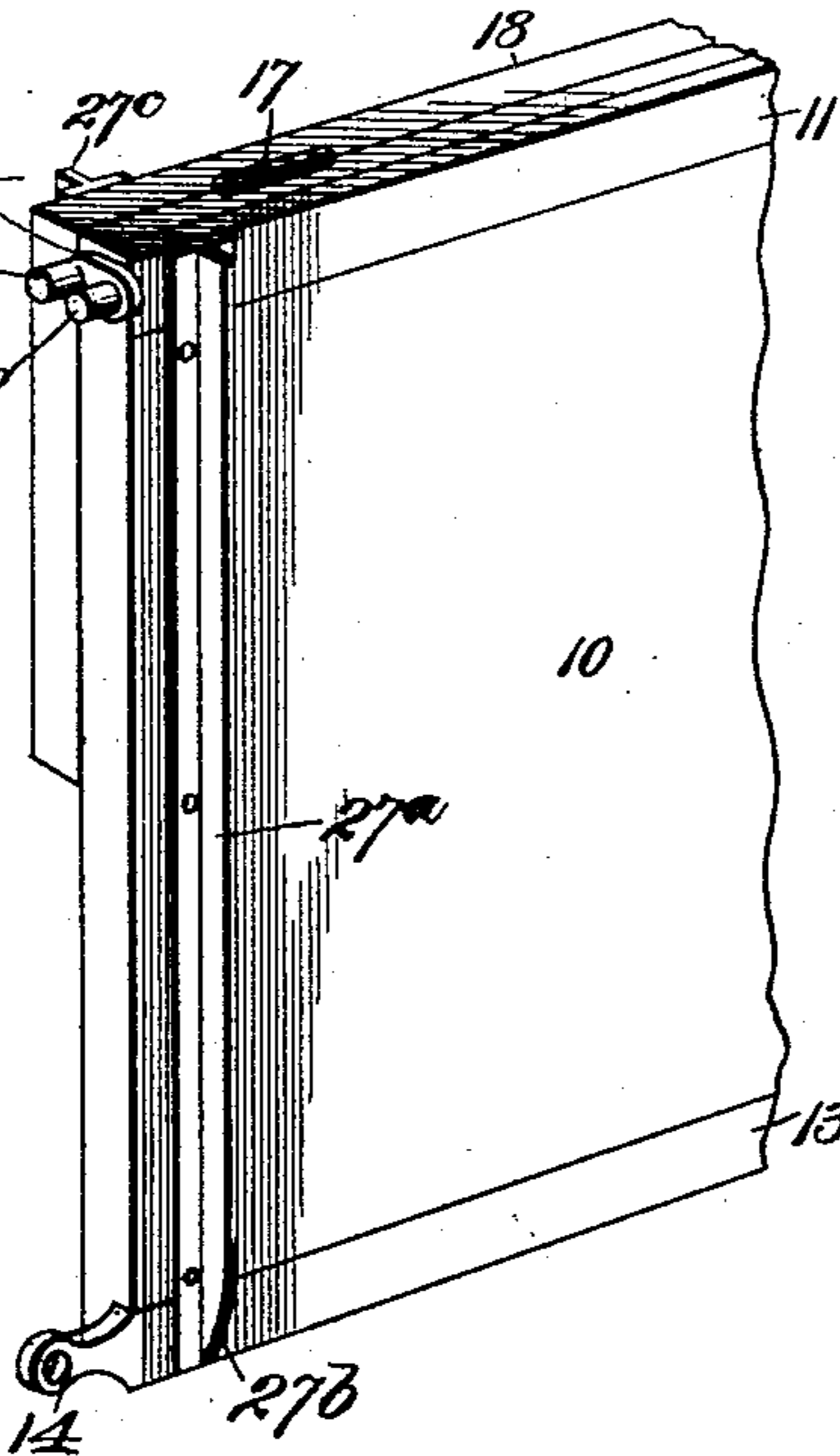


Fig. 6.

