

Feb. 12, 1929.

W. A. LORENZ

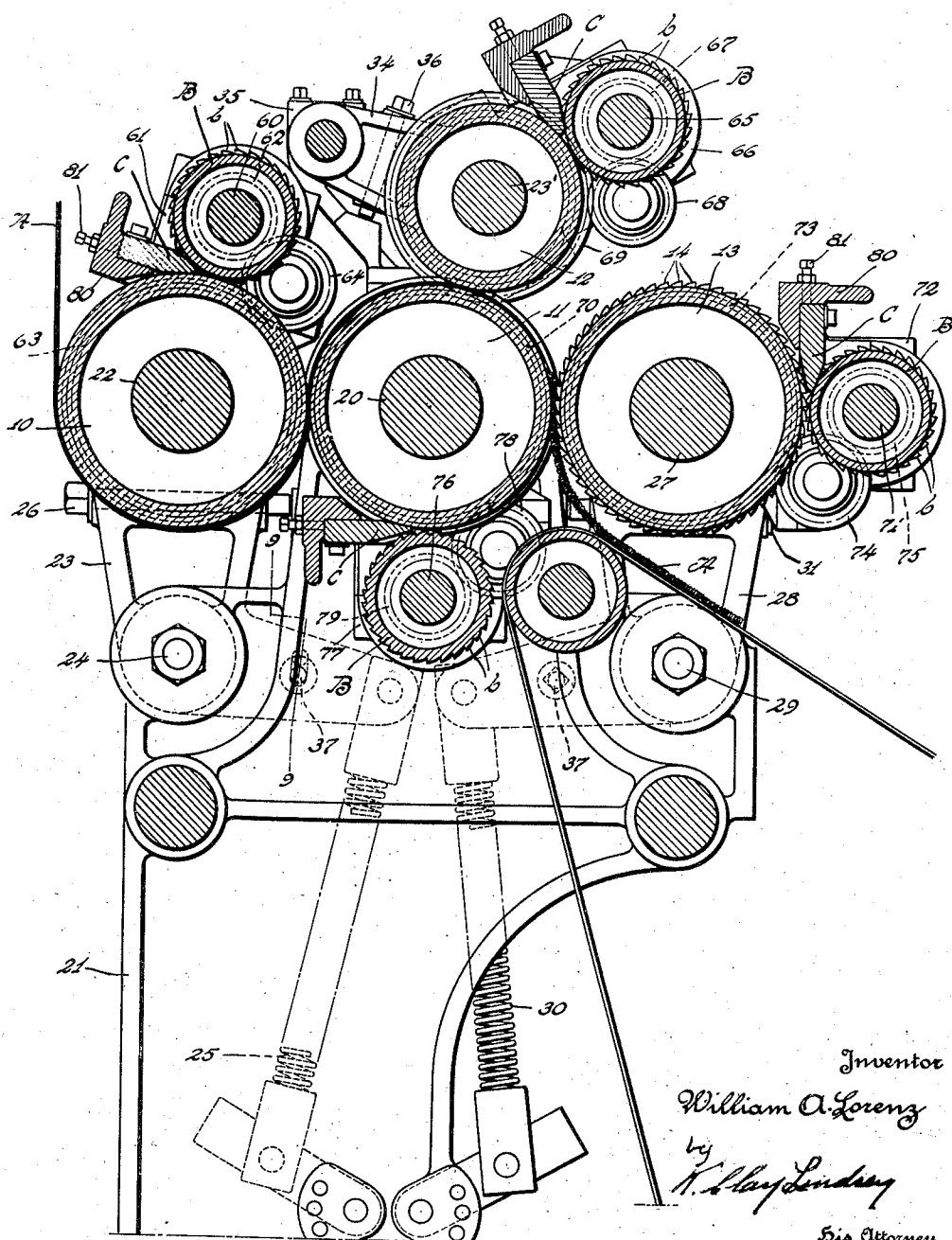
1,701,685

MACHINE FOR MAKING ELASTIC PAPER

Filed May 28, 1927

3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

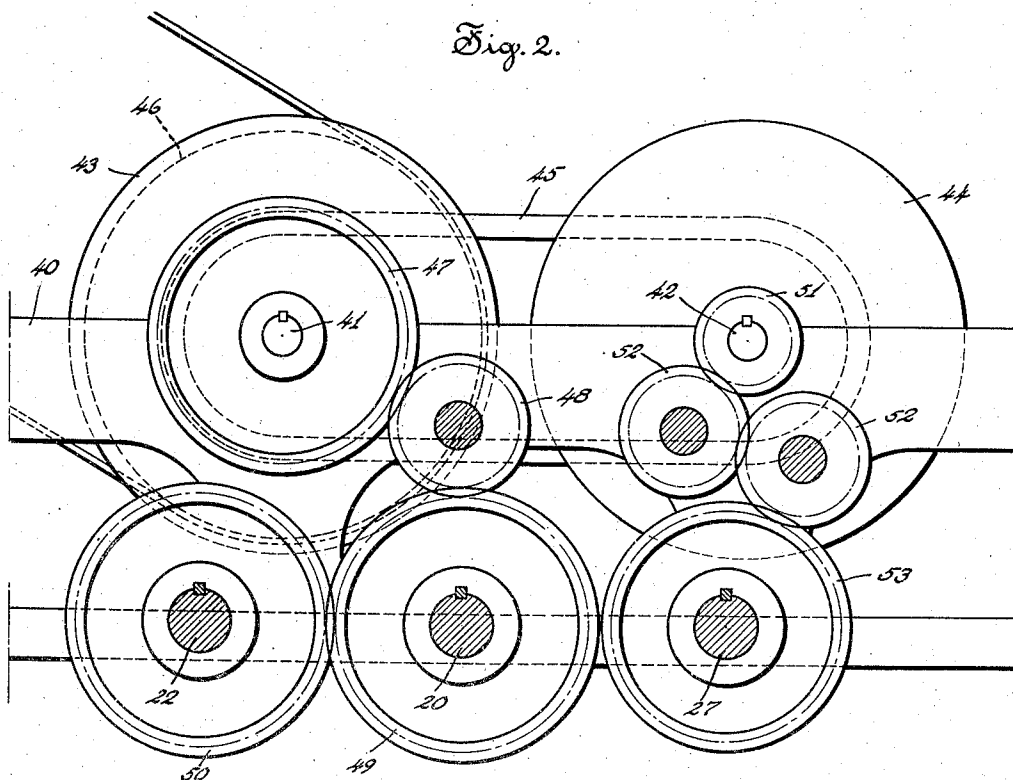


