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COMPACTING MACHINE

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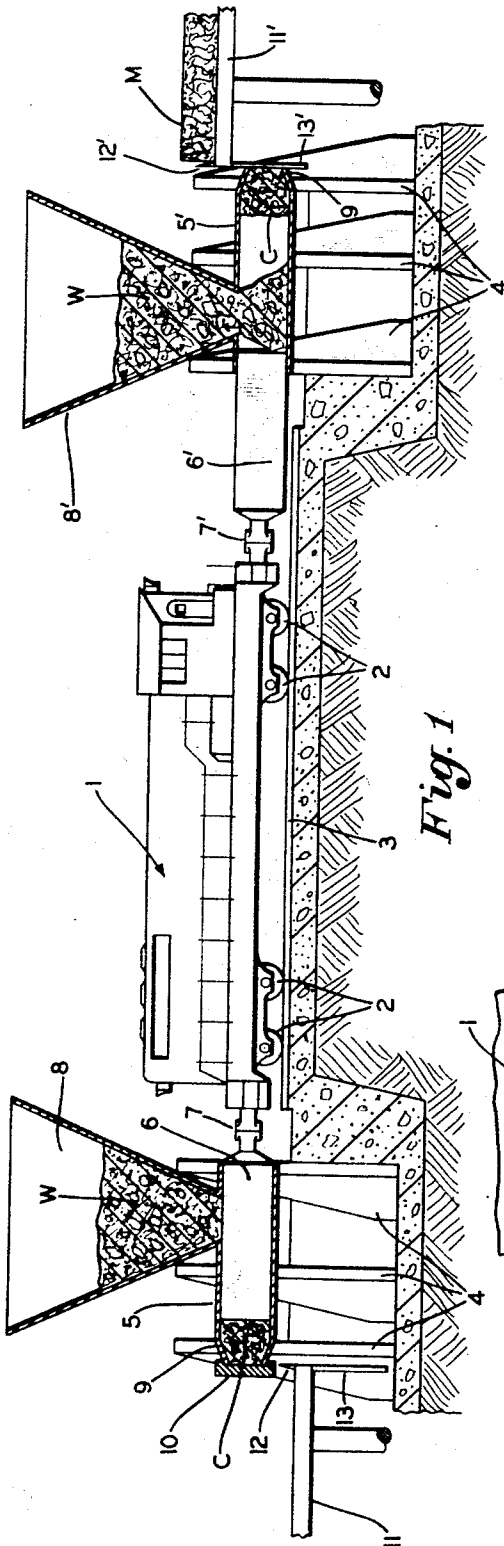


Fig. 1

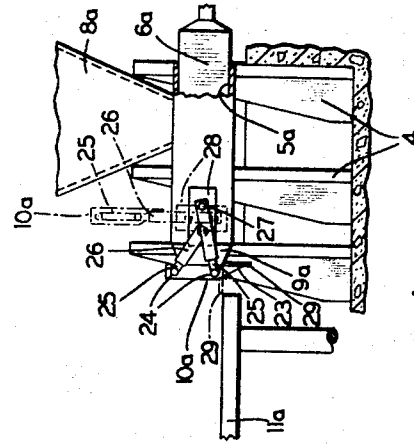


Fig. 2

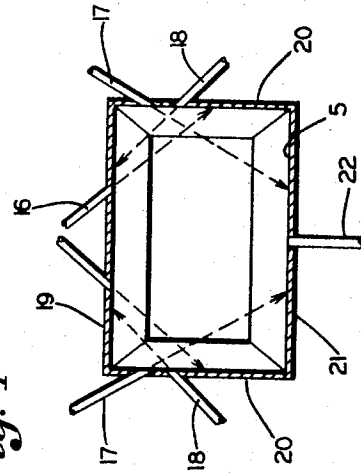


Fig. 3

Fig. 4

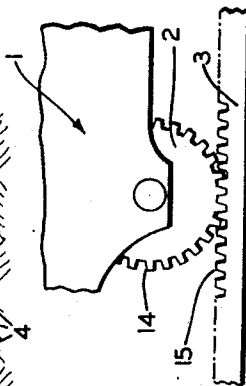
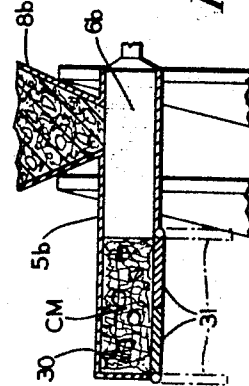


Fig. 5



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COMPACTING MACHINE

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9 Claims

ABSTRACT OF THE DISCLOSURE

A machine for compacting solid waste, in which a locomotive may provide the work force. A ram coupled to the forward end of the locomotive reciprocates within a compaction chamber communicating with a feed hopper. The discharge end of the compaction chamber may be tapered and provided with a door. The compacted waste is extruded from the compaction chamber onto a lift table or the like.

