Jan. 15, 1929. 1,699,507

G. SPIESS

WEB FEEDING MECHANISM

Filed June 13, 1927 2 Sheets-Sheet 1

Fig. 1.

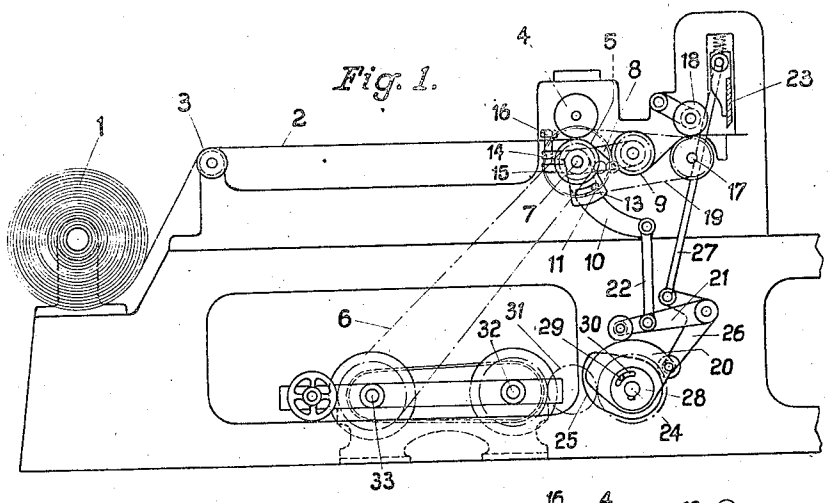


Fig. 2.

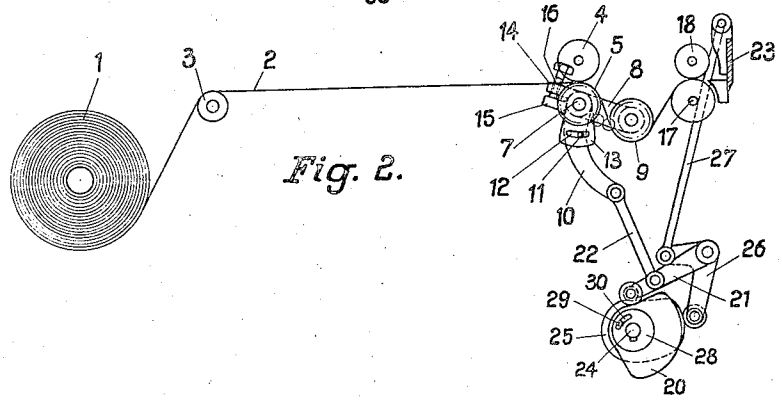


Fig. 3.

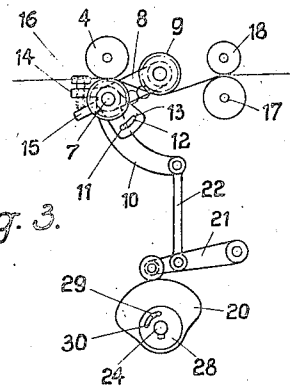
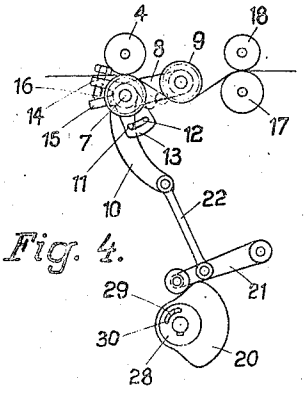


Fig. 4.



