A. WALLACE.

GRAIN DOOR OPENER AND PROCESS OF OPENING IT.

APPLICATION FILED FEB. 7, 1916.

1,201,006.

Patented Oct. 10, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

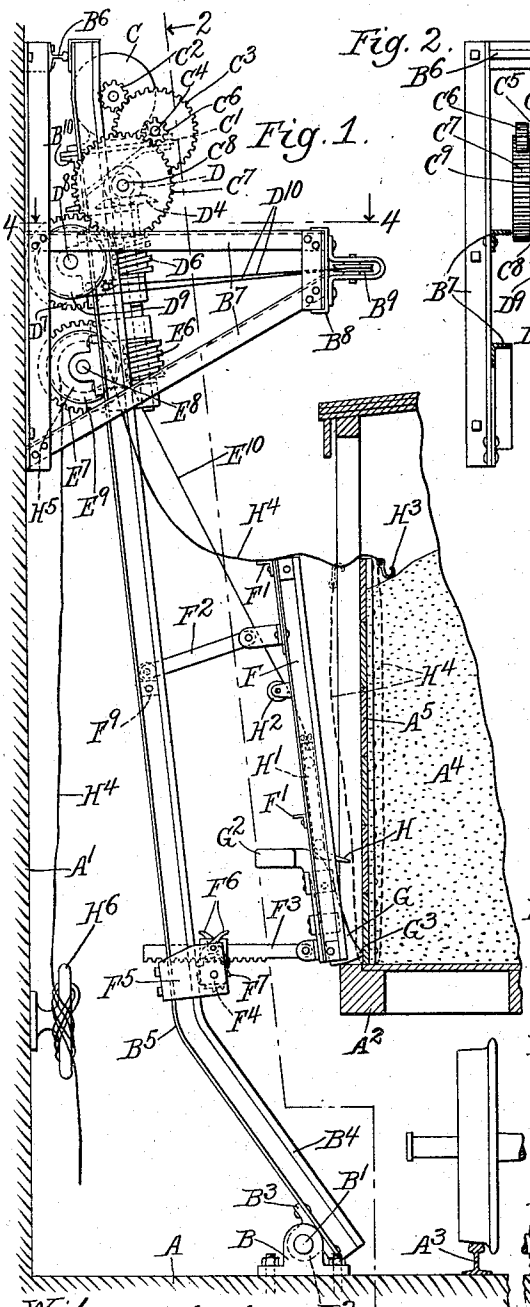
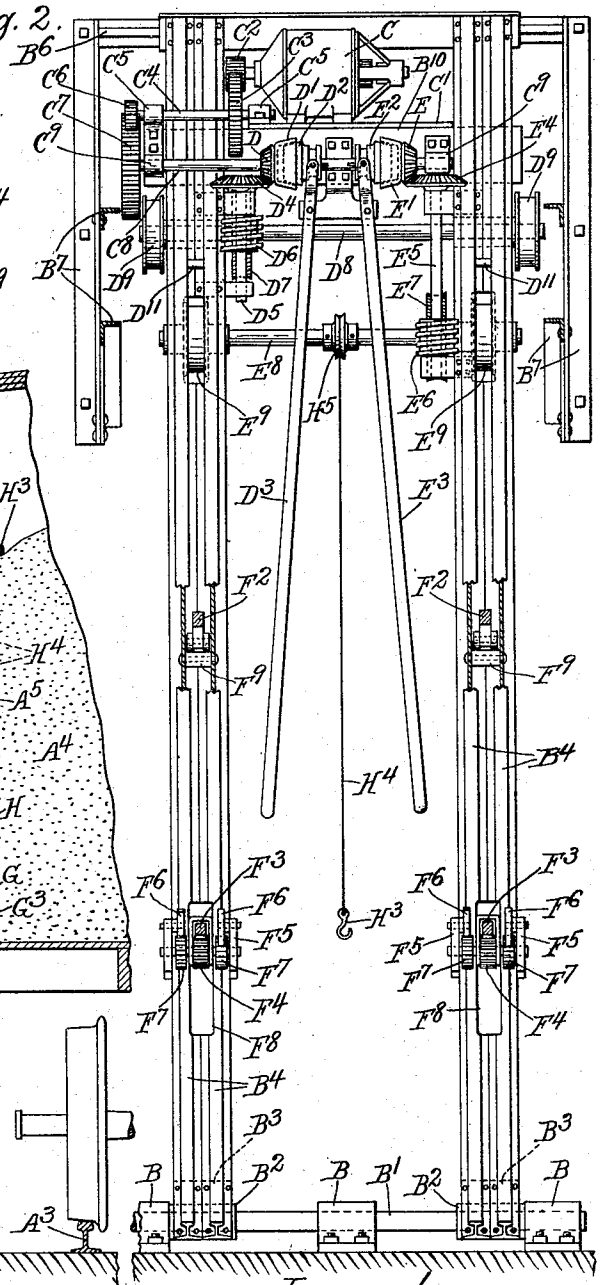


