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(71) Applicant: **SERVIZI ECOLOGICI S.p.A.**
Corso Appio Claudio 229/5
I-10146 Torino(IT)

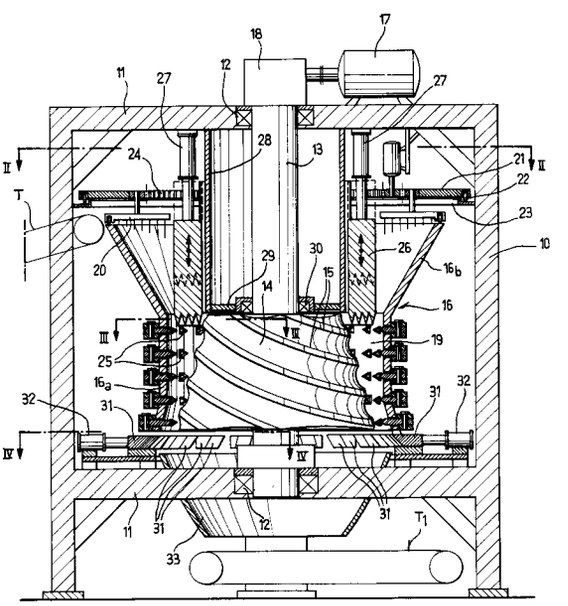
(72) Inventor: **Faussone, Gian Claudio Paolo**
Via Barrera, 31
I-10090 Rosta(IT)

(74) Representative: **Modiano, Guido et al**
MODIANO, JOSIF, PISANTY & STAUB
Modiano & Associati Via Meravigli, 16
I-20123 Milano(IT)

(54) Machine for triturating solid waste, particularly urban waste.

(57) The machine comprises presser means (14-26) for compacting the waste and advancing it continuously from a loading section to a discharge section of the machine and cutting means (31) which are arranged at the discharge section and act on the compacted mass of waste in order to shred it. The presser means comprise a screw rotor (14) and a presser element (26) which plunges into the mass of waste.

Fig. 1



EP 0 495 420 A1

The present invention relates to a machine for triturating solid waste, particularly urban waste.

Modern solid waste disposal technologies entail the preliminary grinding of the waste, in order to reduce it to coarse granules, and the subsequent pumping of these granules into covered storage pits.

However, waste grinding has been found to be difficult to perform, due to the content of humidity and substances in the waste which tend to agglomerate and form clumps in the mass of waste, preventing its fragmentation.

Due to these reasons, conventional ball or hammer mills and crushers normally used to break up minerals and other solid materials have been found to be entirely ineffective.

In practice it has been observed that it is necessary to act on the agglomerated mass of waste with cutting actions, and the machine according to the present invention is based on this concept; said machine is characterized in that it comprises presser means for compacting the waste and advancing it continuously from a loading section to a discharge section of the machine and cutting means, arranged at the discharge section, which act on the compacted mass in order to shred it.

Said presser means comprise a frustum-shaped helical screw or auger which can rotate within a substantially cylindrical jacket inside which it delimits a tapered compaction chamber provided with a loading section and a discharge section with different openings, the opening of the loading section being larger, and a presser element which acts on the mass of waste at said loading section.

The cutting means are constituted by a ring of guillotine blades which have a reciprocating motion, are actuated by respective fluid-activated jacks and affect the compacted mass of waste which exits from the loading section.

Further characteristics and advantages will become apparent from the following detailed description and with reference to the accompanying drawings, given by way of non-limitative example, wherein:

figure 1 is a longitudinal sectional view of the machine according to the invention;

figure 2 is a transverse sectional view, taken along the line II-II of figure 1;

figures 3 and 4 are partial sectional views, taken respectively along the lines III-III and IV-IV of figure 1.

The machine according to the invention substantially comprises a vertical frame constituted by uprights 10 and cross-members 11. Said cross-members 11 support, with the interposition of rolling bearings 12, the vertical shaft 13 of a rotor 14, constituted by a screw or auger which is provided with a plurality of helical starts or threads 15.

