

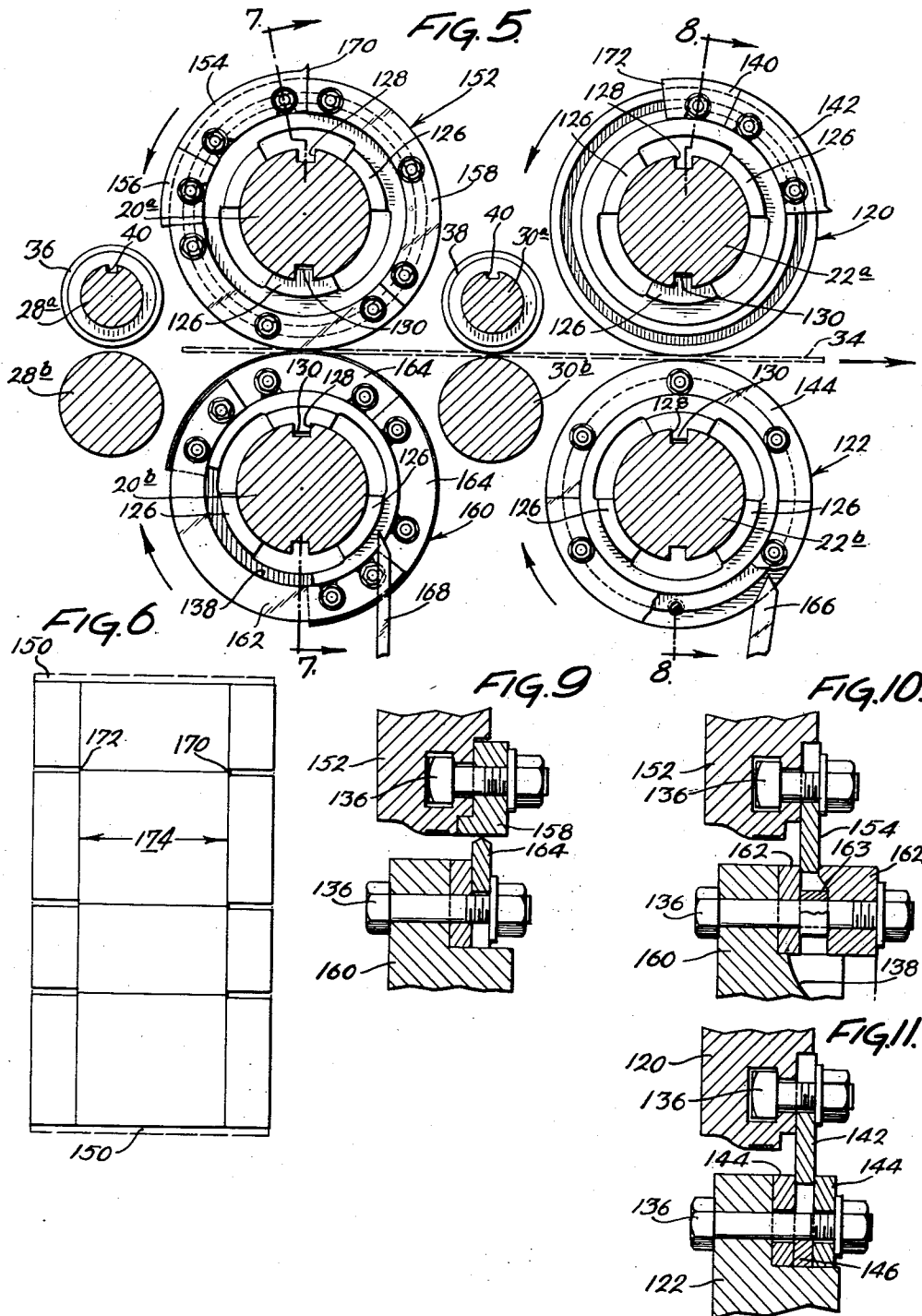
Oct. 10, 1961

W. J. GOETTSCHE
MECHANISM FOR REDUCING SET-UP TIME AND MAINTENANCE
OF SLOTTING, SCORING, SLITTING AND
LAP CUTTING APPARATUS

