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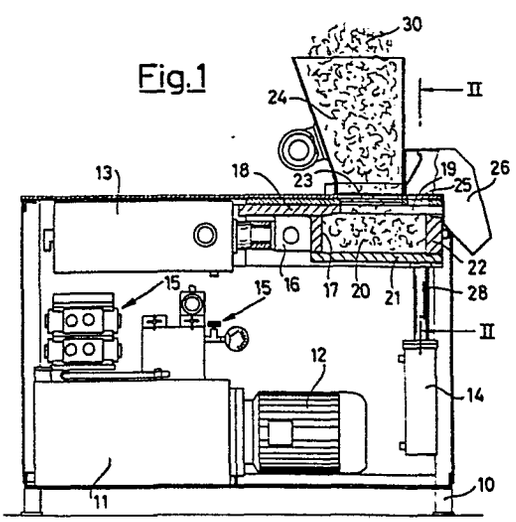
(54) **Machine for forming blocks of compressed wood shavings.**

(57) A machine in which the disintegrated wood material (30) with which the block is formed is fed into a chamber (20); the head of the rod (16) of a cylinder (13) slides in said chamber (20) and compresses the material (30) against the end wall (22) to form the block (31), while at the same time the rod (16) closes the feed aperture (23) for the material (30); during the withdrawal stroke of the rod (16), the rod (29) of a second cylinder (14) extracts the block from the chamber in which it has been formed in order to expel it from a mouth (26) either directly or by the action of the rod of a further expulsion cylinder.

Fig.1




EP 0 066 328 A1

COMPLETE DOCUMENT

Croydon Printing Company Ltd

DESCRIPTION

The invention relates to a machine for forming blocks of compressed wood shavings.

The machine according to the invention is designed for forming blocks of wood shavings or wood shavings mixed with sawdust, in which no binder is provided for maintaining the compactness of the shavings, but instead the high compression to which the shavings are subjected is in itself sufficient to form a block which is so compact as not to be able to crumble.

In this respect, such blocks are prepared at the present time by mixing a binder with the shavings so as not to require high compression in order to obtain compactness. However as the final product is not one of high value but instead represents a recovery of waste material, the use of an additive such as the binder can raise costs to such a level as to discourage the reuse of this material for forming blocks.

In all cases, the binder has been necessary up to now because if high compression was not used on the material, the finished blocks tended to crumble very easily, and would therefore not have been able to be used in any application, being too fragile.

Such blocks are used particularly in the furniture industry as intermediate walls between outer furniture panels or even as inner facings for them, but they are always designed to support small loads as they are rather fragile, even when containing the binder which makes them compact and resistant.

In contrast, the machine according to the invention enables blocks of wood shavings to be formed without the use of a binder, but which are not less compact or resistant because of this fact. In this respect, a press is used which compresses the shavings to such a point that the resultant block is not subject to flaking or breakage even if subjected to torsion or bending stresses of the same value as those to which the same blocks formed with the use of the binder are normally subjected. In addition, the proposed machine has an extremely short operating cycle in terms of loading the shavings, compressing them and expelling the block, so that in addition to saving material (elimination of the binder), a saving is also made in the formation time, and thus a much larger number of blocks is made than at present for the same time period.

These and further objects which will be more apparent hereinafter are attained according to the invention by a machine for forming blocks of compressed wood shavings, characterised by comprising a chamber provided with a feed aperture for wood material in disintegrated form and a discharge aperture for the finished block, there being also provided a first cylinder, of which the rod is slidably guided between the inner walls of the chamber and closes the feed aperture during its extension and the compression of the material, the rod of a second cylinder extracting the block from the chamber in which it has been formed in order to expel it through the discharge aperture, there being provided means for operating said two cylinders and motor means for the sequential control of their operation.

A description is given hereinafter of two preferred embodiments of the machine according to the invention by way of non-limiting example, with reference to the accompanying drawings in which:

Figure 1 is a longitudinal section through a first embodiment of the machine;

Figure 2 is a section on the line II-II of Figure 1;

Figures 3 and 4 are views of a detail of Figure 1 in two different operating positions;

Figure 5 is a section on the line V-V of Figure 4;

Figures 6, 7, 8 and 9 are longitudinal sections through a second embodiment of the machine in four different operating positions.

The embodiment shown in Figures 1 to 5 will firstly be examined, in which the proposed machine comprises a casing 10 housing a central hydraulic unit 11 operated by a motor 12, and a thrust cylinder 13 and extraction cylinder 14 controlled by the central unit 11 by means of suitable pumps and solenoid valves 15. The rod 16 of the cylinder 13 has an end head 17 the top of which is rigid with a slide valve 18. This latter slides in guides 19 (Figure 2) of a chamber 20, the head 17 being slidably contained between the side walls of this latter.

The chamber 20 comprises a base 21 and an end wall 22, and is open upperly at 23 to enable it to be fed from a hopper 24.

A further aperture 25 is provided between the preceding aperture and the end wall 22 and communicates with the outside by way of a mouth 26.