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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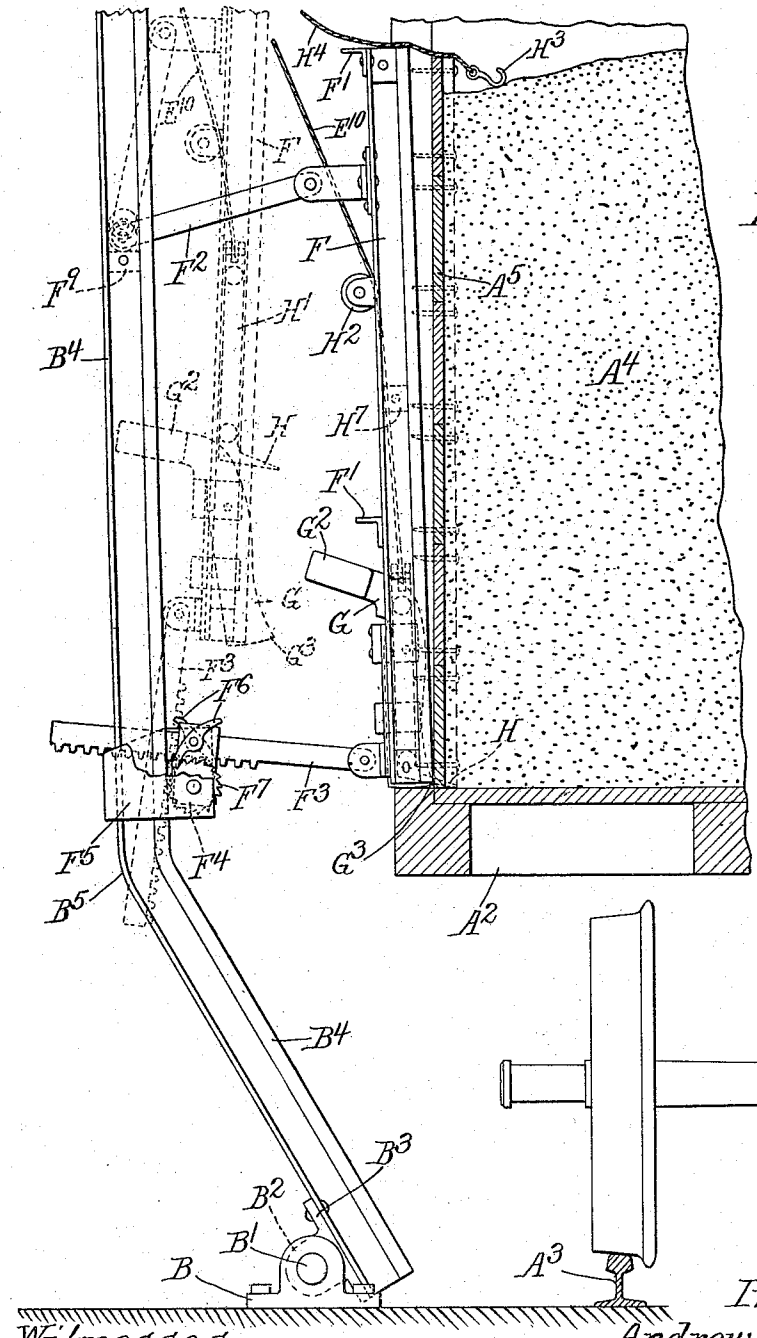


Fig. 3.

