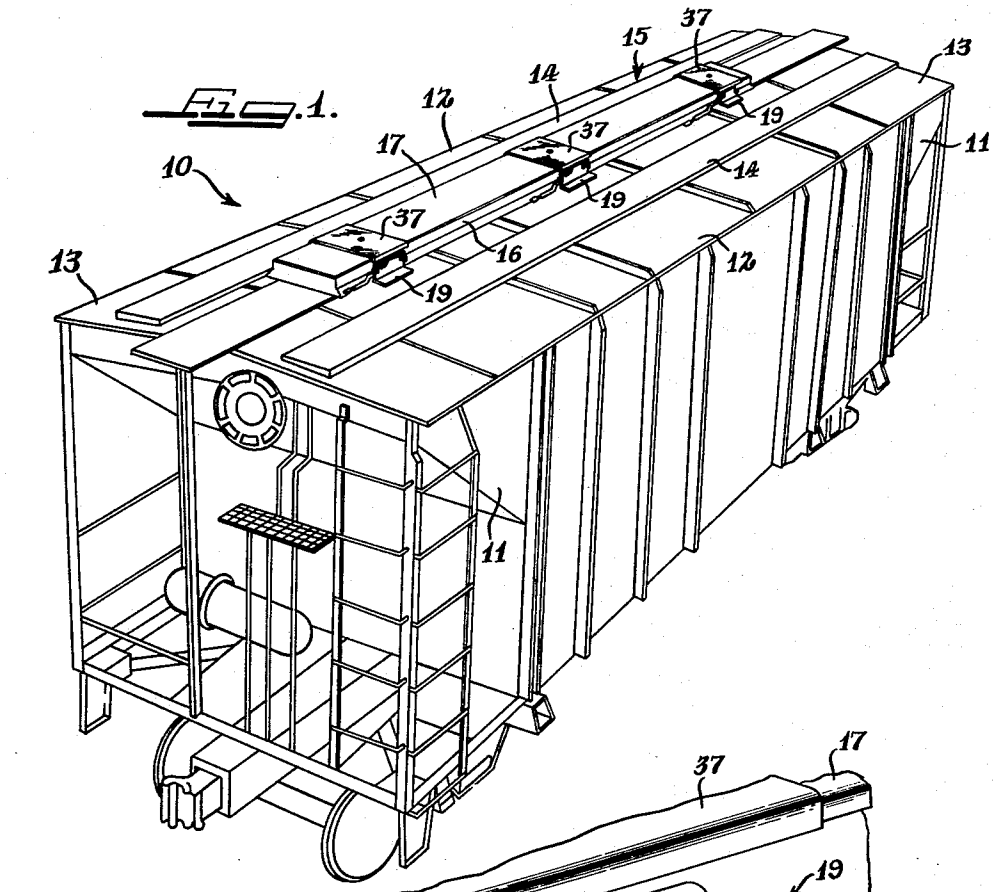
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TROUGH TYPE HATCH OPERATING ARRANGEMENT

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Fig. 1.



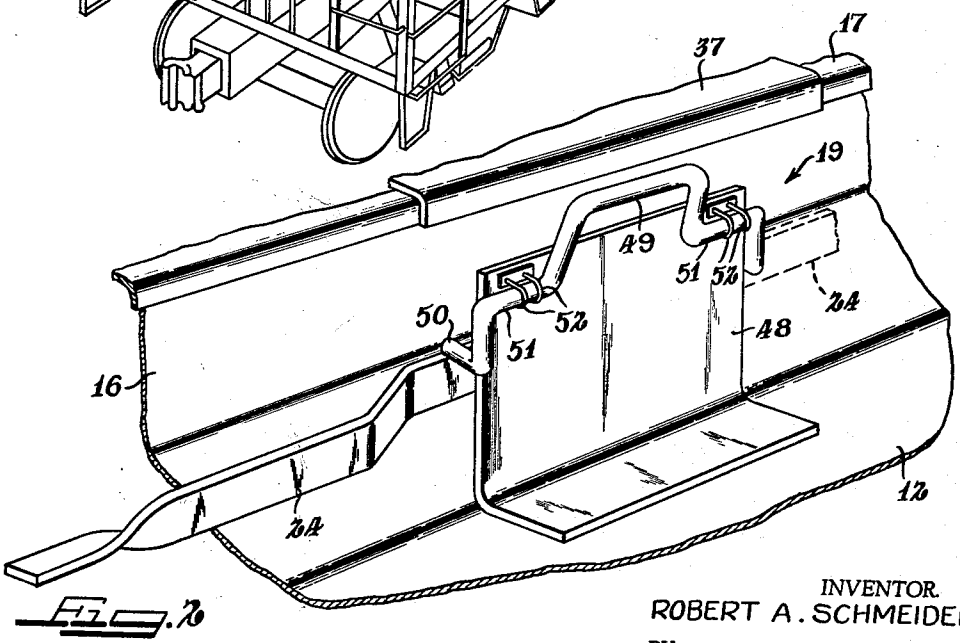


Fig. 2.