Fig. 3.

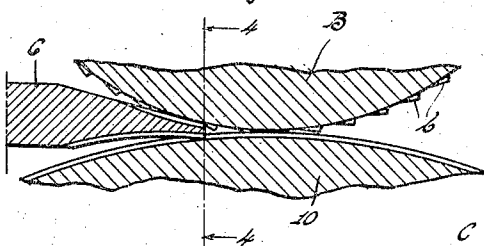


Fig. 4.

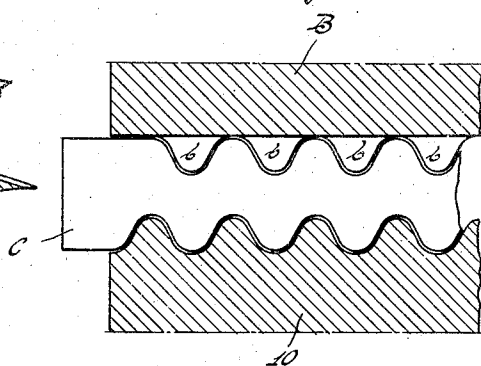
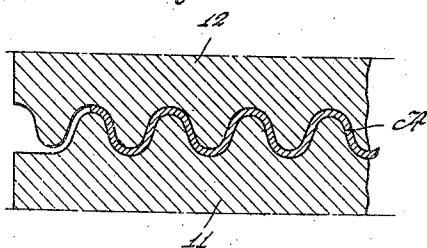


Fig. 5.



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Fig. 6.

