

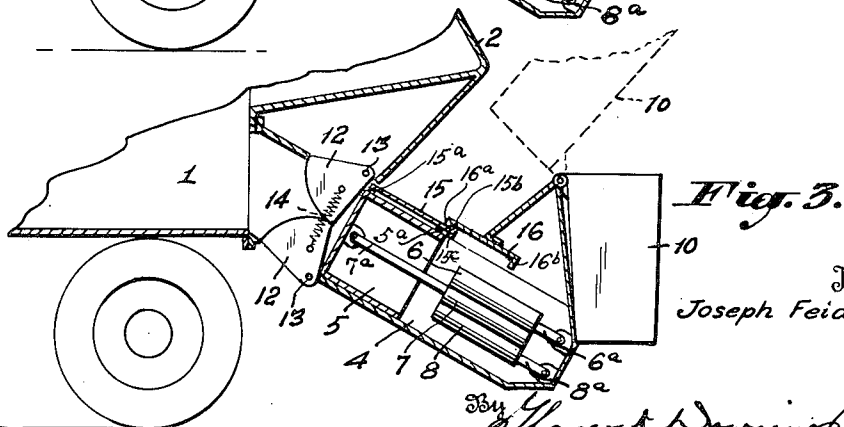
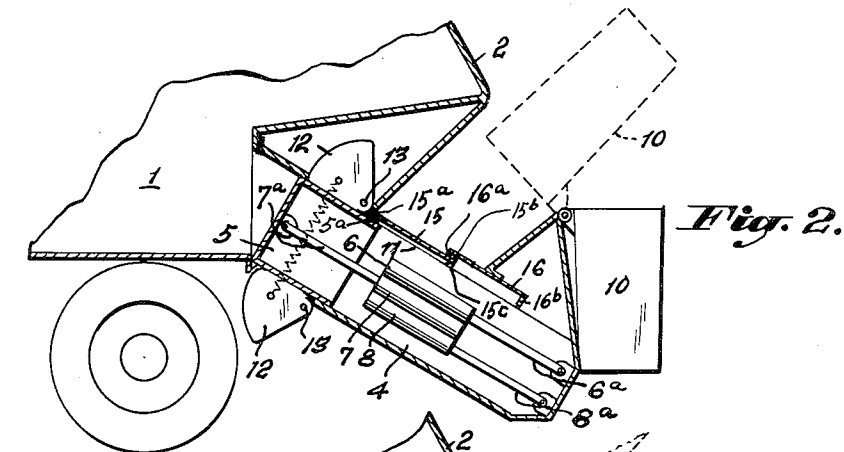
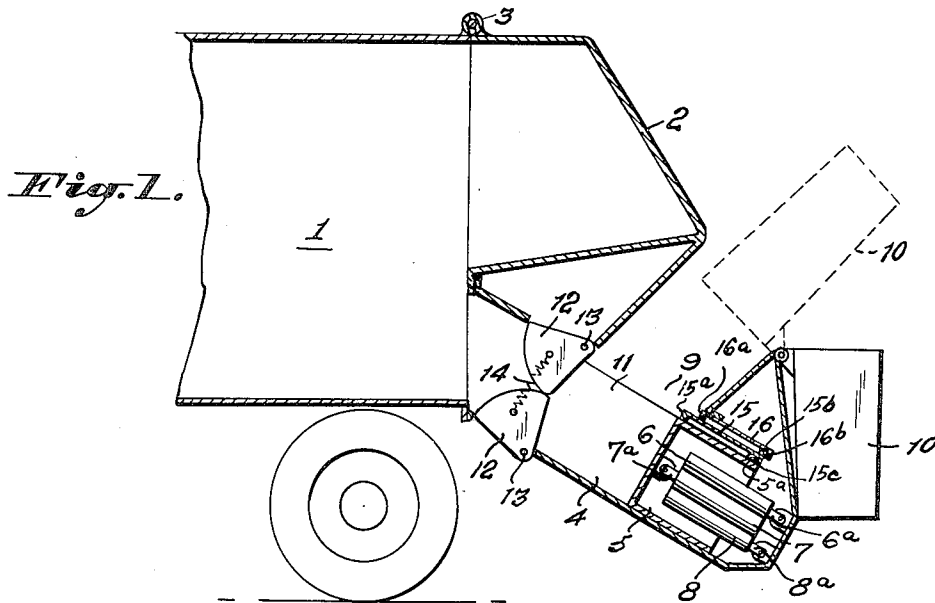
Dec. 23, 1952

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2,622,748

COMPRESSION LOADING MEANS FOR REFUSE VEHICLES

Filed Sept. 8. 1949



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UNITED STATES PATENT OFFICE

2,622,748

COMPRESSION LOADING MEANS FOR
REFUSE VEHICLES

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Application September 8, 1949, Serial No. 114,497
In France September 17, 1948

11 Claims. (Cl. 214—83.3)

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The present invention relates to a device for loading and compressing solid matter, for instance household refuse, into collecting receptacles for removal.