Finally, in the base 21 in proximity to the end wall 22 there are provided two bores 27 (Figure 2) which are connected to two tubes 28, along which the rods 29 of the extraction cylinder 14 slide in a guided manner.

The operation of the machine is as follows. The shavings 30 mixed with sawdust and any other wooden refuse in disintegrated form are fed into the hopper 24. The material falls into the chamber 20 through the aperture 23. At this point the cylinder 13 is operated. This causes the rod 16 to extend, guided in its travel by the guides 19 and walls 20 of the chamber. In this manner, the head 17 compresses the material fed into the chamber 20, while the slide valve 18 closes the material feed aperture 23. On termination of the stroke of the rod 16 (Figure 3), the material has been compressed against the end wall 22 between the base 21, the side walls 20, the head 17 and the end of the slide valve 18. This latter also closes the block expulsion aperture 25.

The material thus compressed and bounded forms the block 31. In the next stage, the cylinder 13 is again operated in order to cause the rod 16 to withdraw to the position of Figure 1. At this point, the rods 29 of the cylinder 14 can be extended in order to push the block 31 upwards, as shown in Figures 4 and 5, through the aperture 25 into the mouth 26 from which the block 31 falls to the outside either to be used or stacked with others.

When the rod 16 has been withdrawn (Figure 1) the cycle recommences with compression of the new material which has fallen into the chamber 20, thus leading to the formation of a new block.

The perfect synchronism of operation of the compression cylinder 13 and extraction cylinder 14 enables a large number of blocks to be formed in an extremely short time, and proper dimensioning of the cylinder 13 enables sufficient power to be used in compressing the material 30 to form a compact rigid block 31 without the use of any binder.

Figures 6 to 9 show a second embodiment in which the machine comprises a casing 110 housing in known manner a central hydraulic unit 111 operated by a motor 112. A thrust cylinder 113, a traverse cylinder 114 and an expulsion cylinder 115. are connected to the central unit 111 by way of suitable pumps and solenoid valves. The rod 116 of the thrust cylinder 113 slides in a chamber 118 between walls 117. The chamber 118 comprises an upper aperture 119 through which the shavings 120 are fed by means of a screw conveyor 121 on to which the shavings fall from an upper tank 122 in which it is agitated by blades 123. The screw conveyor 121 and blades 123 are rotated by respective motors 124 and 125.

The chamber 118 is circular, and in proximity to the end wall 126 comprises a portion 127 which is separated from the rest of the chamber and from the wall, and is fixed to the rod 128 of the traverse cylinder 114.

The rod 129 of the expulsion cylinder 115 is located in a position corresponding with an extraction mouth 130 in which it can slide.

The operation of the machine is as follows.

The shavings are fed into the tank 122 and kept mixed by the blades 123 as they fall through the aperture 120 from which the screw conveyor 121 feeds them into the chamber 118 until it is full (Figure 6).

At this point, the cylinder 113 is operated so that its rod 116 extends and slides between the walls 117 in the chamber 118 until it strongly compresses the shavings 120 against the end wall 126, while at the same time closing the feed aperture for the shavings.

On termination of the stroke (Figure 7), the material has been compressed into the form of a block 131 which completely fills the annular portion 127 of the chamber, which is separated from the chamber 118 and from the wall 126.

During the next stage, the rod 116 returns to its rest position while at the same time the traverse cylinder 114 is operated so that its rod 128 withdraws and drags with it the annular portion 127 in which the block 131 has been formed (Figure 8). The annular portion 127 becomes located in a position exactly corresponding with the head 129 of the expulsion cylinder 115, with the result that when its rod is extended, the head 129 pushes the block 131 into the mouth 130 (Figure 9) and then out of it.

On termination of this stage, the head 129 returns to its rest position, and the rod 128 of the cylinder 114 then extends so that its annular portion 127 returns to the chamber 118, thus completing the cycle and returning to the position shown in Figure 1.

The perfect synchronism of operation of the thrust cylinder 113, traverse cylinder 114 and expulsion cylinder 115, together with the operation of the screw conveyor 121 which feeds the material 120, enables a large number of blocks to be formed in a very short time. Moreover, this thrust cylinder configuration enables compression powers to be obtained which are sufficiently high as to compress any residual material into a block without any wastage, thus attaining the stated objects of the invention.

WHAT WE CLAIM IS

1. A machine for forming blocks of compressed wood shavings, characterised by comprising a chamber (20, 118) provided with a feed aperture (23, 119) for wood material (30, 120) in disintegrated form and a discharge aperture (26, 130), for the finished block (31, 131), there being also provided a first cylinder (13, 113) of which the rod (16, 116) is slidably guided between the inner walls (21, 117) of the chamber (20, 118) and closes the feed aperture (23, 119) during its extension and the compression of the material (30, 120), the rod (29, 128) of a second cylinder (14, 114) extracting the block (31, 131) from the chamber (20, 118) in which it has been formed in order to expel it through the discharge aperture (26, 130), there being provided means for operating said cylinders and motor means for the sequential control of their operation.

