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SLITTING MACHINE CONSTRUCTION

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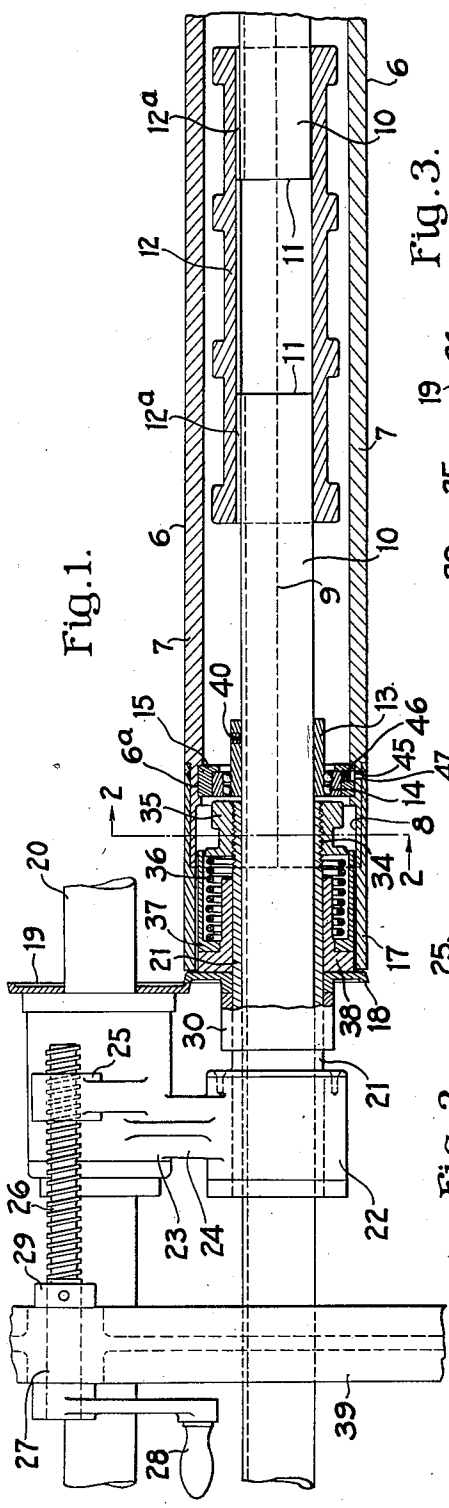


Fig. 1.

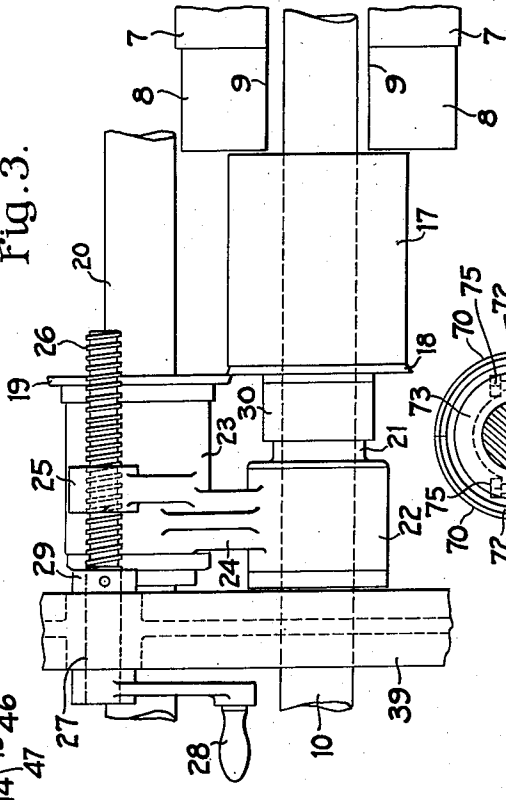


Fig. 3.

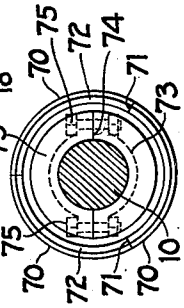


Fig. 4.

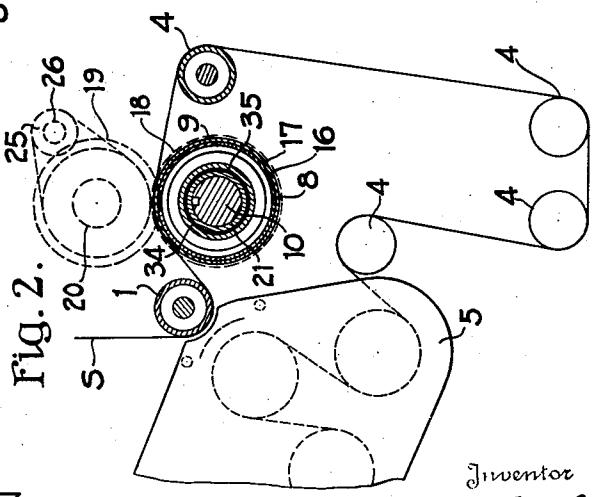


Fig. 2.

