Dec. 5, 1939. E. G. ASHLEY 2,182,219

PAPER SHREDDER

Filed April 11, 1938 2 Sheets-Sheet 1

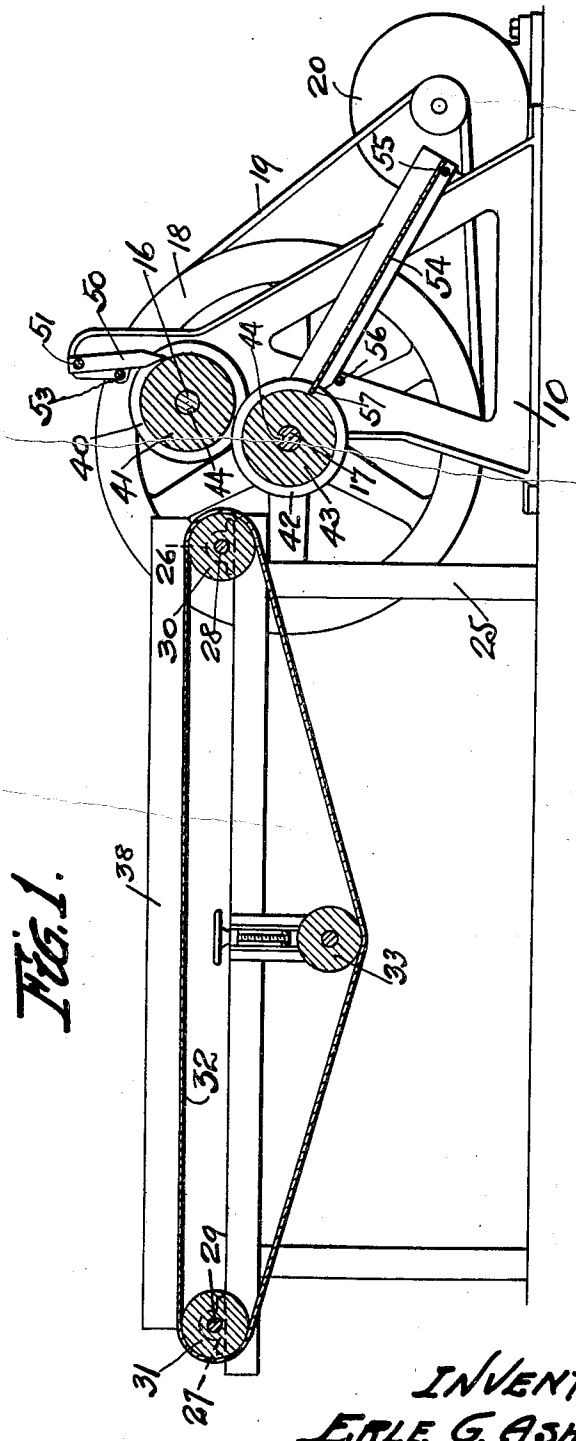


Fig. 1.

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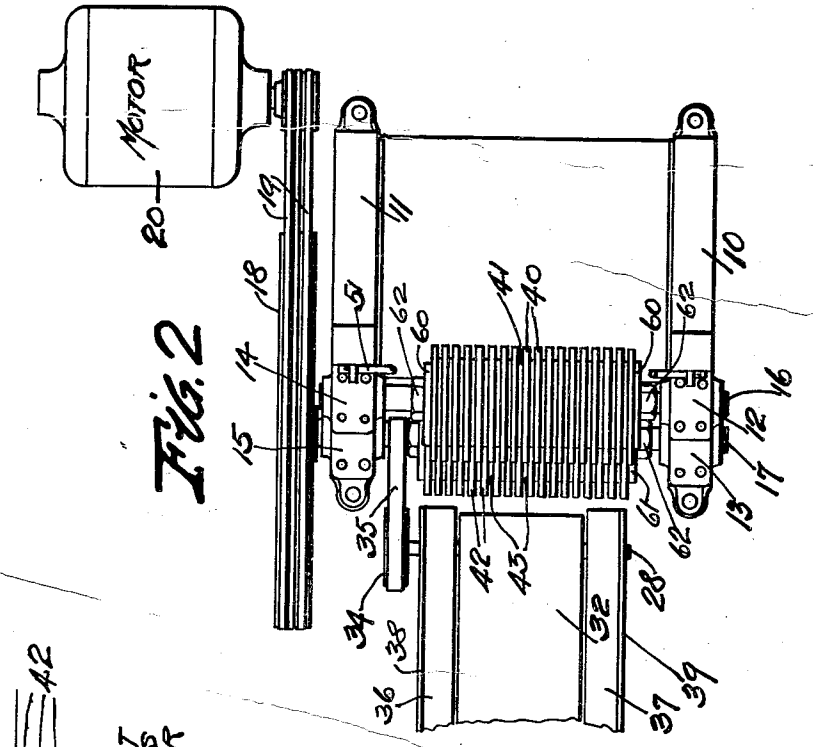


