Jan. 27, 1931. G. W. SWIFT, JR 1,790,559

WEB FEEDING MECHANISM

Filed July 9, 1928 4 Sheets-Sheet 1

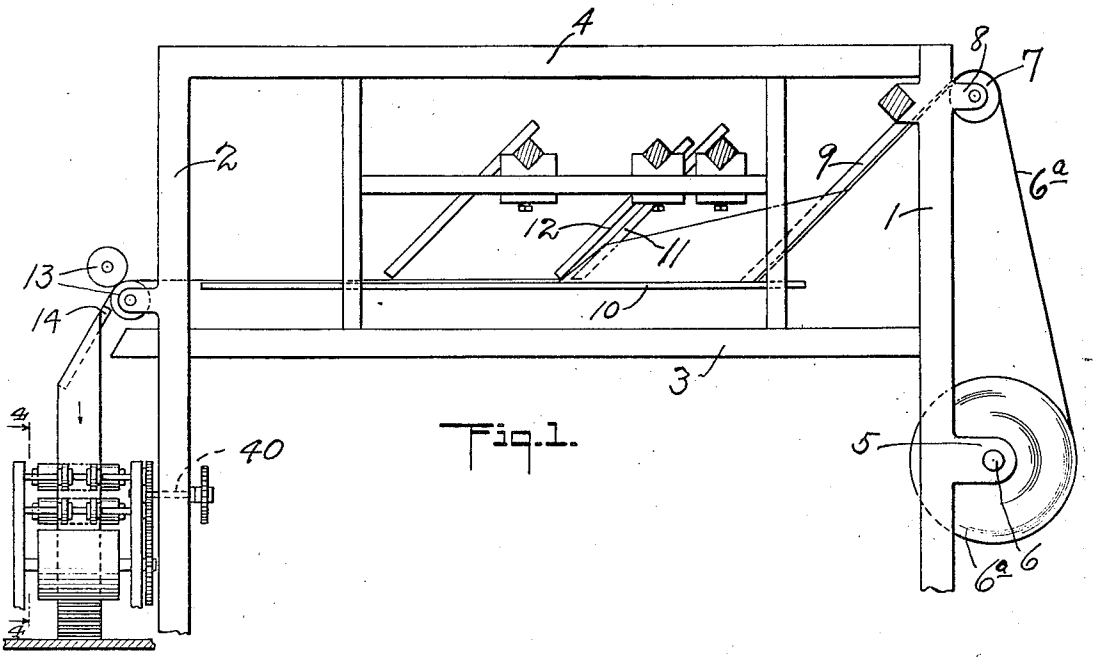


Fig. 1.

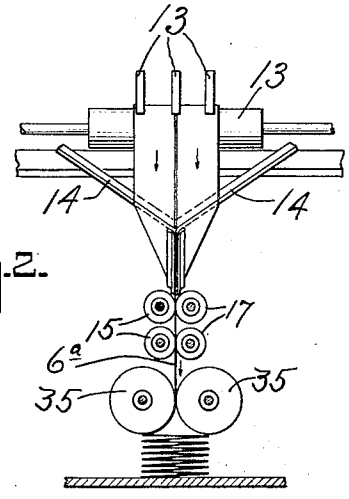


Fig. 2.

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WEB FEEDING MECHANISM

Filed July 9, 1928 4 Sheets-Sheet 2

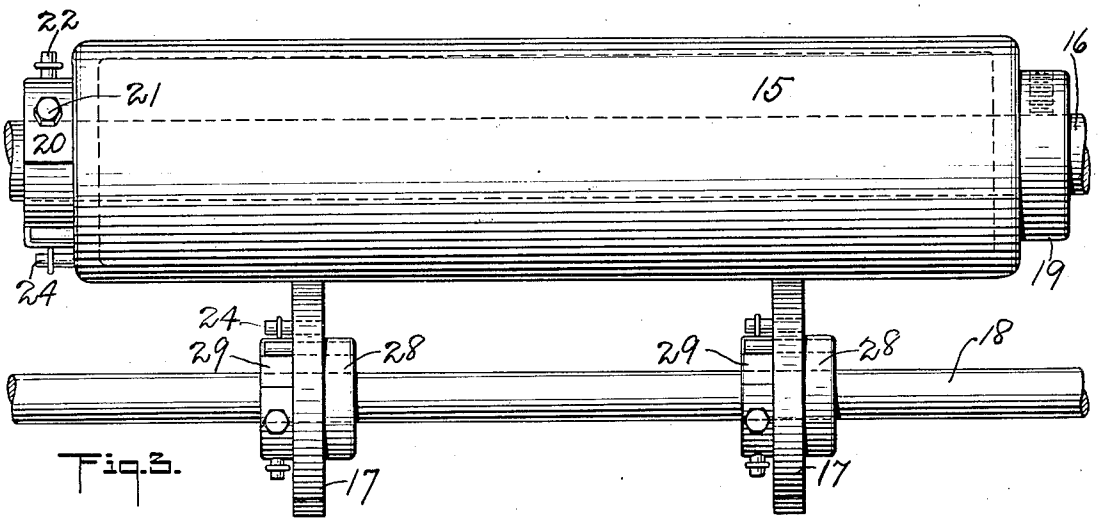


Fig. 3.

