Dec. 15, 1959 J. SALOMON 2,916,956

PIVOTALLY MOUNTED RECIPROCATING CUTTER FOR A CONTINUOUSLY MOVING SUCTIONALLY HELD WEB

Filed June 14, 1956 3 Sheets-Sheet 1

FIG. 1.

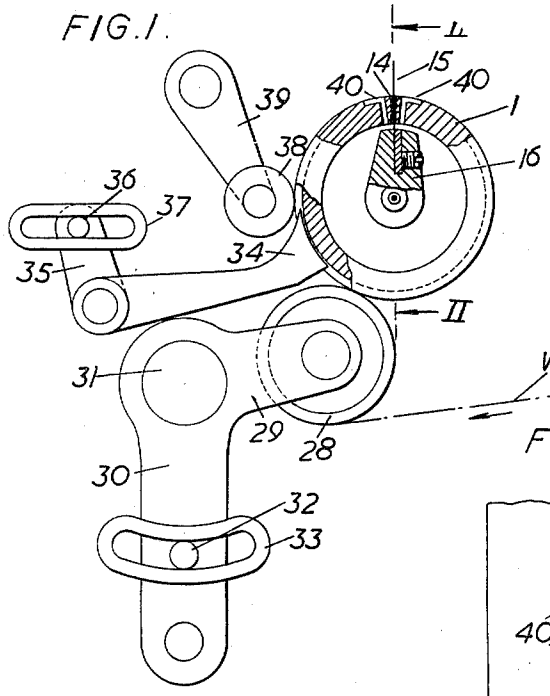


FIG. 3.

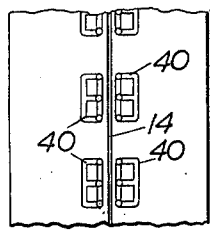
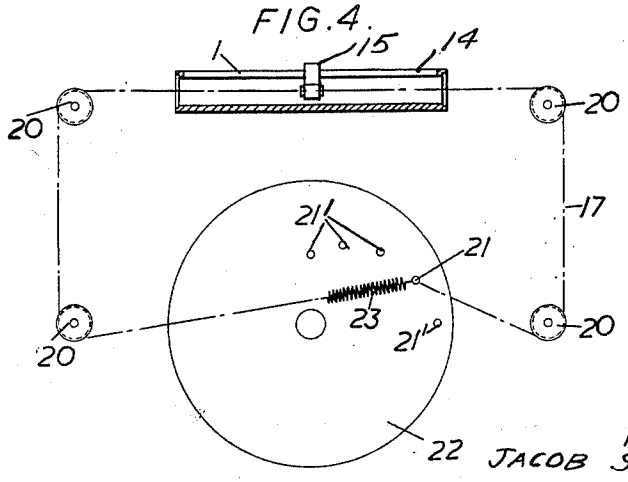


FIG. 4.



