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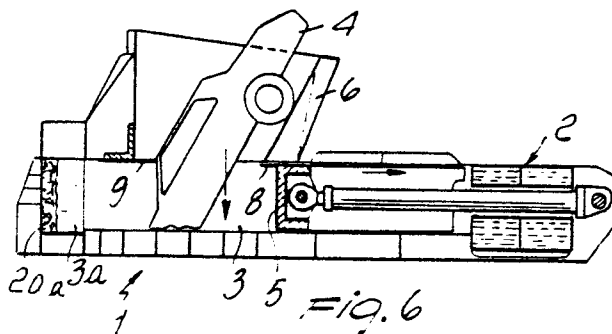
71 Applicant: **VEZZANI S.p.A.**
Piazza Nervi 1
I-15076 Ovada Province of Alessandria(IT)

72 Inventor: **Vezzani, Luciano**
In Corso Italia 43
I-15076 Ovada Province of Alessandria(IT)

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

54 **Method and machine compacting waste material, in particular metallic scrap, and block of compacted material obtained with the method.**

57 The present invention relates to a method and a machine for compacting waste material, in particular metallic scrap, and to a block of compacted material obtained with this method. The method according to the invention has the peculiarity of comprising: a first step of feeding a first amount of material to be compacted into a compression chamber (3), a first step of compression of the material fed into the compression chamber (3) along at least one preset direction to obtain a first compacted portion (20a). Subsequently at least one second step of feeding a second amount of material to be compacted is performed, followed by a second compression step with which the second amount of material is in turn compacted in the compression chamber (3) which still accommodates the first compacted portion - (20a). In this manner a single block is obtained, formed by at least two compacted portions (20a, 20b) which, if required, can again be broken up into the compacted portions which compose it.



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METHOD AND MACHINE FOR COMPACTING WASTE MATERIAL, IN PARTICULAR METALLIC SCRAP, AND BLOCK OF COMPACTED MATERIAL OBTAINED WITH THE METHOD.

The present invention relates to a method and to a machine for compacting waste material, in particular metallic scrap, and to the block of compacted material obtained with this method.

In the field of waste material to be recycled, presses are known which perform the compaction of the material obtaining a considerable reduction of its original volume so as to facilitate its transportation from the location where it is stacked, to the industry which provides the grinding and recycling of the recyclable material.

On order to feed the machines which perform the grinding, it is necessary for the blocks of compacted material not to exceed preset dimensions, since beyond these dimensions there would be great difficulty, if not impossibility, on the part of the grinding elements to process the blocks.

In the other hand, this requirement clashes with the needs of who performs the compaction of the scrap, since the reduced dimensions of the compacted block significantly increase the duration and therefore the cost of the loading and transportation of the compacted blocks.

The aim proposed by the present invention is to eliminate the above described disadvantages by devising a method for compacting waste material which allows to obtain blocks of compacted material with dimensions such as to allow the possibility of quickly loading them, yet being processable "appetizing" for grinding machines.

Within the scope of this aim, an object of the invention is to provide a machine for performing this method which is easy to manufacture and which is highly reliable in operation.

This aim, as well as this and other objects which will become apparent hereinafter, are achieved by a method for compacting waste material, in particular metallic scrap, characterized in that it comprises: a first step of feeding a first amount of material to be compacted into a compression chamber, a first step of compression of the material fed into said compression chamber along at least one preset direction to obtain a first compacted portion, at least one second step of feeding a second amount of material to be compacted into said compression chamber containing said first compacted portion, at least a second compression step along said preset direction to obtain at least one second portion joined in a separable single block to said first compacted portion, and a step of unloading said block out of said compression chamber.

The method according to the invention may be preferably, but not exclusively, provided by a machine comprising a framework internally defining a compression chamber slideably accommodating a first piston operable for reducing the useful volume of said chamber for compacting the material inserted therein, characterized in that, at the end of the chamber opposite with respect to the head of said first piston, is defined a containment region adapted for accommodating at least two portions, compacted and joined into a single separable block.

The compacted block of waste material which is obtained by the method according to the invention is characterized in that it comprises at least two portions compacted in sequence and joined into a single block which can be split into said two portions.