2. A machine as claimed in claim 1, characterised in that the rod (16) of the first cylinder (13) is provided with a slide valve (18) in order to close the feed aperture (23) and discharge aperture (26) in succession during its extension and compression of the material, the block (31) which is formed on termination of said extension stroke being expelled directly by the rod (29) of the second cylinder (14) which pushes it beyond the discharge opening (26) when, during the withdrawal of the rod (16) the slide valve (18) of the first cylinder (13) uncovers said aperture (26).

3. A machine as claimed in claim 1, characterised in that the second cylinder (14) is provided with two parallel rods (29)

controlled simultaneously by the cylinder (14) so that both abut against the block (31).

4. A machine as claimed in claim 1, characterised in that the straight lines along which the rods (16, 116 and 29, 128) of the two cylinders (13, 113 and 14, 114) act are orthogonal.

5. A machine as claimed in claim 1, characterised in that between the second cylinder (114) and the discharge aperture (130) there is disposed a third cylinder (115), of which the rod (129) pushes the block (131) extracted from the compression chamber (118), towards the discharge opening (130).

6. A machine as claimed in claim 5, characterised in that the first cylinder (113) closes the feed aperture (119) during the compression stage, and the formed block (131) becomes located in a portion (127) of the chamber (118) which can be caused to traverse by the operation of the second cylinder (114) with which it is rigid, so that it faces said third cylinder (115) which expels the block through the discharge opening (130).

7. A machine as claimed in claim 6, characterised in that upstream of the feed aperture (119), the material (120) is contained in a tank (122) in which agitator blades (123) rotate to feed the material to a screw conveyor (121) which feeds it to said aperture (119).

8. A machine as claimed in claim 6, characterised in that the traversable portion (127) of the chamber (118) is formed from the chamber itself in that portion thereof which lies in a position corresponding with the end wall (126) against which the material (120) is compressed in order to form the block (131).

9. A machine as claimed in claim 6, characterised in that the chamber (118) and its traversable portion (127) are of circular cross-section.