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3 SHEETS—SHEET 3.

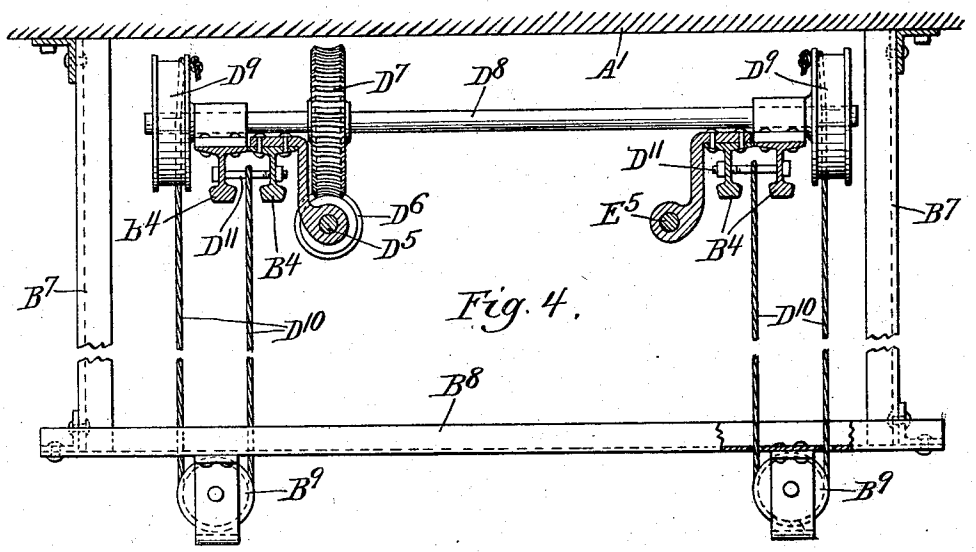


Fig. 4.

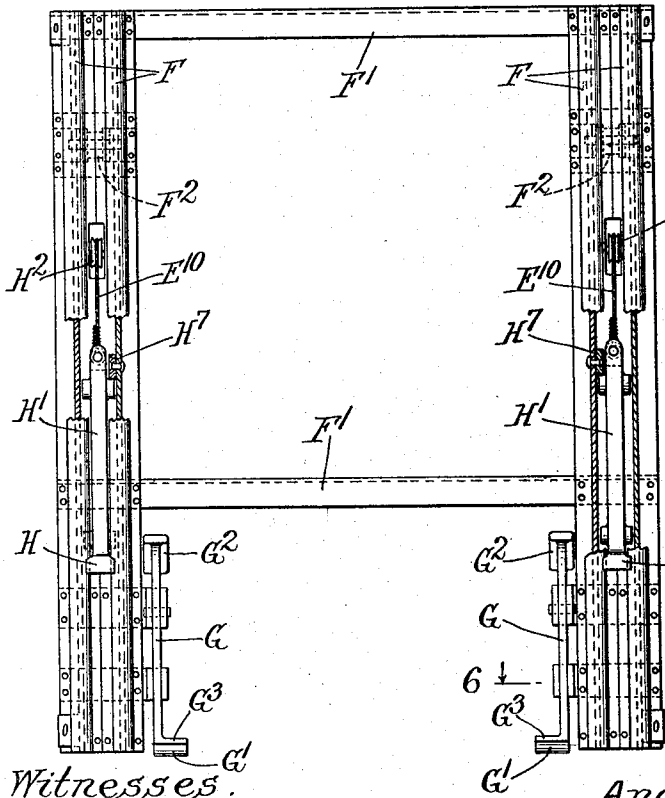
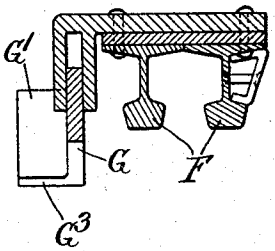


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

ANDREW WALLACE, OF SOUTH CHICAGO, ILLINOIS.