3,003,403

Filed Nov. 3, 1959

3 Sheets-Sheet 2



BY

INVENTOR:
WALTER J. GOETTSCHE
Howson & Howson
ATTYS

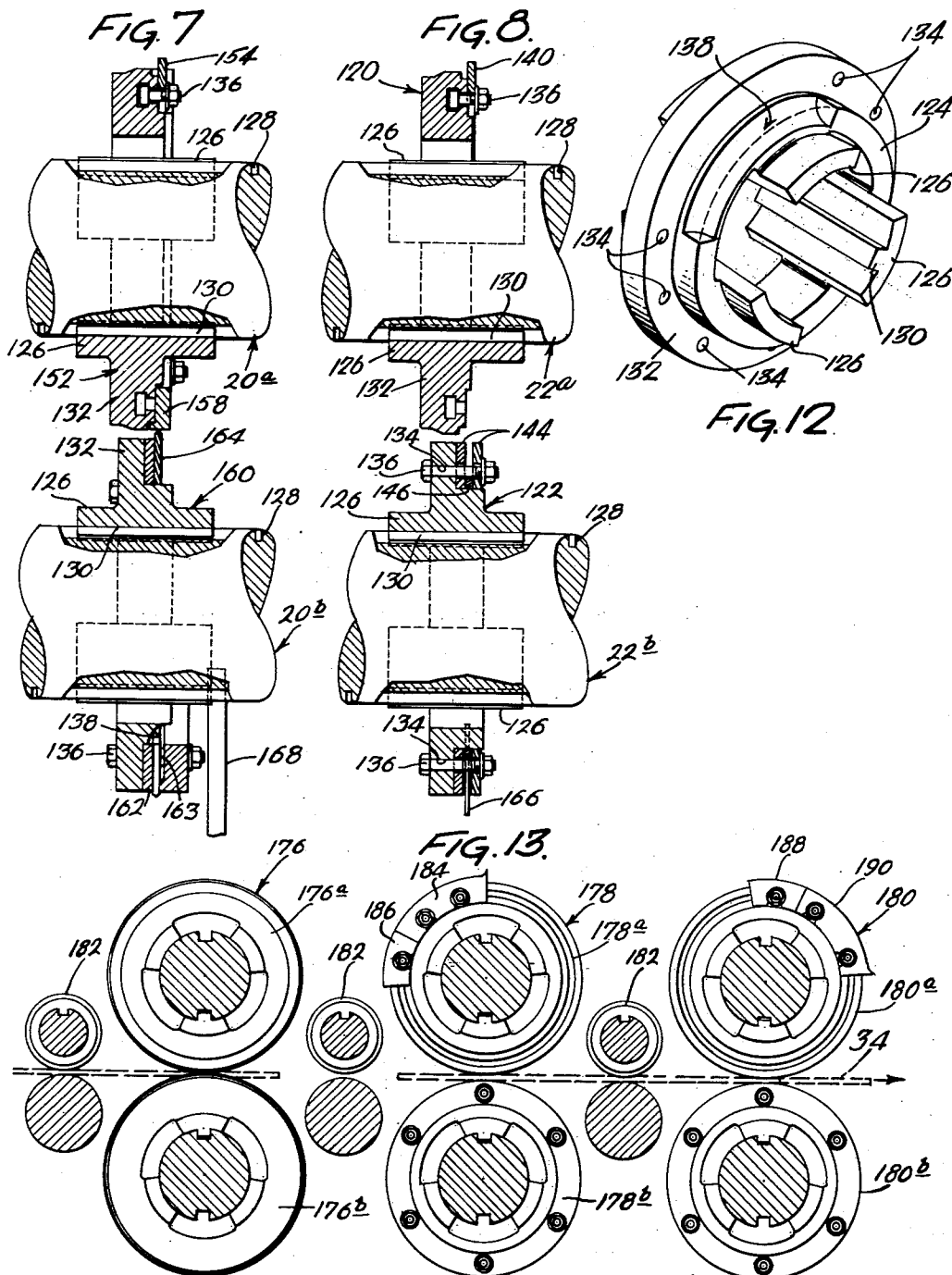
Oct. 10, 1961

W. J. GOETTSCH
MECHANISM FOR REDUCING SET-UP TIME AND MAINTENANCE
OF SLOTTING, SCORING, SLITTING AND
LAP CUTTING APPARATUS

3,003,403

Filed Nov. 3, 1959

3 Sheets-Sheet 3



INVENTOR:
WALTER J. GOETTSCH
BY *Houson & Houson*
ATTYS.

1

3,003,403

MÉCHANISM FOR REDUCING SET-UP TIME AND MAINTENANCE OF SLOTTING, SCORING, SLITTING AND LAP CUTTING APPARATUS

Walter J. Goettsch, Kenilworth, Ill., assignor to Samuel M. Langston Company, Camden, N.J., a corporation of New Jersey

Filed Nov. 3, 1959, Ser. No. 850,726

6 Claims. (Cl. 93—58.2)

The present invention relates broadly to slotting, scoring, slitting and lap cutting apparatus as used in printer-slotter, folder-gluer, and other similar machines employed in the manufacture of corrugated cardboard containers, and more specifically to improved mechanism for reducing set-up time and maintenance of the slotting, scoring, slitting and lap cutting mechanism as used in such machinery.

Machines of this general character and nature are well-known in the art, and only such portions of the apparatus as are required for an understanding of the present invention are incorporated herein, reference being made, for the over-all machine and details, to co-pending application S.N. 769,149, now Patent No. 2,975,706, of Henry W. Moser, William Grobman, and Ewald O. P. Eskilson, assigned to the assignee company of the present application.

In the manufacture of corrugated containers, it is necessary to adjust certain work elements of the apparatus for different sizes and type of corrugated container blanks such as the slotting, scoring, slitting and lap cutting apparatus. The machines must be adapted for the manufacture of regular slotted and scored, or special slotted and scored containers, dependent upon the production requirements and runs of the machines. This is particularly true with reference to slotting