

July 18, 1944.

P. W. CHAPMAN ET AL

2,353,994

MACHINE FOR TREATING PAPER

Filed July 24, 1940

2 Sheets-Sheet 1

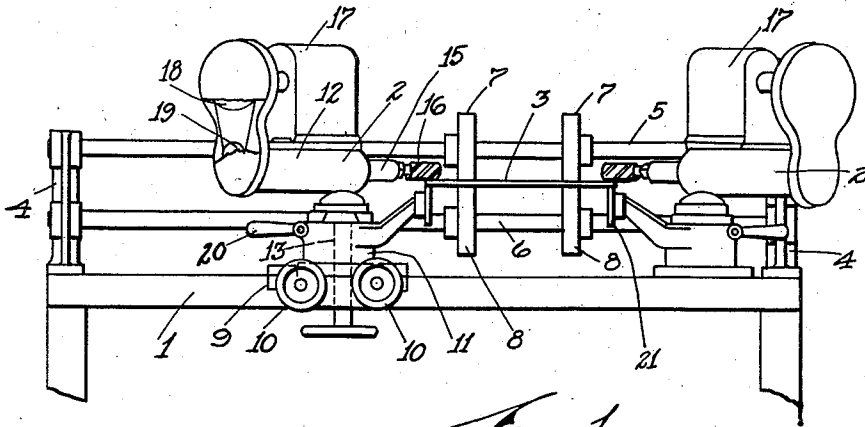
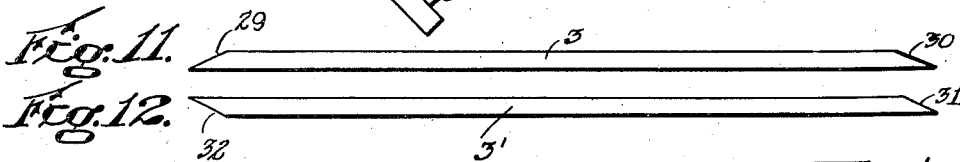
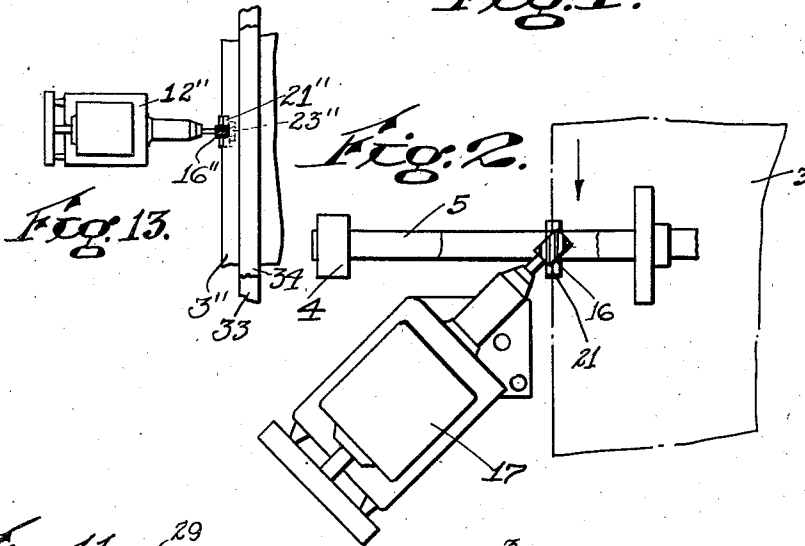


Fig. 1.



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2 Sheets-Sheet 2

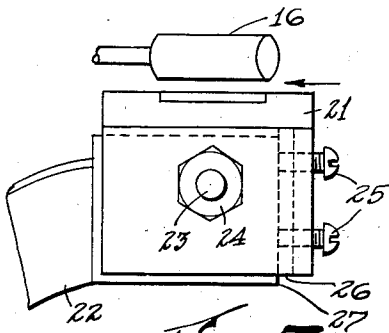


Fig. 3.

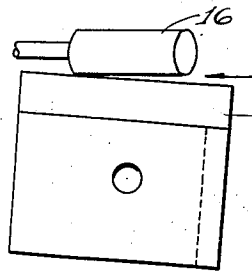


Fig. 5.

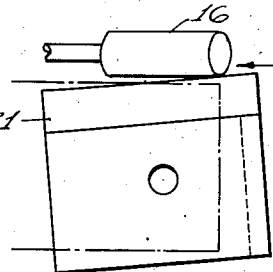


Fig. 7.