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TROUGH TYPE HATCH OPERATING ARRANGEMENT

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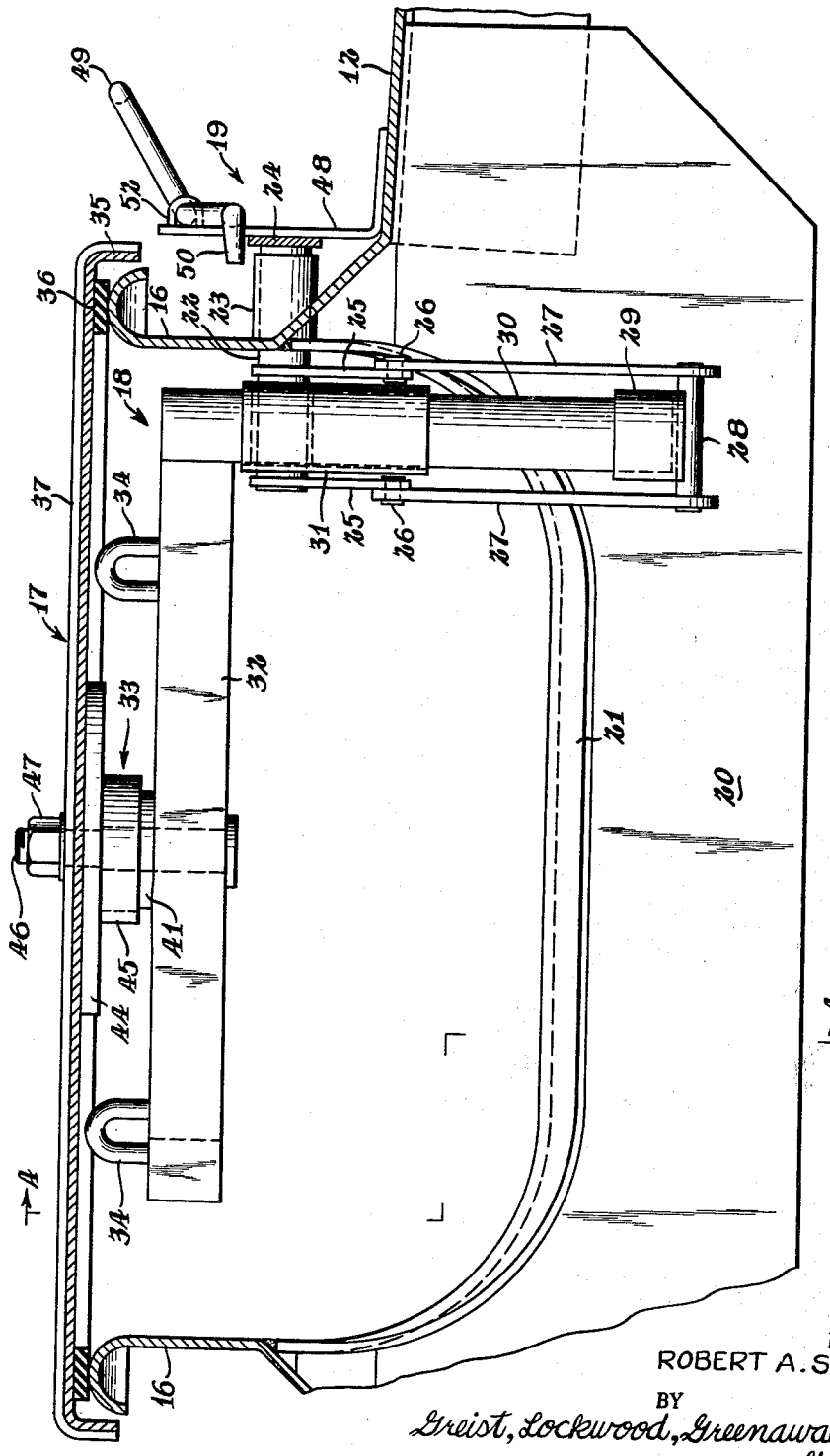


FIG. 3.

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TROUGH TYPE HATCH OPERATING ARRANGEMENT

