Nov. 10, 1942. L. A. MOORE 2,301,566

CUTTING MECHANISM

Original Filed Sept. 23, 1940

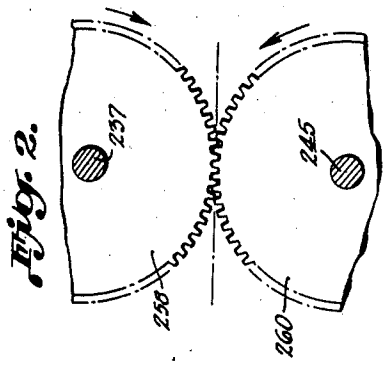


Fig. 2.

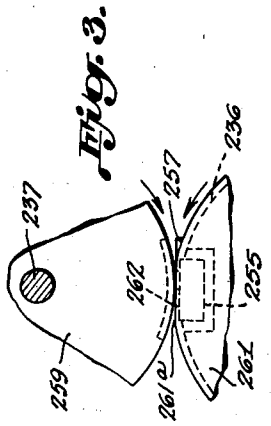


Fig. 3.

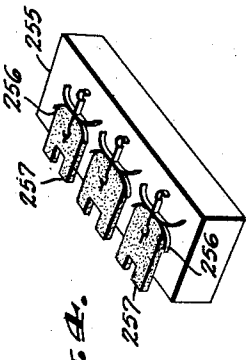


Fig. 4.

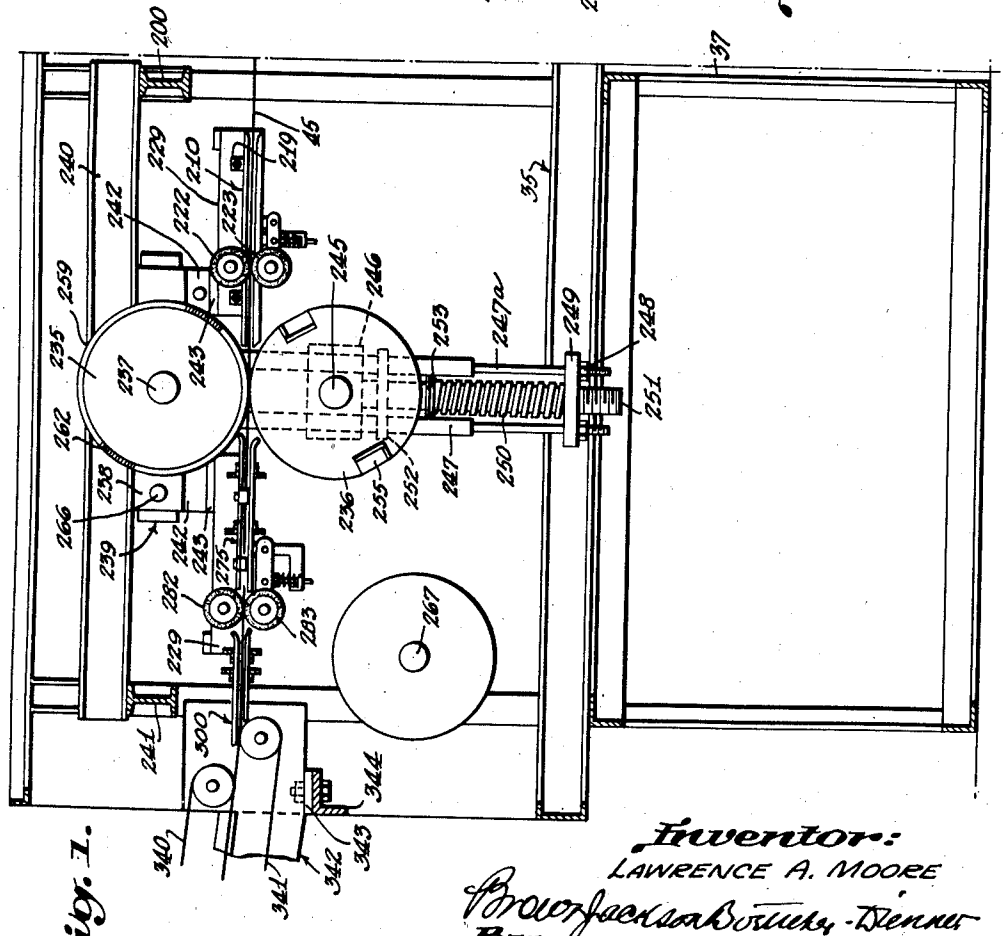


Fig. 1.

Inventor:
LAWRENCE A. MOORE
By Brown Jackson Boettcher & Dienner
Attorneys

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2,301,566

CUTTING MECHANISM

Lawrence A. Moore, Elkhart, Ind., assignor to American Coating Mills, Inc., Elkhart, Ind., a corporation of Indiana

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3 Claims. (Cl. 164—28)

This invention relates to cutting mechanism for cutting strip material into proper lengths to produce suitable blanks which by appropriate treatment may readily be formed into desired articles.