INVENTOR
JACOB SALOMON

BY

ATTORNEY

Dec. 15, 1959 J. SALOMON 2,916,956

PIVOTALLY MOUNTED RECIPROCATING CUTTER FOR A CONTINUOUSLY MOVING SUCTIONALLY HELD WEB

Filed June 14, 1956 3 Sheets-Sheet 2

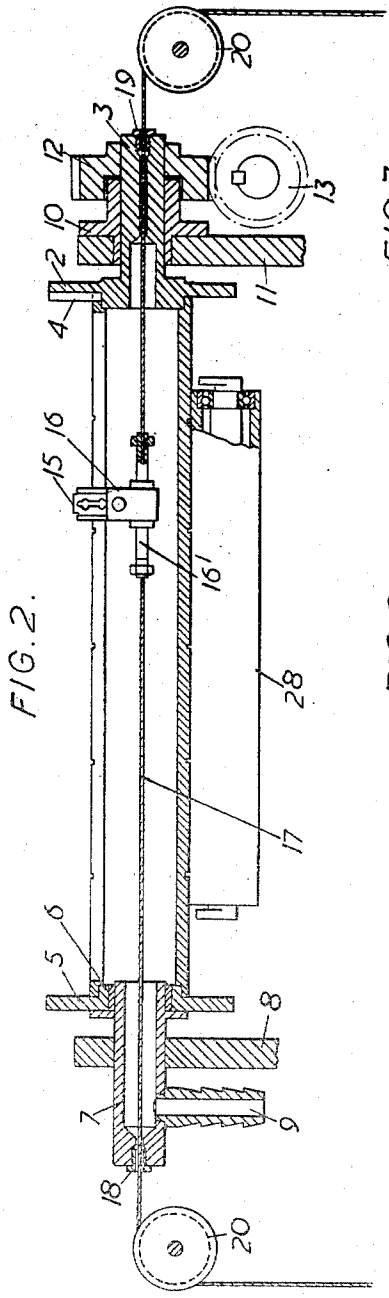


FIG. 2.

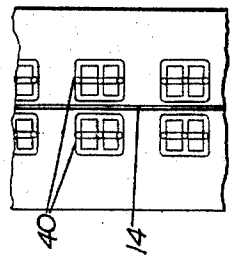


FIG. 7

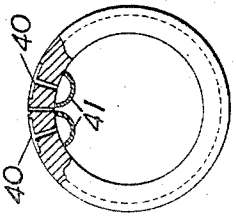


FIG. 6.



FIG. 5.

INVENTOR
JACOB SALOMON

BY

ATTORNEY

Dec. 15, 1959 J. SALOMON 2,916,956

PIVOTALLY MOUNTED RECIPROCATING CUTTER FOR A CONTINUOUSLY MOVING SUCTIONALLY HELD WEB

Filed June 14, 1956 3 Sheets-Sheet 3

FIG. 8.

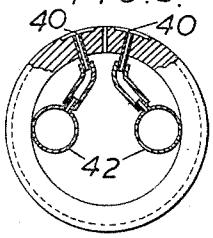


FIG. 9.

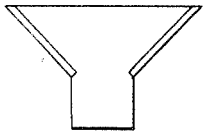


FIG. 10.

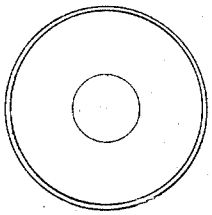


FIG. 11.

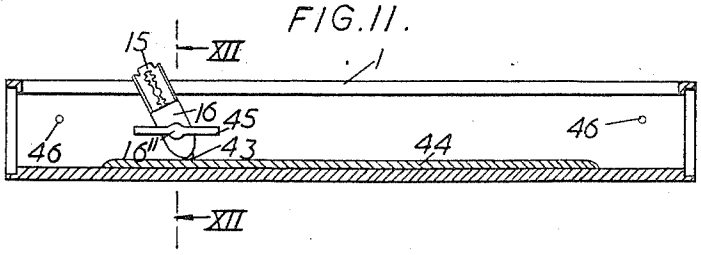
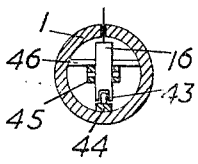


FIG. 12.



INVENTOR
JACOB SALOMON

BY

ATTORNEY

United States Patent Office 2,916,956 Patented Dec. 15, 1959

2,916,956

PIVOTALLY MOUNTED RECIPROCATING CUTTER FOR A CONTINUOUSLY MOVING SUCTIONALLY HELD WEB

Jacob Salomon, Holon, Tel-Aviv, Israel

Application June 14, 1956, Serial No. 591,479

8 Claims. (Cl. 83—163)

This invention relates to an apparatus for cutting a web of material, e.g. a web of paper, transversely. Although it is not restricted to this use, the invention is of particular value for the transverse cutting of a web of material which has been printed in a rotary printing machine.

The speed with which printed sheets of material may be obtained by transverse division of a web of material printed in a rotary printing machine is largely dependent upon the speed with which such transverse division can be effected. It is therefore an object of this invention to provide an apparatus for cutting a web transversely at a speed equal to that at which the web may be printed. It is a further object of the invention to provide a web-cutting apparatus such that the web is held firmly in a desired position during the said transverse division.

According to the invention there is provided web-cutting apparatus comprising a hollow rotatable drum provided with an axially extending slot, means for rotating the drum, a rotatably mounted knife holder mounted for axial reciprocating motion within said drum and adapted to present a knife through said slot, means for reciprocating the knife holder axially, means for feeding a web of material around the drum, means for holding the web of material by suction against the drum in the neighbourhood of said slot, and means for stripping a cut portion of the web from the drum.

