# United States Patent [19]

**Heesen**

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[54] **ROLLER PRESS**


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[52] **U.S. Cl.** ..... **425/237**; 425/230; 100/174; 100/176; 425/436

[51] **Int. Cl.** ..... **A01j 21/00**

[58] **Field of Search** ..... 100/121, 155, 168, 172, 100/174, 176; 425/237, 363, 311, 314, 294, 230, 436



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[57] **ABSTRACT**

A roller press is provided having two cooperating rollers, at least one of which is provided with centric grooves for compressing material fed to the roller press into strips and having a radially movable ring in each centric groove the outer periphery of which forms the movable operative bottom of the groove.


**15 Claims, 5 Drawing Figures**

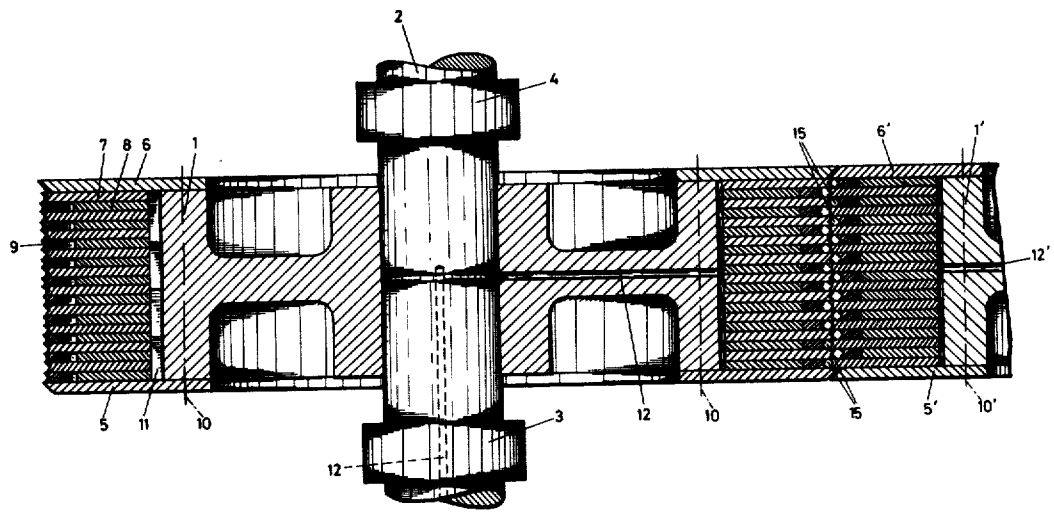
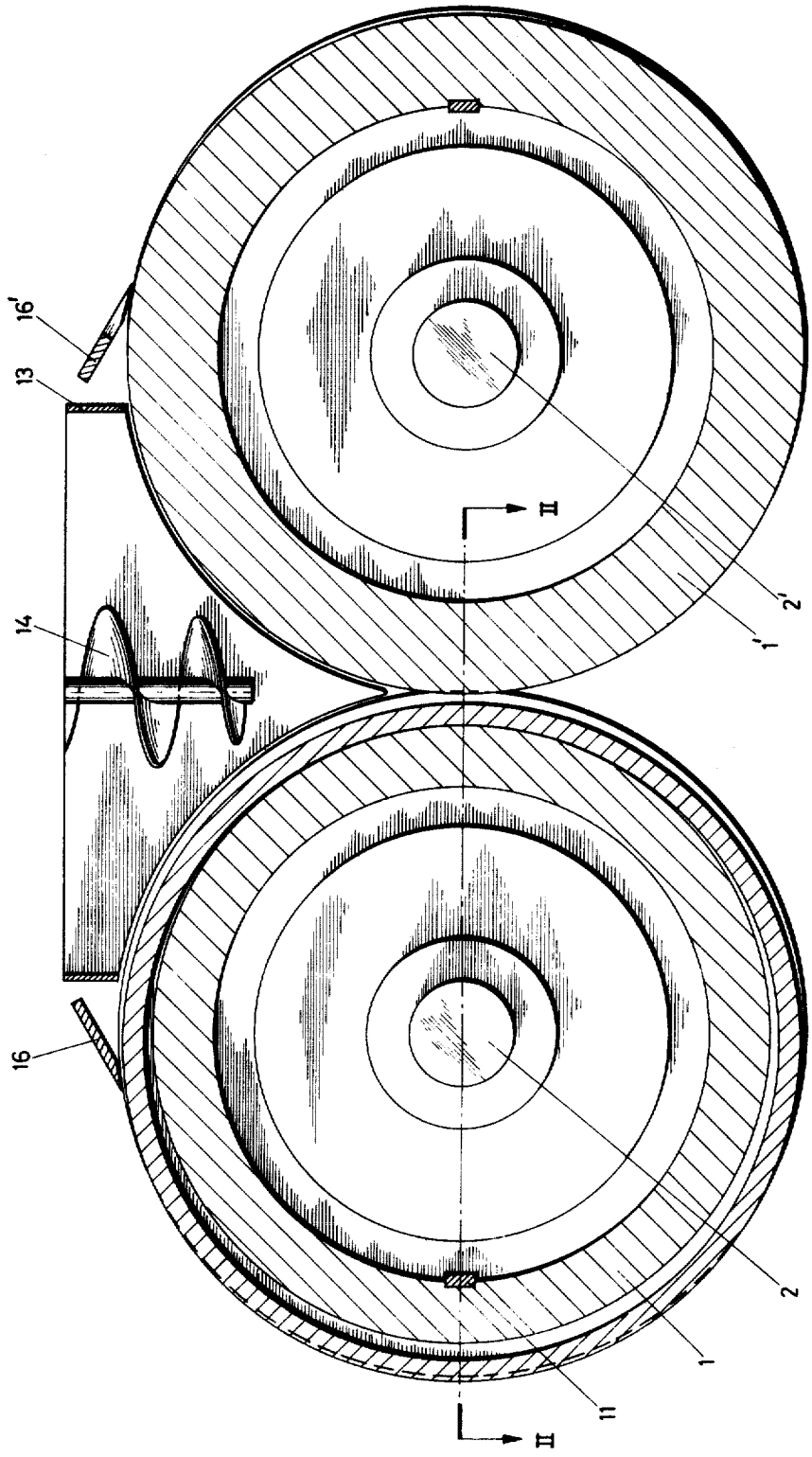