GRAIN-DOOR OPENER AND PROCESS OF OPENING IT.

1,201,006. Specification of Letters Patent. Patented Oct. 10, 1916.

Application filed February 7, 1916. Serial No. 76,851.

To all whom it may concern:

Be it known that I, ANDREW WALLACE, a citizen of the United States, residing at South Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Grain-Door Openers and Processes of Opening Them, of which the following is a specification.

My invention relates to improvements in grain door openers, and has for one object to provide means for quickly and easily opening the grain doors of freight cars and the like.

Another object is to provide means for opening such doors without destroying them.

Other objects of my invention will appear in the specification.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 shows a cross section through a freight car showing my device in elevation. Fig. 2 is a section along the line 2—2 of Fig. 1; Fig. 3 is a detail on an enlarged scale, showing my device in elevation of a grain door in section with the parts viewed a short interval later in operation than in Fig. 1; Fig. 4 is a section along the line 4—4 of Fig. 1; Fig. 5 is a front elevation of the door contacting portion; Fig. 6 is a section along the line 6—6 of Fig. 5.

Like parts are indicated by similar letters throughout all the parts.

A is the floor, and A^1 the wall of the grain handling house, into which the freight car A^2 comes riding along the track A^3. The freight car which contains grain or other such material, as indicated at A^4, has its door closed by a so-called grain door A^5, made up of a series of planks horizontally disposed on edge, extending across the door and nailed or otherwise suitably attached to the inside wall of the car on either side of the door. These planks are normally put in place and nailed or locked in position before the car is filled, and they making a close snug contact with the wall of the car, prevent discharge of material from the car. However, when the car is to be unloaded, the pressure of the material on these boards prevents their being withdrawn, because they must be forced back into the car to release the nails which hold them. The ordinary practice is to cut or chop or break out the bottom two or three boards, thus destroying them. The material then runs out beneath the boards until it sinks low enough so that the operator can climb in over, draw out the nails and remove the other boards one at a time. This is manifestly an exceedingly expensive process, because these doors cost in the neighborhood of fifty cents to one dollar a piece, and about one third of each door is normally destroyed in unloading. In my arrangement I provide means for forcing the doors into the car against the weight of material, thus drawing out the nails. The door is then drawn up on the inside of the car, so as to permit the material to flow out beneath. The forcing end process and withdrawal of the door takes place almost instantaneously, and no breakage takes place.

B B are pillow blocks on the floor of the house. They carry rotatably mounted therein a shaft B^1. On this shaft adjacent either end and adjacent the two end pillow blocks B, are sleeves B^2 having flat supporting surfaces B^3 upon which are bolted the two T rails B^4 B^4. These two T rails are arranged side by side, one arranged at each end of the shaft. These rails are bent, as indicated at B^5, at a point slightly above their pivot point, and then extend up to rest against the stop rail B^6, when in the inoperative position.

B^7 B^7 are two A-shaped brackets projecting outwardly from the wall A^1. They support at their outer end a cross bar B^8 upon which are mounted two sheaves B^9 B^9, in front of respectively, the two T rail beam groups B^4 B^4.

B^{10} is a reinforcing channel riveted to the bases of the four T rails to hold the two beams in fixed position with respect one to another.

C is a motor mounted on a bracket C^1, on the channel B^{10}. This motor has a pinion C^2 driving a gear C^3 on the shaft C^4. This shaft is mounted in bearings C^5 on the bracket C^1 and channel B^{10}, and carries a pinion C^6 in mesh with the gear C^7, which gear in turn is carried by a shaft C^8 in bearings C^9 supported on the channel B^{10}. This shaft is always in operation being driven by the motor and serves as a counter shaft from which the drive is taken.