Further characteristics and advantages of the invention will become apparent from the description of a preferred, but not exclusive, embodiment of the method according to the invention and of the machine for the execution thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Fig. 1 is a lateral elevation view of the machine for performing the method according to the invention;

Fig. 2 is a perspective view of the machine;

Fig. 3 is an enlarged top plan view of the machine;

Fig. 4 is a partially cut-away enlarged lateral elevation view of the machine;

Figs. 5 and 6 are schematic and partial cross-section lateral elevation views of the machine, illustrating some steps of the method according to the invention;

Fig. 7 is a schematic partial cross section top plan view of the machine, illustrating another step of the method according to the invention;

Fig. 8 is a cross section view of a portion of the machine, illustrating the step of unloading the block out of the compression chamber; and

Fig. 9 is a perspective view of the compacted block of waste material obtained with the method according to the invention.

With reference to the above described figures, the machine for performing the method according to the invention, generally indicated with the reference numeral 1, comprises a framework 2 which defines a compression chamber 3 intended to accommodate the material to be compacted, composed, e.g. of the car wreckage 4. In the compression chamber 3 a first piston 5 is accommodated,

controlled e.g. hydraulically, which can be controllably operated to reduce the useful volume of the chamber 3 giving rise to the compaction of the material contained therein. In order to facilitate the introduction of the material to be compacted, it is possible to provide a slide 6 at the inlet opening 7 of the chamber 3.

At the upper edge of its head, the piston 5 is provided with a blade 8, which as the piston advances abuts a cutting edge 9 matchingly provided on one side of the inlet opening. This cutting edge is suitably slanted with respect to the direction of advancement so as to obtain, as the piston 5 advances, a gradual shearing of the scrap which is introduced into the chamber 3.

At the opposite end of the chamber 3 with respect to the head of the piston, a containment region 3a is defined which is adapted for containing at least two compressed portions produced by two compressions in sequence of amounts of material introduced into the chamber 3.

At this containment region, a second piston 10 is provided, arranged with an axis which is substantially perpendicular with respect to the axis of the first piston 5 which, like the latter, can be operated hydraulically to reduce the useful volume of the containment region 3a.

In the part opposite to the head of the piston 10, a port 11 is arranged which is slideable within vertical guides 12, and which can be controllably raised by means of a pair of hydraulic pistons 13 to allow the expulsion from the chamber 3 of the compacted material.

For the sake of descriptive completeness, it should be added that the framework 2 can be provided with wheels 14 and with a coupling bar 15 to obtain the easy shifting of the machine. Furthermore, the part of the framework 2 which supports the second piston 10 is hinged to the remaining part so that it is possible to rotate it substantially through 180° to obtain a reduction of the transverse dimensions of the machine during transport, as illustrated in Fig. 3.

In order to perform the method according to the invention, the machine 1 is operated as follows.

Initially, there is a first feeding step, in which a first amount of scrap is fed into the compression chamber 3. If the scrap has large dimensions, it will be inserted only partially into the chamber 3 inserting it into the inlet opening 7. The first feeding step is followed by a compression step in which the first piston 5 is advanced (Fig. 5). By virtue of the advancement of the piston 5, the part of scrap inserted into the chamber 3 is sheared and subsequently compacted along at least one preset direction, in the case illustrated, in the direction of advancement of the piston 5.

As a consequence of this first compression step, a first compacted portion 20a is obtained which remains in the containment region 3a when the piston 5 is moved back (fig. 6).

The backward motion of the piston 5 once more frees the inlet opening, which was closed during the compression step by the skirt of the piston 5, and then there is a second feeding step, in which a second amount of scrap is fed into the compression chamber.

Subsequently, a second compression step is carried out, in which the second amount of material is compacted against the first compacted portion 20a and constitutes a second compacted portion 20b which, by virtue of the high pressures usual in these machines, forms a single block with the first portion 20a.

The second compression step may be followed by other feeding and compression steps until the compacted block reaches preset dimensions, compatible with the ones of the port 11.