Inventor

Henry E Van Derhoef

By Newton M. Pierce

Thaddeus H. Stewart

Attorneys

UNITED STATES PATENT OFFICE

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SLITTING MACHINE CONSTRUCTION

Henry E. Van Derhoef, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

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13 Claims. (Cl. 164—60)

The invention relates to machines for slitting [illegible] widths of strip material, such as cellulose acetate, nitrate or the like from long bands. The object of my invention is to provide a machine construction so arranged that the material to be slit is drawn taut over a supporting roller adjacent the slitting knives. Another object of the invention is to provide a slitting machine construction in which the parts are particularly designed to facilitate disassembling the knives for sharpening. Another object of my invention is to provide a cutting machine in which the strip material passes over a supporting roller which may be disassembled without removing the shaft supporting such roller from the machine. Still another object of my invention is to provide a shaft construction permitting the removal of the slitting knives without removing the shaft supporting the knives, and other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

Coming now to the drawing, wherein like reference characters denote like parts throughout:

Fig. 1 is a part section and part elevation of a slitting machine construction constructed in accordance with and embodying a preferred form of my invention.

Fig. 2 is a fragmentary, sectional view on line 2—2 of Fig. 1, and showing diagrammatically the path of a strip of material passing between the slitter knives.

Fig. 3 is a fragmentary end elevation showing the supporting roller in a partially disassembled position.

Fig. 4 is a section through a supporting shaft showing a modified form of roller support.

It has always been difficult in machines handling long rolls of relatively wide material to trim off the edges or slit the material into strips of extremely accurate width, particularly where the strip is of some form of cellulosic material. It is usually somewhat more difficult to slit thin material than the thicker varieties, but one of the difficulties arises where the material is slightly wavy or wrinkled, so that a wrinkle may form in the sheet as it passes between the slitters, causing a notch in the edge of the material even though the cutters remain accurately spaced apart. Very often the faults occur quickly so that the resulting strip slit from the material will have inaccuracies in its width.

In order to overcome these difficulties, I have designed a slitting machine in which a supporting roller made of two or more semi-cylindrical members can be assembled on a shaft, the semi-cylindrical members being held together by means of sleeves which are of sufficient length and diameter to telescope a portion of the mechanism which holds the slitting knives in cutting contact. The parts have been so arranged that the roller and knives can be disassembled without removing the supporting shaft from the machine, this being a great advantage since it enables the knives to be quickly removed for sharpening or replacement.

Referring to Fig. 2, a strip of material, such as cellulosic material S, may be drawn over a guide roller 1 between cutting knives 18 and 19 and over a series of guide rollers 4, after which the material may may pass into a conditioning chamber 5 or to a wind-up device. The roller 1 and the first guide roller 4 tend to draw the sheet tightly over a supporting roller 6, adjacent the cutting knives 18 and 19, so that the sheet will lie in a smooth, taut condition at the place where the cutting occurs.

In the drawing, I have shown cutting knives 18 and 19 at one end of the roller 6 only, but it is to be understood that these knives are arranged at each end of the roller 6 and the construction may be the same at each end .

I prefer to provide the roller 6 in longitudinal, semi-cylindrical sections 7, having ends 8 of a reduced diameter and having longitudinal edges 9 accurately faced so that these sections will fit smoothly and tightly together in a position in which they may form a perfectly smooth roller 6 for supporting the strip material S. The roller 6 is preferably supported by means of a shaft 10, this shaft preferably being made in two similar sections coaxially arranged and having the two ends 11 of the shaft spaced apart, but being normally held together by a sleeve 12, which includes a key 12a for causing the two shaft sections 10 to turn as a single shaft. I prefer to drive this shaft by any suitable source of power at approximately the speed that the strip material S is to travel through the cutting station.

The roller 6 is preferably supported upon ball bearings. There is an inner race member 13 which may be adjusted longitudinally on the shaft and may be set in the desired position by means of a set screw 40, and there is an outer race for supporting the balls 14 of the ball bearing, this outer race fitting in the ring 15 which, in turn, fits into a ring-like notch 6a on the inside of the roller 6. Thus, since the shaft 10 is turned, the ball bearing tends to rotate the roller 6, although, of course, this roller may also be

driven by its frictional contact with the strip material S.

In order to hold the semi-cylindrical sections 7 accurately on the ball bearings and to hold these sections into the shape of a cylinder, I provide a sleeve 17, having an outside diameter equal to the outside diameter of the roller 6 and having an inside diameter sufficient to telescope the completely assembled semi-cylindrical sections 7 by sliding over the reduced end areas 8 thereof.

