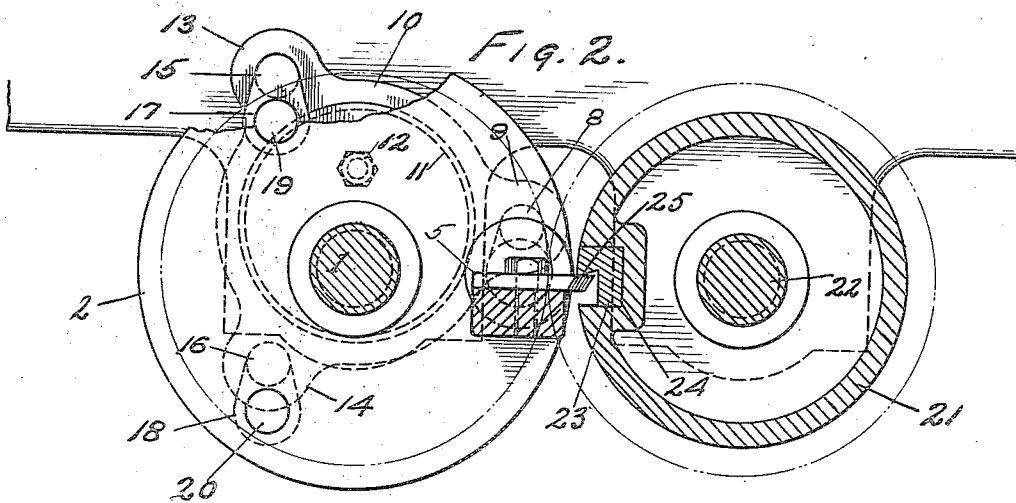
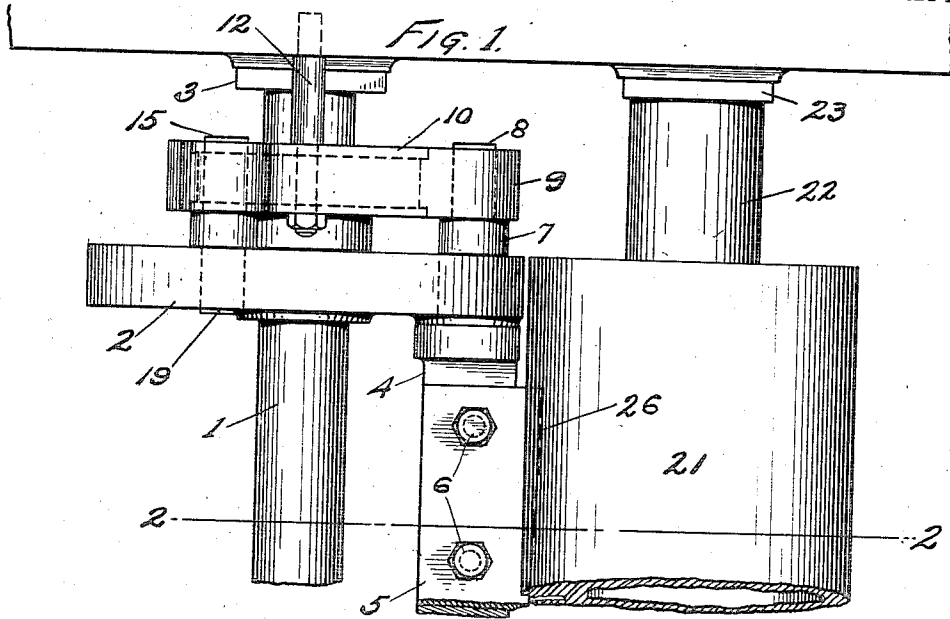


E. W. COOPER.
CUTTING MECHANISM.
APPLICATION FILED MAR. 15, 1909.

971,022.

Patented Sept. 27, 1910.

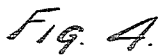
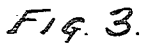
4 SHEETS—SHEET 1.



WITNESSES.
A. White
John J. Kearns

INVENTOR.
E. W. Cooper
Philip S. Sawyer, Rice & Kennedy
ATT'YS.