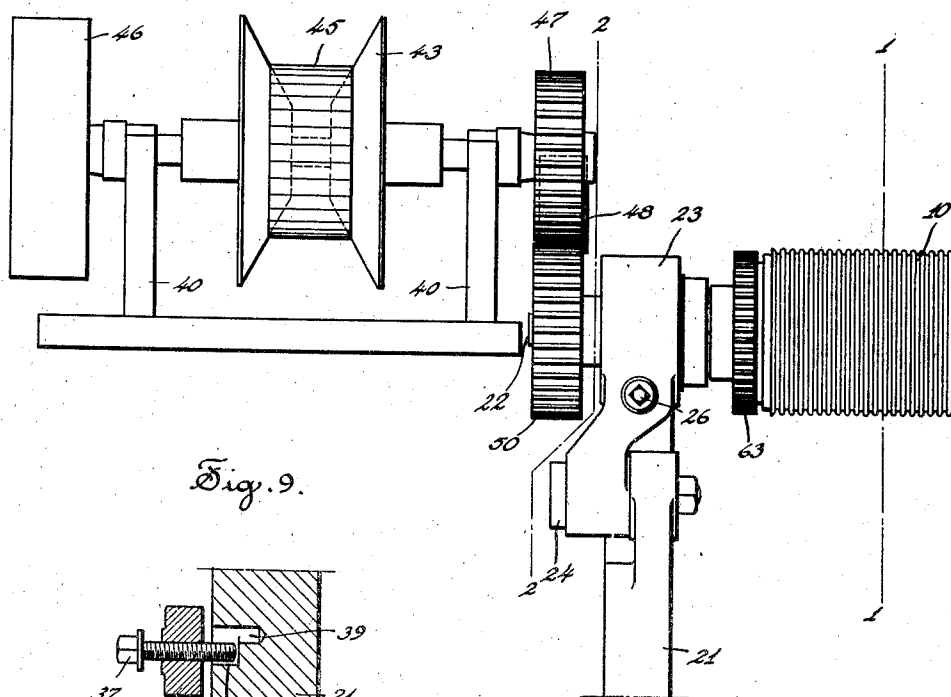


Fig. 9.

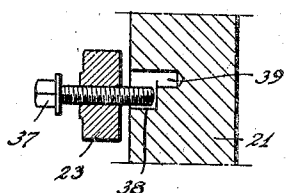


Fig. 7

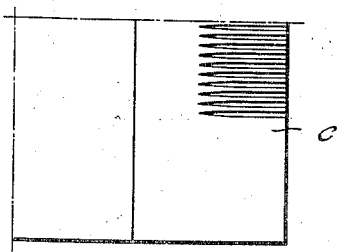
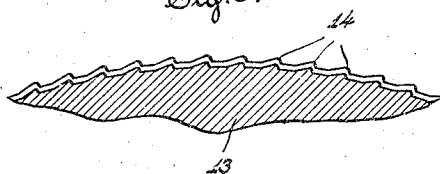


Fig. 8.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING ELASTIC PAPER.

Application filed May 23, 1927. Serial No. 194,981.

This invention relates to a machine for corrugating and crinkling a web of paper or paper pulp.

The aim of the invention is to provide a machine of this sort having various features of novelty and advantage and by means of which a web of paper or paper pulp may be efficiently corrugated and transversely crinkled.

A further object of the invention is to provide an improved machine which may be operated continuously at a high rate of production.

A still further object is to provide a machine with improved means for preventing the web from wrapping or winding about the cylinders or rolls about or between which it passes, this means being so arranged that, in the event the paper web should tend to wrap itself about any one of the cylinders, the web would be thrown onto the next succeeding cylinder.

A still further object of the invention is to provide improved means for cleaning the cylinders or rolls without interrupting the operation of the machine.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings, wherein I have shown, for illustrative purposes one embodiment which the present invention may take:

Figure 1 is a longitudinal sectional view through the machine, this view being taken substantially on line 1—1 of Fig. 6, the driving mechanism shown in Fig. 2 being omitted;

Fig. 2 is a view showing more or less diagrammatically the driving mechanism for the cylinders over which the paper passes, this view being taken substantially on line 2—2 of Fig. 6;

Fig. 3 is a detail view showing, in section, portions of one of the pick-off rolls and its associated cylinder together with the scraper bar for maintaining the cylinder in clean condition;