Collecting receptacles carrying on a fixed or movable rear wall a fixed introduction tube into which the matter is poured through an inlet orifice and then transported towards the inside of the collecting receptacle by means of a worm are known. In order to transport solid objects of large dimensions poured by chance into the inlet orifice, the free space between the periphery of the worm and its case, forming the introduction tube, has to be so great that the fine matter is no longer engaged by the turns of the worm and hence falls back to the bottom of the inlet orifice. Moreover rapid wear and tear of the transporting members which work in the material or are in continual motion has been experienced.

Devices for filling collecting receptacles are also known which carry on their rear wall a loading and compressing tube in which a piston actuated by hydraulic jacks thrusts the refuse or other matter into the collecting receptacle. A full refuse bin is hooked to a tipping system actuated by the travel of the hydraulic jacks, and the rammer piston closes the inlet orifice of the introduction tube. When starting the hydraulic jacks, the rammer piston liberated the inlet orifice while the refuse bin tips towards this latter. At the end of the stroke of the jacks, the rammer piston has left the introduction tube at the same time as the refuse bin has emptied its contents in front of the rammer piston through the open inlet orifice.

At the return of the hydraulic jacks, the refuse bin returns into its initial position while the rammer piston thrusts the material towards the interior of the collecting receiver. In order to effect a compression of the rubbish or other material, the outlet cross section of the loading and compressing tube is reduced in order to give a conical form to the tube. One may also momentarily interpose a plate, against which the first heap of matter is discharged, in order to form a kind of plug. Then, after this plate is withdrawn from the tube, the succeeding operations thrust one plug after another into the collecting receptacle. The disadvantage of this device is that the plugs of the compressed matter scatter again when leaving the tube to fall into the collecting receptacle, and that, even towards the end of loading, compression is no longer possible, owing to the fact that since the outlet orifice of the introduction tube is not obturated, the rubbish falls back

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again with the movement of the rammer piston, which has only a very small travel.

Other devices are known in which a press-plate discharges the household refuse into the collecting receptacle. The press-plate operating in a loading chamber over the whole width of the collecting receptacle is actuated by hydraulic means arranged within the collecting receptacle. Although padded, it works in refuse and at its return also transmits a return movement to the mass, having the effect of causing refuse to fall back into the unobturated loading chamber of the collecting receptacle. During the displacement of the press-plate, one is compelled to discontinue the filling of the collecting receptacle, since refuse poured in at this juncture may fall behind the press-plate and prevent it from regaining its initial position.

In other known devices the collecting receptacle carries at the rear a fixed loading channel or a feeding chamber open at the top, into which household refuse or other rubbish is poured, to be afterwards thrust into the collecting receptacle by a rammer of suitable shape sliding in this channel or feeding chamber forming a passage. At the return of the rammer, the household refuse partly falls back, and, towards the very end of loading, falls into the channel or feeding chamber again on account of its elasticity, and because the outlet orifice of the channel or feeding chamber is not obstructed. A plate serving as a guide for the rammer does indeed prevent the refuse from pouring behind the said rammer, but it allows the rammer only a very short stroke.

The present invention relates to a device comprising one or more removable and interchangeable introduction tubes, in which a hydraulic member with a long stroke actuates a piston, which in its turn discharges all the refuse or other matter into the collecting receptacle.

In order to succeed in compressing the material, and in order to prevent the latter from falling back into the introduction tube through its outlet orifice, this orifice is closed by swivelling flap valves, which, under the pressure of springs, meet again and entirely close the orifice. These valves are so shaped and arranged that they diverge under the thrust of the ramming piston when the latter drives the refuse towards the collecting receptacle. The reaction of the mass compressed in this receptacle ensures the fluid-tightness of closing when the piston recedes and allows the valves to meet again.

