

June 25, 1957

A. J. BENNETT

2,796,930

CONTINUOUS ROLL FEED DEVICE

Filed Oct. 5, 1954

2 Sheets-Sheet 1

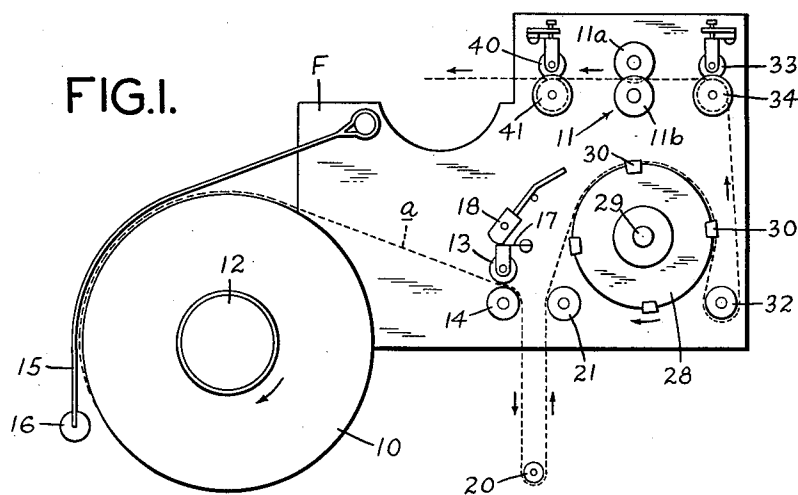
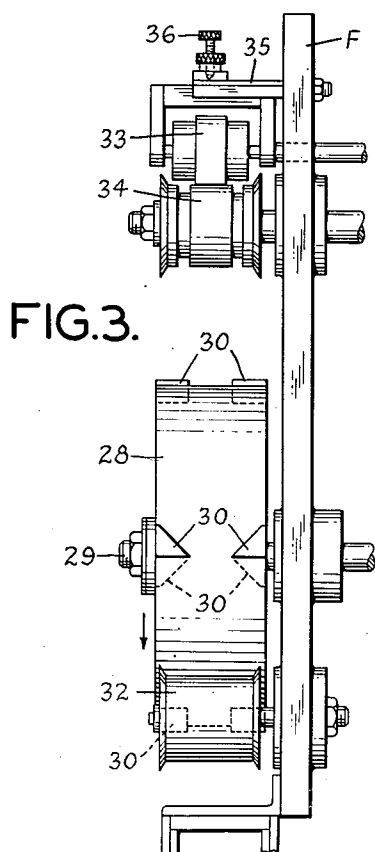
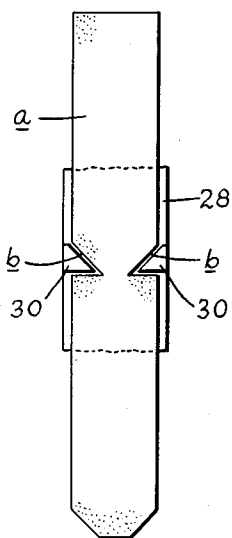


FIG. 4.