The rotor 14 has a frustum-shaped profile and is arranged with its larger circular base directed downward (with reference to figure 1) inside a jacket 16 having a substantially cylindrical lower portion 16a which contains the rotor and an upper frustum-shaped portion 16b which defines a loading hopper.

A motor 17 rotates the rotor 14 by means of a reduction unit 18. The jacket 16 and the rotor 14 delimit a tapering chamber 19 for compacting the waste, which is fed by means of a conveyor belt T into the hopper-like portion 16b. Rotating combs 20 are provided in order to uniformly distribute the waste loaded into the hopper. The combs 20 are supported by an annular disk 21 which is provided with wheels 22, which roll along a circular track 23 rigidly associated with the uprights 10, and with an internal set of teeth 24 with which there meshes an actuation sprocket moved by a motor 17a.

By virtue of the frustum-shaped configuration of the rotor 14, the compaction chamber 19 has an upper loading section provided with an annular opening of preset extent and a lower discharge section provided with a smaller annular opening; the value of the ratio between the areas of the loading and discharge openings is comprised between 2 and 2.5.

Accordingly, in passing from the loading opening to the discharge opening, the waste undergoes a significant compaction and a first shredding produced by a plurality of fixed blades 25 which protrude inside the jacket 16. A presser element 26 is provided in order to force the waste into the chamber 19 and facilitate its transit from the loading opening to the discharge opening, which is produced essentially by the rotation of the rotor 14. The presser element 26 is constituted by a hollow vertical cylindrical element which is provided with end teeth, can move vertically so as to plunge into the mass of waste and is subjected to the action of reversible fluid-activated jacks 27 which rhythmically lower and raise it.

The presser element 26 is guided, in its working stroke, by a fixed cylindrical wall 28 which is rigidly connected to the upper cross-member 11 and is prevented from moving laterally by spokes 29, connected to the shaft 13 with the interposition of bearings 30.

According to the invention, the machine furthermore comprises a ring of guillotine blades 31 which are spaced by an angular pitch a and are arranged at the discharge section of the chamber 19; the angular spacing of the blades is comprised between 10 and 20°. Each blade is supported at the end of the stem of a respective double-action fluid-activated jack 32 and performs a back-and-forth motion, affecting and cutting up the mass of

compacted waste which flows continuously out of the discharge opening of the chamber 19. A source of pressurized fluid (not illustrated) supplies all of the jacks 32 with the interposition of a rotating distributor which cyclically reverses the inlet and the outlet of the cylinders of the jacks in order to produce the back-and-forth motion of the stems.

The waste is cut up by the blades 31 and reduced to blocks with sides having a length comprised between 2 and 5 centimeters. The blocks fall into a collecting hopper 33 which distributes them onto a conveyor belt T1, which then feeds the blocks to a successive pumping and sorting station.

The constructive details and the embodiments may naturally vary extensively with respect to what is described and illustrated by way of non-limitative example without altering the concept of the invention and without thereby abandoning the scope of the invention.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Machine for triturating solid waste, particularly urban waste, characterized in that it comprises presser means for compacting the waste and for advancing it continuously from a loading section to a discharge section of the machine, and cutting means which are arranged at the discharge section and act on the compacted mass in order to shred it.

2. Machine according to claim 1, characterized in that said presser means comprise a frustum-shaped helical screw rotor which can rotate in a substantially cylindrical jacket inside which it delimits a tapered compaction chamber which has a loading section and a discharge section with respective openings, the opening of the loading section being larger than the opening of the discharge section, said machine further comprising a presser element which acts on the mass of waste at the loading section of the compaction chamber.

3. Machine according to claim 1, characterized in that said screw rotor is provided, at its lower end, with a vertical shaft which is rotated by a gearmotor and is orientated so that its larger circular face is directed downward.