Fig.2

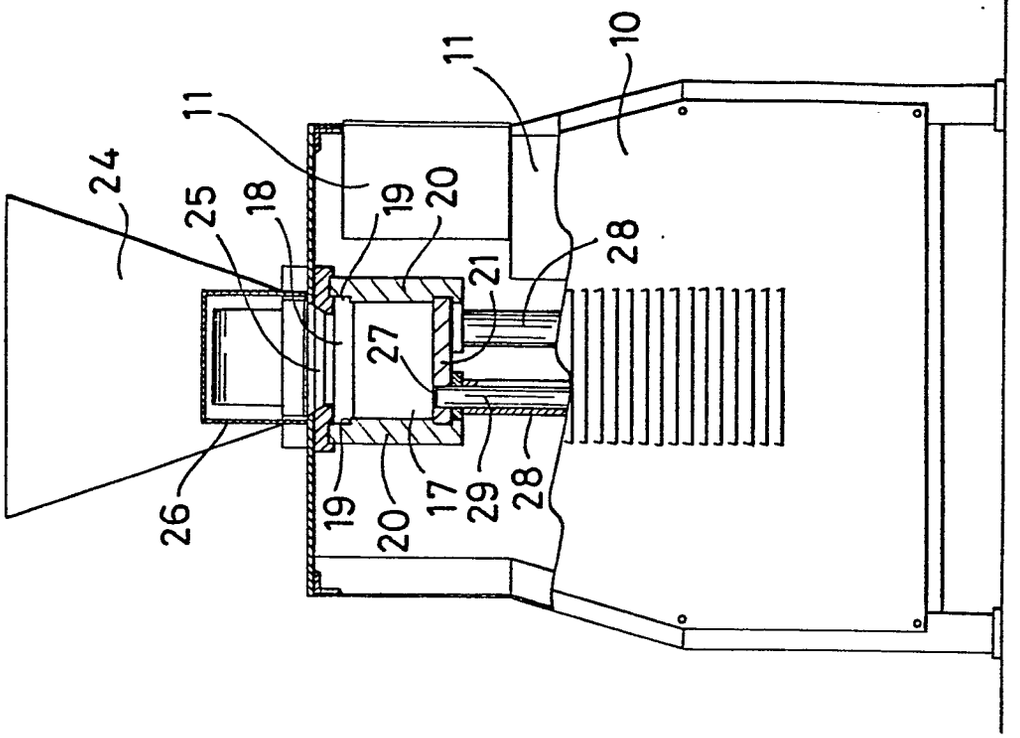

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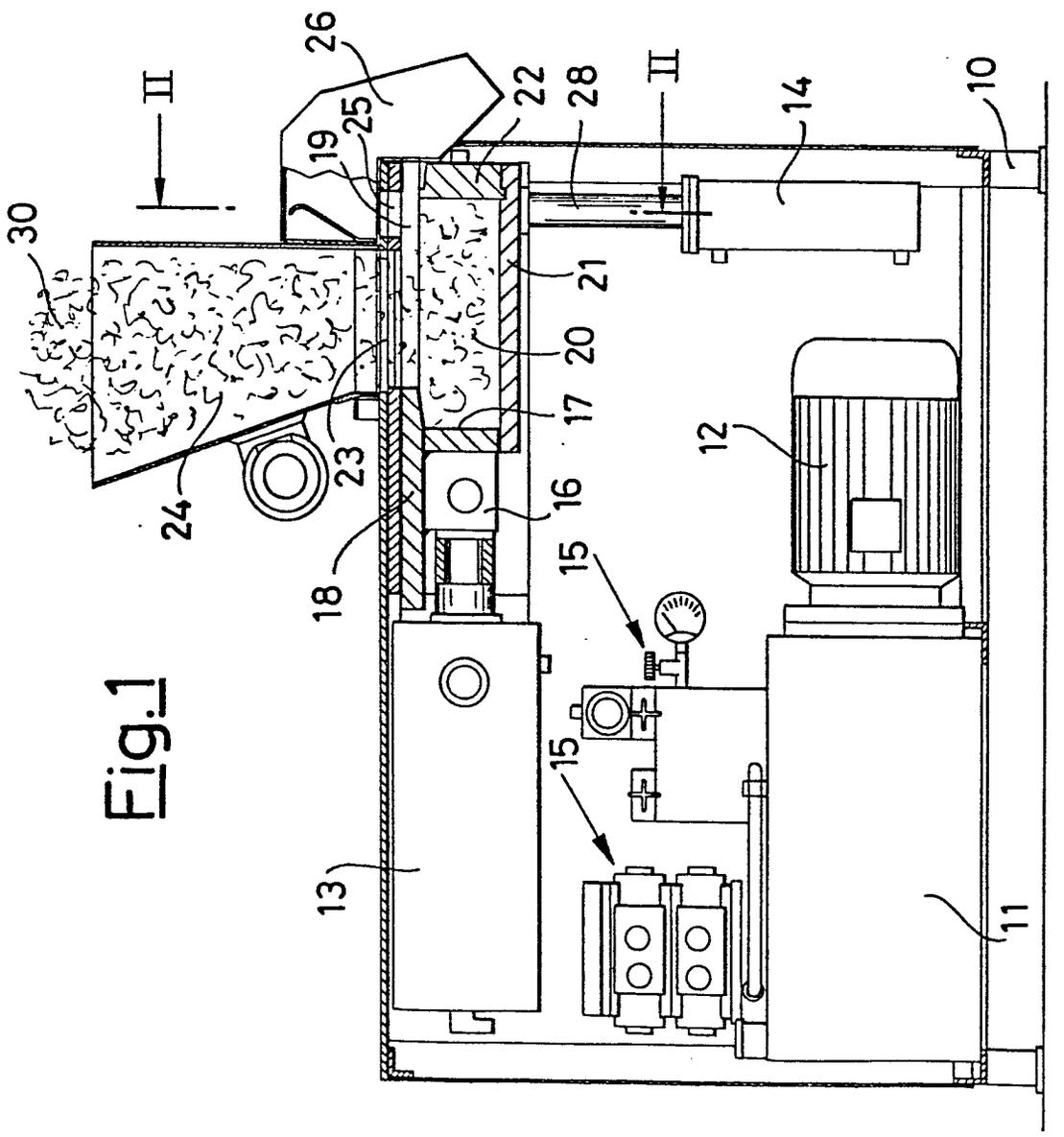
Fig.1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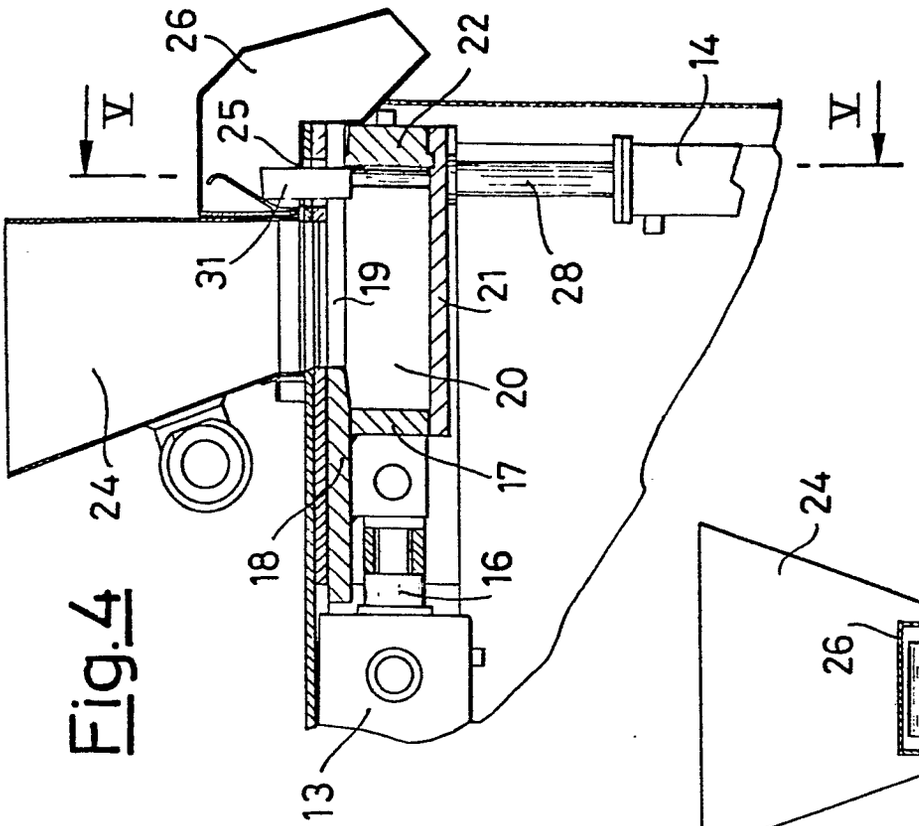