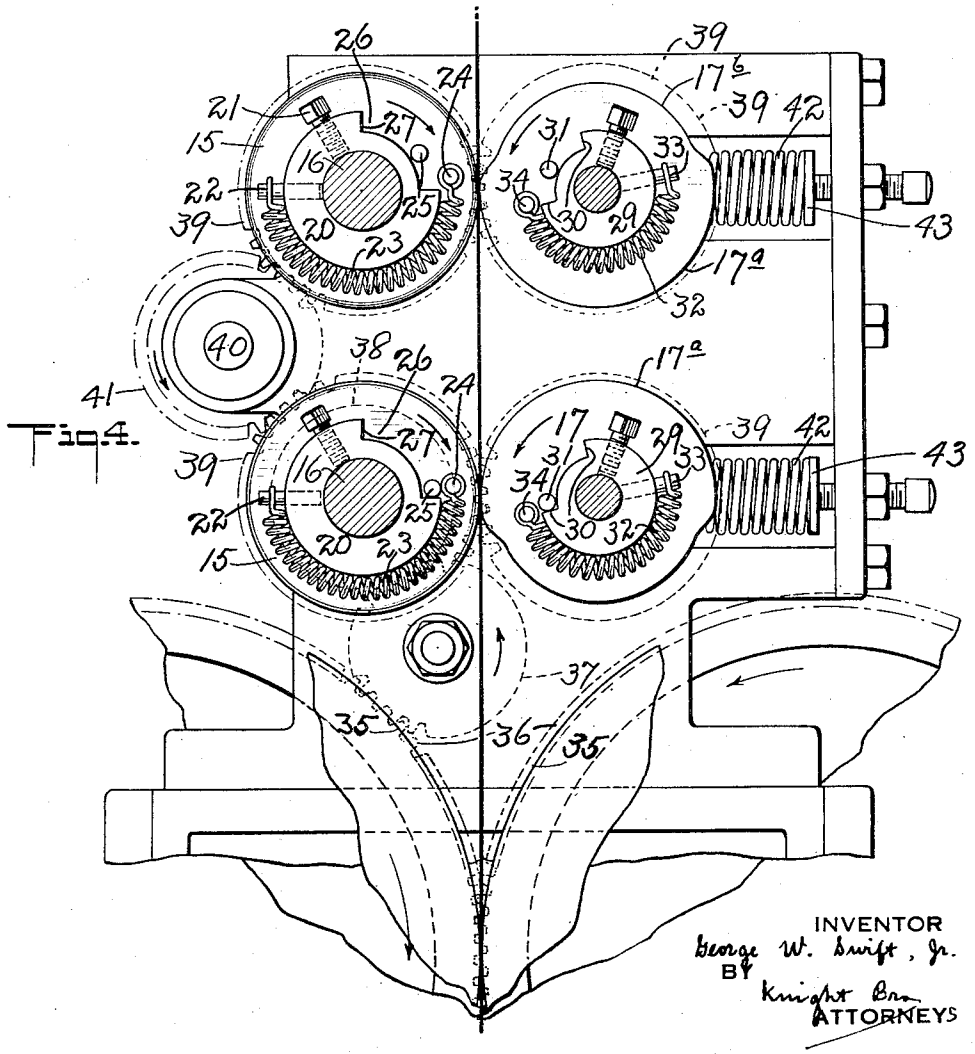


Fig. 4.

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WEB FEEDING MECHANISM

Filed July 9, 1928 4 Sheets-Sheet 3

Fig. 5.