In order not to stop the filling of the collecting receptacle, and in order to prevent the refuse from

falling behind the piston during the functioning of the latter, the inlet orifice through which the refuse is poured in between the piston and valves is automatically closed by a telescopic system of sliding plates or by a leather or rubber strip which winds around a spindle with a spring. The piston, when thrusting the refuse into the collecting receptacle, actuates this obturating device in such a manner as to close the inlet orifice, and when it recedes, it brings the obturating device back to its initial position.

One form of construction of a device according to the invention is illustrated by way of example in the accompanying drawings, in which:

Figures 1, 2 and 3 represent this device in longitudinal section, in three different positions.

The collecting receptacle denoted at 1 is mounted on a vehicle only a portion of which is illustrated. The rear of this receptacle is closed by a door 2 hinged at 3. A tube 4 of rectangular cross section is removably fixed to this door and in this tube can slide a ramming piston 5 actuated by a hydraulic member composed of three cylinders 6, 7 and 8, in which pistons 6a, 7a and 8a work. Into the top of this tube 4 opens a hopper 9, into which the collected refuse is poured by a refuse bin 10.

Between the outlet orifice 11 of this hopper and the receptacle 1 are interposed non-return flap valves 12. The latter are previously movable about horizontal spindles 13 located above and below the tube, and they oscillate across openings provided in the walls of the tube. A spring 14 impels them towards each other so as to shut off the inner cross section of the tube, as shown in Figures 1 and 3, while permitting them to diverge under the thrust of the piston so as to make way for the refuse and the piston itself, Figure 2.

Therefore, as illustrated in the drawings, the inlet channel which is carried by the rear end of the vehicle extends outwardly and downwardly with respect thereto. This channel includes walls which define a compression cylinder within which the compressing means constituted by the ramming piston 5 is movable. This ramming piston 5 is substantially U-shaped in cross-section with its open end directed away from the vehicle. The hydraulic means comprising the cylinders 6, 7 and 8 and pistons 6a, 7a and 8a are disposed between the closed end of the ramming piston 5 and the remote end of the feed channel. The piston 7a is connected to the ramming piston 5 while the pistons 6a and 8a are connected to the remote end of the feed channel. Since the pistons are transversely aligned, movement of the latter two pistons effects movement of the cylinder 7 which is connected to the cylinders 6 and 8 so that upon subsequent movement of the piston 7a the ramming piston 5 is moved a distance equal to the sum of the strokes of pistons 6a and 8a and piston 7a. Upon the movement of the ramming piston 5a the front end thereof contacts flap valves 12 since these valves are disposed a distance removed from the vehicle and also a distance removed from the remote end of the compression cylinder, the ramming piston during its compression stroke positively moves and holds the flap valves apart as shown in Figure 2. Upon the reverse movement of the ramming piston the resilient means denoted by the spring 14 keep the valves in contact with the ramming piston until the same has moved rearwardly a distance sufficient to dispose

the front face of the ramming piston rearwardly of the axes 13 of the valves so that the return flow of refuse is prevented.

Obturator plates 15, 16 are guided across the orifice 11 in such a manner that they can be displaced parallel to the travel of the piston. These plates comprise at their ends abutments or projections 15a, 15b, 15c, 16a, 16b, which enable them to be drawn along by the piston and to draw one another along.

The device operates in the following manner:

In the position of rest (Figure 1), the piston 5 is situated to the rear of the orifice 11, that is to say, on the right-hand side in the drawing. The plates 15 and 16 are then superposed above this piston, also at the rear of the orifice 11. Refuse can therefore be poured freely into the introduction tube 4 between the rammer piston 5 and the valves 12. After this chamber is filled, oil under pressure is allowed to enter the cylinders 6, 7, 8, thus expelling the pistons 6a, 7a and 8a, hence, the rammer piston 5 is pushed towards the receptacle 1. It thrusts the valves 12 apart and discharges the refuse into the container. The piston itself engages between the valves until it arrives at the end of the tube, as shown in Figure 2. In this movement, it has dragged the obturating plate 15 along by an upstanding projection 5a at its rear end, which abuts against the projection 15a projecting downwardly from the front end of the plate 15. The plate 15 in turn has the projection 15b upstanding from its rear which engages and drags along the plate 16, which for this purpose is provided with a projection 16a extending downwardly from its front end. By virtue of this obturating device, the orifice 11 is closed not only by the piston itself, when the latter is below it, but by the plates 15 and 16, when the piston has advanced beyond the said orifice.