Fig. 4 is an enlarged sectional view taken substantially on line 4—4 of Fig. 3;

Fig. 5 is a sectional view showing, on an enlarged scale, the paper passing between two of the corrugating cylinders or rolls;

Fig. 6 is an end view of the driving mechanism shown in Fig. 2, and a portion of the corrugating cylinder 10;

Fig. 7 is a top view of a part of one of the scraper bars;

Fig. 8 is a sectional view of a portion of the periphery of the crinkling cylinder; and

Fig. 9 is a detail sectional view taken on line 9—9 of Fig. 1 and shows the means for holding the cylinders away from each other so as to prevent injury thereto in shipment.

Referring to the drawings in detail, A designates a web which is to be operated upon. This may be a web of pulp taken directly from a paper making machine, or it may be finished paper taken from a roll, or the paper may be wetted. The web A may pass over suitable guide rolls, not shown, to an adjustable cylinder 10 which is circumferentially grooved or corrugated, as shown most clearly in Fig. 6. The web is carried by this cylinder 10 and delivered to a rotating cylinder or drum 11 which is preferably mounted in fixed bearings. This drum 11 is also circumferentially corrugated, and the ribs thereof extend into the grooves of the cylinder 10 so that, as the web passes between these two cylinders, it is corrugated and caused to adhere to the periphery of the cylinder 11. If desired, the cylinder 10 may be so adjusted as to preliminarily or partially corrugate the paper, and a supplemental corrugating cylinder 12 may be provided for completing the corrugating operation. This cylinder 12, which may engage the top of the cylinder 11, has circumferential ribs which extend into the grooves of the cylinder 11. The cylinder 11 carries the paper to a crinkling cylinder 13 which rotates in the same direction as, but at a slower speed than, the cylinder 11 so as to effect the crinkling operation. This cylinder 13 is similar in construction and operation to the crinkling cylinder disclosed in my Patent No. 1,548,788 issued August 4th, 1925 for paper crinkling. The cylinder is circumferentially corrugated so that the ribs thereof match with, and extend into the grooves of, the cylinder 11. The circumferential ribs of the crinkling cylinder are interrupted so as to form series of teeth 14, the forward faces of which are preferably inclined and the rear faces of which are radi-

ally disposed. The crinkled paper or pulp web is designated by the letter A'.

In the present illustrative disclosure of the invention, the corrugated cylinder or drum 11 is fixed to a shaft 20 journaled in suitable side frames, one of which is shown in the drawings and designated by the numeral 21. The cylinder 10 is fixed to a shaft 22 journaled in pivoted levers, one of which is shown in the drawings and designated by the numeral 23. These levers are suitably pivoted to the side frames 21, as at 24, and, associated with each lever, is a spring 25 so arranged as to normally urge the cylinder 10 towards the fixed cylinder 11. The distance that the ribs of the cylinder 10 extend into the grooves of the cylinder 11 and, therefore, the extent of corrugation of the web as it passes between these cylinders, may be adjusted by means of the set screw 26. The crinkling cylinder 13 is supported in like manner as is the corrugating cylinder 10. This cylinder 13 is fixed to a shaft 27 journaled in levers 28 pivoted as at 29. Connected to the levers 28 are the springs 30. These levers may be adjusted by set screws 31. The supplemental corrugating cylinder 12 is fixed to a shaft 23' journaled in suitably pivoted arms, one of which is shown in the drawings and designated by the numeral 34. These arms are pivoted in suitable brackets 35 fixed to the top of the side frames, as shown most clearly in Fig. 1. This bracket is omitted in Fig. 6. The cylinder 12 may be adjusted with respect to the cylinder 11 by a screw 36. In order to hold the cylinders out of mesh during shipping and thus prevent injury to these relatively heavy cylinders, each of the levers 23 and 28 is provided with a screw 37 and the frame of the machine is provided with recesses 38 for each screw. Each of these recesses has an offset portion 39, as shown most clearly in Fig. 9. When the screws 37 are advanced into the recesses 39, the levers are locked in a position where the cylinders are out of mesh, and in this condition the machine is shipped. When in operation, the screws are backed out so that they clear the inner ends of the portions 38.