Fig.4

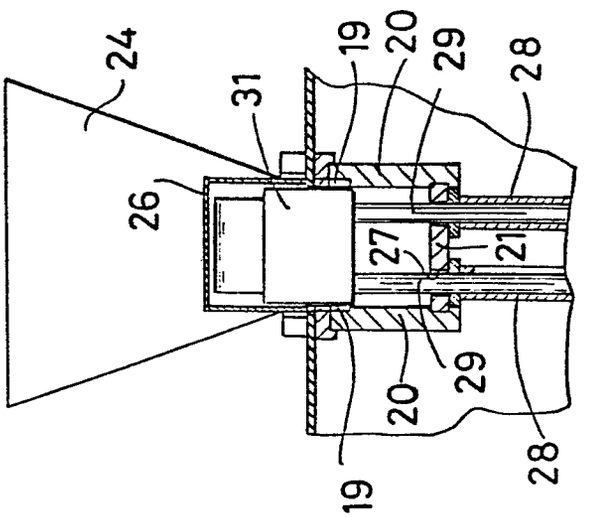


Fig.5

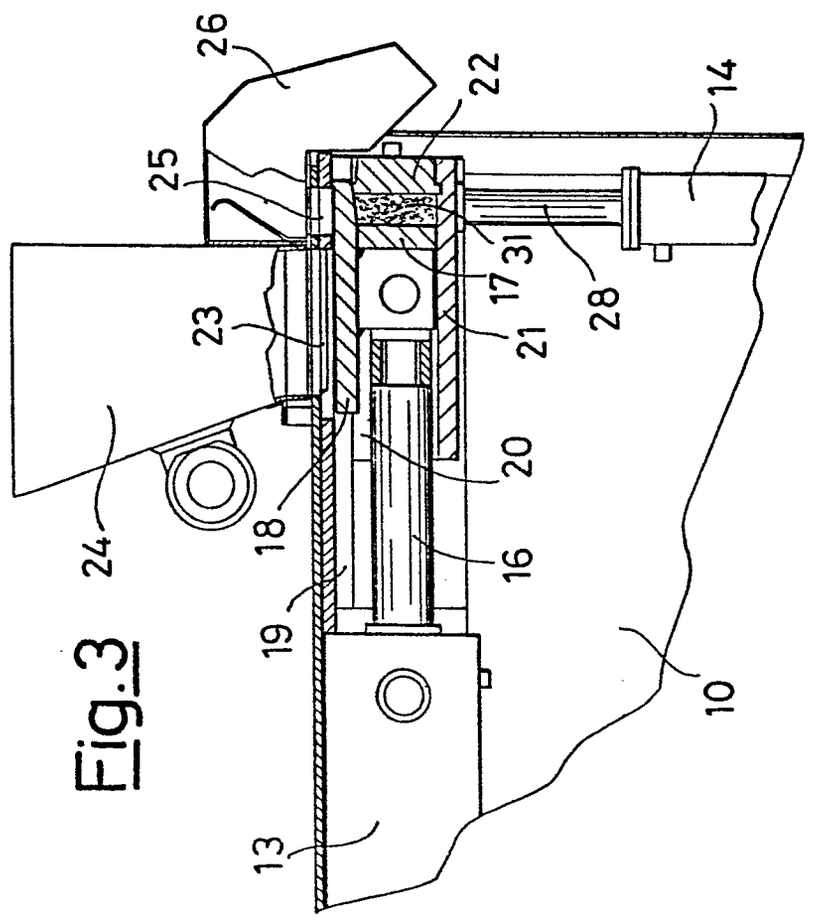


Fig.3

Fig.6

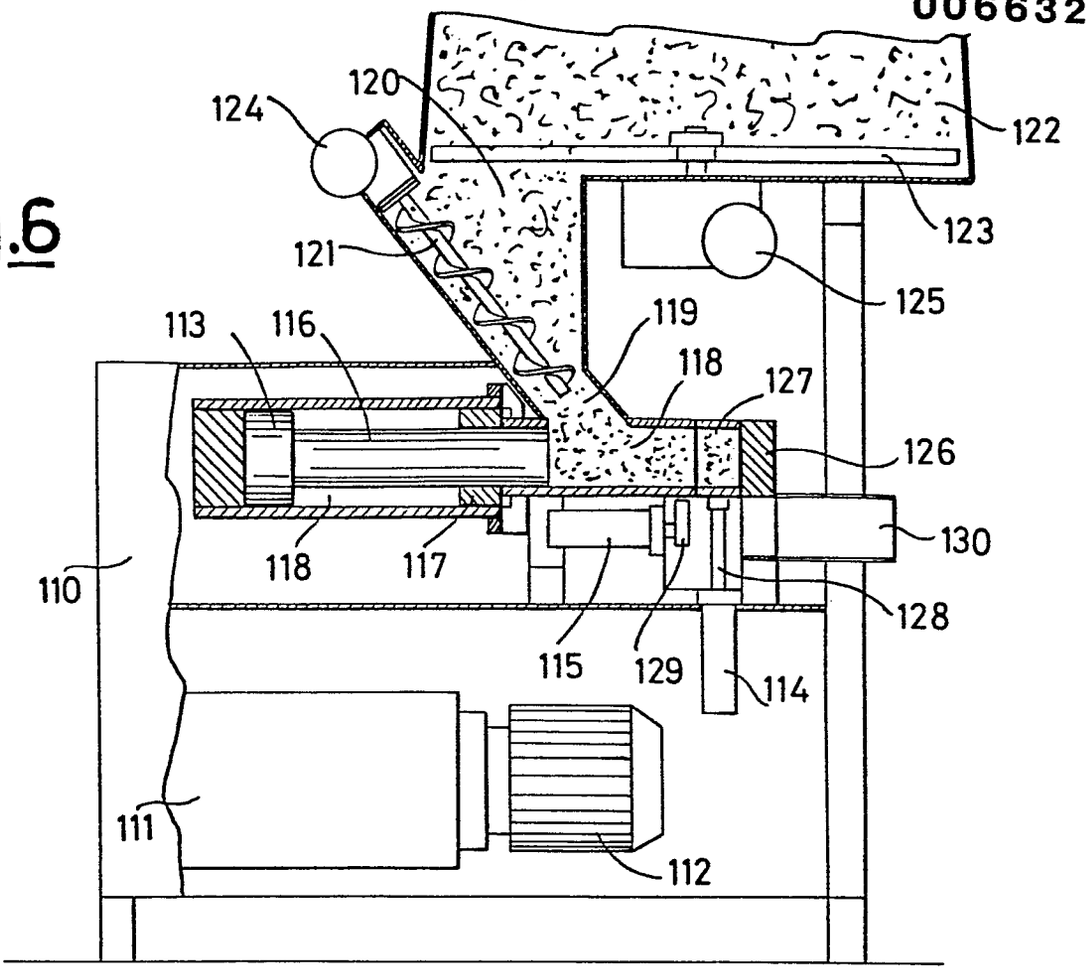
