Oct. 27, 1942. R. L. RICHMOND 2,300,177

APPARATUS FOR OPERATING ON WEB AND SHEET MATERIALS

Filed Sept. 26, 1941

Fig. 1.

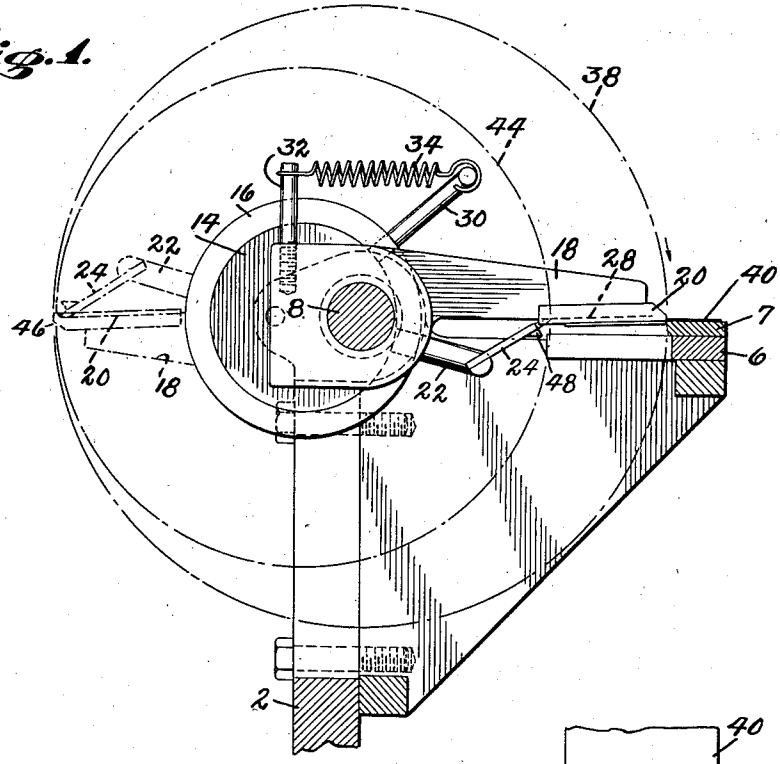
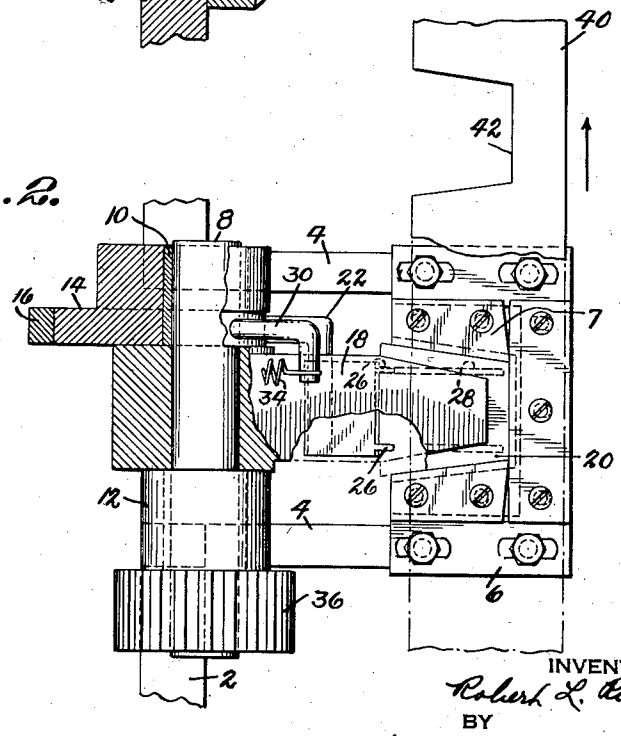


Fig. 2.



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APPARATUS FOR OPERATING ON WEB AND SHEET MATERIALS

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9 Claims. (Cl. 164—64)

This invention is directed to an improved apparatus for operating on web and sheet materials with particular reference to an apparatus which will remove a piece of predetermined size and shape from the edge of a web or sheet of material which may be stationary or in motion, means being provided whereby the piece or chip that is cut out of the web or sheet will be disposed of so as not to interfere with the operation of the apparatus or equipment on repetition of the cutting operation.

It is well known by those skilled in the art of handling or converting materials that it is quite difficult positively to dispose of chips or cutouts from a continuously rotating knife member once they have been removed from the sheet or web. These chips or cut-outs, particularly in the case of paper and like materials, tend to adhere to the cutting means or knife. This is due to electrostatic conditions, air resistance, the natural adhesion of one plane surface to another and where the cut is not perfectly clean there is a tendency for the fibers of the material to adhere to the edge of the cutter.