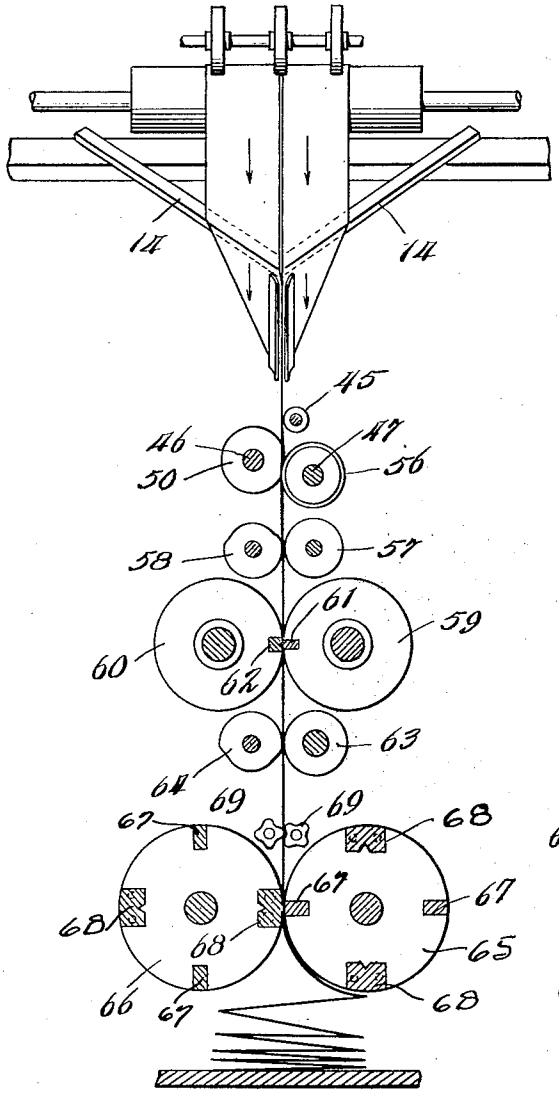
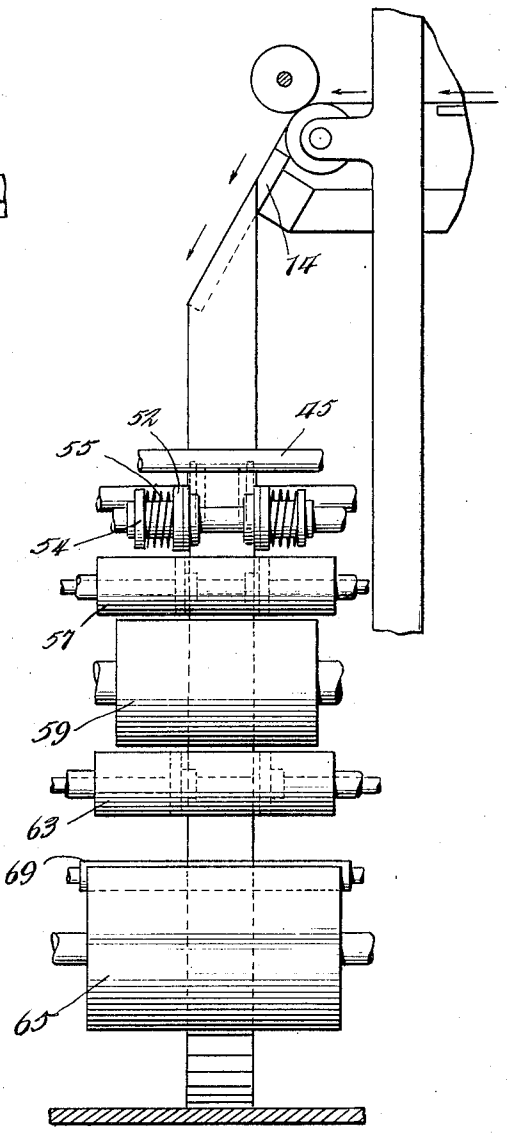


Fig. 6.