and scoring which will be described in detail hereinafter, although it is to be understood that the invention is equally applicable to lap cutting elements and/or slitting devices. With the present arrangement, the machine can be quickly and easily adjusted to accommodate different types and sizes of container blanks, and the mechanism is particularly adapted to eliminate the necessity for rearranging blade assemblies to obtain various slot lengths in different types and sizes of boxes.

As is known, slotter heads commonly in use carry blades which can consist of three or more segments, and the normal procedure for adjustment of the apparatus to cut the proper depth of panel requires repositioning of the rear slotter blade on each slotter head. This, in current practice, may require the manipulation of five or more clamp bolts on each slotter head. This is a lengthy operation and requires mechanism providing easy access to the slotting heads.

Slotting heads presently in use are sometimes arranged with the top slotting head carrying two assemblies, one for each of the two slots which have to be cut out of the corrugated blank by each pair of heads, when making either regular slotted or special slotted cartons which comprise approximately 95% of the production run over such machines. Considerable time is required to assemble and bolt blade segments to the head so that the required length of slot is obtained, and so that the blade assemblies are properly spaced relative to each other. Frequently, in making up blade assemblies, worn and new blades are placed side by side with the resultant difference in width causing poor quality of work produced, and possible damage to upper and lower blades or both. The mechanism of the present invention eliminates the need for rearranging blade assemblies to obtain various lengths, or to vary the position of assemblies on the heads in substantially well over 95% of box sizes likely

2

to be required, without in anyway curtailing the flexibility of the apparatus.

