March 5, 1929. F. M. BAILEY 1,704,420

GRAIN DOOR FOR CARS

Filed Dec. 6, 1926 3 Sheets-Sheet 1

Fig. 2

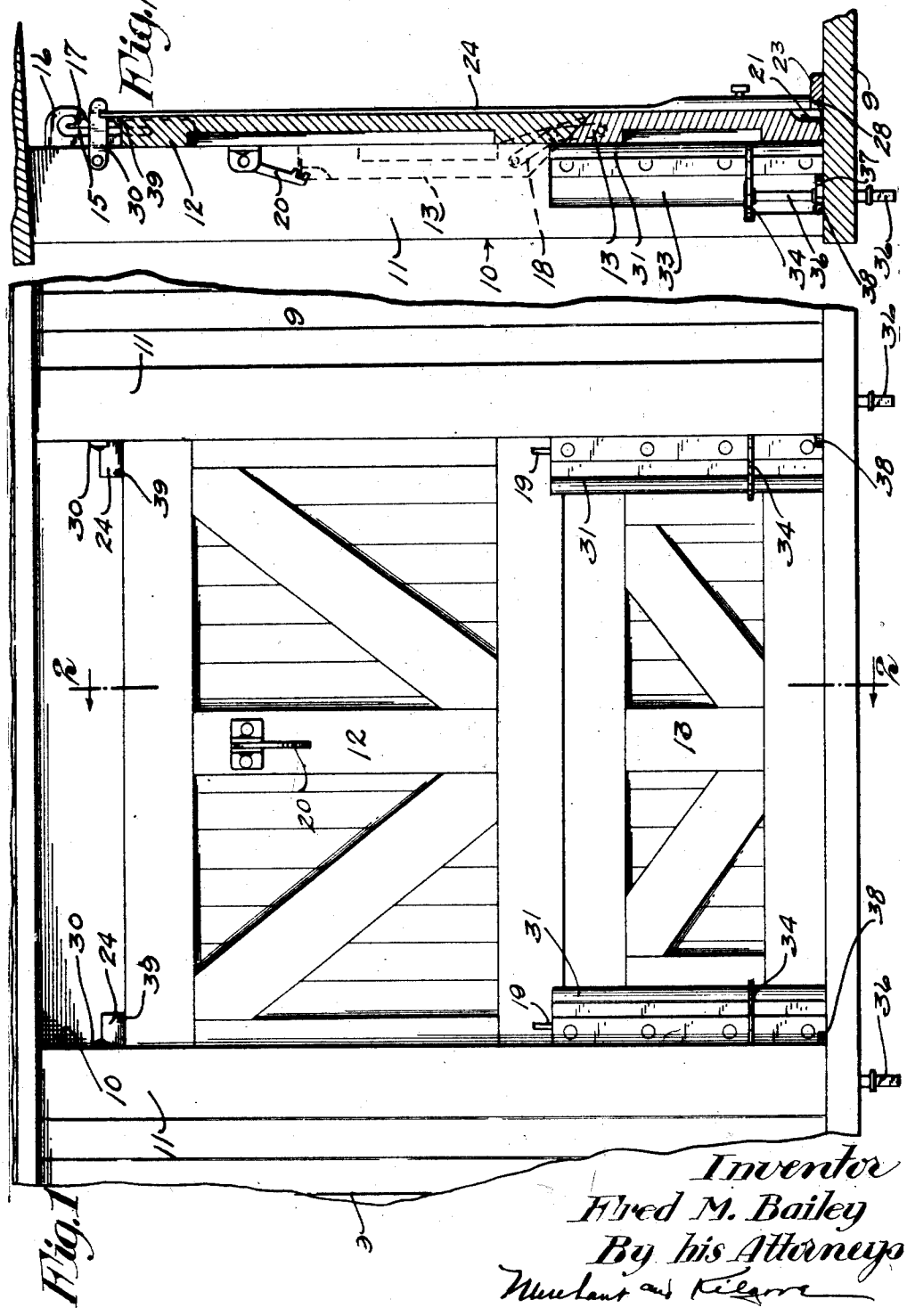