Fig. 2

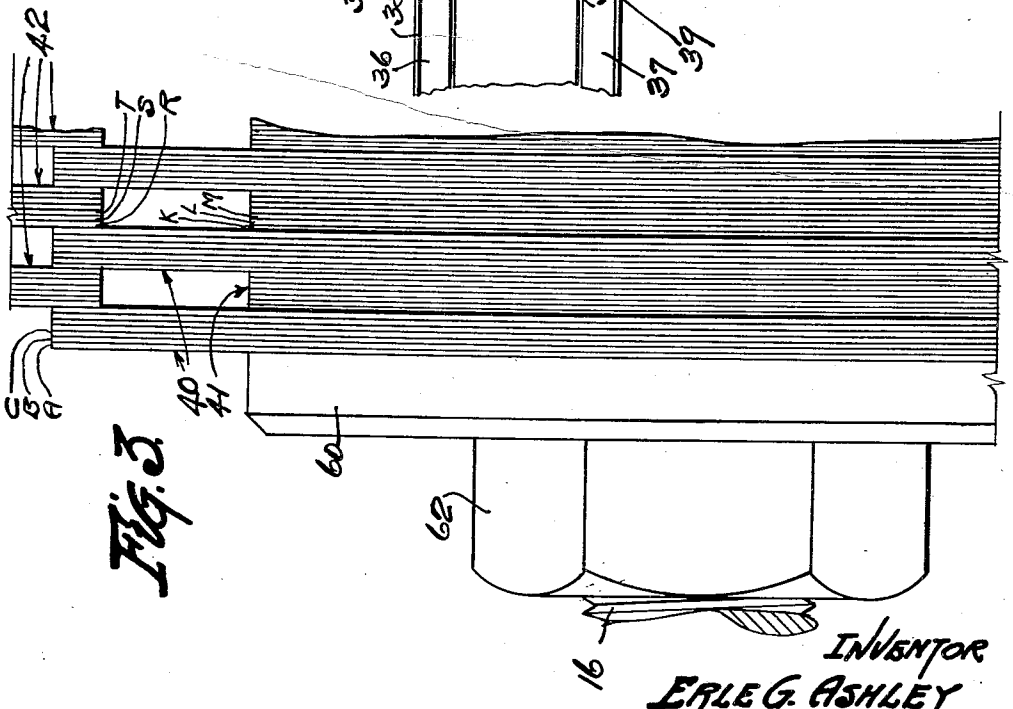


Fig. 3

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PAPER SHREDDER

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Application April 11, 1938, Serial No. 201,227

4 Claims. (Cl. 164—61)

This invention relates to improvements in machines for cutting paper into narrow strips.

The objects of the invention are:

To provide an improved machine embodying a plurality of intermeshing rotatable knives which are adapted to cut sheets of paper into a plurality of narrow strips;

To provide an improved paper shredding machine having rotatable cutters which are adaptable to compensate for wear incident to the cutting action, and in which parts of the cutters are shiftable to present new cutting surfaces, as when wear renders those in use dull and ineffective; and

To provide improved details of construction in such a device.

The means by which the foregoing and other objects are accomplished and the manner of their accomplishment will readily be understood from the attached specification, on reference to the accompanying drawings, in which,

Fig. 1 is a longitudinal sectional elevation of the machine;

Fig. 2 is a plan view of the cutter portion of the machine;

Fig. 3 is a fragmentary elevation of one end portion of the cutter assembly, on an enlarged scale, showing the detail of the cutters and spacers, and the manner in which the cutters of the two adjacent cutter assemblies intermesh.

Referring now to the drawings, in which the various parts are indicated by numerals, 10, 11 are spaced side frames, carrying respectively bearings 12, 13, and 14, 15. 16 is a shaft journaled in the bearing 12, 14, and 17 is a similar shaft journaled in the bearings 13, 15. The shaft 17 extends beyond the side frame 11 and has secured thereon a flywheel 18, which serves as a pulley, driven through belts 19, as by an electric motor 20.