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Fig.7

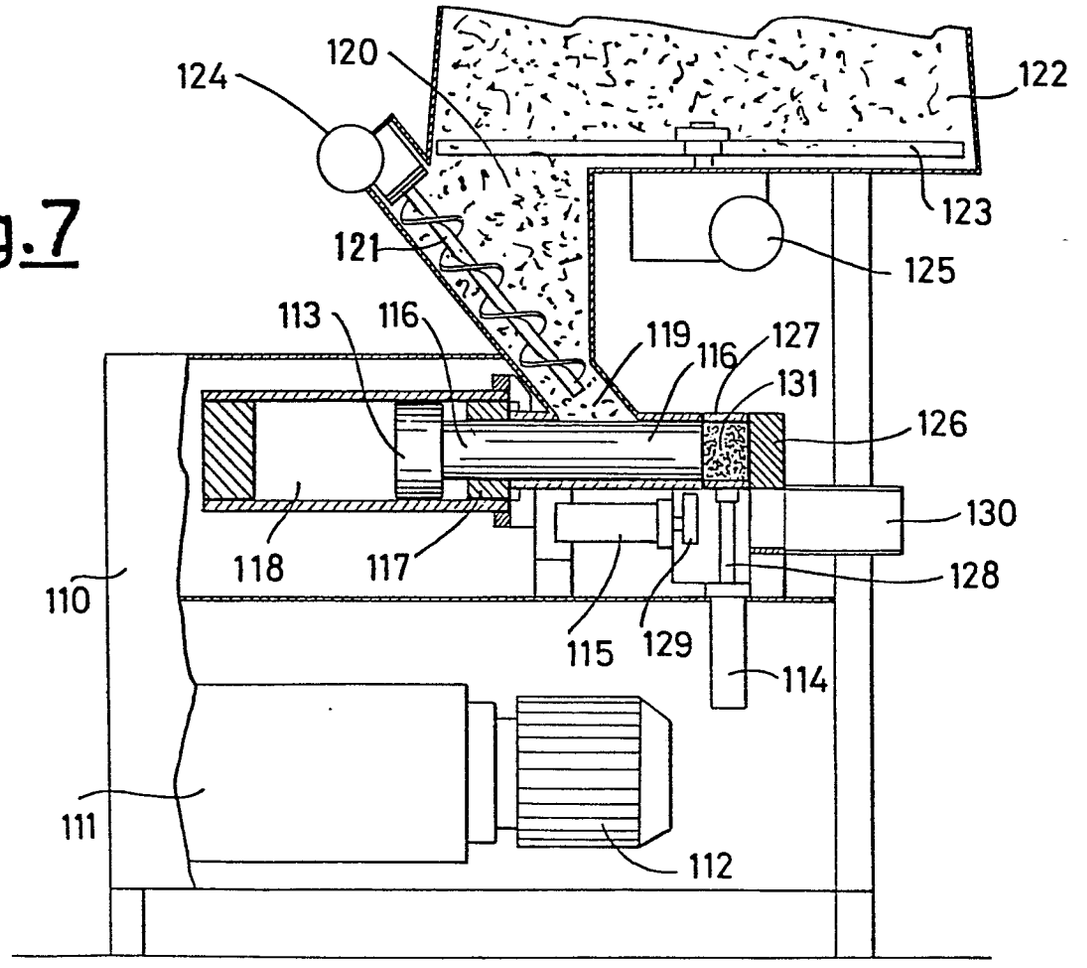
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Fig. 8