4 SHEETS—SHEET 2.



INVENTOR.
Ellis H. Cuyper
by Phillips, Sawyer, Rice & Kennedy
ATTYS

971,022.

Patented Sept. 27, 1910.

4 SHEETS—SHEET 3.

FIG. 5.

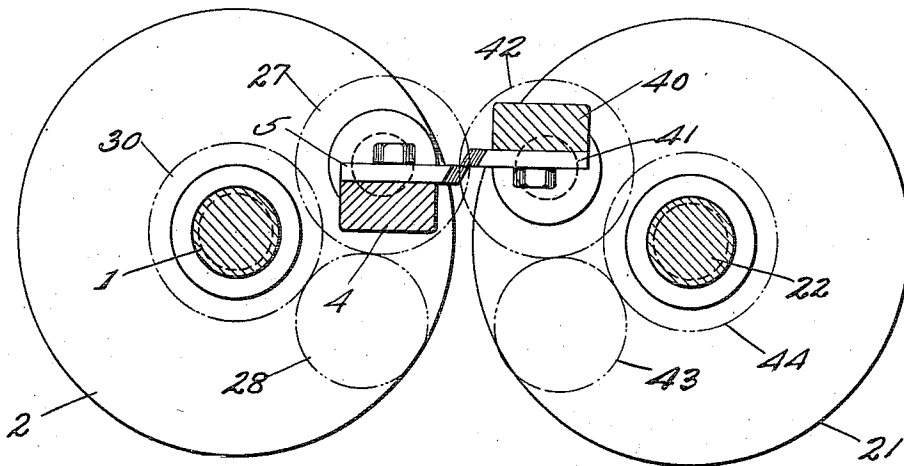
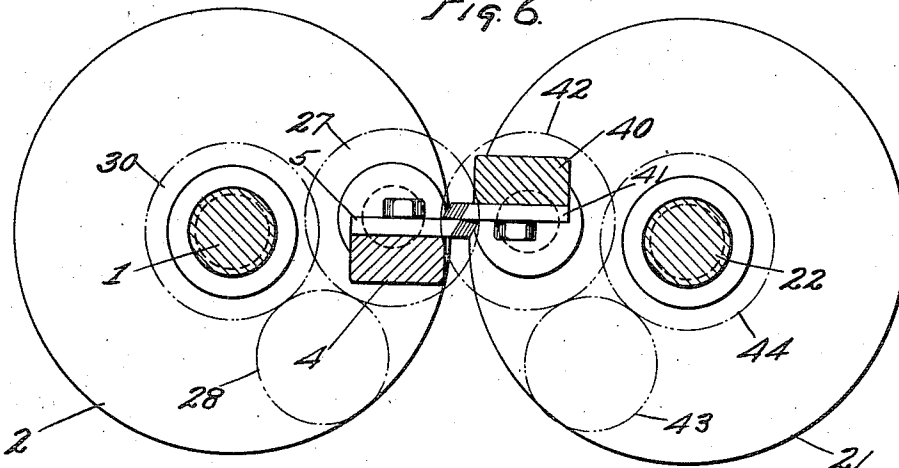


FIG. 6.



WITNESSES.
A. White
John J. Kearns

INVENTOR.
Ellis W. Cooper
by Philip J. Sawyer, C. E. Kennedy
ATT'YS.

E. W. COOPER.
CUTTING MECHANISM.
APPLICATION FILED MAR. 15, 1909.

971,022.

Patented Sept. 27, 1910.

4 SHEETS—SHEET 4.

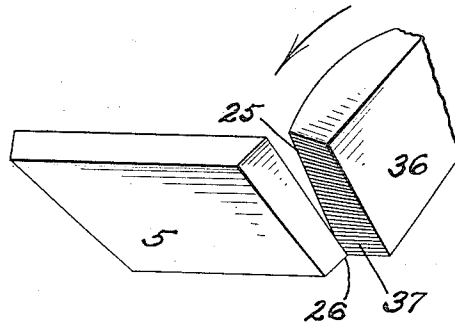


Fig. 7.