In accordance with the present invention, two pairs of upper and lower shafts adapted for mounting the slotting, scoring, slitting and lap cutting elements are utilized, and wherein one pair of shafts are so geared that any circumferential adjustment made, whether by means of a clutch or running register device, will effect both shafts equally, and wherein means are provided whereby the two pairs of shafts can be adjusted circumferentially independently of each other to accommodate different types and requirements of corrugated container blanks.

The primary object of the present invention accordingly, is to provide an improved machine and mechanism for reducing set-up time and maintenance of slotting, scoring, slitting and lap cutting apparatus, and the invention resides in certain structural and mechanical features of the machine hereinafter more specifically described.

Other objects and advantages will be more readily apparent from the following detailed description of an embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is a fragmentary plan view of a slotting, scoring, and slitting section of a printer-slotter or the like machine, embodying the present invention;

FIG. 2 is an elevational view of the apparatus shown in FIG. 1;

FIG. 3 is a schematic showing of a gear train for associated shafts in the sections of FIGS. 1 and 2, taken on line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary sectional view taken on line 4—4 of FIG. 1;

FIG. 5 is an enlarged sectional view, partially in elevation, showing a scorer-slotter assembly in accordance with the present invention;

FIG. 6 is a schematic plan view of a blank for a corrugated container;

FIG. 7 is a sectional view taken on line 7—7 of FIG. 5;

FIG. 8 is a sectional view taken on line 8—8 of FIG. 5;

FIG. 9 is an enlarged fragmentary sectional view of cooperating upper and lower scorer heads;

FIG. 10 is an enlarged fragmentary sectional view of cooperating slotter heads;

FIG. 11 is an enlarged fragmentary sectional view of a further type of cooperating slotter heads;

FIG. 12 is a perspective view of a lower scorer-slotter head; and

FIG. 13 is an elevational view, partially in section, of a modification of the present invention, utilizing six shafts with work heads thereon.

In the various views of the drawings, only that section of the over-all machine pertaining to slotting, scoring and slitting has been shown. To this end in the embodiment of FIGS. 1 and 2, blank slitting and scoring couples indicated respectively by the reference numerals 20 and 22 are rotatably mounted in side members 24, 26 in a usual manner. Feed roll couples 28, 30 are likewise rotatably journaled in side members 24 and 26 at their opposite ends and are suitably driven in a usual manner at the desired speed by suitable connection with a common line shaft 32. These feed rolls are adapted for feeding a traveling corrugated blank, indicated at 34, through the slotting and scoring section following previous treatment such as printing and/or the like, also in a usual manner. The slotting and slitting couples 20 and 22 include upper and lower shafts 20a, 20b and 22a, 22b respectively as is usual in the art. The feed roll couples 28 and 30 include upper and lower shafts 28a,

28b and 30a, 30b respectively. The shafts 28b and 30b are of the usual type to facilitate feed of the paper or blank therethrough. The upper shafts 28a and 30a are provided at spaced intervals therealong with the usual type of feed collars designated as 36, 38 respectively and which are splined or otherwise secured to these shafts such as at 40. The drive means for the shafts of the feed roll couples are synchronized with the drive means for the various shafts in the slotting and slitting couples.

