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(72) Inventor: **The designation of the inventor has not yet been filed**

(74) Representative:  
**Sanz-Bermell Martinez, Alejandro  
Játiva, 4  
46002 Valencia (ES)**

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(71) Applicant: **Sabater Belenguer, Isidro  
46370 Chiva (ES)**

(54) **Grinder for shredding wood scraps and other products**

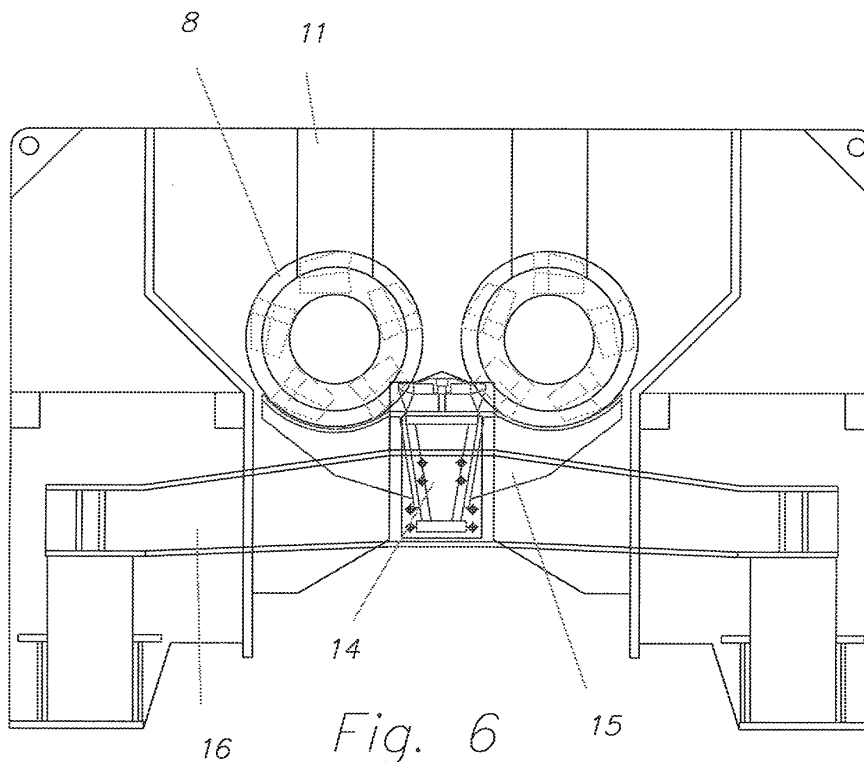
(57) This machine consists of a shredding box (2) with independent motors (4) for two inversely rotating cutting rollers (8), which drive a central part (14) generating two different cutting edges.

The central part can be moved when a force greater than the established level is applied to it, by the insertion

of a metal bar or similar item.

The machine has means for removing the shredded product, and means for disconnection when there is any obstruction or any of its inspection panels or parts is opened.

For industrial application in the manufacturing of machinery for shredding wood and other materials.



*Fig. 6*

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## Description

**[0001]** The technical field involved in this invention is that of manufacturing machinery for processing wood, and in particular that of machinery for shredding wood for obtaining chips or shreds for industrial reuse.

**[0002]** The use of chipboard as this has been done for many years now initially arose as a way to make use of the remains of low quality wood which could not be used in conventional furniture, which had always been made of solid wood.

**[0003]** Nowadays the use of chipboard involves two very important advantages as compared with using solid wood. The first consists in making use of the remains of low quality wood or woods, and the second its low price in respect of solid woods.

**[0004]** One of the problems that comes up is the reuse of waste.

**[0005]** The most relevant state of the art is disclosed in the following documents:

EP 0 419 919 A1 discloses a grinder for waste which has a feed hopper, a grinding roller against a fixed part and a zone for feeding to the grinding zone. The machine described has a single roller and has certain torque problems apart from a performance lower than might be desirable.

ES 1045137U discloses a grinder with automatic rejection of untreatable products, which has a pair of rollers turning in opposite directions, so that the feed system allows certain products which could damage the shredding assembly to be rejected. It has a single cutting zone between the two rollers. This machine nevertheless does not solve the problems of possible jams and is not designed for crushing wood and similar items.

