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P. V. LARSEN
DIPPER FOR POWER SHOVELS AND THE
DOOR MOUNTING MEANS THEREFOR

2,561,518

2 Sheets-Sheet 1

Fig. 1

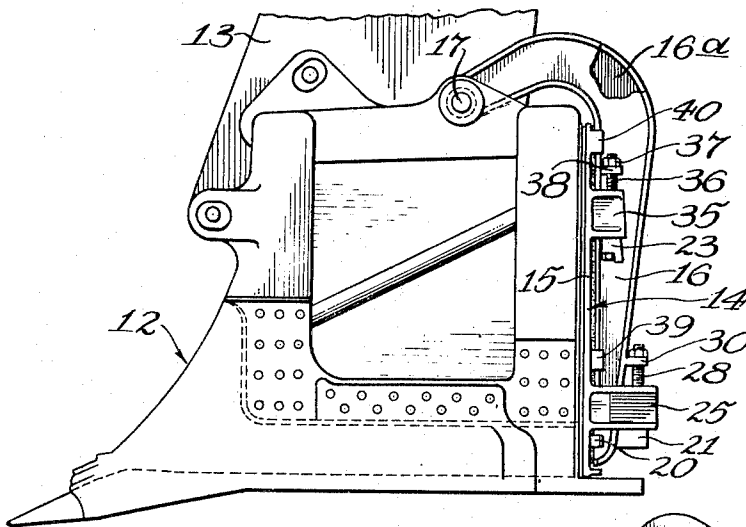


Fig. 2

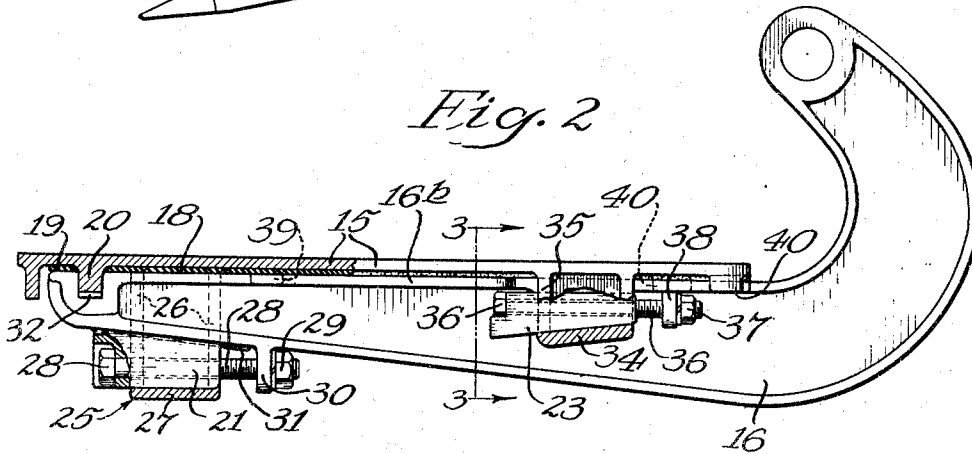
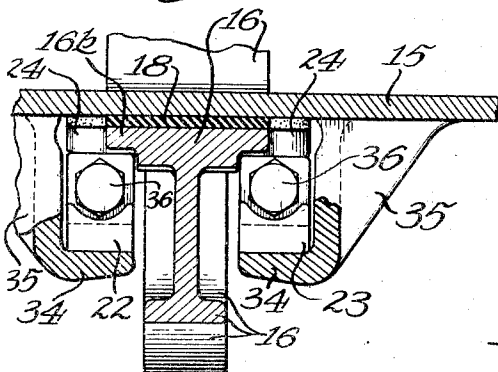