4. Machine according to claim 2, characterized in that said rotor has a plurality of helical starts or threads.

5. Machine according to claims 1 and 2, characterized in that said jacket has a cylindrical lower portion which contains the rotor and a frustum-shaped upper portion which acts as loading hopper.

6. Machine according to claims 1 and 2, characterized in that said jacket is provided, on the internal surface of its cylindrical portion, with a plurality of fixed blades which perform a first shredding of the waste being compacted.

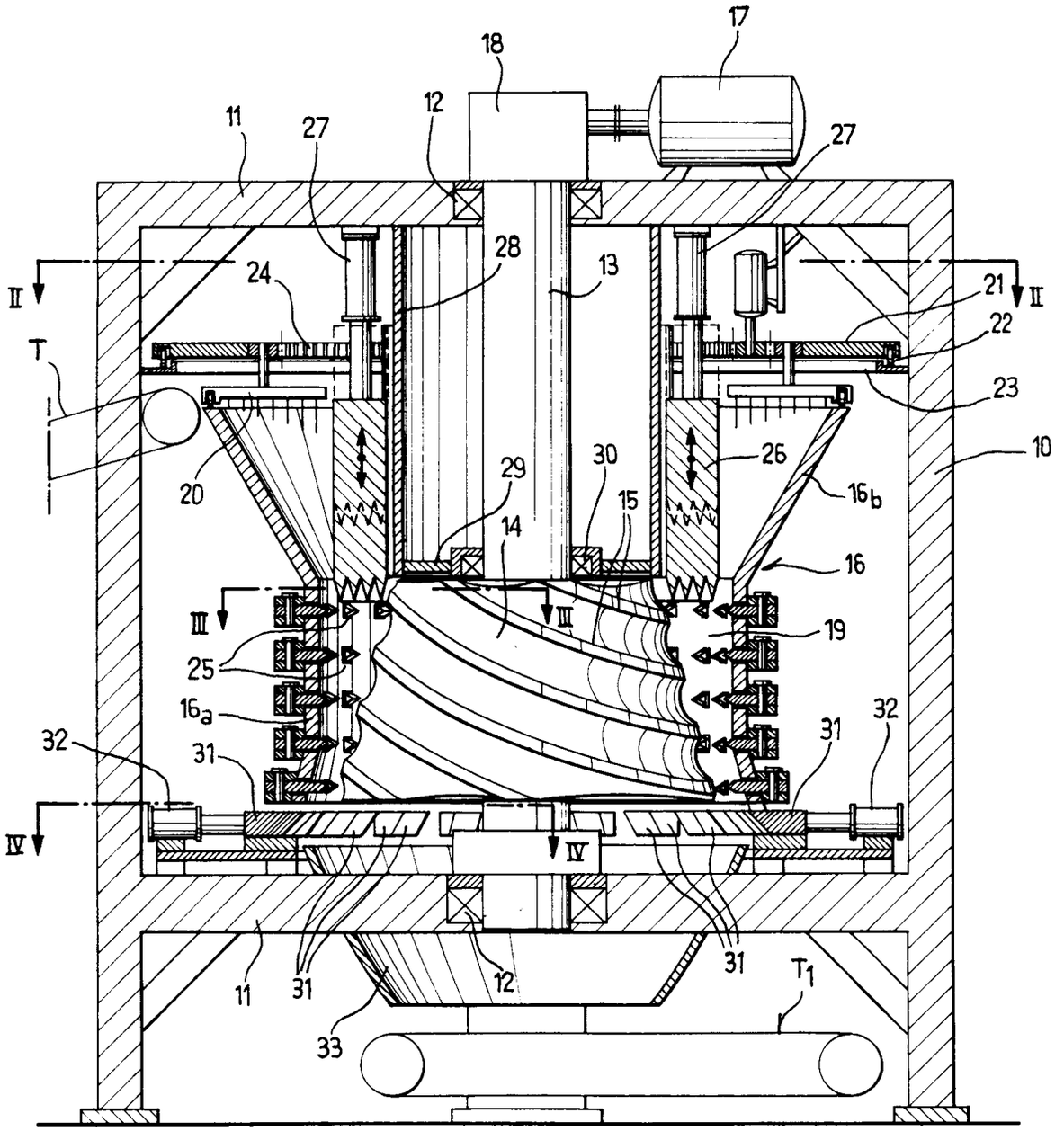
7. Machine according to claims 1 and 2, characterized in that said presser element is constituted by a hollow vertical cylindrical element which is provided with end teeth, can move vertically and is subjected to the action of fluid-activated jacks which rhythmically lower and raise it; said element plunging into the mass of waste and cooperating with the scroll rotor in order to compact said waste and cause advancement in the compaction chamber.

