

Jan. 27, 1970

E. VANDENBERG

3,491,641

ADJUSTABLE ROTARY KNIFE STRUCTURE

Filed Nov. 21, 1966

3 Sheets-Sheet 2

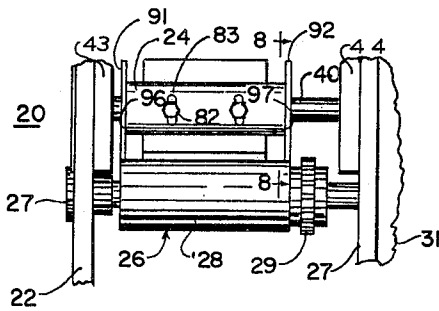


FIG. 7

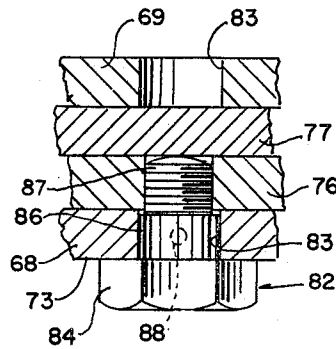


FIG. 3A

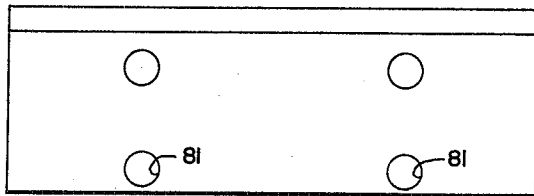


FIG. II

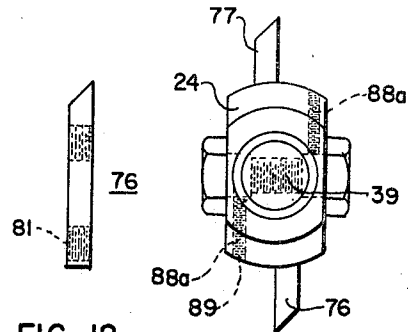


FIG. 12

FIG. 9

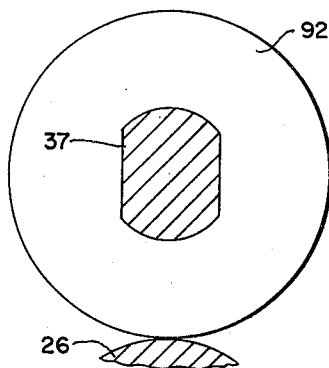


FIG. 8

INVENTOR.
EDWARD VANDENBERG
BY *Pearce & Schaeferklaus*

Attorneys

Jan. 27, 1970

E. VANDENBERG

3,491,641

ADJUSTABLE ROTARY KNIFE STRUCTURE

Filed Nov. 21, 1966

3 Sheets-Sheet 3

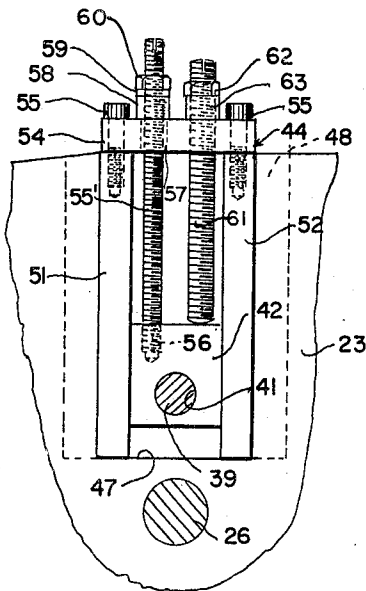


FIG. 6

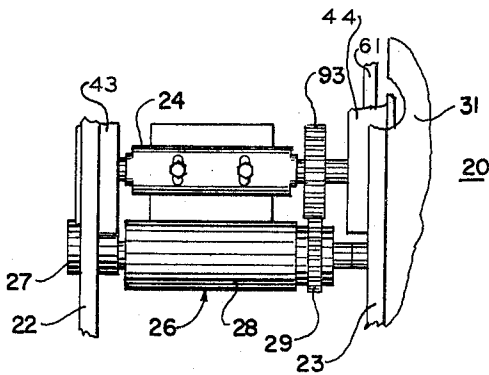


FIG. 10

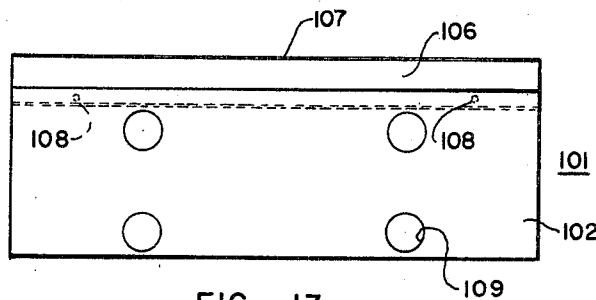


FIG. 13

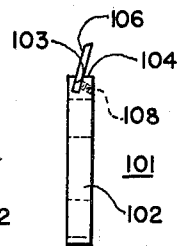


FIG. 14

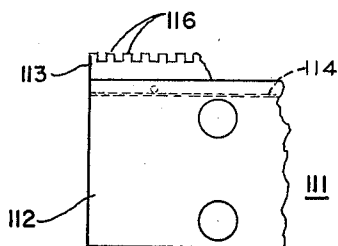


FIG. 15

INVENTOR.
EDWARD VANDENBERG
BY *Pearce & Schaeperklaus*

Attorneys

1

3,491,641

ADJUSTABLE ROTARY KNIFE STRUCTURE

Edward Vandenberg, 426 Findlay St.,
Cincinnati, Ohio 45214

Filed Nov. 21, 1966, Ser. No. 595,866

Int. Cl. B26d 1/36

U.S. Cl. 83—346

3 Claims

ABSTRACT OF THE DISCLOSURE

A rotary knife structure which comprises a rotating housing having a slot extending crosswise of the axis, knife members mounted in the slot and adjustable crosswise of the axis, knife positioning members mounted on and extending transversely of the knife members, there being slots in the housing intersecting the crosswise slot and receiving the knife positioning members, and means for holding the knife members in predetermined positions of adjustment crosswise of the axis.

This invention relates to a power driven knife structure. An object of this invention is to provide an adjustable rotating knife.

A further object of this invention is to provide a knife structure of this type in which the blade is mounted in a slot in a rotatable housing and can be adjusted crosswise of the housing while held in the slot.

A further object of this invention is to provide a knife structure of this type in which the blade is held in adjusted position by screw members or the like which are mounted in the blade and extend transversely of the blade and through slots in walls of the housing.

A further object of this invention is to provide a knife structure of this type in which locking set screw members are mounted in the housing and extend parallel to the blade and into engagement with the screw members to hold the blade in adjusted position.

A further object of this invention is to provide a knife structure of this type in which the blade cooperates with a back-up roll which is geared to and turns in a direction opposite to that in which the knife housing and knife turn.