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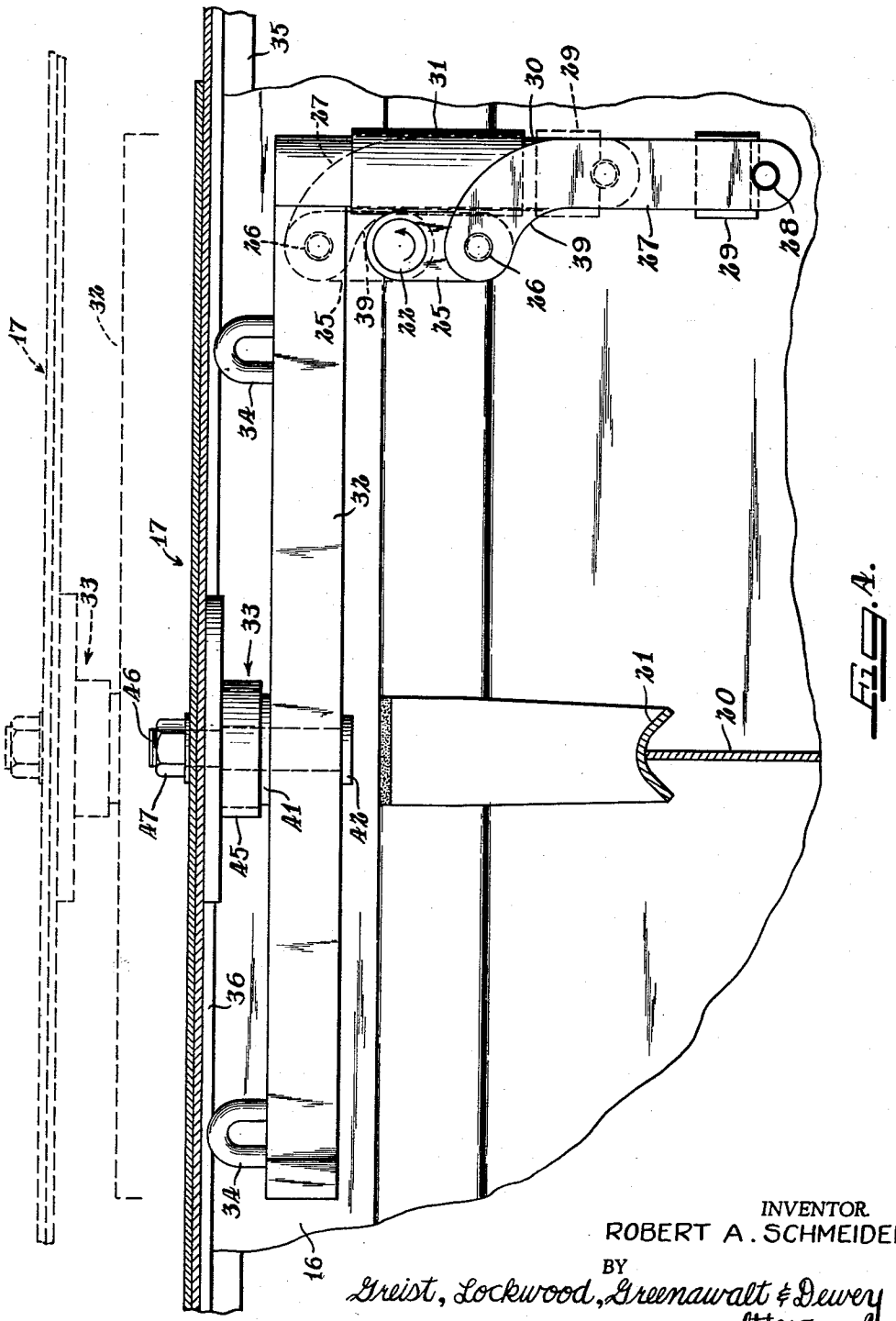


FIG. 4.

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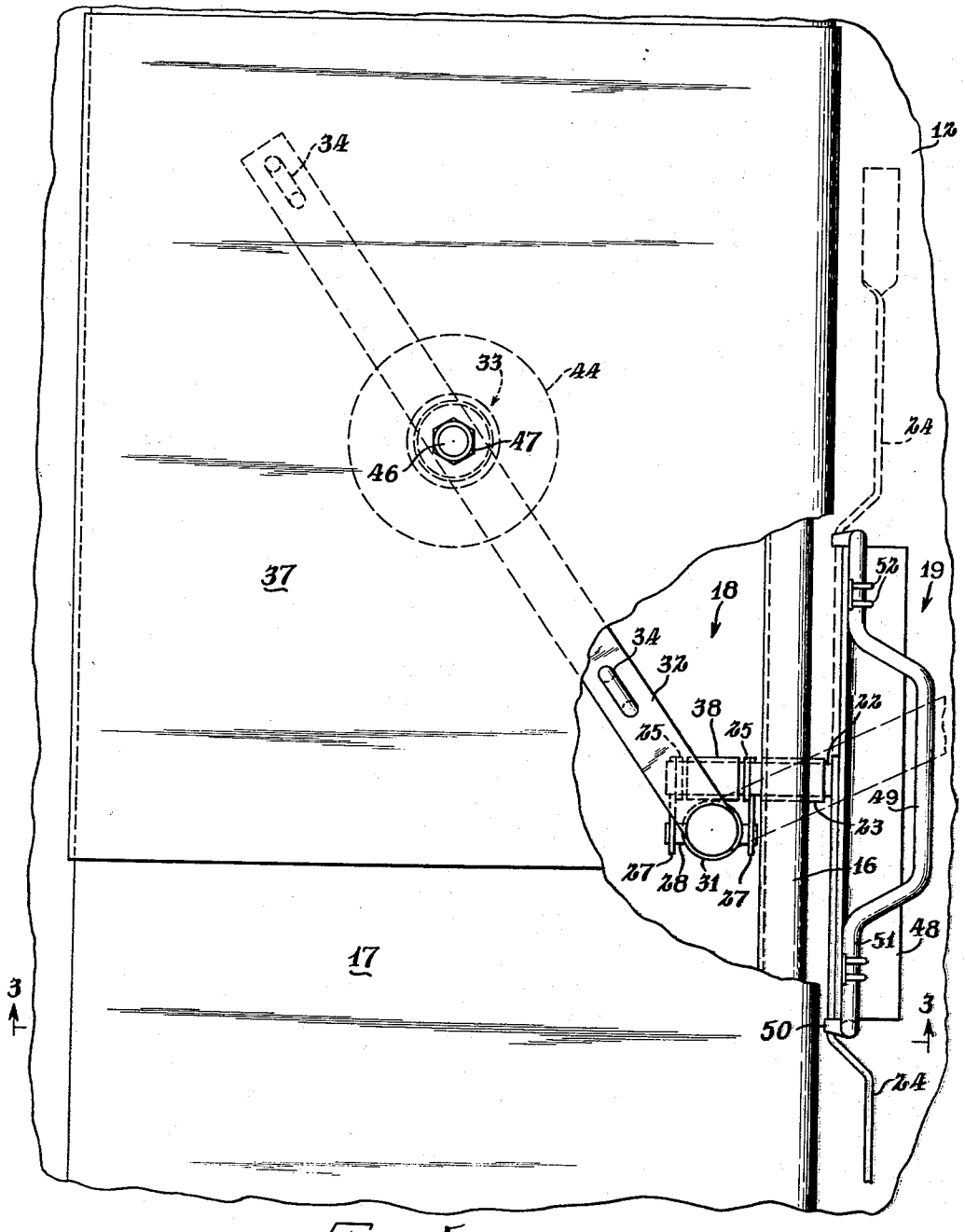


Fig. 5.

