F. L. HOLT.

METHOD AND MACHINE FOR STRAIGHTENING COATED PAPER.

APPLICATION FILED APR. 7, 1910.

1,185,600.

Patented May 30, 1916.

3 SHEETS—SHEET 1.

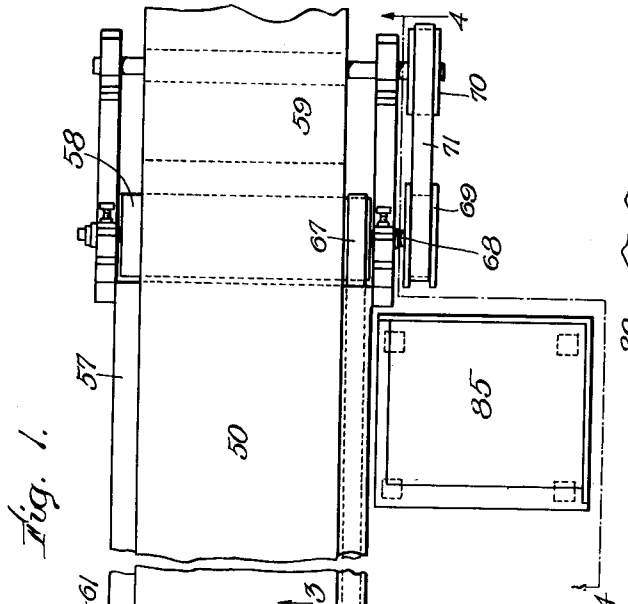


Fig. 1.

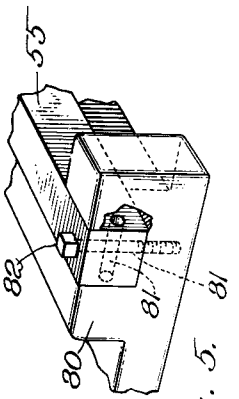
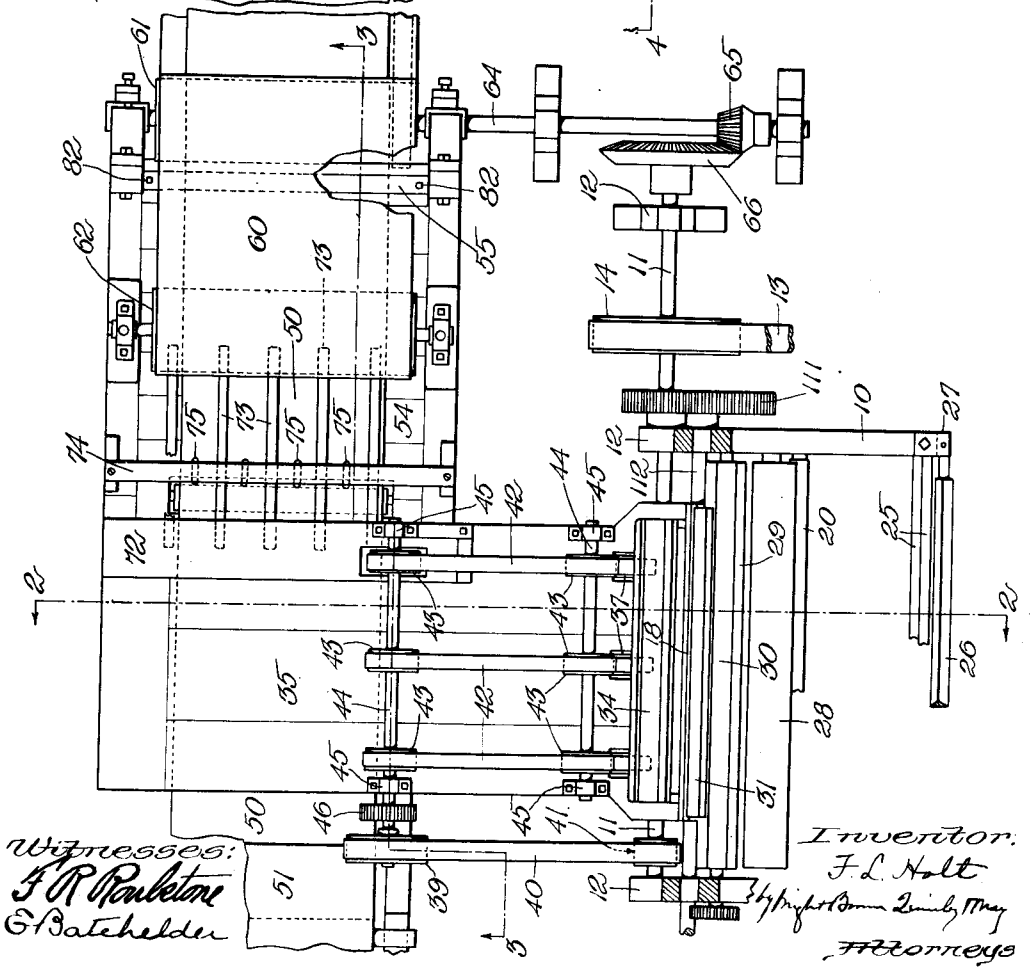


