March 2, 1948. R. E. J. NORDQUIST 2,436,821

FEEDING AND GAUGING MECHANISM

Filed June 28, 1944 4 Sheets-Sheet 1

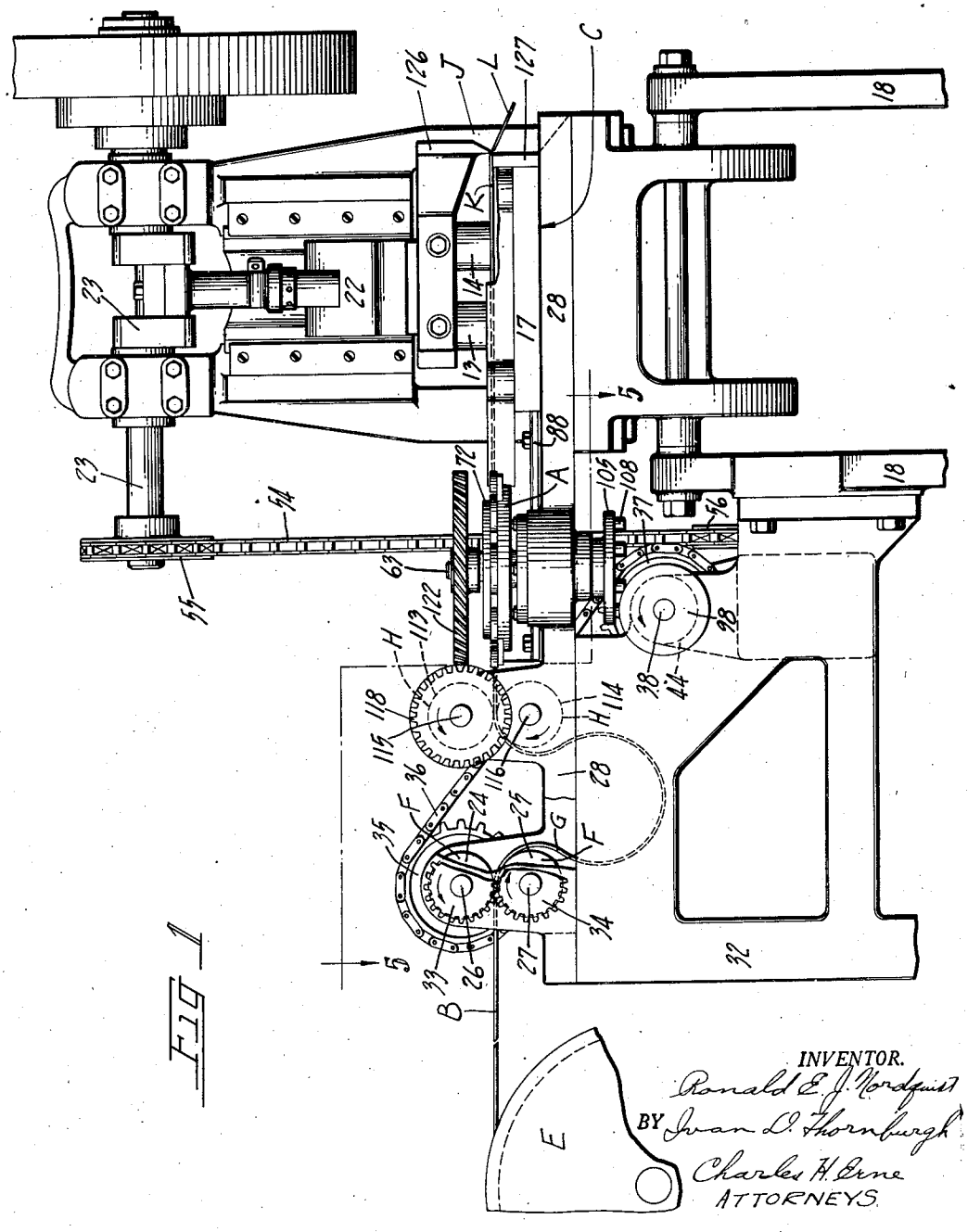

FIG 1

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FEEDING AND GAUGING MECHANISM