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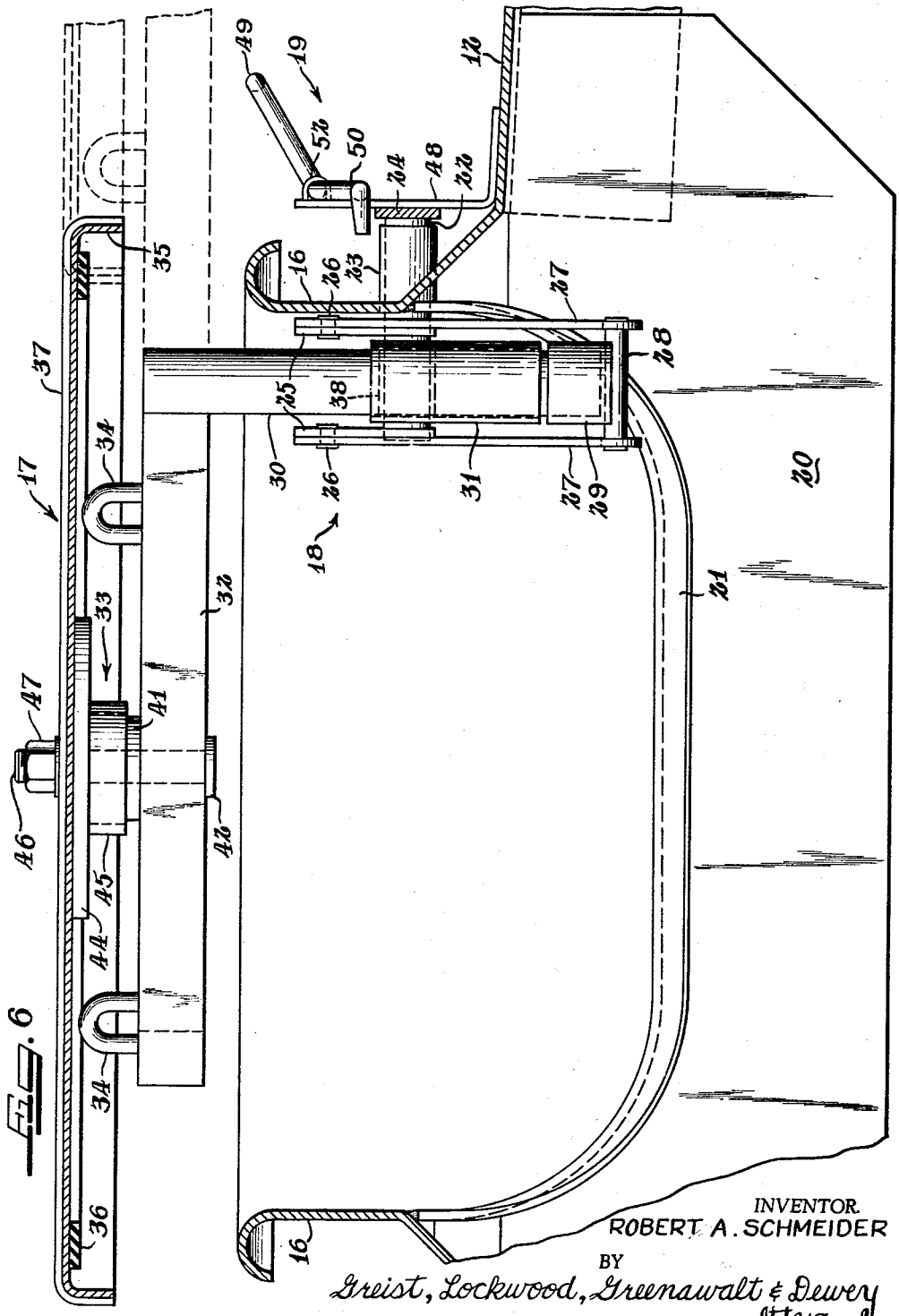


FIG. 6

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Fig. 7.