At the end of the last compression step, with the first piston 5 in contact with the compacted block 20, the second piston 10 intervenes, performing on the block an additional compression in a direction substantially perpendicular to the preceding compressions. This additional compression has the effect of increasing the cohesion between the compacted portions 20a, 20b, 20c.

At the end of this operation, the port 11 is raised and the block 20 is expelled from the chamber 3 by means of the same piston 10.

The block 20 which is obtained with the described method has a cohesion between the various compacted portions 20a, 20b, 20c which ensure its integrity against small shocks which can occur during the normal operations of transfer for transport. However, the fact that the portions 20a, 20b and 20c are compacted individually in sequence allows an easy separation of the various portions when the block is subject to greater shocks.

In practice, it has been observed that the method according to the invention fully achieves the intended aim since it allows to compact the waste material into blocks with dimensions such as to be easily loadable, or unloadable, on means of transport; such blocks, once they have reached the recycling industries, may then quickly split into the compacted portions which composed them and which have dimensions suitable for feeding the grinding machines.

A further advantage is that of having provided a machine for performing the method according to the invention which is easy to provide and which is highly reliable.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; moreover, all the details may be replaced with technically equivalent elements.

For the sake of simplicity, the invention has been described with specific reference to metallic scrap, though it is understood that the same method can also be applied to other waste materials, which have problems similar to the ones described above.

In practice, the materials employed for the construction of the machine which performs the method according to the invention, as well as its dimensions, may be any according to requirements and state of the art.

Claims

1. Method for compacting waste material, in particular metallic scrap, characterized in that it comprises a first step of feeding a first amount of material to be compacted into a compression chamber, a first step of compression of the material fed into said compression chamber along at least one preset direction to obtain a first compacted portion, at least one second step of feeding a second amount of material to be compacted into said compression chamber containing said first compacted portion, at least a second compression step along said preset direction to obtain at least one second portion joined in a separable single block to said first compacted portion, and a step of unloading said block out of said compression chamber.

2. Method according to claim 1, characterized in that, before said unloading step, an additional compression of said compacted portions is performed to increase the cohesion between said compacted portions in said single block.

3. Method according to claims 1 and 2, characterized in that said additional compression is performed along a direction which is substantially perpendicular to said preset direction.

4. Method according to claim 1, characterized in that said feeding scrap comprises a shearing step of a preset volume of waste material to be compressed.

5. Machine for compacting waste material, in particular metallic scrap, comprising a framework (2) internally defining a compression chamber (3) slideably accommodating a first piston (5) operable for reducing the useful volume of said chamber (3) for compacting the material inserted therein, characterized in that at the end of said chamber (3) opposite with respect to the head of said piston (5) is defined a containment region (3a), adapted for

accommodating at least two portions (20a, 20b) compacted in sequence and joined in a single separable block (20).

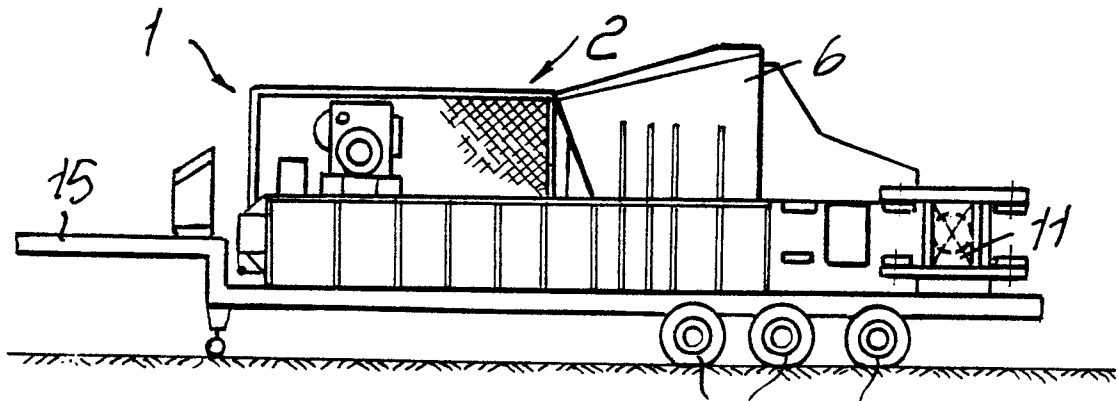
6. Machine according to claim 5, characterized in that, at said containment region (3a), a second piston (10) is provided, which is movable in a direction which is substantially perpendicular to said first piston (5) and can be operated to reduce the useful volume of said containment region (3a) to increase the cohesion between said compacted portions (20a, 20b).

