Feb. 8, 1938. T. A. RATKOWSKI 2,107,342

DIPPER DOOR FOR EXCAVATING BUCKETS

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Fig. 1.

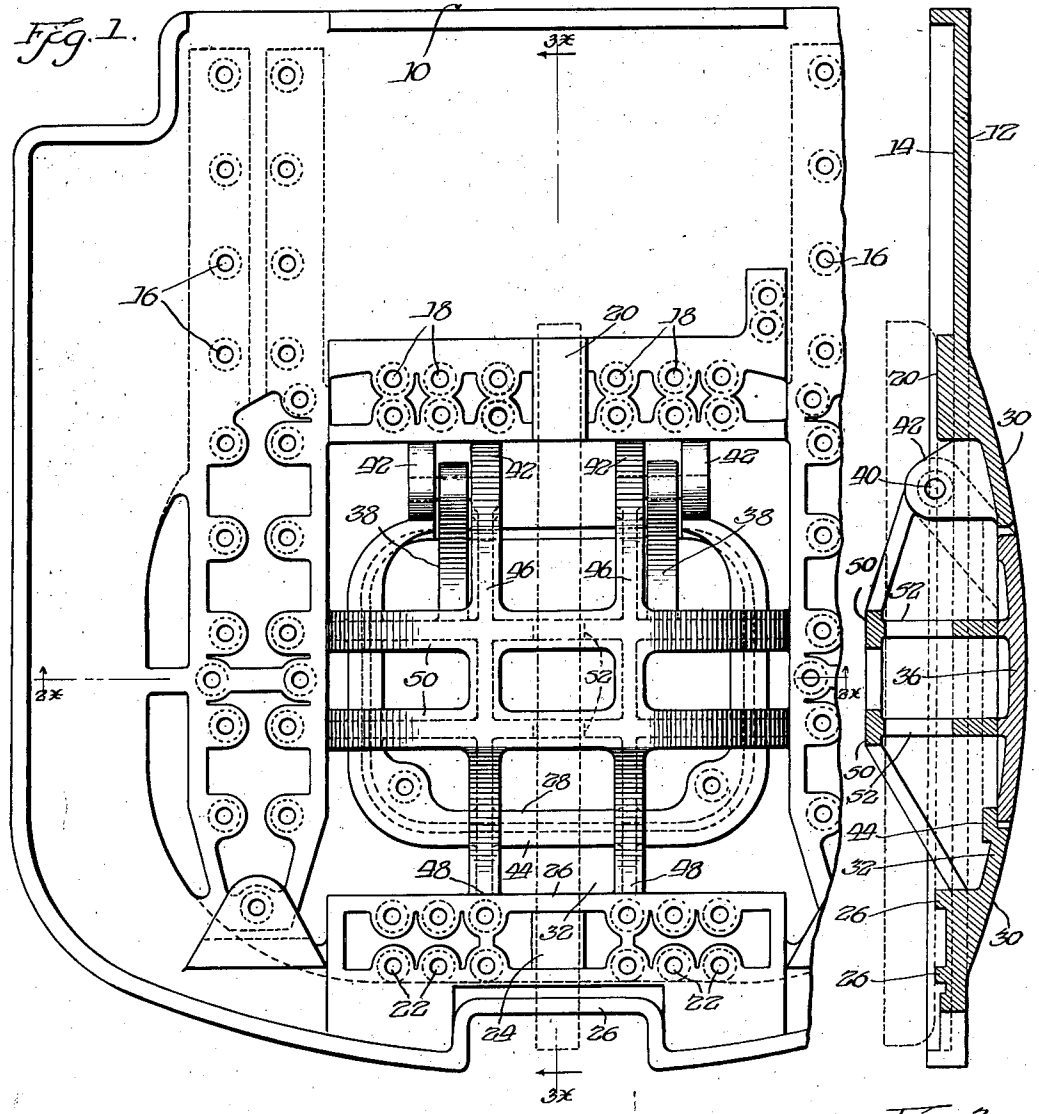


Fig. 2.