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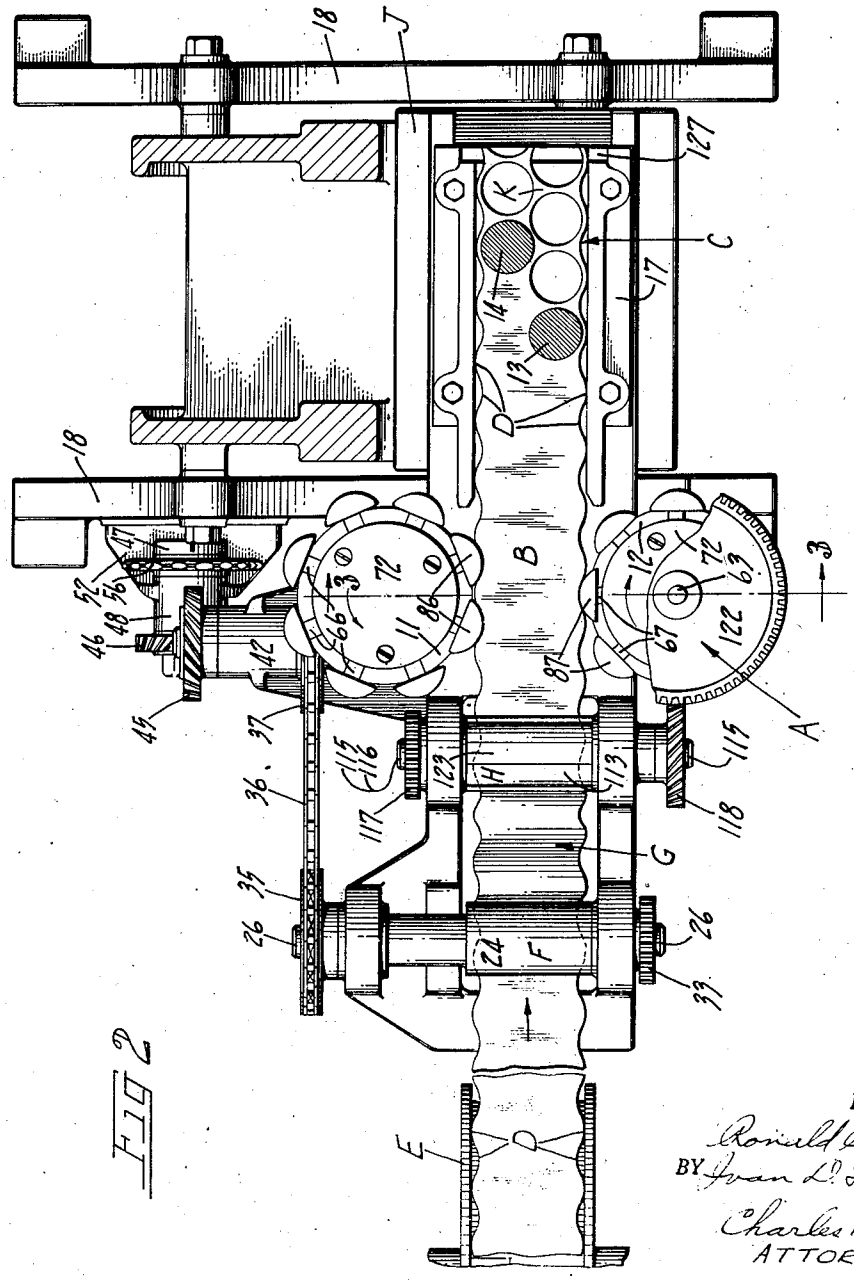

FIG 2

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FEEDING AND GAUGING MECHANISM