Fig. 3

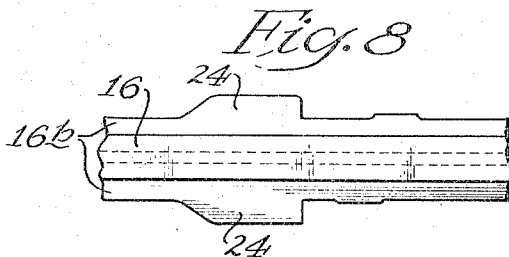
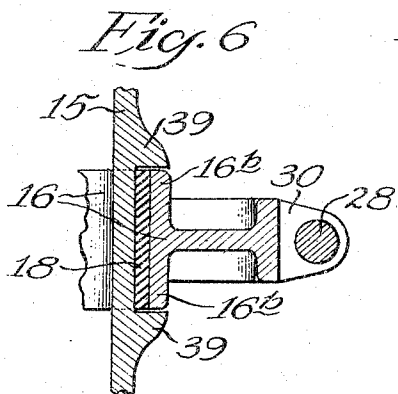
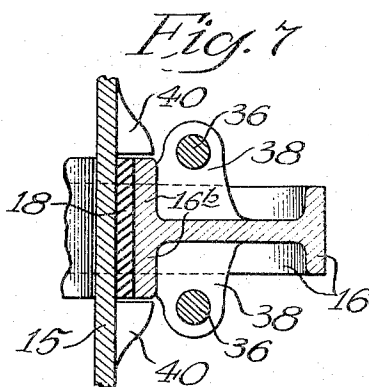
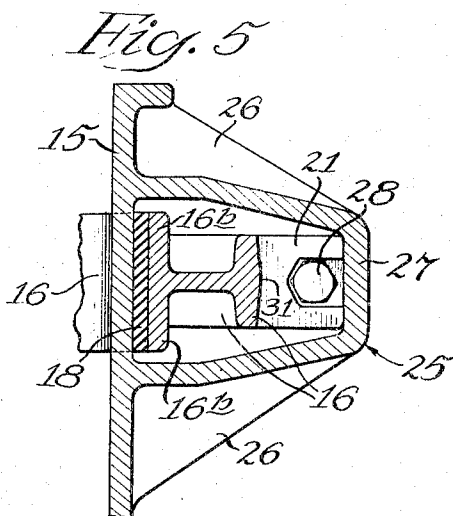
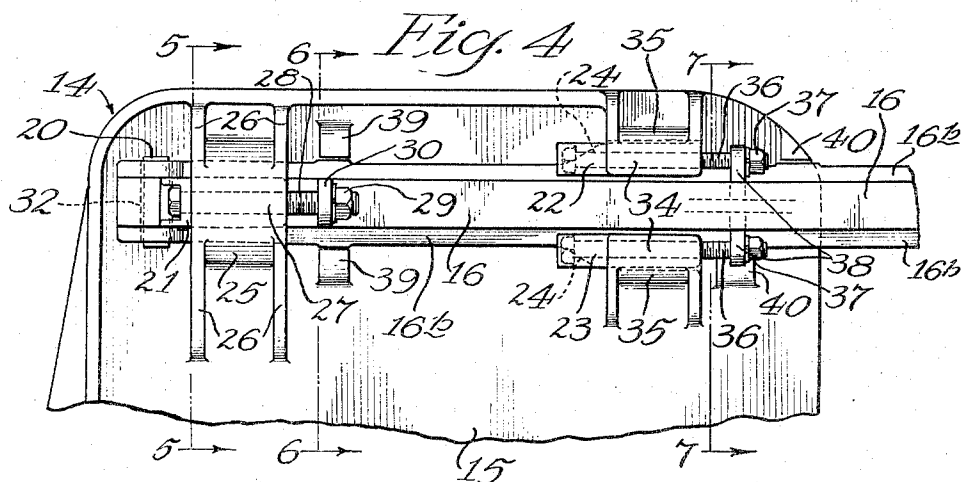


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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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DIPPER FOR POWER SHOVELS AND THE
DOOR MOUNTING MEANS THEREFORPaul V. Larsen, Portland, Oreg., assignor to Elec-
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17 Claims. (Cl. 214-145)