A. J. BENNETT
INVENTOR
Campbell, Brumbaugh
BY Free and Graves
ATTORNEY

June 25, 1957

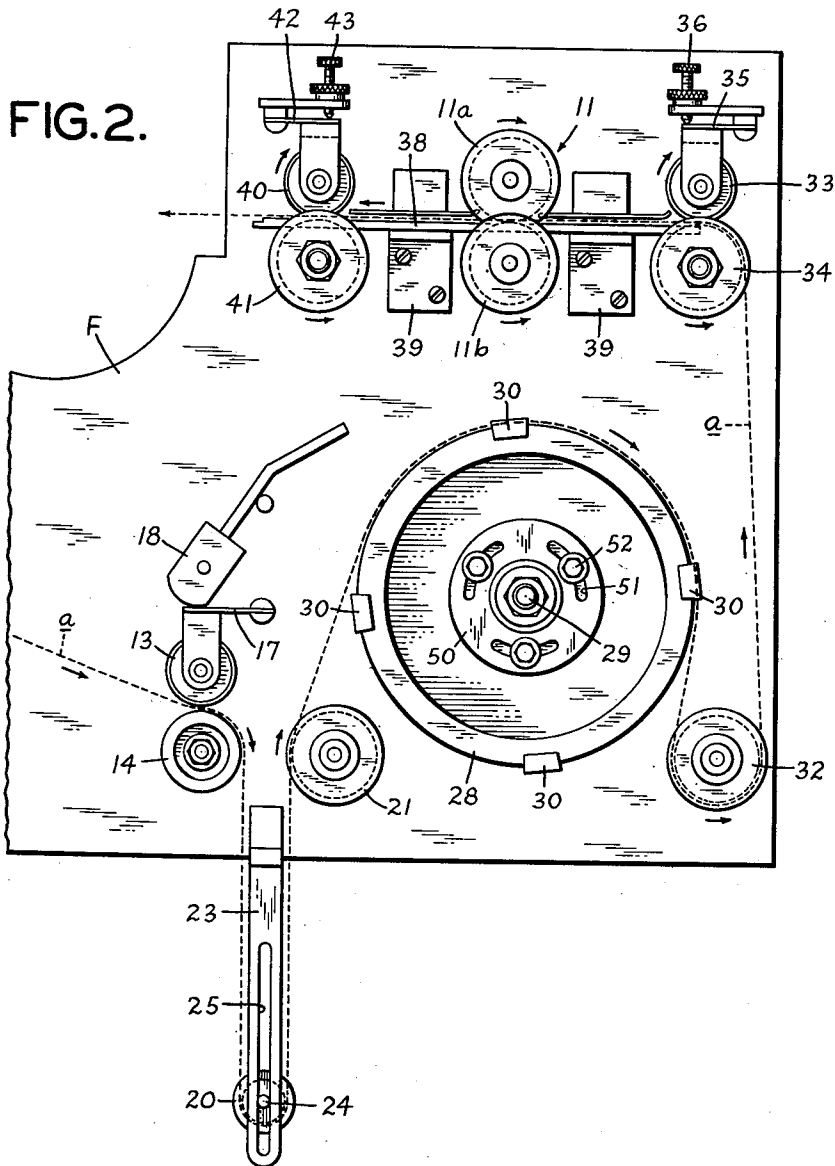
A. J. BENNETT

2,796,930

CONTINUOUS ROLL FEED DEVICE

Filed Oct. 5, 1954

2 Sheets-Sheet 2



A. J. BENNETT
INVENTOR
Campbell, Brumbaugh,
BY Free and Graves
ATTORNEY

1

2,796,930

CONTINUOUS ROLL FEED DEVICE

Arthur J. Bennett, North Bergen, N. J., assignor to Thomas J. Lipton, Inc., Hoboken, N. J., a corporation of Delaware

Application October 5, 1954, Serial No. 460,346

7 Claims. (Cl. 164—68)

This invention relates to web feeding systems, and more particularly to a system for continuously feeding, under relatively light, uniform tension, a frangible web while maintaining a predetermined registration at all times between the web and the feed system.

The present invention is particularly applicable to, although not limited to, a system for feeding a chain of connected envelopes to a cutting mechanism which severs the chain at predetermined locations to form individual envelopes of the kind used for making tea bags. In order to insure that the cutting mechanism will come into cutting contact with the envelope chain at the desired location, the envelope chain is delivered thereto by feed means properly synchronized with the cutting mechanism.

Toward this end the feed mechanism is provided with a rotatable index wheel which travels at a predetermined speed ratio with respect to the operation of the cutting mechanism, and the envelope chain is accurately registered with respect to the periphery of the rotatable index wheel. The distance of the path of travel of the envelope chain between the index wheel and the cutting mechanism is such that when the envelope chain is in proper registration with the index wheel, the envelope chain will be properly presented to the cutting mechanism to insure that the envelopes will be severed at the desired locations.