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Fig 4

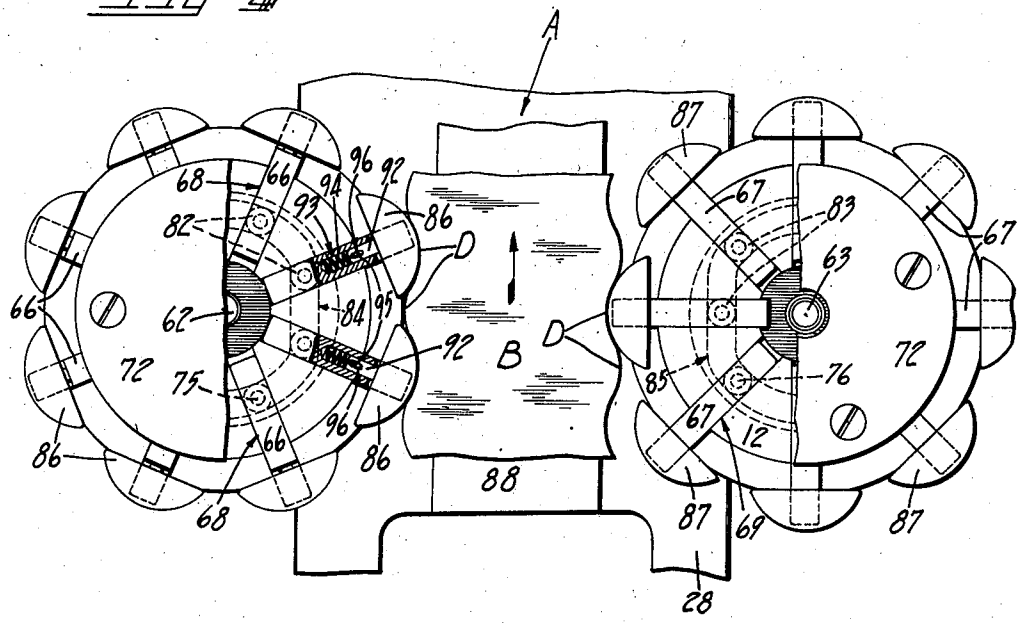

Fig 3

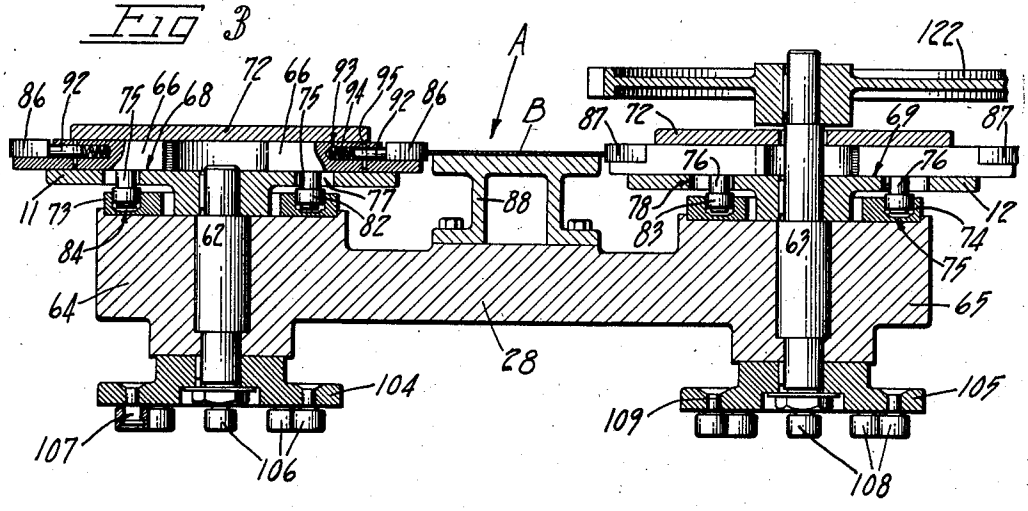

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Fig 5

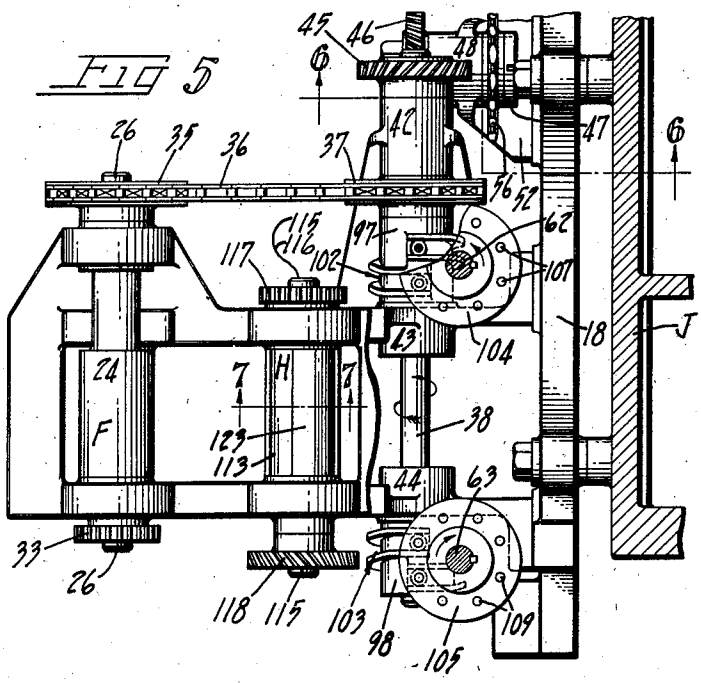


Fig 6

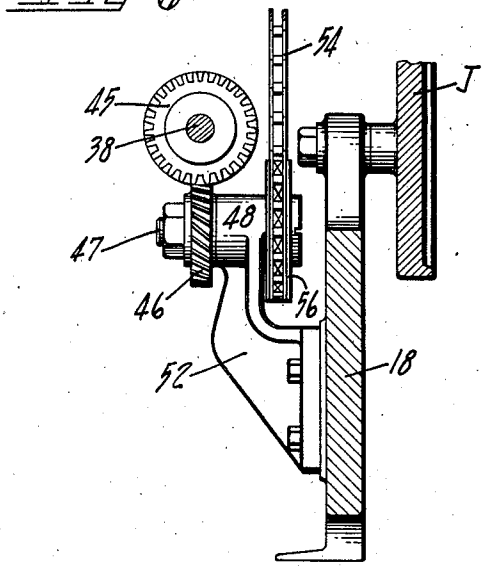
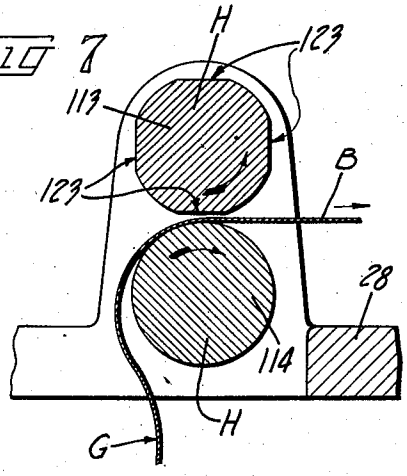


Fig 7



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UNITED STATES PATENT OFFICE

2,436,821

FEEDING AND GAUGING MECHANISM

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Application June 28, 1944, Serial No. 542,564

6 Claims. (Cl. 271—2.4)

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This invention relates to a mechanism for feeding and gauging web and strip material having one or more undulated or scroll cut edges and has particular reference to spaced intermittently operated turrets for accurately advancing such a web or strip therebetween by engagement of the scroll edge or edges to gauge a predetermined distance of advancement as when a portion of the web is moved into an operating station.

An object of the invention is the provision in a suitable machine, for example, a machine for preparing non-rectangular articles such as can ends from a continuous web or strip of material having its opposite edges undulated or cut in scroll outline, of a pair of spaced gauging turrets having elements for engaging the opposite lateral undulated edges during feeding of the strip or web while simultaneously gauging the same laterally and longitudinally of its path of travel for accurately locating a portion of the strip at an operating station, and for holding it in position for a desired operation.

Another object is the provision in such feeding and gauging turrets, of radial arms for carrying gauging elements and for keeping them in contact with the opposite undulated edges of the strip, together with devices associated with each of the turrets for actuating the arms and for moving the elements along a substantially straight line path of travel while the elements engage such undulated edges of the strip for feeding it and for gauging and holding a portion thereof in a desired position in an operating station.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a front elevation of a mechanism embodying the present invention;

Fig. 2 is a top plan view of the mechanism shown in Fig. 1, with upper parts broken away and parts in section;

Fig. 3 is an enlarged vertical sectional view taken substantially along the line 3—3 in Fig. 2 and showing parts at the feeding and gauging station;

Fig. 4 is a fragmentary top plan view of the parts shown in Fig. 3, with parts broken away;

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Fig. 5 is a fragmentary top plan view with parts broken away and other parts in section, the view being taken substantially along the broken lines 5—5 in Fig. 1, with the web of material removed;

Fig. 6 is a vertical sectional view taken substantially along the broken lines 6—6 in Fig. 5; and

Fig. 7 is an enlarged vertical sectional view taken substantially along the line 7—7 in Fig. 5.

