

July 14, 1959

M. H. PANNING ET AL
SHREDDER

2,894,697

Filed Jan. 9, 1958

3 Sheets-Sheet 1

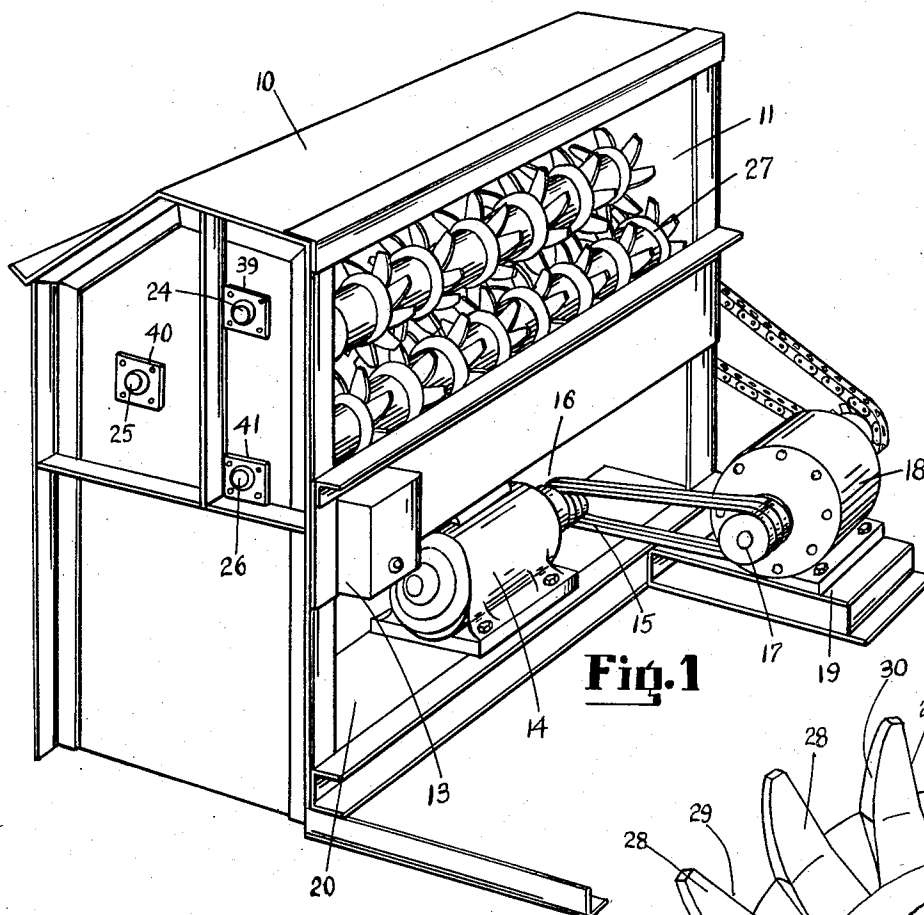


Fig. 1

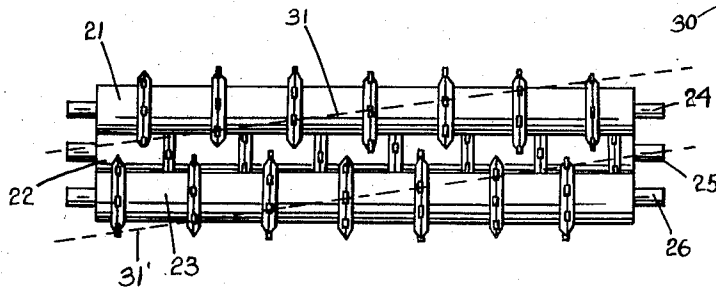


Fig. 2

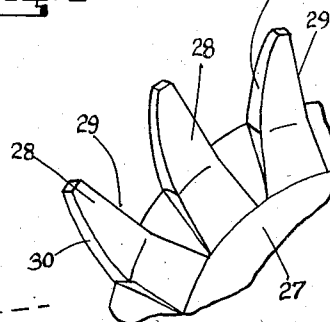


Fig. 3

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3 Sheets-Sheet 2

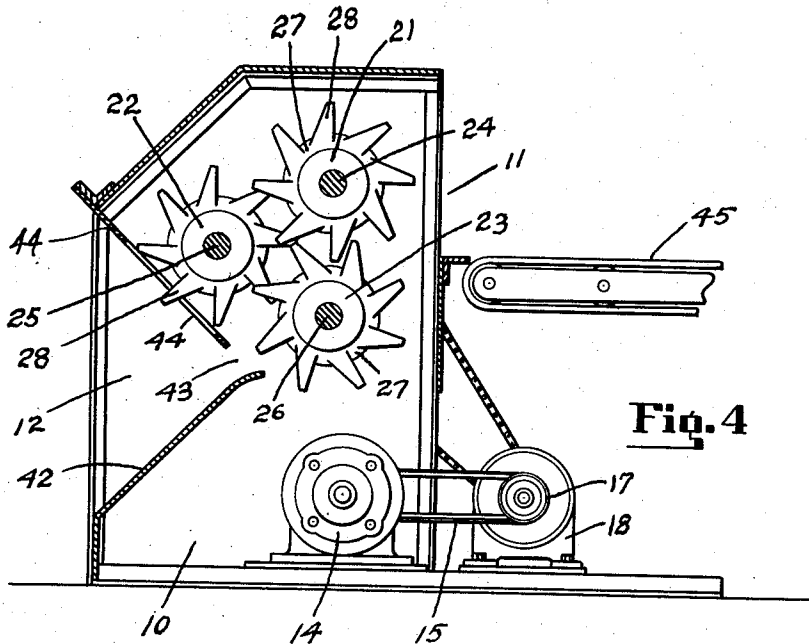


Fig. 4

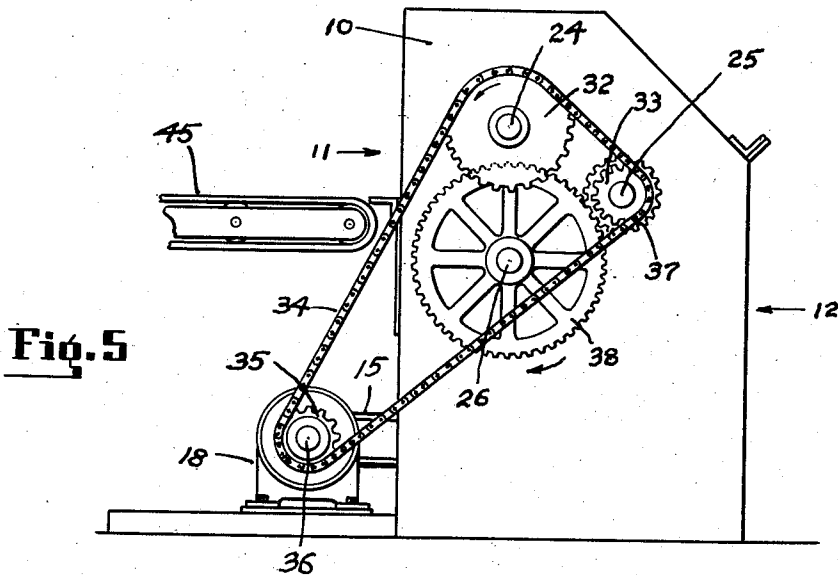


Fig. 5

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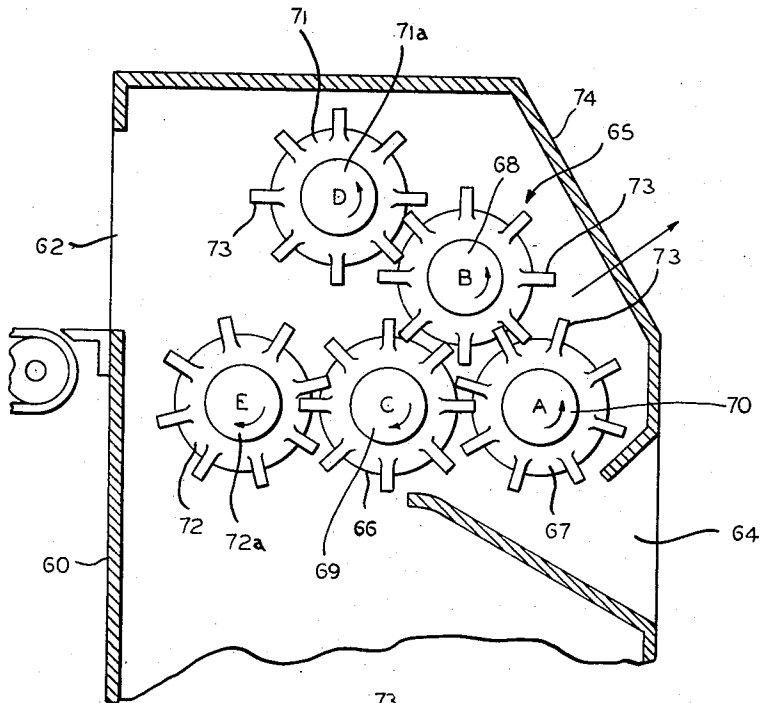


Fig. 6

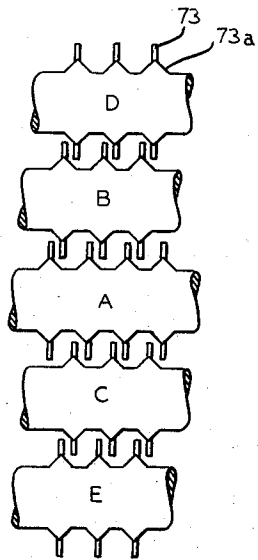


Fig. 7

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SHREDDER

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Application January 9, 1958, Serial No. 708,048

5 Claims. (Cl. 241—154)

Our invention relates to a machine for shredding paper board and the like.

It is manifest to anyone familiar with the baling of waste material such as cardboard boxes or sheets of cardboard, that it is often quite difficult to compress the sheets into a compact condition with a baling press, to acquire a maximum weight per bale, because flat sheets do not lend themselves for folding into compact condition.