The broad details of such drive means do not constitute a portion of the present invention and reference is made to said copending application S.N. 769,149, now Patent No. 2,975,706, for details thereof. Drive means for the shafts of the slotting and slitting couples will be described in sufficient detail, however, for purposes of the present application. The line shaft 32 which is of a splined construction extends the full length of the printer-slitter machine and this shaft is suitably supported and suitably driven. The slotting and slitting section is operatively connected into this shaft 32 by a transmission mechanism, broadly designated 42, and the actual interconnection is through the medium of a worm 44 on the shaft 32 and a worm wheel 46 operatively connected to the end of upper shaft 20a. The operative connection, which includes a clutch generally designated 48 is best shown in FIG. 2 of the drawings as also FIG. 4 wherein a similar clutch is shown in detail, and reference is made to the said copending application S.N. 769,149, now Patent No. 2,975,706, for further details thereof. The worm wheel 46 is attached to a sleeve 50 journaled by bearings in a housing 52 of the transmission 42. At one end the sleeve carries the outer member 54 of the clutch 48, and the inner clutch member 56 is keyed to a stub shaft 58 which is journaled in the sleeve 50. The inner and outer clutch members are adapted to be operatively engaged and disengaged by inflation and deflation respectively of flexible tubes interposed therebetween as shown and described in the copending application. Such inflation and deflation may be effected selectively with appropriate connections between the flexible tube and a fixed terminal fitting 60 on tube 62 extending to a suitable source of fluid pressure. At the opposite end of sleeve 50 is a gear 64. The stub shaft 58 and shaft 20a are operatively interconnected within the sleeve 50.

When the clutch 48 is engaged, the worm wheel 46 will have driving connection with the shaft 20a, and when the clutch is disengaged the shaft 58 and shaft 22a will be free to turn about the common axis independently of the worm wheel, and the driving connection will be broken.

Means are also provided as set forth in detail in said copending application S.N. 769,149, now Patent No. 2,975,706, for adjusting shaft 20a with the common drive shaft 32. The motor 66 is operable to this end, and operates when the clutch 48 is engaged to adjust the angular relation between shaft 20a and the common drive shaft 32 for proper alignment and registry of the slotting, or other work members carried on couples 20 and 22.

As will appear hereinafter, the couples 20 and 22 are driven in unison by a gear train interconnected with shaft 20a at the end opposite to the transmission 42 so that when the clutch 48 is disengaged the entire slotter-scoring assembly or section is disconnected from the main drive, and this arrangement permits for certain adjustments to be made with respect to the angular disposition of the shafts in the couples 20 and 22, which otherwise would not be possible.

Shaft 22a, as will clearly appear from FIG. 4 of the drawings, has at its end, remote from the transmission 42, a stub axle 68 rotatably journaled in bearing 70 in side member or housing 26. The stub axle 68 which constitutes a shaft extension of shaft 22a extends outwardly beyond the side frame 26 of the machine. A

collar 74 is secured on the axle 68 for rotation therewith by means of a pin 76 or the like. A scale 78 is carried by collar 74 and is graduated to permit accurate reading of panel length to be slotted and/or cut in the machine, as will appear in more detail hereinafter. A second clutch generally designated 80 is used in conjunction with this end of shaft 22a. The inner clutch member 82 is splined to the end of stub axle 68 as at 84. The outer member of the clutch 86 is secured to gear 88 spaced at its inner periphery by bearing 90 from stub axle 68. The gear 88 is one of the gears in the drive gear train for the various slotter-slitter shafts, and this gear carries a pointer 92 for cooperation with scale 78. Housing extension 94 is provided with an opening at 96 to permit the scale to be read.

The inner and outer clutch members 82 and 86 respectively are operatively engaged and disengaged by inflation and deflation respectively of an interposed flexible tube 98. The inflation and deflation may be effected selectively through a fitting in the nature of a slip fitting 100, communicating with a bore 102 in stub axle 68, communicating through tube 104 with inlet fitting 106 opening into the interior of the flexible tube 98. A hand wheel 108 is splined onto the end of stub axle 68 as shown in FIG. 4 and serves to permit adjustment of shaft 22a as will appear hereinafter.