Registration between the rotatable index wheel and the envelope chain is maintained by forming notches along both edges of the envelope chain and by equipping the periphery of the index wheel with notch-engaging lugs which are adapted to enter the notches when properly registered therewith. The periphery of the wheel contains a number of such lugs spaced apart at distances equal to the lengths between the notches on the envelope chain, and the envelope chain is guided into operative contact with the periphery of the wheel and with the notch-engaging lugs for at least a portion of its circumference.

A special feature of the feed system of the present invention is the means for actually maintaining the continuous travel of the envelope chain without mutilation by the notch-engaging lugs and without fracture due to excessive stresses. The envelope chain is delivered from a roll to the driven index wheel by a set of feed rolls and from the index wheel to the cutting mechanism by another set of feed rolls. Thus, positive feed means are provided for the envelope chain both before and after its contact with the index wheel, the two sets of feed means preventing excessive pressure between the lugs carried by the index wheel and the notches formed along the edges of the envelope chain. In addition, means are provided to maintain a uniform, light tension on the envelope chain to prevent fracture and the formation of slack.

These and other features of the present invention will be apparent from the detailed description which follows and by reference to the accompanying drawings in which:

Fig. 1 is an illustrative view of the feeding apparatus of the present invention;

2

Fig. 2 is an enlarged representation of a portion of the system illustrated in Fig. 1;

Fig. 3 is an end view of the apparatus shown in Fig. 2, looking from the right hand side, with the envelope chain removed; and

Fig. 4 is a view illustrating a portion of the envelope chain in registered relationship with the lugs carried by the index wheel.

The present invention is shown and described herein as applicable to a machine for producing individual envelopes adapted for use in making tea bags. The envelope chain is supplied from a roll 10 to a cutting mechanism, generally designated 11, following a path indicated by the broken lines *a* of Figs. 1 and 2, and the cutting mechanism severs the envelope chain into individual envelopes.

The apparatus of the present invention is supported by one or more frames *F*, and the operating parts are driven by a suitable gear transmission not shown.

The roll 10 of the envelope chain is supported upon a shaft 12, and the roll is free to rotate in the direction of the arrows as the envelope chain is fed therefrom by a pair of feed rolls 13, 14. To prevent the envelope chain from being unwound too rapidly, a drag member 15 is maintained in frictional contact with the periphery of the roll 10 by a weight 16.

The lower feed roll 14 is a driven roll having a circumference equal to the envelope length, and the upper roll 13 is a rubber pressure roll suspended from a flexible spring member 17 which tends to urge the roll 13 toward a raised position. The pressure roll 13 is maintained in operative pressure relationship with respect to the lower drive roll 14 by the engagement of a quick-acting cam 18 with the spring member 17. When the machine is not in operation, the cam will be shifted to the inoperative position, thereby permitting the spring mounting 17 to maintain the roller 13 in raised position to facilitate the insertion of a new envelope chain therebetween.

After passing between the feed rolls 13, 14, the envelope chain is then guided downwardly around a roll 20 mounted for vertical movement between a pair of vertically disposed supporting brackets 23 (only one of which is shown in the drawings). The extreme ends of the shaft 24 supporting the roll 20 engage vertically disposed slots 25 formed in the brackets 23, and the axis of the roll 20 is, therefore, free to be raised or lowered. During the feeding operation, the envelope chain in passing around the lower periphery of the roll 20 supports the weight of the roll above its lowermost position, and the roll 20 thereby serves as a gravity take-up to prevent the formation of slack and to maintain the chain in contact with an idler roll 21. The idler roll 21 is spaced apart from, but substantially on the same level as the feed roll 14.

After passing around the roll 20 and in contact with the idler roll 21, the envelope chain is guided around a portion of a circumference of a driven index wheel 28 which is rotatably supported upon a shaft 29. As mentioned above, the index wheel serves to advance the envelope chain in predetermined registration therewith to insure that it is properly presented to the cutting mechanism 11 so that the latter will sever the chain at the desired locations.

To insure proper registration, the envelope chain, as best shown in Fig. 4, is provided with notches *b* formed along both edges of the chain, and the periphery of the registration wheel 28 is provided with a plurality of oppositely disposed pairs of lugs 30 which mesh with the notches. The rotation of the index wheel 28 is so synchronized with the operation of the cutting mechanism that proper presentation of the envelope chain to the

3

cutting mechanism is insured when the lugs are in the desired engagement with the notches *b*.