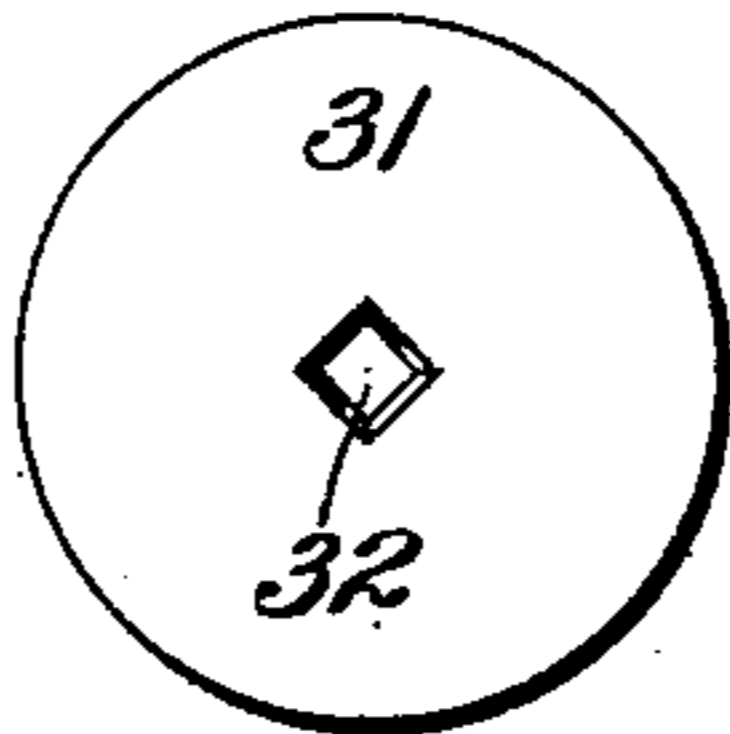
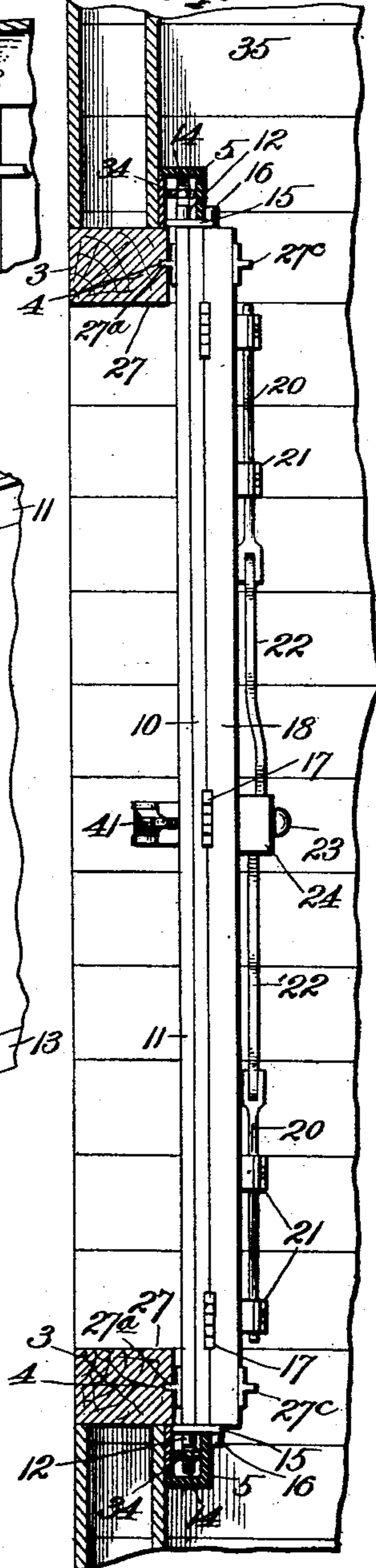


Fig. 4.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## GRAIN-DOOR FOR CARS.

SPECIFICATION forming part of Letters Patent No. 713,481, dated November 11, 1902.

Application filed February 24, 1902. Serial No. 95,448. (No model.)

*To all whom it may concern:*

Be it known that I, SILAS E. MCKINNEY, a citizen of the United States, residing at Menlo, in the county of Thomas and State of Kansas, have invented certain new and useful Improvements in Grain-Doors for Cars, of which the following is a specification.

My invention relates to grain-doors for cars; and my objects are to produce a device of this character which can be easily and quickly caused to assume an operative or inoperative position and which effectually prevents the leakage of grain from the car.

A still further object is to produce a grain-door which is of simple, strong, durable, and cheap construction and which can be readily adapted to any style of grain-car now in use.

With these general objects in view the invention consists in certain novel and peculiar features of construction and combinations of parts, as hereinafter described and claimed, and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1 is a side view of a grain-car equipped with a door embodying my invention. Fig. 2 is a longitudinal section of the car. Fig. 3 is a vertical section taken on the line III III of Fig. 1 with the door elevated to its inoperative position in dotted lines. Fig. 4 is a horizontal section taken just above the door when in its operative position with its extension folded. Fig. 5 is a perspective view of a portion of the door. Fig. 6 is a side view of the drum for raising the door to inoperative position.

Referring now to the drawings in detail, 1 designates a box-car from which is omitted the customary outside sliding door, as forming no part of the present invention.

2 designates the door-opening, flanked at either side by the usual stiles 3, having vertical grooves 4 in their inner faces for a purpose which hereinafter appears.