Various methods have been tried to overcome these difficulties such as the use of air, vacuum, brushes, and other more or less complicated mechanisms.

My invention provides a mechanism which is of very simple mechanical construction and positive in operation.

Generally speaking my invention comprises a construction employing a rotary notching knife and rotary stripper plate, means being provided whereby the stripper plate is reciprocated in proximity to the face of the knife to remove from the knife any chips that may be adhering thereto.

More specifically, so far as the embodiment illustrated is concerned, my improved mechanism comprises a rotary knife which is mounted on a shaft the axis of which is parallel to the edge of the material to be cut. The stripping mechanism which is conveniently mounted in the same frame or bracket by which the rotary knife is supported rotates with the knife but in a path eccentric to that of the knife so as to reciprocate relatively to the knife thereby positively to remove the chip or cutout.

In the accompanying drawing wherein I have shown an embodiment of my invention:

Fig. 1 is a part sectional elevational view; while

Fig. 2 is a plan view in part section.

Referring to the drawing in detail: 2 designates the frame of a machine to which my apparatus is attached, while 4 designates a bracket attached to this frame.

Adjustably supported by the bracket 4 is a stationary knife holder plate 6, and removably mounted on this knife plate is a stationary knife 7.

The bracket 4 above referred to also supports a shaft 8 which is mounted in bushings 10 and 12. The bushing 10 has a large circular head 14 which provides a bearing seat for a circular stripper carrier 16, the stripper carrier rotating about the bushing head.

18 designates a knife carrier which is fixed to the shaft 8 and carries the rotating knife 20.

Affixed to the stripper carrier 16 is a stripper arm 22 carrying a stripper plate 24. This stripper plate has projections 26 corresponding to and working in grooves 28 provided for that purpose in the knife blade 20.

The carrier ring or stripper carrier 16 is provided also with a spring arm 30. Mounted on the knife carrier 18 is a stud 32, the spring arm 30 and stud 32 being connected by a spring 34. This spring 34 provides the necessary force to hold the stripper plate 24 against the underside of the knife 20.

It will be seen from Fig. 1 that the centers of the bushing 10 and the circular head 14 are eccentric by about half the length of the knife 20.

The knife 20 is caused to rotate about the center of the shaft 8 in a clockwise direction, as viewed in Fig. 1, through driving effort applied to the gear 36 on the shaft 8. The path 38, indicated in broken lines in Fig. 1, is the path of the outermost edge of the knife 20.

Inasmuch as the plate 6 carrying the stationary knife 7 is adjustable on the bracket 4, as above pointed out, the stationary knife 7 can be adjusted relatively to the rotating knife 20, which permits of the proper relative adjustment of the knives 7 and 20 to insure a good shearing action.

In the drawing the sheet 40 which is to be notched is assumed to travel in the direction of the arrow on Fig. 2.

It will be quite evident from the description so far given that as the knife 20 rotates past the position shown in Fig. 1 it removes a chip of material from the material 40 to provide a notch in the material such as shown at 42 in Fig. 2.

Inasmuch as the stripper plate lies beneath the knife 20, rotation of the knife causes the stripper plate 24 to be rotated. However, instead of the stripper plate 24 being rotated about the axis of the shaft 8, as is the knife 20, the stripper plate will be rotated about the center of the bushing head 14. The path of the tip of the stripper plate 24 is shown in broken lines on Fig. 1 and designated 44. As shown in Fig. 1, the paths 38 and 44 practically coincide at the point 46 or approximately 180° from the cutting point. Obviously, therefore, the result of the rotation of the knife 20 is a sliding action of the

stripper plate 24 from a point adjacent to the inner edge of the knife to a point adjacent the outer edge of the knife.

It will be quite apparent, therefore, that if a chip has been cut out of the material 40 and is adhering to the knife 20 at a point slightly past the cutting point of the knife, that is, slightly past the point at which the knife is shown in full lines in Fig. 1, further rotation of the knife 20 will cause the projections 26 to enter in the grooves 28 in the knife, further rotation of the knife causing the projections 26 to enter further in the grooves 28 beneath the chip between the chip and knife, projections 48 on the stripper plate 24 preventing the chip from riding up on the plate thereby breaking the chip away from the knife.