EP 0 529 221 A1 discloses a shredding device with a hopper and a removal device by means of a conveyor belt, in which there is a cutting mechanism consisting of two rollers turning in opposite directions, with a single grinding zone between said rollers. It has a number of cutting blades in each of said rollers set on disks spaced out at regular intervals on said cylinders.

EP 0 876 843 A1 presents a grinding machine with collection hopper and two cutting rollers rotating in opposite directions, the shredding action being as in the previous case, caused by the action of one of the rollers against the other. It also has a distribution roller located at the base of the hopper in order to prevent material snagging and preventing operation. This machine does not solve the problems of jamming.

ES 1000270U refers to a small-sized grinding machine which has a collection hopper with a grinding roller fitted with cutting blades which act on a fixed part, this roller being provided with an external momentum flywheel. In this case collection means are

not provided, but its production cannot be high and it does not solve possible problems of jams.

**[0006]** This invention covers a grinding machine with great production advantages as compared with prior items, balancing the consumption flow of raw material placed in the hopper and also preventing damage through snagging, apart from facilitating the removal of any possible unwanted material.

**[0007]** This invention also allows automatic stoppage when there is any snagging, preventing the drive motors from continuing to run until there is a manual stop.

**[0008]** The machine covered by this invention is also designed for removing the shredded products by means of a conveyor belt, as well as removing any unwanted metal particles by means of an electro-magnet.

**[0009]** This machine has a pair of rollers turning in opposite directions which act on a central part, so that the cutting capacity is duplicated in an essentially identical space as compared with any of the twin-roller antecedents.

**[0010]** Furthermore, the central part is able to move downwards when the roller motion, along with the product that the machine is attempting to grind, exerts a force greater than the cutting resistance programmed for the material to be ground. As an example, if there is an iron bar between a set of wooden boards, since the cutting pressure would have to be much higher than the force needed for wood in this case, the tare setting of said central part would mean that this would move downwards, against the action of a spring or a pneumatic or hydraulic device, and in its displacement it would act on a mechanical, optical or other form of detector which cuts off the current for driving the motors, and where applicable all the auxiliary mechanisms that might be necessary to guarantee the safety of the operator removing the unwanted item.

**[0011]** Placing the motors after the rollers was considered to give greater mechanical safety and better power performance, also facilitating access by any operator for cleaning, maintenance or repair of these, which in turn entails the reduction of attention time needed and consequently of the overall performance of the machine in question.

**[0012]** The body of the machine has opening windows at both sides, as inspection panels for cleaning and removing any unwanted products as described above. Opening either of these inspection covers will obviously require/and or give rise to cutting off the current needed, to make it impossible for the machine to run in these conditions.

**[0013]** For mechanical convenience, the motors have reduction units to adjust the speed of the rollers to the optimum running specifications. The motor power and/or the turning speed are expected to be specifically prepared for the form of usage, as well as the material to be shredded or the conditions of the raw material. If the raw material is, for example, very fine wood, very high

roller turning speeds can be used, whilst if the material to be crushed is plastic the heat produced by friction would also have to be taken into account to prevent an excessively high rotation speed from adversely affecting the cutting conditions or the resulting shredded material.

**[0014]** In order to illustrate the explanation to follow, six sheets of drawings are adjoined to this descriptive report and form an integral part of this, representing the essence of this invention in sixteen figures, and in which:

Figure 1 illustrates a lateral view of the machine described in the invention;

Figure 2 illustrates a front view of the same machine;

Figure 3 shows a plan view of the machine according to the invention at the height of the rollers;

Figure 4 shows each of the lateral mounting plates of the cutting rollers;

Figure 5 shows the side plate shown in Figure 4 with the rollers fitted on this;

Figure 6 shows a magnified view similar to the one in Figure 5 in which one can appreciate the moving central part in greater detail, as well as the support for this.