A further object of this invention is to provide a knife structure of this type in which guide rolls removably mounted on the housing are engageable with the surface of the back-up roll for positioning the housing for adjustment of the blades radially thereof.

A further object of this invention is to provide a knife structure of this type in which the guide rolls are of a diameter equal to the pitch diameter of the gear which is mounted on the housing during operation of the knife structure.

The above and other objects and features of the invention will be apparent to those skilled in the art to which this invention pertains from the following detailed description and the drawings, in which:

FIG. 1 is a fragmentary view in side elevation of a web handling machine embodying a knife structure constructed in accordance with an embodiment of this invention;

FIG. 2 is a fragmentary view in end elevation of the machine shown in FIG. 1;

FIG. 3 is a view in end elevation of the knife structure of the machine shown in FIGS. 1 and 2 removed therefrom;

2

FIG. 3A is a view in section taken on the line 3A—3A in FIG. 3 on an enlarged scale;

FIG. 4 is a view in front elevation of the knife structure shown in FIG. 3;

FIG. 5 is a plan view of the knife structure shown in FIGS. 3 and 4;

FIG. 6 is a view in section taken on the line 6—6 in FIG. 2 on an enlarged scale;

FIG. 7 is a fragmentary view in end elevation of the machine illustrated in FIGS. 1 and 2 showing the knife structure with blades in a different position, knife adjusting guides being shown in association therewith;

FIG. 8 is a view in section taken on the line 8—8 in FIG. 7 on an enlarged scale;

FIG. 9 is a view in end elevation of the knife structure showing blades thereof in adjusted position;

FIG. 10 is a fragmentary view in end elevation of the machine shown in FIGS. 1, 2, and 7, showing the knife blades in adjusted position with a drive gear in place;

FIG. 11 is a plan view of a knife blade forming a part of the knife structure shown in FIGS. 3, 4, and 5;

FIG. 12 is a view in end elevation of the knife blade shown in FIG. 11;

FIG. 13 is a plan view of a composite blade for the knife structure;

FIG. 14 is a view in end elevation of the composite blade shown in FIG. 13; and

FIG. 15 is a plan view of another form of composite blade for the knife structure.

In the following detailed description and the drawings, like reference characters indicate like parts.