The envelope chain forms substantially a semi-circle around the periphery of the index wheel 28, and upon leaving engagement therewith, the envelope chain travels downwardly around a fixed idler roll 32, whereupon it travels upwardly to the lower driven feed roll 34 of a pair of feed rolls 33, 34. The circumference of the feed roll 34 is preferably slightly greater than the length of a single envelope, and therefore slightly greater than the circumference of the feed roll 14, although it is driven at substantially the same angular speed. The upper roll 33 is a pressure roll suspended from the resilient member 35 which normally urges the roll 33 toward a raised position out of pressure contact with the lower roll 34 to facilitate the initial insertion of the envelope chain therebetween. The roll 33 is maintained during the operation of the machine in pressure contact with the roll 34 by an adjustable set screw 36 which resists the action of the resilient member 35. The set screw 36, of course, makes it possible to vary the pressure exerted by the upper roll 33 against the envelope chain. The feed rolls 33, 34 maintain the forward advance of the envelope chain toward the cutting mechanism, insuring a uniform tension in the envelope chain between the index wheel 28 and the feed rolls 33, 34 at all times.

The cutting mechanism 11 comprises upper and lower rotary members 11a and 11b, respectively, one or both carrying knife blades for severing the envelope chain into individual envelopes. The envelope chain is guided between the feed rolls 33, 34 and the cutting mechanism 11 by a horizontally disposed platform 38 supported by brackets 39 which are mounted to the frame F. After the envelopes are severed, they are then guided across the platform 38 toward the feed rolls 40, 41, which feed rolls resemble the feed rolls 33, 34, except that the circumference of the lower driven roll 41, like the roll 14, is equal to the envelope length, whereas the circumference of the roll 34 is slightly greater.

The upper feed roll 40 is a pressure roll normally suspended from a resilient member 42 which is normally urged upwardly to an inoperative position, but the roll 40 is maintained in the desired pressure relationship with the lower roll 41 by the adjustable set screw 43. The feed rolls 40, 41 engage the leading edge of the envelope before it is severed by the cutting mechanism and feed the individual envelopes into the receiving end of a tea bag machine (not shown) at the proper rate, the tea bag machine forming no part of the present invention.

An important feature of the machine is the relationship between the feed rolls 13, 14 and the feed rolls 33, 34, the former feeding the envelope chain from the roll 10 to the index wheel 28 and the latter feeding the envelope chain from the index wheel 28 to the cutting mechanism 11. The feeding effect of both sets of feed rolls is intended to insure that the lugs 30 on the index wheel 28 do not excessively pull on the frail envelope edges during the rotation of the driven index wheel. Thus, the only force that the lugs 30 exert on the envelope is due to the weight of the roll 20 less the frictional force between the envelope chain and the periphery of the index roll.

It may also be noted that the circumferences of the driven feed rolls 14 and 41 are substantially equal, and about the envelope length, whereas the circumference of the driven feed roll 34 is slightly greater than the envelope length. All, however, are driven at the same angular speed of rotation, with the result that the linear speed of the periphery of the roll 34 is slightly greater than that of the peripheries of the rolls 14 and 41. This arrangement makes it possible for the feed rolls 33, 34 to advance the chain at the rate of feed established by the feed rolls 13, 14 and to maintain the envelope chain under light, uniform tension between the feed rolls 33,

4

34 and the index wheel 28, thereby keeping to a minimum the pulling effect of the lugs 30 upon the frangible envelope chain. Since some slippage of the feed rolls 33, 34 on the web may be desirable, the pressure of the upper roll 33 may be adjusted to provide the desired slippage by the setting of the screw 36. In addition, the tension on the envelope chain between the feed rolls 40, 41 and 33, 34 is reduced in preparation for the cutting action of the cutting mechanism 11.