My invention is directed to cutting mechanism of the character stated having means assuring quick and clean cutting of the strip material, by a sharp blow or stroke at the instant of the cutting operation. More specifically, I provide cooperating plate and die rolls and associated elements, such that the rolls have abrupt relative movement one toward the other, when the cooperating cutting elements are brought into cooperating relation to one another. Further objects and advantages of my invention will appear from the detail description.

The cutting mechanism above referred to, though suitable for many purposes, is particularly suitable for use in a machine for producing articles from strip-cardboard, such as the machine disclosed in my copending application for Trouser guard machine, filed September 23, 1940, Serial No. 357,847, now Patent No. 2,268,767, of which the instant application is a division. Accordingly, I have illustrated the cutting mechanism of my invention, by way of example, as applied to the machine of my above identified patent, showing those parts of the machine which contribute to a clear understanding of the construction and operation of the mechanism of the instant invention.

In the drawing:

Figure 1 is a semidiagrammatic lengthwise central vertical sectional view of a portion of the machine of my above identified patent embodying therein the mechanism of my present invention;

Figure 2 is a side view, partly broken away, of the gears at one end of the cutting rolls;

Figure 3 is a side view, partly broken away, of the rails at one end of the cutting rolls; and

Figure 4 is an isometric view of one of the die blocks and the cutting dies and associated parts carried thereby.

The machine comprises a suitably constructed main frame 35 supported by appropriately located base frames, one of which is shown at 37, which base frames may be enclosed in a suitable manner to provide housings available for storage or other purposes. Strip cardboard, or other suitable material, is trimmed and/or slit to provide three strips 45 of appropriate width each of which is delivered to suitable guide means 210 having associated upper and lower rubber covered pulling rollers 222 and 223, respectively, supported from a frame 229, suitable means being provided for yieldably urging roller 223 upward for gripping strip 45, and roller 222 is suitably driven at proper speed to pull strip 45 through guide means 210 under desirable tension, the yielding mounting of roller 223 permitting slippage sufficient to prevent tearing or breaking of the strip gripped between the rollers 222 and 223; as disclosed in my above identified patent.

The strip 45 passes from the guide means 210 between a pair of cutting rolls comprising an upper plate roll 235 and a lower die roll 236. Plate roll 235 is secured on a shaft 237 rotatably mounted in bearing blocks 238 constutiting the side members of a rectangular frame 239 depending from two I-beams, one of which is shown at 240. Bearing blocks 238 are bolted or otherwise suitably secured to I-beams 240, and the latter seat upon cross I-beams 200 and 241 of the main frame 35. A bearing block 242 is secured to and depends from each of the bearing blocks 238, and a spacer 243 is secured to the underface of each bearing block 242, frame 229, formed in two sections, being suitably secured to bearing blocks 242 and spacers 243. The parts referred to may be secured together as by bolting or any other suitable manner and the frame 229 provides a support for the cross rods 219 and related parts, for the guide means 210.

Die roll 236 is secured on a shaft 245 rotatably mounted adjacent each end in a bearing block 246 slidable on guide rods 247 secured to and depending from bearing block 238. Rods 247 have their lower portions 247a reduced in diameter and are threaded at their lower ends for reception of nuts 248 which bear against the underface of a cross bar 249 slidable on the rods. A coil compression spring 250 is mounted about a plunger rod 251 disposed between rods 247 and slidable through cross bar 249 and an upper guide plate 252 suitably secured on rods 247. The upper end of plunger rod 251 bears against the underface of bearing block 246 and spring 250 is confined between cross bar 249 and a collar 253 on plunger rod 251. Die roll 236 is thus provided with a floating mounting at each end and is yieldingly urged upward toward the plate roll 235 in an obvious manner. By means of the nuts 248 the compression of spring 250 may be varied to suit requirements.

Die roll 236 has mounted therein, in a suitable known manner, two diametrically opposite die blocks 255, the outer faces of which are flat. Each block 255 carries three cutting dies 256

(Figure 4) projecting beyond the outer face of blocks 255 and shaped as shown. Each of the dies 256 comprises a leading portion and a following portion, both of the same configuration, the following portion being provided with a resilient pad 257 formed of sponge rubber or other suitable material, this pad fitting into and about the following portion of the die with its upper surface disposed, normally, somewhat above the cutting edges of the following portion of the die, for a purpose to be explained presently.

A gear 258 (Figure 2) is secured on shaft 237 adjacent each end of plate roll 235 and a bearing disc or rail 259 is secured to each end of plate roll 235. The gears 258 mesh with gears 260 secured on shaft 245 of die roll 236 adjacent each end thereof, one of such gears 260 being shown in Figure 2. A bearing disc or rail 261 is secured to each end of die roll 236 and is maintained in bearing contact with the circumferential surface of the corresponding rail 259 on shaft 237 by the compression spring 250 in an obvious manner. The rails 259 are of circular shape throughout their extent, the pitch circle of the respective gears 258 corresponding to the contour of the associated rails 259. Each of the rails 261 is provided with two flat areas 261*a* corresponding to the flat outer faces of the die blocks 255. The pitch contour of the teeth of each of the gears 260 corresponds to the contour of the adjacent rail 261, this gear accordingly having two flat areas corresponding to areas 261*a* of rail 261. Plate roll 235 has mounted thereon, in any suitable known manner, two diametrically opposite cutting plates 262 conforming in curvature to roll 235, the outer faces of these plates being flush with the outer circumferential faces of the rails 259, as shown more clearly in Figures 1 and 3.