D is a miter pinion rigidly connected to a female member D^1 in opposition to a male clutch member D^2, splined on the shaft.

D^3 is a clutch control rod to throw this clutch into and out of operation to rotate or release the miter gear in response to the rota-

tion of the shaft. This miter pinion D is in mesh with a miter gear D^4 on the worm shaft D^5. The worm D^6 on the shaft is in mesh with the worm wheel D^7 on the drum shaft D^8. The drum shaft D^8 is supported on the rail beams, and carries at either end drums D^9. A cable D^{10} is anchored at one end on the drum D^9, at the other end on a pin D^{11} between the rails, the bight passing around the sheave B^9, so that a rotation of the drum winds up the cables and draws the upper ends of the beams out, rotating them about their pivotal point.

E is a miter pinion floating on the shaft C^8, having a female clutch member E^1 in opposition to a male clutch member E^2 splined on the shaft, and controlled by a clutch lever E^3. This pinion is in mesh with the gear E^4, which drives a worm shaft E^5, and by means of a worm E^6 drives a worm wheel E^7. This worm wheel is mounted on the hoisting shaft E^8. It carries at either end the drums E^9 around which are wound the hoisting cables E^{10}.

F F are vertically disposed rails tied together by the cross bars F^1 to form a door opening plunger. The links F^2 F^2 are slidably mounted at one end between the rails B^4 and rest against the stops F^9 at their other ends. They are pivoted between the rails F so as to support the upper end of the door opening plunger pivotally from the main rail beams.

F^3 are racks pivoted on the lower ends of the rails F, and in engagement with the gears F^4 in yokes F^5 mounted on the rails B^4. Dogs F^6 lock the gears against rotation, but may be withdrawn when necessary, to permit rotation of the gears by the hand of the operator to move the rack longitudinally. These dogs engage, of course, one of each of a pair of ratchet wheels F^7 F^7 to lock the gear against movement in either direction. The rails are cut away as indicated at F^8 to permit movement of the rack both longitudinally and rotative.

G G are pivotally mounted guide shoes mounted on the lower ends of the rails F, having curved car floor contacting surfaces G^1. They are pivotal at points slightly above the ends of the rail, and counterbalanced by means of weights G^2, so that they normally hang in the position shown in Fig. 1 projecting forwardly in front of the plunger, but when pressure is brought to bear upon the plunger, they assume the position shown in Fig. 3 contacting the door at the point G^3. The position of the parts is such that the operator by feeding forward the rack until the shoe rests upon the car floor and its point just contacts the door, will know the parts are in the proper position, and will then lock them in such position.

H H are lifting hooks mounted on carriages H^1, which slide between the rails F, the hooks projecting forwardly in front of the rails a distance such that when the parts are in the position shown in Fig. 1, the hook will be just free to fall without contacting the door surface. This hook is adapted to be lifted and controlled by the cables E^{10}, which pass over sheaves H^2 on the rails F, so that a rotation of the drum E^9 will raise or lower the lifting hook as the case may be.

It will be observed that the point of application of the pressure between the rails B^4 and the rack is above the pivotal point of the rack on the door opening plunger, so that any pressure upon this plunger caused by the forward movement of the upper end of the rail will not tend to lift the plunger, but will force it firmly against and under the door. This pressure or downward component is partially balanced by the fact that the upper link is inclined in the opposite direction, but at the upper end the pressures are much lower, so that there is still a component left tending to hold the plunger down and prevent its upward withdrawal or forcing by the pressure which forces it in to open the door.

H^3 is a hook on the end of the hand line H^4 passing over a pulley H^5 from the shaft E^8, which may be used to hold the door in position in coöperation with a cleat H^6 after the mechanism previously described has opened and raised the door.

H^7 is a stop for the plunger, whose function is to limit the upper movement of the plunger and hook, so that the door opening plunger may be raised into the inoperative position shown in dotted lines before the car is brought in.

