No. 816,230. PATENTED MAR. 27, 1906.

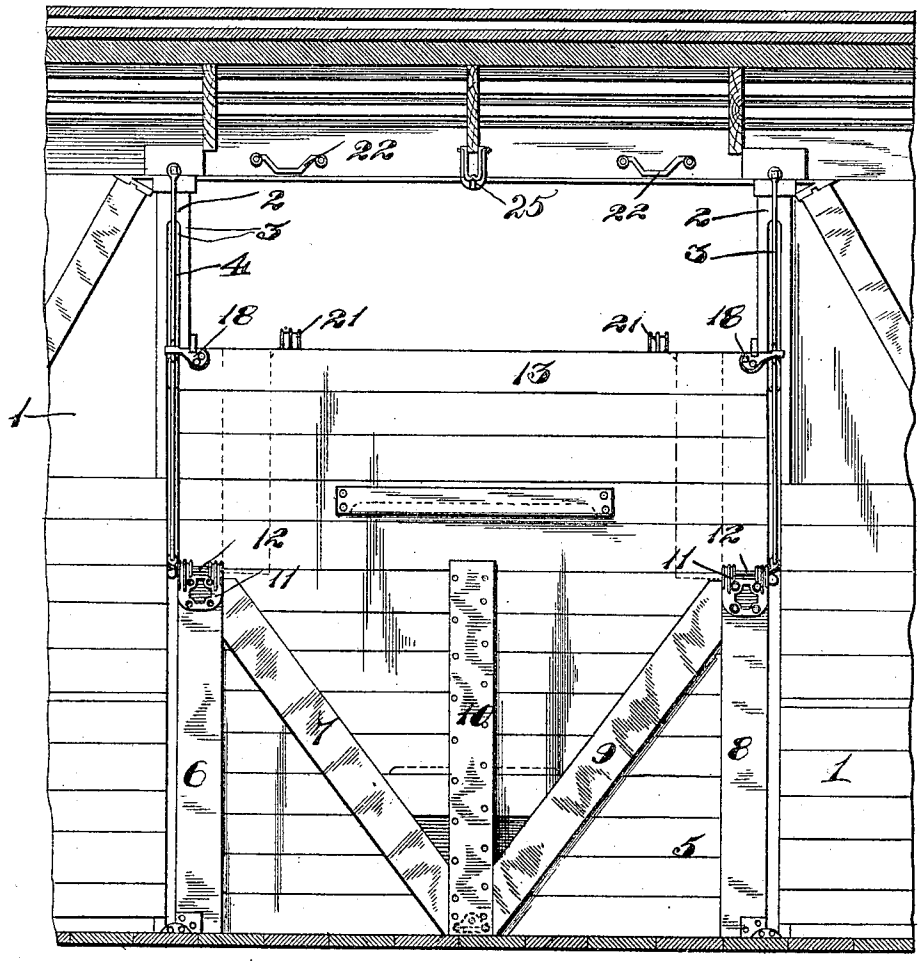
E. A. HILL.

GRAIN DOOR.

APPLICATION FILED JAN. 20, 1904.

7 SHEETS—SHEET 1.

Fig. 1.



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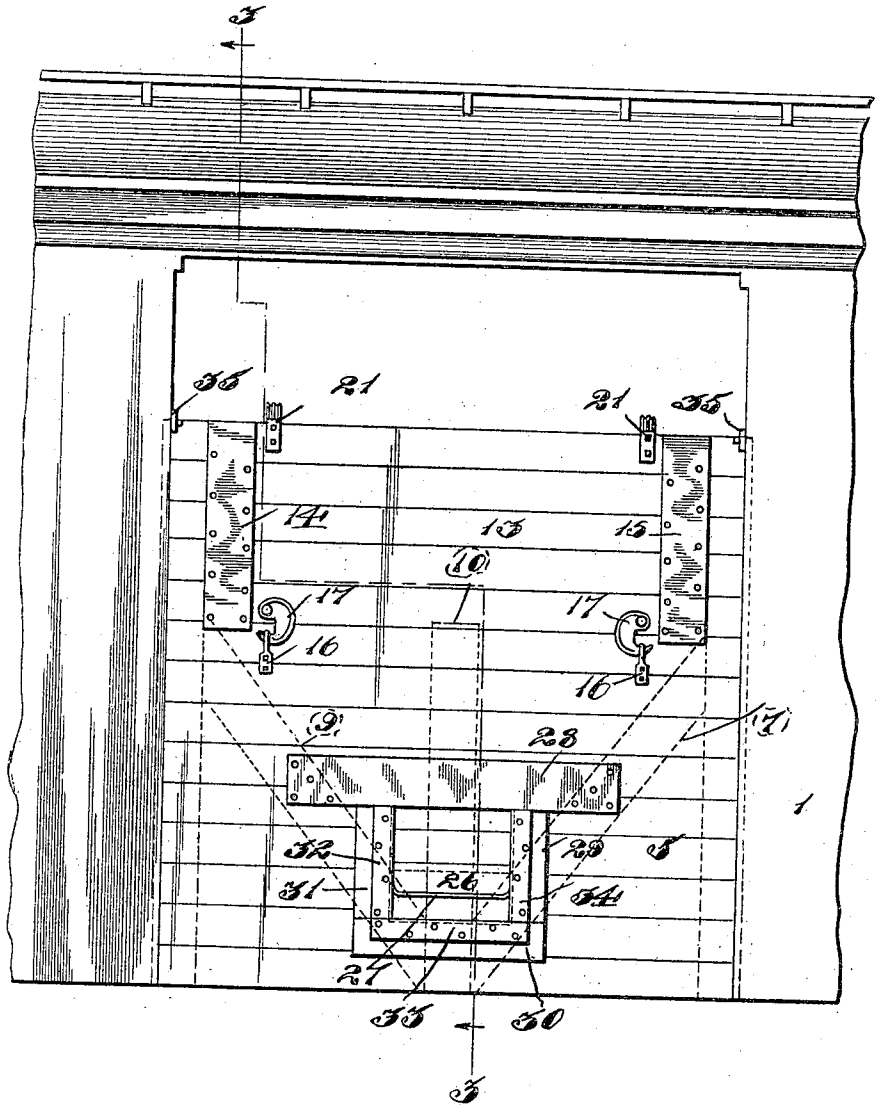
7 SHEETS—SHEET 2.