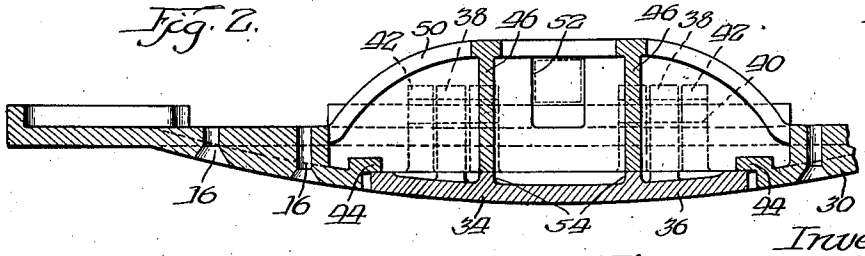


Fig. 3.

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DIPPER DOOR FOR EXCAVATING BUCKETS

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6 Claims. (Cl. 214—145)

This invention relates to improvements in a dipper door for excavating buckets including a relief door pivotally carried by the main dipper door and reinforcement means integrally formed with the main dipper door to strengthen the construction.

It has been previously recognized as an advantage in a dipper adapted for use in hydraulic dredging, for example, to provide the main dipper door with a relief door or flap valve whereby, when the dipper is lowered into the water with the main door closed and locked, the considerable resistance encountered when the dipper strikes the water and in passing through the water is relieved by permitting the water to pass through the relief door thereby equalizing the pressure on opposite sides of the main dipper door. It will be understood that such a relief door opens in the opposite direction to the direction of opening of the main door and therefore when the bucket is filled with material the relief door is maintained in closed position by the material in the bucket. An objection to this construction has been that such relief doors materially weaken the construction of the main dipper doors and this disadvantage is particularly apparent when the dipper is used for excavating rocky material from under water, and the present invention is intended to overcome this objection.

In some respects the manner in which the dipper door is reinforced according to the present invention follows the teachings of an application in the name of Daniel H. Meyer, Serial No. 397,379, filed October 4, 1929, which has since matured into Patent No. 1,864,210, dated June 21, 1932, in that the inner surface of the main door is formed with a convex portion or what may be called a "turtle back design", and this design tends to strengthen the dipper door against shocks due to impact of rocky material picked up by the bucket. However the present invention is an improvement over the Meyer disclosure since the Meyer application does not contemplate the use of a relief door.

It is, therefore, an object of the present invention to provide in a dipper door a relief door which forms a portion of the convex inner surface of the dipper door.

It is further an object of the present invention to strengthen the dipper door by a bridging system of ribs extending over the opening in the main door with which the relief door cooperates. The bridging reinforcement not only serves to strengthen the main dipper door but also provides abutment against which the center portion of the relief door seats outwardly when the relief door is in closed position, and through which shocks applied to the relief door, will be transmitted to the main dipper door. The bridging reinforcement is also designed to permit the association with the dipper door of the usual latching mechanism including a latch bolt slidable through openings formed in the bridging reinforcement.

Further and additional objects and advantages of the present invention will be more readily apparent from the following description taken in connection with the attached drawing, in which

Figure 1 is a plan view of the exterior of the dipper door;

Figure 2 is a sectional view on the plane indicated $2x$—$2x$ in Figure 1, and

Figure 3 is a sectional view on the plane indicated $3x$—$3x$ in Figure 1.

The main dipper door is generally indicated 10 having an inner side 12 facing the inner side of the bucket and an outer side 14. A plurality of rivet holes 16 are shown for the attachment of the usual hinges for the dipper door. The rivet holes 18 are for the purpose of attaching a housing for guiding the usual latching bolt, which housing is intended to be centered and positioned by the pad 20. The rivet holes 22 provide for the attachment of another housing member guiding the end of the latching bolt adjacent to the latch and this housing is positioned by pad 24, having ribs 26 between which are positioned the rollers which constitute a bearing for the latching bolt. In the drawing the latching bolt is indicated in dotted lines.

