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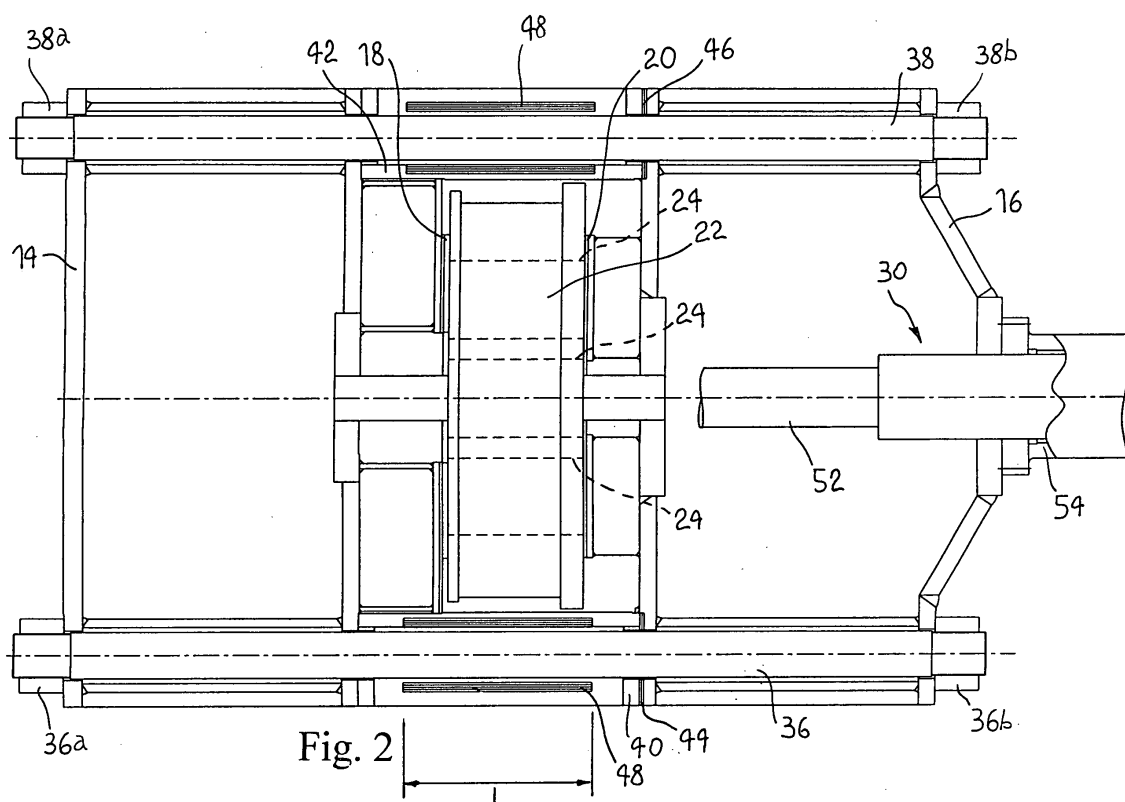
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(54) **Waste-compacting machine**

(57) The machine comprises a drum (22) which is pivotally supported on respective front-end cross-pieces (14, 16) and houses a plurality of compaction chambers (24) open to one loading, axial end of the drum (22) which is hinged to one first cross-piece (16). A transverse plate (20) is arranged close to said loading end of the drum and is integral with the first cross-piece (16).

The cross-pieces (14, 16) are mutually connected to each other along a longitudinal direction by two pairs of tie rods (36, 38) which are arranged between respective ends of the cross-pieces, against a spacing member (40, 42) and a plurality of removable, register spacers (44, 46) which are longitudinally clamped between the supports.



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Description

[0001] The present invention relates to an improvement in a waste-compacting machine, particularly for urban solid waste (USW).

[0002] Machines are known which compact urban solid waste by pressing it under very high pressure, thereby causing its humid fraction, which can be recycled for production of fertilizers, to be separated from its dry fraction, which can be recycled as fuel.

