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(54) Improved shredding device.

(57) A shredding device essentially including a shivering unit (2) and a feed hopper (4) through which the material (3) to be shredded is fed to the shivering unit (2), also provided with a screen (1) positioned below the shivering unit (2) as well as with a circuit for the washing of the inner walls of the feed hopper (4) and of the underlying shivering members. The device is capable, by means of the screen, of selecting according to their size the shreds of material produced. The device, finally, has improved effectiveness and cleanliness characteristics thanks to the possibility of carrying out semiautomatic cleaning operations at the end of each operating cycle.

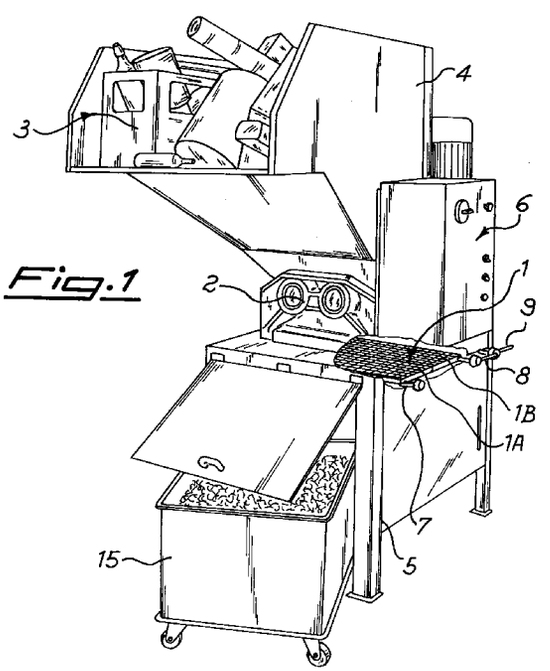

Fig.1

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The present invention concerns a shredding device of the type used to shiver scrap materials and waste.

It is known that in many cases there is the need to reduce to small size waste of various kinds and scrap materials such as plastic, glass, metal, rubber, wood. Usually, the shivering of waste and scrap materials meets the requirement to reduce the volume and hence the bulk thereof, but this operation may be necessary for other reasons too.

In particular as far as ships and boats are concerned, the volume of refuse and waste is, in itself, of relatively little importance since said materials are not, usually, stowed but on the contrary they are directly discharged into the sea. However, this operation is controlled by regulations and it is allowed only if the waste to be discharged into the sea are of small size, in order to make easier their scattering and, as far as possible, their biodegradation.

Various shredding devices are known, naval and industrial, which provide the shivering of scrap materials and waste but none of these can check whether the size of the processed material is below a fixed limit. In the special case of naval shredders, this lack causes both ecological inconveniences in that the marine environment must withstand the introduction of waste which are biodegradable or integrable in the environment itself with greater difficulty, and a drawback for the person in charge of the use of said devices who incurs penalties from the authorities, due to the discharging into the sea of waste not in compliance with the regulations.

Another drawback of the shredding devices, naval or industrial, already known is that, since they process any kind of waste, in many cases they constantly exhale a bad smell owing to the residues which deposit especially on the grinders or cutters which provide the shivering of the waste, as well as on the inner walls of the hoppers usually used to feed the grinders themselves.

Therefore, the object of the present invention is to provide a shredding device capable of producing shivered material according to the desired size and of selecting any piece of material which is oversize, and which allows to carry out a simple and fast semiautomatic cleaning operation every time the processing of a load of waste is over.

This object is achieved by means of a shredding device including a shivering unit and a feed hopper through which the material to be shredded is fed to the shivering unit, being also provided with at least one screen positioned below the shivering unit so as to select according to their size the shreds of material produced, and being finally provided with a washing circuit for the cleaning of the feed hopper inner walls and of the underlying shivering members.

The improved shredding device according to the present invention has the advantage, in case of use on board of ships or boats, of assuring the compliance with the regulations concerning the environmental impact of sea discharged waste and therefore of protecting the people in charge of craft from unpleasant surprises such as fines or sanctions.

Another advantage of the present device is that the user may work in a healthy environment in that there are no bad smells coming, for example, from the processing of food waste.

A further advantage, finally, is that the regular cleaning of the shivering members such as grinders or cutters increases the effectiveness and life of the members themselves.