The principal object of our invention is to provide a simple, efficient machine for shredding or tearing flat sheets of cardboard, fiberboard, corrugated board, or products manufactured therefrom.

Another object of our invention is to provide a machine which will accommodate various thicknesses of sheet material to be shredded.

In carrying out our invention we provide a machine which receives and shreds the paper board fed therein, so as to produce a mass of small torn particles or shredded portions that are easily fed into a baling press, in condition especially suitable for compressing into a compact bale, with a maximum amount of material within a limited space.

Other and further objects of our invention will become more apparent as the description proceeds, when taken in conjunction with the drawings, in which:

Figure 1 is a perspective view of the assembled machine showing the loading side thereof, but with the feed conveyor removed therefrom;

Figure 2 is a plan view of the rotatable shredding members outwardly used in the machine, and indicating the cooperative relation of the shredding spurs thereon;

Figure 3 is an enlarged fragmentary detail view of a portion of a spur disc or wheel showing the shape of the shredding spurs thereon;

Figure 4 is a vertical cross section of the machine showing the rotatable shredding members and their relation to each other;

Figure 5 is a side view of the drive arrangement for the shredding members, showing the different sizes of sprockets attached to their shafts to provide different speeds and direction of rotation of said members;

Figure 6 is a cross sectional illustration of a modified form of the invention; and

Figure 7 is a layout view of the shredding member illustrated in Figure 6 and illustrating the cooperative relation between the shredding members of Figure 6.

Similar characters of reference indicate corresponding parts throughout the several views and referring now to the same, the character 10 indicates a casing which has a side opening 11 to allow feeding cardboard or the like to be shredded, and an opposite side opening 12 to allow the shredded particles of board to be removed after the shredding operation.

A starting and stopping switch 13 is provided for controlling the current for the operation of the drive motor which is connected by means of a belt 15, disposed over motor pulley 16, to a pulley 17 on a speed reducer 18. This speed reducer 18 may be mounted on an extension

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19 of the machine base 20 on which base the motor 14 is also mounted.