The cylinders 10, 11 and 13 are driven through the mechanism shown in Figs. 2 and 6, this mechanism being omitted in Fig. 1. Supported in a suitable supplemental frame 40 are shafts 41 and 42 provided with pulleys 43 and 44, respectively, about which passes a belt 45. The shaft 41 is provided with a drive pulley 46. On the right hand end of the shaft 41 is a gear 47 meshing with an intermediate gear 48 which meshes with a gear 49 fixed on the left hand end of the shaft 20 of the fixed cylinder. Fixed to the left hand end of the shaft 22 which carries the cylinder 10 is a gear 50 which meshes with the gear 49. On the right hand end of

the shaft 42 is a gear 51 which drives, through change gears 52, a gear 53 fixed to the left hand end of the shaft 27 which carries the crinkling cylinder. Obviously, the shafts 41 and 42 may be driven at differential speeds, and the gears 52 may be changed so as to vary the speed of rotation of the crinkling cylinder with respect to the cylinder or drum 11.

Owing to the fact that the web operated upon is wet and tends to adhere to the cylinders, there is a possibility that, instead of being properly transferred from one cylinder to another, it will tend to wind itself about the cylinders and, unless means were provided for preventing this, it would be necessary to waste time in stopping the machine to correct the difficulty. In accordance with the present invention, I provide each of the cylinders with what I term, for convenience, a "pick-off-roll", the arrangement being such that, in the event the paper tends to wind about any one of the cylinders, the pick-off roll associated therewith will strip the web from that cylinder and throw it onto the next succeeding cylinder, thus avoiding the necessity of stopping the machine. These pick-off rolls are designated by the letter B. Each of these rolls is generally similar in construction to the crinkling cylinder 13; that is to say, they are circumferentially corrugated so as to provide ribs which mesh with the corrugations of the respective cylinders, and these ribs are interrupted so as to form teeth *b*. However, in case of the pick-off rolls, the forward or leading face of each tooth is preferably radial, and the rear faces are inclined. The pick-off rolls are driven in the same direction as, but at a considerably greater speed than, the cylinders with which they are associated. The pick-off roll associated with the cylinder 10 is carried by a shaft 60, the opposite ends of which are supported in suitable brackets fixed on the top of the levers 23, one of these brackets being shown in the drawings and being designated by the numeral 61. This shaft 60 has a gear 62 driven from a gear 63 through an intermediate gear 64. The gear 63 is carried by that shaft 22. The pick-off roll associated with the supplemental corrugating cylinder 12 is fixed to a shaft 65 journaled in suitable brackets carried by the arm 34, one of these brackets, designated by the numeral 66, being shown in the drawings. The shaft 65 carries a gear 67 meshing with an intermediate gear 68 which, in turn, meshes with a gear 69 fixed to the shaft 33. This gear 69 is driven from a gear 70 fixed on the shaft 20. The pick-off roll B associated with the cylinder 13 is fixed to a shaft 71 journaled in suitable brackets fixed to the levers 28, one of these brackets, designated by the numeral 72, being shown in the drawings. The shaft 71 is driven through a gear 73 fixed to the

shaft 27, an intermediate gear 74, and a gear 75 fixed to a shaft 71. The pick-off roll associated with the cylinder 11 is fixed to a shaft 76 journaled in brackets carried by the side frames, one of these brackets, designated by the numeral 77, being shown in the drawings. The shaft 76 is driven through the gear 70, an intermediate gear 78 and a gear 79 fixed to the shaft 76. Obviously, the several pick-off rolls may be mounted for adjustment with respect to their respective cylinders and, to this end, any suitable mechanism may be employed. Also, the speed of the pick-off rolls may be varied as desired.