Fig. 2.



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7 SHEETS—SHEET 3.

Fig. 3.

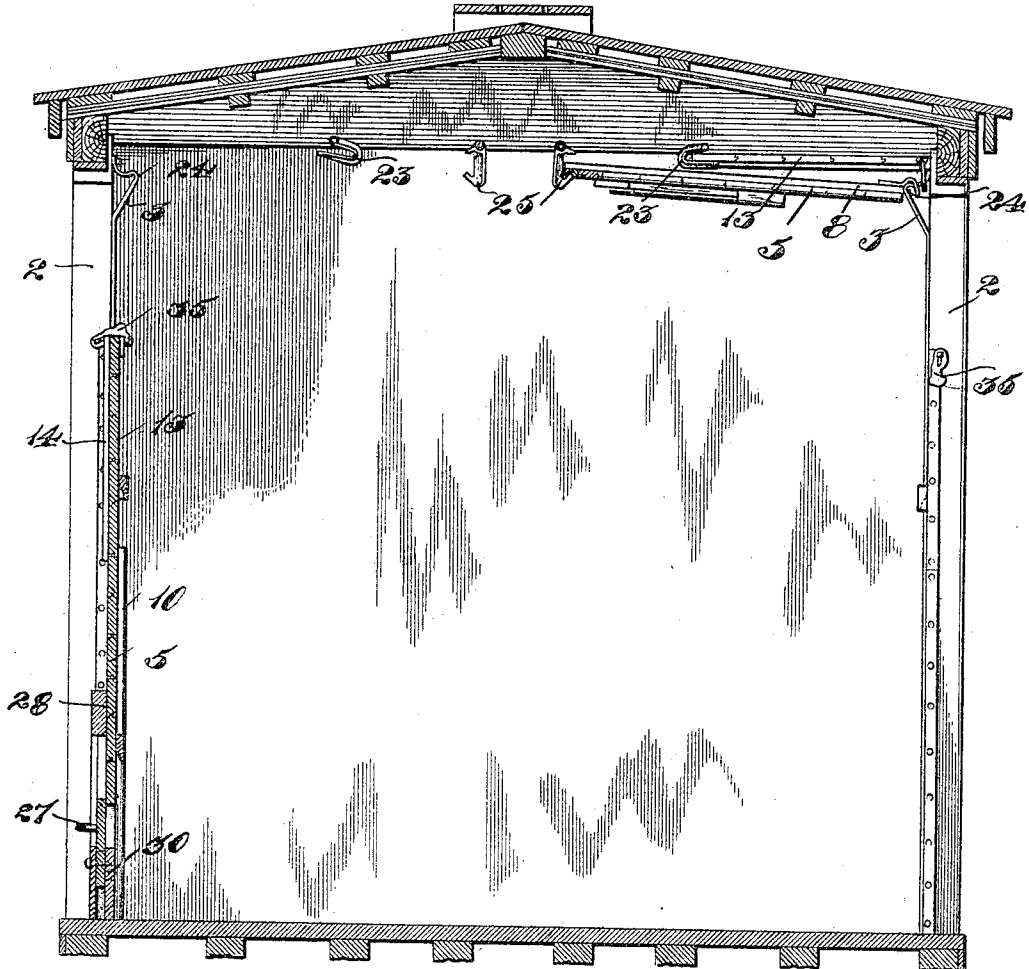
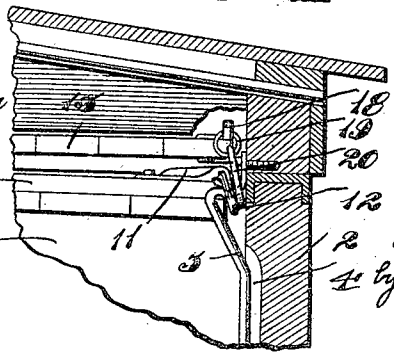


Fig. 3a.