Fig. 5.



Witnesses:
F. R. Ronketone
E. Batchelder

Inventor:
F. L. Holt
by Wright Brown Quinby & May
Attorneys

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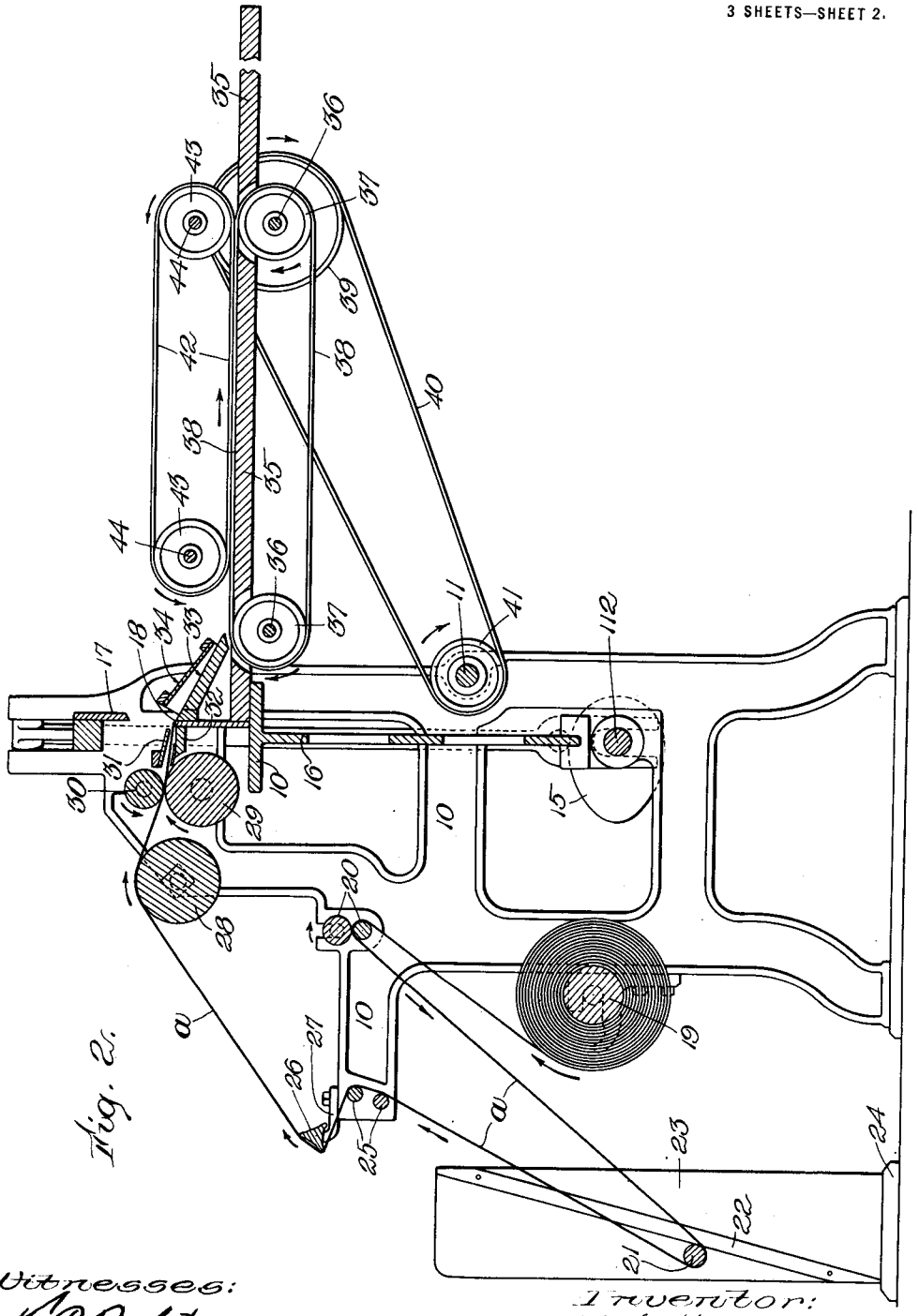