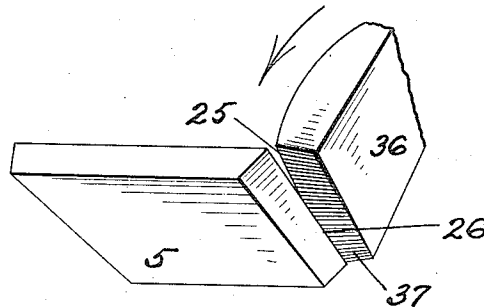


Fig. 8.

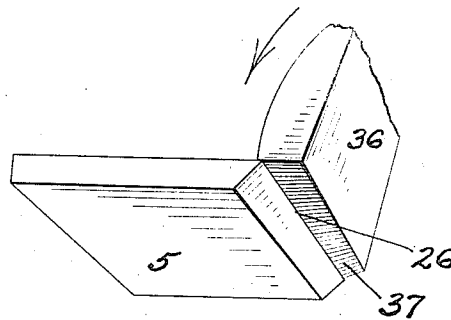


Fig. 9.

WITNESSES.
A. White
John J. Kearns

INVENTOR.
Ellis W. Cooper
by Phillips, Sawyer, Rice & Cunniff
ATTYS

UNITED STATES PATENT OFFICE.

ELLIS W. COOPER, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,
HOE AND CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CUTTING MECHANISM.

971,022.

Specification of Letters Patent. Patented Sept. 27, 1911

Application filed March 15, 1909. Serial No. 483,363.

To all whom it may concern:

Be it known that I, ELLIS W. COOPER, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Cutting Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to improvements in cutting mechanism for cutting sheet material and more particularly to that class of cutting mechanisms in which one or both of the cutting members are mounted so as to move in a curved path.

15 In the constructions ordinarily employed for cutting sheet material, such, for instance, as paper, in which the cutting member is mounted on a rotary carrier, the cutter is so disposed with relation to the carrier that the cut must take place in a comparatively short period of time in the rotation of the carrier. For instance, if, as is common in a certain class of constructions, the knife is mounted on a rotary carrier, this knife co-
25 operating with a cutting member on a second rotary carrier, the cut must take place substantially in that period of time during which the paths of the carriers are substantially tangent to or most nearly approach each other. This requires a rapid operation of the cutter, and it is, therefore, usual in constructions of the character referred to to so mount the cutting blade that
30 all parts of it come into operation substantially simultaneously. In this class of cutting devices, therefore, the advantages incident to what is known as a "shearing cut" are not obtained.

40 It is one of the objects of this invention to produce an improved cutting mechanism in which the cutting members, or one of them, shall move in a curved path and in which the time during which the cutting may take place shall be increased.

45 A further object of the invention is to produce an improved cutting mechanism in which the cutting members, or one of them, shall move in a curved path and by which a shearing cut may be effected.

50 With these and other objects not specifically referred to in view, the invention con-

sists in certain constructions and in certain parts, improvements and combinations as will be hereinafter fully described and then specifically pointed out.

Referring to the accompanying drawings—Figure 1 is a plan view of a cutting mechanism embodying the invention. Fig. 2 is a section, on the line 2—2, of Fig. 1. Fig. 3 is a plan view of a modified form of construction embodying the invention. Fig. 4 is a section on the line 4—4 of Fig. 3. Figs. 5 and 6 are diagrammatic views illustrating another modified form of construction in which the invention may be embodied, certain parts being shown in different positions in the two figures. Figs. 7, 8 and 9 are diagrammatic views illustrating the operation of the cutting members shown in Figs. 1 to 4 inclusive.

In the mechanisms which have been selected to illustrate concrete embodiments of the invention, the cutting members are mounted on rotary carriers.

Referring more particularly to the construction illustrated in Figs. 1 and 2, the carrier for the knife comprises a shaft 1 provided with heads, only one head, 2, however being shown. The shaft is supported in suitable bearings, one of which is indicated at 3. In the particular construction illustrated in these figures, the rotary carrier supports a knife holder. The details of construction of this holder, when employed, may be varied, but in the particular construction illustrated in Figs. 1 and 2, it consists of a bar 4, the ends of which are formed to provide journals which are mounted in suitable bearings in the heads 2 of the carrier.