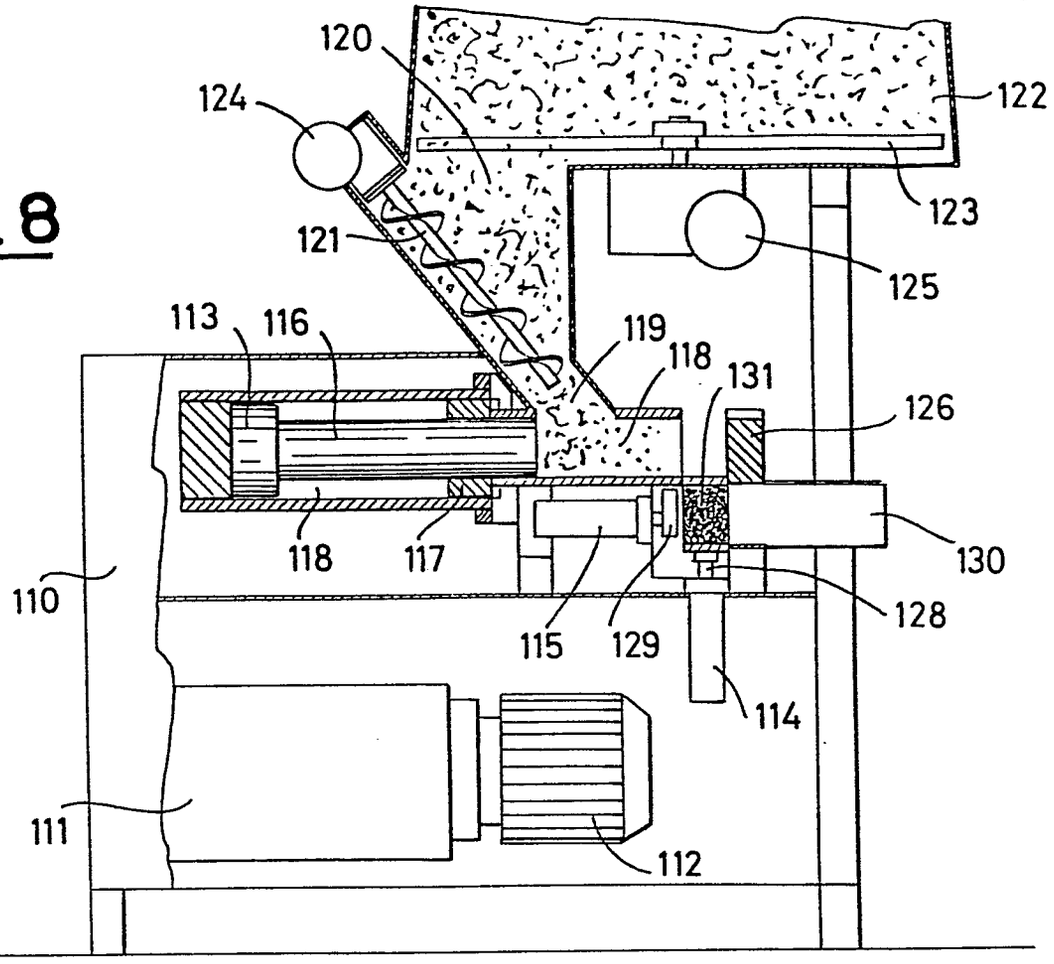
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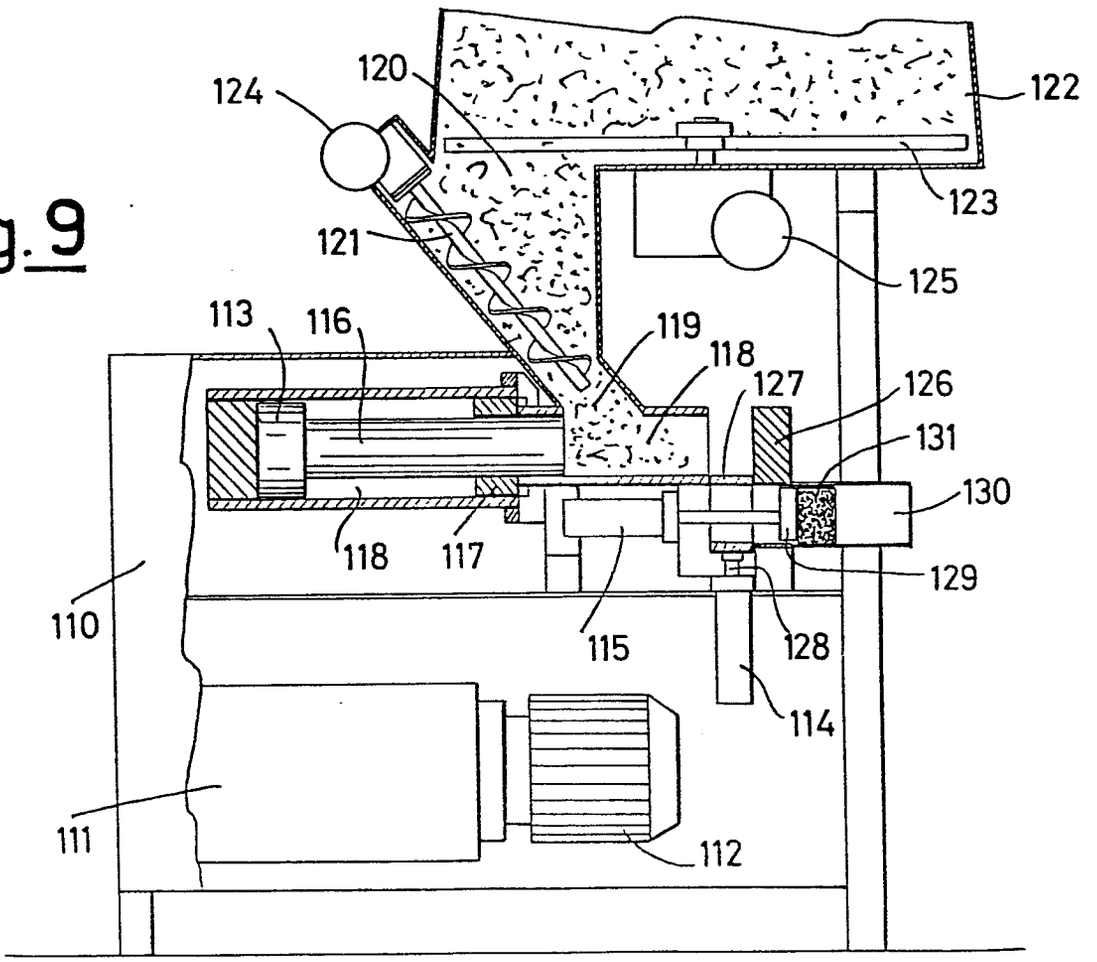
Fig. 9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European Patent Office