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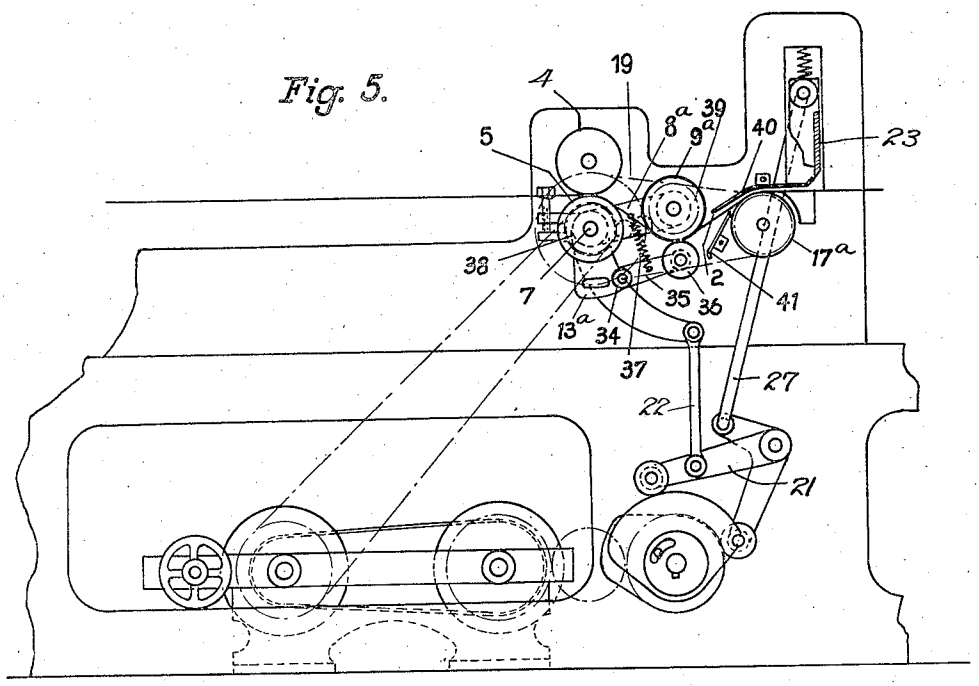
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Filed June 13, 1927 2 Sheets-Sheet 2

Fig. 5.



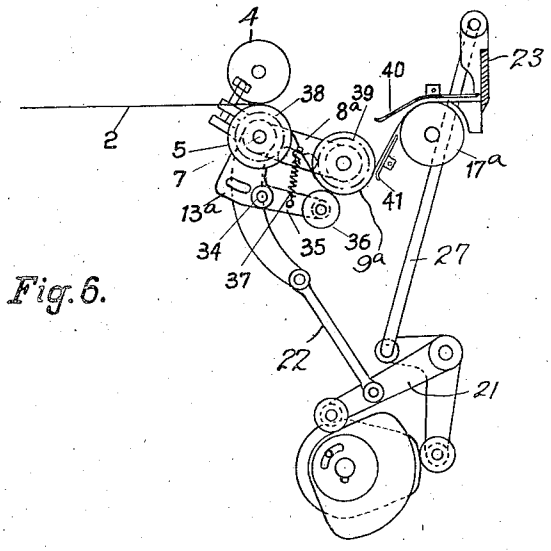


Fig. 6.

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UNITED STATES PATENT OFFICE.

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WEB-FEEDING MECHANISM.

Application filed June 13, 1927, Serial No. 198,384, and in Germany June 11, 1926.

For the treatments of a web of paper or other fabric unwinding from a roll it is frequently necessary or advisable to periodically stop a portion of the web, for example at the cutting of the end of the web, and then to feed it again at higher or lower speed, while the web itself continues to be unwound from the roll and fed at uniform speed. It has become known from transverse cutters, to form, during the period of stoppage or retardation of the end of the web, a bight in the web or to enlarge such a bight, which is then straightened completely or partly during the feeding or accelerated feeding of the end of the web.

The method according to the invention consists in that the bight is formed or enlarged in that portion of the web which has come from the devices which feed the web at uniform speed i. e., viewed in the direction of feeding, behind this feeding device and by making this portion of the web slip on the device designed for continuing the feeding and by increasing the resistance of the web to being fed forwards and to straightening out this bight in accordance with the retardation of the resistance by making this feeding device rotate at a higher feeding speed than that of the constantly and uniformly feeding device. This effect is obtained, according to the invention, by arranging a rocking roller, which forms, in a manner known per se, the bight or enlarges the same, between a pair of rollers which feed the web constantly and uniformly and a second pair of rollers, which continue to feed the portion of the web which has been delivered by the first mentioned pair of rollers, said second pair of rollers being arranged so that slip of the web is allowed at the increasing of the resistance of the web to being fed forwards beyond the rate necessary for keeping the portion of the web taut, this increasing being due to oscillating movement of the roller for straightening out the web.