The gear train for synchronous drive of shafts 20a, 20b and 22a, 22b, which form the couples 20 and 22 respectively, is diagrammatically shown in FIG. 3. Gear 88 carried on shaft 22a as described hereinbefore is adapted for driving from idler gear 110 which is in driven engagement with gear 112, mounted on the end of shaft 20a. Gears 114 and 116 secured respectively on the ends of shafts 20b and 22b are adapted for driving through idler gear 118 in operative engagement with driven idler wheel 110. The direction of rotation of the various gears, and thus the individual shafts 20a, 20b and 22a, 22b are indicated in FIG. 3 of the drawings and this gear train arrangement is of a usual known type. A usual running register device generally designated 118 is operatively associated with shaft 20a for adjustments in a usual manner. As pointed out hereinbefore, clutch 48 is operable for disengaging shafts 20a, 20b and 22a, 22b from the driving means, or line shaft, or gear train, whichever might be used for driving the slotter-scoring assemblies in the machine.

The various shafts 20a, 20b, 22a, 22b are all adapted for carrying working heads for slotting, scoring and slitting. The upper and lower scoring heads of the couples may be the same diameter and the four shafts may also be the same diameter. Shafts 20a and 20b are so geared that any circumferential adjustment made with the running register device 118 on shaft 20a will affect both shafts 20a and 20b equally. Shaft 22a is also geared so that any circumferential adjustment made with the running register device on shaft 20a will affect shafts 20a, 20b and 22a, 22b equally. The clutch 80 is operable upon disengagement to disconnect shaft 22a from shafts 20a and 20b since, upon disengagement of the clutch, the gear 88 and outer clutch member 86 are free to rotate with respect to the shaft 22a and inner clutch member 82 splined thereto as will be apparent. It is of the essence of this invention that the shafts of the two couples 20 and 22 can be adjusted circumferentially independently of each other, since otherwise the blade segments of the assemblies carried thereby would have to be rearranged individually for various slot lengths of boxes in practically all cases.

Shafts 22a and 22b carry upper and lower slotter heads 120 and 122, respectively, of conventional design. For the heads carried by the various shafts, reference is made to FIGS. 5, 7-12 inclusive for details of construction and mounting. The heads generally consist of a hub portion 124 having a plurality of wings 126 for strength and stability of alignment. The shafts are lon-

5

itudinally grooved as at 128, and tongues 130 carried by wings 126 are adapted for coacting with the grooves, to form a splined connection between the head and the shaft. The flange portion 132 has a plurality of spaced bolt holes or openings 134 adapted to accommodate blade segment fastening bolts 136. By reference to FIGS 7 and 8, it will be seen that in some instances, the bolts 136 pass entirely through the flange, whereas in other heads the bolt heads are carried in openings provided in the flange. Blade segments of various types are adapted for securing to these heads by means of the bolts to accomplish the desired end result. In the head shown in FIG. 12 adapted to be used for or as a combination slotting and scoring head, an ejector slot 138 is provided for transverse discharge of cut material. While all bolts have been designated 136, different lengths and/or shapes may be required depending upon the configuration and location with respect to the different components used.

In the embodiment of FIG. 1, as distinguished from that of FIG. 13, the upper slotter head 120 on shaft 22a carries slotting segments 140 and 142 positioned as required. The lower slotter head 122 carries full slotting blades 144 separated by a spacer 146 in a known manner. The construction and intercoaction of the heads 120 and 122 is more clearly shown in FIG. 11 of the drawings, wherein the reference characters hereinbefore used have been applied.

On a machine adapted to run one blank out, there would be three pairs of such heads, plus one additional pair of heads to slot as well as cut glue or stitch flaps. Additionally, as shown in FIGS. 1 and 2 of the drawings, edge slitter heads 148 can be mounted on the shafts 22a, 22b to trim the lateral portions 150 from the traveling blank as shown in FIG. 6.

The heads carried on the shafts 20a and 20b are a combination of slotters and scorers which is an important aspect in the operation of the present invention. On a machine to run one blank out, there would normally be three pairs of such heads, plus one additional pair of heads to both slot and cut glue or stitch flaps.