Thus, a sleeve 17 at each end completes the smooth roller 6 which supports the strip material for slitting.

There are ordinarily two slitting knives 18 and 19, knife 19 being revolubly carried by a shaft 20 which is parallel to the shaft 10 and which, like shaft 10, is mounted on an end frame 39 of the machine.

In order to move the cutting knives a distance sufficient to slide the sleeve 17 off the end of the roller section 7, I have provided a bracket 24, having bearings 22 and 23, mounted to slide on the shafts 10 and 20. This sliding movement may be accomplished through the medium of a threaded ear 25, which receives a screw 26, carried by a shaft 27, which may be rotated in the end frame 39 by means of a handle 28. A collar 29, attached to the shaft 27, prevents it from moving axially in the frame member 39.

When it is desired to disassemble the cutting knives, the handle 28 may be turned, causing the bracket 24 to approach the frame 39 in the manner illustrated in Fig. 3. When in this position, the sleeve 17 may be slid axially toward the frame 39 and the semi-cylindrical sections 7 of the roller 6 may be disassembled.

The cutting knife structure which permits the knives to be disassembled will now be described.

The bracket 24 carries a sleeve shaft 21, extending about the shaft 10 on which the knife 18 is mounted, this knife being held in place by a collar 30 and by two sleeves 38 and 37, the latter having a flange against which one end of a spring 36 may press, the opposite end of the spring 36 pressing against a threaded nut 35 which may be screwed onto the thread 34 on the end of a sleeve shaft. Thus, the spring 36 normally thrusts the cutting knife 18 into cutting engagement with the knife 19 and the spring-tensioned parts of the slitter are completely enclosed by the sleeve 17 which surrounds these parts, as shown in Fig. 1.

This construction has many advantages. In the first place, the tensioned parts of the slitters are so covered that any dirt or grease will be held inside of the roller 6 and cannot readily reach the material being slit. Moreover, it is possible to readily disassemble the roller 6 and the cutting knives for cleaning, sharpening or the like, by disassembling the roller 6 as described above, and by sliding the sleeve 12 axially onto one of the shaft sections 10, so that by releasing the nut 35 and removing it from the sleeve shaft 21, the lower slitting knife 18, with its spring-tensioned assembly, may be slid off the end of the shaft 10 between the two ends 11.

The slitting knife 18 and its spring assembly may be replaced over the end 11 of the shaft 10, moved into position, and fastened by the nut 35. The ball bearing race 13 is then slid axially of the shaft into position to receive the ring notches 6a of the roller section 7 which can then be assembled with their edges 9 in close contact, and by sliding the sleeve 17 over the reduced area 8 of these sections, the roller 6 may be completely assembled. It is necessary, of course, before assembling the roller 6, to slide the sleeve 12 to cover both end sections 11 of the coaxially arranged shafts 12.

It is preferable to provide a means for frictionally holding the sleeves 17 on the ends of the roller sections 7, and I have provided, in the present instance, a snap latch consisting of a plunger 45, carried by the ring 15 and spring-pressed outwardly by means of a collar spring 46. This causes the plunger 45 to engage a notch or ring cut in the portion 6a of the roller 6, so that by merely sliding the sleeve 17 axially, this snap latch moves into an operative position to hold the parts in assembled relation.

While I have described a preferred form of supporting roller 6 and associated knife structure, it is also possible, and sometimes desirable to make the roller of more than two arcuate sections 7, as shown in Figs. 1 and 3. Accordingly, as indicated in Fig. 4, I have shown a roller built up from 3 arcuate sections 70, each section having two accurately formed, longitudinal edges 71 fitting together throughout the length of the roller. As in the first described embodiment of my invention, I have provided reduced ends 72 on these sections, which may be telescoped by the sleeve 17 as above described.

I have also illustrated, in Fig. 4, a modified form of sleeve to take the place of the sleeve 12 described in the first embodiment of my invention. In this instance, the sleeve connecting the shaft sections 10 may be a split sleeve consisting of 2 sections 73 which may separate along a center portion 74 and which may be held in operative relationship by a pair of bolts 75. With this type of shaft connection, in assembling or disassembling the parts, the bolt 75 can be removed to permit the removal of the two sections 75 of the sleeve, so that the parts may be slid off the ends 11 of the shaft sections 10 as described above.

What I claim is:

1. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, and means for holding the sleeves in an operative position for retaining the semi-cylindrical members in an assembled relation.

2. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, and means for holding the sleeves in an operative position for retaining the semi-

cylindrical members in an assembled relation comprising a spring plunger and a plurality of recesses between the sleeves and cylindrical roller positioned for frictionally latching the parts together.