Fig. 1

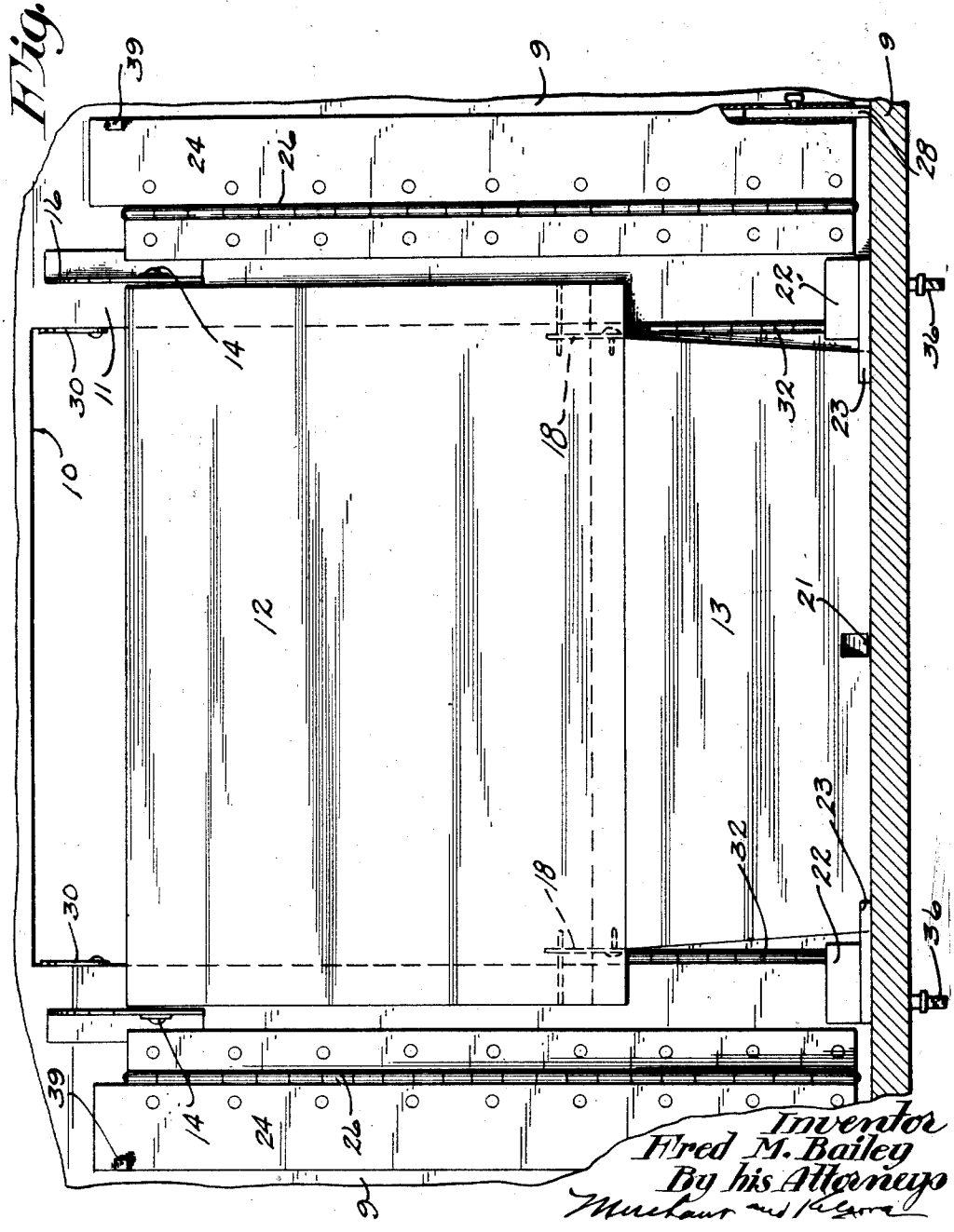
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March 5, 1929. F. M. BAILEY 1,704,420