# EUROPEAN SEARCH REPORT

Application number

EP 82 20 0605.2

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim |
|---|---|---|
| Y | FR - A - 1 573 928 (P. SARBIER)<br>* fig. 3 * | 1,2 |
| Y | DE - A1 - 2 932 405 (A. HEGGENSTALLER)<br>* claim 1; fig. 1, 2 * | 1,2 |
| Y | FR - E - 95 386 (P. SARBIER)<br>* fig. 1 * | 1,2 |
| P,Y | DE - A1 - 2 948 082 (A. HEGGENSTALLER)<br>* claim 3; fig. 3, 4 * | 1,2 |
| Y | DE - A - 2 112 558 (S.A. D'EXPLOITATION DES ETABLISSEMENTS E. BOFFET)<br>* fig. 2 *<br>& GB - A - 1 347 745 | 1,2 |
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| P,A | DE - U1 - 8 027 473 (K. STÖCKEL)<br>* claim 1; fig. 1 * | 1,2 |
| A | US - A - 3 397 424 (B.O. RÖVDE et al.) | |
| A | DE - A1 - 2 932 387 (INTERCANE SYSTEMS INC.)<br>& US - A - 4 212 616 | |

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CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

B 29 J 5/04
B 29 J 5/08

TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

B 29 J 5/00

CATEGORY OF CITED DOCUMENTS

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X The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Berlin | 20-08-1982 | FINDELI |

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## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim |
|---|---|---|
| A | US - A - 2 598 016 (L.D. RICHARDSON) | |

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

TECHNICAL FIELDS SEARCHED (Int. Cl.³)