These and other advantages of the improved shredding device according to the present invention will become apparent from the following detailed description of an embodiment thereof, referring to the annexed drawings wherein:

Fig.1 is a perspective view, with removed parts, of the shredding device according to the present invention;

Fig.2 is a side view, partly in section, of the lower part of the device of fig.1;

Fig.3 is a top view of the feed hopper of the device of fig.1; and

Fig.4 is a view, partly in section, of the lower part of the device taken in the direction of arrow IV of fig.2.

Fig.1 shows that, likewise the known devices of this kind, the shredding device according to this invention essentially includes a feed hopper 4 through which the waste 3 are fed to an underlying shivering unit 2 which, being already known, will not be described in detail hereafter. The whole structure is mounted on a base stand 5 inside which a container 15 is positioned, wherein the shreds, produced by the device which is controlled by a control unit 6, are gathered.

According to the present invention, the shredding device is also provided with a screen 1 positioned below the said shivering unit. The screen 1 acts as a filter letting through its meshes the shreds of shivered material having sufficiently small size, whereas it retains the oversize shreds which must be periodically taken out and subsequently inserted again into the hopper 4 to undergo a further shivering. By using from time to time screens with different mesh size it will be therefore possible to obtain shreds of material of the desired size, in particular the naval grinders may be provided with a screen 1 such as to allow the passage only of the shreds of a size in compliance with the regulations for the discharge of waste into the sea.

The screen 1 may be of any type, shape and material suitable for the object but, preferably, it consists of a steel grid not necessarily made in a single piece.

Fig.2 shows, in fact, that the screen 1 is formed, in this case, by two parts 1A, 1B which are mutually integral in the operating position. The parts 1A and 1B

can be separated and then can open by rotating towards the inside of the base stand 5, being pivoted on axes 17, 18 parallel to the two transverse sides of the screen 1. Fig.2 also shows the hand-wheels 7, 8 used to take into operating position the two parts 1A, 1B which, in this embodiment, form the screen 1, while through a hand-wheel 9 the manual release of both parts 1A, 1B of the screen 1 can be provided, for example when it is desired to remove shreds of material accumulated on the screen itself. Preferably, the automatic release of the screen 1 controlled by the control unit 6 is provided too, in case the latter senses an excessive accumulation of shreds of material on the screen 1 and therefore a clogging of the screen itself. Fig.2 finally shows a tank 10 wherein a detergent liquid is contained for the washing of the hopper 4 as will be described later on.

Fig.3 shows the hopper 4 through which the scrap material falls onto the grinders or cutters, not shown, of the underlying shivering unit 2. Along the walls of the hopper 4, in its upper part and inside it, a duct 11 is positioned, provided with a plurality of nozzles, not shown, having suitable diameter and orientation. Through said nozzles, jets of water, possibly mixed with detergent liquid, are spread, which remove the residues and deposits from the hopper walls as well as from the grinders or cutters which form the shivering unit 2. The dirty water and the washing residues are gathered, finally, in a suitable container, not shown, which is positioned inside the base stand 5, replacing said container 15 prior to the starting of the washing operation.

The washing process preferably provides a first stage wherein water only is supplied to remove the coarser residues, a second stage wherein liquid detergent is added to the water and finally a third stage or rinsing wherein water only again is used.

Fig.4 shows the lower part of the washing circuit which includes a ball valve 12, through which water is drawn from an external supply circuit, which valve is connected to a pressure regulator 13 preferably present so that, inside the device washing circuit, water has a fixed and constant pressure. This is to avoid that, in case the pressure is too high, the nozzles spread water excessively atomized, thus compromising the effectiveness of the washing operation. The pressure regulator 13 is connected to a pump 14, same as the tank 10 containing detergent liquid. The pump 14 is operated by the user, for example through proper controls on the control unit 6, during the washing stage wherein the use of detergent liquid is provided, and provides for the measurement of the amount of liquid that is mixed with the water.

It should be noted that in order to achieve an effective washing operation it is necessary that the pressure in the external water supply circuit is not lower than that fixed for the washing circuit of the shredding device. Otherwise, in fact, the nozzles would spread water in compact jets, thus resulting in a limited effectiveness of the washing. Therefore, in case of insufficent pressure of the supply water the device washing circuit must also include a proper auxiliary pump.