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7 SHEETS—SHEET 4.

Fig. 4.

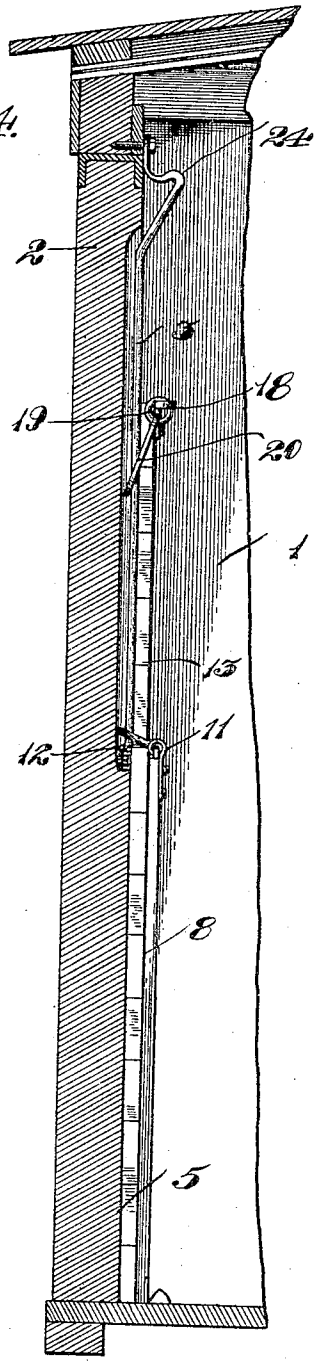
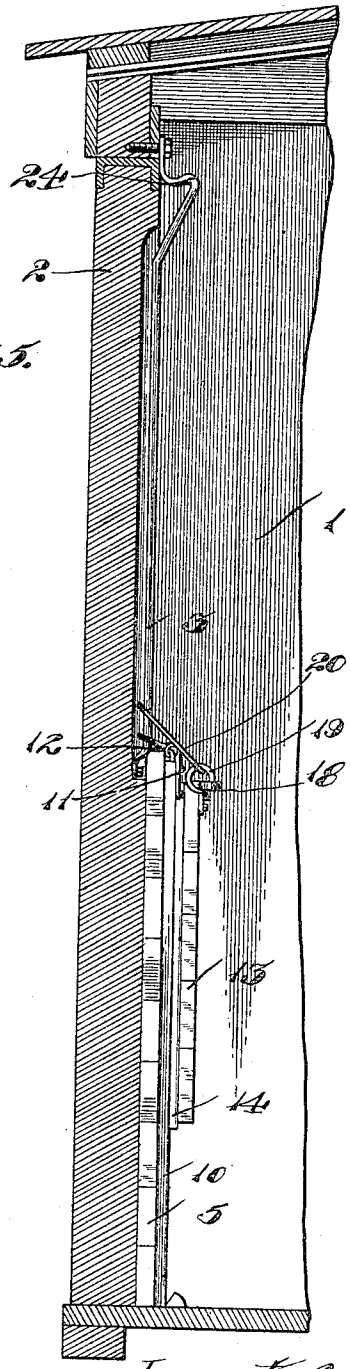


Fig. 5.



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7 SHEETS—SHEET 5.

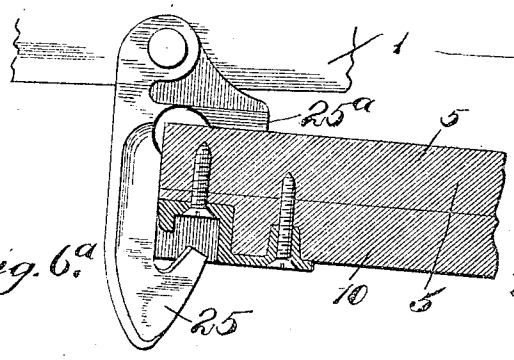

Fig. 6a.

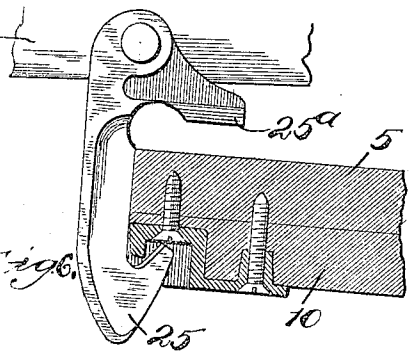

Fig. 6.

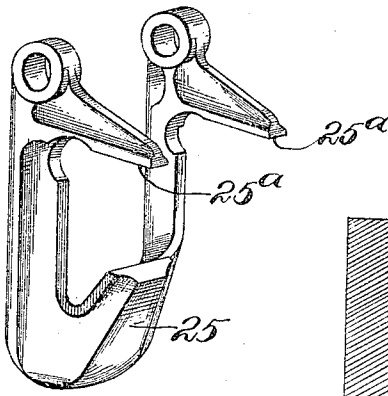

Fig. 7.