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WEB FEEDING MECHANISM

Filed July 9, 1928 4 Sheets-Sheet 4

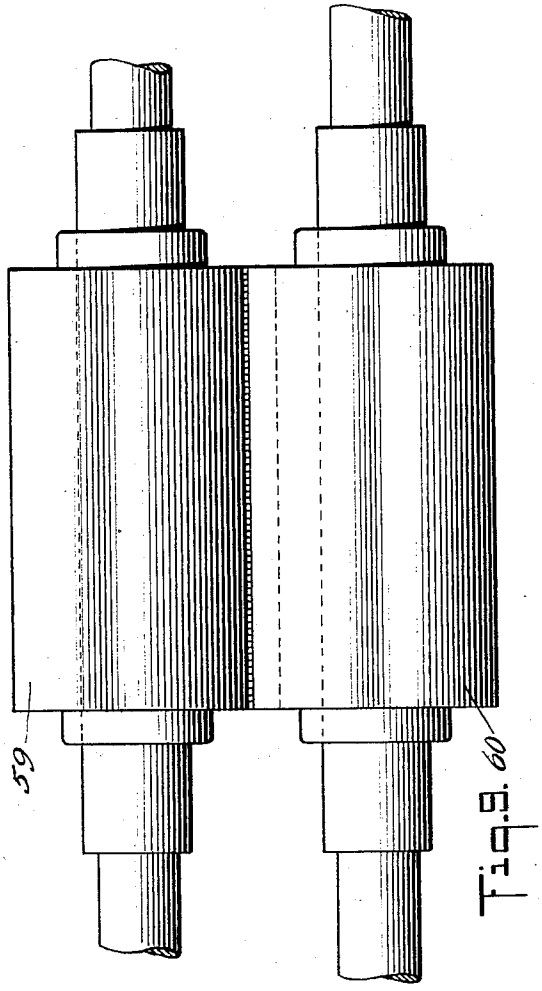


Fig. 9.

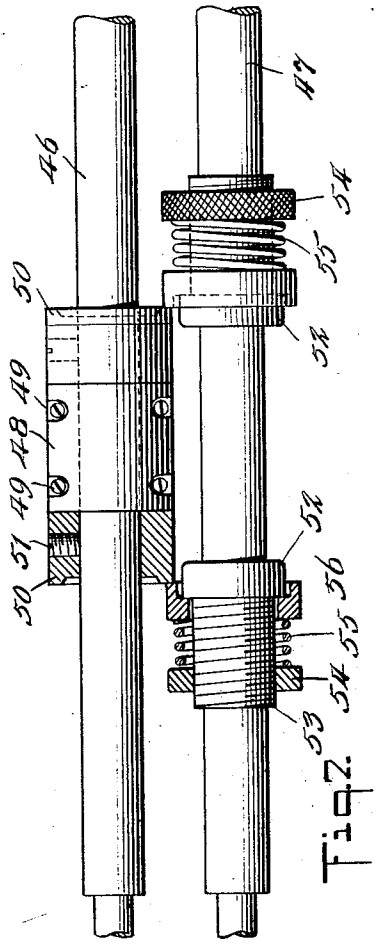


Fig. 7.

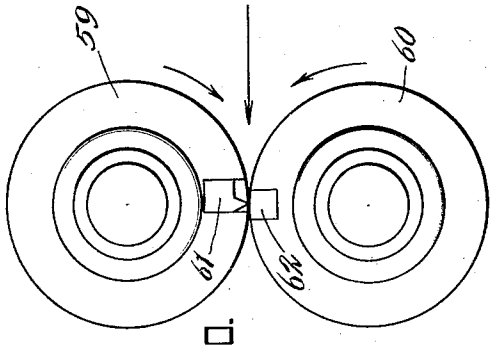


Fig. 10.

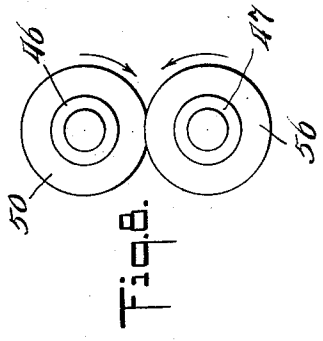


Fig. 8.

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UNITED STATES PATENT OFFICE

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WEB-FEEDING MECHANISM

Application filed July 9, 1928. Serial No. 291,338.

This invention relates more especially to that type of web-feeding mechanism in which continuously driven web-feeding rolls are arranged in successively operating pairs for maintaining a continuous movement of a web upon which they are arranged to operate.

The primary object of my invention is to provide an improved construction and arrangement of parts in web-feeding mechanism of this character wherein successive pairs of web-feeding elements may be adapted in alternation to periodically release their grip upon the web for the purpose of preventing the "creasing-in" of wrinkles which would otherwise be ironed in and thus cause imperfections in the product.

One of the objects of my invention is to provide improved web-feeding mechanism comprising successive couples of continuously rotating feed-rolls which are yieldably driven and adapted to operate intermittently, the arrangement being such that the feed-rolls of one couple are adapted to grip the web during the idle periods of the feed-rolls in the other couple.

Another object of my invention is to provide an improved adaptation of my invention wherein successive couples of intermittently operative web-feeding rolls are adapted to serve as auxiliary web-feeding mechanism for a machine which positively grips said web during its performance of certain functions in connection therewith.

Another object of my invention is to provide an improved construction and arrangement of segmental spring feeding mechanism in combination with web-slitting and web-perforating mechanisms.

An adaptation of my invention is shown on the drawings in connection with a continuously operating web-folding machine similar to that which is shown, described, and claimed in U. S. Patent No. 1,501,499, granted in my name under date of July 15, 1924. According to this patent, the web is first folded inwardly upon two lines which define a central unfolded zone; next, upwardly upon two other lines parallel with the first-mentioned lines, and finally upon a longitudinal line extending centrally through the unfolded central zone.