FIG. 1



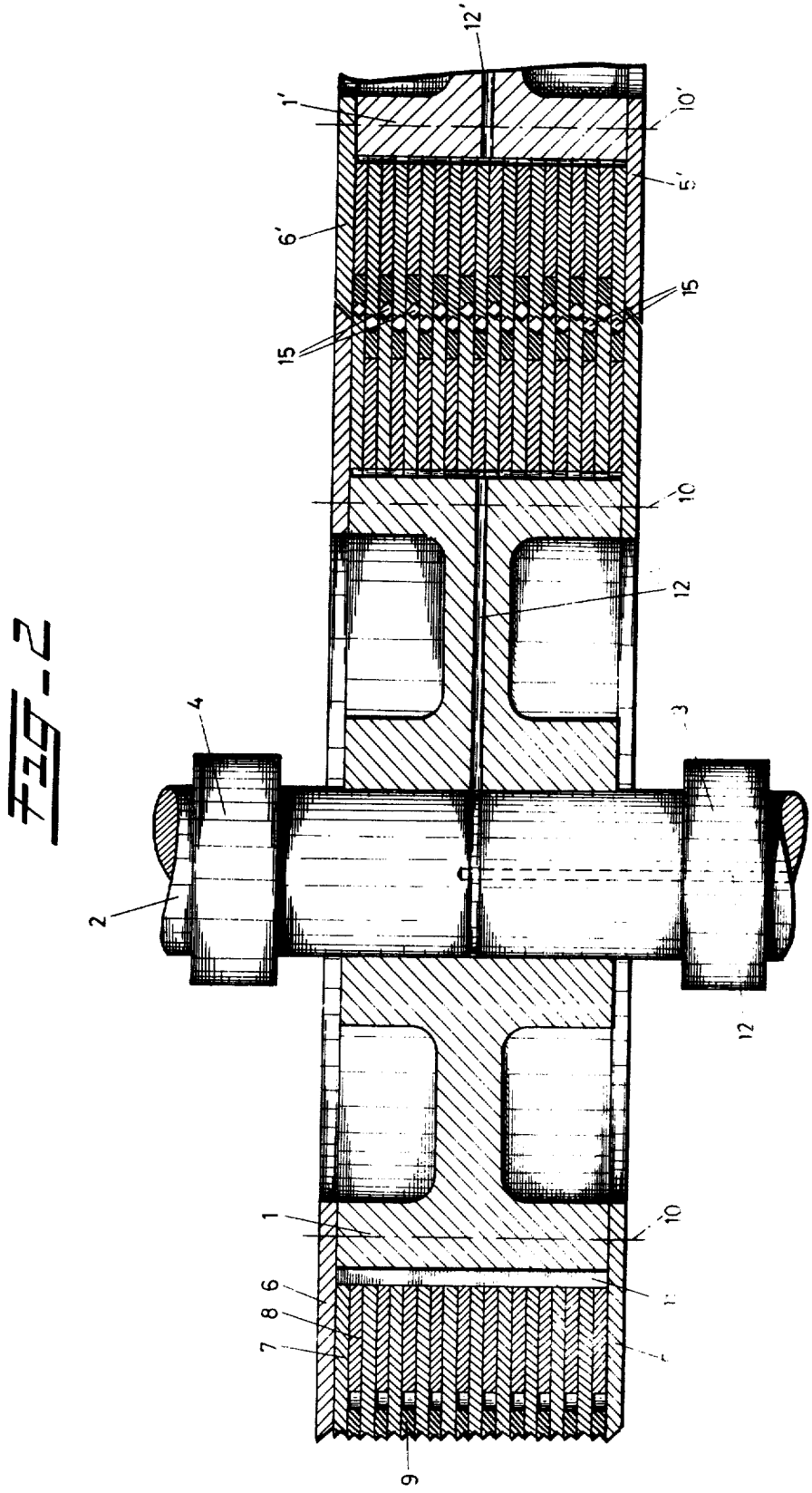



Fig-2

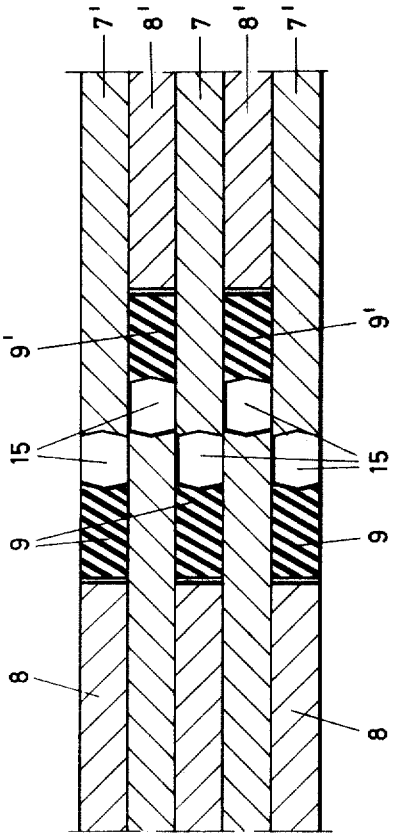
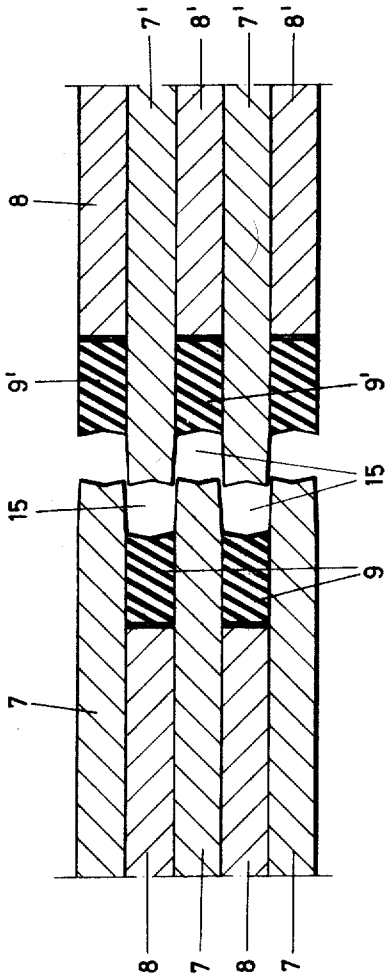