[0003] In particular, for an increased productivity, a waste-compacting machine is known which comprises three perforated cylinders supported on a revolving drum and arranged to be cyclically filled with the material to be compacted. The drum is driven to rotate by steps so that all the cylinders are successively conveyed in front of a plunger, which penetrates into the cylinder and squeezes the material contained therein, thereby causing the fluid fraction to be drained through the holes.

[0004] A plate integral with the frame rises in front of the loading side base of the drum and is provided with an opening through which the material is loaded into that cylinder aligned to the opening. The rotation of the drum causes the excess fraction of USW to be cut off by shearing between the adjacent surfaces of the cylinder and of the plate.

[0005] Therefore, the shearing surfaces are subjected to wear so that the gap between them tends to widen, with a risk that rigid bodies enclosed in the material become stuck between the drum and the screen, thereby blocking the rotation of the drum and causing damages in the structure.

[0006] Therefore, it is a main object of the present invention to provide a waste-compacting machine of the above-mentioned type, which is improved so that the wear due to mutual sliding of the adjacent surfaces of the cylinder and of the plate can be periodically compensated in an easy and practical way.

[0007] The above and other objects and advantages of the invention, which will better appear below, are achieved by a waste-compacting machine having the features recited in claim 1, while the other claims state other advantageous, though secondary features.

[0008] The invention will be now described in more detail with reference to a preferred, non-exclusive embodiment, shown by way of non-limiting example in the attached drawings,

Fig. 1 is a side view of the waste-compacting machine according to this invention;

Fig. 2 is a cross-section view of the machine of Fig. 1 along line II-II;

Fig. 3 is a view in longitudinal cross-section of a detail of the machine of Fig. 1 according to an alternative embodiment.

[0009] With initial reference to Figs. 1, 2, a waste-compacting machine 10 comprises a frame 12 provided with two cross-pieces 14, 16 supporting respective transversal plates 18, 20 with a horizontal drum 22 pivotally supported between them about a longitudinal axis A. Drum 22 supports three perforated cylinders 24 which are open at their ends, have horizontal axes, and are spaced at equal angles from each other around the axis of the drum. A cylindrical, compaction chamber is defined within the cylinders.

[0010] A loading station 26 and an unloading station 28 are arranged in front of one longitudinal end of the drum, while a squeezing station 30 is arranged in front of the opposite end. The three stations are angularly spaced from each other around the axis A, correspondingly to cylinders 24. The loading side plate 18 is open to the corresponding ends of cylinders 24 at stations 26, 28, 30. The opposite plate 20 is open to the corresponding ends of cylinders 24 at the unloading station 28 and squeezing station 30, while it shuts the end of that cylinder which is arranged in front of loading station 26.

[0011] The drum is driven to rotate by steps by a motor (not shown), in order to cyclically convey one cylinder in front of the loading station, another cylinder in front of the squeezing station, and the last cylinder in front of the unloading station.

[0012] In a way known per se, loading station 26 comprises a pressing member 32, or any other suitable feeding device such as, e.g., a screw feeder, which is coaxial to cylinder 24 when the latter is positioned in front of the loading station, and is axially operable for conveying the material from a hopper 24 to the cylinder via a feeding duct 35.

[0013] The rotation of the drum, in order to convey the material from loading station 26 to squeezing station 30, causes the excess fraction of USW to be cut off by shearing between the adjacent surfaces of the cylinder and of loading side plate 18.

[0014] According to this invention, two pairs of tie rods 36, 38 connect the cross-pieces to each other at respective ends thereof along a longitudinal direction, against respective spacing members 40, 42 which are clamped between the cross-pieces, together with a plurality of removable, register spacers 44, 46.

[0015] Each tie rod is provided with threaded nuts 36a, 36b, 38a, 38b screwed to its opposite ends and abutting against the outer sides of the cross-pieces.

[0016] A middle portion L of each tie rod is surrounded by a heating sleeve 48 connected to power supply means (not shown).