A plurality of rotatable shredding members 21, 22 and 23, herein three in number, are disposed on parallel horizontal axes extending across the entire machine between the end walls thereof. These members are supported on shafts 24, 25 and 26, respectively. Each of said shredding members has a plurality of spaced discs 27 therealong, fixed to their respective shafts. Said discs have radially extending spurs 28, extending outward therefrom. As shown herein, each of these spurs has a straight leading edge 29 and an arcuate side 30 in Figure 3. The spur discs are mounted along the three members in alternate staggered relation to each other, as shown in Figure 2, and the spurs on each member are disposed in progressive angular relation to each other so that they are spirally aligned along each member, as indicated by the dotted lines 31 and 31' in Figure 2. This spiral arrangement of the spurs insures that each spur on a given shredding member will individually engage the cardboard as it is fed into the machine, rather than having a plurality of spurs engage the cardboard at the same instant. The spurs on all three shafts 24, 25 and 26 rotate in mutually lapping, interfitting relation with each other as seen in Figures 2 and 4.

By referring to Figure 5, it will be seen that the adjacent ends of the shafts 24 and 25 have sprockets 32 and 33, respectively, fixed thereon, the sprocket 33 on shaft 25 being smaller than the sprocket 32 on the shaft 24. The drive chain 34 from a sprocket 35 on a shaft 36 of speed reducer 18 is trained over the sprockets 32 and 33 so as to drive the shredding members 21 and 22 in the same direction, but at different speeds. The shaft 25 also has a pinion 37 fixed thereon which engages a much larger spur gear 38 fixed on the shaft 26. In this manner the chain 34 will drive the shaft 25 of member 22 at a high rate of speed, the shaft 24 of member 21 at somewhat less speed, and the shaft 26 of member 27 will be driven at a still slower speed, but in the opposite direction. It will be noted that the two shredding members 21 and 22 nearest the feed opening 11 rotate inwardly and toward each other, so as to tend to draw the cardboard into the machine, while the third shredding member 22 rotates in the opposite direction. Thus, the shredding members 21, 22 and 23 cooperate with each other to tear the board in small particles or pieces for the purpose for which the machine is intended, namely, each in baling.

Since the members are of the same size, the members have differential peripheral speeds, which provides an efficient shredding action.

The shafts 23, 25 and 26 are journaled in bearings 39, 40 and 41, respectively, mounted on the outer walls of the enclosure 10.

At the unloading side of the machine adjacent the opening 12 is a downwardly and outwardly inclined plate 42 upon which the shredded particles of paper drop for discharge by gravity through opening 12. An upwardly and outwardly inclined guard plate 44 may also be mounted adjacent the shredding member 22, having slots 42 therein for accommodating the spurs on the latter shredding member, and also to permit discharge of shredded material through said guard plate by gravity upon plate 42 therebelow. The shredded portions of material may also be discharged directly through opening 43 upon plate 42, from whence the material may be conveyed by means of any type of conveyor, or manually into the baling device (not shown).

Figure 5 shows a portion of a conventional type of belt conveyor 45, which may be employed for bringing the cardboard to the rotatable shredding members so that there is a steady feed of cardboard into the ma-

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chine. Any type of conveyor may be employed, as the conveyor is not considered a part of our invention.

Figures 6 and 7 illustrate a modified form of the invention. In Figure 6 a casing 60 defines an enclosure for a shredding chamber 61. The casing is provided with an inlet 62 and an outlet 64 defined in the rear wall of the chamber. A plurality of triangularly spaced shredding members 65, 66 and 67 are mounted for rotation on shafts 68, 69 and 70. The supporting shafts 68, 69 and 70 are mounted for rotation in the casing. A suitable drive mechanism (not shown) similar to that illustrated in Figures 1 through 5, may be employed to rotate the shredding members 65, 66 and 67 at different speeds and in different directions in precisely the same manner as that disclosed with regard to Figures 1 through 5.