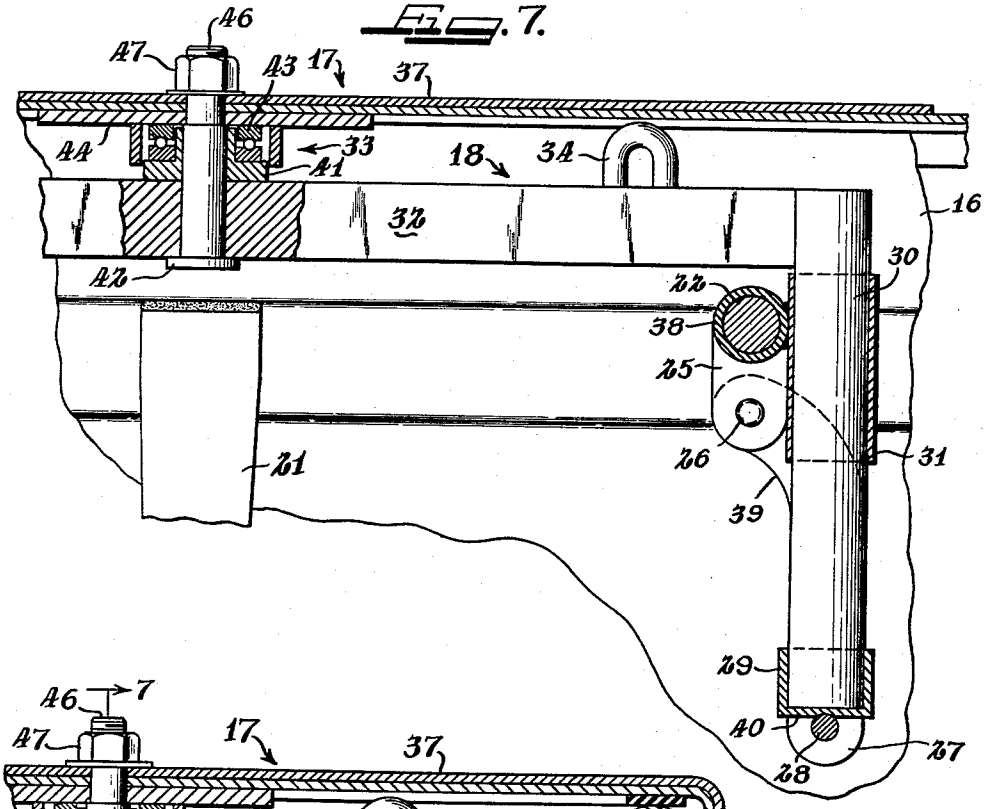
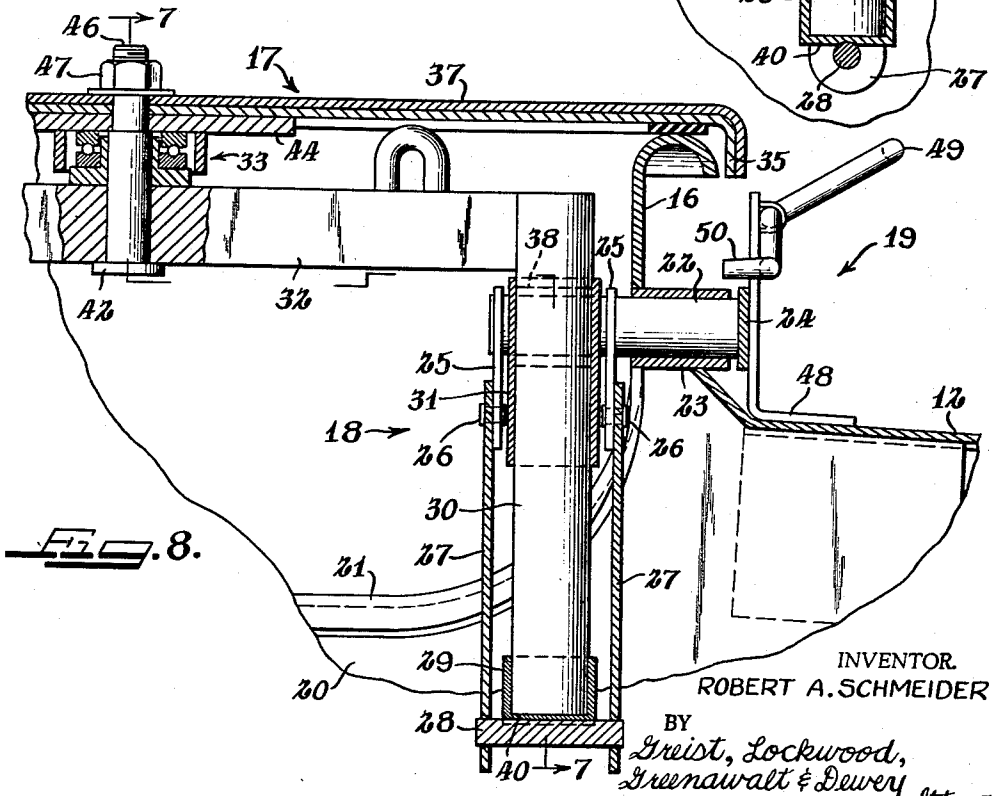


Fig. 8.



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United States Patent Office 3,176,630 Patented Apr. 6, 1965

3,176,630

TROUGH TYPE HATCH OPERATING ARRANGEMENT

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Filed June 4, 1963, Ser. No. 285,397
9 Claims. (Cl. 105—377)

The invention is directed to improvements in hopper cars particularly those of the type provided with elongated hatch openings and cover plates permitting simultaneous exposure of a plurality of aligned hoppers for simultaneous or continuous progressive material filling thereof. More specifically, the invention deals with new and improved operating means for a hatch cover plate especially of the type used with trough hatch arrangements wherein the cover plate is of substantial length.

