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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Vehicle Loading Device

I, ROBERT HENRY BURGESS, an Australian Citizen, of 573 Hume Highway, South Strathfield, New South Wales, Commonwealth of Australia, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a loading device by means of which material may be loaded into the interior of a container or vehicle.

The invention is particularly though not exclusively applicable to loading devices for loading garbage into a garbage wagon. The requirements for such a device are that it has an aperture into which garbage bins may be tipped, arranged at a convenient height at the side or end of a garbage wagon and that the garbage should be fed into the interior of the wagon under a fairly high pressure so that a degree of compaction of the garbage within the wagon is obtained, to enable full use to be made of the carrying capacity of the wagon. It should be understood however that loading devices according to the present invention may be constructed for use for other purposes.

The object of the present invention is to provide an improved operating mechanism in a loading device of the kind in which an open topped hopper is swept by a blade which presses material tipped into the hopper through an aperture into a vehicle or container. The forces that are required to be applied to the blade make it difficult to provide a mechanism that will operate smoothly and reliably.

The present invention consists in a loading device consisting of an open topped hopper adapted to be attached to the side or end of a vehicle or container in register with an aperture in the side of the vehicle or container, the hopper defining a part circular cavity having a substantially flat or dished base there being in the cavity a radially extended arm

or blade pivotable about an axis coinciding with the axis of the cavity, means being provided to impart an oscillatory motion to the arm or blade whereby it is moved about its axis to sweep over the floor of the cavity first in one direction and then in the other in such a manner that any material lying on the floor of the cavity in the path of the arm or blade is pressed through the aperture in the side of the vehicle or container, characterised in that the means to impart an oscillatory motion to the blade consist of a radially extending member attached to one end of a shaft from which shaft the blade extends radially, a first hydraulic jack the ram of which is connected to a first point on said member by means of a rigid connecting rod pivotably attached at each end and a second hydraulic jack similarly connected to a second point on said member adjacent the first by a rigid connecting rod pivotably attached at each end and hydraulic means to extend and retract the rams of the hydraulic jacks alternately, the arrangement being such that as the ram of each jack is retracted the arm or blade is caused to sweep in one direction over the floor of the cavity, and such that the torque applied by the jack to the said shaft increases progressively from a minimum at the beginning of the stroke to a maximum at the end. It is preferred that the base of the cavity be arranged at such an angle that material is introduced into the container or vehicle at floor level in an upward direction.

In order that the invention may be better understood a preferred form thereof is hereinafter described, by way of example, with reference to the accompanying drawings in which:—

Fig. 1 is a perspective view from the side and rear of a garbage collection vehicle incorporating the invention,

Fig. 2 is a sectional view from below of the blade reciprocating mechanism on plane 2—2 of Fig. 1.

[Price 4s. 6d.]

Fig. 3 is a sectional view on plane 3—3 of Fig. 2,

Fig. 4 is a side elevation on line 4—4 of Fig. 3.

5 Fig. 1 shows a garbage collecting vehicle 10 which is of generally conventional construction and it is therefore not proposed to describe it except in so far as is necessary for an understanding of the present invention.

10 The vehicle 10 has an upwardly hinging rear door 11 which may be raised or lowered by means of the hydraulic jacks 12. Mounted on the lower part of the door is the loading device indicated generally at 13 with which the present invention is concerned.

15 This consists of an open topped hopper bounded by a part circular wall 14 and a base 15. An outwardly splayed rim 16 is provided around the upper edge of the wall 14 and the upper edge of this is covered with a protective rubber rim 17. Across the top of the forward portion of the hopper opening extends a box beam 18, on the upper surface of which a rubber pad 21 is provided on which the rim of a garbage bin may be stuck to dislodge garbage adhering to the interior of the bin.

20 The open topped hopper opens into the interior of the vehicle 12, the base 15 of the hopper being inclined upwardly in relation to the floor 22 of the vehicle (see Fig. 4). This ensures proper loading of the vehicle, as if the base 15 were aligned with the floor 22, there would be a tendency to produce a compacted layer of garbage on the floor of the vehicle without filling the interior completely.

30 It should be noted that where the hopper opens out into the interior of the vehicle, the door 11 is formed with a sloping surface 23 and wings 24 which provide a rapid increase in the area of the passage through which garbage passes from the hopper into the vehicle 10 and it has been found that this arrangement facilitates the passage of the garbage and does in fact allow more to be packed into the vehicle. Furthermore this shape allows garbage to expand into the interior of the vehicle without boundary friction and also reduces or makes impossible any springback of garbage into the hopper. Were there a long parallel throat extending from the hopper it would require downstream pointing projections to prevent backflow.

40 A blade 25 of robust fabricated construction is mounted on the shaft 26 which is rotatable in sealed ball races 27 and 28 arranged above and below the hopper respectively. The shaft 26 is arranged at the centre of the wall 14 and rotation of the shaft causes the blade 25 to sweep over the base of the hopper, thus acting to force any garbage lying in its path into the interior of the vehicle 10. It has been found that it is preferable to leave quite substantial clearances between the underside of the blade 25 and the base 15 of the hopper and between the tip of the blade and the wall

14. This does not reduce the effectiveness of the blade in displacing garbage, but does reduce the occasions on which jamming occurs due to garbage lying between the blade and the hopper.