GRAIN DOOR FOR CARS

Filed Dec. 6, 1926 3 Sheets-Sheet 2

Fig. 3



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March 5, 1929. F. M. BAILEY 1,704,420

GRAIN DOOR FOR CARS

Filed Dec. 6, 1926 3 Sheets-Sheet 3

Fig. 4

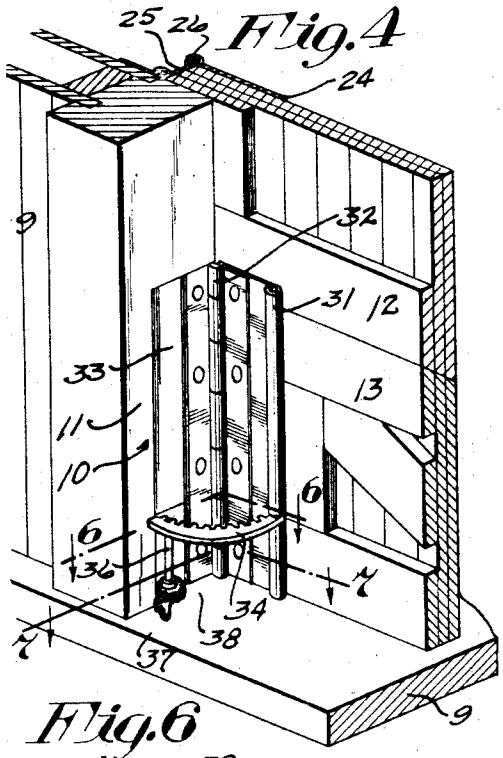


Fig. 5

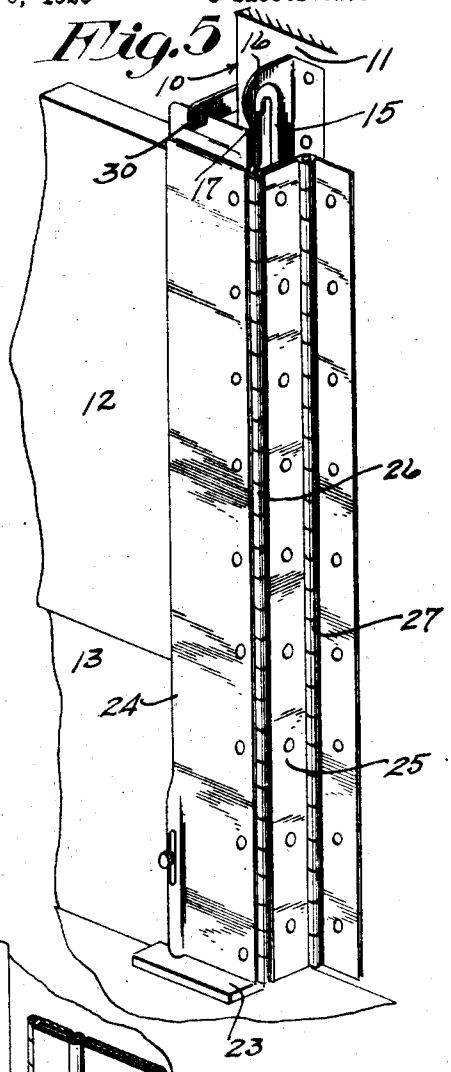


Fig. 6

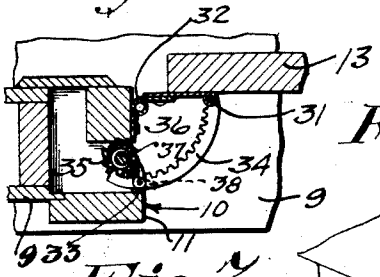


Fig. 8

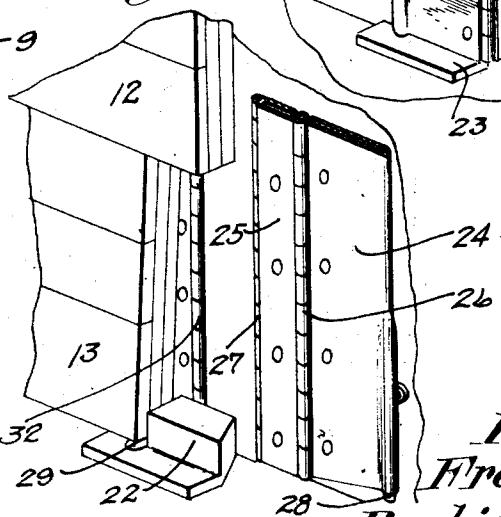
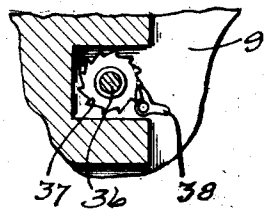


Fig. 7



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Patented Mar. 5, 1929. 1,704,420

UNITED STATES PATENT OFFICE.

FRED M. BAILEY, OF MINNEAPOLIS, MINNESOTA.

GRAIN DOOR FOR CARS.

Application filed December 6, 1926. Serial No. 153,032.

My invention has for its object to provide a simple and highly efficient grain door for cars, and to this end it consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a fragmentary view in outside elevation of a car body at its door opening, and having the invention embodied therein;

Fig. 2 is a transverse vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is an inside elevation of the parts shown in Fig. 1 with the clamping plates released to permit the door to be opened;

Fig. 4 is a fragmentary outside perspective with some parts sectioned and showing the car body and door at one of the door posts;

Fig. 5 is a fragmentary inside perspective view of the car body and door at the door posts, as shown in Fig. 4;

Fig. 6 is a detail view in section taken on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary detail view partly in plan and partly in section taken on the line 7—7 of Fig. 4; and

Fig. 8 is a fragmentary perspective view of the parts shown in Fig. 5 with the respective clamping plate and stop plate released, and the lower door section partly open.