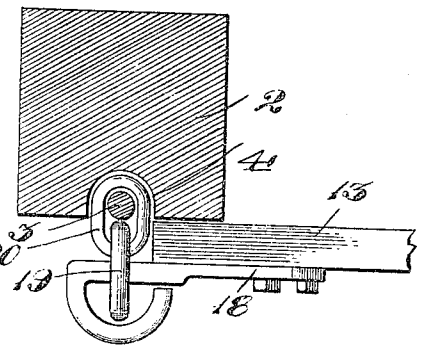

Fig. 5.

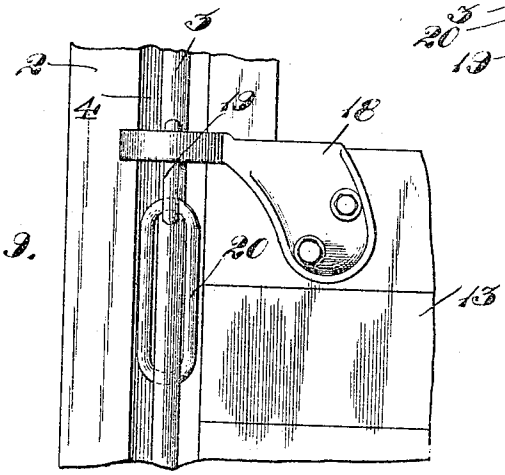

Fig. 3.

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No. 816,230. PATENTED MAR. 27, 1906.

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7 SHEETS—SHEET 6.

Fig. 16.

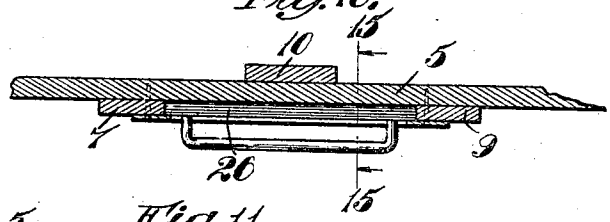


Fig. 11.

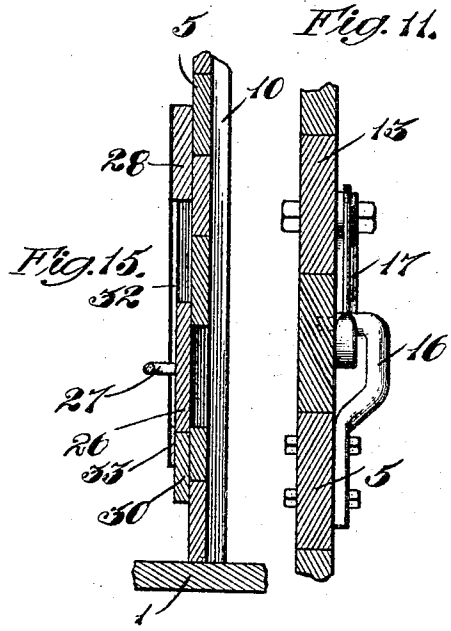


Fig. 15.

Fig. 14.

Fig. 10.

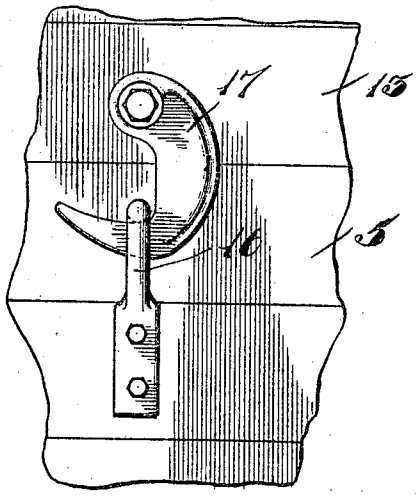
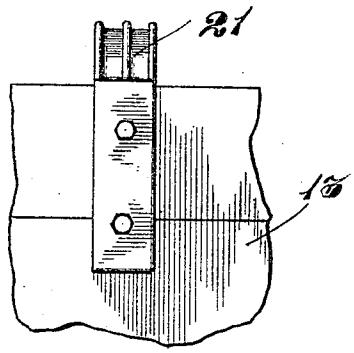
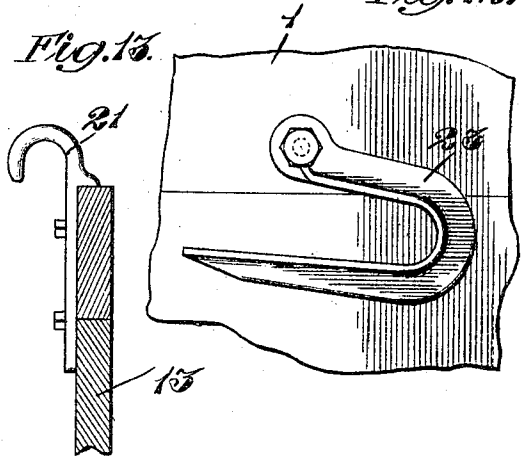


Fig. 12.

Fig. 13.





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PATENTED MAR. 27, 1906.