It has been found that where a wet web of pulp or paper is passed about rotating cylinders or rolls, lint, fibre and dirt tend to accumulate on the rolls making it necessary to stop the machine in order to clean the web carrying members. In order to automatically clean the cylinders and pick-off rolls, and thus avoid the waste and nuisance incident to stopping the machine to clean these elements, there are provided scraper bars, designated by the letter C. These bars are positioned at the throat between the cylinders and their respective pick-off rolls. A description of one of these bars applies to all of them. For instance, the bar C associated with the cylinder 10 is adjustably fixed to the supporting bar 80 carried by and extending between the brackets 61. The scraper bar may be adjusted by the screws or bolts 81. The forward end of the scraper bar extends between the cylinder 10 and the pick-off roll B and is corrugated on its top and bottom so as to match the circumferential corrugations of the cylinder and pick-off roll. The forward end of the scraper bar just clears the cylinder and pick-off roll and has a blunt forward face.

The operation of the machine is briefly as follows: The paper A passes beneath the cylinder 10 and from this cylinder onto the fixed cylinder 11. The fixed cylinder 11 carries the paper to the crinkling cylinder 13. As this cylinder 13 rotates slower than the cylinder 11, the paper is crinkled as described in my said patent. As the paper passes between the cylinders 10 and 11 and the cylinders 12 and 11, it is corrugated, and these cylinders may be so adjusted that the corrugation of the paper is effected in stages, the cylinder 10 corrugating the paper to a given extent, and the cylinder 12 completing the corrugations. The cylinder 12 also causes the paper to hug or adhere more closely to the periphery of the cylinder 11 which is of advantage during the crinkling operation. When the paper is started on the cylinder 10, it may have a tendency to roll itself upon this cylinder, in which event the first pick-off roll will strip the leading edge of the paper or web from the cylinder 10 and throw it onto the cylinder 11. Also, in the event that the paper should break

and tend to wind itself upon the cylinder 10, the pick-off roll would throw the paper back onto the cylinder 11 so that the machine can be operated continuously without stopping the same to repair breaks in the paper or web. Similarly, the pick-off rolls associated with the other cylinders will prevent the web from winding about these cylinders. The scraper bars will effectively clear the cylinders, it being found in practice that, owing to the arrangement described, the lint and dirt will tend to accumulate at the forward blunt ends of the scraper bars, resulting in a clean polished surface on the cylinders.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In a machine of the character described, a rotating cylinder with which a web is adapted to be engaged, said cylinder being circumferentially grooved, and a high speed roll rotating in the same direction as and in close proximity to said cylinder for preventing the web from winding about the cylinder, said roll having circumferential ribs adapted to extend into the grooves of said cylinder.

2. In a machine of the character described, a rotating cylinder adapted to engage a web and having circumferential grooves, and a pick-off roll driven in the same direction as and at a greater speed than said cylinder, said pick-off roll having circumferential rings of teeth adapted to extend into the grooves of the cylinder.

3. In a machine of the character described, a series of corrugated cylinders between which a web is adapted to pass, and a pick-off roll associated with one of said cylinders for preventing the paper from winding thereabout after it has passed between the cylinders and for throwing the web onto the next succeeding cylinder, said pick-off roll having circumferential rings of teeth adapted to extend into the grooves of the cylinder with which it is associated.

4. In a machine of the character described, a series of corrugated cylinders between which a web is adapted to pass, and a pick-off roll associated with one of said cylinders for preventing the paper from winding thereabout after it has passed between the cylinders and

for throwing the web onto the next succeeding cylinder, said pick-off roll having circumferential rings of teeth adapted to extend into the grooves of the cylinder with which it is associated, said teeth having abrupt forward faces and said pick-off roll being driven in the same direction as but at a greater speed than said cylinder.

5. In a machine of the character described, a series of circumferentially corrugated cylinders between which a web is adapted to pass, and a pick-off roll associated with each of said cylinders for preventing the web from winding about the respective cylinders, each of said pick-off rolls having annular rings of teeth adapted to extend into the grooves of the respective cylinders.

6. In a machine of the character described,

a pair of corrugated cylindrical members, the ribs of one member matching with the grooves of the other, and a scraper bar extending into the throat between said members, the opposite faces of said scraper bar being corrugated to match said members and the forward face of said scraper bar being blunt.

7. In a machine of the character described, a rotating cylinder having circumferential grooves, a pick-roll associated therewith and having circumferential ribs matching the grooves of said cylinder, said ribs being interrupted to form teeth, and a scraper bar extending into the throat between said cylinder and pick-off roll and having its opposite faces corrugated to respectively match said bars.

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