Feb. 5, 1935. J. P. MURTAUGH 1,989,818

EXCAVATING IMPLEMENT DOOR

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Fig. 1.

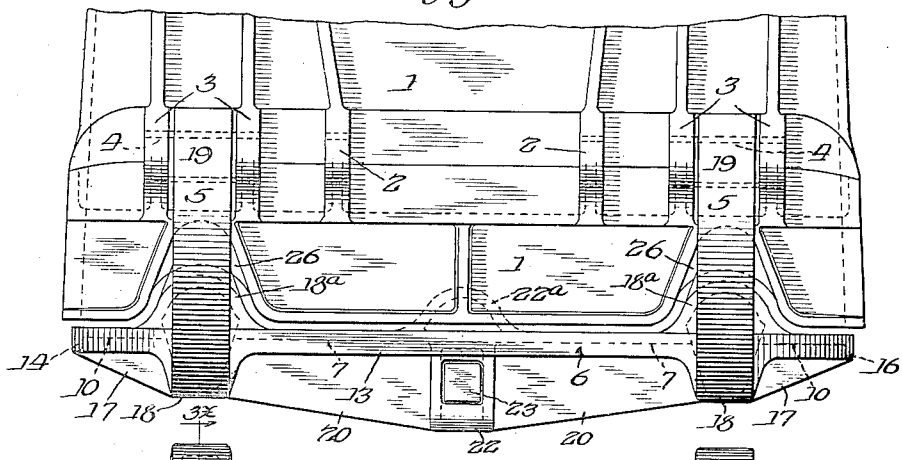
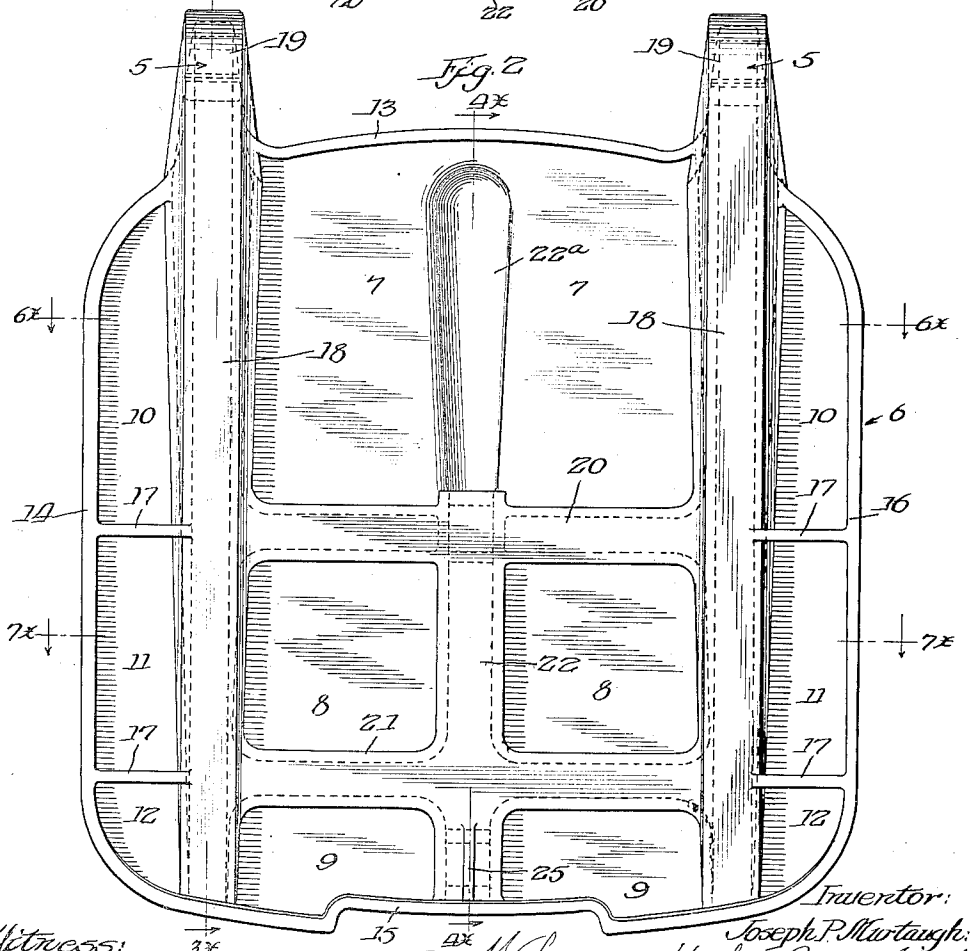


Fig. 2



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Fig. 3.