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This invention relates to improvements in a dipper for a power shovel and particularly to means for providing a resilient mounting of great strength and great durability for the door structure of the dipper, and it has for its object the provision of a new and improved form and arrangement of parts whereby the desired resiliency and strength are provided. In a construction of this type, involving a heavy metal door whose operative movements with respect to the dipper are controlled by gravity and by flipping or snapping movements of the dipper or shovel on the end of a heavy supporting and operating beam, it is highly important that the contacting and supporting parts of the structure shall be of great strength and of great durability. At the same time, it is important that there shall be provision for a substantial amount of yield in the structure for cushioning the impact of the relatively movable parts so as to protect the parts from being pounded to pieces by the shock from often repeated blows.

It is one of the objects of this invention to provide an improved form of connection between the door of a structure of this type and the hinge bars by which the door is movably supported in position whereby the door is permitted to have a limited movement with respect to the bars and whereby a resilient stoppage of the movement of the door is assured at the end of a movement of the door into its closed position. I have attained this object by the provision of an improved arrangement of parts, comprising a strip of rubber or other resilient material interposed between impact and supporting elements, such strip of yielding material serving not only to relieve the blows incident to normal operation and to take the heavy pressure of parts brought forcibly together, but also to accommodate and take care of slight irregularities in the formation of the parts whereby the necessity for accurate machining in the manufacture of such parts may be avoided.

It is another object of my invention to provide an improved arrangement of the connecting means between the door and the hinge bars whereby the use of rivets, bolts, welded joints and the like may be avoided. I have accomplished this object in the construction shown by the use of an improved arrangement of connecting means, comprising holding blocks preferably in the form of wedge members cooperative with heavy associated parts for pressing the door into engagement with the hinge bars, together with heavy lug and socket means for holding the door

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in position longitudinally of the hinge bars, and heavy side bearing face parts for controlling the position of the door transversely of the hinge bars. All of this mechanism is arranged for permitting a slight amount of movement of the door with respect to the hinge bars so as to provide for the easy fitting of the parts together, while at the same time serving to hold the door very strongly in operative position with respect to the body of the dipper or shovel.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings,

Fig. 1 is a side face view of a dipper mounted on a power shovel stick and embodying my improved construction;

Fig. 2 is a side face view of one of the hinge bars of the structure shown in Fig. 1, with the dipper door mounted thereon; such parts being turned for convenience of illustration through a 90° angle as compared with their position in Fig. 1;

Fig. 3 is a cross sectional view taken at the line 3-3 in Fig. 2;

Fig. 4 is a bottom face view of one side portion of my improved dipper door mounted on a hinge bar as shown in Fig. 2, with the end portion of the bar broken away at the right;

Figs. 5, 6 and 7 are vertical sectional views taken respectively on the line 5-5, the line 6-6 and the line 7-7 of Fig. 4; and

Fig. 8 is an outside face view of a portion of the hinge bar as shown in Fig. 4 but with the associated parts removed for clearness of illustration.

Referring now to the several figures of the drawings, 12 indicates the body of a dipper of a conventional type mounted on the end of a power shovel stick as is illustrated in Fig. 1. As is usual in structures of this type, a dumping door 14 is mounted at the rear face of the dipper in position to take the pressure of the dirt or other material as the dipper is pressed forwardly toward the left in Fig. 1 for picking up a load, such door being pivotally mounted on the dipper so as to yield readily when released for dumping the contents of the dipper. This door 14 comprises a heavy metal plate 15 extending from side to side and from top to bottom of the load carrying chamber of the dipper, as is usual in constructions of this type, being movably mounted on the dipper through the medium of

heavy hinge bars 15 and 16a at opposite sides of the door, only one of the two similarly arranged hinge bars and associated parts being shown in detail in the drawings. In my improved arrangement, the hinge bars 16 and 16a have the usual goose-neck formation, with the short arm portions of the bars pivotally connected with the dipper by means of heavy axis pins 17, as shown in Fig. 1. Heavy laterally extending flanges 16b are provided on the hinge bars at the faces adjacent to the door.