8. Machine according to claim 7, characterized in that the cylindrical element which constitutes the presser element is guided in its working stroke by a fixed cylindrical wall.

9. Machine according to claim 1, characterized in that said cutting means are constituted by a ring of guillotine blades which have a reciprocating motion and affect the mass of compacted waste which flows out of the discharge section of the compaction chamber.

10. Machine according to claim 9, characterized in that each blade is supported at the end of the stem of a respective double-action fluid-activated jack.

Fig. 1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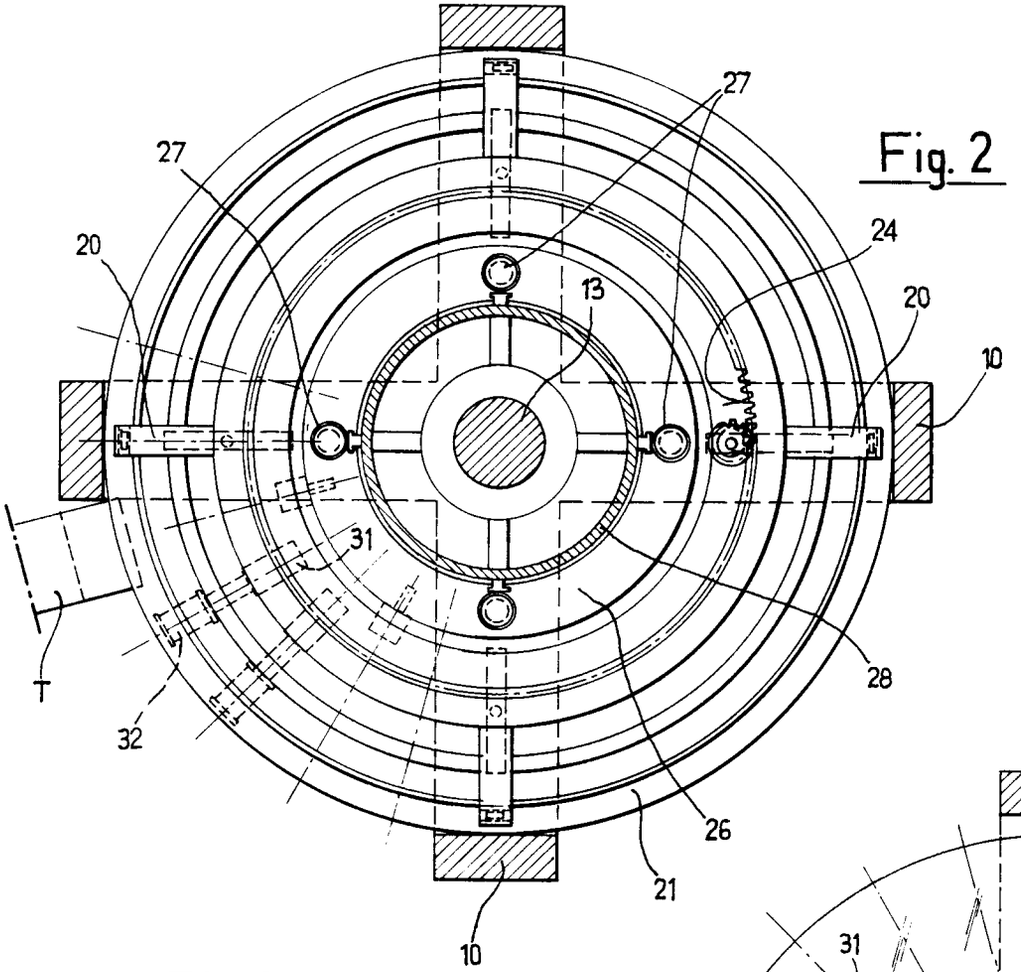