[0017] Squeezing station 30 comprises a shutting piston (not shown), which is coaxial to the cylinder positioned in front of such station and sealingly closes its loading side end, as well as a pushing member or plunger 52 that is drivable by a hydraulic cylinder 54 to penetrate into cylinder 24 through the other end, thereby causing the material contained therein to be squeezed with its humid fraction drained through holes.

[0018] In a known way, unloading station 28 comprises a knockout piston 56 which is coaxial to that cylinder 24 positioned in front of such station, and is drivable by a hydraulic actuator 58 to penetrate into the cylinder through its loading side end and knock the compacted material out through the opposite end. The knocked-out material is unloaded onto a chute (not shown) for removal.

[0019] In the operation, the drum is driven to rotate by steps of 120° for cyclically subjecting each cylinder to:

- a loading step, in which a part of the material in hopper 34 is conveyed into the cylinder aligned to the loading station by pressing member 32 or the screw feeder,
- a squeezing step, in which plunger 52 penetrates into that cylinder 24 aligned to the squeezing station and causes the material contained therein to be squeezed, against the shutting piston, the fluid fraction being drained through the holes in the cylinder,
- an unloading step, in which knockout piston 56 penetrates through one end of the cylinder aligned to the unloading station and pushes the compacted material out through the opposite end.

[0020] In order to reduce the gap between the adjacent surfaces of loading side plate 18 and drum 22, due to the wear by sliding, a registering operation is periodically carried out, which consists of removing, after loosening the nuts, one or more register spacers 44, 46.

[0021] During initial installation, in order to loosen or tighten the nuts for pre-tensioning as desired, as well as in the registering operations, heating sleeve 48 is energized, thereby causing the tie rod to lengthen by thermal expansion, and then the nuts are tightened/loosened as desired.

[0022] An alternative embodiment of the invention is shown in Fig. 3, where one of the nuts engaging the end of tie rod T1 is substituted by an actuator 62 having a hollow, through piston rod 64 that is screwed to the end of the tie rod and abuts, with its bottom 62a on the side of the pressurized chamber, against the side of cross-piece TR. Piston 64 is provided with a stop abutment 64a which abuts against the opposite bottom 62b of the cylinder with the cylinder in its home position.

[0023] By operating actuator 62, abutment 64a moves away from bottom 62b so that spacers 66 can be inserted therebetween, in order to maintain the tie rod pre-tensioned at a desired value when the piston is depressurized.

[0024] A few preferred embodiments of the invention have been described herein, but of course many changes may be made by a person skilled in the art, depending on the circumstances, within the scope of the inventive concept.

Claims

1. A waste-compacting machine, comprising

- a drum (22), which is pivotally supported on respective front-end supports (14, 16), and houses a plurality of compaction chambers (24) open to one loading, axial end of the drum (22) which is hinged to one first of said supports (16),
- a transverse plate (20) arranged close to said loading end of the drum and integral with said first support (16),

characterized in that said supports (14, 16) are mutually connected to each other along a longitudinal direction by at least one tie rod (36, 38), against a spacing member (40, 42) and a plurality of removable, register spacers (44, 46) which are longitudinally clamped between the supports.