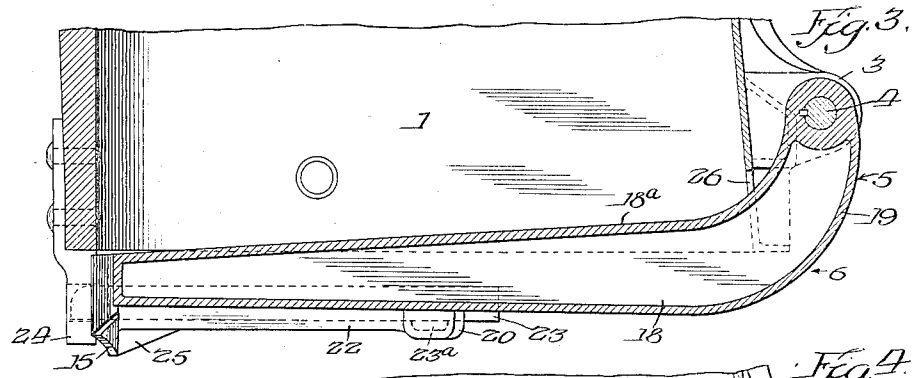


Fig. 4

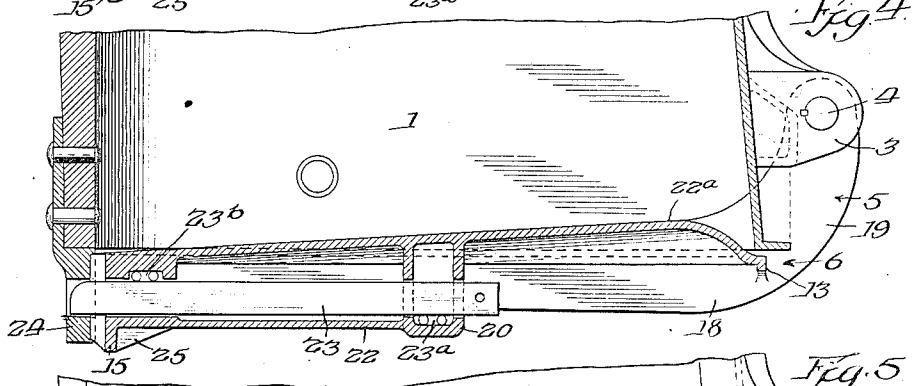


Fig. 5

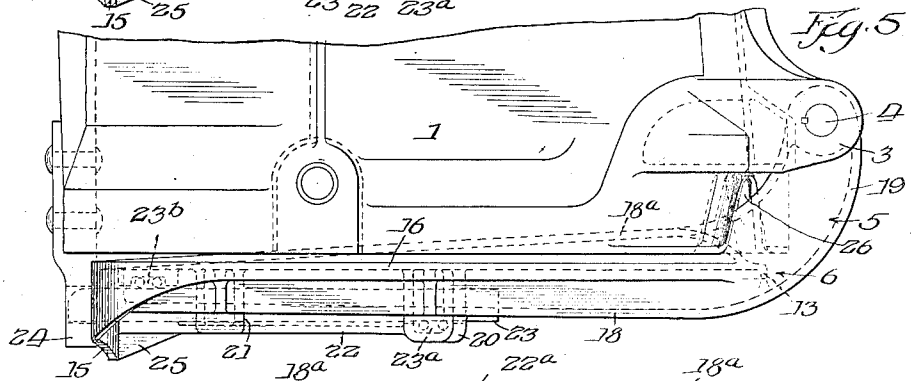


Fig. 6.