In my improved arrangement, cushioning members 18 in the form of elongated strips of rubber or other suitable material are interposed between the outer face of the door plate 15 and the inner faces of the bars 16 and 16a for relieving the severity of the impact when the door is brought forcibly to its closed position or when a heavy rock or the like is thrown against the inner face of the door. These cushioning strips are preferably cut from $\frac{3}{8}$ " woven standard rubber belting material whereby great durability is assured along with the requisite degree of resiliency for taking up the shock of the blow of the door against the dipper. In the arrangement shown, short lengths 19 of the strip material are employed at the edge portion of the door to supplement the action of the strips 18, such short lengths being employed beyond the positions of transversely extending lugs or ribs 20 at opposite sides of the door as hereinafter described.

The means utilized for connecting the door 14 to the hinge bar at either side of the door comprises a comparatively large heavy metal holding block 21 preferably in the form of a wedge engaging the outer face of the hinge bar near its free end, and comparatively heavy metal holding blocks 22 and 23 preferably in the form of wedges engaging the outer faces of the flanges 16b at 24 where the flanges are made wider for supporting the blocks.

The improved means I have employed in connection with the wedge member 21 for holding it pressed against the outer face of the hinge bar 16 comprises bracket means in the form of a yoke 25 formed integrally with the door plate 15 on its outer face in position to straddle the hinge bar, with reinforcing webs 26 at opposite sides of the yoke for strengthening the construction. With the hinge bar 16 extending through the yoke by insertion from the right in Figs. 2 and 4, the wedge 21 is driven into position from the left between the cross bar section 27 of the yoke and the outer face of the hinge bar, the wedge being maintained in operative position by a bolt 28 having a nut 29 thereon pressing on the outer face of a lug 30 extending outwardly from the outer face of the hinge bar. As is clearly shown in Figs. 2 and 5, the outer face of the bar 16 is crowned slightly at 31 and the inner face of the wedge is correspondingly shaped, serving to expedite the easy assembly of the parts in their operative positions and to insure the desired co-operative action between the hinge bar and the wedge.

As is set forth above and as is shown in Fig. 2 of the drawings, the plate 15 of the door 14, at a point near the outer edge of the door, is provided with a transversely extending lug or rib 20 projecting from the outer face of the door, such lug having in effect a tongue and groove connection with a transversely extending groove or socket 32 provided in the inner face of the hinge bar. It will be understood that when the bar 16 is being inserted through the yoke 25 the groove 32 can

be brought into engagement with the lug 20 by a proper manipulation of the parts before the wedge 21 is inserted in the yoke. In the arrangement shown, when the parts are in their operative positions, as shown in Figs. 1 and 2, the lugs 20 at opposite sides of the door are effective by engagement with the grooves 32 for holding the door from movement in either direction longitudinally of the hinge bars 16 and 16a.

The means employed in connection with the elongated wedge members 22 and 23 for holding them pressed against the outer faces of the widened flange portions 24 of the hinge-bars at opposite sides thereof is best shown in Fig. 3. As shown in that figure, the wedge members 22 and 23 bear at their inner faces against the laterally extending flange portions 24 of the hinge-bars, with the cross bar portions 34 of brackets 35 engaging the outer faces of said wedge members, said brackets 35 being mounted fixedly in position on the outer face of the door plate 15. Said wedge members 22 and 23 engage the outer faces of the flanges 24 throughout the full width of said flanges, and the bearings of the wedge members on the flanges are substantially as long, longitudinally of the hinge-bars, as their width transversely of said bars. The arrangement is such that when said wedge members are driven to the limit of their movement toward the right in Fig. 2, for insertion between the brackets 35 and the hinge-bars, the door 14 and the hinge-bars are held very strongly in operative relationship to each other. In this arrangement, the wedges 22 and 23 are held in their operative positions by bolts 36 passing through the wedge members longitudinally thereof and having nuts 37 on their end portions adapted to be tightened against the faces of laterally extending lugs 38 carried by the hinge-bars at opposite sides thereof, as is clearly shown in Fig. 7.