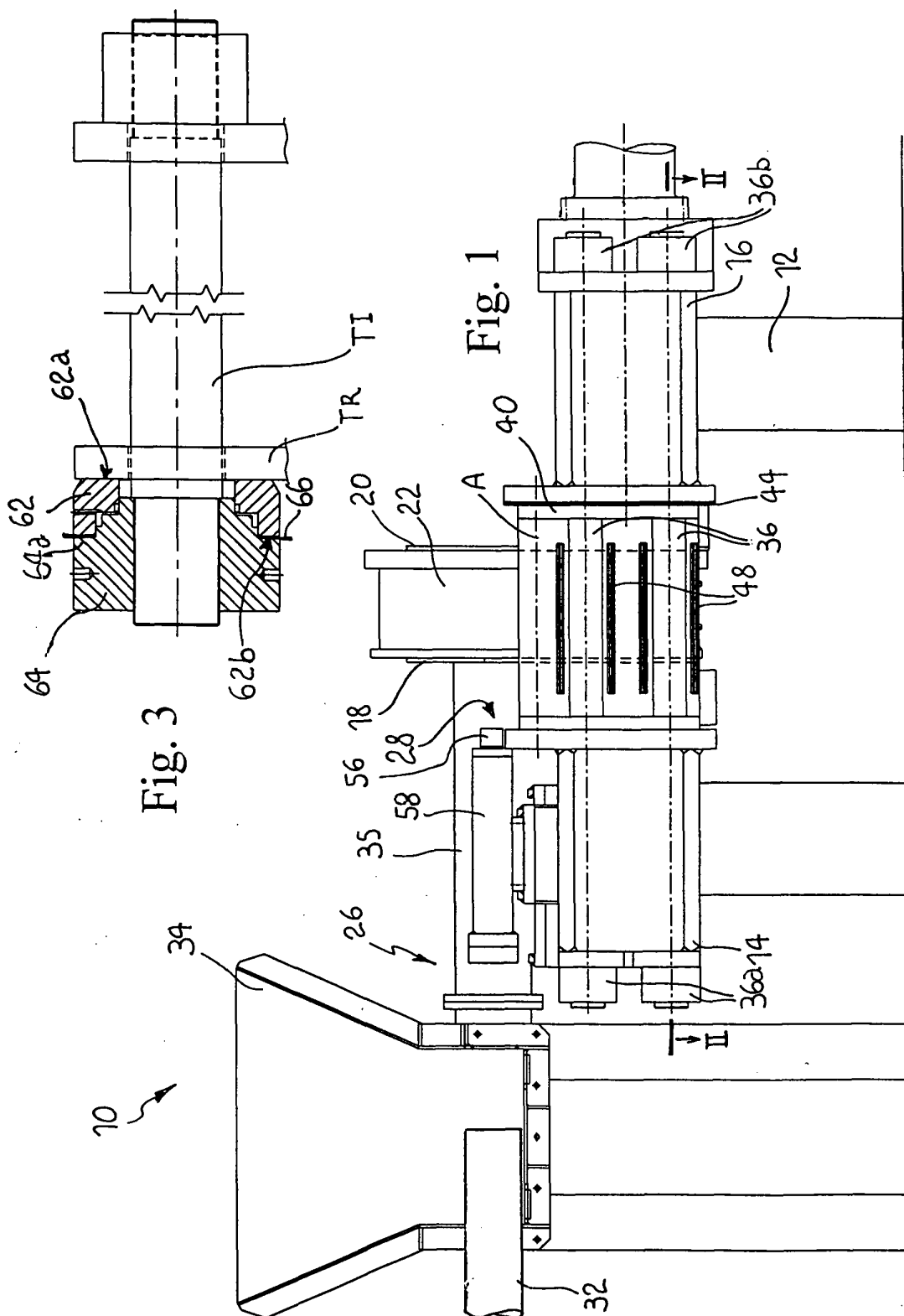
2. The machine of claim 1, **characterized in that** said tie rod (36, 38) is provided with a threaded nut (36a, 36b, 38a, 38b) screwed to one of the ends of the tie rod and abutting against the corresponding support, and with extension means (48, 62-66) connected to produce a lengthening in the tie rod, thereby causing the nut to move away from the support.