The heads 152 carried by shaft 20a include a plurality of male slotting segments such as at 154 and 156 properly located along the circumference and may for example have a combined length of approximately 95% of the circumference of the head. These blades are of the same type as used on the head 120. The portion of the circumference not occupied by these upper male slotting segments, are provided with mountable female scoring segments 158. When boxes of great depth and very shallow slots are run out of blanks requiring the maximum width capacity of the machine, the longer of the male slotting blades can be removed and a scoring segment installed in its place.

The heads 160 carried on shaft 20b have female slotting elements 162 of a length equal to the length of the male slotting assembly 154, 156 on head 152 and spacers 163 therebetween. It is on this section of the head that the slotted out sections of the board are discharged laterally through the ejector slot 138. That part of the circumference not occupied by the female slotting elements 162 is provided with demountable male scoring segments 164. When the length of the slotting blade assembly on shaft 20a is shortened, a short male scoring segment is added in the female slotting element. The construction and intercoaction of the different portions of heads 152 and 160 will be more readily apparent from a study of FIGS. 9 and 10 of the drawings showing portions of these combined scorer-slotter heads. In FIG. 9 mating portions of the heads carry scoring elements whereas in FIG. 10 mating portions of the heads carry male and female slotting elements.

In order to insure that slotted material is removed from the cutter heads, ejectors or the like are used. As shown in FIG. 5, an ejector 166 is interposed between the female slotting elements 144, since there will be an uninterrupted slot extending around the periphery of this

6

head. An ejector or cleaner 168 is utilized in conjunction with head 160 which is disposed transversely of the work area, because of interruptions in the slotting groove due to the male scoring segments or sections 164.

In operation, following disengagement of clutch 48 which disconnects shafts 20a, 20b and 22a, 22b from the line shaft drive, depth of slot is set-up in conventional manner. The edge 170 of slotter segment 154 on head 152 registers the depth of slot and starting point of the panel. This slotting segment can be attached permanently.

The heads on shafts 20a and 22a being of the same diameter, rotation thereof and of gears 112 and 88 will be in a fixed one to one ratio. The indicator 92 mounted on gear 88 serves for exactly positioning point 170 of the slotter blade 154 on shaft 20a. This point 170 also determines the depth of slot on the leading end or edge of the blank as indicated in FIG. 6. The edge 172 of slotter segment 140 on head 120 represents the starting point of slot of this head 120 and similarly on the other heads on shaft 22a. Therefore the relative positions of point or edge 170 and edge 172 represents the required length of panel 174 in FIG. 6. The position established by edge 172 marks the zero point of the scale 78 keyed to upper slotter shaft 22a, and which point is appropriately marked on this scale. This permits an instant and accurate reading of panel length.

To make a set-up for a given style and size of box, the following steps are required:

The depth of the first slot determined by point 170 is set in the conventional way as on current printer-slotters. This is accomplished with clutch 48 disengaged to permit rotation of couples 20 and 22 in synchronism through the gear train. The clutch 80 during this operation is engaged. The two sets of heads in couples 20 and 22 are rotated until the indicator 92 on gear 88 is in view. Clutch 80 is now disengaged and slotter shaft 22a is rotated to the required length of panel readable directly on scale 78. Due to the disconnection or disengagement of the clutch 80, the other shafts are not affected. Clutch 80 is now reengaged and the machine is ready to operate. It will accordingly be seen that the required set-up time and work involved therein is greatly reduced, and the necessity of individually rearranging or replacing of various blade segments is eliminated.

FIG. 13 discloses a further embodiment of the invention incorporating the same basic principles. Again in this embodiment the necessity for rearranging individual blade segments on the various heads is eliminated due to the provision of clutching means which permit different set-ups for different sizes and requirements of blanks in a similar manner.

In this embodiment, however, three couples 176, 178, and 180 are arranged in tandem and a series of feed roll couples 182 are used. The feed devices are similar to those in the feed roll couples 28 and 30 and need not be further described. The blanks being worked are again indicated at 34 in broken lines.