Two embodiments of the invention are illustrated, by way of example, in the accompanying drawing in which:—

Fig. 1 is an elevation of the machine, according to the first embodiment of the invention, and in connection with a cross cutter, showing the parts in positions which they occupy during the travel of the end of the web.

Fig. 2 shows the principal parts in positions occupied while the web is stationary.

Figs. 3 and 4 show the adjusting of the parts designed for the production of sheets of smaller size.

Fig. 5 is an elevation of the machine according to the second embodiment of the invention.

Fig. 6 is a similar elevation showing only the parts according to the invention, but in different positions.

From the roll 1 the web 2 passes over a roller 3 to a pair of feed rollers 4, 5, the roller 5 being driven at a uniform speed by a chain 6 and a sprocket wheel on a shaft 33. The roller 4 is held down on the web with sufficient pressure to prevent slip. On the axle 7 of the roller 5 two arms 8 are rotatably mounted, and these carry a rotatable roller 9. On the same axle 7 there is rotatably mounted an arm 10, and a bolt 11 projects from this arm 10 through a curved slot 12 in a short arm 12 fixed to one of the arms 8, so that this arm 8 and the arm 10 can be coupled with each other at a variable angle by means of a nut on the bolt. The hubs of the arm 8 and of the arm 10 respectively have projections 14 and 15, and a screw 16 in the projection 14 abuts against the projection 15, for regulating the angle at which the two arms are set in relation to each other.

After passing between the rollers 4 and 5 the web 2 passes under the roller 9, and then between a roller 17 and a series of rollers 18 resting thereon. The roller 17 is smooth, and is driven by a chain 19 and a sprocket wheel on the axle 7. The rollers 18 have pivoted bearings, and rest on the web by gravity; springs may be used to increase their pressure. The pressure here applied is such that the web coming from the rollers 4, 5 is kept taut, but that when the resistance of the web to being fed forwards increases above a certain limit, slip is allowed on the roller 17, with a corresponding reduction of the surface velocity of the rollers 18.

The arm 10 is connected to a pivoted arm 21 by a link 22, and a roller carried by the arm 21 rests on a cam 20 mounted on a shaft 24, whereby the arm 10, and with it the arms 8, are rocked, so that in the course of each revolution of the cam the roller 9 is once lifted and once lowered, its descent being due to gravity, and making a bight in the web between the rollers 5 and 17, with a pull which causes the web to slip on the roller 17. The slip which occurs, and consequently the reduction of the speed of the web, depend on

the speed with which the roller 9 is moved downwards, and this depends on the shape of the cam 20. It may be caused to effect an actual stoppage of feed, or even a rearward movement of the web on the roller 17. Towards the end of the downward movement of the roller 9 the retardation decreases, and during the upward movement the feed is accelerated while the bight in the web is being straightened out.

After passing between the rollers 17, 18 the web travels under a vertically movable knife or guillotine 23, for cutting it transversely. The knife is actuated by a cam 25 on the shaft 24, by means of a bell-crank lever 26 and rod 27.

The cam 20 is adjustable on the shaft 24, to which it is coupled by means of a bolt 29 passing through a curved slot 30 in a flange 28 on the shaft. By adjusting the cam the stoppage of the feed is accurately timed to coincide with the descent of the knife. A scale and pointer may be arranged on the cam and flange respectively, to facilitate the adjustment.

The shaft 24 is driven by a counter-shaft 32 and a train of toothed gear 31, the shaft 32 being driven by the shaft 33 by means of a belt and step pulleys. The rate of revolution of the shaft 24 can thus be changed without altering the rate at which the web is drawn from the roll 1, and the rate of movement of the roller 9 and knife 23 can thus be altered for cutting sheets of different sizes. In order to regulate, as required, the size of the bight made in the web by the roller 9 the angle of the arms 8 in relation to the arm 10 is regulated by means of the bolt 11. Figs. 1 and 2 show the adjustment for sheets of the largest size, and Figs. 3 and 4 show the adjustment for sheets of the smallest size.