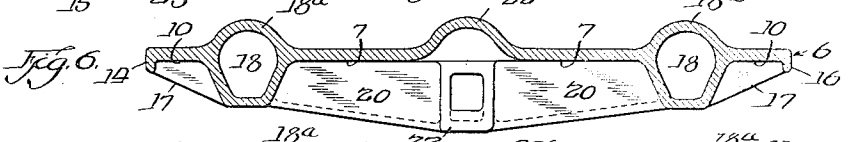
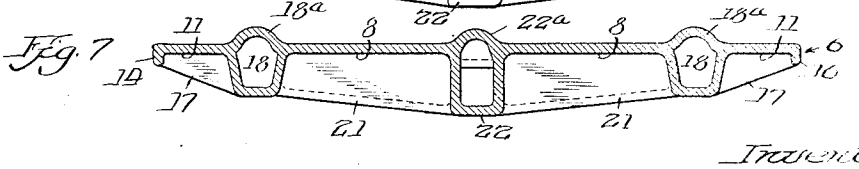


Fig. 7



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UNITED STATES PATENT OFFICE

1,989,818

EXCAVATING IMPLEMENT DOOR

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Application January 5, 1934, Serial No. 705,313

22 Claims. (Cl. 214—145)

The invention relates to excavating implements, such as power actuated shovels, dippers or the like, provided with doors through which material gathered by the implement may be discharged at voluntarily determined points; and particularly doors articulated with such implements in a manner to permit opening and closing by hinging action.

In the development of dippers of larger capacity, some of which are capable of gathering, conveying and discharging as much as fifteen or more cubic yards of material at a single operation of the implement, the hinging doors are required to withstand not only large stresses resulting from loads directly imposed thereon, but severe shocks due to impact against materials being handled and door designs heretofore resorted to in meeting these conditions, have involved undesirably large weight of metal and complication of structure.

It is an object of the present invention to provide a hinging door for excavating implements which will be very light compared with loads and physical forces which it is required to stand, and at the same time be very rigid and sturdy in construction, as well as relatively cheap to produce by foundry methods.

The invention proceeds upon the principle of constructing the door of integrally related, web-like, wall-forming portions together with framing beams, the framing beams being primarily related in the structure as the arms of hinges and terminating in ends constructed for articulating the door with the body of the implement; there being also, preferably, other beams related to the hinge arm beams in the nature of cross beams or transoms. Preferably, also, the several beams are united with the web portions in planes intermediate of the planes of the outer and inner walls of the hollow beams, so that the inner walls of at least the hinge arm beams, and preferably any beam or beams parallel therewith, while providing portions of the inner surface of the door, will be related to the web portions as corrugations which will not interfere with the loading or discharge of the implement.

Another object of the invention is to utilize certain of the hollow beams as a mounting for the door latch; to which end, the preferred embodiment of the invention includes an intermediate hollow beam parallel with the hinge arm beams, intersecting the transom beams and providing a housing for the latch and its bearings.

In the accompanying drawings, in which the preferred embodiment of the invention is shown by way of illustration—

Figure 1 is a top plan view of the bottom portion of a known type of excavating dipper having the door of the present invention applied thereto.

Figure 2 is an elevational view of the outside of the door.

Figures 3 and 4 are longitudinal sections taken, respectively, on the lines $3x$—$3x$ and $4x$—$4x$ of Figure 2.

Figure 5 is a side elevation of the rear portion of the implement and its door, as viewed from the left of Figures 1 and 2; and

Figures 6 and 7 are transverse sections taken, respectively, on the lines $6x$—$6x$ and $7x$—$7x$ of Figure 2.

1 represents a portion of the body of an excavating implement, for instance, a dipper, constructed with a known arrangement of bearings 2 for the usual dipper stick (not shown) and bearings 3 for pintles 4 (dotted lines in Figure 1) through means of which to articulate with the dipper the hinges 5 of a door 6,

Door 6, according to the present invention, is designed as an integral casting composed of web portions and integral beam framing; the web portions being subdivided according to the disposition of the beam members which constitute the framing, for instance, the web portions 7, 8, 9, 10, 11 and 12, with or without reinforcing marginal portions 13, 14, 15 and 16 and marginal brackets 17 if desired. The framing comprises hollow beams 18 which are positioned as the arms of hinges and transmit the load of the door, after the manner of hinges, to their ends 19 constructed for articulation through means of the pintles 4 with the hinge bearings 3 on the body of the implement; also, hollow cross beams or transoms 20, 21, extending integrally between the hinge arm beams 18 in a manner to develop with the latter a relatively light but very strong framing for the door; and, preferably also, a middle beam 22 parallel with the beams 18 and integrally intersecting the beams 20, 21, as a further element of reinforced framing and conveniently available as a housing for a dipper latch bolt 23 and its anti-friction bearings 23a, 23b, which bolt it holds in position to coact with the latch keeper 24 (as shown in Figures 3 to 5). As further shown in these figures, the bottom reinforce rim 15 may be strengthened opposite bolt 23 by means of gusset or bracket 25.