In the embodiment of Figures 6 and 7, additional shredding members 71 and 72 are mounted for rotation in the casing 60. Shafts 71a and 72a support the members 71 and 72 respectively. The shredding member 71 may, for example, be positioned above the shredding member 65 and adjacent to the inlet 62. The shredding member 72 may be positioned on the same horizontal level at or below the shredding member 66 so as to define an open space between the shredding member 71 and shredding member 72. By employing the additional shredding members 71 and 72 adjacent the inlet, in the manner shown, it is possible to accommodate bulkier cartons of material than is possible with the three shredding members 65, 66 and 67 alone.

As is seen most clearly in Figure 7, the shredding members 65, 66 and 67 each have spurs 73 which, as in the embodiment of the invention illustrated in Figures 1 through 5, are disposed in spiral relation along the respective axes of the shredding members and with the spurs of adjacent shredding members in mutually lapped interfitting relation with each of the other spurs. The spurs of the shredding members 71 and 72 may be spirally formed on the shredding members. The spurs 73 of the member 71 may be disposed in lapped interfitting relation with the spurs of the shredding member 65 whereas the spurs 73 of the shredding member 72 may be disposed in lapped interfitting relation with the spurs of the shredding member 66. The spurs 73 may extend outwardly from discs 73a which are formed on the members.

It should be understood that the shredding members 71 and 72 are adapted for rotation in the direction of the arrows in Figure 6. They may be driven by means of a chain drive leading from the drive motor, such as is employed in Figures 1 through 5.

It is preferred to rotate the shredding members 71 and 72 at slower speeds than the shredding members 65, 66 and 67. While the shredding members 71 and 72 are shown as positioned to define a relatively narrow opening between the members, it should be understood that the opening or gap between these members may be increased by positioning the member 71 at a higher level and member 72 at a lower level.

The discharge from the shredders may either take place through the discharge opening 64 in the event that the shredding member 67 is rotated in a counterclockwise direction as viewed in Figure 6 or a discharge opening may be provided in the wall of the enclosure for an outward discharge (in the direction of the arrow) and through the upper wall 74 in the event that the shredder 67 is rotated in a clockwise direction.

This application is a continuation in part of copending application Serial No. 589,921, filed on June 7, 1956, now abandoned.

Whereas we have shown and described an operative

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form of the invention, it should be understood that this showing and the description thereof is to be taken in an illustrative or diagrammatic sense only. There are many modifications to the invention which will fall within the scope and spirit thereof and which will be apparent to those skilled in the art. The scope of the invention should be limited only by the scope of the hereinafter appended claims.

We claim:

1. A shredding device comprising an enclosure having an inlet and outlet, a pair of shredding members disposed on parallel horizontal axes within said enclosure and adjacent said inlet, and a third shredding member disposed on an axis parallel to the first named pair of shredding members adjacent said outlet, said axes being triangularly arranged, each of said shredding members having a plurality of discs thereon with outwardly extending spurs, said discs being mounted in spaced relation along said members and in staggered relation to the discs of the adjacent members, and the spurs on all of said members being disposed in spiral relation along their respective axes, the spurs of each member being in lapped, interfitting relation with the spurs of each of the other members, and means for rotating said members at differential peripheral speeds and the first pair of members in different directions to each other.

2. The structure in accordance with claim 1, wherein the enclosure inlet is at one side of said enclosure, the first named pair of shredding members are disposed one above the other within said enclosure and adjacent the inlet, and the third shredding member is rotatable in the same direction as the uppermost member of said first named pair of members.

3. The structure in accordance with claim 1 characterized by and including at least one additional shredding member disposed adjacent said inlet and having spurs in interfitting relation with the spurs of one of said pair of shredding members, and means mounting said additional member in cooperative material feeding relation to said one shredding member.

4. The structure in accordance with claim 1 characterized by and including two additional shredding members positioned between said first named shredding members and said inlet and spaced to define therebetween an inlet space leading to said pair of shredding members, said additional two shredding members having spurs in interfitting relation with the spurs of said pair of shredding members.

5. The structure in accordance with claim 1 wherein said enclosure has an outlet in an upstanding side wall thereof, and means are provided below said third member for guiding shredded material from said members to said outlet.

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