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3,477,489

SHREDDER

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Fig. 1

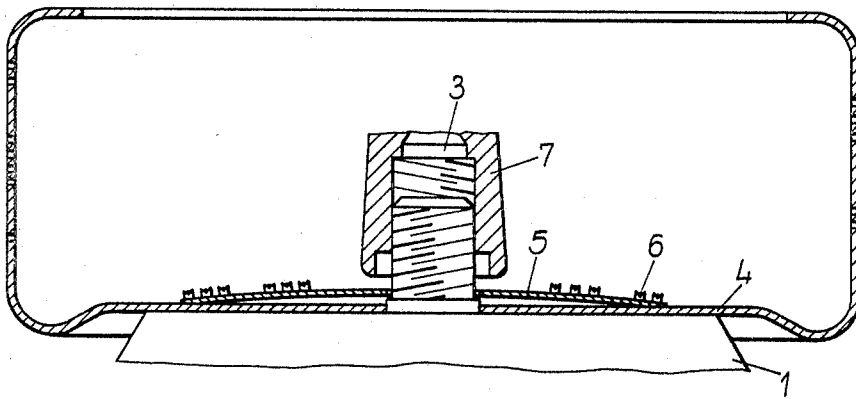


Fig. 2

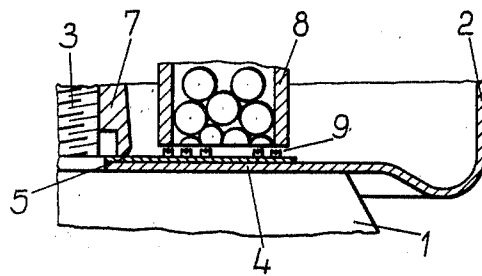
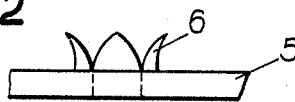


Fig. 3

1

3,477,489  
SHREDDER

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10 Claims

## ABSTRACT OF THE DISCLOSURE

A shredding member in a juice extractor consists of a disc of relatively thin elastically deformable material. The disc has a convex first side which is provided with a plurality of clusters of projecting teeth, and a concave second side which is adapted to overlie a substantially planar support surface in surface-to-surface engagement therewith when deflecting pressure is exerted against the convex first side, the disc being reinforced by such engagement.

## BACKGROUND OF THE INVENTION

The present invention relates generally to a shredder, and more particularly to a shredding member. Still more particularly the invention relates to a shredding member for use in juice extractors.

Juice extractors can be divided into two basic categories, namely the one in which the material from which juice is to be extracted is subjected to pressure so as to extract the juice therefrom, and another category in which the material (fruit, vegetables or the like) is shredded for the purpose of disintegrating its cellular structure and to obtain the juice in this manner, the present invention is particularly concerned with this latter type of extractor.

The disruption of the cellular structure of the materials to be treated is accomplished by means of rotating shredding members which heretofore have usually consisted of a massive plate provided with teeth. However, the manufacture of such shredding members is relatively expensive and to overcome this disadvantage it has been proposed to utilize shredding members which consist of plates of synthetic plastic material on which cutter blades are secured—or in which such blades are partially embedded; but the use of cutter blades has not been found satisfactory because these blades are incapable of disrupting the cellular structure of the material from which juice is to be extracted. Teeth, on the other hand, cannot be provided in a satisfactory manner on plates which consist of synthetic plastic material.

Another solution which has been proposed is to stamp teeth from discs which consist of relatively thin sheet material. This is an inexpensive way of producing the shredding members and would at first sight seem to overcome the disadvantages outlined above. However, members consisting of thin sheet material have a tendency to twist and become deformed as a result of torsional stresses which develop upon engagement with the material from which juice is to be extracted, and which hereafter will for the sake of convenience be identified as fruit although this definition encompasses other suitable materials as well. Such twisting or deformation, however, brings with it certain disadvantages. In this context it must be recalled that the shredding member will usually be located in a rotatable drum, with the fruit being fed into the proximity of the teeth of the shredding member via a feed hopper which extends into the drum and whose lower edge is located closely above the teeth of the shredding member, which latter rotates underneath this lower edge. Thus, if the shredding member becomes twisted or otherwise deformed to non-planar condition, any upwardly

2

projecting portions of the shredding member will contact the lower edge portion of the feed hopper and will damage the same or be damaged thereby, or else will jam against the lower edge portion and stop rotation of the device with consequent danger of damage, for instance motor burn-out. Nor can this problem be corrected by increasing the space between the teeth of the shredding member and the lower edge portion of the feed hopper because, if this is done, non-shredded portions of the fruit will be able to escape between the lower edge portion of the feed hopper and the shredding member and will become admixed with the juice being extracted.

## SUMMARY OF THE INVENTION

The present invention overcomes the aforementioned disadvantages.

More particularly, the present invention provides a shredding member which is inexpensive to manufacture, simple to produce, and highly effective in disintegrating the cellular structure of fruit or other materials from which juice is to be extracted.

The shredding member according to the present invention is also very easy to clean, thus fulfilling another of the important requirements which are made of such articles.