Figure 7 shows a plan view and lateral elevation in which one can appreciate the support part of the central piece;

Figure 8 shows a set of rollers mounted on the central piece;

Figure 9 shows a front view of one of the two grinding rollers;

Figure 10 shows a schematic view of the flanges for fitting the motors on the rollers (not shown) through the reduction unit;

Figure 11 shows a plan view of the central part;

Figure 12 shows a detail of the flange for mounting the roller with the reduction unit;

Figure 13 shows a detail of how the cutting tool is fitted on one of the rollers;

Figure 14 shows a detail of the cutting tool;

Figure 15 shows a front view and a section of the roller on which the cutting tool is mounted; and

Figure 16 shows a plan view of the machine with the rollers mounted.

**[0015]** In these figures 1 represents the base of the machine on which the other items are held and in particular the shredding box 2 and a table 3 for supporting the motors 4. 5 indicates a reception hopper for the material to be shredded and 6 opening inspection covers in the shredding box 2 at the bottom of the sides.

**[0016]** The motors 4 are provided with a cover 7 (individual or joint) fitted with the required safety means so that this part of the machine cannot be operating while the inspection panels are open.

**[0017]** The rollers 8 turn by means of the motors 4 through a reduction unit 9 fitted between these, the speed and power of the motors 4 as well as the reduction

ratio of the reduction unit 9 being adjusted to suit the particular needs.

**[0018]** On two of its sides the shredding box has two opposite parts 10 which have "U" shaped cutaways which house the shredding rollers 8 and in which these are fitted, by means of securing plates 12.

**[0019]** The shredding box has a second internal hopper 13, converging downwards, fitted so that the exterior sides do not allow any part through, which is assisted by the turning motion of the roller which in this zone is upward (in normal operation conditions).

**[0020]** As was stated above, the rollers 8 move in opposite directions, and act on a central part 14, thus providing two cutting zones, as opposed to the single zone found in known antecedents. To prevent any damage being done to this central part 14, there is a support base provided with elastic retraction means for withdrawal when a force greater than the usual level is applied to these, which might happen when the roller or the rollers attempt to crush extremely thick metal parts. When this occurs the movement of the central part will activate a means of cutting off the electrical current to the roller drive motors and to any other auxiliary mechanisms which have to be disconnected. This central part 14 also has lateral stops 15 which prevent the material to be shredded from extending beyond the cutting zone, which would cause a particular flow of uncrushed material to parts of the machine where this should not reach, possibly damaging sensitive parts of the machine in any case.

**[0021]** The central part is held in a preferably "H" shaped structure by a base 18 with the relevant housing 19, fitted with side supports 16 set on support legs 17, in such a way that these supports 16 do not prevent or hinder the shredded material from falling through.

**[0022]** The rollers are held at their ends 20 and 21 in the corresponding cutaways 11 made in the side parts 10 of the box 2 and provided with a slotted profile 22 on which a further spiral slot 23 is made.

**[0023]** The roller is connected to the motor through a reduction gearbox 9 by means of two connection flanges 24 and 25.

**[0024]** The cutting tools 26 are located on the roller surface, in any suitable arrangement, according to the profile of the central part against which this acts. It is thus possible for each turn of the roller to make one or more cuts in the material to be shredded (each ring has one or more cutting tools) and as a particular embodiment it being designed for the arrangement to be spiral in one or more lines per ring. Securing can be by means of welding, screwing or any other suitable securing means.