In FIGS. 1 and 2 is shown a machine 20 for handling a web 21 (FIG. 1). The machine 20 includes frame plates 22 and 23 (FIG. 2) between which a knife housing 24 and a back-up roll 26 are rotatably mounted. The back-up roll 26 is rotatably mounted in bearings 27 mounted in the frame plates 22 and 23. The back-up roll includes a cylindrical body 28 (FIG. 7). A gear 29 is mounted on the back-up roll 26, the gear 29 having a pitch diameter equal to the diameter of the body 28. Appropriate drive mechanism 30 inside a housing 31 drives the back-up roll in unison with web advancing rolls 32 and 33 (FIG. 1) and at a speed equal to the speed at which the web 21 is advanced.

The knife housing 24, as shown in FIGS. 4 and 5, includes a central body 34, shouldered extensions 36 and 37 at opposite ends of the central body 34, and outwardly extending journal portions 38 and 39, there being a gear receiving section 40 between the shouldered extension 37 and the journal portion 39. The journal portions 38 and 39 are rotatably received in bearing openings 41 (only one of which is shown, FIG. 6) of bearing blocks 42. Each of the bearing blocks is mounted for sliding radially of the axis of the back-up roll 26. The bearing blocks 42 are mounted in slide assemblies 43 and 44 which are mounted in slots 46 (FIG. 1) and 47 (FIG. 6) in the frame plates 22 and 23, respectively. Each of the slide assemblies includes a back-up plate 48 which is attached to the frame plate on which it is mounted by fasteners 49 (FIG. 1). Guide tracks 51 and 52 (FIG. 6) are attached to the back-up plate 48 by fasteners 53 (FIG. 1). The bearing blocks slide between the guide tracks 51 and 52. Cap bars 54 are attached to and span each pair of guide tracks 51 and 52. Fasteners 55 (FIG. 6) attach the cap bars 54 to the guide tracks 51 and 52. The bearing block 42 is supported for sliding between the guide tracks 51 and 52 by a rod 55', which is threaded in a socket 56 in the bearing block 42. The rod 55' extends upwardly through a

bore 57 in the cap bar 54 and through the central openings of an annular resilient washer 58 of rubber-like material and a metal washer 59. A nut 60 threaded on the rod 55' and bearing on the metal washer 59 supports the rod 55' and the bearing block 42. A hold-down rod 61, which is threaded in the cap bar 54, bears on the bearing block 42 to hold the bearing block in position with the resilient washer 58 in compression so that the bearing block 42 is positively positioned. A nut 62 threaded on the hold-down rod 61 engages on a metal washer 63 which bears on the cap bar 54 to lock the hold-down rod in position.

Details of construction of the body 34 of the knife housing 24 are shown in FIGS. 3, 4, and 5. A slot 67 (FIG. 4) extends diametrically of the body and divides the body into two sections 68 and 69 which have flat or planar inner faces 71 and 72 respectively and planar outer faces 73 and 74 respectively. Between the inner faces 71 and 72 are received flat knife blades 76 and 77. The knife blades 76 and 77 have cutting edges 78 and 79, respectively, which extend outwardly of the body 34, as shown in FIG. 3, and, as shown in FIG. 2, are constructed to cooperate with the back-up roll 26 for severing lengths of the web or for scoring the web. As shown in FIGS. 11 and 12, the knife blade 76 is provided with transverse threaded bores 81. The other knife blade is provided with similar transverse bores.

Shoulder screws 82 (FIGS. 3, 4 and 5) are mounted in selected bores 81. As shown in FIG. 3A, each shoulder screw extends through one of a plurality of slots 83 which are formed in the body sections 68 and 69 and extend transversely thereof and transversely of the cutting edges 78 and 79 of the knife blades (FIG. 5). As shown in FIG. 3A, each shoulder screw 82 includes a head 84 which bears on the outer face portion of one of the body sections in the manner in which the head 84 bears on the outer face 73. A cylindrical shoulder portion 86 of the shoulder screw 82 is slidably received in the slot 83, the diameter of the shoulder portion being substantially equal to the width of the slot 83. A threaded tip 87 of the shoulder screw 82 is received in the bore 81. As shown in FIGS. 3 and 3A, a back-up set screw 88 is threaded in the body section 68 and extends parallel to and into the slot 83 to engage the shoulder portion 86 of the shoulder screw 82 and hold the shoulder screw 82 and the knife blade 76 in adjusted position.

The knife blades 76 and 77 are mounted flatwise of and in face-to-face engagement with each other and with inner faces of the body sections. The knife blades can be adjusted inwardly and outwardly as between the position shown in FIG. 3 and that shown in FIG. 9. In the FIG. 9 position, back-up set screws 88a extend from sockets 89 in which the back-up set screws 88a are mounted lengthwise of the slots 83 and into engagement with the shoulder screws 82 to lock the shoulder screws and knife blades in adjusted position.