In accordance with one feature of my invention I provide, as a novel article of manufacture, a plate-like shredding member which consists of relatively thin elastically deformable material. This member has a convex first side which is provided with a plurality of clusters of projecting teeth, and a concave second side. The latter is adapted to overlie a substantially planar support surface in surface-to-surface engagement therewith in response to deflecting pressure which is exerted upon the convex first side, so that the shredding member is deflected into planar position overlying the support surface and is reinforced by the same.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary elevational section through an apparatus embodying my invention;

FIG. 2 is a fragmentary elevation of a portion of a shredding member according to the present invention; and

FIG. 3 is a detail view of FIG. 1, showing my shredding member in operative position ready for juice extraction.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly FIGS. 1 and 2, it will be seen that a supporting plate 1 of a juice-extracting centrifuge has mounted thereon a removable extracting basket or drum 2. The drum 2 is mounted on a rotatable shaft 3 which in turn is connected with a nonillustrated electric motor of conventional type. The drum 2 rotates with the shaft 3 in response to rotation of the latter, with which it is concentric. The shaft 3 is, as evident from the drawing, provided with external screw threads for a purpose still to be discussed.

Placed over the shaft 3 is a shredding member according to my invention. This shredding member is identified with reference numeral 5 and is in the shape of a disc

having a central opening through which the shaft 3 passes. It consists of relatively thin elastically deformable sheet material, such as sheet steel or the like, which is not in itself capable of resisting deformation under the influence of torsional stresses which develop when the member 5 is rotated in engagement with the fruit or other produce from which juice is to be extracted. The disc 5 is of substantially concavo-convex configuration, as clearly seen in FIG. 1, and is provided on its convex side, that is the side which faces away from the support surface constituted by the bottom wall 4 of the drum 2, with a plurality of clusters of teeth 6. These teeth are produced by stamping the material of the plate 5 from the concave side thereof through towards the convex side, thereby producing an aperture which is surrounded by upwardly projecting portions of the material of the plate 5 which define an annulus of teeth 6 about the aperture. Advantageously each of the clusters, of which one is illustrated in FIG. 2 in detail and on an enlarged scale, comprises no less than three such teeth 6.

A suitable nut member 7 (compare FIGS. 1 and 3) is provided with an internal screw thread which meshes with the external screw thread of the shaft 3. Thus, when the plate-shaped shredding member 5 is to be used, it is placed over the shaft 3 in the position illustrated in FIG. 1, and thereupon the nut member 7 is threaded onto the shaft 3 and downwardly until it engages the member 5 and deflects the same into a substantially planar condition into surface-to-surface contact of its underside with the support surface which is constituted by the bottom wall 4 of the drum 2. The shredding member of 5 is now reinforced and protected against torsional twisting so that the lower edge portion of a feed hopper 8 for fruit or other produce from which juice is to be extracted, can be placed into close proximity with the teeth 6 of the member 5. The gap 9 which exists between the teeth and the lower edge portion of the hopper 8 will always remain unchanged, because the member 5 cannot become deformed, and the gap 9 is so small that only finely shredded produce can pass therethrough from the interior of the hopper 8.

It is advantageous that all of the teeth 6 of each cluster, and in fact all of the teeth of all of the clusters, be identical length as illustrated in FIG. 2. It is further advantageous that the clusters, or to put this another way, the apertures which are surrounded by the annuli of teeth, be arranged on the disc in form of a spiral as is suggested in FIG. 1.

It will be understood that the reason why the shredding member 5 is not permanently secured to the bottom wall 4 of the drum 2 resides in the fact that it must be removable for cleaning purposes, and that it is further desirable to have the member 5 removable so that it can be exchanged for another shredding member which may have differently configured teeth or may otherwise be different for treating different types of produce or material. This of course greatly enhances the versatility of a machine so equipped.

Different types of materials are suitable for making the member 5, as already pointed out, and sheet steel is mentioned here only as one possible example.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of arrangements differing from the types described above.

While the invention has been illustrated and described as embodied in a shredding member for a juice extractor, it is not intended to be limited to the details shown, since various modifications and structural changes may be

made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. As a novel article of manufacture, a plate-like shredding member of relatively thin elastically deformable material, said shredding member having a convex first side provided with a plurality of clusters of projecting teeth, and a concave second side adapted to overlie a substantially planar support surface in surface-to-surface engagement in response to deflecting pressure exerted upon said convex first side, whereby said member is reinforced by said support surface through such surface-to-surface contact therewith.

2. In an apparatus of the type described, particularly in a juice extractor, the combination of a rotary support having a substantially planar support surface; a substantially plate-shaped shredding member of elastically deformable sheet material having a concave first side overllying said support surface, and a convex second side facing away from said support surface and being provided with a plurality of clusters of projecting teeth; and means operatively associated with said shredding member and releasably deflecting the same into surface-to-surface engagement of said first side with said support surface.

3. In an apparatus as defined in claim 2, wherein said shredding member is of relatively small thickness.

4. In an apparatus as defined in claim 2, wherein each of said clusters comprises a plurality of teeth.

5. In an apparatus as defined in claim 2, wherein each of said clusters comprises at least three teeth.

6. In an apparatus as defined in claim 2, wherein each of said clusters comprises a plurality of teeth, the teeth of each cluster being of identical length.

7. In an apparatus as defined in claim 6, wherein the teeth of all of said clusters are of identical length.

8. In an apparatus as defined in claim 4, wherein said teeth are constituted by portions of said shredding member which projects transversely from said second side in the direction away from said first side.

9. In an apparatus as defined in claim 4, wherein said shredding member comprises a plurality of apertures each associated with one of said clusters, and wherein the teeth of each cluster form an annulus about the respective aperture.

10. In an apparatus as defined in claim 9, wherein said shredding member is a disc, and wherein said apertures are arranged in form of a spiral on said disc.

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W. GRAYDON ABERCROMBIE, Primary Examiner

U.S. Cl. X.R.