In the space surrounded by the rivets which attach the door hinges and the latch housing members an opening 28 is formed in the dipper door. It will be noted that this opening is in a portion of the door which is raised on the inner side 12 of the bucket, as indicated by the convex portion 30, and depressed on the outer side as indicated by the depression 32. A relief door 34 is arranged to cooperate with the opening 28 and the inner surface 36 of the relief door forms a continuation of the convex surface 30 on the main dipper door. The convex or turtle back design of the door tends to cushion impact shocks subjected to the dipper door by impingement of material into the bucket. The relief door has hinge arms 38 supported by pivot pins 40 on lugs 42 so that the relief door may swing inwardly with respect to the main body of the dipper door. The relief door in closed position will seat upon a

flange **44** extending around three sides of the opening **28**.

It will be noted that the dipper door is provided with a bridging reinforcement on the exterior over the relief door. Thus, there is shown a pair of longitudinal ribs **46** extending from the lugs **42** and merging at **48** into the main body of the dipper door. A further pair of ribs **50** extend crosswise with respect to the ribs **46** and merge at their ends into the main body of the dipper door. It will be noted that the cross ribs **50** have openings **52** to admit the slidable latch bolt. The ribs **46** and **50** form a support for the central portion of the relief door and it will be noted that the relief door is formed with short ribs **54** which seat upon the ribs **46** and **50** when the relief door is in closed position.

The construction described provides a dipper door having a relief door and substantially as strong as the usual dipper door without a relief door, due to the provision of reinforcing ribs formed integral with the main dipper door and tying together the sides of the opening with which the relief door cooperates.

Various modifications and changes may be resorted to without departing from the spirit of my invention as expressed in the appended claims.

I claim:

1. In a dipper door, a relief door movably carried by the main body of the dipper door, the main body of said dipper door having an opening normally closed by said relief door and bridging reinforcing means integrally formed with the main body of said dipper door and extending across said opening on the outer side of said door.

2. In a dipper door, a main body member having an outwardly closing relief opening therein, a relief door movably carried by said main body member cooperating with said relief opening and reinforcing ribs integrally formed with said main body member extending crosswise with respect to said opening on the outer side of said dipper door and providing an abutment for the intermediate portion of the relief door.

3. In a dipper door, a main body member having a relief opening therein, a relief door pivotally carried by said main body member and cooperating with said relief opening, a pair of reinforcing ribs integrally formed with said main body member extending across the opening of said dipper door, said ribs having openings permitting assembly of a latching bolt for said dipper door.

4. A dipper door having a convexedly curved surface on its inner side, a relief door forming part of the dipper door movably supported by the main body of said dipper door and forming a portion of said convexedly curved surface and reinforcing ribs integrally formed with the main body of said dipper door extending crosswise of said relief door on the outer side of said dipper door.

5. In a dipper door, a main body member having a relief opening therein, a relief door pivotally carried by said main body member and adapted in closed position to close said opening and reinforcing ribs integrally formed with the main body member extending across the relief opening of said main body member on the outer side of said dipper door, said ribs providing the pivot bearing for the relief door and forming abutments for said relief door to receive shocks transmitted thereto when said relief door is in closed position.

6. In a dipper door, a main body member having rivet-receiving openings for the attachment of the usual hinges and latch housing members, said main body member having an opening in the space surrounded by said rivet receiving openings, a relief door pivotally carried by said main body member adapted to swing inwardly with respect to said main body member when said main body member is in closed position, reinforcing ribs integrally formed with said main body member extending crosswise with respect to said relief door on the outer side of said main body member, said reinforcing ribs forming abutments for said relief door when said relief door is in closed position.

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