As shown in Figures 6 and 7, the inner walls 18a of the hinge arm beams 18 and the inner wall 22a of the latch housing beam 22 constitute corrugations on the inner surface of the door and

together with inner surfaces of the several webs constitute the inner surface of the door; in other words, the several web portions integrally unite with the framing beams 18 and 22 in a plane intermediate of the planes of the inner and outer walls of these particular beams. Said web portions, however, constitute the inner walls of the hollow transoms 20 and 21 in order that there may be no transverse obstruction on the inner surface of the door to retard movement of the material in dumping.

The hollow framing beam 22, which integrally intersects the transom beams 20, 21 and provides the housing for the latch bolt 23, has those of its walls which lie on the outer side of the plane of the web portions terminated intermediately of the height of the door; but its inner wall 22*a*, which provides a vertical stiffening corrugation on the inner surface of the door, continues upwardly therebeyond, as shown in Figures 2 and 4. Latch bolt 23 is merely typical of any suitable known construction of device of that kind and will, of course, in practice be equipped in a known manner for voluntary control.

As shown in Figures 3 to 5, the pintle or point of articulation 4 is offset a substantial distance inwardly from the door for the known purpose of more advantageously disposing of the door in its swinging movements; but according to the present invention, the hinge arm beams, together with their inner walls which provide the corrugations on the inner surface of the door, are deflected inwardly from points materially below the upper end of the door, which maintains the advantage of the offset pintle with very much less prominence of the upper end of the hinge arm; and in order to accommodate this inwardly deflected portion, the body of the implement to which the door is applied is recessed at 26 (Figures 1 and 3).

A door embodying the structural principle herein described and designed appropriately for a given capacity of excavating implement, can be made with approximately 40% less weight of metal than a door of like capacity embodying principles of construction relied upon prior to the present invention.

What is claimed is:

1. In excavating implements, in integral door structure comprising web portions and hollow framing beams; said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with an implement upon which the door is to be mounted, said hinge arm beams near their articulating ends, but below the upper end of the door, being deflected inwardly beyond the inner surface of the door.

2. In excavating implements, an integral door structure comprising web portions and hollow framing beams; said beams being positioned in said structure to provide hinge arms and transoms; and the beams which provide said hinge arms being constructed at their ends for articulation with the body of an implement which the door is to serve.

3. A hinged door for excavating implements, comprising hollow framing beams and web portions merging integrally with said beams; said beams being positioned in the door to provide hinge arms therefor and having spaced inner and outer walls; and said web portions meeting side walls of the beams in a plane intermediate of the planes of the inner and outer walls of the beams, whereby the inner walls of the beams constitute raised portions of the inner surface of the door.

4. A door constructed as described in claim 1, which also embodies in its structure transom beams united at their ends to the hinge arm beams.

5. A door as described in claim 3, which also embodies in its construction hollow transom beams merging integrally at their ends with the hinge arm beams and having inner and outer spaced walls, of which the inner walls are in substantially the same plane with the web portions.

6. A door as described in claim 1, which also embodies in its construction a hollow framing beam intermediate of and substantially parallel with the hinge arm beam.

7. A door as described in claim 1, which also embodies in its construction a hollow framing beam intermediate of the hinge arm beams and constructed to provide a latch bolt housing for the door.

8. A door as described in claim 1, which is also constructed with an intermediate hollow framing beam substantially parallel with the hinge arm beams and having its inner wall formed as a corrugation in the inner surface of the door.

9. A door as described in claim 1, which is also constructed with an intermediate hollow framing beam substantially parallel with the hinge arm beams and having its inner wall formed as a corrugation in the inner surface of the door; the outer wall of said intermediate beam terminating intermediately of the vertical dimension of the door, with its inner wall being continued beyond said termination as a continuation of the corrugation on the inner surface of the door.

10. A door as described in claim 3, in which the hinge arm beams, together with their inner corrugation-forming walls, are deflected at points below the upper end of the door inwardly beyond the inner surface of the door in determining the location of their points of articulation with an implement upon which the door is to serve.