The use of a trough type hatch arrangement in hopper cars permits a substantial reduction in car loading time by reason of the fact that all of the hoppers are exposed through the roof of the car for simultaneous or continuous progressive filling. The material delivery equipment need merely be progressively advanced along the hatch opening as each successive hopper is adequately filled and no time is lost in discontinuing material discharge operations while movement from one isolated hopper to the other is carried out. With the advent of this type of hopper car filling arrangement, various forms of hatch cover operating means have been proposed, and it is the principal object of the present invention to provide a new and improved form of operating means which is unique by reason of its simplicity and effectiveness.

A further object is to provide a specific form of operating means for use with an elongated hatch cover arrangement, the operating means including as a part thereof a mechanical linkage arrangement of uncomplicated design utilized to lift the hatch cover plate in a controlled and efficient manner.

Still a further object is to provide a new and improved hatch cover operating means for hopper cars or the like, the operating means consisting of supports and operating linkages relying solely on reciprocating and pivoting action thus providing simplicity of design and operation.

Another object is to provide a new and improved hatch cover plate operating means of the type described in the foregoing objects, the operating means including as a part thereof positive lock means of uncomplicated and efficiently functioning design.

Other objects not specifically set forth will become apparent from the following detailed description of the invention made in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective of a hopper car including a trough type hatch arrangement and the operating means of the invention;

FIG. 2 is an enlarged fragmentary perspective of the handle and lock arrangement of the operating means of the invention;

FIG. 3 is a transverse section of a portion of the trough type hatch arrangement illustrating the operating means in elevation;

FIG. 4 is a fragmentary elevation of the operating means as viewed longitudinally of the hatch arrangement along line 4—4 in FIG. 3;

FIG. 5 is a fragmentary plan view of the operating means;

FIG. 6 is a view similar to FIG. 3 illustrating functioning of the operating means;

FIG. 7 is a fragmentary section of the operating means as viewed generally along line 7—7 in FIG. 8; and

FIG. 8 is a fragmentary section of the operating means viewed generally at right angles to the illustration of FIG. 7.

FIG. 1 illustrates a hopper car 10 including a plurality of longitudinally aligned hoppers 11, only the end ones of which are shown. The hoppers are of known configuration including converging wall sections terminating at the bottom thereof in material discharge devices of any suitable type through which material can be withdrawn from the car either by gravity operation or by pneumatic suction tube equipment. The hoppers are closed off at their tops by side roof sheets 12 and end roof sheets 13 of any suitable arrangement, these root sheets receiving thereon longitudinally extending running boards 14 located along either side of a trough type hatch arrangement generally designated by the numeral 15. The hatch arrangement 15 includes an elongated generally rectangular hatch opening defined by a peripherally continuous upstanding sealing rim 16 and a hatch cover plate 17 of a configuration conforming to the opening and rim. At spaced intervals along the trough hatch arrangement 15 special operating means 18 (FIG. 3) including the external handle and lock assemblies 19 of FIGS. 1 and 2 are mounted for use in controlling operational positioning of the cover plate 17 between the sealed position shown in FIGS. 1 and 3 and the raised or open position shown in FIG. 6.

Referring particularly to FIGS. 3–5, the hatch arrangement is reinforced at spaced intervals longitudinally thereof in association with each operating means 18 by transverse, generally U-shaped plates 20 extending across the hatch opening in fixed undersurface engagement with the roof sheets 12 and oppositely positioned upstanding rim sections 16. Each plate 20 reinforces the hatch arrangement transversely thereof and along the top, generally concave surface area thereof a convex baffle plate 21 is provided which extends across the hatch opening in opposite end attachment with opposite rim sections 16. The baffle plate 21 not only further reinforces the hatch arrangement but also presents a relatively smooth baffle surface across the hatch opening to prevent damage to material being delivered thereinto by eliminating contact with any sharp reinforcing plate edges.

Each operating means 18 generally comprises a drive or operating shaft 22 extending transversely of the hatch opening through a section of the rim 16 thus providing an end portion received within the hatch opening and an opposite end portion projecting externally thereof for ready operating access thereto. The outer end portion of the shaft 22 is rotatably journaled in a support sleeve 23 suitably fixed to the rim 16. The outermost end of the shaft 22 projects from the sleeve 23 and has fixed thereto a longitudinally extending operating handle 24 which is in close operative association with the lock assembly 19.

The inner portion of the shaft 22 within the hatch opening has fixed thereto a pair of radially downwardly directed and axially spaced short lever arms 25 which at the lowermost ends are pivotally attached by fasteners 26 to downwardly extending, relatively long levers 27. The levers 27 at their lowermost ends are pivotally received about a transverse pin 28 forming a part of a socket member 29 of cup-like configuration in which is received the bottom end of a support shaft 30 extending upwardly in vertically sliding and rotatably pivoting relation through a guide sleeve 31.

The support shaft 30 at its uppermost end is fixed to a transversely extending, horizontally arranged and diagonally projecting pivot arm 32 which is located across the hatch opening directly under the adjacent portion of the cover plate 17. Centrally of the pivot arm and cen-

trally of the cover plate 17 a bearing assembly 33 pivotally interconnects the arm and plate. In spaced relation on either side of the bearing assembly 33 the top surface of the pivot arm 32 has mounted thereon upwardly projecting bearing brackets 34 of inverted U-shaped located in close association with undersurface portions of the cover plate 17 for stabilization thereof and intermediate support thereof bearing in mind that the cover plate 17 is relatively flexible.