FIG. 3

FIG. 4



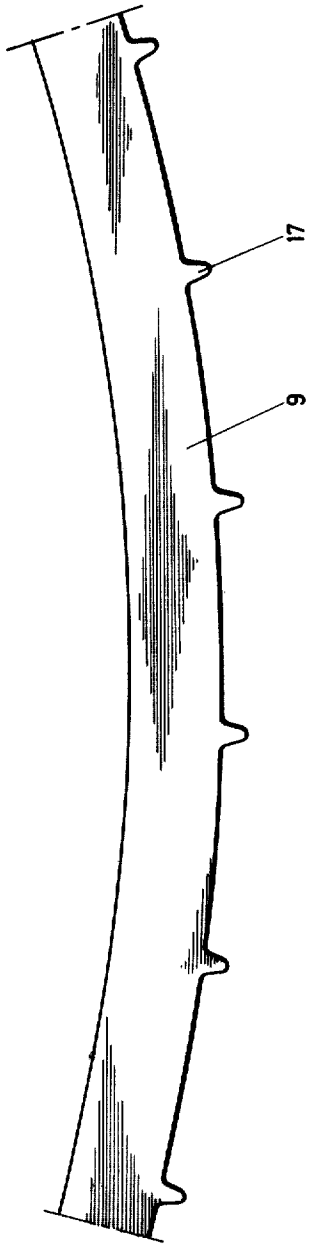



FIG. 5

# ROLLER PRESS

This invention relates to a roller press, comprising two rollers co-operating with one another and of which at least one roller is provided with centric grooves destined for the compressing of material, fed to the roller press, into strips.

Such a roller press is generally well-known in practice and is employed to compress products into strips, which strips are further broken up into small pieces. A field for the adaption of such a roller press is, for example, the manufacture of cattle-feed in the form of small blocks (pellets).

The known roller press is provided with fixed centric grooves. These roller presses are effective but have the disadvantage that the strips cannot be removed from the roller press without damage.

The invention aims at eliminating this objection, and this aim is achieved in that a movable ring is arranged in each of the centric grooves, the outer periphery of each of which rings forms the movable operative bottom of the groove. The pressure developed by the roller press extends over a zone where the two rollers cooperate with one another, which pressure ensures that the movable rings are here pressed against the fixed bottoms of the grooves. This means that these movable rings will, however, assume a certain eccentricity such that the grooves, diametrically opposite thereto, will be reduced in depth or entirely disappear. In this manner at further rotation of the rollers, the strips are forced out of the grooves.

Preferably, the inner diameter of each movable ring is approximately as much greater than the diameter of the fixed bottom of the groove, as the outer diameter of the movable ring is smaller than the diameter of the roller. In this manner each groove diametrically opposite the contacting zone between the rollers completely disappears. In general, the rollers are in contacting engagement on a horizontal line drawn through the axes of these rollers. The point at which the grooves completely disappear is also on this horizontal line. Above this horizontal line the movable rings move again inwardly. In view of the fact however that the strips have the opportunity to expand to a certain degree, they will not tend to follow the movable rings and can be easily removed from the roller by peel-off members.