It follows that refuse poured at this moment into the hopper 9 is retained therein and does not run the risk of falling behind the piston and of being rejected outwards when the piston is returning to its position of rest.

When this return is being effected, the piston is at first sliding between the valves 12, and then allows them to close again under the action of the springs 14. The closing of the valves can only be assisted by the thrust of the refuse contained in the receptacle 1 if it tends to follow the piston in its recoil movement.

When the piston is thus recoiling, its projection 5a meets the projection 15c provided beneath the plate 15 at the rear end thereof and thus drags this plate rearwards. Then the projection 15b in turn engages the down-turned projection 16b at the rear of the plate 16, so that this plate 16 moves rearwardly and at the end of the rearward travel of the piston the plates 15 and 16 have returned to their original position as shown in Figure 1, leaving the orifice 11 free for the passage of a fresh load of refuse.

Without departing from the invention, any other suitable obturating device controlled by the piston 5 may be used, instead of the sliding plates 15, 16. For instance, the orifice 11 may be closed by means of a broad flexible band, made of leather or rubber for example, the front edge of which, like the projection 15a, is carried forward by the piston at the time of its movement towards the receptacle 1, its rear end being wound around a drum located above the tube 4, and subjected to the action of a torsion spring, thus exerting a suitable tension in the band. The falling of the

refuse through the hopper may alternatively be intercepted by a swivelling obturator constituted by a hollow cylinder swivelling about its horizontal axis and having peripheral openings, its oscillations being associated with the displacement of the piston by any suitable mechanism.

It must be understood that the form of construction hereinbefore described is given merely by way of example, and that without departing from the invention use may be made of any equivalent mechanical means, for instance the form and arrangement of the non-return valves may be varied, they may be kinematically connected with one another, or use may be made of any suitable hydraulic, electrical or other driving means for moving the piston.

It is to be observed that by virtue of the combination of the non-return valves with the feeding and ramming device, the device described enables a high degree of compression of the refuse to be effected in the receptacle when the loads introduced into the hopper are rather numerous. Loading will be stopped when this compression is deemed to be sufficient. The unloading of the collecting receptacle may be effected in the usual manner.

I claim:

1. Means for loading and compressing household refuse and like materials into a container, comprising: an introduction tube leading to and terminating in an outlet opening adjacent the base of the container, a ramming piston reciprocable in the introduction tube, means for charging the tube with material in front of the ramming piston, and hydraulic means for reciprocating the ramming piston and thereby impelling the charge of material into the container, the said hydraulic means including a plurality of transversely aligned cylinders and oppositely extendable pistons so that the stroke of the ramming piston is equal to the sum of the strokes of at least two hydraulic pistons.

2. Means for loading and compressing household refuse and like material into a container as claimed in claim 1, further comprising: non-return valves in the introduction tube at its outlet into the container.

3. Means for loading and compressing household refuse and like material into a container as claimed in claim 1, further comprising: non-return valves in the introduction tube at its outlet into the container, means normally urging the valves to closed position, said valves being disposed in the introduction tube at an area within the stroke of the ramming piston so that the ramming piston pushes the valves open during its forward stroke and holds them open at the beginning of its return stroke.

4. Means for loading and compressing household refuse and like material into a container as claimed in claim 1, further comprising: non-return valves in the introduction tube at its outlet into the container, and springs resisting the opening of the valves and tending to close them.

5. Means for loading and compressing household refuse and like material into a container, comprising: an introduction tube leading to the container, a ramming piston reciprocable in the introduction tube, the introduction tube having an aperture in its upper side in advance of the ramming piston through which material can be charged into the said tube in front of the ramming piston, hydraulic means for reciprocating the ramming piston and thereby impelling the

charge of material into the container, the said hydraulic means including a plurality of transversely aligned cylinders and oppositely extendable pistons so that the stroke of the ramming piston is equal to the sum of the strokes of at least two hydraulic pistons and obturating means oppositely movable with the ramming piston to close the charging aperture as the ramming piston advances, so as to prevent material falling into the introduction tube behind the ramming piston, and to re-open the charging aperture as the ramming piston is retracted.

6. Means for loading and compressing household refuse and like material into a container as claimed in claim 5, the said obturating means comprising at least one sliding plate, and projections on the sliding plate and on the ramming piston, said projections being so disposed as to engage one another as the ramming piston moves so that the ramming piston draws the plate across the charging aperture as it advances and withdraws it therefrom as it returns.