70 The shaft 26 is of very robust construction and is of hexagonal cross section thus permitting the upper and lower plates 31 and 32 of the blade 25 to be clamped to it by means of the caps 33 and screws 34. It must be appreciated that the forces involved in compacting the garbage into the vehicle are high and it is therefore necessary that the blade be attached to the shaft in a manner which will withstand these forces despite the oscillatory movement of the blade. The construction illustrated has been found very satisfactory in practice.

80 The shaft 26 projects at its lower end below the base 15 of the hopper and the means for reciprocating the blade is located here. This arrangement enables a short shaft to be used and keeps the highly stressed parts of the structure close together, both of which features assist in reducing the weight of the apparatus.

85 The shaft 26 is rotated by means of a pair of single acting hydraulic jacks 35 and 36, the cylinders of which are pivotably mounted by pins 37 and 38 respectively.

90 To the lower end of the shaft 26 is attached the radial arm 41 which is fabricated from upper and lower plates 42 and 43 joined by a web 44. The arm 41 is provided with two eyes 45 and 46 each of which contains a pin 47, the pin being retained by plates 48. Each pin 47 passes through one end of one of the connecting rods 51 and 52, the other ends of which are connected also by pins to the ends of the pistons of hydraulic jacks 35 and 36 respectively. Reciprocation of the blade 25 is effected by retracting the piston of each jack in turn by means of a hydraulic system including the pilot valve 53 which is operated by a cam 54 on the shaft 26, the cam acting through the rods 55. When the blade 25 reaches the end of its stroke in each direction, the valve 53 is operated to cause hydraulic fluid to retract the piston of the jack which is extended. The valve 53 is capable of overriding manual control by means of the lever 56, so that an operator can reverse the direction of movement of the blade 25 to clear a jam. The pilot valve 53 controls a free piston or pilot operated valve of larger size to effect the change of flow of hydraulic fluid. As the hydraulic circuit is conventional in character it is not proposed to describe it in detail.

105 While the reciprocation of the blade 25 could be effected by a variety of different mechanisms, that described above has a number of substantial advantages over others.

110 One main feature of the arrangement is that the torque on the shaft 26 is least when the blade is at the beginning of a stroke and lightly loaded and at a maximum when at the end

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of the stroke when maximum force is required for compaction of the garbage. This can readily be seen in Fig. 2 in which jack 35 has just completed a stroke and the moment of the force applied about the axis of the shaft 26 is a maximum. When retraction of the piston of jack 36 commences to reverse the direction of stroke of the blade 25, the moment of the applied force will be a minimum due to the position of the connecting rod 52. The velocity of movement of the blade also varies, but in an inverse manner in relation to the torque.

In addition to the advantages mentioned above, the arrangement enables single acting jacks to be used thus simplifying valving. The system is always in tension, thus eliminating jerkiness in operation. It is capable of handling the torque forces involved, the maximum tension in the connecting rods being of the order of nine tons.

Finally the mechanism is simple, robust and reliable all important features in apparatus of this kind.

A wall or septum 57 extends forwardly from the shaft 26 to guide compacted garbage from either face of the blade 25 into the body of the vehicle.

A manually operable bolt mechanism 58 enables the door 11 to be firmly secured to the floor 22 of the vehicle thus enhancing the rigidity of the structure.

WHAT I CLAIM IS:—

1 A loading device consisting of an open topped hopper adapted to be attached to the side or end of a vehicle or container in register with an aperture in the side of the vehicle or container, the hopper defining a part circular cavity having a substantially flat or dished base there being in the cavity a radially extended blade pivotable about an axis coinciding with the axis of the cavity, means being provided to impart an oscillatory motion to the blade whereby it is moved about its axis to sweep over the floor of the cavity first in one direction and then in the other in such a manner that any material lying on the floor of the cavity in the path of the blade is pressed

through the aperture in the side of the vehicle or container, characterised in that the means to impart an oscillatory motion to the blade consist of a radially extending member attached to one end of a shaft from which shaft the blade extends radially, a first hydraulic jack the ram of which is connected to a first point on said member by means of a rigid connecting rod pivotably attached at each end and a second hydraulic jack similarly connected to a second point on said member adjacent the first by a rigid connecting rod pivotably attached at each end and hydraulic means to extend and retract the rams of the hydraulic jacks alternately, the arrangement being such that as the ram of each jack is retracted the arm or blade is caused to sweep in one direction over the floor of the cavity, and such that the torque applied by the jack to the said shaft increases progressively from a minimum at the beginning of the stroke to a maximum at the end.

2. A loading device as claimed in Claim 1, wherein the means to impart an oscillatory motion to the blade is connected directly to one end of a shaft from which said blade extends radially and is accommodated immediately below the hopper.

3. A loading device as claimed in Claim 1 or Claim 2, wherein the hopper material displaced from the hopper by the motion of the arm or blade is led into the vehicle or container by means of a passage the cross sectional area of which increases rapidly.

4. A loading device as claimed in any one of the preceding claims, wherein a substantial clearance is provided between the arm or blade and the hopper.

5. A loading device substantially as described with reference to and as shown in the accompanying drawings.

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