The machine shown in Figs. 5 and 6 differs from the machine which has just been described in that the rocking roller for straightening the bight forms together with a roller pressed on elastically the device for feeding the end of the web and for straightening the bight and in that it possesses a separate drive.

To the lever-like extensions 13^a of the arms 8^a for rocking the roller 9^a and in which said rocking roller 9^a is journalled, arms 35 are hingedly connected by means of bolts 34, a pressing roller 36 being rotatably mounted in said arms 35. The roller 36 is pressed on the rocking roller 9^a by means of pull springs 37 attached on the one hand to the arms 35 and on the other hand to the rocking arms 8^a. The rocking roller 9^a is rotated at slightly higher circumferential speed than that of the roller 5 from the shaft 7 through the intermediary of a set of toothed gears, consisting of a spur wheel 38 on shaft 7 and of spur wheel 39 on the shaft of the rocking roller and of the required intermediate gears.

The end of web 2 fed by the rocking roller 9^a and the pressing roller 35 is conducted by guidings 40, 41 upon the roller 15, which is driven from shaft 7 by means of a chain 19.

When the rocking roller 9^a descends the points at which the web leaves the roller 5 and at which it runs up on the rocking roller 9^a move slightly the one towards the other and this distance increases accordingly when the rocking roller is returning into its highest position. To equalize this slight difference of length of the web a higher circumferential speed of the rocking roller 9^a is necessary. The tensile stress of the end of the web at the straightening out of the bight, which in the machine shown in Figs. 1 to 4 is effected by the overcoming of the friction of the end of the web on the rollers 17, 18, is reduced to the minimum and the end of the web is free from tension when coming from the rocking roller 9^a. The end of the web rests loosely on the roller 17^a and is drawn along merely by the friction due to gravity.

When this friction alone should not be sufficient to ensure the feeding of the web end pressing rollers might evidently be provided.

I claim:—

1. The method of feeding a web intermittently or with periodic retardation, consisting in causing it to pass in succession into engagement with two feed devices, the first of which feeds it at a uniform rate, and the second of which feeds it at a higher rate but allows slip when a backward pull is imposed, and deflecting the web periodically between said feed devices, to produce a bight, while maintaining feeding engagement between said devices and the web.

2. A machine for feeding a web intermittently or with periodic retardation, comprising two feed devices through which the web passes in succession, the first engaging the web without allowing slip, and feeding at a uniform rate, and the second being driven for constant feeding engagement with the web at a higher speed and at normal feed tension of the web but allowing slip where the web tension is increased, and a back pull device operating on the web between said feed devices, to increase the web tension for a slippage action so as to thereby produce periodically a bight in the web.

3. A machine as claimed in claim 2, wherein the second feed device consists of rollers between which the web passes, said rollers constantly engaging the web with sufficient pressure to automatically keep it taut behind them when no pull is imposed on the web between the two feed devices, but automatically allowing slip when the bight is being formed.

4. A machine as claimed in claim 2, wherein the second feed device consists of a roller driven at a uniform speed and a freely rotatable roller or rollers coacting therewith to engage the web.

5. A machine as claimed in claim 2, where-

in the bight is formed by a rocking roller acting on the web.

6. A machine as claimed in claim 2, in which the bight producing device comprises a rocking roller, and including means for timing the action of the rocking roller, and means for adjusting said roller relatively to the normal path of the web.

7. A machine as claimed in claim 2, wherein the device for producing the bight comprises a rocking roller carried by a rotatable arm coupled with an actuating lever arm by means of a bolt working in a curved slot.

8. A machine as claimed in claim 2, wherein the device for producing the bight comprises a rocking roller rocked by mechanism including a cam which is angularly adjustable on a driving shaft.

In testimony whereof I affix my signature.

GEORG SPIESS.