The arrangement of the blocks 21, 22 and 23 and the holding parts with which said blocks have sliding engagement is such in my improved construction that they provide bearings of comparatively large size through which pressure is applied effectively from the door to the hinge-bars. With the holding blocks 21 extending laterally throughout the full width of the outer faces of the hinge-bars, and the blocks 22 and 23 extending laterally throughout the full width of the flanges of the hinge-bars at 24, and with the bearing faces of the several wedge blocks 21, 22 and 23 of at least substantially as great length longitudinally of the hinge bars as their width, the application of pressure on the door and other parts of the dipper is effected with very little if any tendency for any of the parts to be distorted or to become loosened, and with very little likelihood that any of the parts shall be broken during long periods of exceedingly hard usage. For enabling this result to be brought about, I have preferably employed manganese steel castings for the production of the door and the hinge-bars, with the critical high strength and high tension parts thus formed of that material without the use of inserts, either removable or otherwise, for such critical parts, but it will be understood that this arrangement involving integral formation of the parts may be departed from, if desired.

In my disclosed structure, heavy lugs are provided on the outer face of the door plate 15 in position to have snug engagement with the side face portions of the hinge-bars for limiting the movement of the hinge-bars transversely with respect to the door. This means comprises a pair

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of lugs 39 of comparatively large size at opposite sides of each of the hinge-bars near the free end of the hinge-bar, and a second pair of lugs 40 also of comparatively large size at opposite sides of each of the hinge-bars in position to engage the side edge faces of the hinge-bar in substantially spaced relationship to the lugs 39. The lugs of each pair are so spaced with respect to each other as to permit limited movement of the door transversely with respect to the hinge-bars but so as very strongly to resist such transverse movement of the door beyond the desired limits, so long as the hinge-bars are held in their operative positions with respect to the door by the connections comprising the brackets and the holding blocks or wedges.

By the use of this construction, involving my arrangement of cushioning means and my improved arrangement of broadfaced holding parts, whereby the necessity for the use of bolts or rivets or welded joints is avoided, I am enabled without the use of excessively heavy elements to provide an operative structure which is adapted to work satisfactorily for a very long time without the necessity for frequent repairs or replacement of parts, in which structure the parts are protected from the danger of damage which might be brought about by the blows of the parts against each other. My improved connections between the door and the hinge bars are such as to prevent injury by reason of the loosening of any of the holding parts, the wedge members with their broad bearing faces in contact with correspondingly broad bearing parts being highly effective for combatting wear and breakage in the operation of the machine.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a door for the dipper of a power shovel, the combination of a closure plate, hinge-bars extending across the outer face of said closure plate, resilient means serving to cushion the closure plate with respect to said hinge-bars so as to permit the closure plate to move bodily toward the hinge-bars upon the application of heavy pressure on the plate toward said bars, and connections between said closure plate and said hinge-bars adapted to permit movement of the closure plate toward the hinge-bars against the force of the resiliency of said cushioning means and comprising brackets rigidly mounted on said plate and extending outwardly therefrom into position to overlie portions of said hinge-bars, and holding members in the form of blocks interposed between the overlying portions of said brackets and said hinge-bars serving very strongly to limit movement of the closure plate in the direction away from the hinge-bars.

2. In a door as specified in claim 1, the holding blocks being of comparatively great width and length so as to have effective engagement with the outer faces of the hinge-bars throughout substantially the full width of the hinge-bars and throughout at least as great a length as width.

3. In a door as specified in claim 1, the combination being further characterized by ribs on

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the closure plate extending transversely of the plate on its outer face and having a working fit in grooves on the hinge-bars for holding the closure plate against any substantial movement longitudinally of the hinge-bars while said hinge-bars are held in operative position by said holding members.