Fig. 2.

Witnesses:
F. P. Poulstone
E. Batchelder

Inventor:
F. L. Holt
By Wright Brown Quinby & May.
Attorneys.

F. L. HOLT.

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3 SHEETS—SHEET 3.

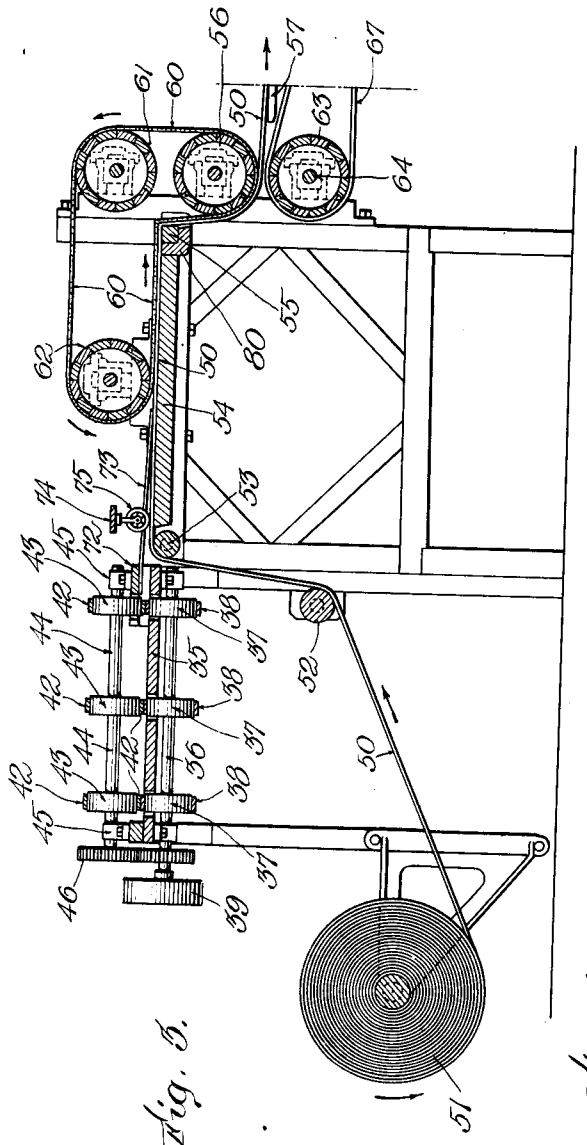


Fig. 3.