I have shown one mechanism for carrying out my door opening process. If we could conceive of a single man strong enough to force the material back into the car by pressing on the door and strong enough to then open the door while raising it against the friction of the material, we would have a man or a machine able to carry out my process, and any machine which is so constituted as to be able to press the door back against the material in the car far enough to disengage the door holding mechanism and then raise the door a few inches to permit the material to flow out below it, will carry out my process, and I want it to be understood that the particular mechanism shown is merely the first preferred form for carrying out this process, but that any suitable mechanism might be used.

It will be evident that, while I have shown in my drawings an operative device, still many changes might be made in size, shape, and arrangement of parts, without departing from the spirit of my invention.

The use and operation of my invention

are as follows: The freight car which is to be unloaded is now on the track in the position shown. The cars vary somewhat in width, somewhat in height, and somewhat in width of sill. The sliding door is moved back, exposing the grain door which is usually made up of three or four boards fastened together, and nailed to the inside of the door jamb. My apparatus is meanwhile in the position shown in dotted lines in Fig. 3 with the heavy rails resting on the support at the top. The operator manipulates the clutch to unwind the cable and lower the door opening foot or plate into the position shown in Fig. 1. The operator by hand moves the rack in or out as the case may be to bring the curved pivoted shoe to rest upon the door sill with the point touching the door. He then further releases the cable, permitting the door raising hook to drop down so that it also rests on the sill. With the rack locked in position the operator then manipulates the other clutch to tilt the opening heavy levers forward from above. This brings the door opening shoe into engagement with the pivoted foot in the position shown in Fig. 3. The further movement brings the whole shoe against the door, and a still further movement presses the door in against the material behind it, thus drawing the nails all out evenly and freely without breaking the door or the nail. As soon as the door has been pushed in so that the nails are all clear a position is held, but no further movement takes place. The pressure on the door at this time without further movement is no greater than it was before, because the material will have been displaced and will assume a position of rest. The other clutch is then operated to wind up the housing drum, the hooks which extend beneath the door engaging it and sliding it up along the rails forming the door opening shoe. This movement will be continued until the door has been raised a few inches, possibly a foot above the bottom of the car. The grain or material then rushes out. The hook on the cable shown in Fig. 1 will be positioned as shown. As the grain runs out, the hook will ride down on the top of the grain until it passes through the door from below. It can then be fastened to the door or brought up and fastened about the cable, and the door held in position without the use of the rigid ponderous door opening machinery. The whole operation takes but a short time. The door is being forced in almost as soon as the power is applied to my device, thus operating with a minimum of labor and without damaging the car doors in any way. The adjustment by means of the gear and ratchet of the position of the bottom of the door pressing frame results in making the effective length of the link connecting the frame with the lever at the bottom a variable while the length of the link at the top of the frame is a constant. When the frame is lifted up into the inoperative position, it swings about the pivot of the lower link on the lever. The pivot point of the upper link is free to slide and it slides to compensate as indicated in dotted lines in Fig. 3, but the pivotal point when in operative position is always below the pivotal point on the frame so that there is never a tendency to throw the pivot point on the lever up instead of down.

I claim:

1. The process of opening grain doors in railroad cars and the like, which consists in forcing the door bodily inward against the mass of material behind it until it is completely free from the car body, then holding it against the pressure of material and raising it bodily upward within the car.

2. The process of opening grain doors in railroad cars and the like, which consists in forcing the door bodily inward against the mass of material behind it until it is completely free from the car body, then holding it against the pressure of material and raising it bodily upward within the car, then releasing the pressure and holding the door in the raised position until the material has run out from beneath the door.

3. The process of opening grain doors which consists first in forcing the door as a unit inwardly against the pressure of material behind it then raising the door bodily along the line at right angles to the line of its first movement and holding it in position while the material in the car runs out beneath the door.

In testimony whereof, I affix my signature in the presence of two witnesses this 3rd day of February, 1916.

ANDREW WALLACE.

Witnesses:

ESTHER VAN FRANK,

CHRISTINA DEANS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."