As a preferred embodiment of the present invention the drawings illustrate a feeding and gauging mechanism A for intermittently and for accurately positioning a portion of a web or strip of sheet material B in a desired location at a working station C as the web is being fed into the mechanism. Such a web preferably has one or both of its opposite edges pre-cut or undulated as at D so that movement of the web is under control at all times.

The web material is unwound from a reel E (Figs. 1 and 2) which is journaled in any suitable support adjacent the feed-in end of the instant mechanism. Initial feed rollers F continuously draw the web from the reel and discharge it into a loop or stack section G in a suitable opening in the mechanism frame so that a supply of material is on hand for intermittent advancement to the feeding and gauging mechanism A. For this purpose a second set of feed rollers H are provided. These rollers are adapted to coact with the mechanism A during the feeding operation and to release their hold of the web during the gauging and work performing operations. This will be described fully hereinafter.

In the feeding and gauging of web material B having its opposite edges undulated as at D (Fig. 2), the mechanism A includes two spaced feeding and gauging turrets 11, 12 one on each side of the web. In feeding material where the web has one edge undulated, one such turret may be used in cooperation with one or more rollers for guiding the web. In the present mechanism as shown by way of example, a web having both edges undulated is operated on. Two turrets 11, 12 are used to feed the web G to the right (as viewed in Fig. 2) while gauging it, so that portions of the web are positioned accurately beneath upper die parts 13, 14 at the working station C.

Upper die parts 13, 14 (see also Fig. 1) cooperate with lower die parts carried on a bolster plate 17 of a conventional form of press J. This

press is mounted on a press frame 18. The upper dies 13, 14 are moved up and down by a slide 22 in the usual manner. Two sets of dies are shown herein for use on the double width of web for a double row cut. A single set comprising an upper die and a lower die would be used in connection with a single width of web for a single row cut.

These dies may shear or cut circular or non-rectangular blanks from the web B or the dies may be the combination blanking and forming units for cutting and forming articles such as can ends directly from the web. In either case, however, the operation of the present mechanism is the same. The slide 22 which carries the upper dies 13, 14 is operated by a crank shaft 23 which may be driven in any suitable manner and it is this shaft that constitutes the main drive for the feeding and gauging mechanism.

The initial feed rollers F (Figs. 1, 2 and 5) include an upper feed roller 24 and a lower feed roller 25. These rollers are mounted on shafts 26, 27 journaled in suitable bearings in a frame 28. This frame is mounted on a machine main frame 32 and on the press J. The frames 18 and 32 are or may be bolted together in support of frame 28 (Fig. 1).

The feed rollers 24, 25 operate together for unwinding the web from the reel E, a spur gear 33 mounted on the shaft 26 meshing with and driving a gear 34 mounted on shaft 27. A chain sprocket 35 is mounted on the end of shaft 26 opposite the spur gear 33 and is driven by an endless chain 36. This chain passes over and is driven by a chain drive sprocket 37 mounted on a transverse shaft 38 (Figs. 2 and 5).

The shaft 38 is journaled in bearings 42, 43, 44 in the main frame 32. A helical gear 45 is mounted at one end of the shaft 38 and meshes with a similar drive gear 46 (see also Fig. 6) mounted on a stub shaft 47 journaled in a bearing 48 of a bracket 52. Bracket 52 is secured to press frame 18. The stub shaft is driven in time with the action of the press by a chain drive operating from the crank shaft of the press J. Such a drive includes an endless chain 54 which passes over and around a chain drive sprocket 55 mounted on the crank shaft 23 and a chain driven sprocket 56 mounted on the stub shaft 47.

The turrets 11, 12 of the feeding and gauging mechanism A are keyed to the upper part of vertical shafts 62, 63 (Figs. 3 and 4) journaled in bearings 64, 65 in the frame 28. Each turret carries a plurality of spaced horizontal arms 66, 67 which are slidable in radial slideways 68, 69. These arms are retained in the slideways by plates 72, there being one plate secured to the top of each turret. Arms 66, 67 are actuated by stationary cams 73, 74 mounted on the upper ends of the bearings 64, 65. Each cam is located beneath a turret and surrounds a centrally disposed boss or hub of the turret.

Each arm 66 has preferably an integral section 75 and in like manner there is a section 76 (Fig. 3) for arm 67. These sections extend downwardly through elongated openings 77, 78 in the respective turrets 11, 12. Sections 75 carry cam rollers 82 at their lower ends. Similarly sections 76 carry cam rollers 83 at their lower ends. Cam rollers 82, 83 operate in cam grooves or raceways 84, 85.