The cover plate 17 is formed from a main longitudinally extending plate of generally inverted U-shape having a peripherally continuous depending flange portion 35 inwardly of which a continuous gasket 36 is carried for sealing engagement with the outwardly curled top edge portion of the rim 16. Adjacent the connection of each operating means 18 to the cover plate 17, a transversely extending reinforcing plate section 37 is attached to the cover plate and conforms thereto.

FIGS. 7 and 8 illustrate the uncomplicated design and arrangement of the mechanical elements of each operating means 18. The inner end portion of the shaft 22 between the upper end connection thereof with the lever arms 25 is rotatably journaled through a sleeve 38 which is fixed to the guide sleeve 31 and extends transversely thereof. In this respect the sleeves 38 and 31 provide one another with mutual support and cooperate in rigidifying and fixing the various elements of the operating means relative to one another. While the operating means is primarily supported by the shaft 22, it will be understood that any suitable attachments can be made to further rigidify and support the elements if necessary.

The longer levers 27 at the top end portions thereof are each formed with an arcuate neck-like section 39 providing for an offsetting of the upper end relative to the lower end placing the upper end in attachment alignment with the associated lever arm 25. This offsetting design further provides for clearance between the shaft 22 and the levers 27 in the raised position of the cover plate as shown in FIG. 4, operation to this raised position to be described.

The socket member 29 as previously described is of cup-shaped and merely encompasses the lower end of the support shaft 30 to permit pivoting of the lower end in the socket member 29. The socket member includes a bottom section 40 having recessed in the bottom surface thereof and fixed thereto the transverse pivot pin 28.

The cover plate and pivot arm bearing assembly 33 includes an annular bearing block 41 fixed to the upper surface of the pivot arm 32 and receiving therethrough a bearing bolt 42 which extends upwardly through the pivot arm and through the cover plate. The bearing block 41 mounts peripherally thereabout a conventional bearing assembly 43 in engagement with a bearing plate 44 fixed to the undersurface of the cover plate 17. An annular depending sleeve 45 is carried by the plate 44 and extends downwardly in overlapping relation with the bearing block 41 to protectively enclose the bearing assembly 43 from the ingress of material delivered into and stored in the hopper. The bearing bolt 42 projects about the upper surface of the cover plate and includes a threaded shank portion 46 about which a lock nut 47 is received. With this arrangement the cover plate 17 is centrally supported by the pivot arm 32 and pivotal movement between these elements is provided.

Operation of each operating means 18 is brought about by movement of the handle 24 through an arc of approximately 180° from the position shown in solid lines in FIGS. 2 and 5 to the position in broken lines in the same views. The handle 24 extends longitudinally of the car in paralleling relation with the hatch opening and cover plate and upon movement from the closed hatch solid line position illustrated through an arc of 180°, the shaft 22 is correspondingly rotated in a counterclockwise manner as viewed in FIGS. 4 and 8 resulting in the lever arms 25 fixed to the shaft 22 being moved from a depending position to an upright position as shown in FIG. 4 in broken lines and as shown in FIG. 6 in solid lines. During such movement the curved upper ends of the levers 27 move rearwardly and upwardly relative to the fixed sleeve 38 along opposite side surfaces of the vertical sleeve 31. With such movement the levers 27 are raised vertically and the transverse movement thereof is permitted by reason of their bottom end pivotal attachment with the pin 28. The vertical movement results in the lifting of the socket member 29 accompanied by the lifting of the support shaft 30 through the sleeve 31. The pivot arm 32 rises with the shaft 30 and the cover plate 17 is correspondingly elevated out of sealing engagement with the rim 16.

Operation is completed when the handle 24 completes movement through its arc of approximately 180° and at such time the lever arms 25 have fully reversed their positions. The curved offsetting neck portions 39 of the levers 27 move into overlying relation relative to the shaft 22 as best shown in FIG. 4. Further counterclockwise movement can be prevented by abutment of the neck portions 39 of the levers 27 with the shaft 22, but the total movement is also limited by abutment of the handle 24 with the adjacent roof sheet portion 12. The raised position of the cover plate is shown in FIG. 6 in solid lines and in FIG. 4 in broken lines. In this raised position the cover plate of course completely clears the rim 16 and the pivot arm 32 also completely clears the rim 16. This permits horizontal transverse movement of the cover plate into a position to one side of the hatch opening as shown in broken lines in FIG. 6. The pivot arm rotates about the vertical axis of the support shaft 30 and the pivot arm also rotates relative to the cover plate by reason of the bearing assembly 33. In the offset position of the cover plate the hatch opening is completely available throughout its entire length for material introduction into the longitudinally aligned hoppers. The longitudinal spacing of the operating means 18 permits continued and efficient support of the cover plate in its raised and offset position and the bearing members 34 are available to reinforce the cover plate to prevent any substantial bending thereof to an extent that would be detrimental thus providing a stabilizing action.