The means for reciprocating the knife may be a crank mechanism. Thus the knife holder may be connected by flexible means to a point on a rotary member remote from the centre of rotation thereof. Alternatively the knife holder may be connected by flexible means to a point on an endless belt adapted to be entrained around a pair of spaced rollers. In either case, the said flexible means may be a rope whose opposite ends are connected to the said point, the rope passing along the axis of the drum and being entrained over rollers.

The drum is preferably provided with at least one aperture therethrough to either side of the said slot, each aperture communicating with a duct adapted to be connected to a suction apparatus.

The knife holder may be pivotally mounted, means being provided for pivoting the knife holder so that, in operation, it is always inclined in the direction in which it is moving. Thus means may be provided adjacent each end of the drum for varying the inclination of the knife holder and these means may be abutments which are adapted to be struck by the knife holder. Preferably, the cylindrical wall of the drum is provided internally with a raised axially extending track which stops short of either end of the drum, the knife holder being provided with a roller movable over said track, the track and roller being so disposed with respect to the pivot point of the knife holder that the knife holder is maintained in an inclined position so long as the roller is on the track.

The invention is illustrated, merely by way of example, in the accompanying drawings in which:

Fig. 1 is a side elevation, partly in section, of a web-cutting apparatus according to the invention,

Fig. 2 is a sectional elevation on the line II—II of Fig. 1,

Fig. 3 is a broken away plan view of a drum constituting part of the web-cutting apparatus shown in Figs. 1 and 2,

Figs. 4 and 5 are diagrammatic views illustrating alternative means for reciprocating the knife of the web-cutting apparatus shown in Figs. 1–3,

Figs. 6 and 7 are respectively a side view, partly in section, and a broken away plan view of a modified drum,

Fig. 8 is a side view, partly in section, of a further modified drum,

Figs. 9 and 10 illustrate two alternative forms of knife,

Fig. 11 is a sectional elevation of a drum provided with means for varying the inclination of the knife holder, and

Figs. 12 is a cross section taken on the line XII—XII of Fig. 11.

Referring to the drawings, a web-cutting apparatus comprises a rotatable hollow drum 1 one end of which is carried by a flange 2 of a driving shaft 3, the drum being secured to the flange 2 by a key 4. The opposite end of the drum 1 is carried by a flanged plate 5 which is mounted on a bronze bush 6 on a hollow shaft 7. It will be appreciated that by interposing suitable spacing rings between the drum and the members 2, 5 the apparatus may readily be adapted to take drums of different sizes.

The shaft 7 is mounted on a side frame 8 of the apparatus and is provided with an attachment 9 to which may be secured a vacuum hose (not shown). The shaft 3, which is journalled in a bronze bushing 10 mounted in a side frame 11 of the apparatus, is keyed to a helical gear 12 which is in mesh with a driven helical gear 13.

The cylindrical wall of the drum 1 is provided with an axially extending slot 14 in which is movably mounted a knife 15. The knife 15 may, as shown in Fig. 2, be constituted by a two-edged razor blade or, as shown in Figs. 9 and 10 respectively, it may be triangular or circular. The knife 15, whose width is small in relation to the length of the slot 14, extends outwardly of the drum 1 and extends into the interior of the drum where it is carried by a knife holder 16. The knife holder 16 is rotatably mounted on a member 16' by means of which it is secured to a flexible steel wire rope 17. The rope 17, which extends along the axis of the drum 1 and passes through the shafts 3, 7 and through stuffing boxes 18, 19 carried thereby, is entrained over idler rolls 20. In the arrangement illustrated in Fig. 4, one end of the rope 17 is secured to a peg 21 mounted on a rotary disc 22 remote from the centre thereof, the other end of the rope 17 being connected to the peg 21 through the intermediary of a spring 23. It will be appreciated that rotation of the disc 22 (by means not shown) will cause the knife 15 to be reciprocated in the slot 14. It is arranged that the disc 22 makes one revolution to two revolutions of the drum 1 so that the knife 15 is moved throughout the length of the slot 14 in one direction only at each revolution of the drum 1. The distance through which the knife is reciprocated may be varied by securing the ends of the rope 17 to one of the pegs 21' which are disposed at varying distances from the centre of the disc 22.