11. In combination, an excavating implement body having door articulating bearings, and a hinged door therefor comprising hollow framing beams and web portions merging integrally with said beams, the beams being positioned in the door structure as hinge arms and including inner walls positioned as corrugations in the inner surface of the door and outer walls spaced therefrom; said hinge arm beams having projecting ends constructed for articulation with the implement body and being deflected from points short of the hinging end of the door inwardly to articulating bearings upon said body; and said body being recessed to admit the inwardly deflected portions.

12. In excavating implements, an integral door structure comprising web portions and hollow framing beams, said beams being positioned in said door structure and having their inner walls formed as corrugations on the inner surface of the door, said door structure having integral hinge extensions for hinge connection with the implement upon which the door is to be mounted.

13. A hinged dipper door comprising a body portion, reinforcing beams integrally cast with said body portion, said beams forming hinge arms projecting beyond said body portion and said body portion having reinforcing corrugations formed on the inner surface thereof extending parallel to said hinge arm beams, whereby said corrugations permit free discharge of material carried by said door as the door is swung to open position

with respect to the dipper upon which it is mounted.

14. In an excavating bucket, an integral door structure comprising, web portions and hinge arm beams, said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with the bucket upon which the door is to be mounted, the inner walls of said hinge arm beams being formed as corrugations on the inner surface of the door.

15. In an excavating bucket, an integral door structure comprising, web portions and hinge arm beams, said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with the bucket upon which the door is to be mounted, the inner walls of said hinge arm beams being formed as corrugations on the inner surface of the door, said corrugations increasing in height towards the hinge edge of the door.

16. In an excavating bucket, an integral door structure comprising, web portions and hinge arm beams, said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with the bucket upon which the door is to be mounted and an intermediate hollow framing beam substantially parallel with the hinge arm beams and having its inner wall formed as a corrugation on the inner surface of the door.

17. In an excavating bucket, an integral door structure comprising, web portions and hinge arm beams, said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with the bucket upon which the door is to be mounted and an intermediate hollow framing beam substantially parallel with the hinge arm beams, having its inner wall formed as a corrugation on the inner surface of the door and its outer wall terminating substantially midway of the door, said inner wall being continued beyond said termination as a continuation of the corrugation on the inner surface of the door.

18. In an excavating bucket, an integral door structure comprising, web portions and hinge arm beams, said beams being positioned in said door structure in hinge arm relation to the door and having their ends constructed for hinge connection with the bucket upon which the door is to be mounted, said hinge arm beams, near their hinge ends but forwardy of the rear edge of the door, being deflected inwardly beyond the inner surface of the door.

19. In combination, an excavating bucket body having door articulating bearings and a hinged door structure therefor comprising, framing beams and web portions merging integrally with the beams, the beams being positioned in the door structure as hinge arms, said hinge arm beams having projecting ends constructed for articulation with the bearings on the bucket body, said beams being deflected from points short of the hinge edge of the door inwardly towards the articulating bearings upon said bucket body and said bucket body being recessed to admit the inwardly deflected portions of the hinge arm beams.

20. In an excavating bucket an integral door structure comprising, web portions and intersecting hollow framing beams, certain of said beams being positioned in said door structure in hinge arm relation to the door and having curved ends extending beyond the web portions of said door for hinge connection with the bucket upon which the door is to be mounted and other of said beams extending transversely with respect to said hinge arm beams, tying together said hinge arm beams for reinforcement of said door structure.

21. In combination, an excavating dipper bucket having a bottom opening through which material may be dumped, hinge brackets on the back of said bucket offset from the plane of said opening, a door hingedly mounted on said bucket by means of said hinge brackets, said door having integral hinge arms which curve inwardly at their ends with respect to the rear edge of the main body of the door for articulation with said hinge brackets, whereby portions of said curved ends lie within the bucket when the door is in closed position, the back of the bucket having recesses to receive said curved ends.

22. An integral dipper door structure adapted to be hingedly mounted on an excavating bucket comprising, a body portion, hollow hinge arm beams integral with and reinforcing said body portion and extending beyond said body portion to provide curved hinge arm extensions, a hollow framing beam constituting a latch bolt housing integral with said main body parallel to but intermediate said hinge arm beams, a pair of hollow transom beams extending from said latch bolt housing beam and merging integrally at their ends with said hinge arm beams, a marginal reinforcing rib extending around the main body of said door and integral gusset portions between said hinge arm beams and the marginal rib, said gusset portions lying substantially in line with the transom beams for reinforcement of the door structure.

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