Fig. 2

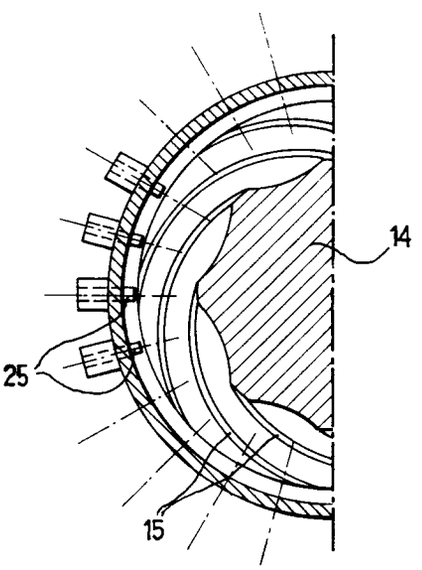

Fig. 3

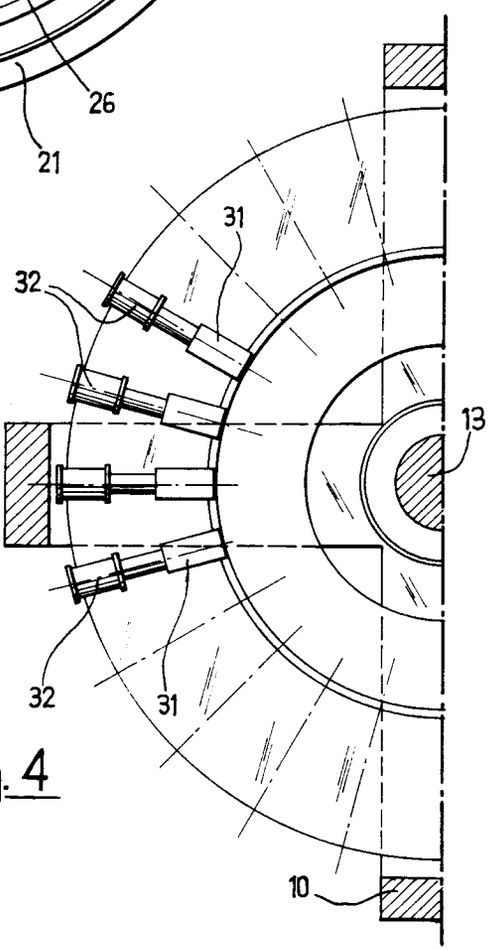

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 10 0422

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2 315 005 (F. KUHLMANN)	1,5	B02C19/22
A	* claims 1-3; figure 1 *	2,3,4	B02C18/02
	---		B02C18/40
X	US-A-4 767 069 (C. S. KIM)	1,3,4,6	B02C18/22
A	* column 2, line 11 - line 59; figure 2 *	2,5	B02C18/10

X	EP-A-0 304 870 (STERLING GRINDING CY. INC.)	1,3-6	
A	* abstract; figure 2 *	2	

X	DE-C-647 552 (E. VINCENT)	1,4,5	
A	* the whole document *	2,3,9	

A	FR-A-525 885 (L. BARTMANN) * figures 1,2,4 *	2,7	

A	DE-A-2 615 178 (INVESTMENTBOLAGET ELAJO AB.) * claims 1-5; figure 1 *	2,7	

A	GB-A-2 065 502 (S. TOKUKATSU) * abstract; figure 1 *	9	
	---		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-4 272 032 (B. HELLBERG) * abstract; figure 1 *	9,10	B02C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 MARCH 1992	VERDONCK J.C.M.J.

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
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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