7. Machine according to claims 5 and 6, characterized in that said containment region (3a) is provided, on the side opposite to the head of said second piston (10), with a controllably openable port (11) for the expulsion of said portions (20a, 20b), compacted and joined in a single separable block (20).

8. Block of compact material, in particular of metallic scrap, characterized in that it comprises at least two portions (20a, 20b) compacted in sequence and joined into a single block (20) which can be separated into said two portions (20a, 20b).

9. Block according to claim 8, characterized in that said two compacted portions (20a, 20b) are compressed in sequence along a same preset direction.

10. Block according to claim 8, characterized in that said two compacted portions (20a, 20b) are compressed in sequence along at least one preset direction and at least along one direction substantially perpendicular to said preset direction.



14 14 Fig. 1

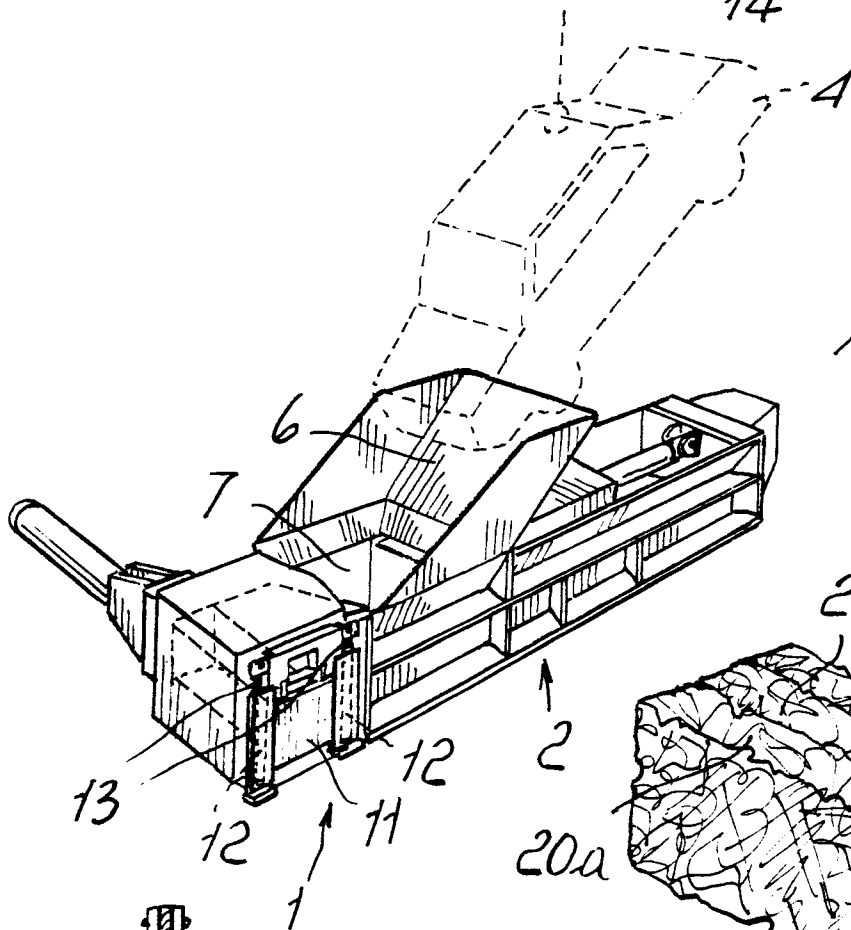


Fig. 2

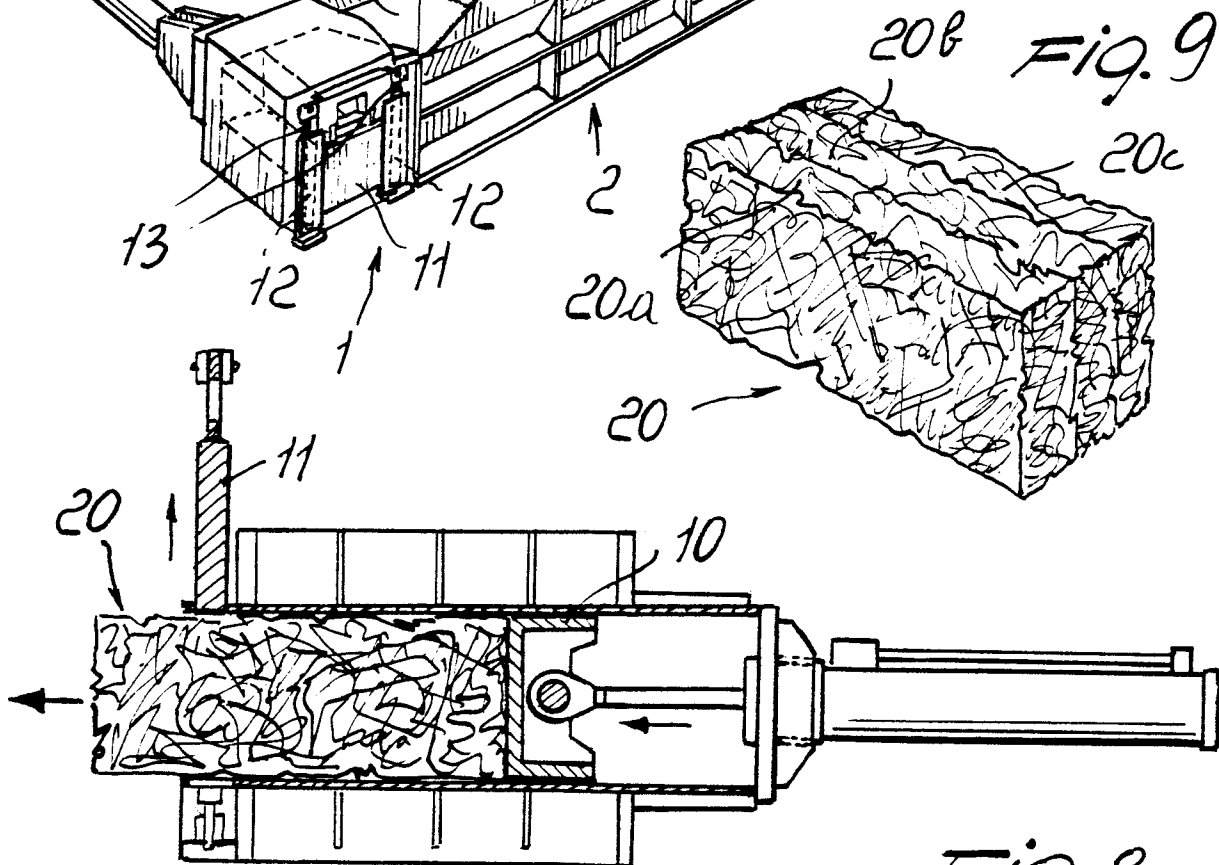


Fig. 8

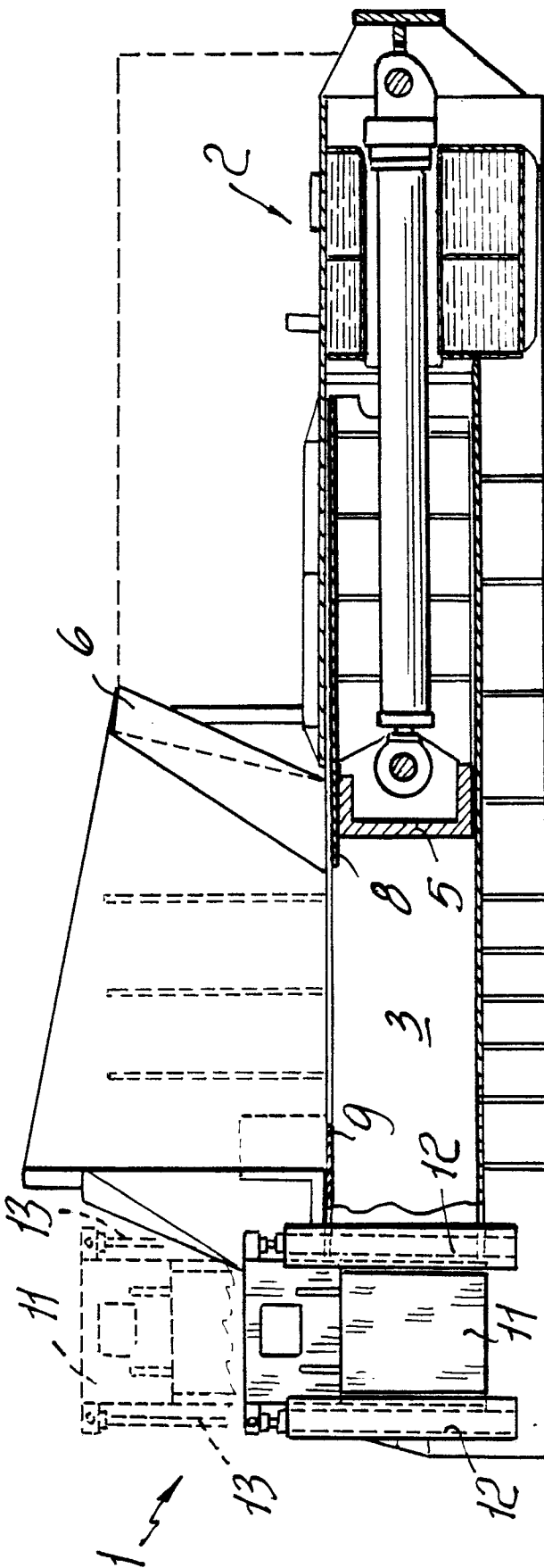


Fig. 4

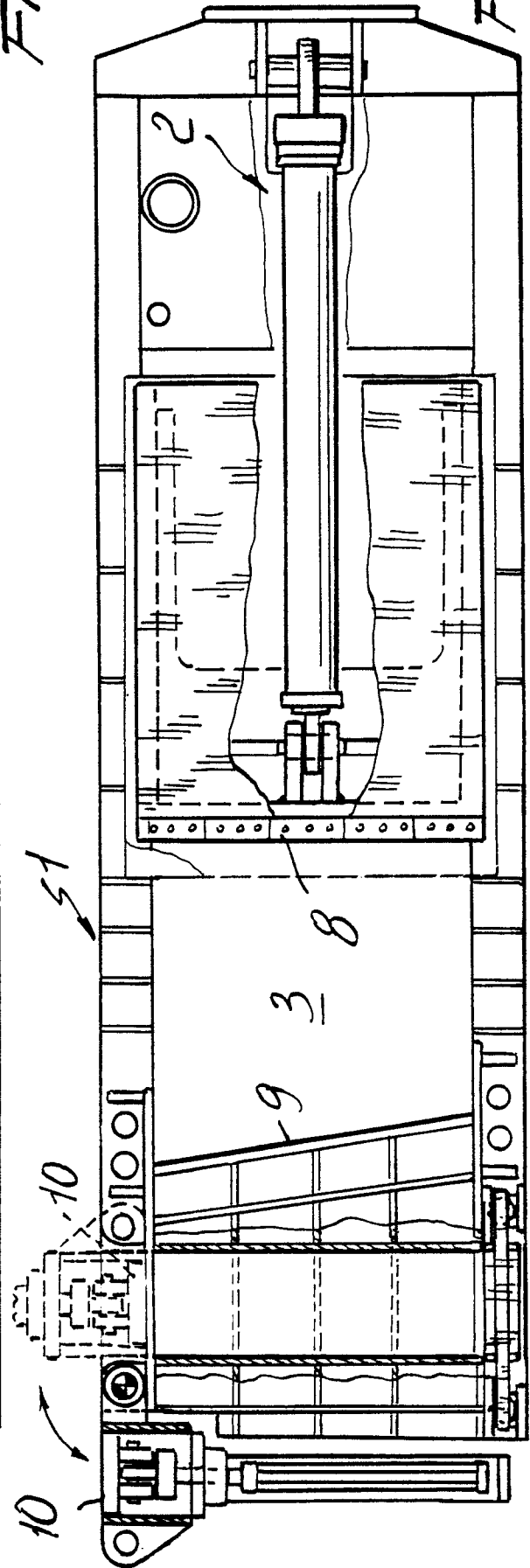