Arranged within the car is a pair of arch-tracks of inverted-L form, as shown, but which in practice will be of inverted-U form (not shown) in order to provide a trackway for both doors of the car. The upright arms of this trackway are arranged vertically and contiguous to stiles 3 and at their upper ends are joined by a sharp curve 6 to the horizon-

tal arms 7, arranged about in the plane of the top of the door-opening. This trackway is supported from earlines 8 by means of depending angle-brackets 9 and may be otherwise braced in any suitable manner from the side walls or floor of the car.

The body of the grain-door, of any suitable material and numbered 10, bridges opening 2, is about half the height of said opening by preference, is of sufficient length to fully lap the stiles 3, and is provided with metallic cross-bars at its upper and lower margins. The upper cross-bar 11 is set into the outer face of the door-body and terminates in cylindrical guide-pins 12, projecting beyond the ends of the door at the outer or tread-surface side of the trackway. The lower cross-bar 13 is also set into the outer face of the door and is formed with apertured guide-arms 14, these arms projecting beyond the side edges of the door and bearing, like pins 12, upon the tread-surface of the trackway.

To assist in guiding and maintaining the door in its proper relation to the trackway, plates 15 are pivoted on pins 12 between the door and the tracks, so as to prevent frictional contact between their ends, and said plates are provided with outwardly-projecting pins 16 to snugly engage the inner sides of the tracks. Friction of course can be further reduced by equipping pins 12 and 16 with antifriction-rollers to travel upon the inner and outer sides of the tracks; but as the use of antifriction-rollers is old and well known it is not deemed necessary to illustrate them in this connection.

Hinged to the upper edge of the door-body, as at 17, is an extension 18, which may project vertically upward or may be folded against the rear side of the door proper, as shown in Figs. 3, 4, and 5, being held in this position by a pivot-hook, as at 19. To lock the door in its depressed or operative position and also to support the extension in its extended position, as shown in Figs. 1 and 2, which position it always occupies when the car contains a full load of grain, I provide a pair of sliding bolts 20, mounted in guide-brackets 21 at the outer side of the extension, said sliding bolts being connected by a toggle-joint consisting of a pair of links 22, overlapping each other at their inner ends and pivoted together

by a pin 23, which pin is adapted to reciprocate vertically in a slot 25 of the bracket 24, secured to the extension, said bracket being also preferably provided with a transverse slot 26, wherein said overlapped ends of the links 22 have play.

When the toggle is expanded, as shown in Fig. 1, the bolts are shot and engage sockets 27 in the stiles 3, and thereby hold the hinged extension in alinement with the door proper. To fold said extension, the operator forces pin 23 upward in slot 25, so as to contract the toggle and withdraw the bolts from said sockets, after which the extension can be swung to the position shown clearly in Fig. 5 and so secured by the pivot-hook, as hereinbefore explained.

To constitute tongues for engagement with the grooves 4, hereinbefore referred to, I secure T-rails 27<sup>a</sup> vertically to the outer face of the door proper, said rails having the lower ends of the webs tapered to a point flush with their heads, as at 27<sup>b</sup>, so that such webs can readily leave the grooves 4 as the door attains its inoperative position and as easily reënter said grooves as the door begins to descend. These rails have extensions 27<sup>c</sup> secured to the outer face of the door extension 18, which rail or tongue extensions fit upon the tongues or rails 27<sup>a</sup> when the door extension occupies its extended position, as shown clearly in Fig. 3. The tongue-and-groove connection thus formed between the door and the door-opening stiles prevents the escape of grain at such points and at the same time adds to the stability of the structure as a whole.

For the purpose of raising the door to its inoperative position and there supporting it I provide the following construction: 28 designates a casing secured under the car at a suitable point, and 29 a crank-shaft journaled in said casing and provided with an angular portion 30, for a purpose which hereinafter appears. 31 is a reel or drum mounted on said shaft and provided with an angular opening 32. When the cylindrical portion of the shaft engages the drum, it may be turned without affecting the position of the latter; but when the shaft is slid forward to the position shown by dotted lines, Fig. 3, its angular portion engages the corresponding portion of the drum, and thereby compels the latter to turn with the shaft. The drum is held from accidental rotation when engaged with the cylindrical portion of the shaft by means of a brake-spring 33 engaging it frictionally. Secured to the drum is a cable 34, which extends up through the floor of the car, and the guideway 35, secured to the inner side of the car. At the upper end of the guideway the cable extends over a pulley 36, and from the latter extends in branches vertically downward, as at 37, and horizontally, as at 38. The branch 37 is secured at its lower end to the contiguous arm 14 of the lower cross-bar of the door, while the arm 38 extends over a second pulley 39 at the opposite side of the door-opening and thence down to the other arm 14 of

said cross-bar of the door, to which arm it is suitably attached.