The six shafts in this embodiment are of the same diameter, and the heads carried on these shafts are similar to those described in conjunction with the other embodiment. On a machine to run one blank out, on the shafts there would be three pairs of heads, plus one additional pair of heads to slot as well as cut glue or stitch flaps. The upper and lower scoring elements are of the same diameter and the heads carried on the shafts are all of identical outside diameter.

The heads 178a have male slotting elements 184, 186 secured thereon and may, for example, have a combined length equal to 95% of the circumference. Except in very unusual cases, the slotter blades and the assembly, after mounting, will need no further adjustment thereon. The lower heads 178b have full circumference female slotter blades.

The heads 180a carry male slotting segments 188, 190 which can be positioned properly with reference to the

box blank being run. The segments on these heads are adjusted for the various slot depths being run, and not the segments on heads 178a of the couple 178. The lower heads 180b of this couple have full circumference female slotting blades.

The heads 176a on the upper shaft of the couple 176 have a full circumference female scorer, and the heads 176b on the lower shaft of the couple have a full circumference male scorer section.

While not shown in the drawings, a clutch would be operatively associated with the upper shaft of the couple 178 which would serve to disconnect all of the shafts in the couples 180 and 178 from the shafts in the couple 176. Another clutch is operatively associated with the upper shaft of couple 180. When the clutch on this upper shaft of couple 180 is disengaged, this permits the relative position between the upper shafts in couples 180 and 178 to be changed. This in turn permits changing of the relative distance of the slots without changing the slotting blade segments on the heads. With this type of arrangement the slotter blade assemblies can be positioned properly with reference to the box blank being run simultaneously. The entire set-up is quickly and accurately made by means of a running register operatively associated with the upper shaft in couple 178. Except in very unusual cases, the upper slotter blade assemblies will need no further adjustments.

Manifestly, depending upon the precise job being run, the various heads and types of operations can be changed as desired while still retaining the meritorious advantages of this invention. Additionally, minor details of construction can be varied without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

I claim:

1. In apparatus for working on corrugated cardboard container blanks, a plurality of pairs of upper and lower rotatably mounted shafts, a plurality of coacting work members mounted on said shafts, drive means connected to one said pairs of shafts, a gear train interconnecting

said pairs of shafts for rotation thereof from the driven shaft pair, first clutch means for said drive means and second clutch means for said gear means, said first clutch means being separately and selectively operable for selectively engaging and disengaging said driven pairs of shafts from the drive means, said second clutch means being separately and selectively operable for selectively engaging and disengaging the gears interconnecting the pairs of shafts whereby one said pair of shafts is circumferentially adjustable with respect to another of said pairs.

2. In apparatus as claimed in claim 1, said work members comprising heads on said shafts, slotting, scoring and slitting work elements detachably mounted on said heads, adjustment of said shafts circumferentially with respect to one another permitting relative settings of said work elements for different lengths and positions of working on a blank without removal of said elements from said heads.

3. In apparatus as claimed in claim 2, the shafts of one said pair being operatively geared to one another whereby circumferential adjustment of one said shaft will effect an equal adjustment of the other of said shafts.

4. In apparatus as claimed in claim 3, adjustment of said shafts permitting setting of depth and position of slots to be cut in a blank.

5. In apparatus as claimed in claim 1, said clutch means comprising fluid actuated coupling members.

6. In apparatus as claimed in claim 1, said work members comprising work heads, a plurality of work elements on said heads, said work elements on said heads including a combination of slotting and scoring elements angularly spaced with respect to one another whereby said work members are adapted for compounded operations on a blank.

References Cited in the file of this patent

UNITED STATES PATENTS

1,713,054	Schroeder et al.	May 14, 1929
1,977,812	Swift	Oct. 23, 1934
2,117,220	Sieg	May 10, 1938