Another adaptation of my invention is shown in connection with a machine which imparts longitudinal folds to a continuous web, trims the lateral edges of said web, and perforates the web transversely at periodic intervals.

Certain minor features of my invention will be described in the following description and referred to in the appended claims.

In the drawings which show a preferred embodiment of my invention,

Figure 1 is a side elevation of the longitudinal web-folding mechanism referred to in my above-identified patent with my improved web-feeding mechanism attached thereto.

Figure 2 is an end elevation of the same taken from the left of Figure 1.

Figure 3 is an enlarged top plan view of one of the web-feeding couples.

Figure 4 is an enlarged vertical section corresponding to the line 4—4 of Figure 1, parts being broken away.

Figure 5 is a diagrammatic end elevation of a longitudinal web-folding machine in which my improved segmental feed mechanism is embodied in an improved arrangement with respect to web-slitting and web-perforating mechanisms.

Figure 6 is a front end side elevation of the same.

Figure 7 is a top plan view of the web-slitting mechanism detached.

Figure 8 is an end elevation of the same.

Figure 9 is a top plan view of the web-perforating mechanism detached; and

Figure 10 is an end elevation of the same.

Referring more particularly to the drawings, the upright frames 1 and 2 are connected by lower side bars 3 and upper side bars 4. Said upright frame 1 is provided with rearwardly presented lugs 5 in which is journalled a roll shaft 6 which carries a roll 6a of paper. Said web passes over a web-guiding roller 7 journalled in rearwardly presented lugs 8 near the top of uprights 1, and thence downwardly and forwardly around the outer edges of a pair of inclined

folding bars 9. As the web passes forwardly from the lower ends of folding bars 9, the central portion passes under transverse guide bars (not shown) and over a bed or platform 10, the lateral edge portions of said web being drawn inwardly between inclined folding bars 11 which have their lower ends adjacent to the bed or platform 10 but spaced therefrom to fold intermediate portions of the web down upon the central longitudinal portion thereof as it passes over the bed or platform 10. The lateral edge portions of the web 6 are next drawn outwardly from the folding bars 11 and folded downwardly upon the previously folded portions of said web as they pass beneath the bottom edges of folding frames 12 which complete the duplex doubly folded three-ply web. The web thus folded next passes between pressure rolls 13 and thence downwardly over folding bars 14 which are inclined forwardly and inwardly toward the central longitudinal plane of the machine and which are adapted to impart a final longitudinal fold which superimposes the three-ply doubly-folded lateral portions of the web one upon the other.

Referring now to Figures 3 and 4, two successively acting web-feeding couples are shown. Each of said web-feeding couples according to the embodiment of my invention shown in Figures 3 and 4, comprises an elongated feed-roll 15 which is freely journalled upon a shaft 16, and in cooperation therewith on the opposite side of the longitudinally folded web, a pair of axially-spaced feed rolls or segmental web-feeding disks 17 which are freely journalled upon a shaft 18. Secured to each shaft 16 at one end of the elongated feed-roll 15 thereon, is a collar 19 which cooperates with an abutment disk or collar 20 at the other end of said feed-roll for preventing axial displacement of said feed-roll. The abutment disk or collar 20 is secured to the shaft 16 by means of a set screw 21 and is provided with a radially presented post 22 to which is connected one end of a helical spring 23. The spring 23 extends part-way around the periphery of disk 20 and has its other end connected to a pin 24 which is presented axially from the adjacent end of the feed-roll 15. A stop pin 25 with which the feed-roll 15 is provided, is adapted to move to and fro within a peripheral recess 26 formed in the disk 20, said peripheral recess being provided at opposite ends with radial shoulders or abutments 27 for confining the movement of pin 25 and thus limiting the angular movement of the feed-roll 15 with respect to its shaft 16. In a similar manner, each of the segmental disks 17 is held against axial displacement upon its shaft 18 by means of a fixed collar 28 on one side thereof and a recessed abutment disk 29 on the other side thereof, each of said abutment disks being provided with radial abutments 30 between which moves a stop pin 31 which projects laterally from the disk 17. A helical spring 32 is connected at one end to a post 33 carried by each abutment disk 29 and has its other end connected to a pin 34 carried by the disk 17. Each of said segmental disks 17 is provided with a segmental web-engaging portion 17*a* which is adapted to cooperate with the periphery of the elongated feed-roll 15 with which it is coupled. Said disk is also provided with a relatively depressed peripheral portion 17*b* which, as it passes the periphery of elongated feed-roll 15, affords a breathing interval for the web passing between it and said feed-roll. From an inspection of Figure 4, it will be understood that the segmental portions 17*a* of the segmental web-feeding disk 17 in the lower web-feeding couple, are displaced 180 degrees with respect to the segmental portions 17*a* of the segmental feed disks of the upper web-feeding couple. In effect, therefore, the larger portion of the web-feeding effect of each couple is exerted alternately with respect to that of the other couple. It will be apparent, however, that both of said couples positively grip the folded web during brief periods of time at the beginning of each period of activity.