If the material being removed is of substantial stiffness it will begin to slide over the outermost edge of the knife 20 and will drop away between 90 and 180° from the cutting position. If, on the other hand, the material is not of substantial stiffness it will curl as the stripper plate 24 slides along the knife but will be broken clear of the knife at about 180° of rotation of the knife. As the knife 20 continues to rotate it will be quite obvious that the stripper plate 24 will return to its original position so that the parts by the time they have rotated to the full line position shown in Fig. 1 will have assumed the position shown in full lines in this figure ready for the next cutting operation.

The stripper points or projections 26 do not actually pass the cutting edge of the knife 20 at position 46. I find that this is of advantage because of the wear which under those conditions would result on the edge of the knife. I find also that to have these projections extend beyond the knife cutting edge is unnecessary since the air resistance encountered by the moving chip is of considerable assistance in removing the chip from the knife.

It will be seen from all of the foregoing that my apparatus is extremely simple in construction and very effective and positive in operation so far as performing the duty it is designed for is concerned.

It is to be understood that changes may be made in the details of construction and arrangement of parts above described within the purview of my invention.

What I claim is:

1. Apparatus for notching materials comprising in combination a fixed knife, a rotary notching knife movable past said fixed knife and cooperating therewith to notch material overlying the fixed knife, a stripper plate, and means for reciprocating said plate in proximity to the rotary knife after the same has passed the fixed knife to remove any chip adhering to the rotary knife as the result of its operation.

2. Apparatus for notching materials comprising in combination a fixed knife underlying the material to be notched, a rotary notching knife movable past said fixed knife to notch said material, a rotary stripper plate, and means for reciprocating said plate in proximity to the knife to remove any chip adhering to the knife as the result of operation of the knife.

3. Apparatus for notching materials comprising in combination a fixed knife underlying the material to be notched, a rotary notching knife movable past said fixed knife to notch said material, a cooperating rotary stripper plate, a common drive for knife and plate, and means for effecting reciprocation of said plate relatively to the rotary knife and in proximity to the face thereof to remove any chip adhering to the rotary knife.

4. Apparatus for notching materials comprising in combination a fixed knife underlying the material to be notched, a rotary notching knife adapted to notch the material as the rotary knife passes the fixed knife, and a cooperating rotary stripper plate driven by the rotary knife about an axis eccentric to that of the rotary knife, to effect movement of the stripper plate along one face of the rotary knife thereby to remove any chip adhering to the said rotary knife.

5. Apparatus for notching materials comprising in combination a fixed knife underlying the material to be notched, a notching knife rotatable past the fixed knife to notch said material, a shaft carrying the notching knife, bushings for said shaft, a ring mounted on one of said bushings and eccentric to said shaft, a stripper plate carried by said ring, and means for constantly maintaining the plate in contact with one face of the rotary knife, whereby as the plate is rotated the stripper plate will be caused to traverse one face of the rotary knife.

6. Apparatus for notching materials comprising in combination a rotary shaft extending parallel to the edge of the material to be notched, a knife carried thereby and extending therefrom to a position overlying the said material, a stripper plate in constant engagement with the leading face of the knife so that as the knife is rotated the stripper plate will be rotated also, and a mount for the plate which is eccentric to the said shaft, so that as the plate is rotated it will be caused to traverse the engaged face of the knife.

7. Apparatus for notching materials comprising in combination a fixed knife underlying the material to be notched, a notching knife adapted to be rotated past the fixed knife to notch said material, a stripper plate, means for rotating said stripper plate about an axis eccentric to the axis of rotation of said rotary knife, the axis of rotation of the plate being offset from that of the knife sufficiently to cause the stripper plate to traverse the rotary knife substantially to the cutting edge thereof on movement of the knife and plate through 180°.

8. Apparatus for notching materials comprising in combination a rotary notching knife, a fixed knife cooperating therewith, one of said knives being adjustable with respect to the other, a shaft parallel to the edge of the material to be notched carrying said rotary knife, a stripper plate, a spring for maintaining the same in engagement with the leading face of the knife, said plate rotating on an axis eccentric to that of the knife so as to cause the plate to traverse the engaged face of the knife.

9. Apparatus for notching materials, comprising in combination a rotary notching knife, a groove in the leading face thereof, a rotary stripper plate driven by the knife about an axis eccentric to the knife to cause the plate to be reciprocated, and a projection on the plate extending into the said knife groove, so that as the stripper plate moves toward the cutting edge of the knife the said projection will enter between the knife and a chip of material clinging to the knife.

ROBERT L. RICHMOND.

CERTIFICATE OF CORRECTION.

Patent No. 2,300,177. October 27, 1942.

ROBERT L. RICHMOND.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, lines 67 and 68, claim 2, before the word "knife" insert --rotary--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of November, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.