The cutter employed may be of any suitable construction, the details being varied according to the material which it is desired to cut and the sort of cut it is desired to produce. The particular constructions illustrated are intended more particularly for cutting sheet material, such as paper, and the knife consists of a flat blade 5 secured to the holder in any suitable manner, as by bolts 6.

In constructions embodying the invention the knife will be so mounted that it may be caused to assume, during the cutting opera-

tion, successive positions which are parallel to each other. The means for giving the holder the movement referred to, so as to cause the knife to assume the successive parallel positions during the cutting operation, may be varied widely, and several mechanisms are shown for that purpose.

Referring more particularly to Figs. 1 and 2, the ends of the journals on the bar 4 are provided with crank arms 7 carrying crank pins 8. These crank pins engage recesses in projections 9 on an eccentric strap 10, this strap surrounding an eccentric 11 secured to the frame by a bolt 12, or in any other suitable manner. The eccentric strap may further be provided, as illustrated in Figs. 1 and 2, with ears or projections 13, 14. These ears are provided with perforations which are engaged by crank pins 15, 16, on cranks 17, 18 mounted on pins 19, 20 journaled in the cylinder heads, these additional cranks making for certainty of movement. While only one end of the carrier and the knife operating mechanism is shown, it will be understood that the other end of the carrier may be provided with similar knife operating mechanism.

In the constructions illustrated, the cooperating member is mounted on a rotary carrier consisting of a cylinder 21 mounted on a shaft 22 supported in suitable bearings, as 23.

In the best constructions embodying the invention, the cooperating member will be formed with a cutting edge with which the knife coacts in making the cut. This cutting edge, when employed, may be formed in various ways, but may be conveniently formed by cutting away a surface to leave a sharp edge or corner.

In the construction shown in Figs. 1 and 2, the carrier 21 has mounted thereon a bar 23 located in a recess 24 in the carrier. The surface of this bar is cut away to form a shoulder, the edge 25 of which constitutes a cutting edge.

In the best constructions embodying the invention, and where, as will usually be the case, a shearing cut is desired, the knife will be arranged so that a part of it shall come into operation before another part. In the construction shown in Figs. 1 and 2, the knife is so constructed that one end of its edge projects farther from its carrier than the other end, this construction being clearly indicated in Fig. 1, in which the projecting end of the edge referred to is marked 26. It is obvious that this construction will provide for a shearing cut along the length of the cutting edge, as successive parts of the knife and edge will come into cooperative cutting relation as the carriers rotate. It is further apparent that the cut will begin at a point some distance in the paths of the carriers from the point where

these paths most closely approach each other, so that the time necessary for the shearing cut to take place is afforded.

The construction illustrated in Figs. 3 and 4 is, in many respects, similar to that illustrated in Figs. 1 and 2, the knife carrying shaft 1, the heads 2, knife holder 4 and the blade 5 being similar in construction to the construction illustrated in those figures. In the construction illustrated in Figs. 3 and 4, however, the journal of the holder 4 is provided with a gear 27 meshing with a broad-faced intermediate 28 mounted on a stud 29 supported in the carrier head 2. This broad-faced intermediate meshes with a gear 30 fast on a collar 31 provided with an arm 32 through which arm is passed a bolt 33 entering an opening in the frame. The opening in the arm through which the bolt 33 passes may be a slot, as indicated at 34, thus providing for slight adjustment of the knife through the gearing referred to. As in the construction shown in Figs. 1 and 2, a cooperating cutting member having a cutting edge is employed, this member being mounted on a rotary carrier 21 supported on a shaft 22. In the construction shown in these figures, however, the carrier has a flat face formed thereon, marked 35, to which is secured a bar 36 cut away so as to provide the cooperating cutting edge before referred to.

To prevent the cooperating cutting edge from rapidly wearing away, it is desirable to provide a body of metal directly behind it at all points in its length. Where, however, the knife is arranged to produce a shearing cut, and the cooperating cutting edge is carried on a rotary carrier, clearance should be provided for that part of the knife which has passed the cutting edge. In the particular construction shown this is effected by providing the wall 37 of the bar 36 behind the cutting edge 25 with a spiral surface (see Figs. 7 to 9).