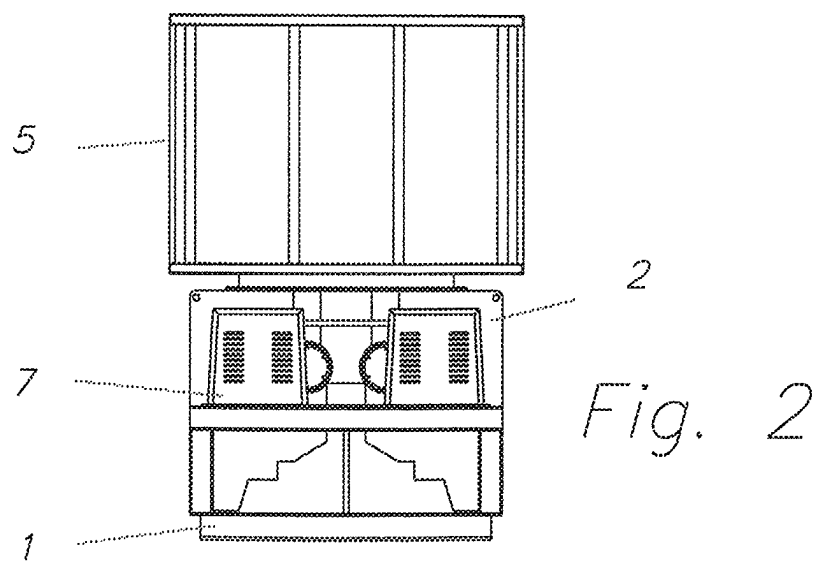
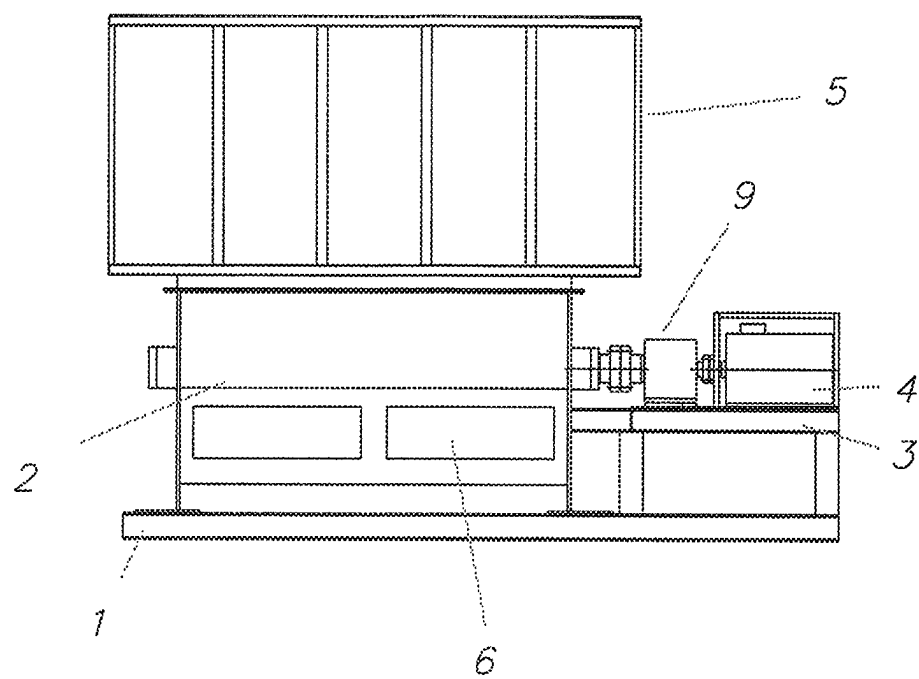
**[0025]** By means of its convergent movement towards the centre and lifting at the ends, the set of grinding rollers 8 prevents any particular unshredded materials from remaining there, the collection thus being fully effective.