25 is an auxiliary frame carrying at its opposite end bearings 26, 27, in which are respectively journaled shafts 28, 29, on which in turn are mounted drums 30, 31, around which a feed belt 32 is disposed. 33 is a tightener pulley. The shaft 28 extends at one side beyond the frame 25 and bearing 26 and has secured thereon a pulley 34, which is driven through a belt 35, from the shaft 17. 36 and 37 are side portions of the frame, which preferably lie slightly below the surface of the belt 32; these side portions having flanges 38, 39 respectively, which extend upward and serve to guide the papers disposed on the belt for cutting.

Mounted on the shaft 16 are a plurality of cutters 40, which cutters are spaced apart by spacers 41 of substantially less diameter, and similarly mounted on the shaft 17, are cutters 42 similarly spaced apart by spacers 43. The spacing of the shafts 16, 17 is such, with relation to the diameter of these cutters 40 and 42, that these cutters intermesh, but the diameter of the spacers 41, 43, relative to the positioning of the shafts and diameters of the cutters, is such that a substantial space is left between the cutters carried by one shaft and the spacers carried by the other thereof, this being most clearly seen in Figs. 1 and 3. The shafts 16 and 17 are preferably provided with keyways, and the cutters and spacers with lugs as keys 44 which engage with such keyways.

50 (Fig. 1) are strippers which depend from a rod 51, disposed transversely across from frame 10 to frame 11, and supported thereby, which strips lie between the cutters 40 to remove cut strips of paper therefrom. The rod 51 is shown broken away in Fig. 2 and the strippers 50 have been entirely omitted from that view for the purpose of clearness. 53 is a transverse rod, against which the strippers 50 rest and which supports these strippers just out of contact with the spacers 41. 54 is a table supported at one end, as by a rod 55 carried by the frames 10 and 11 and resting at its opposite end on a transverse rod 56. This table has finger portions 57 disposed between the cutters 42, and extending into proximity to the spacers 43 between such cutters.

Fig. 3 shows the detail of the cutters and preferably the detail of the spacers. Each of the cutters 40 is laminated, being made up of circular discs A, B, C, etc., preferably all of the same thickness, and in any event relatively thin as compared to the thickness of the cutter itself. In the present instance each cutter is shown as made up of seven discs, and preferably each spacer is similarly laminated and made up of discs K, L, M, etc., though it will be distinctly understood that the spacers may be solid, should it be so desired. Fragmentary portions of the cutters 42 are also shown, these cutters likewise being laminated and made each of a multiplicity of discs, R, S, T, etc. Preferably the cutters carried by the shaft 16 and those carried by the shaft 17 are each made up of the same number of discs, in which event, if as is preferred, the spacers are made up of discs, these spacers are likewise each made up of the same number of discs as are used in the cutters.

At the ends of the banks of cutters, on both the shaft 16 and the shaft 17, are collars 60, 61, these collars preferably being of the same diame-

ters as the spacers, and being clamped against the cutters by nuts 62 suitably threaded on each of the shafts 16 and 17. It will be understood that nuts may be used at both ends, or that one of the collars may be fixed against movement along the shaft and form an abutment, tightening of the nut 62, however, clamping the cutters and spacers between the two collars.

The sheet material, of which the cutters and preferably the spacers are made, is stamped to the desired diameter of cutter or spacer, as the case may be, and a center hole punched therein, which snugly fits the shaft on which the cutters are to be mounted, these holes having the inwardly projecting lugs or keys 44, which engage the shaft keyway. Either due to inherent lack of thickness in the sheet material, or due to the strain of cutting and punching, the discs are not truly flat, and when assembled require substantial length of thread along the shaft to accomplish their grouping and tightening. Also there is a tendency of the outer edges of the discs forming the cutters, to flare apart, and a corresponding thickening or broadening of the face of the cutters. This tendency is of advantage in maintaining contact of the cutting edges of the intermeshed cutters, and may be availed of without undue frictional pressure or wear between these edges. It is found also that these cutting surfaces may be maintained in contact, as they wear, by a slight loosening or readjusting of the pressure of the nuts and an extended period of usefulness be thus obtained. When, however, the cutters have been used to such an extent that adjustment of the nuts is ineffective to re-establish cutting action, the cutter assemblies may be torn down and the two outer discs of each cutter be faced in opposite direction, re-establishing an entirely new set of cutting surfaces. Likewise, when both cutting surfaces of the discs are exhausted, the cutter assembly may be torn down and the worn discs shifted to the interior of the cutter, with other discs of the cutters shifted to the outside to establish new cutting surfaces, and such operations be repeated until both sides of each of the discs of the cutters have been exhausted.