During adjustment of the knife blades 76 and 77, the housing 24 can be mounted in the position shown in FIG. 7 between the slide assemblies 43 and 44 with no drive gear on the gear receiving section 40 and with guide discs 91 and 92 mounted on the knife housing 24, each of the guide discs being received on one of the shouldered extensions as the guide disc 92 is shown mounted on the shouldered extension 37 in FIG. 8. The guide discs 91 and 92 can engage flatwise against shoulder faces 96 and 97, respectively, of the knife housing so that the guide discs extend perpendicularly of the axis of the housing 24. The guide discs are of a diameter equal to the pitch diameter of a gear 93 (FIG. 10) for which the blades are to be positioned so that the guide discs 91 and 92 position the knife housing 24 in the position it will occupy in use, and adjustment of the knife blades is made easy. When the knife blades have been adjusted to and have been locked in position, the guide discs 91 and 92 are removed and the gear 93 is mounted in position and the knife holder re-

stored to position between the slide assemblies 43 and 44 as shown in FIG. 10 ready for use. As the back-up roll 26 is rotated, the knife housing 24 and the blades 76 and 77 are turned in unison with but in a direction opposite to that in which the back-up roll turns so that the knife blades can cooperate with the back-up roll for severing lengths of the web or for scoring the web. In FIG. 2, the knife holder is shown with a drive gear 93a of different and smaller pitch diameter and with knife blades at a retracted position for acting on the web but with the space between position of scoring or shearing being closer than with the position of the blades in FIG. 10.

In FIGS. 13 and 14 is shown a composite knife assembly 101 which includes a generally rectangular body 102 having a lengthwise slot 103 (FIG. 14) in a side face 104 thereof. A replaceable blade edge strip 106 is mounted in the slot 103 and extends outwardly thereof terminating in a cutting edge 107. Set screws 108 hold the blade edge strip in position in the slot 103. The body 102 is provided with threaded sockets 109 for receiving shoulder screws, and the composite blade assembly 101 can be mounted in the same manner as the knives already described.

In FIG. 15 is shown a knife blade assembly 111 constructed in accordance with another embodiment of this invention. The assembly 111 includes a body 112 which is similar in construction to the body of the assembly shown in FIGS. 13 and 14. A knife edge strip 113 is mounted in a slot 114 therein. The knife edge strip 113 terminates in a serrated perforating edge 116 which can cooperate with the back-up roll 26 to cut perforations in the web.

The knife structures illustrated in the drawings and described above are subject to structural modification without departing from the spirit and scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A rotary knife structure which comprises a housing, means for rotatably mounting said housing, said housing having a slot extending crosswise of the axis thereof, a first knife member mounted in said slot for adjustable movement crosswise of the axis, there being an edge on the first knife member extending outwardly of the housing, knife positioning members mounted on and extending transversely of the first knife member, there being slots in the housing intersecting the crosswise slot and receiving the knife positioning members, a second knife member mounted in the crosswise slot, the knife members being in flatwise face-to-face relationship, means for holding the first knife member in predetermined positions of adjustment crosswise of the axis, and means for holding the second knife member in predetermined positions of adjustment crosswise of the axis.

2. In combination with a web handling machine including means for advancing a web, a knife assembly which comprises a rotatably mounted back-up roll, bearing blocks mounted adjacent the back-up roll and movable radially thereof, a knife housing rotatably mounted between the bearing blocks, said housing having a slot extending crosswise of the axis thereof, a flat knife member mounted in said slot for adjustable movement crosswise of the axis, there being an edge on the knife member extending outwardly of the housing and adapted to cooperate with the back-up roll, means for holding the knife member in predetermined positions of adjustment crosswise of the axis, gear means on the back-up roll and on the knife housing interconnecting the back-up roll and the knife housing to turn together and in opposite directions for directing the web therebetween, the gear means on the knife housing being removably mounted thereon, and guide discs removably mounted on the knife housing coaxially therewith and adjacent ends thereof, the guide discs being of a diameter equal to the pitch diameter of the gear mounted on the knife housing, the guide discs

5

bearing on the back-up roll to position the housing for adjustment of the knife member.

3. A combination as in claim 2 wherein knife positioning members are mounted on and extend transversely of the knife member, and slots are provided in the housing intersecting the crosswise slot and receiving the knife positioning members.

5

References Cited

UNITED STATES PATENTS

2,429,945	10/1947	Rayburn	83—346 X
2,829,689	4/1958	Jarvis	83—346 X

10

6

3,008,364	11/1961	Stobb	83—346 X
3,086,416	4/1963	Minarik	83—346 X
3,162,076	12/1964	Emerson et al.	83—347 X
3,247,746	4/1966	Nystrand	83—700 X

FOREIGN PATENTS

920,967	3/1963	Great Britain.
---------	--------	----------------

WILLIAM S. LAWSON, Primary Examiner

U.S. Cl. X.R.

83—700