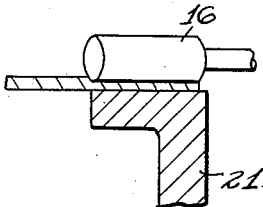


Fig. 4.

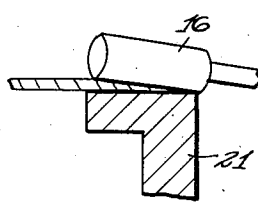


Fig. 6.

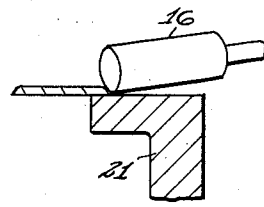


Fig. 8.

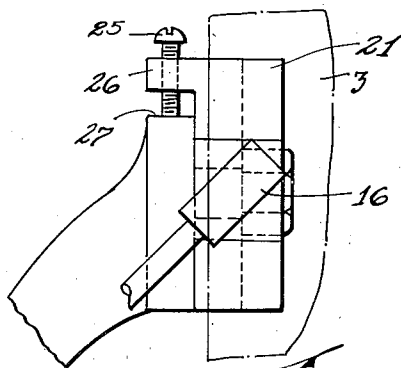


Fig. 9.

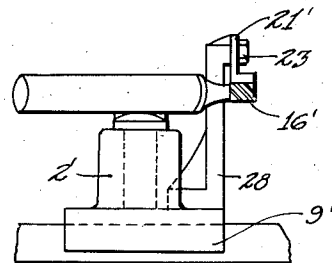


Fig. 10.

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UNITED STATES PATENT OFFICE

2,353,994

MACHINE FOR TREATING PAPER

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Application July 24, 1940, Serial No. 347,134

1 Claim. (Cl. 92—68)

The present invention relates to a machine for treating paper and particularly to a device by which an edge of paper may be skived or deckled.

One form of deckling device, as shown for example in the Fountain Patent #1,607,193, passes the edge of the paper to be deckled between a supporting disk and a cooperating rotary deckling tool, the latter being positioned with its axis at an angle of substantially 45° from the edge of the paper being deckled. Mechanism of this character is arranged for a limited adjustment by changing the angle between the cutter shaft and the edge of the paper so that the appearance of the deckle edge may be controlled to a certain degree. This mechanism is however capable of producing not more than a substantially uniform type of deckling, and its utility is correspondingly limited. The principal object of the present invention is to produce a device for deckling and skiving which is adjustable to such an extent that any variation of edge between a very thinly skived edge to an abrupt deckled edge may be readily produced.

In accordance with the present invention, the cutter cooperates with a support and the cutter and support are adjustable in such a manner that the angularity of the peripheral cutting surface of the cutter with respect to the cooperating surface on the support may be adjusted to a substantial degree. The present invention provides an arrangement by which one or both edges of the paper may be simultaneously skived or deckled and the skiving at opposite edges may be located on the same or on opposite surfaces of the paper.

Other and further objects and advantages of the invention will hereinafter appear from the following detailed description taken in connection with the accompanying drawings in which—

Fig. 1 is an end elevation, with parts broken away, of a machine embodying the invention.

Fig. 2 is a fragmentary plan view showing one of the skiving mechanisms.

Fig. 3 is a diagrammatic side view of the skiving tool and cooperating support in a central position.

Fig. 4 is a diagrammatic view looking in the direction of the arrow of Fig. 3.

Fig. 5 is a diagrammatic view similar to Fig. 3 with the support adjusted for skiving or bevelling a paper edge.

Fig. 6 is a diagrammatic view looking generally in the direction of the arrow of Fig. 5, with the web support in section.

Fig. 7 is a diagrammatic view similar to Fig. 3, with the support adjusted for deckling.

Fig. 8 is a diagrammatic view looking generally in the direction of the arrow of Fig. 7, with the web support in section.

Fig. 9 is a plan view of the tool and support.

Fig. 10 is an end elevation of a skiving mechanism for skiving the bottom surface of the paper.

Fig. 11 is a sectional view of a paper web greatly enlarged after being bevelled by the machine of Fig. 1.

Fig. 12 is a view similar to Fig. 11, but with the left-hand skiving tool reversed in accordance with the disclosure of Fig. 10.

Fig. 13 is a plan view of a modification of the skiving unit.