Both the shaft 16 and the shaft 17 may be driven, but preferably one only thereof is so driven as in the present showing, in which the shaft 17 only is driven. Rotation of the cutters carried by the shaft 16 is accomplished by frictional contact with the intermeshing edges of the two sets of cutters.

In use, a number of sheets of paper, as for instance a section of a daily newspaper, or even two or more sections, is placed on the belt 32 and carried by the belt into engagement with the cutters, the edges of the paper being engaged by the cutters and rapidly drawn through and cut into elongated strips. Should too heavy a batch of paper be inserted, the friction driven cutters would slip and the passage of the batch be stopped without putting undue strain on the mechanism or causing damage thereto.

It will be understood that the number of discs used in the cutters may be varied in substantially any desired manner, it thus being possible to cut such width of strips as may be desired, and since the discs are individually quite thin a desired width may very accurately be obtained in such manner.

While the machine is particularly designed for the cutting of paper into strips it will readily be understood that it may be used for similarly cutting various other materials, such as leather, or cloth.

What I claim is:

1. In a paper shredding machine, a pair of shafts, means for driving at least one thereof, said shafts carrying each an assembly of complementary intermeshing cutters, the cutters of said shafts each being built up of a multiplicity of relatively thin discs which are not truly flat and being spaced apart along said shaft by interposed spacers of substantially less diameter than said discs, each spacer being likewise formed each of a multiplicity of discs, said cutters and spacers being assembled on said shafts, collars on said shafts against the opposite ends of said assembly of cutters and spacers, at least one of said collars of each shaft being slidable along its said shaft, and a nut threadedly secured on each said shaft clamping its said slidable collar against its said assembly.

2. In a paper shredding machine, a pair of cutter assemblies mounted to intermesh, each cutter assembly comprising a shaft and alternating cylindrical cutters and spacers, said spacers being nominally of equal thickness with, and of substantially less diameter than said cutters; said cutters each comprising an equal multiple number of thin resilient sheet metal discs, and means carried by said shafts for clamping said cutter discs and interposed spacers together along said shafts, such clamping inherently reducing the thickness of the clamped portion of said cutters relatively to edge portions thereof and thereby flaring such edge portions into cutting engagement with complementary edge portions of the cutters of the opposite shaft; said discs being substantially identical each with the others and the opposite faces and circumferential face-edges of each said disc being substantially identical, whereby said discs may be removed, interchanged and/or reversed to provide additional cutting edges from time to time.

3. In a paper shredding machine, a pair of cutter assemblies mounted to intermesh, each cutter assembly comprising a shaft and alternating cylindrical cutters and spacers, said spacers being of substantially less diameter than said cutters; said cutters and spacers each comprising an equal multiple number of thin resilient sheet metal discs of equal thickness, and means carried by said shafts for clamping said cutter discs and interposed spacer discs together along said shafts, such clamping inherently reducing the thickness of the clamped portion of said cutters relatively to edge portions thereof and thereby flaring such edge portions into cutting engagement with complementary edge portions of the cutters of the opposite shaft; said discs of said cutters being substantially identical each with the others and the opposite faces and circumferential face-edges of each said cutter disc being substantially identical, whereby said cutter discs may be removed, interchanged and/or reversed to provide additional cutting edges from time to time.

4. In a paper shredding machine, a pair of cutter assemblies mounted to intermesh, each cutter assembly comprising a shaft and alternating cylindrical cutters and spacers, said spacers being of substantially less diameter than said cutters; said cutters and spacers each comprising a multiple number of thin resilient sheet metal discs of equal thickness, each cutter having a complementary spacer, comprising an equal number of discs, and means carried by said shafts for clamping said cutter discs and interposed spacer

discs together along said shafts, such clamping inherently reducing the thickness of the clamped portion of said cutters relatively to edge portions thereof and thereby flaring such edge portions into cutting engagement with complementary edge portions of the cutters of the opposite shaft; said discs of said cutters being substantially identical each with the others and the opposite faces and circumferential face-edges of each said cutter disc being substantially identical, whereby said cutter discs may be removed, interchanged and/or reversed to provide additional cutting edges from time to time.

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