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J. O'F. CLARK

DOOR FOR EXCAVATING DIPPERS AND THE LIKE

Filed Jan. 5, 1925

2 Sheets-Sheet 1

Fig. 1.

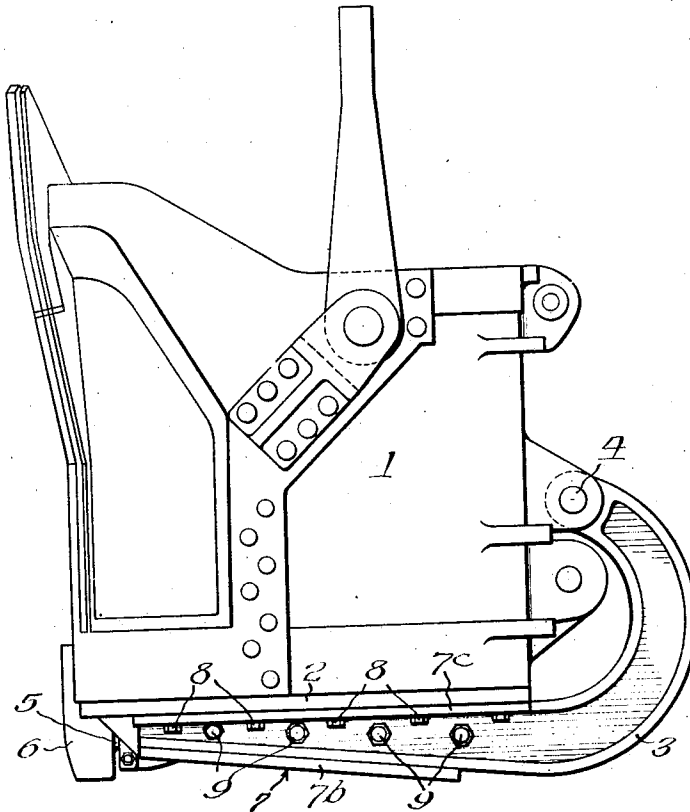
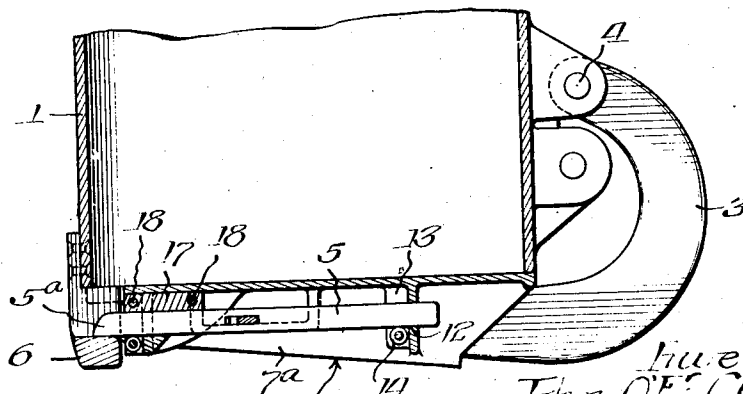


Fig. 2.