As mentioned above, in order to insure that the cutting mechanism severs the envelope chain at the desired locations, it is, of course, essential that proper registration be established between the notches *b* of the envelope chain and the registering lugs 30 on the index wheel. The desired relative positions between the index wheel and the cutting mechanism may be roughly insured by virtue of the positive gear drive transmission (not shown) between the rotary cutter mechanism 11 and the index wheel, however, the relative positions may be established with greater precision by adjusting the position of the index wheel with respect to its shaft 29. For this purpose, as best shown in Fig. 2, the shaft 29 carries a disc 50 fixedly mounted thereto, and the disc 50 is provided with curved slots 51 which accommodate bolts 52 for mounting the index wheel 28 thereto. Thus, the position of the index wheel may be accurately adjusted by loosening the bolts 52 and rotating the index wheel 28 to the desired position of registration with respect to the cutter mechanism before again tightening the bolts 52.

The invention has been shown in a single preferred form and by way of example only, and obviously many variations and modifications may be made therein within the spirit of the invention. The invention, therefore, is not to be limited to any specified form or embodiment, except insofar as such limitations are set forth in the appended claims.

I claim:

1. In a system for feeding a registered web formed with registering means thereon, a driven carrier, registering means carried thereby and engageable with the registering means of the web, driven feed means for feeding the web to the carrier, slack eliminating means between said feed means and the carrier to supply the web to the carrier in taut condition, and driven feed means for advancing the web from the carrier under light tension, thereby advancing the registering means of the web relative to the registering means of the carrier to prevent excessive pressure of the registering means of the driven carrier upon the web.

2. A feed system as set forth in claim 1 including means for adjusting the pressure exerted by the second-mentioned feed means on the web.

3. A feed system as set forth in claim 1 wherein the linear velocity of the second-mentioned feed means is slightly greater than the linear velocity of the first-mentioned feed means.

4. In a system for feeding a web having registering means along its length, a driven indexing carrier, registering means carried thereby and engageable with the registering means of the web, driven feed means for feeding the web to the indexing carrier, and driven feed means for advancing the web from the indexing carrier under light tension, the relationship between the feed means for feeding the web to the indexing carrier and the feed means for advancing the web from the indexing carrier being such that the latter feed means urges the web in a forward direction to advance the registering means of the web relative to the registering means of the indexing carrier, thereby preventing the registering means of the indexing carrier from exerting excessive pressure against the registering means of the web.

5. A system as set forth in claim 4 including means interposed between the feed means for feeding the web to the indexing carrier and the indexing carrier, said means

5

applying light tension to that portion of the web, rendering that portion of the web taut.

6. In a system for feeding a web having registering means along its length, a driven indexing carrier, registering means carried by said indexing carrier and engageable with the registering means of the web, driven feed rolls for feeding the web to the indexing carrier, an idler roll interposed to engage that portion of the web between the feed rolls and the indexing carrier, a support for the idler roll permitting vertical displacement of the axis of the idler roll, the portion of the web between the feed rolls and the indexing carrier extending beneath the idler roll for the support of the idler roll, the weight of the idler roll imposing a predetermined light tension on the web to render that portion of the web taut, and driven feed rolls for advancing the web from the indexing carrier under light tension, the linear velocity of the feed rolls advancing the web from the carrier being greater than the linear velocity of the feed rolls feeding the web to the indexing carrier, thereby applying a tension to the web on the discharge side of the indexing carrier which tends to relieve the pressure exerted by the registering

6

means of the indexing carrier against the registering means of the web.

7. A system as set forth in claim 6 including web cutting means, the driven feed rolls which advance the web from the indexing carrier serving also to feed the web toward the web cutting means, and driven feed rolls on the opposite side of the web cutting means engaging the leading edge of the web before it is severed, said feed rolls advancing the web at a slower speed than the feed rolls which advance the web toward the cutting means, thereby reducing the tension in the length of the web about to be severed, said feed rolls on the opposite side of the web cutting means discharging the severed length of the web after the cutting operation.

References Cited in the file of this patent

UNITED STATES PATENTS

490,054	Wheeler	Jan. 17, 1893
855,753	Brewer	June 4, 1907
1,699,507	Spiess	Jan. 15, 1929
2,275,262	Malhiot	Mar. 3, 1942