According to the embodiment of my invention shown in Figures 1 to 4 inclusive of the drawings, my invention contemplates an arrangement of successive web-feeding couples to serve as an auxiliary feeding mechanism for a machine which in addition to certain prescribed functions which are performed upon the web, is subjected to the burden of positively gripping and feeding the web therethrough. For the purpose of supplying this auxiliary feed to the web, the present invention contemplates in conjunction with the positively acting draw of said machine, the provision of successive couples of web-feeding elements which operate with a yieldable pull at periodic intervals and with the active periods of said couples timed in alternation. As exemplified on the drawings, the web-engaging elements of the machine are represented by cylinders 35 which are power-driven and connected to rotate in unison by means of intermeshing spur-gears 36 to one of which power is transmitted by means of an idler gear 37 which meshes into and is driven by a spur-gear 38 keyed to the lower left hand feed-roll shaft 16 according to Figure 4. Each of the auxiliary feed-roll shafts 16 and 18 is provided with a spur-gear 39 by means of which the shafts of each web-feeding couple are geared together. A power shaft 40 is provided with a driving pinion 41 which delivers power to the left-hand spur-gear 39 of each web-feeding couple. Suitable means for applying pressure to the cooperating web-feeding

elements may be provided by means of compression springs 42 which may be interposed between adjustable abutment disks 43 and the bearings of the feed-roll shafts 18.

Referring now to Figures 5 to 10 inclusive of the drawings, another embodiment of my invention is shown in connection with the delivery end of a web-folding machine of similar type to that illustrated in Figure 1 of the drawings. Thus, as shown in Figures 5 and 6, the folded web after passing between upper and lower pressure rolls 13, has its final longitudinal fold imparted thereto as it is drawn downwardly over the downwardly and inwardly inclined folding bars 14.

Referring to Figures 5 and 6, the longitudinally folded web as it moves from folding frame 14 is engaged on one side by deflecting roll 45 which supports and guides the folded web as it approaches a lateral edge trimming device. As shown in Figures 7 and 8, this trimming device is mounted upon spaced parallel shafts 46 and 47 arranged on opposite sides of the folded web. Rigidly mounted upon the shaft 46 is a spacer block 48 constructed in sections, said sections being secured to the shaft by means of screws or bolts 49. Abutting against opposite ends of the spacer block 48 are oppositely presented cutter disks 50 which are secured to the shaft 46 by means of set-screws 51. The shaft 47 carries axially spaced abutments or collars 52, each of said abutments being provided with a threaded sleeve 53 upon which is threaded a knurled nut 54. This nut 54 is adapted to regulate the tension in a compression spring 55 which is interposed between the nut 54 and a cutter disk 56 which is presented oppositely to and has running engagement with the cutter disk 50 corresponding thereto.

Auxiliary web-feeding means for maintaining a proper tension on the web as it is drawn between the cutters 50 and 56, are arranged below said cutters and preferably include a loosely journalled elongated feed-roll 57 similar in construction and operation to the roll 15 shown in Figure 3 and at the other side of said web, laterally spaced segmental disks 58 which are similar in construction and operation to the segmental disks 17 shown in Figure 3.

As the longitudinally folded web passes downwardly from the auxiliary web-feeding means, it passes between oppositely arranged cylinders 59 and 60 which as shown in Figures 9 and 10, are provided with perforator bars 61 and 62 respectively as indicated in Figure 10 for imparting a series of transverse perforations to the folded web as it moves downwardly between the cylinders 59 and 60.

In order to facilitate the movement of the folded web between said perforator cylinders, an additional auxiliary web-feeding device is arranged below said cylinders and comprises an elongated feed-roll 63 and axially spaced segmental disks 64 oppositely arranged with respect thereto, these elements being substantially similar in construction and operation to those shown in Figures 3 and 4.