4. In a door as specified in claim 1, the resilient cushioning means being in the form of elongated strips of rubber belting type of material interposed between the outer face of the closure plate and the inner faces of said hinge-bars.

5. In a door as specified in claim 1, at least some of said brackets being in the form of yokes extending into position to straddle said hinge-bars, with at least some of the holding members bearing on the outer faces of the hinge-bars and extending across substantially the full width of such outer faces of said hinge bars.

6. In a door as specified in claim 1, the hinge-bars being provided with laterally extending flanges against the outer faces of which some of the holding members bear across substantially the full width of the flanges.

7. In a door as specified in claim 1, at least some of said brackets being in the form of yokes extending into position to straddle the end portions of said hinge-bars and the hinge-bars being provided with laterally extending flanges at their face portions adjacent to the closure plate, with some of said holding members bearing on said yokes and on the outer faces of the hinge-bars across substantially the full width of the hinge-bars, and with the others of said holding members bearing on others of said brackets and on the outer faces of said flanges across substantially the full width of said flanges.

8. In a door as specified in claim 1, each of the hinge-bars being held against any substantial movement laterally with respect to the plate by lugs on the plate in position to engage side face portions of the hinge-bar while said hinge-bar is held in operative position by said holding means.

9. In a door as specified in claim 1, each of the hinge-bars being held against any substantial movement laterally with respect to the plate by two sets of lugs on the plate in spaced position with respect to each other longitudinally of the hinge-bar and in position on the closure plate to engage side face portions of the hinge-bar while said hinge-bar is held in operative position by said holding members.

10. In a door as specified in claim 1, the combination being further characterized by tongue and groove connections between the closure plate and the hinge-bars for holding said closure plate against any substantial movement longitudinally of the hinge-bars.

11. In a door as specified in claim 1, the blocks being in the form of elongated wedge members slidably mounted in position between the overlying portions of the brackets and the hinge-bars.

12. In a door as specified in claim 11, each of said elongated wedge members being held in operative holding position with respect to one of said hinge-bars by means comprising a bolt extending longitudinally through the wedge member and engaging a lug mounted in fixed position on said hinge-bar.

13. In a door as specified in claim 12, the hinge bars being provided with laterally extending flanges against the outer faces of which some of said wedge members bear across substantially the full width of the flanges.

14. In a dipper for a power shovel, the combination of a body member, a door member in the form of a closure plate at one face of the body member, hinge means comprising hinge bars extending across the outer face of said closure plate, resilient means serving to cushion the closure plate with respect to said hinge bars so as to provide for a limited movement of said closure plate bodily in the direction away from the body of the dipper upon the application of heavy pressure outwardly on the closure plate, and connections between said closure plate and said hinge bars comprising brackets rigidly mounted on said plate and extending outwardly therefrom into position to overlie portions of said hinge bars, and holding members in the form of blocks interposed between the overlying portions of said brackets and said hinge bars and of comparatively great width and length so as to have effective engagement with the outer faces of the hinge bars throughout at least substantially the full width of the hinge-bars and throughout at least substantially as great length as width.

15. In a structure as specified in claim 14, the holding blocks being in the form of elongated wedge members slidably mounted between the overlying portions of said brackets and said hinge-bars.

16. In a structure as specified in claim 14, at least some of the brackets being in the form of yokes in position to straddle said hinge-bars, and at least some of said holding blocks being in the form of elongated wedge members slidably mounted between said yokes and the outer faces of said hinge-bars and bearing on said hinge-bars throughout at least substantially the full width of the hinge-bars.

17. In a structure as specified in claim 14, the hinge-bars being provided with laterally extending flanges, and at least some of the holding blocks being in the form of elongated wedge members slidably mounted between the overlying portions of said brackets and the outer faces of said flanges and bearing on said flanges throughout at least substantially the full width of the flanges.

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