Witness
Ed. Peterson

Inventor:
John O'F. Clark.
By *William H. Leu Byron* Attys

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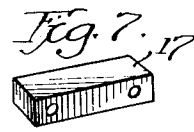
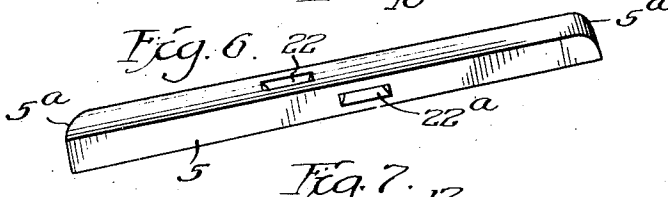
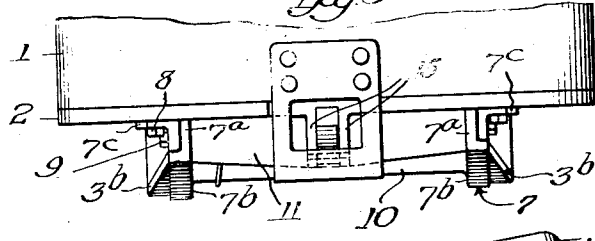
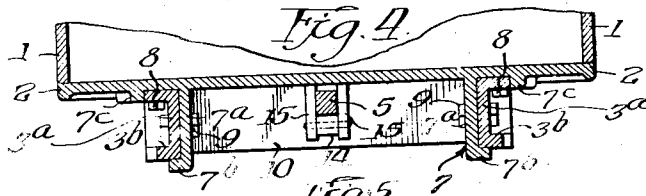
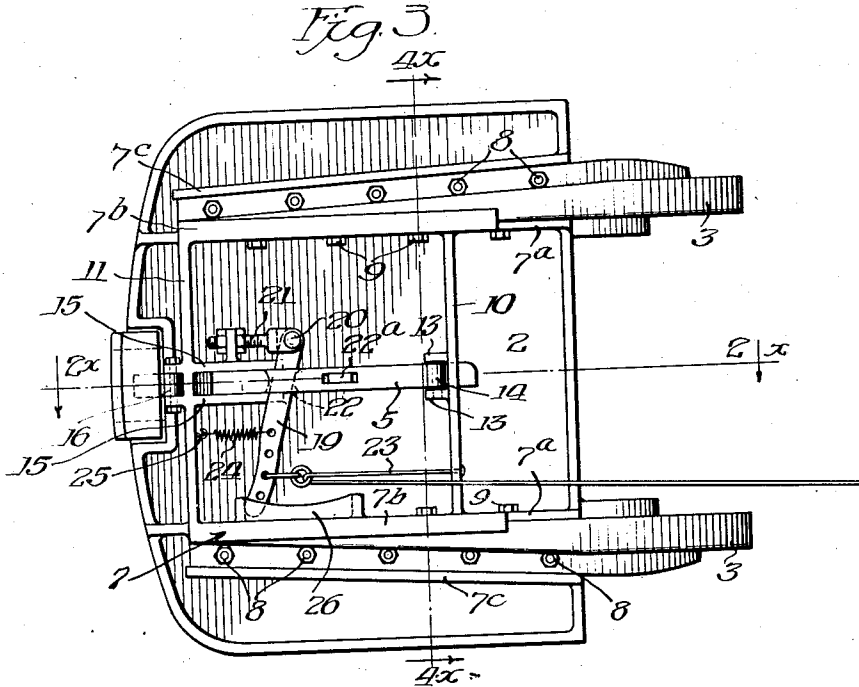
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J. O'F. CLARK

DOOR FOR EXCAVATING DIPPERS AND THE LIKE

Filed Jan. 5, 1925

2 Sheets-Sheet 2



Inventor
John O'F. Clark.

Witness
Ed. E. Brown

By Wilkinson, Husley, Byron & Knight
Attys.

UNITED STATES PATENT OFFICE.

JOHN O'FALLON CLARK, OF CHICAGO HEIGHTS, ILLINOIS, ASSIGNOR TO AMERICAN MANGANESE STEEL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF MAINE.

DOOR FOR EXCAVATING DIPPERS AND THE LIKE.

Application filed January 5, 1925. Serial No. 544.

This invention relates to excavating apparatus in which a dipper, bucket, scraper, or other receptacle for materials to be dislodged and conveyed, is provided with a hinged door held closed by a latch that is releasable at will to discharge the contents.

Receptacles of this kind are subjected to very severe usage, and difficulty has been experienced in maintaining the door in serviceable condition, some of these difficulties arising from distortion or warping of the door under the heavy loads which it is required to bear, and the tearing out of the rivets which hold the hinges; and others being incident to the latching mechanism, which, because of unavoidable contact with rock and other destructive objects, has but a limited life at best and is often put out of function by injury before it has become seriously worn in service.

One object of the present invention is to provide a novel construction of door for uses analogous to that above mentioned, to which end, the door, preferably produced by casting manganese steel, is designed with deep ribs substantially perpendicular to the plane of the door, which extend transversely and longitudinally of the door and meet, preferably integrally, to render them inter-sustaining; and to so design those of the strengthening ribs which extend in the direction of hinge attachment that they will receive and embrace the arms of the hinges and confine the hinges relatively to the door in directions which are both parallel with and perpendicular to the plane of the door, with the result that the rivets or bolts which hold the hinges and door in assembly are wholly relieved from stresses which tend to tear them out.

Another object of the invention is to provide a latching mechanism for doors of the kind described, which will serve for a longer time by reason of having the bolt and latch reversible in position, more readily assembled, and therefore cheaper to replace when parts are worn, and more durable in use because of the construction and organization inherent in its parts; the frame-like reinforcing webs on the door being utilized for mounting the latch mechanism.

In order that the invention may be fully understood, the preferred embodiment there-

of will be described in connection with the accompanying drawings, in which—

Figures 1 and 2 are, respectively, a side elevation and a fragmentary vertical section of an excavating dipper to which the several features of the present invention are applied.

Figure 3 is a bottom plan view of the dipper shown in Figures 1 and 2.

Figure 4 is a section on the line 4^x—4^x of Figure 3.

Figure 5 is a front end elevation of the dipper as seen from the right of Figure 1.