7. Means for loading and compressing household refuse and like materials into a container as claimed in claim 5, the said obturating means comprising a resiliently stretched flexible band.

8. Means for loading and compressing household refuse and like material into a container as claimed in claim 5, the said obturating means comprising a swivelling shutter.

9. Compression loading means for refuse vehicles including means defining an inlet channel carried by the rear end of the vehicle and extending outwardly and downwardly with respect thereto, said channel including walls defining a compression cylinder, compressing means supported by the end of the channel remote from the vehicle and including a ramming piston substantially U-shaped in cross section with the open end directed away from the vehicle and hydraulic means including a plurality of pistons and cylinders disposed between the piston and the remote end of the channel, said piston and cylinders including at least one piston connected to the ramming piston and at least one piston operably connected to the remote end of the channel, the cylinders of the respective pistons being transversely aligned so that movement of the second mentioned piston effects movement of the first mentioned cylinder so that subsequent movement of the first mentioned piston results in the movement of the ramming piston to a distance equal to the sum of the strokes of the two first mentioned pistons, said channel being of a length at least equal to the length of stroke of the two pistons, means defining a refuse feed channel communicating with the compression cylinder in advance of the ramming piston, non-return valves swingably mounted on axes extending transversely of the compression cylinder and located respectively above and below the same, resilient means urging the valves to closed position to prevent reverse movement of refuse through said compression cylinder towards said ramming piston, said valves being disposed a distance removed from the vehicle and a distance removed from the remote end of the compression cylinder such that in the movement of the ramming piston during compression toward the vehicle the piston positively moves and holds the valve to open position and in reverse movement of the ramming piston the valves remaining in contact with the same until the ramming piston has moved rearwardly a distance sufficient to dispose the front face thereof rearwardly of the

axes of the valves thereby preventing reverse flow of refuse toward the ramming piston as the same moves away from the vehicle.

10. Compression loading means for refuse vehicles including means defining an inlet channel carried by the rear end of the vehicle and extending outwardly and downwardly with respect thereto, said channel including walls defining a compression cylinder, compressing means supported by the end of the channel remote from the vehicle and including a ramming piston substantially U-shaped in cross section with the open end directed away from the vehicle and hydraulic means including a plurality of pistons and cylinders disposed between the piston and the remote end of the channel, said piston and cylinders including at least one piston connected to the ramming piston and at least one piston operably connected to the remote end of the channel, the cylinders of the respective pistons being transversely aligned so that movement of the second mentioned piston effects movement of the first mentioned cylinder so that subsequent movement of the first mentioned piston results in the movement of the ramming piston to a distance equal to the sum of the strokes of the two first mentioned pistons, said channel being of a length at least equal to the length of stroke of the two pistons, means defining a refuse feed channel communicating with the compression cylinder in advance of the ramming piston, non-return valves swingably mounted on axes extending transversely of the compression cylinder and located respectively above and below the same, resilient means urging the valves to closed position to prevent reverse movement of refuse through said compression cylinder towards said ramming piston, said valves being disposed a distance removed from the vehicle and a distance removed from the remote end of the compression cylinder such that in the movement of the ramming piston during compression toward the vehicle the piston positively moves and holds the valve to open position and in reverse movement of the ramming piston the valves remaining in contact with the same until the ramming piston has moved rearwardly a distance suffi-

cient to dispose the front face thereof rearwardly of the axes of the valves thereby preventing reverse flow of the refuse toward the ramming piston as the same moves away from the vehicle, and valve means movable with said ramming piston to close communication between the feed channel and the compression cylinder as the ramming piston moves toward the vehicle to prevent refuse falling within the compression cylinder rearwardly of the ramming piston.

11. Compression loading means as defined in and by claim 10 in which said valve means include a plurality of superposed sliding plates having abutments on the ends thereof and said ramming piston having an abutment thereon cooperable with the abutment on the lower most sliding plate so that as the ramming piston moves the abutment thereon, engages the abutment on the lower most sliding plate to move the same and upon continued movement of the ramming piston the abutments on the respective plates engage to move the superjacent plates, each plate also having abutment means responsive to the reverse movement of the ramming piston to retract the plates to again provide communication between the feed channel and the compression cylinder as the ramming piston retracts.

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