A similar ram may be coupled to the rear end of the locomotive, reciprocating within a similar compaction chamber, and associated parts duplicating the compacting machine at the forward end of the locomotive.

As an alternative construction, the tapered end of the compaction chamber with end door may be replaced by a reinforced rectangular box with bottom dropping doors.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates to a machine for compacting solid wastes such as garbage, industrial and agricultural refuse, certain types of demolition and construction debris, and various types of rubbish, for use in conjunction with a sanitary landfill method of solid waste disposal.

Description of the prior art

Various types of compaction machines for use in the compacting of solid waste may now be obtained from several different manufacturers. The great majority of these compaction machines are only designed to compact small amounts of solid wastes during an eight hour working day, the best of them being able to compact only a few hundred tons of solid waste in eight hours.

The force exerted by the compaction control devices in such machines is minimal and the solid wastes are only packed a little tighter together than normal. Some manufacturers offer grinding machines to the solid waste disposal contractor who desires to grind his volume of waste instead of compacting it.

The best and fastest grinding machine on the market today can handle only about 1200 tons of solid waste in eight hours. This grinding machine is also very costly to maintain. All of the best compacting and grinding machines for solid waste were designed only for a small volume, local haul service.

SUMMARY OF THE INVENTION

The compaction machine to which the present invention pertains can exert pressure for the compaction of solid wastes that far exceed the pressure obtainable by any such machines now in use. This improved compaction machine is designed to handle thousands of tons of solid waste in a day instead of a few hundred tons as under present practice.

The invention may be described in general terms as comprising a locomotive for a work force, a ram coupled to one end of the locomotive, a compaction chamber within which the ram reciprocates, a feed hopper communicating with the compaction chamber, door means upon the compaction chamber through which the com-

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acted material is discharged and a lift table or the like onto which the compacted material is discharged from the compaction chamber.

For economic reasons a similar ram may be coupled to the other end of the locomotive to operate within the compaction chamber of a compaction machine duplicating the one at the first named end of the locomotive. Thus as the locomotive moves in one direction it will compact solid wastes in one compaction chamber and as it moves in reverse direction it will compact solid wastes in the other compaction chamber. Thus, while one of the compaction machines is loading the other will be compressing and visa versa.

In one embodiment of the invention the discharge end of the compaction chamber may be tapered with a movable door located at the discharge end.

In another embodiment of the invention this tapered end and door may be replaced by a reinforced rectangular box with bottom dropping doors.

For the purpose of preventing slippage of the locomotive wheels upon the track rails, due to the force exerted upon the waste material and the resistance of the solid waste material thereto, the rails may be toothed in the manner of a rack bar and the periphery of the drive wheels of the locomotive may be toothed in the manner of a gear wheel.

Steam jets may be provided for steam cleaning the top, bottom and side walls of the compaction chamber after each compacted mass of solid waste is discharged therefrom. Means may also be provided for lubricating the interior of the compaction chamber.

It is, therefore, a primary object of the invention to provide a compaction machine including a ram coupled to one end of a locomotive and reciprocating within a compaction chamber communicating with a feed hopper.

Another object of the invention is to provide such a compaction machine in which the discharge end of the compaction chamber is tapered and provided with a movable door.

A further object of the invention is to provide a compaction machine of the character referred to in which the driving wheels of the locomotive are toothed in the manner of a gear wheel and the rails upon which they ride are toothed in the manner of a rack bar.

A still further object of the invention is to provide a compaction machine of this type having means for steam cleaning the inner walls of the compaction chamber after each compacted mass of solid waste has been discharged therefrom.

Another object of the invention is to provide such a compaction machine having means for lubricating the interior of the compaction chamber.

A further object of the invention is to provide a compaction machine of the character referred to in which a reinforced rectangular box is provided at the discharge end of the compaction chamber with bottom dropping doors.