The movement of the arms 66, 67 is transmitted to sheet edge engaging elements or members 86, 87 carried on or secured to the outer ends of the respective arms. Each engaging element has an outer profile configuration to accurately fit into an undulated edge D of the web B. As the turrets rotate intermittently the shape of the grooves in the cams 73, 74 is such as to impart to each element 86 and 87 a path of travel substantially along a straight line on opposite sides of the web or to remain in a momentary fixed holding position.

Hence, as the engaging elements 86 are carried by the moving turret 11 in a counter-clockwise direction and the engaging elements 87 on moving turret 12 in a clockwise direction (when viewed in Figs. 2 and 4), the undulated opposite edges D of the web B are gripped with a slight pressure. Thus the web is guided laterally at all times and is advanced longitudinally over a feed table 88 during movement of the turrets. When the turrets are at rest a predetermined desired portion of the web is held between the die parts at work station C. Feed table 88 is mounted on the frame 28.

In order to impart the proper pressure against the undulated edges of the web B for accurate gauging, while at the same time avoiding buckling the web material, particularly if of a lighter gauge, the engaging elements 86 of turret 11 are formed to operate under a light spring pressure. Elements 86 thus are carried on slides 92 which in turn have slight movement within the ends of arms 66. Each slide extends into a slideway or opening 93 formed in the outer end of each arm 66. A spring 94 is located in the opening (Figs. 3 and 4) at its inner end. The slides 92 are retained in their respective openings 93 by pins 95 carried in the arms and passing through slots 96 in the slides.

The turrets 11, 12 are operated in unison by a pair of geneva drives one for intermittently rotating each shaft 62 and 63. Barrel cams 97, 98 are used in such a drive, both cams being mounted on shaft 38 (Fig. 5). These cams have respective cam grooves or raceways 102, 103 which include a right hand helix and a left hand helix with straight and parallel sections of each raceway at the terminal ends thereof.

Disks 104, 105 are mounted on the lower ends of the respective vertical shafts 62, 63 (Figs. 1, 3 and 5). Disk 104 on shaft 62 carries a plurality of spaced cam rollers 106 rotatably held on pins 107. There are preferably eight of these rollers and each roller is engaged in turn and traverses the entire length of the raceway 102 in the cam 97. In like manner disk 105 carries eight rollers 108 each mounted on a corresponding pin 109. Thus with each rotation of the shaft 38 an intermittent movement and a dwell period is effective for each turret and both turret movements are synchronized for advancing the web and for accurately gauging it in desired position at the working station C.

Consideration may now be given to the feed rollers H. These include an upper feed roller 113 (Figs. 1, 2, 4 and 5), and a lower roller 114. The former is mounted on a trunnion shaft 115 and the lower roller is mounted on a similar lower trunnion shaft 116. Both shafts are journaled in suitable bearings in the frame 28. These rollers are operated intermittently and in time with the feeding and gauging turrets 11, 12 in the following manner: A pair of intermeshing spur gears 117 is mounted, one on the end of each of the shafts 115, 116. A helical gear 118 is mounted on the shaft 115 and is driven by a helical drive gear 122 mounted on the upper end of the vertical shaft 63 (see also Fig. 3).

By means of this connecting drive when the rollers 113, 114 are brought to rest one of four flattened sections 123 on the upper roller 113 is directly above the web. There now being a space between the two rollers, they no longer have any holding effect or action on the web B which at such a time is held stationary entirely by the turrets 11, 12. This continues during the work performing operation. Therefore, each partial or intermittent rotation of the roller 113 is through 90 degrees of travel and four cooperating feeding operations take place during a single complete rotation of the feed rollers H.

The work operation may consist of the blanking out of circular discs from the web B as shown in Fig. 2. For such non-rectangular blank cutting a skeleton K remains at the forward end of the web. Provision is made for rapid disposal of this skeleton K by shearing an overhanging perforated part, identified by the letter L (Fig. 1) from the rest of the web. A cut-off knife 126 secured to the movable slide 22 of the press J coacts with a stationary knife 127 secured to the end of the bolster plate 17 for this purpose. The cut sections L drop by gravity from alongside the press J, this being a conventional scrap cutting operation.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a mechanism for accurately feeding a strip having an undulated edge as an incident to preparing articles therefrom, the combination of spaced turrets located at opposite edges of said strip, a said turret having radially movable means thereon for fitting into the adjacent undulated edge and for gauging the position of said strip, means for moving said radially movable means into engagement with opposite edges of the strip, and means for intermittently rotating a said turret to accurately advance said strip by its engaged undulated edge, said turret holding the strip in a definite position in between its intermittent rotations for preparation of said articles.