With reference first to Fig. 1, the machine has a base 1 on which are mounted one or more skiving or deckling units 2, there being two units shown in the drawings for operating on opposite side edges of the web 3 of paper. The skiving or deckling units 2 are adjustable toward or away from each other on the base to accommodate paper in varying widths, as will hereafter appear.

The base has brackets 4 in which are journaled vertically spaced shafts 5 and 6. On each of these shafts are positioned one or more feed rollers 7 cooperating with corresponding rollers 8 on the other shaft. These feed rollers act to pass paper either in web or sheet form through the machine and to hold the paper against side-wise movement during the skiving or deckling operation.

The skiving units are substantial duplicates, except that one is left-handed and one is right, and a description of the one will be sufficient. On the base of the machine is a slide 9 movable on the base in a direction parallel to the shafts 5 and 6 and held in adjusted position by suitable clamping screws 10. On the slide is a stand 11 in which is turnable on a vertical axis a head 12 having a downwardly projecting integral stem 13 receivable within a bore in the bracket. A shaft 15 is journaled in the head 12 and on the end thereof is mounted the cutting tool 16 hereinafter described in greater detail.

A driving motor 17 is mounted on the head and the motor drives the shaft by any suitable means, which, in the arrangement shown, consists of pulleys 18 and 19 on the motor shaft and on the tool shaft respectively. The angularity of the axis of the tool shaft with respect to the edge of the paper being bevelled or deckled may be adjusted by turning the head with respect to the bracket in which it is mounted, a clamping

screw 20 holding the tool shaft in adjustable position. The above mechanism is substantially the same as that in the Fountain Patent #1,607,193, above referred to. It will be noted that the axis of the cutter shaft 15 is at an angle of substantially 45° to the edge of the paper, as best shown in Fig. 2.

In accordance with the invention, the above mechanism so supports the cutting tool that by adjustment of a support cooperating with the cutter, the device may produce either a skived or bevelled edge or a deckled edge as desired. The invention resides in the particular arrangement for a relative adjustment between the cutter and support to produce an edge of the type required. As best shown in Figs. 1 and 3, cooperating with the cutting tool 16 is a support 21 and the paper passes between this support and the tool. The stand 11 which supports the tool head 12 has an integral projecting arm 22 which has therein a projecting headed stud 23 for holding the support. It will be noted that the stud 23 extends at right angles to the edge of the paper as it passes through the machine, as shown in Fig. 9, and the support 21 which presents a substantially flat upper surface is angularly adjustable about this stud to provide for adjustment of the angle between the periphery of the cutter and the surface on the support.

For adjustment of the position of the support 21, a pair of adjustable screws 25 extend through an integral flange 26 on the support and engage with a flat surface 27 on the projecting arm 22. By adjustment of these screws the angularity of the flat upper surface on the support may be adjusted with respect to the periphery of the cutter to vary the abruptness of the skived edge or to produce in certain instances a deckled edge.

For a more complete understanding of the effect of the adjustment of the support 21 it will be apparent from Figs. 3 and 4 that, in this position of the support 21, elements in the periphery of the cutting tool are parallel to the flat surface of the cutter, the axis of the cutter and the surface of the support being in parallel planes. Paper passing between the tool and support is given a notched edge, as shown in Fig. 4, the spacing of the tool from the support being less than the thickness of the paper. It will be understood that the diagrammatic views of Figs. 3 to 8 inclusive, are greatly exaggerated to show the effect of angular adjustment of the support.

By rocking the support 21 in a clockwise direction about the stud 23, Fig. 3, the surface of the support moves out of a plane which is parallel to the plane of the axis of the cutter and into a plane at a small angle thereto. The effect is to move the rearward edge of the support, Fig. 5, toward the cutter's periphery and into contact therewith, in certain cases. At the same time the forward edge of the support moves away from the periphery of the cutter, the axis of the latter being at an angle to the axis about which the support is adjusted, so that elements of the periphery of the cutter extend at an angle to the plane of the surface of the support, the angle being variable dependent upon the angularity of the support. With the cutter and support in this position the edge of the paper passing between the tool and support is given a skived or bevelled edge, as shown in Fig. 6, which corresponds approximately to the angle between the cutter's periphery and the support. This angle of skiving may be varied considerably, as will be apparent, the only adjustment necessary being a change in

the angularity of the support 21 which is obtained by adjustment of the screws 25.