Alternatively the peg 21 and disc 22 may be dispensed with and, (as shown in Fig. 5) the ends of the rope 17 may be secured to a peg 24 on an endless belt 25 entrained around a driving roller 26 and an idler roller 27, whereby rotation of the driving roller 26 effects reciprocation of the knife 15 in the slot 14.

A rubber covered bottom backing or feed roller 28 is mounted on an arm 29 of a bell crank lever 30. The lever 30 is pivoted at 31 and may be fixed in a desired

position by means of a bolt 32 movable in a slotted member 33. The bottom backing roller 28 is maintained in contact with and driven by the drum 1 but, as will be noted from Fig. 2, the drum 1 projects outwardly of the bottom backing roller 28 at either end thereof.

Mounted above the bottom backing roller 28 is a stripper finger 34 carried by a bell crank lever 35. The lever 35 is provided with a bolt 36 pasing through a slotted member 37 to which the lever 35 may thus be clamped in a number of different positions. Adjacent to but mounted above the stripper finger 34 is an upper backing roller 38 carried by a lever 39.

Longitudinally spaced along the drum 1 and to either side of the slot 14 are a plurality of apertures 40 which extend through the cylindrical wall of the drum 1. In the arrangement shown in Fig. 1, the apertures 40 communicate with the whole interior of the drum 1 which is subjected to suction through the said vacuum hose. The apertures 40 may, however, have the form shown in Figs. 6 and 7 in which they communicate with restricted areas (defined by walls 41) of the interior of the drum 1, the said areas being subjected to suction. Alternatively, as shown in Fig. 8, each aperture 40 may communicate with a tube 42 which is connected to suction means (not shown).

If desired it may be arranged that the knife 15 is moved angularly in the slot 14 when it reaches an end of its stroke so that the knife is always inclined in the direction in which it is being moved and its cutting action is thereby improved. One means of effecting this is illustrated in Figs. 11 and 12 in which the lower end of the knife holder 16 is provided with a centrally disposed roller 43 adapted to roll on a raised axially extending track 44 mounted within the cylindrical wall of the drum 1 but not extending to either end thereof. The knife holder 16 is pivotally mounted in a fastener 45 adapted to be rotatably secured to a flexible rope or other member (not shown) by means of which it may be reciprocated. The drum 1 is provided internally, adjacent either end thereof, with a pin or other abutment 46. The construction is such that when the knife holder 16 reaches the end of its stroke it hits a pin 46 which reverses its inclination with respect to the fastener 45, such reversal of inclination being possible since the roller 43 will, at this moment, be off the track 44. The new inclination of the knife holder is maintained during its travel through the drum 1 from one end to the other by the roller 43 and the track 44. Thus it will be noted that the distance between the roller 43 and the pivot point 16'' of the knife holder is greater than the distance between the surface of the track 44 and the said pivot point. This ensures that so long as the roller is on the track the knife holder will be maintained in an inclined position.

In operation, a web W of paper or other material, which is to be cut transversely, is entrained around the bottom backing roller 28 so as to pass through the nip between the bottom backing roller and the drum 1. The web is entrained around the drum against which it is held tight in the region of the slot 14 by the suction at the apertures 40. The web is cut transversely by the knife 15 reciprocating in the slot 14 so as to move from one side of the web to the other, the cut length of web being stripped from the drum 1 by the stripper finger 34. It is arranged that cutting takes place while the drum 1 is rotated through approximately 270°, and that the remaining 90° of movement of the drum occurs while the knife 15 is adjacent one end of the slot 14, so that the knife is allowed to clear the backing rollers and stripper finger, which are disposed about approximately 90° of the circumference of the drum. It will be appreciated that the knife follows a spiral path during the cutting operation since it is simultaneously rotated and moved axially of the drum.

The apparatus illustrated in the drawings may be used in conjunction with a rotary printing machine, the drum 1 being rotated at the same speed as the printing cylinder of the printing machine. Thus the cutting of the web may be effected at the same speed as the web is printed.