Further characterizing features and advantages of the invention will be brought out in the following description read with reference to the drawings in which:

FIG. 1 illustrates, in cross-section, a side view of the roller press according to the invention,

FIG. 2 shows a section of FIG. 1, along the line II—II, and

FIGS. 3, 4 and 5 illustrate, on a larger scale, details of some embodimental possibilities.

In the roller press according to the invention, always two rollers designated 1 and 1' are working in cooperation. The roller 1 is driven via a shaft 2 which is supported in bearings 3 and 4. The shaft for the roller 1' is designated 2' in FIG. 1. For the sake of clarity in the description only roller 1 is to be discussed since the roller 1' corresponds substantially completely thereto.

The roller 1 is provided with two side plates 5 and 6 at its ends, which have diameters such that they extend radially beyond the diameter of the roller 1. In the enclosing space formed between the side plates 5 and 6, rings 7 and 8 of larger and smaller width respectively



are arranged alternately. The rings 7 have an outer diameter which is approximately equal to the outer diameter of the enclosing side plates 5 and 6. The rings 8 have a smaller outer diameter than that of the side plates 5 and 6. Rings 9 are arranged around the rings 8 and the inner diameter of which ring 9 is approximately as much greater than the outer diameter of the ring 8, as the outer diameter of the rings 9 is smaller than the outer diameter of the rings 7.

The enclosing side plates 5 and 6 are affixed to the ends of the roller 1 by means of bolts of which only the centre lines 10 are indicated, and such that all rings 7 and 8 are rigidly clamped together between the side plates. These rings 7 and 8 are affixed to the shaft 2 by means of a key 11 but in such a manner that they have free radial movement and nevertheless the ingress of foreign matter is prevented between the side walls of the rings 9 and the adjacent side walls of the rings 7. The movable rings 9 are lubricated from a central lubricating system via a system of channels 12.

The two rollers 1 and 1' are arranged opposite each other in such a manner that the movable rings 9 of the roller 1 lie opposite the fixed rings 7' of the roller 1'.

If now the rollers 1 and 1' are rotated in opposite directions and a product to be compressed is fed thereto from for example a feed hopper 13, placed above the rollers 1 and 1', and with the aid of a pre-compressing transport screw 14, then the movable rings 9 will be pressed against the rings 8 and such that a space exists between the adjacent peripheral faces of a ring 9 and a ring 7'. It will be readily understood that such a space will exist between each pair of opposite lying rings 9 and 7' and 9' and 7. These spaces are designated by the reference numeral 15 in FIG. 2.

The compressing of a product by rollers with fixed grooves is, in itself, well-known; however, there is a disadvantage inasmuch that the product cannot be removed from the compressively filled grooves without serious damage.

Through the fact that the rings 9 and 9' of the roller press according to the invention are continuously forced outward as the result of the force of the pressure maintained between the rollers 1 and 1', the product of strip-like form compressed in the grooves will be forced therefrom by the rings 9 and 9'. As soon as this is completely achieved and the pressure falls away completely then the compressed strip-like formed product will expand to some degree and such that the strips will not follow the rings 9 and 9' above the line drawn through the axis, should these rings move inwardly again thereabove. The strips are easily removable from the rollers 1 and 1' by means of peel-off members designated 16 and 16'.

In this manner, strips are manufactured from the product fed from the feed hopper 13. These strips can eventually be divided into small pieces in a known manner. In order to divide the strips to be pressed into small pieces at the same time and of like length it is possible to provide equipspaced teeth 17 extending from the grooves 15, which may be arranged on the rings 9 and 9' as shown in FIG. 5 on an enlarged scale, or may be arranged on the rings 7 and 7'.