Figure 6 is a detail view of the reversible latch bar; and

Figure 7 is a detail view of a replaceable pillow block through which the portion of the latch bar near its locking end enters into bearing against the door.

1 represents the body of an excavating dipper, 2 a door mounted thereon through the medium of hinges 3 having their pintles at 4, and 5 represents a latch bar carried by the door and coacting with the keeper 6 upon the dipper 1 to keep the door closed.

Hinges 3 are of the offset arm type designed to effect a substantial offset of the door 2 from their pintles 4, so that the pintles can be located at intermediate points on the dipper body, notwithstanding the application of the door to the lower end of the dipper, and so that when the door is free to swing to open position, it will clear the line of discharge of material from the dipper. But according to the present invention, each hinge arm 3 is designed with an L-shape or equivalent section, providing flanges 3^a perpendicular to the door and flanges 3^b parallel therewith, and thereby affording substantially transverse dimensions in both said directions. Each arm is united to the door 2 mainly through the medium of an angular socket 7 composed of a web 7^a which is deep in the direction perpendicular to the plane of the door, and which terminates in lip 7^b parallel to the plane of the door and adapted to engage the perpendicular flange 3^a and confine the hinge arm 3 to the door in said perpendicular direction; also a web 7^c likewise perpendicular to the plane of the door but laterally offset from and of substantially less depth than the web 7^a and engaging the parallel leg 3^b of the hinge arm 3, and, in cooperation with the web 7^a, con-

fining said arm against lateral displacement in the plane of the door. Moreover, web 7^a decreases in height toward the free end of the door, so that the lip 7^b converges toward the face of the door, and web 7^c converges toward the web 7^a in said direction; hence, the angular socket afforded by the members 7^a, 7^b, 7^c, and the conforming lines of the hinge arm constitute a wedging fit between the hinges and the door which renders the assembly very accurate and secure, and, in a measure, enables the hinge arms to lend still greater stiffness to the structure of the door, with consequent decrease in the permissible thickness of the door without going beyond the margin of safety. A material advantage in having the dimension of the lip 7^b less than the spacing between the webs 7^a, 7^c, and having the depth of the web 7^c less than that of the web 7^a, is that the inner faces and angles of these members are fully exposed for the grinder in finishing the castings of which they are made, thus making the construction especially adapted for production from manganese steel; and it also opens up the faces of the perpendicular and parallel flanges of the hinge arm for the application of securing bolts.

To prevent longitudinal displacement of the hinge arm 3 from the door 2, bolts 8 and 9 are employed, some of which pass through the wall of the door and the parallel flange 3^b of the hinge arm, while the others pass through the perpendicular web 7^a of the socket and the perpendicular flange 3^a of the hinge arm. But these bolts, being relieved by the angle sockets from all but shearing strains in the longitudinal direction of the hinges, need be very much less numerous than rivets which alone are relied upon to take all the stresses set up between the door and the hinges in service; moreover, such securing means, under the conditions of the present invention, being in the form of bolts with releasable nuts, provide for convenient assembly and disassembly of the door with its hinges in a fraction of the time that it takes to cut away the heads of rivets or burn them out with the torch.

Obviously, the webs 7^a and 7^c constitute very substantial elements of strength for the door 2, and admit of the latter being made of much lighter design than when its plate section is largely or wholly relied upon to sustain it against distortion; and in order to render the webs 7^a still more effective as stiffening elements, they are connected by cross web 10 near their ends toward the hinge pintles, and with a transverse web 11 at their outer ends. The webs 7^a, 10, and 11 constitute a substantially rectangular frame integral with and enclosing such a substantial area of the plate dimension or the area of the door as to render the door rigid and proof against distortion, and con-

sequently very much less liable to the development of cracks which ultimately render it useless.

Webs 7^a, 10, and 11 afford a convenient and substantial mounting for the latching mechanism of a door of the kind described, web 10 being constructed with a guide opening 12 to receive the inner end of the latch bar 5 and having lugs 13 carrying an anti-friction roller 14 to resist wear of the latch bar in its said guide; and the cross web 11 being united with upstanding cheeks 15 carrying anti-friction roller 16 and constituting a guide for the outer end of the latch bar 5. The load of the door 2 is imposed upon the latch bar 5 through the medium of the pillow block 17 confined between the cheeks 15 held against displacement by pins 18 (Figure 2), and this pillow block is made readily replaceable so that the door can be held tightly closed at all times.