According to the present embodiment of my invention, two cooperating fan-fold cylinders 65 and 66 are arranged to receive the trimmed longitudinally folded and transversely perforated web, said cylinders being provided with cooperating web-folding elements 67 and 68 by means of which said cylinders are adapted to impart the zigzag folds to the folded web as indicated at the bottom of Figure 5. Interposed between the auxiliary feed rolls 63, 64 and the cylinders 65, 66 are cooperating star-rolls 69 between which the longitudinally folded web passes prior to the transverse folding imparted thereto by cylinders 65 and 66. The purpose of star feed-rolls 69 is to keep the longitudinally folded web brushed out straight so that it will be properly registered in respect to the folding blades mounted in the cylinders 65 and 66. The folded web is thus prevented from being drawn back or out of alignment. The star feed-rolls 69 are made relatively small so that they may be placed as near as possible to the folding cylinders for securing the best results.

I claim:—

1. In a web-feeding mechanism, the combination of a pair of feed-rolls arranged on opposite sides of a web and having their peripheries cooperatively engaging said web, and means for yieldably driving said feed-rolls, one of said feed-rolls being segmental in form to adapt said feed-rolls to operate intermittently upon said web.

2. In a web-feeding mechanism, the combination with two pairs of feed-rolls, the feed-rolls of each pair being arranged on opposite sides of a web to be fed thereby, of means for yieldably driving one of said feed-rolls of each pair, one of said feed-rolls of each pair being segmental in form and periodically operative on the web at different times than the segmental roll of the other pair of feed-rolls.

3. In a web-feeding mechanism, the combination with a pair of feed-rolls arranged on opposite sides of a web, one of said feed-rolls being segmental in form to permit an intermittent cooperation of said feed-rolls for feeding said web, and means for yieldably driving one of said feed-rolls, said driving means being adapted to come into unyielding driving relation to said yieldably driven feed-roll after a predetermined amount of yield.

4. In a web-feeding mechanism, the combination with a pair of feed-roll shafts arranged on opposite sides of a web, of a feed-roll freely journalled upon each of said

shafts, and a yieldable driving connection between each of said feed-rolls and the shaft upon which it is journalled, said feed-rolls cooperatively engaging said web in the common plane of their axes.

5. In web-feeding mechanism, the combination with a plurality of power-driven shafts arranged in pairs, of a feed-roll freely journalled on each of said shafts, and a yieldable driving connection between each of said feed-rolls and the shaft upon which it is journalled, one of the feed-rolls in each pair of shafts being provided with a segmental peripheral portion operative upon the other feed-roll in that pair during a portion only of each rotation.

6. In web-feeding mechanism, the combination with a plurality of paired shafts geared together to rotate in unison, the shafts of each pair being arranged on opposite sides of the plane of feed, of a feed-roll freely journalled on one shaft of each pair of said shafts, a segmental feed-roll freely journalled on the other shaft of each pair of said shafts, and a yieldable driving connection between each of said feed-rolls and the shaft upon which it is journalled, said pairs of feed-rolls being operative for feeding the web during alternate periods of activity.

7. In web-feeding mechanism, the combination with a feed-roll rotatable about an axis, of a shaft rotatable about an axis parallel to the axis of said feed-roll, axially-spaced segmental feed-rolls freely journalled on said shaft, said segmental feed-rolls being adapted to intermittently cooperate with the first-mentioned feed-roll, and a yieldable driving connection between each of said segmental feed-rolls and said shaft.

8. In web-feeding mechanism, the combination with two feed-rolls rotatable on parallel axes on one side of a web, of means for yieldably driving each of said feed-rolls, a rotary shaft arranged opposite to each of said feed-rolls on the other side of said web, and a segmental feed-roll mounted on and driven by each of said shafts.

9. In web-feeding mechanism, the combination with two rotary feed-rolls engaging one side of a web, of means for yieldably driving said feed-rolls, rotary shafts mounted oppositely with respect to said feed-rolls respectively, segmental feed-rolls freely journalled on each of said shafts and engaging the other side of said web, yieldable driving connections between each of said segmental feed-rolls and the shaft upon which it is journalled, and means for rotating said shafts in unison, one of said segmental feed-rolls being arranged 180 degrees in advance of the other of said segmental feed-rolls.

10. Web-feeding mechanism comprising a plurality of pairs of feed-roll shafts, the feed-roll shafts of each of said pairs being arranged on opposite sides of a web to be fed, a feed-roll freely journalled on each of said shafts, driving disks secured to said shafts, said driving disks being arranged adjacent to said feed-rolls respectively, and a helical spring extending part-way around each of said driving disks and having its opposite ends secured to said driving disk and feed-roll respectively, one of said feed-rolls in each pair having a segmental periphery to permit a release of the web during each revolution of the segmental feed-roll.

11. Web-feeding mechanism comprising successive pairs of feed-roll shafts oppositely arranged with respect to a web, means positively connecting all of said feed-roll shafts to rotate in unison, and a feed-roll freely journalled on each of said shafts, said feed-roll being provided with a yieldable driving connection with its shaft.