All the elements forming the washing circuit as above described may be of any known kind suitable for the object.

Claims

1. A shredding device essentially including a shivering unit (2) and a feed hopper (4) through which the material (3) to be shredded is fed to the shivering unit (2), characterized in that it also includes at least one screen (1) positioned below the shivering unit (2) so as to select according to their size the shreds of material produced, said device being also provided with a washing circuit for the cleaning of the inner walls of the hopper (4) and of the underlying shivering members.

2. A device according to claim 1, characterized in that the screen (1) is formed of at least two parts (1A, 1B) which can separate mutually departing so as to let through the shreds of material accumulated on the screen (1).

3. A device according to claim 2, characterized in that a control unit (6) can automatically control the separation of the parts (1A, 1B) forming the screen (1), when it senses an excessive accumulation of shreds of material on the screen (1).

4. A device according to one or more of the preceding claims, characterized in that the washing circuit includes a duct (11) fixed to the walls of the feed hopper (4) and provided with a plurality of nozzles suitable to spread jets of water and/or detergent liquid.

5. A device according to claim 4, characterized in that the washing circuit also includes a pressure regulator (13) and/or an auxiliary pump to keep constant the pressure of the water inside the circuit itself.

6. A device according to claim 4 or 5, characterized in that the washing circuit also includes a pump (14) which provides for the mixing of the water of the washing circuit with fixed amounts of detergent liquid drawn from a tank (10) connected to the pump (14).