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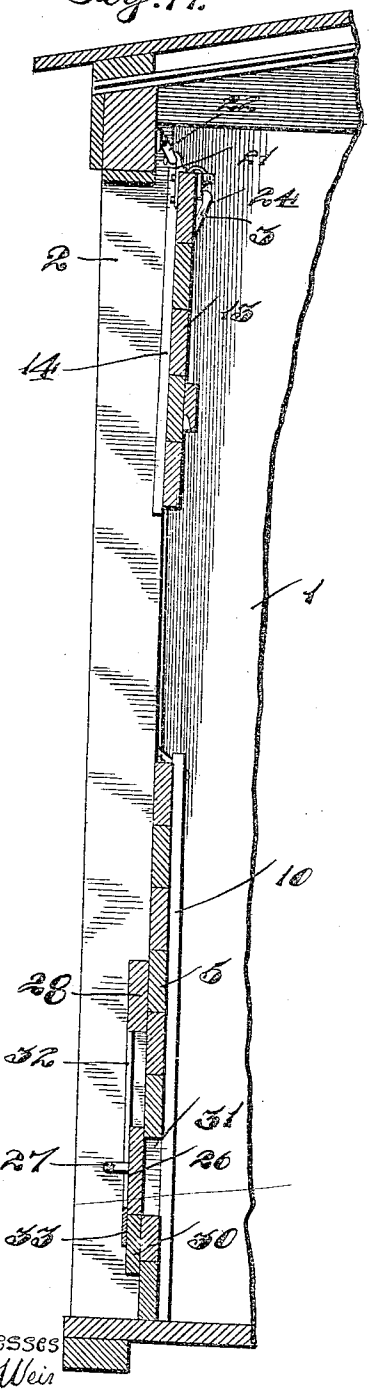
APPLICATION FILED JAN. 20, 1904.

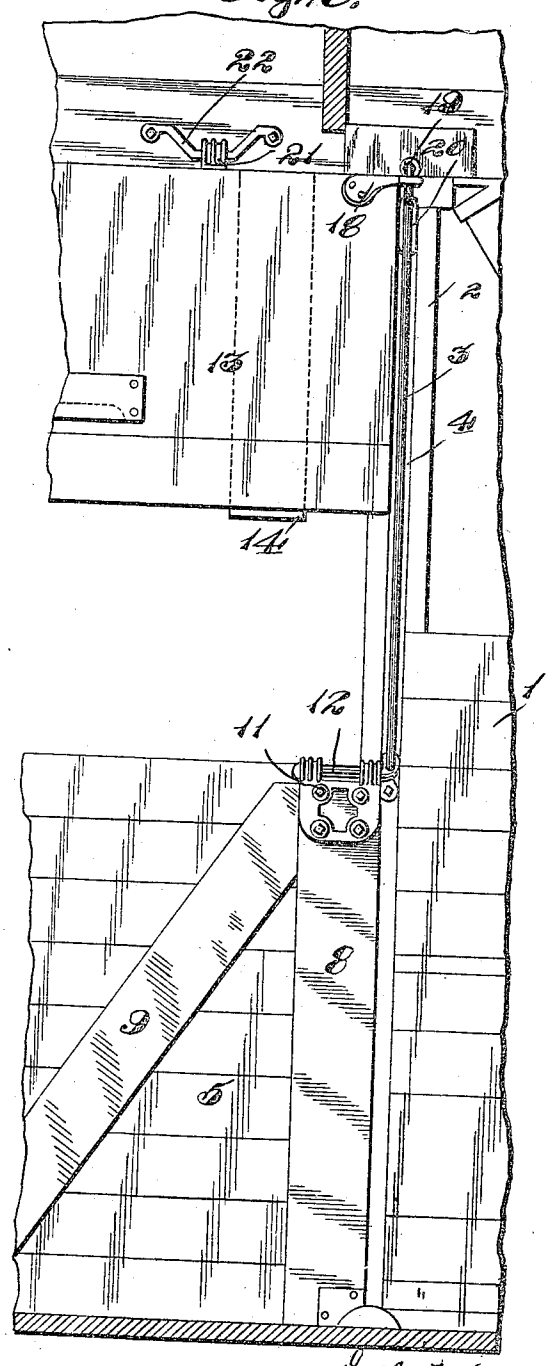
7 SHEETS—SHEET 7.

Fig. 17.



Witnesses
J. B. Weir
Robert A. Weir

Fig. 18.



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UNITED STATES PATENT OFFICE.

EDWARD A. HILL, OF CHICAGO, ILLINOIS; ASSIGNOR TO CHICAGO GRAIN DOOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

GRAIN-DOOR.

No. 816,230. Specification of Letters Patent. Patented March 27, 1906.

Application filed January 20, 1904. Serial No. 189,930.

To all whom it may concern:

Be it known that I, EDWARD A. HILL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Doors, of which the following is a specification.

My invention relates to improvements in doors for grain-cars.