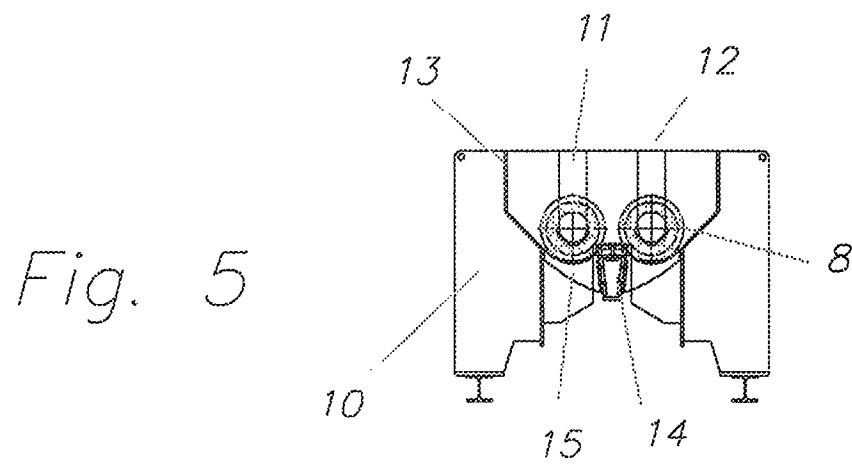
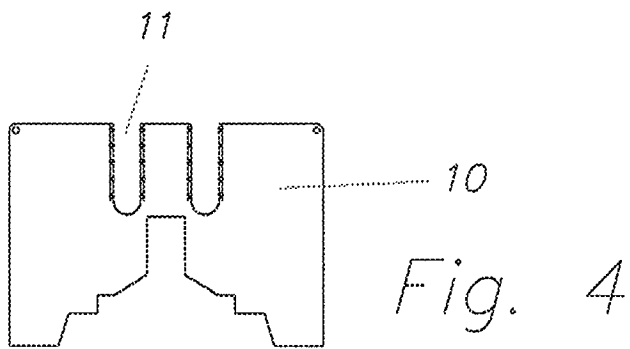
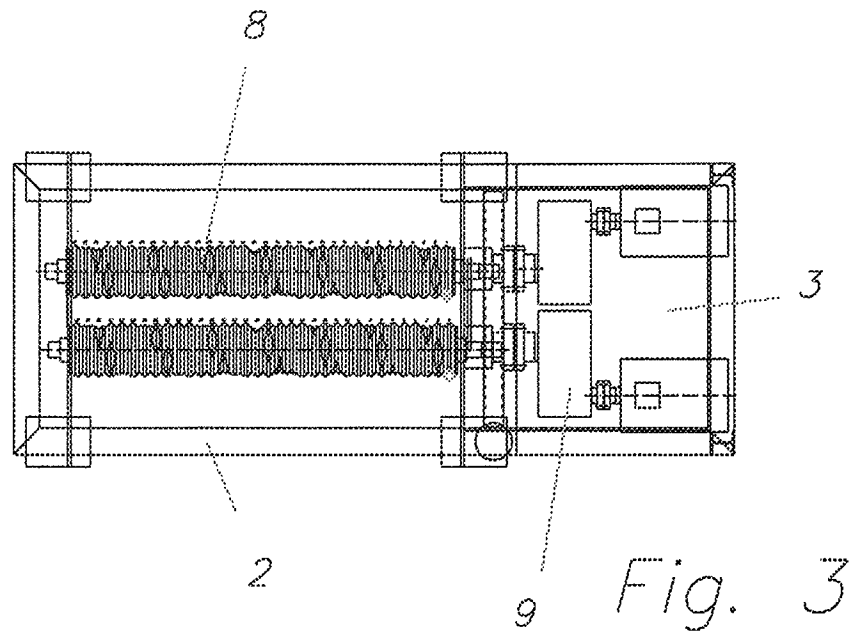
**[0026]** This is for industrial application in making machinery for shredding wood and other materials.

## Claims

1. Grinder for shredding scraps of wood and other products, with a base (1), a feed hopper, a grinding assembly formed at least of a grinder roller and possibly a device for pulling the shredded material, **characterised by** having rollers (8) located in a central body which forms a shredding box (2) and which turn in opposite directions and act on a central piece (14) which on each of its sides acts as a counter-blade in respect of the corresponding roller. 5 10
2. Machine, according to claim 1, **characterised in that** the central piece (14) is able to move against the action of an elastic means as soon as the pushing force reaches a particular magnitude through the effect of a catch, for example. 15
3. Machine, according to claim 2, **characterised in that** the central piece (14) is located on an "H" shaped central frame with a crosspiece (18) which has a support (19) for said central part (14), held by means of legs to the base (1). 20
4. Machine, according to claim 1, **characterised in that** the motors (4) and the reduction units (9) which drive the rollers (8) are arranged in an essentially longitudinal arrangement in respect of the roller axle on a table adjacent to the shredding unit, being covered by a protection casing (7), so that opening these disconnects the electrical supply to said motors (4). 25 30
5. Machine, according to claim 1, **characterised in that** at least one of the sides of the shredding box (2), has covers or inspection doors (6) for access to the shredding zone for cleaning, maintenance and freeing jams in the shredding zone. 35
6. Machine, according to claim 4, **characterised in that** the opening of the inspection covers (6) disconnects the electrical supply of the motors and other auxiliary mechanisms. 40
7. Machine, according to claim 1, **characterised in that** on two of its sides the shredding box has parts (10) with preferably "U" shaped cutaways (11) for supporting the rollers, these cutaways being closed by means of two appropriately shaped closing items (12). 45 50
8. Machine according to claim 1, **characterised in that** the rollers (8) consist of a number of slotted rings (22), carrying cutting blades (26). 55
9. Machine according to claim 8, **characterised in that** each ring has more than one cutting blade in equally spaced positions.
10. Machine according to claim 8, **characterised in that** the rollers have the cutting blades located on each of the rings in a spiral arrangement.