3. A roller for cutting machines including, in combination a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, bearings carried by the shaft for supporting at least the ends of the cylindrical members, a shaft supporting said bearings, cylindrical sleeves movable axially of the shafts for sliding movement to and from the ends of the semi-cylindrical members to telescope the ends thereof, the sole support for said sleeves being the ends of the semi-cylindrical members.

4. A roller for cutting machines including, in combination a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, bearings carried by the shaft for supporting at least the ends of the cylindrical members, a shaft supporting the roller bearings, a cylindrical sleeve mounted above the shaft to telescope the assembled ends of the semi-cylindrical members to hold them together, knives at the ends of the sleeves, and means for moving the knives a distance at least as long as the sleeves whereby said sleeves may be removed axially of the shaft from the ends of the roller.

5. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends thereof to hold the parts in assembled relation on the bearings, a second shaft parallel to the first mentioned shaft, a bracket slidably mounted on the two shafts, means for moving the bracket and knives axially of the shaft a distance at least sufficient to remove the sleeves from the ends of the semi-cylindrical members to disassemble these parts.

6. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a bracket including a sleeve shaft mounted on the shaft, a second shaft, cutting knives, one mounted on the second shaft and the other mounted on the sleeve shaft, and spring carried by the sleeve shaft for holding the knives in cutting contact.

7. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a bracket including a sleeve shaft mounted on the shaft, a second shaft, cutting knives, one mounted on the second shaft and the other mounted on the sleeve shaft, and means covered by the sleeve on the end of the roller for thrusting the cutting knife on the sleeve shaft into cutting engagement with the knife carried by the second shaft.

8. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a bracket including a sleeve shaft mounted on the shaft, a second shaft, cutting knives, one mounted on the second shaft and the other mounted on the sleeve shaft, means covered by the sleeve on the end of the roller for thrusting the cutting knife on the sleeve shaft into cutting engagement with the knife carried by the second shaft, and a handle operated screw for moving the knives axially of the first mentioned shaft and to and from the roller whereby clearance may be provided for sliding the sleeves holding the semi-cylindrical members off the semi-cylindrical members so that they may be removed or assembled.

9. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a bracket slidably mounted on the shaft, a cutting assembly carried by the bracket including means for holding the knives in cutting contact, said last named means being of a size and shaft to telescope inside of the sleeve holding the semi-cylindrical sections assembled as a roller.

10. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a bracket slidably mounted on the shaft, a cutting assem-

bly carried by the bracket including means for holding the knives in cutting contact, said last named means being of a size and shaft to telescope inside of the sleeve holding the semi-cylindrical sections assembled as a roller, and a handle operated screw for moving the cutting assembly relative to the roller.

11. A roller for cutting machines including, in combination a two part coaxially arranged shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a knife mounted axially of the two part shaft, means for disassembling the roller by removing the cylindrical sleeves and semi-cylindrical roller sections, and means for removing the knife from between the two shaft sections by sliding the sleeve connecting the shaft sections on one section to permit the knife to be slid off the end of the opposite shaft section.

12. A roller for cutting machines including, in combination a two-part coaxially arranged shaft, an elongated roller comprising semi-cylindrical members having accurately formed edges fitting together to form a complete cylinder, said semi-cylindrical members having ends reduced in diameter, bearings carried by the shaft for supporting at least the ends of the cylindrical members, cylindrical sleeves having an inside diameter substantially equal to the outside diameter of the assembled semi-cylindrical members and adapted to telescope the ends of reduced diameter thereof to hold the parts in assembled relation on the bearings, a slidable sleeve connecting the two-part coaxially arranged shafts, a knife mounted axially of the two part shaft, means for disassembling the roller by removing the cylindrical sleeves and semi-cylindrical roller sections, and means for removing the knife from between the two shaft sections, by sliding the sleeve connecting the shaft sections on one section to permit the knife to be slid off the end of the opposite shaft section.

13. A roller for cutting machines including, in combination, a shaft, an elongated roller comprising a plurality of arcuate members having accurately formed edges fitting together to form a complete cylinder, bearings carried by the shaft for supporting said arcuate members, cylindrical sleeves telescoping with the ends of the cylinder formed by said arcuate members to hold the same in assembled relation on the bearings, and means for holding the sleeves in an operative position for retaining the arcuate members in an assembled relation.

HENRY E. VAN DERHOEF.

CERTIFICATE OF CORRECTION.

Patent No. 2,238,481. April 15, 1941.

HENRY E. VAN DERHOEF.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, lines 53 and 69, page 3, first column, line 59, and second column, lines 4, 25, 51 and 70, and page 4, first column, line 16, and second column, line 5, claims 1, 2, 6, 7, 8, 9, 10, 11, and 12 respectively, for the word "inside" read --outside--; 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 27th day of May, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)