As is well known, the tendency of late years has been to increase the size, and therefore the capacity, of freight-cars of all kinds. This has been quite as true as to cars for carrying grain as well as for other cars. With increasing the grain-carrying capacity of a car there has come a necessity for using larger doors for retaining the grain in the car. Owing to the great pressure of the body of the grain in the car and owing also to the rough treatment to which these doors are subjected, these doors must be very stoutly made, and consequently are made of heavy lumber strongly reinforced or battened. The result is that these doors at best are heavy and unwieldly, and with the increased size that has been called for laterally it is practically impossible to handle these doors unless they are made in sections.

I am aware that grain-doors have been made in sections in various manners, and therefore do not broadly claim a sectional grain-door.

The primary object of my invention, however, is to provide a stout and heavy grain-door made in sections so assembled that each section may at the will of the operator be separately operated or may be so firmly united to the other section as to form, in effect, a single continuous door. At the same time my improved door is so constructed that the two separable sections are independently mounted upon the same guiding means and are separately provided with means whereby they may be firmly secured under the roof of the car when the car is not being used for grain-carrying purposes. These and such other objects as may hereinafter appear are attained by the devices shown in the accompanying drawings, in which—

Figure 1 is an elevation of my improved door and part of a freight-car looking from the interior of the car outwardly. Fig. 2 is a similar view looking toward the door from the outside of the car. Fig. 3 is a transverse section through the car and door. Fig. 3ª is a detail of Fig. 3. Figs. 4 and 5 are sectional details. Fig. 6 is a detail of a supporting-hook supporting the lower edge of the main door beneath the roof of the car. Fig. 6ª is another detail of same. Fig. 7 is a perspective view of the supporting-hook shown in Fig. 6. Fig. 8 is a horizontal section of a door-post, guide-rod, door-section, and connecting means. Fig. 9 is a front elevation of the parts shown in Fig. 8. Fig. 10 is a detail of the locking-hook for securing the sections of the door to each other. Fig. 11 is another view of the same parts. Fig. 12 is an elevation in detail of a door-supporting hook. Fig. 13 is a detail of a hinge-hook mounted upon one of the sections of the door. Fig. 14 is an elevation of the parts shown in Fig. 13. Fig. 15 is a vertical section through the relief-door. Fig. 16 is a transverse sectional view of the parts shown in Fig. 15. Fig. 17 is a vertical section with the upper door-section elevated, and Fig. 18 is an elevation of Fig. 17.

Like numerals of reference indicate the same parts in the several figures of the drawings.

Referring to the accompanying drawings, 1 indicates the side sheathing of a car. At each side of the door-opening are arranged the door-posts 2. Arranged upon the door-posts 2 are the guide-rods 3, which are of a familiar type and are partly or wholly contained within rabbets 4, formed in the faces of the door-posts.

5 is the lower section of the door, which, as shown, is formed of heavy boards which are held together by a framework of battens 6, 7, 8, 9, and 10. Mounted upon the upper corners of the door-section 5 are hinge-plates 11, carrying guide-pins 12, pivotally mounted in the hinge-plates 11 and provided with angularly-extending heads having eyes through which the guide-rods 3 pass. Mounted upon the guide-rods 3 and resting upon the upper edge of the lower door-section 5 is the upper door-section 13, which, as shown, is formed of boards held together by transverse battens 14 and 15.

In the preferred arrangement shown in the drawings the central vertical batten 10 on the lower door-section 5 projects upwardly above the upper edge of the door-section 5, while the battens 14 and 15 project downwardly below the lower edge of the upper door-section 13, so that with the parts assembled as shown in Figs. 1 and 2 the two

door-sections are interlocked and braced together by the projecting ends of their respective battens. The door-sections are further secured to each other by means of eyes 16, secured to one of the sections, and cam-hooks 17, secured to the other of said sections in such a manner that each of said cam-hooks is arranged to engage one of said eyes, and in being locked therewith will draw the two door-sections tightly together so as to, in effect, constitute but a single door.

Arranged at the upper corners of the upper door-section 13 are fixtures 18. These fixtures 18 project outwardly from the door-section 13 and are provided with eyes preferably arranged axially opposite the guide-rods 3, formed, preferably, as shown in Fig. 8—to wit, that side of the eye which is nearest to the door-post is straight or flat, so as to allow a freer play therein of the link 19. Each of the eyes is provided with one of these links 19, which, as shown, is short and substantially round and is in turn loosely connected with an elongated link 20, which slidably engages a guide-rod 3. With this arrangement when the hooks 17 and the eyes 16 are disengaged from each other the upper door-section 13 may be lifted very readily upon the guide-rods 3 without any tendency to bind and there is sufficiently free play to allow the corners of the section 13 to be lifted alternately instead of simultaneously. The upper edge of the section 13 is also provided with hooks 21, preferably mounted on the outer face of the section 13 in such a manner that when the upper section 13 is lifted to its topmost position the hooks 21 will automatically engage the eyes 22, which are secured at the top of the door-opening and on the inside of the car, said engagement providing a hinge upon which the upper section 13 may be freely swung, the linked engagement between the section 13 and the guide-rods 3 allowing a sufficient play to permit the upper section 13 to be swung upward to a horizontal plane while supported at one end by the hinges formed by the hooks 21 and eyes 22. The upper section 13 is then held in this position by a weighted hook 23, (shown in detail in Fig. 12,) said hook being so weighted that its normal tendency is to swing in the direction of the door, so that the jolting of the car will have no tendency to disengage the lower edge of section 13 from the hook 23.