12. Web-feeding mechanism comprising successive pairs of feed-roll shafts positively geared together to rotate in unison and oppositely arranged with respect to a web, a feed-roll freely journalled on each of said shafts, one of said feed-rolls in each pair being provided with a segmental contour to permit a periodic release of the web at that point, and a yieldable connection between each of said shafts and the feed-roll journalled thereon.

13. In web-feeding mechanism, the combination with two power-driven shafts arranged on spaced parallel axes on one side of a continuously moving web, a feed-roll freely journalled on each of said shafts and having their peripheral surfaces operating on said web, a yieldable driving connection between each of said shafts and the feed-roll journalled thereon, and segmental feed-roll disks cooperatively arranged with respect to said feed-rolls respectively.

14. In web-feeding mechanism, the combination with two power-driven shafts geared together and arranged on spaced parallel axes on one side of a continuously moving web; of a feed-roll freely journalled on each of said shafts and operating on said web, a yieldable driving connection between each of said shafts and the feed-roll journalled thereon, a shaft geared to each of the first-mentioned shafts and arranged on the opposite side of said web, segmental feed-rolls freely journalled on the last-mentioned shafts, and a yieldable driving connection between each of said segmental feed-rolls and the shaft upon which it is journalled.

15. In web-feeding mechanism, the combination with a plurality of paired shafts geared together to rotate in unison, the shafts of each pair being arranged on opposite sides of a continuously moving web, of an elongated feed-roll freely journalled on one of the shafts in each pair of shafts, axially-spaced segmental feed-rolls freely journalled on the other shaft of each pair of shafts, a driving

disk for each of said elongated feed-rolls, a driving disk for each of said segmental feed-rolls, each of said driving disks being secured to the shaft upon which the corresponding elongated or segmental feed-roll is journalled, and a yieldable driving connection between each of said driving disks and the feed-roll corresponding thereto.

16. In a machine of the character described, the combination with a pair of cooperating cylinders adapted to operate upon a longitudinally folded web, of continuously running web-feeding mechanism adapted to feed a longitudinally folded web to said cylinders, said web-feeding mechanism comprising two power-driven shafts arranged on spaced parallel axes on one side of said web, a feed-roll freely journalled on each of said shafts and having their peripheral surfaces operating on said folded web, a yieldable driving connection between each of said feed-rolls and the shaft upon which it is journalled, and segmental feed-rolls cooperating with the first-mentioned feed-rolls respectively and operating on the other side of said web, and cooperating star feed-rolls interposed between said continuously running web-feeding mechanism and said cooperating cylinders, said star feed-rolls being of relatively small diameter in respect to said cooperating cylinders and disposed in close juxtaposition thereto within the angular space formed between the peripheries of said cylinders.

17. In a web-feeding mechanism, the combination of two pairs of cooperating feed-rolls, one feed roll in each of said pairs being yieldably driven, one pair of said cooperating feed-rolls being spaced from the other pair of said cooperating feed-rolls longitudinally of a web fed thereby, one of the feed-rolls in each of said pairs having a portion of its periphery removed to render it operative for only a portion of each revolution.

18. In a web-feeding mechanism, the combination of two pairs of cooperating yieldably driven feed rolls, one feed roll in each of said pairs being of segmental form to render it periodically operative, one pair of said cooperating feed-rolls being spaced from the other pair of said cooperating feed-rolls longitudinally of a web fed thereby.

19. In a web-feeding mechanism, the combination of cooperating cylinders arranged on opposite sides of and operating upon a web passing between them, a pair of yieldably-driven feed-rolls operating upon said web for feeding it to said cooperating cylinders, and a pair of star feed-rolls interposed between said yieldably-driven feed-rolls and said cooperating cylinders.

20. In a web-feeding mechanism, the combination of cooperating cylinders arranged on opposite sides of and operating upon a web passing between them, a pair of yieldably-driven feed-rolls operating upon said web for feeding it to said cooperating cylinders, and a pair of star feed-rolls interposed between said yieldably-driven feed-rolls and said cooperating cylinders, said star-feed rolls being of relatively small diameter with respect to said cooperating cylinders and within the angular cylindrical space formed between said cylinders on the side towards said yieldably-driven feed-rolls.

21. In a machine of the character described, web-feeding mechanism comprising two pairs of power-driven shafts, the shafts of each pair being oppositely arranged with respect to said web, a feed-roll freely journalled on each of said shafts, and a yieldable driving connection between each of said feed-rolls and the shaft upon which it is journalled, each pair of said feed-rolls being periodically operative upon said web at times during which the other pair of said feed-rolls are inoperative.

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