When loading the car with grain, it is customary to fold the extension to the inner side of the door proper in order to facilitate the loading operation. When the level of the load about reaches the lower end of the extension, the latter may be swung to its extended position and there secured by the toggle-operated bolts 20. The loading operation then continues until the car is charged to the required extent. The sliding door is then closed and secured and the car proceeds to its destination, at which point the sliding door is opened. The person in control then withdraws bolts 20 and folds the extension in the manner above explained and then grasps the crank-shaft and pulls it forward until its angular portion engages the reel or drum, when the latter may be turned so as to cause the door to travel upwardly upon the trackway, which operation eventually results in disposing the door in approximately the position shown in dotted lines in Fig. 3, in which position its weight is carried by the trackway, and it is prevented from slipping down under the motion of the car or from any other cause by the spring-actuated catch 40 or any equivalent device.

After the door is secured in the inoperative position above described the crank-shaft is forced back to its original position beneath the car, so as to be out of the way, this action causing the reengagement of its cylindrical portion with the drum and permitting the latter to turn, and therefore offer no resistance to the accidental descent of the door. For this reason the catch 40, above referred to, is desirable, though of course I do not desire to restrict myself to the use of this particular catch. When it is desired to lower the door to operative position, the operator trips the spring-catch 40 to permit the door by gravity to descend upon the track to its original position, retarding the door, so that it shall descend at a proper speed and without danger of injury, the friction of the spring 33 on the drum preventing too rapid unwinding of the latter.

As a means for starting the opening movement of the door in case the pressure of the grain is so heavy that it is found difficult to raise it by means of the crank, I pivot at the outer side of the door a lever 41, the same being bifurcated, as at 42, for a suitable distance above its pivot, and pivoted at its upper end in the bifurcation is a leg 43, which as said lever is swung outward and downward bears against the door-sill and provides a fulcrum, whereby the operator can raise the door slightly, and thus open up an escape for the grain. The door can then be easily opened by means of the crank in the manner above described.

In practice it may be found desirable to secure the crank-shaft from movement by attaching a suitable seal to it; but as there are

various ways of accomplishing this object and as it forms no part of the door mechanism I do not deem it necessary to illustrate a seal for this purpose.

5 From the above description it will be apparent that I have produced a grain-door for cars which embodies the features of advantage enumerated as desirable in the statement of invention and which is obviously  
10 susceptible of modification in various particulars without departing from the spirit and scope or sacrificing any of the advantages of the invention.

15 Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a car having a door-opening and the usual stiles, tracks contiguous to the latter, a door-body having pins  
20 engaging the tracks, an extension hinged to the door, and means for locking the extension to the stiles when the door is closed; of a suitably-guided cable connected with the lower corners of the door-body, a drum to  
25 which the lower end of the cable is attached, the drum having a square axial opening, a casing inclosing the drum, a brake-spring therein for the purpose set forth, and a crank-shaft journaled and sliding in said casing  
30 and having a square portion to fit the opening in the drum and a smaller round portion adjacent.

2. The combination with a car having a door-opening and stiles at the sides thereof  
35 with vertical grooves on their inner faces, tracks contiguous to the stiles, a door-body, and an extension hinged thereto, both standing between the tracks; of pins on the body engaging the tracks, means for raising and  
40 lowering said body, means for locking the extension when the door is in closed position, rails of T-shaped cross-section having their

gaging said grooves while the lower ends of such webs are tapered to a point flush with  
45 their heads, and rail extensions of similar shape similarly secured to the outer face of the door extension and adapted to engage said grooves when such extension is in unfolded  
50 condition.

3. The combination with a car having a door - opening, tracks adjacent the stiles thereof, a door-body having pins engaging said  
55 tracks, and a door extension hinged to the upper edge of the body and adapted to engage said stiles when unfolded; of door-elevating means attached to the body only, door-locking  
60 means attached to the extension only, door-supporting means, and starting means consisting of a lever bifurcated at its lower end and pivoted at its extremity to the body, and  
a leg pivoted near the crotch of the bifurcation and adapted to rest on the sill.

4. The combination with a car having a door - opening, upright stiles at the sides  
65 thereof, and tracks parallel with and inside said stiles and extending overhead across within the car; of a door-body moving between the tracks inside the stiles, pins at its upper and  
70 lower corners engaging said tracks on their outer faces, plates pivoted on said upper pins and carrying other pins engaging the tracks on their inner faces, an extension hinged to  
75 the upper edge of the body, bolts on the outer face of this extension adapted to engage the stiles when the door is closed, a toggle-lever for operating said bolts, and a pivot-hook for latching the extension when folded against the body.

In testimony whereof I affix my signature  
80 in the presence of two witnesses.

SILAS E. MCKINNEY.

Witnesses:

H. C. RODGERS,  
G. Y. THORPE.