In order to make the freeing of the product easier from the grooves 15, it is preferable that the rings 7 and 7' (insofar that they extend outside of the rings 9 and 9') should have a slightly conical form such as is illustrated in FIG. 4.

By imparting a particular form to the outer peripheries of the rings 7 and 9', and rings 7' and 9 it is possible to influence the form of the strip.

In order that the rings 9 and 9' can move easily, they must be thinner than the rings 8 and 8' however not so much that product material can come therebetween.

It is possible to produce the rings 9 and 9' from springy material for example of hard rubber or nylon. Then the play between rings 7 and 9, and rings 7' and 9' will be completely taken up as soon as pressure is applied, so that nothing can come between them, and whilst at the same time rings 9 and 9' can easily move without pressure.

The rings 7 and 7' must be as thick as rings 9 and 9', and thus thinner than rings 8 and 8'. In this manner it is possible by varying the distance between the centre lines of the rollers, also to adjust the width of the grooves 15 since the rings 7 and 7' of both rollers 1 and 1' pass between each other.

What we claim is:

1. A roller press comprising two rollers co-operating with one another and at least one of which rollers is provided with centric grooves destined for the compressing of material, fed to the roller press, into strips, characterized in that a radially movable ring is located in each of the centric groove, the outer periphery of each of which rings forms the movable operative bottom of the groove.

2. A roller press as claimed in claim 1, characterized in that the inner diameter of each movable ring is approximately as much greater than the diameter of the fixed bottom of the groove, as the outer diameter of the movable ring is smaller than the diameter of the roller.

3. A roller press as claimed in claim 1, characterized in that the grooves are formed by alternately arranged thicker and thinner rings, which are centricly affixed to the body of the roller and such that the fixed bottom of each groove is formed by the outer periphery of a fixed thinner one of the said rings, around which thinner one of the said rings the movable ring is arranged always between two fixed thicker rings.

4. The roller press as claimed in claim 3, characterized in that in the two rollers always the outer periphery of a fixed thicker one of the rings of one roller is located opposite the outer periphery of a movable ring of the other roller.

5. A roller press as claimed in claim 4, characterized in that the movable rings are as thick as the fixed thicker rings.



6. A roller press as claimed in claim 3, characterized in that the movable rings are somewhat thinner than the fixed thinner rings in order to provide for radial movement thereof between the side faces of the movable rings and the side faces of the adjacent fixed thicker rings.

7. A roller press as claimed in claim 1, characterized in that the fixed rings are composed of rigid material and the movable rings are composed of springy material, such as hard rubber or nylon.

8. A roller press as claimed in claim 3, characterized in that the fixed thicker rings are of a smaller width over a portion thereof extending beyond the periphery of the movable rings.

9. A roller press as claimed in claim 1, characterized in that on the outer periphery of the movable rings projections are arranged at mutually equal distances to divide the compressed strips into small pieces of like length.

10. A roller press as claimed in claim 3, characterized in that on the outer periphery of the fixed thicker rings projections are arranged at mutually equal distances to divide the compressed strips into small pieces of like length.

11. A roller press as claimed in claim 1, characterized in that the fixed rings have all the same inner diameter and engage with this inner diameter the outer diameter of the body of the roller and are connected therewith by a key or similar means, so that relative rotation is prevented.

12. A roller press as claimed in claim 11, characterized in that a central lubricating system is arranged for the movable rings.

13. A roller press as claimed in claim 1, characterized in that strips compressed from the product are removed from the rollers by means of a peel-off member that is arranged in the position with respect to each roller where the movable rings move inwards again.

14. A roller press as claimed in claim 1, characterized in that the rollers are so arranged one with respect to the other that the distance between their centre lines may be adjusted.

15. A roller as claimed in claim 3 characterized in that at least one of the outer periphery of each fixed thicker ring and the outer periphery of each movable ring is provided with a selected profile for imparting a particular shape to the strip.

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