The construction referred to will be understood by referring to the diagrams, Figs. 7, 8 and 9, in which the spiral surface is illustrated and marked 37. This spiral surface is formed around the cutting edge 25 as a center. In these diagrams, Fig. 7 illustrates the position of the knife 5 and the bar 36 at the time the end of the knife edge 26 has just passed the cutting edge, Figs. 8 and 9 illustrating successive positions of the knife and bar.

Figs. 3 and 4 show intermeshing gears 38, 39 which may be employed to drive the shafts 1 and 22, as is common in rotary cutting mechanism.

Figs. 5 and 6 illustrate diagrammatically, in part, another form of mechanism in which the invention may be embodied. The shafts 1 and 22 are the same as in the construction before described and the holder bar 4 in the

carrier 2 is operated by means of gearing 27, 28 and 30, as in the construction illustrated in Figs. 3 and 4, this gearing being, however, diagrammatically indicated. The carrier 21, however, is provided with a holder bar 40 mounted in the same manner as the holder bar 4, this bar being provided with a knife 41. The holder 40 and knife 41 are, by means of the gears, diagrammatically indicated at 42, 43, 44, caused to assume successive parallel positions, the construction being the same as that described in connection with the knife illustrated in Figs. 3 and 4. The knives 5 and 41 illustrated in these figures are arranged to produce a shearing cut, Fig. 5 representing the position of the parts about the time the cutting operation begins, which, it will be seen, as has been pointed out, is considerably in advance of the points at which the paths of the carriers most nearly approach each other. Fig. 6 illustrates the relative position of the parts at the time the cut is nearly completed.

While several constructions have been illustrated in which the invention may be embodied, it will be understood that the invention may be embodied in other constructions differing from these. It will be further understood that cutting mechanisms may be constructed which embody certain features independently of other features. The invention is not, therefore, to be limited to the specific constructions hereinbefore described and illustrated.

What is claimed is:—

1. The combination with a carrier, of a cutter mounted thereon, said carrier being constructed to move the cutter in a curved path during the cutting operation, means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, and a co-operating cutting member.

2. The combination with a rotary carrier, of a cutter mounted thereon, means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, and a co-operating cutting member.

3. The combination with a rotary carrier, of a cutter mounted thereon, the edge of the cutter being so disposed that a part thereof comes into operation before another part, whereby a shearing cut is effected, means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, and a co-operating cutting member.

4. The combination with a rotary carrier, of a cutter mounted thereon, means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, and a second rotary carrier having a co-operating cutting surface.

5. The combination with a rotary carrier, of a cutter mounted thereon, means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, and a second rotary carrier having a co-operating cutting edge.

6. The combination with a carrier having a surface cut away to form a cutting edge, the wall behind the edge being formed on a spiral and the carrier being arranged to cause the edge to move in a curved path during the cutting operation, of a second carrier, a cutter mounted thereon, said second carrier being arranged to cause the cutter to move in a curved path during the cutting operation, and means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, the edge of the cutter being arranged at an angle to the co-operating cutting edge whereby a shearing cut is formed.

7. The combination with a rotary carrier having a surface cut away to form a cutting edge, the wall behind the edge being formed on a spiral, of a second rotary carrier, a cutter mounted thereon, and means for causing the cutter during the cutting operation to assume successive positions which are parallel to each other, the edge of the cutter being arranged at an angle to the co-operating cutting edge whereby a shearing cut is formed.

8. The combination with a rotary carrier, of a cutter holder journaled therein, a cutter blade mounted on the holder, means for rotating the holder during the cutting operation to cause the blade to assume successive positions during the cutting operation which are parallel to each other, and a second rotary carrier having a co-operating cutting surface.

9. The combination with a rotary carrier, of a cutter holder journaled therein, an eccentric, a cutter mounted on the holder, the cutter being constructed so that a part of its edge comes into operation before another part, and a second carrier having a surface cut away to provide a cutting edge, the wall behind the cutting edge being formed on a spiral.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

ELLIS W. COOPER.

Witnesses:

F. W. H. CRANE,
GEO. V. WILLIAMSON.