*Fig. 1*





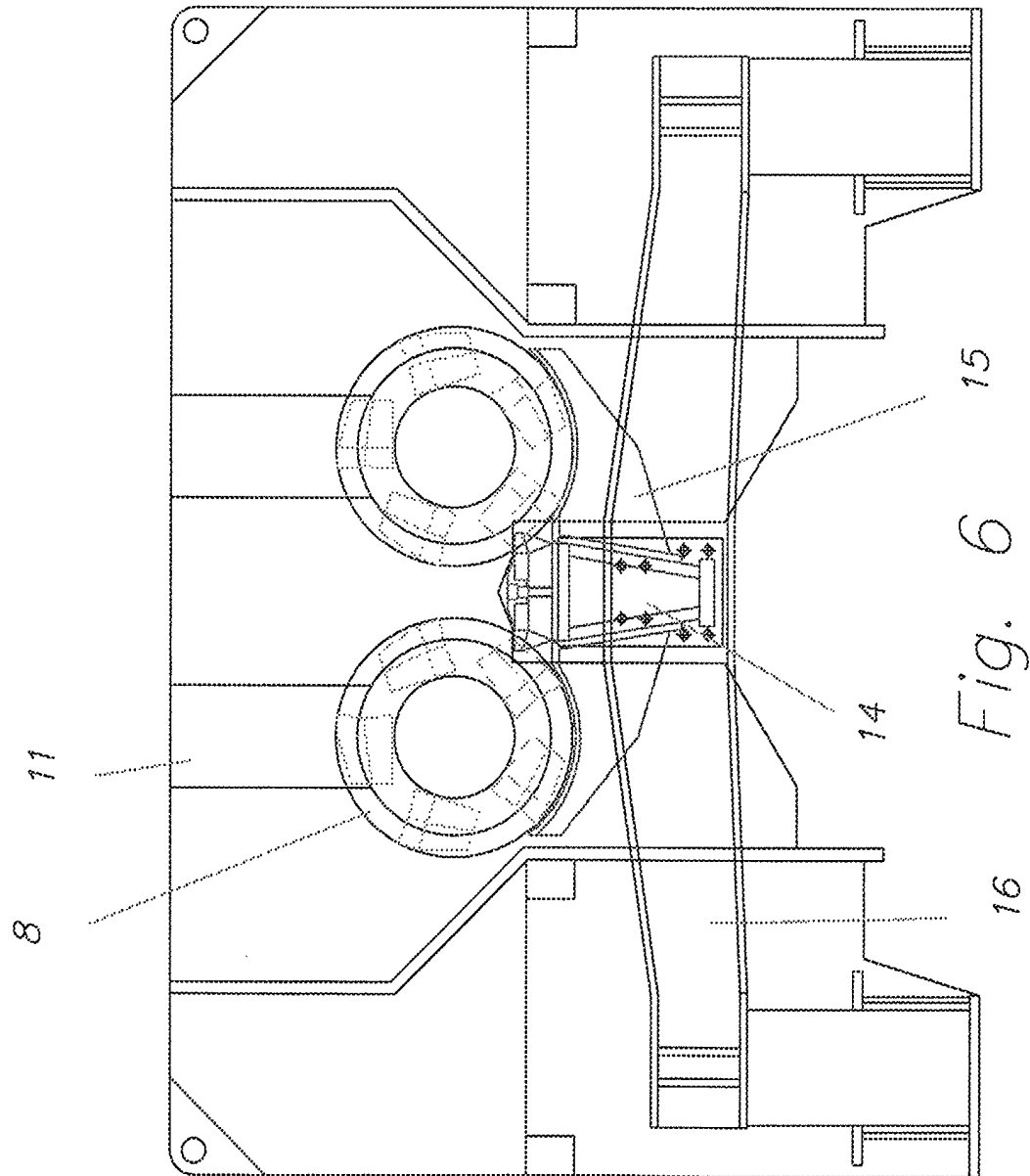


Fig. 7

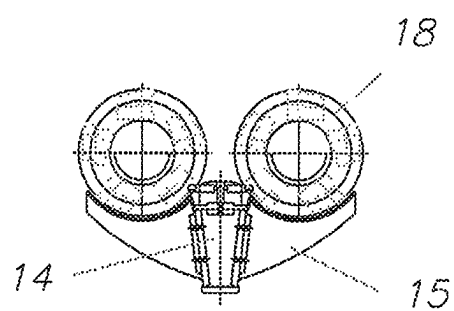
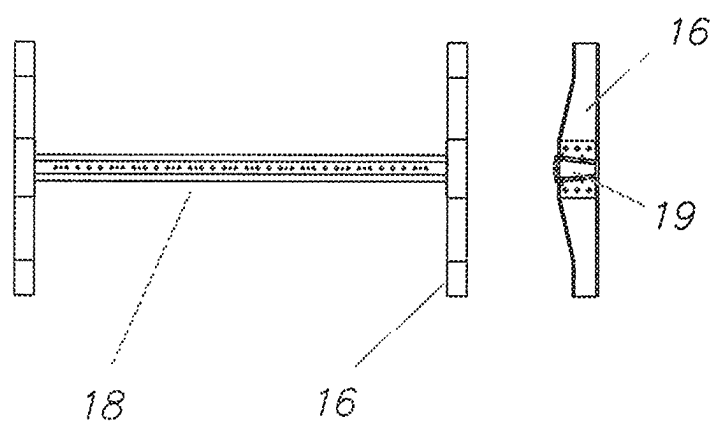