FIGS. 2 and 5 best illustrate the lock assembly 19 as comprising a generally L-shaped support plate suitably fixed along the base leg portion thereof to the adjacent roof sheet 12 with the upstanding leg portion thereof paralleling the handle 24 in close association therewith. This upstanding leg portion functions as a guide surface for the handle 24 during operation thereof and also can be used in retaining the shaft 22 in its proper operative positon. Adjacent the top portion of the upstanding leg portion of the support plate 48 it is a lock element provided with a central offset and projecting handle portion 49 and opposite end prong-like lock elements 50 which overextend the opposite vertical side margins of the support plate and project inwardly therefrom in overlapping engagement with the adjacent top surface portion of the handle 24. Intermediate the handle portion 49 and each of the offset lock elements 50 there is provided a journal neck portion 51 extending through straps 52 suitably fixed to the support plate 48. This arrangement permits pivoting of the handle member 49 in a vertical manner through an arcuate path accompanied by appropriate movement of the horn or prong-like lock elements 50 into and out of overlying locking relation with the handle 24.

To release the handle 24 for movement of the same into cover plate lifting position, it is necessary merely to adequately depress the handle 24 to permit clearance of the lock element 50 in engagement therewith and then lift the handle portion 49 to clear the lock element therefrom. The handle is then free to be moved to its open position and it will be noted that the arrangement of the

lock elements 50 in longitudinally spaced pairs permits one lock element to hold the handle 24 in one of the operating positions thereof. In this respect one lock element will hold the handle in the cover plate closed position and the remaining lock element will hold the handle in the cover plate raised position thus providing means for locking the cover plate in each of its operative positions.

The operating means described is of compact design and can be manufactured and installed economically. The utilization of transversely spaced pairs of toggle-type linkages provides for a force balancing in the operations of lifting and lowering the elongated cover plate. The mechanical parts and connections are of a very simple nature thus eliminating the possibility of fouling thereof by the material introduced into the hoppers.

Obviously certain modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. In a hopper car having a plurality of aligned hoppers provided with a continuous hatch opening which is defined by a continuous rim, and a single hatch cover plate enclosing said opening with marginal portions thereof in sealing engagement with said rim, the provision of hatch cover plate operating means mounted in said opening and comprising a horizontal pivot arm extending transversely of said cover plate and being pivotally attached thereto centrally thereof, said pivot arm including vertical support means extending downwardly therefrom adjacent a side portion of said opening, means carried by said car and pivotally receiving said support means, drive means for said support means carried by said car and extending externally thereof for access thereto, and lever means interconnecting said drive means and support means to raise and lower said support means and said pivot arm and cover plate upon operation of said drive means.

2. The hopper car of claim 1 wherein said drive means includes a rotatable shaft interconnected with said support means through toggle-type relatively pivotal lever means.

3. The hopper car of claim 1 wherein said means receiving said support means includes a vertical sleeve in which said support means is received for pivoting and reciprocating movement, the lower portion of said support means projecting downwardly from said sleeve and being pivotally received in a socket member to which said lever means is connected.

4. The hopper car of claim 1 wherein said drive means includes a rotatable shaft extending through said rim transversely of said opening and having handle means attached thereto externally of said car longitudinally of said cover plate, and lock means on said car and engaging said handle means to hold the same in cover plate open and closed positions, said lock means including an upstanding support means pivotally mounting thereon a generally L-shaped locking member, said locking member being movable into and out of edge engaging relation with said handle means to maintain the same in longitudinally paralleling relation with said cover plate.

5. In a hopper car having a plurality of aligned hoppers provided with a continuous hatch opening which is defined by a continuous upstanding rim, and a single hatch cover plate enclosing said opening with marginal portions thereof in sealing engagement with said rim, mounted in said opening and comprising a horizontal pivot arm extending transversely of said cover plate and being pivotally attached thereto centrally thereof, said pivot arm including a vertical shaft member located adjacent said rim and pivotally and reciprocably received in a vertical sleeve carried by said car, a transverse drive shaft extending through said rim having fixed thereto lever arm means which in the closed position of said cover plate extends downwardly along said sleeve, and lever means pivotally attached to said lever arm means and extending downwardly into pivotal attachment with said shaft member, whereby rotation of said drive shaft raises said lever means and shaft member relative to said sleeve accompanied by raising of said pivot arm and cover plate.

6. The hopper car of claim 5 wherein said drive shaft outwardly of said rim has handle means attached thereto which extends longitudinally of said cover plate, and lock means on said car and engaging said handle means to hold the same in cover plate open and closed positions, said lock means including an upstanding support means pivotally mounting thereon a generally L-shaped locking member, said locking member being movable into and out of edge engaging relation with said handle means to maintain the same in longitudinally paralleling relation with said cover plate.

7. The hopper car of claim 5 wherein spaced pairs of lever arm means and lever means extend downwardly along opposite side portions of said sleeve for balanced raising of said shaft member.

8. The hopper car of claim 5 wherein spaced pairs of lever arm means and lever means extend downwardly along opposite side portions of said sleeve for balanced raising of said shaft member, the lower end portion of said shaft member projecting below said sleeve and receiving a supporting socket member thereon and in which said shaft member is pivotal, said lever means being pivotally attached to said socket member.

9. The hopper car of claim 5 wherein said lever means includes an offset top portion pivotally attached to said lever arm means for clearance with said drive shaft in the raised position of said lever means.

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LEO QUACKENBUSH, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,176,630 April 6, 1965

Robert A. Schmeider

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 13, for "root" read -- roof --; column 3, line 6, for "shaped" read -- shape --; line 43, for "cup-shaped" read -- cup-shape --; column 6, line 9, after "rim," insert -- the provision of hatch cover plate operating means --.

Signed and sealed this 28th day of September 1965.

(SEAL)
Attest:

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Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents