Dec. 16, 1952 F. T. LEE 2,621,567

PAPER SHREDDING MACHINE

Filed May 23, 1949 4 Sheets-Sheet 1

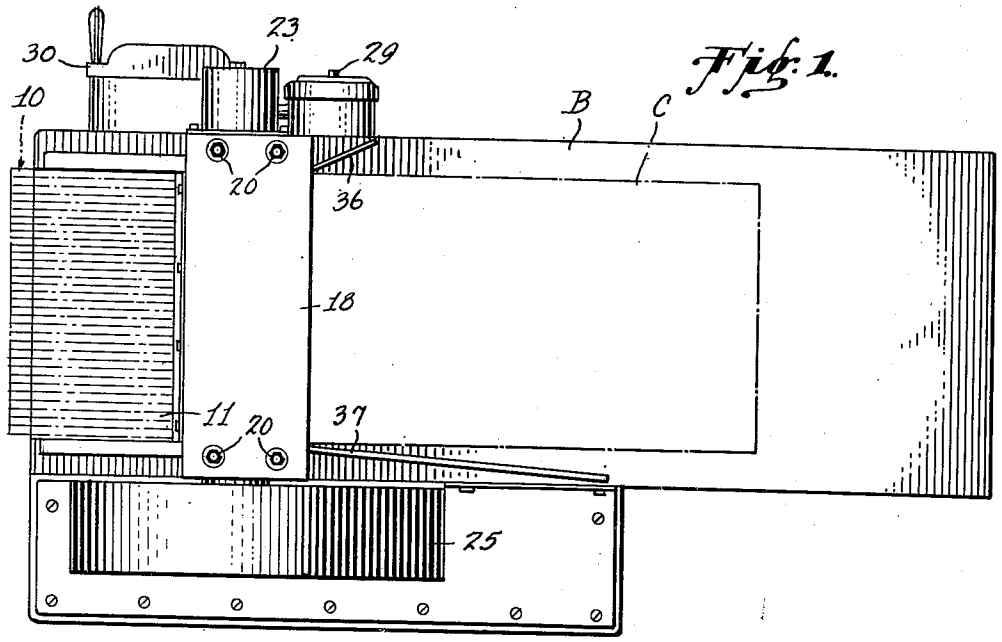


Fig. 1.

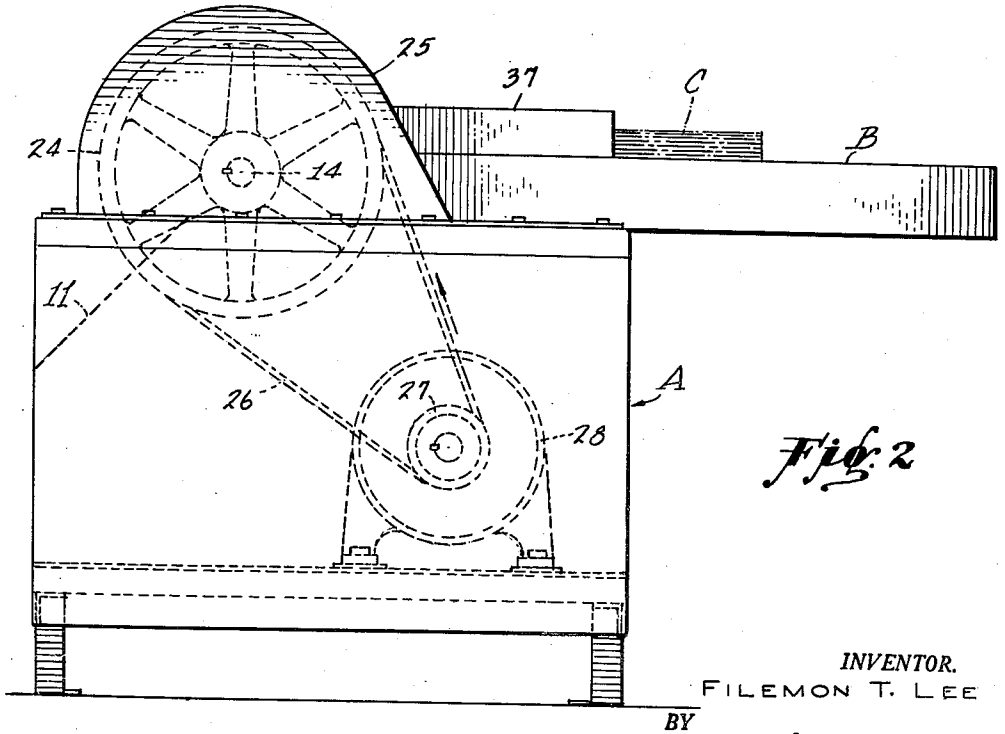


Fig. 2

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PAPER SHREDDING MACHINE

Filed May 23, 1949 4 Sheets-Sheet 2

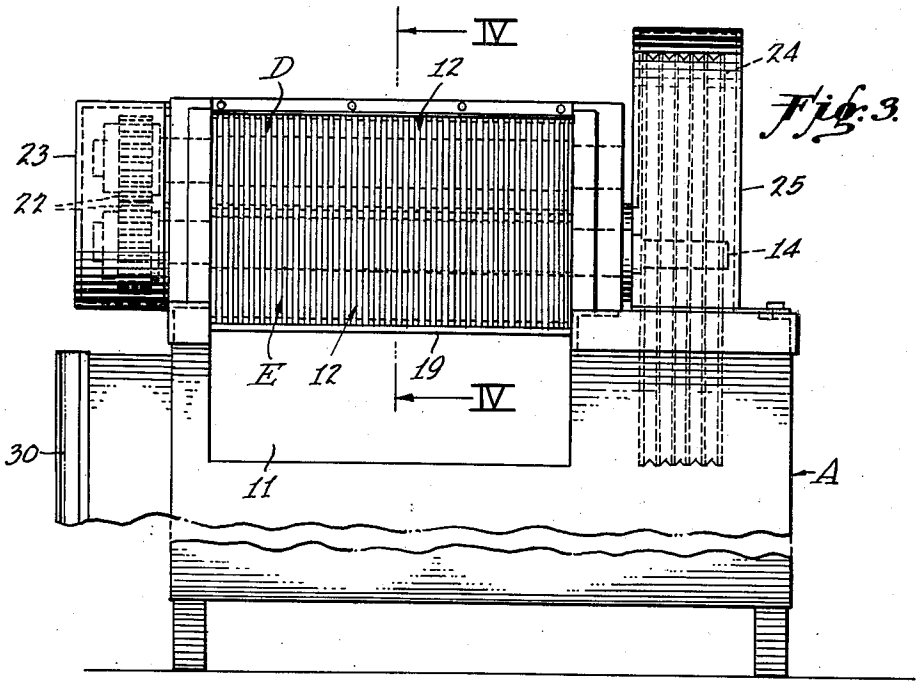


Fig. 3.

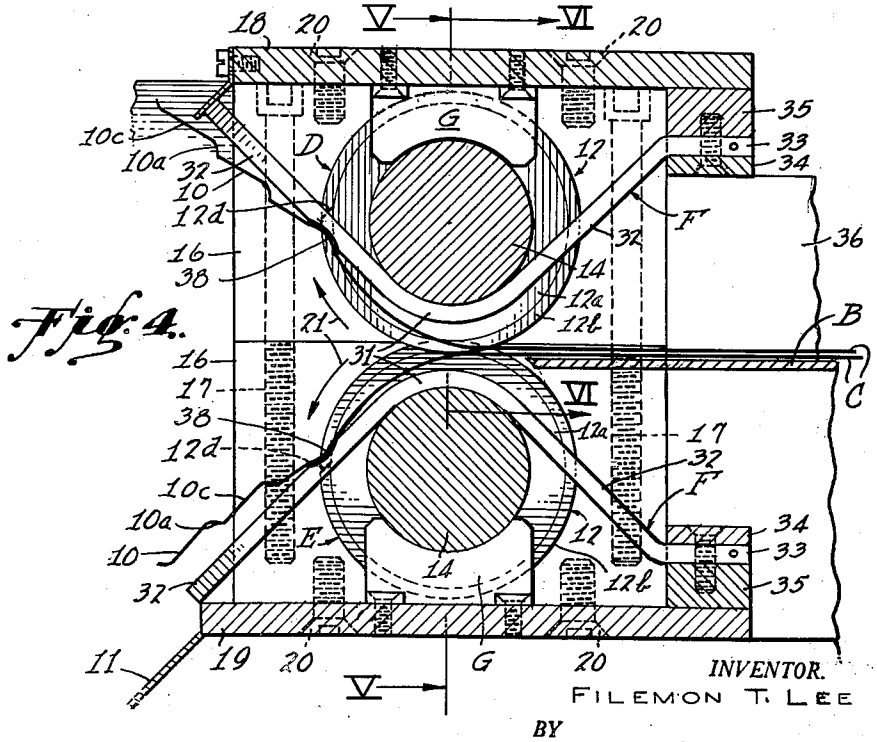


Fig. 4.

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PAPER SHREDDING MACHINE

Filed May 23, 1949 4 Sheets-Sheet 3

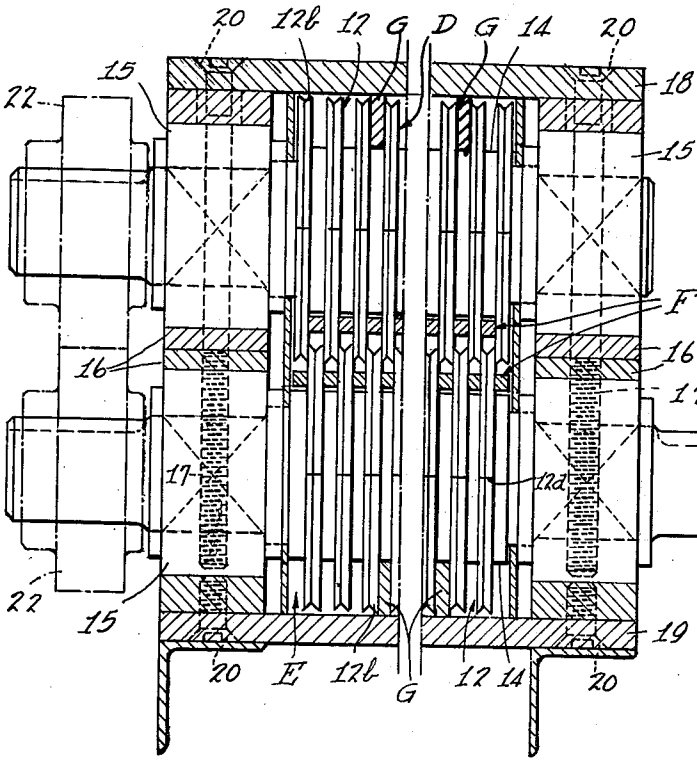


Fig. 5.

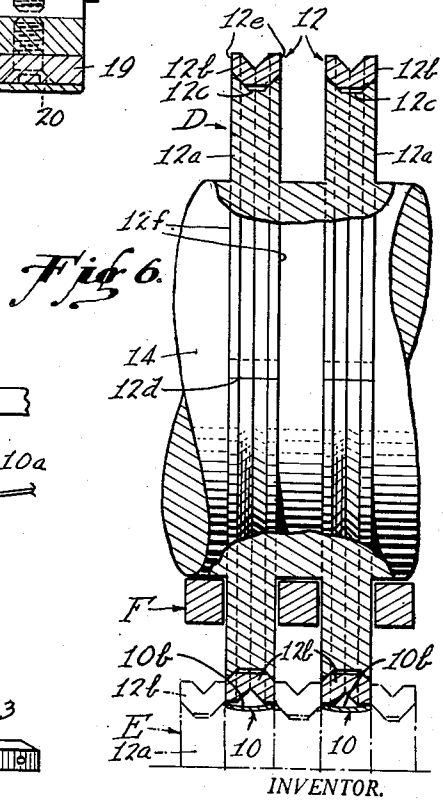
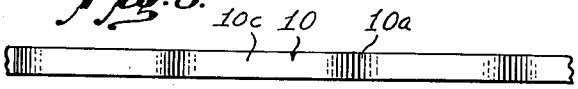


Fig. 6.

Fig. 8.



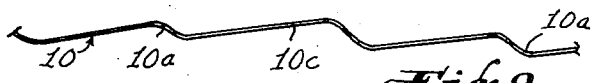


Fig. 9.

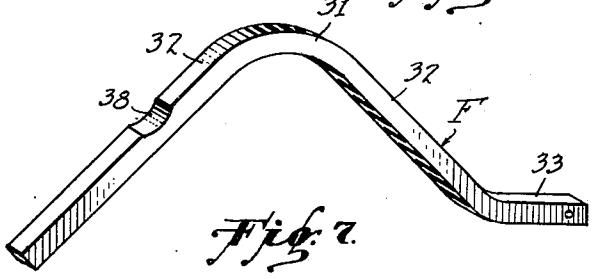


Fig. 7.

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PAPER SHREDDING MACHINE

Filed May 23, 1949 4 Sheets-Sheet 4

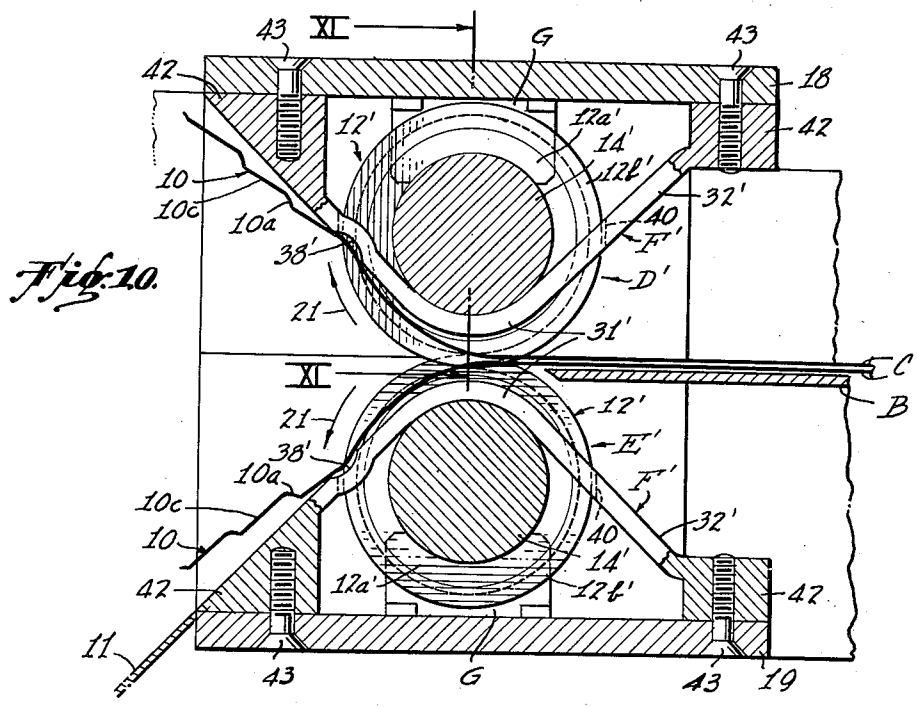


Fig. 10.

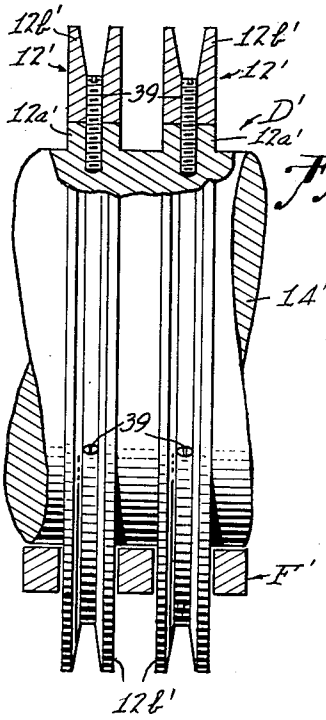


Fig. 11.

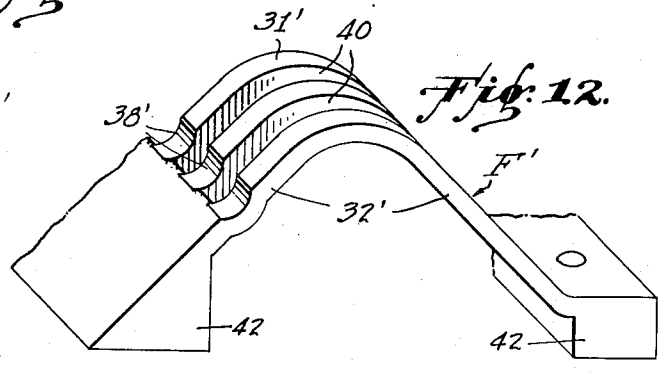


Fig. 12.

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UNITED STATES PATENT OFFICE

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PAPER SHREDDING MACHINE

Filemon T. Lee, San Francisco, Calif.

Application May 23, 1949, Serial No. 94,851

6 Claims. (Cl. 93—1)

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The present invention relates to improvements in a paper shredding machine. It has particular reference to a machine adapted for cutting sheets of paper, for instance newspapers, into strips to be used as a filler in packing merchandise.

An object of my invention is to provide a paper shredding machine, which is sturdy, compact and simple in construction; also, dependable and economical to operate. It will produce shredded paper in large quantity and can be operated by an unskilled person. Shipping departments of stores and factories can quickly convert waste paper into first-class packing material.

A further object is to provide a shredding machine adapted to shear paper into strips, and to kink the strips at spaced-apart points along their length to produce zigzag strips. At the same time, the strips are dished transversely. The strips thus produced are restrained somewhat against free flexing, thus requiring less filler material in packing merchandise in cartons and the like.

Other objects and advantages will appear as the specification continues. The novel features of my invention will be set forth in the claims hereunto appended.

For a better understanding of my invention, reference should be had to the accompanying drawings, forming part of this application, in which:

Figure 1 is a top plan view of a paper shredding machine constructed in accordance with my invention;

Figure 2 is a side elevation thereof;

Figure 3 is a fragmentary front elevational view of my machine;

Figures 4 and 5 are vertical sectional views taken along the lines IV—IV, and V—V, respectively, of Figures 3 and 4;

Figure 6 is an enlarged fragmentary sectional view, partly in elevation, taken along the line VI—VI of Figure 4;

Figure 7 is an oblique view of a comb tooth utilized in Figures 1 to 6, inclusive;

Figures 8 and 9 are top plan and side elevation views, respectively, of a completed strip of paper produced by my machine;

Figure 10 is a view similar to Figure 4, but disclosing modified forms of the paper-shearing cutters and the combs for removing the sheared strips from the machine;

Figure 11 is an enlarged sectional view taken along the line XI—XI of Figure 10, parts being shown in elevation; and

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Figure 12 is an oblique view of the modified comb used in Figures 10 and 11.

While I have shown only the preferred forms of my invention, it should be understood that various changes, or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

Referring to the drawings, I provide a cabinet-like structure indicated generally at A having a table top B mounted thereon at a convenient working height for an operator. This top is adapted to have sheets of paper C, such as old newspapers, stacked thereon. These sheets are guided by the operator between upper and lower shearing rollers D and E, respectively, so as to shear the paper into a plurality of strips 10 (see Figure 1). The strips are discharged from the machine by an inclined chute 11 (see Figures 2 to 4, inclusive).

During the passage of the paper through my shredding machine, the srips 10 are kinked at spaced-apart points 10*a* along their lengths to produce the zigzag strips disclosed in Figures 8 and 9. Also, these strips are dished transversely at 10*b* (see Figure 6). Thus the completed strips have a certain amount of rigidity; accordingly, less filler material will be required for the packaging of merchandise.

The shearing rollers D and E are arranged in parallel relation with one another. Each roller has a series of spaced-apart disc cutters indicated generally at 12 anchored thereon and rotatable therewith. The cutters on one roller are interspaced and have peripheral sections overlapping the cutters on the other roller, as 12 include parallel discs 12*a*, which are formed clearly shown in Figures 4 and 6. The cutters integral with the shafts 14 of the rollers D and E, and ring-shaped cutter blades 12*b* surrounding the discs 12*a*.

Any suitable means may be provided for securing the blades 12*b* to the discs 12*a*. For this purpose, I have shown the discs 12*a* fashioned with annular peripheral grooves 12*c* into which the blades 12*b* are disposed and sweated (see Figure 6). The disc cutters 12*b* are of the split-ring type and have inclined overlapped ends 12*d* (see Figures 4 and 6). The opposing faces 12*e* of each disc blade 12*b* are flush with the opposing faces 12*f* of the disc 12*a*.

The shafts 14 of the rollers are journalled in bearings 15 (see Figure 5). These bearings are mounted in blocks 16, which are secured together by bolts 17. The frame of the machine

includes upper and lower plates 18 and 19, respectively, between which the blocks 16 are secured by countersunk screws 20. Saddles G are fastened to the lower plate 19 and support the intermediate portion of the lower shaft 14, (see Figures 4 and 5). Also, saddles G support the uppermost shaft 14.

The rollers D and E are mounted above and below the general plane of the table top B, respectively, and are rotated in opposite directions, as indicated by the arrows 21 in Figure 4. The shafts 14 of these rollers have intermeshing gears 22 keyed thereto, which are enclosed in a removable housing 23 (see Figures 1 and 3).

In order to rotate the rollers D and E, I provide a driven pulley 24 on the shaft 14 of the lower roller E (see Figures 2 and 3). This pulley is housed in a removable cover 25, and is connected by a belt 26 to a drive pulley 27 on an electric motor 28 (see Figure 2). A conventional circuit is provided for this motor, which includes a switch control 29 and a safety switch 30 (see Figure 1).

Transversely-arched comb teeth F are associated with the cutter rollers D and E. These teeth are arranged in the space between adjacent cutters on the rollers (see Figures 4 and 6). Each comb tooth defines a crown 31 and sides 32 diverging relative to one another from its crown (see Figure 7). The ends 33 of the teeth are anchored between clamping plates 34 and 35 (see Figure 4). In turn, the plates 35 are secured to the plates 18 and 19.

The crowns 31 of the teeth F are disposed adjacent to the roller shafts 14. The upper combs are inverted with respect to the lower combs, and the two sets of combs are spaced apart to allow passage of the sheets of paper C therebetween. Upright guides 36 and 37 are provided on the table top B to assist the operator in directing the sheets of paper into a position between the upper and lower sets of comb teeth F, and thereby subject the paper to the shearing action of the rotating disc cutters 12.

It will be noted from Figure 4 that the paper C is fed between the rollers D and E from one side, and the strips 10 are discharged into the chute 11 at the opposite sides of the rollers (left side in Figure 4).

As the strips 10 emerge from the cutters 12, there is a natural tendency for them to follow the revolving cutters. The leading ends of the strips are projected into semi-circular notches 38 fashioned in the comb teeth. These notches are aligned with one another and are disposed in registration with the peripheries of the cutter blades 12*b*, as shown in Figure 4. The free end of each strip is formed with one of the kinks 10*a*, which glides out of the notch 38. After a short straight section 10*c* of the strip has cleared the notch 38, the strip is pulled again into the notch 38, due to the revolving cutter tending to carry the strip therewith, and another kink is formed in the strip. Actual tests on my machine disclose the fact that the kinks 10*a* and straight sections 10*c* alternate with one another throughout the length of the severed strip.

It will be observed from Figure 4 that some of the strips 10 follow over the upper surface of the lower comb teeth, while others ride over the lower surface of the upper comb teeth. All of the cut strips fall into the inclined chute 11 and are carried away, ready to be used as filler material in packaging merchandise.

Referring now to Figure 10, it will be seen that it corresponds with Figure 4. However, it illustrates modified forms of disc cutters 12′ and combs F′. The operation of this modified machine, as shown in Figures 10 to 12, inclusive, is the same as in the first embodiment.

The shafts 14′ of the upper and lower shearing rollers D′ and E′, respectively, have parallel discs 12*a*′ formed integral therewith. Each disc has an annular ring-shaped cutter blade 12*b*′ mounted therearound and secured thereto by screws 39 (see Figure 11).

Each modified comb F′ is formed from a casting having slots 40 in its crown 31′. The diverging sides 32′ of each modified comb merge into base portions 42. The base portions of the upper and lower combs are secured to the upper and lower plates 18 and 19, respectively, by screws 43. Notches 38′ are provided in the sides 32′ of the casting over which the severed strips 10 are discharged (left side of Figure 10). These notches form the kinks 10*a* in the strips in the same manner as the notches 38 in the first embodiment of my invention.

Summary of operation

The operation of my paper shredding machine is summarized briefly as follows:

The electric motor 28 is started by closing the switch control 29. In the first form of the invention, this will cause the upper and lower shearing rollers D and E, respectively, to rotate in opposite directions, as suggested by the arrows 21 in Figure 4. A stack of papers C is placed on the table top B and are fed by the operator between these shearing rollers. The ring-shaped cutter blades 12*b* thereon will dish the strips 10 transversely, as shown at 10*b* in Figure 6, during the shearing of the strips from the paper. As the strips pass over the sloping sides of the comb teeth F (left side of Figure 4), the notches 38 will cause kinks 10*a* to be formed in the strips at spaced points therealong, producing zigzag strips. The latter fall into the discharge chute 11.

The same operation takes place in the modified machine shown in Figures 10 to 12, inclusive. Here the upper and lower shearing rollers D′ and E′, respectively, have been substituted for the shearing rollers D and E in the first embodiment. Also, the cast combs F′ have been used in place of the bar-like comb teeth F illustrated in connection with the first-described form of my paper shredding machine.

In either case, the sheared strips 10 of paper are fashioned with alternate kinks 10*a* and straight sections 10*c* along their entire length. Moreover, the strips are dished transversely, as at 10*b*. Thus the strips are reinformed somewhat against free flexing, requiring less filler material when packaging merchandise.

I claim:

1. In a paper shredding machine: a pair of rollers arranged in parallel relation with one another; each roller having a series of spaced-apart disc cutters thereon and rotatable therewith; the cutters on one roller being interspaced and having peripheral sections overlapping the cutters on the other roller; each cutter on each roller having a shearing fit with the adjacent cutters on the other roller to provide a plurality of cleavage points along the length of the rollers; means for rotating the rollers in opposite directions; means for guiding sheets of paper between the rollers to be sheared into strips by the cutters; and comb-like members having teeth disposed between adjacent cutters for removing the strips from the

cutters, and including means forming part of the comb teeth for kinking the strips at spaced-apart points along their lengths to produce zigzag strips.

2. In a paper shredding machine: a pair of rollers arranged in parallel relation with one another; each roller having a series of spaced-apart disc cutters thereon and rotatable therewith; the cutters on one roller being interspaced and having peripheral sections overlapping the cutters on the other rollers; each cutter on each roller having a shearing fit with the adjacent cutters on the other roller to provide a plurality of cleavage points along the length of the rollers; means for rotating the rollers in opposite directions; a transversely-arched comb associated with each roller; each comb having teeth arranged in the space between adjacent cutters on the roller with which that comb is associated; each comb defining a crown and sides diverging relative to one another from its crown; the crowns of the combs being spaced from one another; and means for guiding sheets of paper between the combs from one side of the rollers to be sheared into strips by the cutters; with the strips being discharged from the opposite side of the combs; the diverging sides of the combs on the discharge side thereof having notches therein into which the cut strips are projected by the rotating cutters.

3. In a paper shredding machine: a pair of rollers arranged in parallel relation with one another; each roller having a series of spaced-apart disc cutters thereon and rotatable therewith; the cutters on one roller being interspaced and having peripheral sections overlapping the cutters on the other rollers; each cutter on each roller having a shearing fit with the adjacent cutters on the other roller to provide a plurality of cleavage points along the length of the rollers; means for rotating the rollers in opposite directions; a transversely-arched comb associated with each roller; each comb having teeth arranged in the space between adjacent cutters on the roller with which that comb is associated; each comb defining a crown and sides diverging relative to one another from its crown; the crowns of the combs being spaced from one another; and means for guiding sheets of paper between the combs from one side of the rollers to be sheared into strips by the cutters, with the strips being discharged from the opposite side of the combs; the diverging sides of the combs on the discharge side thereof having notches therein into which the cut strips are projected by the rotating cutters; the notches in each comb registering with the peripheries of the cutters with which that comb is associated.

4. In a paper shredding machine: a transversely-arched comb having a base, and teeth integral with the base; the teeth defining a crown and sides diverging relative to one another from its crown; the teeth on one of the comb sides having notches therein on the upper side of the arch.

5. In a paper shredding machine: a transversely arched comb having a base, and teeth integral with the base; the teeth defining a crown and sides diverging relative to one another from its crown; the teeth on one of the comb sides having notches therein on the upper side of the arch; all of the notches being aligned with one another.

6. In a paper shredding machine: a transversely-arched comb tooth; the tooth defining a crown and sides diverging relative to one another from its crown; one of the sides of the tooth having a notch therein on the upper side of the arch.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
609,896	Morris	Aug. 30, 1898
1,027,363	Valentine	May 21, 1912
1,601,299	De Waldo	Sept. 28, 1926
1,866,690	Wilson	July 12, 1932
1,966,109	Wilson	July 10, 1934
2,040,745	Joyce	May 12, 1936