The numeral 9 indicates a car body having the customary side door opening 10 and door posts 11 at the sides thereof.

The improved door comprises upper and lower sections 12 and 13, respectively, the latter of which is relatively low. Said upper door section 12 has secured at its vertical edges, at the upper corners thereof, headed hinge studs 14 mounted in vertical slots 15 formed in angle hinge brackets 16 secured to the inner face of the car body 9 near the top of the door openings 10. When the upper door section 12 is closed its hinge studs 14 rest on the hinge brackets 16 at the lower ends of the slots 15 with freedom for vertical lifting movement until the upper edge portion of said door section is substantially at the top of the door opening 10. The slots 15, at their upper ends, terminate in inwardly offset notch-like seats 17 for the hinge studs 14 when the upper door section 12 is raised. The formation of the slots 15 at their junction with the seats 17 is such as to cam the hinge studs 14 laterally inward over said seats during the lifting movement of the door section 12 so that by a slight downward movement of said door section, before releasing the same, will carry the hinge studs into said seats.

When the hinge studs 14 are mounted in the seats 17 the upper door section 12 is supported thereby for inward swinging movement to a position in which said door section may be secured in a fully open position under the roof of the car body by any suitable means, not shown. The upper door section 12 is of such width that when closed it overlaps and bears on the inner face of the car body 9 at the door posts 11 and is held thereby against outward swinging movement.