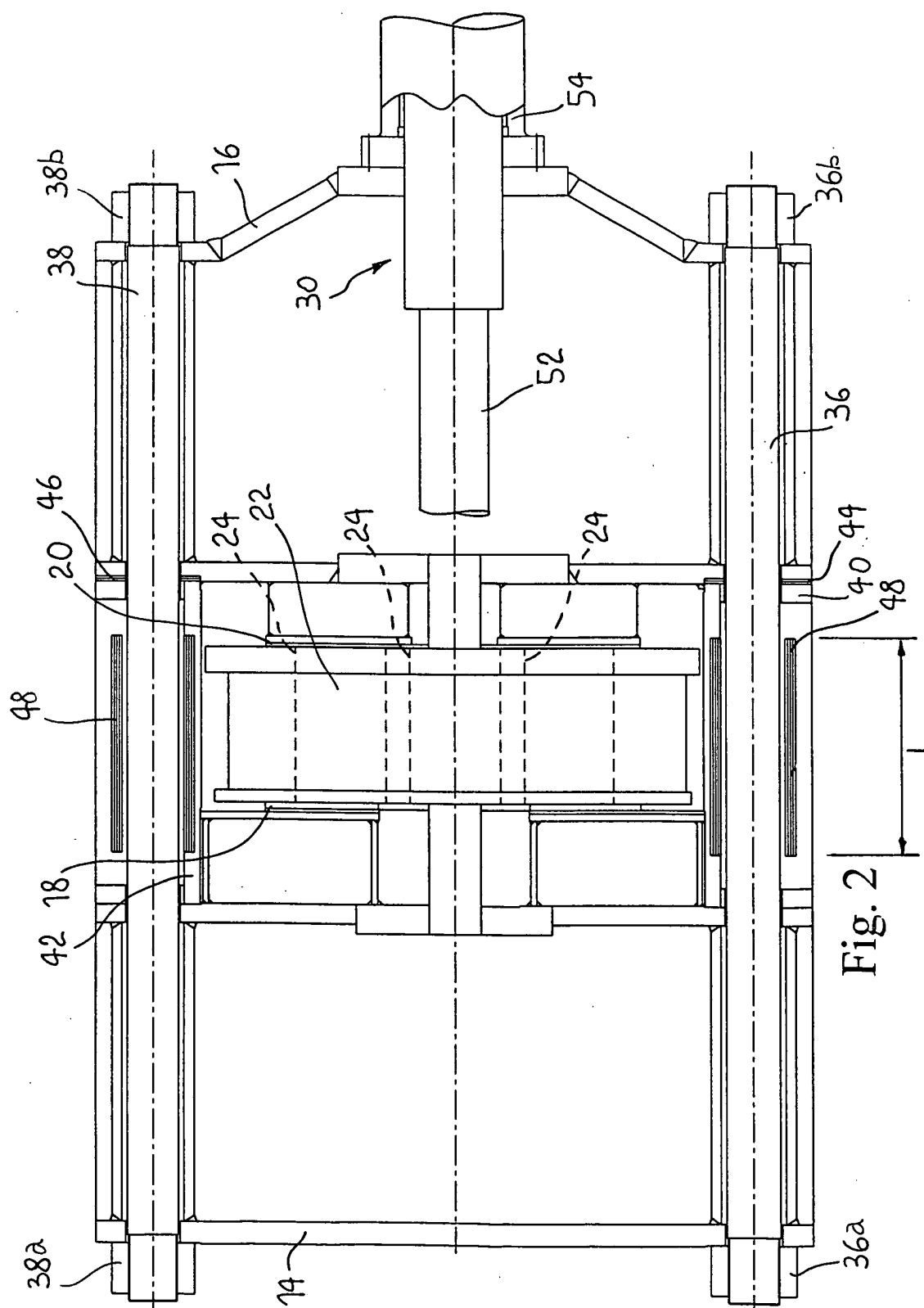
3. The machine of claim 2, **characterized in that** said extension means comprise heating means (48) connected to produce a lengthening in the tie rod by thermal expansion.

4. The machine of claim 3, **characterized in that** said heating means (48) comprise a heating member (48) engaging a middle portion of the tie rod.

5. The machine of any of claims 1 to 4, **characterized in that** at least one of said tie rods (36, 38) has one end integral with an actuator (62) which is connected to the support for pulling the tie rod.

6. The machine of claim 5, **characterized in that** said actuator (62) abuts, with its bottom (62a) on the side of the pressurized chamber, against the support, and is provided with a hollow, through piston rod (64) that is screwed to one end of the tie rod (36, 38) and has an abutment (64a) which abuts, in a home position, against an abutting surface (62a) of the actuator.







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 00 3861

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 June 2005	Examiner Belibel, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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