If, on the other hand, the support 21 is turned counterclockwise from the position of Fig. 3 into the position of Fig. 7, the forward edge of the support moves toward the cutter and the rearward edge moves away so that the cutter and support are in a position for producing a deckled edge as a web of paper passes between the cutter and the support. The cutter being of familiar construction having helical cutting edges thereon, the ends of these edges will function to produce the rough deckled edge which is at present so familiar.

Instead of bevelling or deckling the top surface of the web or sheet of paper passing through the unit, the positions of the support and cutter may be reversed, as shown in Fig. 10, with the cutter 16' positioned below the web of paper and the support 21' positioned above the web. With this arrangement the action of the cutter takes place on the under surface of the web and produces a skived edge on the opposite surface of the paper to that skived by the cutting tool 16. It will be understood that either or both of the cutting tools may be mounted for skiving the under surface of the web rather than the upper surface, or where only one edge is to be skived the support and cutter may still be mounted for a skiving of the under surface of the web.

As shown in Fig. 10, a tool supporting structure 2' corresponding to that of Figs. 1 and 2 supports the cutter 16' at the same angle to the edge of the paper sheet as in Fig. 2, and the support 21' is mounted on a bracket 28 mounted on the slide 9' corresponding to the slide 9. The support is thus above the cutter and holds the edge of the paper down against the upper surface of the cutter. The support 21' has adjusting screws, not shown, the same as the support 21, and is mounted on a stud 23' in the same manner.

It will be understood that either of the devices 2 of Fig. 1 is separately adjustable as outlined above so that one edge of a web may be deckled and the other edge may be skived or bevelled. Furthermore, either device 2 may be replaced by a device 2' as in Fig. 10, so that one edge may be bevelled or skived on the top surface and the other edge skived on the under surface.

The effect of the skiving is shown greatly exaggerated in Figs. 11 and 12. In Fig. 11 the web 3 of paper has been passed through the device of Fig. 1 and thus has the opposite edges bevelled at 29 and 30, each bevel or skive being located on the upper surface of the paper. If, however, the left-hand device 2 of Fig. 1 be replaced by the device 2' of Fig. 10, the web 3' will then have its right-hand edge bevelled on the upper surface, as shown at 31, but the left-hand edge is bevelled on the under surface by the device 2' to produce a bevelled edge 32.

Where the structure that controls the paper feed permits, it is desirable in certain deckling or notching operations on the edge of the paper, to have the axis of the cutter practically at right angles to the edge of the paper. As shown in Fig. 13, the web 3'' of paper is advanced by cooperating belts 33 and 34, so that there are no roll shafts comparable to the feed roll shafts 5 and 6. In this event, where the machine is adapted primarily for deckling or notching to produce the results shown in Fig. 4, the cutter 16'' is carried by a tool head 12'', with the axis of the cutter approximately at right angles to

the edge of the paper. The support 21'' is mounted in the same manner as the support 21, with the supporting stud 23'' extending at right angles to the edge of the paper. The support 21'' presents a substantially flat upper surface to co-operate with the cutter, as will be apparent. The advantage of this arrangement is that for inexperienced operators the machine may be more readily set up in this position than where the axis of the cutter is oblique to the edge of the paper.

It will be readily apparent that a machine of this character, which provides for a cutting operation on the side edge of a web of paper or other similar material, may readily be incorporated in other types of machines operating on continuous webs, as for example, printing machines, sheeting machines for cutting the web into uniform sheets, or tubing machines for forming the web or sheets into tubes. The machine is so constructed that it is capable of operating at substantial variations in speed, so that the skiving or deckling may be adjusted to take place at the same rate of speed that the web can be handled in the other devices associated therewith.

We claim:

A machine for deckling or skiving the edge of a continuous web of paper comprising in combination means for supporting and longitudinally moving the web of paper by frictional engagement of the web between the edges thereof, a milling cutter rotatable about an axis parallel to, but spaced from, said web, said cutter being operable upon one side of said web along the edge thereof, a web support providing a flat surface engageable with the side of the web opposite to said cutter for holding the advancing web against said cutter, with the flat surface of said support extending beyond the ends of said cutter, as measured in the direction of web movement, said support being turnable bodily in either direction about an axis extending at right angles to the edge of the web and lying in a plane parallel to said web, but offset therefrom, and means for adjusting said support about its axis and maintaining it in the selected position, whereby the angular relationship between the plane of the flat surface of said support and the cutter axis is established to produce deckling or skiving of the edge of the web of paper.

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