Gears 258 mesh with pinions (not shown) secured on a countershaft 266 rotatably mounted parallel with shaft 237. Countershaft 266 is driven from a rotatably mounted shaft 267 in a suitable known manner, conveniently by chain and sprocket means. Gears 258, and with them rails 259 and plate roll 235, are driven in clockwise direction, as viewed in Figure 2, and serve to drive gears 260, and with them rails 261 and die roll 236, in counterclockwise direction. The guide means 210 directs the strip 45 between the rolls 235 and 236 and positions it accurately for cutting by the dies 256. In the rotation of the cutting rolls, the strip is cut into suitable lengths to provide blanks having each end more or less rounded and provided with a substantially hook-shaped slit with a short central slit hook-shaped extending from the inner hook portion of one of the slits, produced by a corresponding extension of the following portion of cutting die 256, as will be clear from Figure 4.

The blanks pass from the cutting rolls to blank guide means 275, thence between upper and lower rubber covered gripping rollers 282 and 283, respectively, similar to rollers 222 and 223, supported from frame 229. Roller 282 is driven at such speed that the blank severed from strip 45 is advanced at increased speed, so that the cut blanks are thus spaced a short distance apart. The rollers 282 and 283 deliver the blanks in spaced apart relation to suitable guide means 300, from which the blanks pass between the upper and lower runs of upper and lower endless belts 340 and 341, respectively, of a transfer unit 342 provided, at each side, with a bolting flange 343 seating upon and bolted to an angle cross member 344 of the main frame 35. The transfer unit conveys the blanks to forming means by which they are formed to desired shape. The guide means 275, rollers 282 and 283, guide means 300, transfer unit 343, and associated parts, and the forming means, are all described in detail in my above identified patent and need not be further described here.

As previously mentioned, the following portion of die 256 (Figure 4) has associated therewith an elastic cushion 257. As the dies and the plates of the cutting rolls come into register, plate 262 rolls across the dies, which are urged toward the plate by spring pressure in the manner previously described, roll 236 moving upward abruptly so as to, in effect, strike the strip 45 a sharp blow with the die. This assures clean and accurate cutting of the strip. Since the forward portion of the strip is, at that time, gripped between the pulling rolls 282 and 283, the following end of the blank thus produced will be pulled free of the cutting rolls. In order to assure the succeeding blank will enter the guide means 275 properly, it is desirable that means be provided to force out of the dies the end portion of the strip which is to be the leading end of the next succeeding blank. When this cut is made by the following portion of die 256, the cushion 257 is compressed and, as soon as the die 256 and the plate 262 pass out of cooperating relation, cushion 257 expands forcing the cut end portion of the strip out of the die, thus assuring that this end of the strip will clear the cutting rolls and pass into the guide means 275.

It will be understood that changes in construction and arrangement of parts of my invention may be resorted to without departing from the field and scope thereof, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred form only of my invention has been disclosed.

I claim:

1. In a machine of the character described, cutting means comprising a plate roll and a cooperating die roll geared together, die blocks carried by said die roll, cutting dies in said blocks projecting beyond the outer faces thereof, bearing rails secured to said die roll provided with flats corresponding to said blocks and otherwise of circular contour, bearing rails of circular contour secured to said plate roll and bearing upon said die roll rails, and means yieldingly urging said die roll toward said plate roll.

2. In a machine of the character described, cutting means comprising a plate roll and a cooperating die roll, die blocks carried by said die roll, cutting dies carried by said blocks projecting beyond the outer faces thereof, bearing rails secured to said die roll having flats corresponding to said blocks and otherwise of circular contour, gears secured to said die roll having the pitch contour of their teeth corresponding to the contour of said die roll rails, circular rails secured to said plate roll bearing on said die roll rails, gears secured to said plate roll meshing with said die roll gears and having the pitch contour of their teeth corresponding to the contour of said plate roll rails, and means yieldingly urging said die roll toward said plate roll.

3. In a machine of the character described, cutting means comprising a plate roll and a cooperating die roll, die blocks carried by said die roll, cutting dies carried by said blocks project-

ing beyond the outer faces thereof, bearing rails secured to said die roll having flats corresponding to said blocks and otherwise of circular contour, gears secured to said die roll having the pitch contour of their teeth corresponding to the contour of said die roll rails, circular rails secured to said plate roll bearing on said die roll rails, gears secured to said plate roll meshing with said die roll gears and having the pitch contour of their teeth corresponding to the contour of said plate roll rails, and means yieldingly urging said die roll toward said plate roll, the depth of the teeth of said gears and said rails being so related as to prevent bottoming of said gear teeth.

LAWRENCE A. MOORE.