I claim:

1. Web-cutting apparatus comprising a hollow rotatable drum provided with an axially extending slot, means for rotating the drum, a knife holder carrier mounted for axial reciprocating motion within said drum, a rotary member, flexible means for continuously reciprocating the knife holder carrier axially, said flexible means being connected to a point on said rotary member remote from the centre of rotation thereof, a knife holder rotatably mounted on said carrier and adapted to present a knife through said slot, means for feeding a web of material around the drum, means for holding the web of material by suction against the drum in the neighbourhood of said slot, whereby atmospheric pressure forces the web against the knife and means for stripping a cut portion of the web from the drum.

2. Web-cutting apparatus as claimed in claim 1 in which the flexible means is a rope whose opposite ends are connected to the said point, the rope passing along the axis of the drum and being entrained over rollers.

3. Web-cutting apparatus comprising a hollow rotatable drum provided with an axially extending slot, means for rotating the drum, a knife holder carrier mounted for axial reciprocating motion within said drum, an endless belt, flexible means for continuously reciprocating the knife holder carrier axially, said flexible means being connected to a point on said endless belt, a knife holder rotatably mounted on said carrier and adapted to present a knife through said slot, means for feeding a web of material around the drum, means for holding the web of material by suction against the drum in the neighbourhood of said slot, whereby atmospheric pressure forces the web against the knife, and means for stripping a cut portion of the web from the drum.

4. Web-cutting apparatus comprising a hollow, rotatable drum provided with an axially extending slot, means for rotating said drum, a rotatably and pivotally mounted knife holder mounted for axial reciprocating motion within said drum and adapted to present a knife through said slot, means for reciprocating said knife holder axially, means adjacent each end of said drum for varying the inclination of said knife holder so that it is always inclined in the direction in which it is moving, means for feeding a web of material around said drum, means for holding said web of material by suction against said drum in the neighbourhood of said slot, whereby atmospheric pressure forces said web against said drum and means for stripping a cut portion of said web from said drum.

5. Web-cutting apparatus as claimed in claim 4 in which said means for varying the inclination of said knife holder are abutments which are adapted to be struck by said knife holder.

6. Web-cutting apparatus comprising a hollow, rotatable drum having an axially-extending slot, an axially-extending track within the drum which stops short of both ends of said drum, means for rotating said drum, a rotatable and pivotally mounted knife holder adapted to present a knife through said slot, a roller on the knife holder and movable over said track, said track and roller being so disposed with respect to the pivot of said knife holder that the knife holder is maintained in an inclined position while said roller is on the track, means for reciprocating said knife holder axially within the drum, means for feeding a web of material around the drum, means for drawing said web of material by suction against said drum in the neighbourhood of said slot whereby atmospheric pressure holds said web against the drum and means for stripping a cut portion of said web from the drum.

7. Web-cutting apparatus comprising a hollow, rotatable drum provided with an axially-extending slot, a flexible, non-rotary cord-like member disposed along the axis of

said drum for reciprocation along the drum, a knife holder rotatably carried by the cord-like member, a knife mounted in said holder and projecting through said slot, guide means for the cable-like member, a rotary member having anchoring means eccentric with respect of the axis of rotation, resilient means attached to said anchoring means, said cord-like member passing around the guiding means with one of its ends secured to said anchoring means and with its other end secured to the resilient means whereby rotation of said rotary member causes reciprocation of said cord-like member and said knife holder, means to rotate said drum about said axis, means for holding a web of material against said drum in the neighbourhood of said slot and means for stripping a cut portion of the web from said drum.

8. Web-cutting apparatus as claimed in claim 7 comprising a pivot on said knife holder for allowing the knife to turn through a limited angle along the line of said slot and means adjacent each end of said drum for changing the inclination of said knife so that it is always inclined in the direction in which it is moving.

References Cited in the file of this patent

UNITED STATES PATENTS

1,421,969	Loeb	July 4, 1922
1,983,326	Taylor	Dec. 4, 1934
2,010,308	Leonard	Aug. 6, 1935
2,105,707	Stancliff	Jan. 18, 1938
2,585,250	Jones et al.	Feb. 12, 1952
2,743,777	Balsam	May 1, 1956