The lower section 5 is substantially the same as is shown in my prior patent, No. 724,474, and, as shown in the drawings, it is provided with the fixtures shown in said Patent No. 724,474, whereby it is slidably mounted upon the guide-rods 3. As it is lifted to its topmost position the eyes of the pivoted pins 12 turn over the shoulders 24 formed on the guide-rods 3, Figs. 3, 4, 5, so that the pins 12 rest upon the top of said shoulders 24, and the upper edge of the door-section 5 is thus supported upon a pair of hinges. It will be noted in this connection that the linked connection between the upper door-section 13 and the guide-rods 3 is such that with the upper door-section 13 swung up out of the way neither the door-section 13 nor its connecting-links will interfere with the swinging upward of the lower door-section 5, although both door-sections are mounted upon the same guide-rods. The lower door-section 5 is then swung to a substantially horizontal plane immediately below the upper door-section 13 and is supported in this position by the guide-pins 12, resting upon the shoulders 24 of the guide-rods 3, and by a swinging hook 25, which is supported by one of the roof-timbers of the car. Obviously in a device of this sort there should be no nice fit between the lower edge of the door-section 5 and the hook 25, and yet with the constant jolting of the car there is a continuous tendency to jolt the door-section 5 upwardly, and thus out of engagement with the hook 25. To overcome this tendency, I provide the hook 25 with an arm 25^a, which, as shown, projects substantially in a horizontal direction. I also cut away the hook 25 at the junction between the arm 25^a and the main body of the hook, so that the extreme lower edge of the door 5 will not when jolted upwardly strike any part of the hook 25, but the surface of the door a short distance from its lower edge will strike the arm 25^a, so that every time the door is jolted upwardly it will strike the arm 25^a, thereby causing the hook 25 to travel inwardly, or toward the door, as far as the temporarily-raised position of the door will permit. By thus causing the hook to follow the door whenever the door is jolted upwardly I avoid any possibility of the hook swinging in the wrong direction.

The practical feature which must be considered in this art is that the men handling these cars will not always operate the parts in the manner in which they are designed to be operated, so that in handling an empty car it might well happen that a careless operator would drop the upper door-section 13 downwardly and inside of the lower door-section 5 instead of securing it in position under the roof of the car, as should be done. If any of the ordinary connections be used between the upper door-section 13 and the guide-rods 3, the result of this action will be to leave the door-section 13 projecting inwardly into the car at an angle and in such a manner as to bring a seriously objectionable strain upon the connecting parts; but with the door-section 13 connected to the guide-rods in the manner shown the door-section 13 is free to drop behind the door-section 5 in the manner shown in Fig. 5.

In lifting the grain-door it is a matter of common knowledge that the pressure and friction of the stationary body of grain against

the grain-door make it difficult and at times impossible to lift the door; but it is a peculiar fact that if an opening be made near the lower edge of the door, so as to allow some of the grain to escape, the movement of the grain will so lessen the friction between the door and the grain that the door can be lifted with comparative ease. Various devices have been made to permit of the escape of the grain through the lower portion of the door, and for this purpose I provide a vertically-slidable door or slide 26, arranged on the outer face of the door 5 and provided with a handle 27. Across the outer face of the lower door-section 5 is a horizontal cleat or flange 28, forming the upper side of a square, the other sides of which are formed by guide-strips 29 and 31 and a flange 30. Secured to the outer face of these strips and overlapping the inner edges of the same are metallic strips 32, 33, and 34, providing overhanging flanges, between which and the outer face of the door 5 is slidably fitted the slide 26, which normally rests upon the flange 30 and closes an escape-opening through the door-section 5. This simply-constructed, strong, and easily-operated slide 26 may be readily slid upward against the cleat 28, which serves as a stop, whereupon the opening through the lower door-section 5 is uncovered and the grain immediately behind the door-section 5 begins to escape.

35 represents hooks pivotally secured to the door-frame and arranged to hold the upper edge of section 13 in vertical position, as shown in Fig. 3.

It will be seen that by the device described I not only provide *per se* a sectional door so constructed and fitted that the upper and lower sections may be locked together so as to constitute, in effect, an unbroken solid door, but which may, nevertheless, be separated into its sections, which may be separately operated, but I also provide the further features which are necessary to the practical success of such a door—to wit, suitable separate connections between the door-sections and the guiding means, whereby each section may be readily operated independently of the other and without interfering with the other, may be separately swung up and secured out of the way, so that with only the lower door-section in place the car may be freely loaded and unloaded, and also so mounted with relation to each other that the two sections may be mounted upon the same guiding means, may, when not in use, be separately swung up out of the way and secured to the roof of the car without interfering with each other, and without any parts so constructed as to be readily damaged by any unintelligent operation of the door. In this connection it will be noted:

First. That the center of the eye upon the attachment 18 (*vide* Fig. 8) is preferably arranged directly opposite the center of the guiding-rod 3.