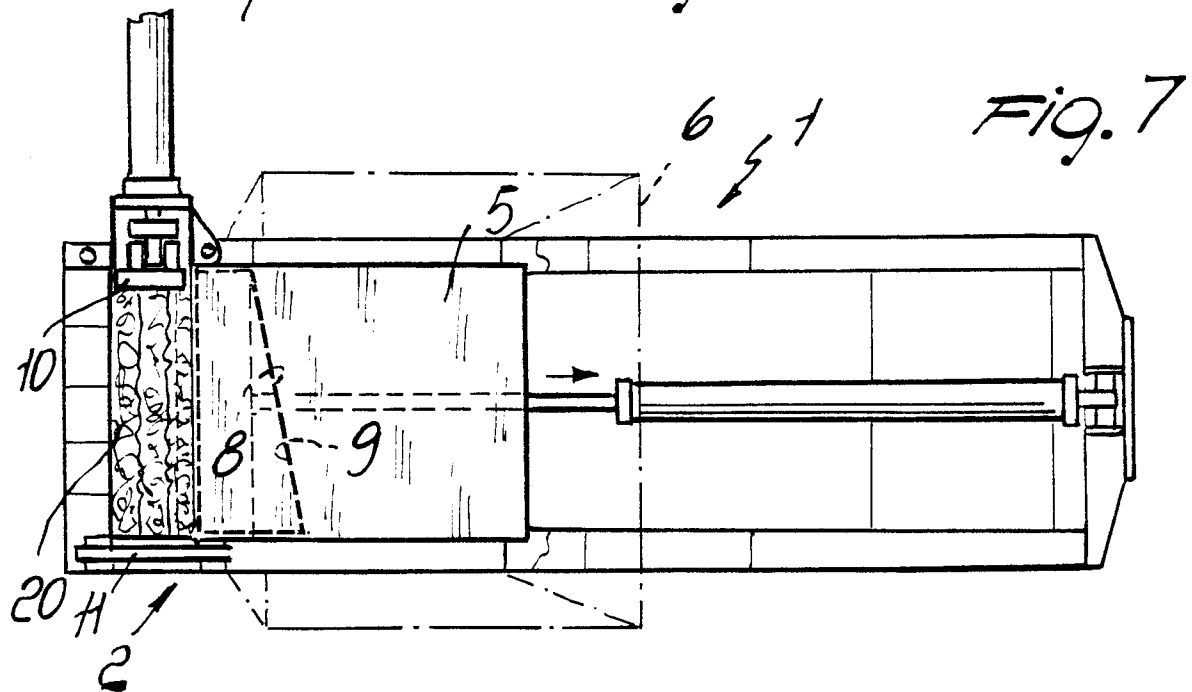
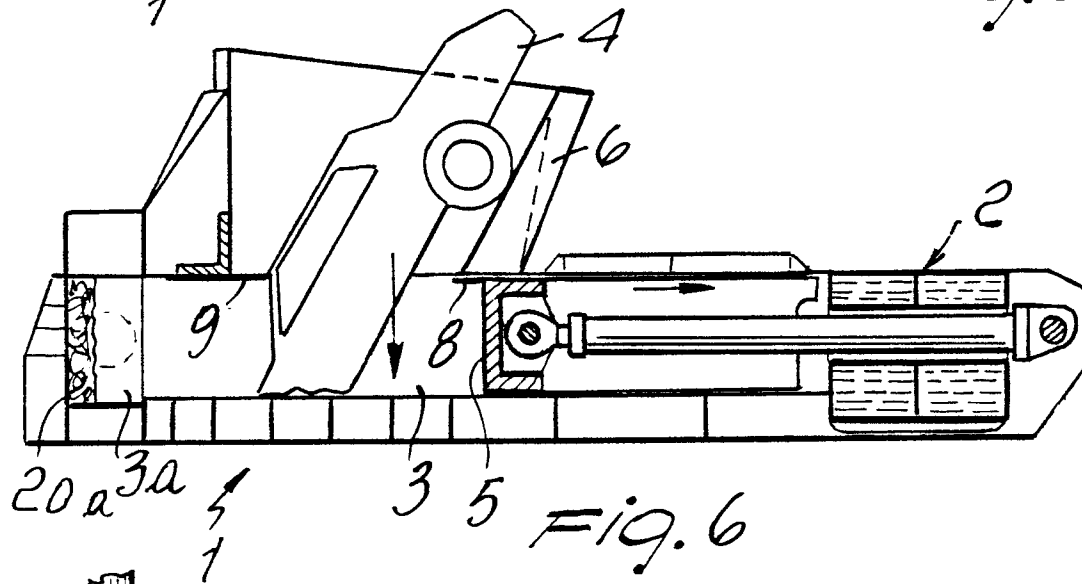
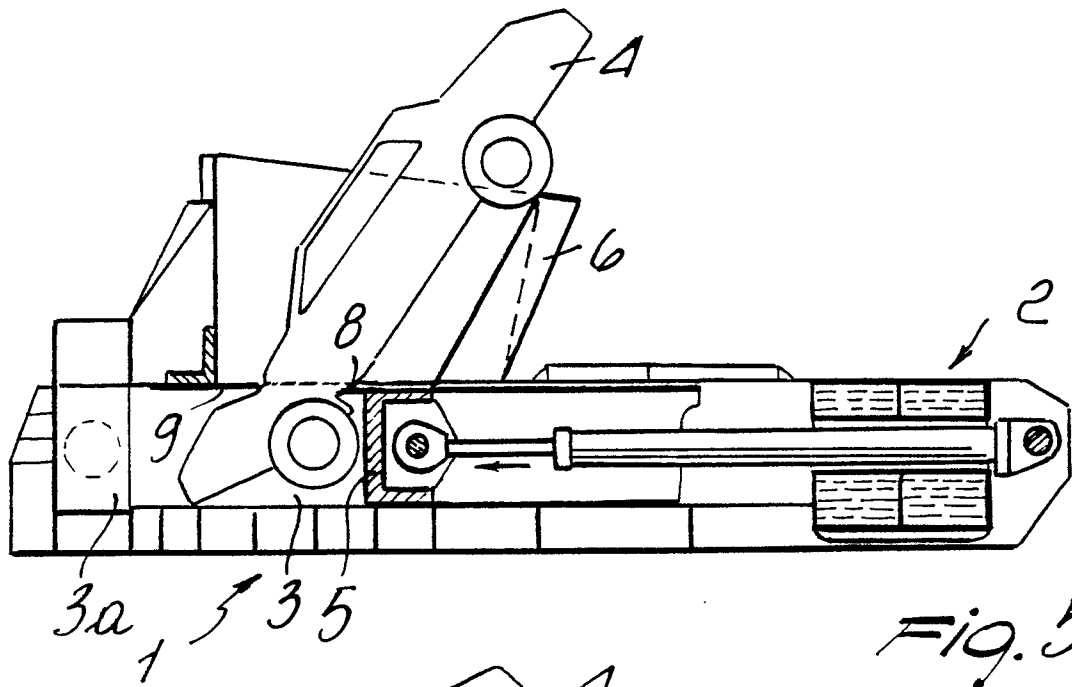


Fig. 3





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 86117400.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	US - A - 4 018 169 (SCHMALZ) * Fig. 4,6-10; abstract * --	1	B 30 B 9/32 B 30 B 9/30
A	DE - A - 1 627 826 (HELLBERGS ME KANISKA) * Totality * --	1,2,3, 4,5,6, 7	
A	AT - B - 201 976 (LINDEMANN) * Fig.; claims 1-4,6; page 1, lines 23-27,32-36 * ----	2,3,4, 6,7	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			B 30 B 9/00 B 23 D 25/00 B 65 F 9/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 12-03-1987	Examiner SCHÖNWÄLDER
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			