The lower door section 13 is supported from the upper door section 12 by a pair of upright hinge-acting links 18, the upper end portions of which are mounted in vertical slots 19 in the outer face of the upper door section 12 and pivoted thereto for swinging movement transversely of the door. The lower end portions of the hinge-acting links 18 overlap the vertical edge portions of the lower door section 13 and are pivoted thereto. Said lower door section 13 is of such width as to freely swing toward the door posts 11. The door sections 12 and 13 have overlapping engagement between their horizontal edges and said engagement permits outward swinging movement of the lower door section 13 but prevents inward swinging movement thereof. The hinge links 18 connect the lower door section 13 to the upper door section 12 for compound lateral swinging movement and vertical edgewise lifting movement. These hinge links 18 also permit the lower door section 13 to be swung laterally outward and upward into a position in the field of the upper door section 12, with their outer faces turned toward each other.

The door sections 12 and 13, at their adjacent horizontal edges, have beveled engagement to form a grain-tight joint and this beveled engagement is such as to afford stop surfaces which prevent lateral inward movement of the door section 13 in respect to the upper door section 12.

A pivoted hook 20 on the upper face of the upper door section 12 is arranged to engage a detent 21 in the back of the lower

door section 13 at the lower horizontal edge thereof and holds said lower door section folded onto said upper section, as shown by dotted lines in Fig. 2. Relatively thick stop blocks 22 on the floor of the car body 9, at the door posts 11, are arranged to prevent undue edgewise shifting movement of the lower door section 13, and relatively thin stop blocks 23 on said floor, inward of the stop blocks 22, are arranged to be engaged by the lower door section 13 to prevent inward swinging movement thereof.

The upper door section 12 is held closed and pressed against the inner face of the car body 9 at the door posts 11, and the lower door section 13 is held against inward swinging movement by upright flat clamping plates 24. These clamping plates 24 are attached to joint plates 25 for horizontal swinging movement by hinges 26, and said joint plates are attached to the inner face of the car body 9 at the door posts 11 by hinges 27 for like movements. The clamping plates 24 and joint plates 25 extend substantially the full height of the door opening 10 and their hinges 26 and 27 are continuous and extend the full height of said plates. The joint plates 25 cover the vertical edges of the door sections 12 and 13 and the clamping plates 24 extend at right angles to the joint plates 25 and overlap the vertical edge portions of said door sections. The hinges 26 and 27 connect the clamping plate 24 and joint plate 25 for releasing movements in which they extend in the same plane and parallel to the inner face of the car body 9. Lock bolts 28 in the free vertical edge portions of the clamping plates 24, at the lower ends thereof, are arranged to be projected into open notches 29 in the outer faces of the stop blocks 23 and hold the clamping plates 24 and hence the joint plates 25 in operative positions.

Latches 30, pivoted to the inner faces of the door posts 11, are arranged to engage the upper end portions of the clamping plate 24, which extend above the upper door section 12, and co-operate with lock bolts 28 to hold said clamping plates 24 operative.

To prevent outward swinging movement of the lower door section 13, stop plates 31 are hinged at 32 to the opposing faces of the door posts 11 for horizontal swinging movement in which they overlap the vertical edge portions of said lower door section. Recesses 33 are formed in the opposing faces of the posts 11 to receive the stop plates 31 when operated to release the lower door section 13 for outward swinging movement. When the stop plates 31 are turned into the recesses 33 they are entirely out of the way and do not in any way obstruct the door opening 10.

To swing the door stop plates 31 to and from operative positions and hold the same pressed against the lower door section 13, there are pivoted to said plates at the free vertical edges thereof segmental racks 34 which mesh with pinions 35 on vertical shafts 36 journaled in the door posts 11 with their lower end portions extending below the car body 9 and formed square in cross section to receive a key or wrench, not shown, for turning said shafts. To lock the shafts 36 against backward rotation under the action of outward pressure on the stop plates 31 by the lower door section 13, there is secured to the shafts 36 ratchet wheels 37 and co-operating pawls 38 are pivoted to the car body 9 at the sill of the door opening 10. Formed with the clamping plates 24 are stop lugs 39 which overlie the upper edge portion of the door section 12 when closed and prevent lifting movement of the door sections 12 and 13 under the jarring action of the car body 9.