Fig. 8

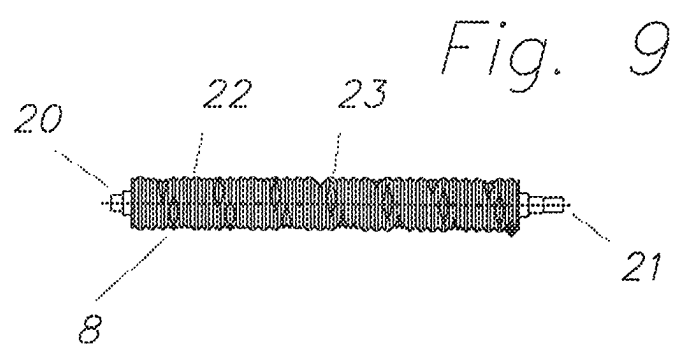


Fig. 9

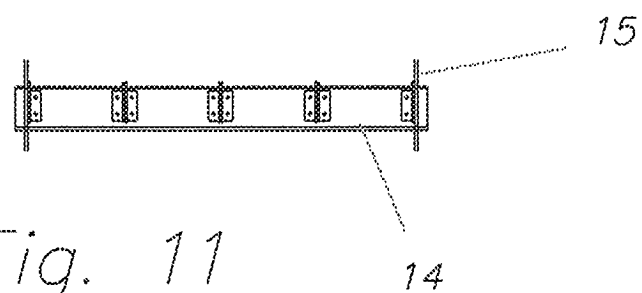
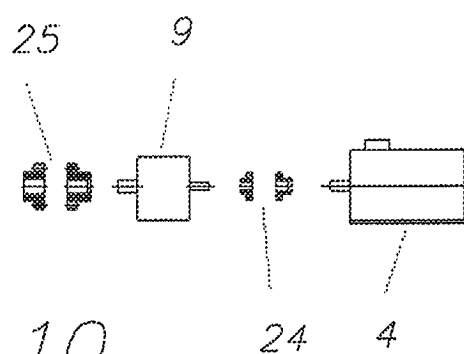


Fig. 12