The above and other objects, apparent from the drawing and following description, may be attained, the above described difficulties overcome and the advantages and results obtained, by the apparatus, construction, arrangements and combinations, sub-combinations and parts which comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic side elevation of a compaction machine embodying the invention coupled to each end of a locomotive;

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FIG. 2 is a fragmentary, longitudinal sectional view through a slightly modified form of compaction machine;

FIG. 3 is an enlarged transverse sectional view through the compaction chamber of the machine showing the means for steam cleaning the inner walls thereof and the means for lubricating the same;

FIG. 4 is an enlarged diagrammatic fragmentary elevation showing a toothed driving wheel of the locomotive mounted upon a toothed track rail; and

FIG. 5 is a fragmentary, longitudinal sectional view through another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to the construction shown in FIG. 1, the fork force of the compaction machine is shown as a locomotive, indicated generally at 1. This is preferably at 125 ton Diesel locomotive of 2,000 horsepower. The locomotive is provided with driving wheels 2 mounted upon track rails 3.

At the forward end of the locomotive is fixedly mounted, as upon the structure 4, a compaction machine embodying the invention. This machine includes an elongated compaction chamber 5 within which is reciprocally mounted the ram 6 which is coupled by conventional coupling indicated at 7 to the front end of the locomotive 1.

A feed hopper 8 communicates with the top of the compaction chamber 5 near the rear end thereof so that solid waste material loaded into the hopper may be fed into the compaction chamber 5 by gravity when the ram 6 is retracted.

The forward discharge end of the compaction chamber may be tapered as indicated at 9 and is provided with a movable or removable door 10. Beyond the discharge end of the compaction chamber is located a lift table 11 or the like, by means of which the compacted waste will be lifted and dumped into a railroad car or truck.

A blade 12 is attached to the edge of the lift table 11 adjacent to the tapered open end of the compaction chamber 5. A piece of sheet steel 13 depends from the same edge of the lift table 11.

In order to double the capacity of the apparatus, another compaction machine, identical to the one located at the forward end of the locomotive, may be located at the rear end thereof as shown in FIG. 1. For this purpose a ram 6' is coupled to the rear end of the locomotive 1 as indicated at 7' and reciprocates within a compaction chamber 5' mounted upon a structure 4'.

This compaction chamber communicates with the feed hopper 8' and may have a tapered discharge end 9' provided with a door similar to door 10. The compacted waste material extruded from this rear compaction machine may be extruded upon a lift table 11' or the like for lifting the compacted waste and dumping it into a railroad car or truck. A blade 12' and sheet steel 13' are attached to the edge of the lift table 11'.

For the purpose of preventing slippage of the wheels of the locomotive upon the rails, as shown in FIG. 4, each driving wheel 2 may be provided around its periphery with teeth 14 in the manner of a gear wheel, and each track rail 3 may be provided with teeth 15 in the manner of a rack bar. Thus, the locomotive driving wheels will at all times have positive contact with the track rails so as to prevent any slippage.

As shown in FIG. 3, means is provided for steam cleaning the interior walls of the compaction chamber 5 after each compacted mass of solid waste has been discharged therefrom as well as for lubricating the same. Although the compaction chamber may be round, square, or of other cross-sectional shape, it is preferably of the rectangular shape shown in FIG. 3, being of greater width than height.

For the purpose of steam cleaning the interior walls of the compaction chamber, diagonally disposed steam jets

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16, 17 and 18 are provided. The jets 16 are located through the top wall 19 of a compaction chamber and direct steam down against the side walls 20 thereof.

The jets 17 are located diagonally through the side walls 20 and direct steam downwardly against the bottom wall 21, and the jets 18 are located diagonally through the side walls 20 and direct steam upwardly against the top wall 19.

The steam for this purpose may be generated by the locomotive and suitable valve means (not shown) may be provided for controlling the admission of the same to the interior of the compaction chamber. For the purpose of lubricating the interior of the compaction chamber, one or more oil jets 22 may be provided.

In FIG. 2 is shown a slightly modified form of the invention in which the compaction chamber 5a is similar to that shown in FIG. 1, being provided with the tapered discharge end 9a. The compaction chamber is mounted upon the structure 4a and provided with the ram 6a and feed hopper 8a.

The movable door 10a has a razor-sharp blade 23 at its lower end. This door is pivotally connected at 24 to the piston rods 25. These piston rods are operatively mounted in the air-operated cylinders 26, which are pivotally mounted at 27 upon the rotatable member 28, the latter member being pivotally mounted upon the side of the compaction chamber 5a and arranged to be rotated from the full line position to the broken line by any suitable means (not shown).

The door 10a is very large and heavy, and must be supported on each side of the compaction chamber by a similar combination of piston rods 25, cylinders 26 and rotatable member 28. A rubber lip 29 is fixed at one edge to the lower edge of the discharge end of the compaction chamber. This rubber lip is adapted to be depressed, as shown in full lines, by closing of the door 10a, and adapted to be raised to the broken line position when the door is raised, thus closing the space between the lift table 11a and the discharge end of the compaction chamber and preventing waste material from dropping into the lift table well.