2. In a mechanism for accurately feeding a strip having undulated edges as an incident to preparing articles therefrom, the combination of means for advancing the strip a predetermined distance to position a portion of the strip in an operating station, spaced gauging turrets located on opposite sides of said strip and having radially movable means thereon coacting with said advancing means for moving the strip longitudinally by engaging the opposite undulated edges of the strip to accurately locate and hold the strip in said station, and means for urging said radially movable means into engagement with the opposite undulated edges of the strip for the purpose described.

3. In a mechanism for accurately feeding a strip having undulated opposite edges as an incident to preparing articles therefrom, the combination of means for advancing the strip a predetermined distance longitudinally to position a portion of the strip in an operating station, spaced gauging turrets located on opposite sides of said strip and coacting with said advancing means for controlling the movement of the strip, radially movable peripherally spaced means on said turrets for engaging the opposite undulated edges of the strip to accurately position the same before each article preparing operation and to hold the strip during said operation, and means for urging said radially movable means on the turrets into yieldable engagement with the opposite undulated side edges of said strip during the feeding operation.

4. In a mechanism for accurately feeding a strip having an undulated edge as an incident to preparing non-rectangular articles therefrom, the combination of means for advancing the strip a predetermined distance longitudinally to position a portion of the strip in an operating station, a gauging turret located at a side of said strip and coacting with said advancing means for controlling the movement of the strip, radial arms slidable in said turret, means cooperating with said turret for moving said arms radially of the turret towards an edge of said strip, and means carried on said arms for yieldingly engaging the undulated edge of the strip to accurately position the strip before each operation and to hold the strip during a said operation.

5. In a mechanism for accurately feeding a strip having undulated opposite edges as an incident to preparing articles therefrom, the combination of a pair of intermittently engageable feed rollers for advancing the strip a predetermined distance longitudinally to position a portion of the strip in an operating station, rotatable spaced gauging turrets located on opposite sides of said strip and coacting with said feed rollers for feeding the strip and operating independently thereof for controlling the gauging of the said strip at said operating station, said turrets having a plurality of radially disposed slideways, a plurality of arms carried on said gauging turrents with one of said arms slidable in each of said slideways, means adjacent each turret for moving the arms radially in said turret slideways, spaced strip engaging members carried on said arms and movable in a straight line path of travel parallel to and in the direction of the advancing strip while engaging the opposite undulated edges thereof, and means on said arm moving means for holding said strip engaging members in said straight line path of travel during a portion of the rotation of said arms with a said turret, whereby to accurately position the strip before each operation and to hold the latter during said operation.

6. In a mechanism for accurately feeding a strip having undulated opposite edges as an incident to preparing non-rectangular articles therefrom, the combination of means for advancing the strip a predetermined distance longitudinally to position a portion of the strip in an operating station, intermittently operated gauging turrets located on opposite sides of said strip and coacting with said advancing means for feeding and for controlling the movement of the strip, said turrets having a plurality of radially disposed slideways, arms carried in said gauging turrets, a said arm being slidable in each of said slideways, a stationary cam located adjacent each of said gauging turrets for effecting the radial movement of said arms as the turrets rotate, spaced strip engaging means carried on said arms, an engaging means of one turret moving in unison with a corresponding engaging means on the other turret, means on said cam engaging each of said arms for holding the latter to a straight line path of travel parallel to and

in the direction of the advancing strip during a portion of a revolution of a said turret while said strip engaging means are in engagement with said strip on opposite sides thereof, each engaging means having an outer contour conforming to and fitting within opposite portions of the undulated edges of the strip when passing along said straight line to accurately position the strip before each operation and to hold the strip during said operation, and spring tension means cooperating with said arms for urging said strip engaging means on one of said turrets into yielding engagement with the adjacent undulated edge of said strip.

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REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
194,909	Germany	Feb. 3, 1908