Second. That the side of said eye immediately adjacent to the guiding-rod 3 is straight and not circular. I have found by experiment that if a circular eye be used then when the upper door-section is lifted irregularly, first one side and then the other, as it most always is, the link 19 will tend to remain at one point in the eye—to wit, that point nearest to the guide-rod 3—with a consequent tendency to bind and to kink and to very materially interfere with the easy operation of this awkward and heavy door. On the other hand, with the construction shown in Fig. 8 the link 19 will quickly and readily work laterally from one side to the other of said eye, thereby adapting itself to varying positions of the door 13 and eliminating all tendency of the link connection between the casting 18 and the rod 3 to bind or kink, especially when the door is being lifted over the shoulders 24 at the upper end of the guide-rods 3.

Third. It will be noted that by connecting the casting 18 with the guide-rod 3 by means of two links, one of which is elongated, not only may the door-section 13 be safely dropped over the door-section 5 into the position shown in Fig. 5 without any injurious strain upon the door-section 13, but when the door-sections are swung up under the ceiling of the car this link connection permits the door-section 13 sufficient play to allow it to swing upwardly to a horizontal position while supported at one end upon the hinge formed by the hooks 21 and eyes 22 and entirely out of the way of the door-section 5 and its connections, notwithstanding the fact that the door-section 5 and the door-section 13 are mounted upon the same guide-rods 3.

Fourth. Furthermore, this arrangement of links allows of the free movement vertically of the door-section 13 upon the guide-rods 3 without any tendency to bind upon the guide-rods 3.

Fifth. It will be seen that the hooks 21 are mounted so that their free ends project outwardly from the outer face of the door-section 13 and their upper surfaces are curved, so that as the door-section 13 is lifted upon the guide-rods 3 when the upper faces of the hooks 21 come in contact with the under surface of the eyes 22 there will be a cam-like action, whereby the upper edge of the door-section 13 will be carried inwardly as the upper forward surfaces of the hooks 21 ride over the eyes 22 until the free ends of the hooks 21 engage the eyes 22. Here, again, the link connection between the door-section 13 and the guide-rods 3 permits of sufficient play to allow of this automatic hooking of the door-section 13 upon the eyes 22.

Sixth. Furthermore, the devices for holding the doors in their elevated positions are so

constructed as to automatically swing to locking position, so as to automatically remain in locked position.

I claim—

1. The combination with a car-door and a vertical guide-rod, of connections between the door and the guide-rod, said connections comprising an arm secured to the door and extending outwardly therefrom and opposite to the guide-rod, said arm being provided with an eye in the portion thereof extending opposite to said guide-rod, the side of said eye adjacent to the guide-rod being straight, a link loosely engaging said eye, and a second link engaging said first link and slidably engaging said guide-rod.

2. The combination with a car-door, of a vertical guide-rod, and connections between the car-door and guide-rod, said connections comprising an arm secured to the door and projecting outwardly therefrom and opposite to the guide-rod, said arm being provided with an eye, a round link engaging said eye, an elongated link engaging said round link and slidably engaging said guide-rod.

3. The combination with a car, of a door comprising separable upper and lower sections, vertical guiding means mounted upon said car, slidable connections between the lower door-section and the vertical guiding means, and vertically-slidable connections between the guiding means and the upper door-section, said last-named connections comprising an arm mounted upon the upper door-section and provided with an eye, a link engaging said eye, and an elongated link engaging said first-named link and slidably engaging said guiding means.

4. An attachment for car-doors comprising an arm adapted to be mountd upon a car-door and provided with an eye having the side thereof nearest the car-door flattened, a link engaging said eye, and a second link engaging said first link and adapted to be slidably mounted upon guiding means.

5. An attachment for car-doors, comprising an elongated link adapted to be slidably mounted upon guiding means, a short link loosely engaging said elongated link, an arm adapted to be mounted upon a car-door, and provided with a semicircular eye engaging said shorter link, said eye being so arranged that the flat side thereof will be nearest to the guiding means when the attachment is mounted in operative position.

6. The combination with a car provided with a door-opening, of door-posts arranged one on each side of said opening, the inner face of each door-post being provided with a rabbeted channel, vertically-arranged guide-rods mounted one upon each of said posts and opposite to the rabbet in the post, each guide-rod being formed with a shoulder adjacent to its upper end, a door adapted to said door-opening and comprising upper and lower sections, separable means for locking said door-sections together, connections whereby each door-section is slidably mounted upon each of said guide-rods so as to be independently movable thereon, the connections between the upper door-section and the guide-rods comprising a pair of arms mounted one adjacent to each of the upper corners of the upper door-section and extending outwardly opposite to the adjacent guide-rod, each arm being provided with a semicircular eye, the flat side of which is nearest to the guide-rod, a short link loosely engaging the eye, an elongated link engaging the short link and engaging the guide-rod, means for hingingly securing the upper edge of the upper door-section to the roof of the car, and means for supporting the lower edges of both door-sections adjacent to the roof of the car, substantially as described.

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