In FIG. 5 is shown another modification of the invention in which the feed hopper 8b communicates with one end portion of the compaction chamber 5b within which the ram 6b is slidably mounted. Instead of having a tapered discharge end upon the compaction chamber, a reinforced rectangular box 30 is provided with bottom dropping doors 31.

Any suitable means, not shown, may be provided for temporarily holding the doors in closed position as shown in full lines in the drawing until a desired amount of solid waste is compacted when the doors may be opened to broken line position permitting the compacted waste to fall onto a conveyor belt or the like which will carry it to a railroad car, truck or other means of conveyance.

It should be understood that while all of the parts are shown diagrammatically, in actual practice the apparatus must be very rugged so as to withstand the extreme pressures produced. Where a 2,000 horsepower, 125 ton locomotive is used, 1,400 tons pressure can be produced in a ten-foot movement of the locomotive so that the compaction chamber, doors, etc. must be very heavy and strong.

OPERATION

Referring first to the operation of the embodiment of the invention as shown in FIG. 1, waste material indicated at W is introduced into the hoppers 8 and 8' when the ram is in the retracted position of the ram 6', permitting the material to fall easily into the compaction chamber.

At the time the door 10 is fastened in position at the tapered discharge end of the compaction chamber. The locomotive is then operated forcing the ram against the solid waste in the compaction chamber, compressing the

same with great force into the tapered end portion of the compaction chamber as indicated at C.

The locomotive is then operated to retract the ram, the door 10 is removed and more solid waste material is fed into the compaction chamber and the cycle is repeated until the desired amount of waste material has been compacted and extruded through the tapered discharge end of the compaction chamber onto the lift table.

The lift table is then raised to the position of the lift table 11' at the right hand end of FIG. 1, the blade 12 cutting off the compacted mass M of solid waste upon the lift table from the compacted waste C in the tapered end of the compaction chamber.

At the same time, the piece of sheet steel 13, attached to the bottom of the lift table, will cover the discharge end of the compaction chamber preventing any waste material from spilling into the lift table well.

In the operation of the embodiment illustrated in FIG. 2, the rotary member 28 and piston and cylinders 25 and 26 would be in the full line position holding the heavy steel door 10a in closed position while the first charge of waste material is compacted in the tapered discharge end portion of the compaction chamber.

The rotary member 28 and pistons and cylinders 25 and 26, respectively, is then operated to the broken line position, raising the door 10a and further waste material is compacted and extruded until the desired amount of waste material has been extruded onto the lift table.

At this point the rotary member 28 and pistons and cylinders 25 and 26, respectively, are operated to drop the heavy steel door 10a by gravity, the blade 23 at the lower edge thereof cutting off the mass of compacted waste material on the lift table from that remaining in the tapered end of the compaction chamber.

The operation of the embodiment of the invention shown in FIG. 5 is very simple and will be easily understood. When the desired amount of waste material has been compacted within the rectangular box 30 as indicated at CM, the doors 31 will be opened and dropped to the broken line position, permitting the compacted mass of material CM to drop onto a conveyor belt or the like which conveys it away from the machine.

I claim:

1. A compaction machine for compacting solid waste materials including a locomotive mounted upon track rails, a horizontally disposed compaction chamber located at one end of the locomotive, a feed hopper communicating with the compaction chamber, a ram connected to the adjacent end of the locomotive and slidably located within the compaction chamber, door means at the dis-

charge end of the compaction chamber, and conveyor means for receiving compacted waste material discharged from the compaction chamber.

2. A compaction machine as defined in claim 1 in which there is a compaction chamber at each end of the locomotive and a ram connected to each end of the locomotive and slidably located within the corresponding compaction chamber.

3. A compaction machine as defined in claim 1 in which the discharge end of the compaction chamber is tapered and a lift table is provided for receiving a compacted mass of solid waste extruded from said compaction chamber.

4. A compaction machine as defined in claim 3 in which means is provided for cutting off the extruded compacted mass of solid waste from the compacted waste in the tapered end of the compaction chamber.

5. A compaction machine as defined in claim 4 in which said cutting-off means is mounted upon the lift table.

6. A compaction machine as defined in claim 4 in which said cutting-off means is mounted on the door means.

7. A compaction machine as defined in claim 1 in which the discharge end of the compaction chamber comprises a reinforced rectangular box with bottom dropping doors.

8. A compaction machine as defined in claim 1 in which there is means for steam cleaning and means for lubricating the interior of the compaction chamber.

9. A compaction machine as defined in claim 1 in which the track rails are toothed and the locomotive has toothed driving wheels.

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