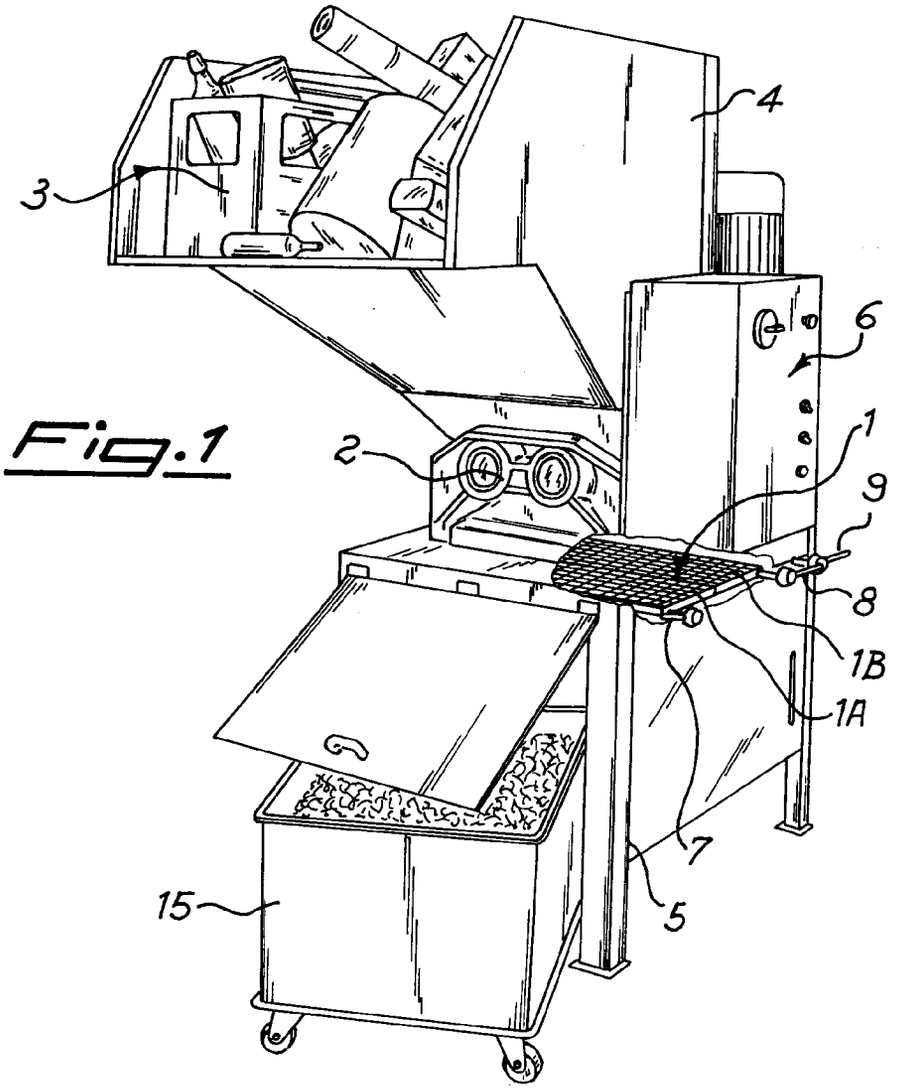

Fig.1

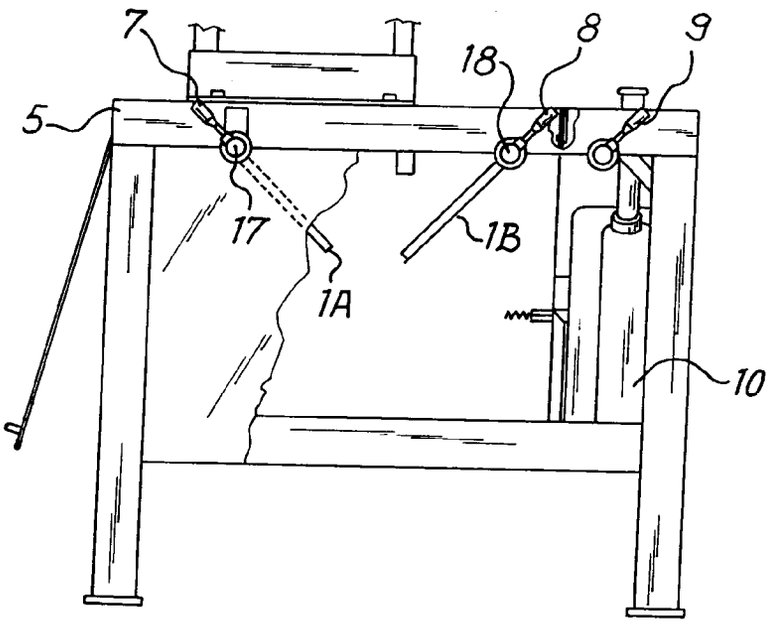

Fig.2

Fig.3

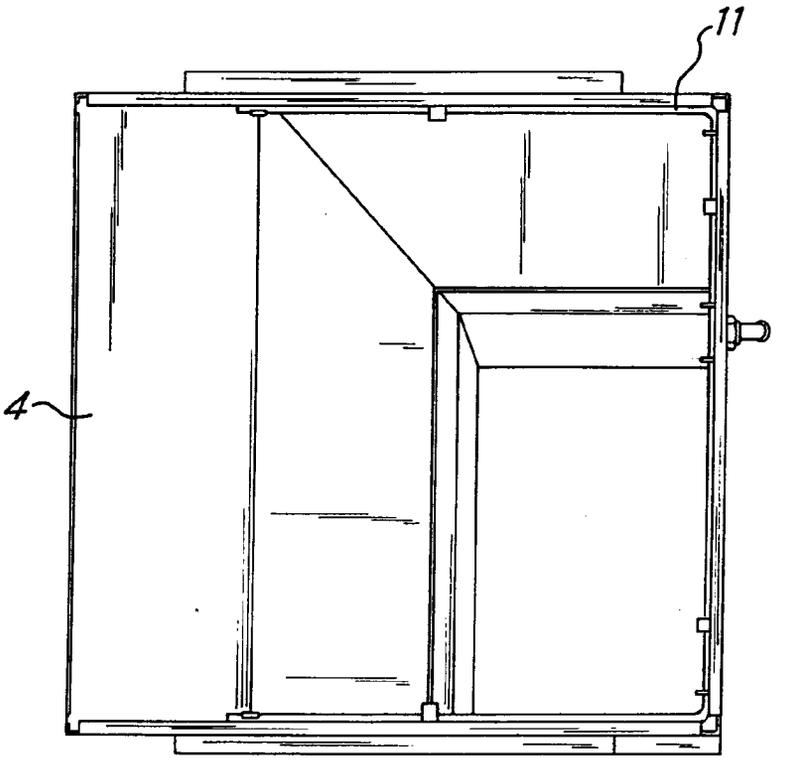

Fig.4