To operate the latch bar 5, a lever 19 pivoted at 20 upon an adjustable post 21 supported on one of the cheeks 15, is passed through an opening 22 in the latch bar 5 and has its outer end brought under control of the pull cord 23, a spring 24 being introduced between the latch lever 19 and a fixed point 25 in order to normally hold the lever and, through it, the latch bar in keeper-engaging position. 26 represents a limiting stop in the form of a box or trough, preferably formed integrally on one of the perpendicular socket webs 7^a. This limiting stop engages the latch lever 19 at both limits of its movement and becomes the means for defining the throw of the latch bar 5, and thereby admits of the latter being made in the form of a straight piece (as shown in Figure 6) without shoulders or internal angles, and therefore well adapted for cheap production from hard and durable material as well as readily reversible in position, and consequent double duration in use.

In order to render the latch bar 5 reversible as stated, its opposite ends are alike designed with camming bevels 5^a; and in order to maintain accuracy of control of the latch lever 19, the opening 22, through which said lever passes, is duplicated at 22^a so that when the end of the bar in working position, as well as the opening 22, has become worn in use until it is no longer safe, it is simply necessary to turn the bar end for end and introduce the latch lever 19 into the second opening 22^a. The section of the bar 5 is square, and the openings 22, 22^a, as well as the bevels 5^a of the latch bar are disposed at 90° angle of rotation from each other in order that faces which receive wear when one end of the latch bar is in service, namely, those faces which are parallel to the plane of the door and impinge against their supports under very great friction, will become the sides of the latch bar

in the reverse position, and thus leave available an original thickness of bar at the new end to hold the door in its proper relation.

I claim:

- 5 1. In a dumping receptacle, a door constructed with webs spaced in the direction of the plane of the door, and a hinge arm fitting between said webs and confined thereby against lateral displacement in the plane of the door; one of said webs being provided with a lip overhanging the hinge arm and confining the same to the door in the direction perpendicular to the door.
- 10 2. In a dumping receptacle, a door, a web projecting perpendicularly to said door and carrying an overhanging lip, a hinge arm bearing against said web and confined between said lip and the door, and a second web perpendicular to the door, spaced from the first web and confining the hinge arm to a position against the web first named and beneath said lip; the lip being of less dimension than the space between the perpendicular webs and leaving a substantial portion of the arm-receiving space exposed.
- 15 3. In a dumping receptacle, a door, a web projecting perpendicularly to said door and carrying an overhanging lip, a hinge arm bearing against said web and confined between said lip and the door, and a second web perpendicular to the door, spaced from the first web and confining the hinge arm to a position against the web first named and beneath said lip; the second web being of less depth than the first web and leaving exposed a substantial area of the first web adjacent its lip.
- 20 4. In a dumping receptacle, a door, a hinge arm for mounting said door upon said receptacle, webs perpendicular to the plane of the door and spaced apart thereon to receive the hinge arm between them, and bolts passing in one direction through the door and the hinge arm, and in another direction through one of the webs and the hinge arm.
- 25 5. In a dumping receptacle, a door, a hinge arm for mounting the door upon the receptacle, said hinge arm being of substantially L-shaped section, a web perpendicular to the door receiving a perpendicular face of the hinge arm and having means for securing it thereto, and securing means passing through a portion of the arm parallel to the door and through said door.
- 30 6. In a dumping receptacle, a door, a pair of webs integral with, extending from, and substantially perpendicular to the plane of said door, each of said webs and an adjacent portion of the door together forming a hinge mounting of L-shaped section, adapted to receive a separately formed hinge and confine the hinge against relative movement in at least two directions, and a web also integral with, extending from, and substantially perpendicular to the plane of said door, uniting the webs first named; said pair of webs and the uniting web together providing a strengthening frame upon the door.
- 35 7. In a dumping receptacle, a door, longitudinal webs projecting from the plane of the door and formed integral therewith, integral transverse webs uniting said longitudinal webs, a latch bar mounted to slide in said transverse webs, a latch lever engaging said latch bar, and a limiting stop mounted on one of the longitudinal webs in position to engage the end of said latch lever.
- 40 8. In a dumping receptacle, a door, a latch bar for locking said door, a latch lever controlling said latch bar, a limiting stop defining the stroke of said latch lever, and a fulcrum for said latch lever adjustable to change the position of the latch bar.
- 45 9. In a dumping receptacle, a door, cheek-plates upstanding from said door, a keeper, a latch bolt, confined between said cheek-plates in position to cooperate with said keeper, said latch bolt being adapted to enter between said cheek-plates with either end presented to the keeper and in either of two positions at 90° angle of revolution to each other, and means carried by said latch bolt and through which it is adapted to be engaged in either of its positions, to operate it; the ends of the latch bolt being fashioned so that they will, respectively, cooperate with the keeper only when it is confined between said cheek plates in its respective positions of rotation.

Signed at Chicago Heights, Illinois, this 26th day of December, 1924.

JOHN O'FALLON CLARK.