The operation of the improved grain door may be briefly described as follows:

It may be assumed that the door is closed and held closed by the clamping plates 24, which in turn are held operative by the lock bolts 28 and latches 30, and the stop plates 31 which are held operative by the pawls 38. With the door thus closed the joints between said door and the car body 9 are tightly closed by the joint plates 25 and the clamping plates 24 so that the door is sealed against leakage of grain from the car body 9. When the outer door of the car body, not shown, is closed and sealed the pawls 38 which are inside of said door can not be tampered with.

To unload the car body when loaded with grain, the operator first releases one of the pawls 38, and if the pressure of the grain on the door section 13 is not sufficient to open the released stop plate 31 the operator opens the same by turning the respective shaft 35 by means of a wrench or other tool. When one of the stop plates 31 is opened the pressure of grain on the respective end portion of the door section 31 will move said door section outward and the hinge links 18 will permit said section to also move upward and assume an angular position both horizontally and vertically to the door section 12 and thus permit the escape of grain through the door section 13. The operator then releases the other stop plate 31 and allows the door section 13 to be swung open by the pressure of grain thereon.

After the initial flow of grain from the car body 9 through the open door section 13 said section may be turned upward against the outer face of the door section 12 and secured by the latch 20. This initial flow of grain will relieve the pressure from the upper door section 12 and permit the same to be opened inward and secured by any suitable means to the roof of the

car body with the lower door section 13 folded thereon.

To open the door section 12, the operator lifts the lock bolts 28 and latches 30 to release the clamping plates 24 which are then folded with the joint plates 25 into inoperative positions against the respective side of the car body 9. Said door section 12 may then be opened as previously described. When the clamping plates 24 and joint plates 25 are folded inoperative against the inside of the car body 9 and the clamping plates 31 moved into the recess 33 and the door sections 12 and 13 opened, the door opening 10 is completely open to its full width without any obstruction whatsoever. After the door sections 12 and 13 have been opened the balance of the load in the car body 9 may be discharged by tipping the car or any other well known unloading method.

What I claim is:

1. The combination with a car body having a door opening, of a displaceable door for said opening mounted for vertical swinging movement to and from a closed position, substantially flat joint plates hinged to the car body and extending perpendicular to the respective side thereof at the vertical edges of the door, substantially flat clamping plates hinged to the free edges of the joint plates and extending substantially at right angles from the joint plates and overlapping the inner face of the door at the vertical edge portions thereof and engaging said door to form tight joints between the car body and door, said joint plates and clamping plates extending substantially the full height of the door, and fastening means for securing the clamping plates in operative positions to the car body.

2. The combination with a car body having a door opening, of a displaceable door for said opening mounted for vertical swinging movement to and from a closed position, substantially flat joint plates hinged to the car body and extending perpendicular to the respective side thereof at the vertical edges of the door, substantially flat clamping plates hinged to the free edges of the joint plates and extending substantially at right angles from the joint plates and overlapping the inner face of the door at the vertical edge portions thereof and engaging said door to form tight joints between the car body and door, lock bolts securing the lower end portions of the clamping plates to the car body, and latches extending over the upper edge of the door and securing the upper ends of the clamping plates to the car body.

3. The structure defined in claim 2 in which the door is also mounted for bodily lifting movement and in further combination with stop devices on the clamping plates which project over the upper edge of the door and hold the same against lifting movement.

4. The combination with a car body having a door opening, of a displaceable door for said opening mounted for bodily lifting vertical swinging movements, clamping plates hinged in respect to the car body at the vertical edges of the door for horizontal swinging movement to and from operative positions in which they overlap the inner face of the door at the vertical edge portions thereof, and stop devices on the clamping plates arranged when the clamping plates are in operative positions to prevent lifting movement of the door.

In testimony whereof, I affix my signature.

FRED M. BAILEY.