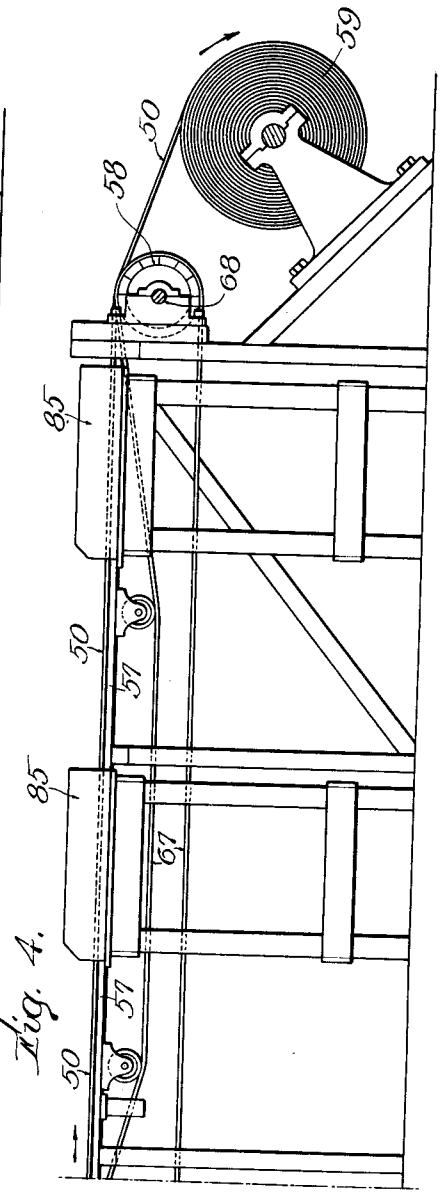


Fig. 4.

Witnesses:

F. P. Palestine

E. Batchelder

Inventor:

F. L. Holt

by Wright Brown Quinby & May

Attorneys.

UNITED STATES PATENT OFFICE.

FRED L. HOLT, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO CARTER, RICE & CO. CORPORATION, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD AND MACHINE FOR STRAIGHTENING COATED PAPER.

1,185,600. Specification of Letters Patent. Patented May 30, 1916.

Application filed April 7, 1910. Serial No. 554,013.

To all whom it may concern:

Be it known that I, FRED L. HOLT, of Nashua, in the county of Hillsboro and State of New Hampshire, have invented certain new and useful Improvements in Methods and Machines for Straightening Coated Paper, of which the following is a specification.

This invention relates to the production of sheets of coated paper, especially paper coated on one side with an adhesive gum. The many objections to paper which automatically curls up after the coating is dry and seasoned are so well known that it is not necessary to mention them herein.

Coated paper, especially that which is coated with an adhesive gum, has a special tendency to curl up in the direction transverse of that in which the coating was applied. Usually the grain of the coating and the grain of the paper are the same, because the paper is usually coated while in the form of a web unwound from a roll. Since it is practically the uniform custom to roll up paper as it is manufactured, the grain of the paper being lengthwise of the web, and since such roll is usually run through the coating machine in such manner that the material applied is laid in the same direction as the grain of the paper, the result is that the grain of the paper and the coating will be the same. Usually the coated paper is then rolled up to season, with the coated side outermost. This tends to result in such a setting of the coating as will offset the tendency of the paper to curl in a direction the reverse of that in which it has been rolled. But when the paper is cut into sheets, the contracting or pulling effect of the coating will curl up the paper in whatever direction it is easiest for the paper to yield. This direction is usually transverse of the grain of the paper and the cutting. Hence, to render it certain that the sheets, when cut from the web, will remain flat, it is essential for the best results that the coating be minutely broken in different directions.

The present invention has for its object the production of flat sheets of coated paper which will remain flat whether left in a pile or separated.

The principal object of this invention is to remove this tendency of the paper to curl, after it is in cut sheet form, this being preferably done by breaking the coating in two directions while the paper is being converted from a roll to a plurality of sheets.

To these ends the invention consists in the improvements which will now be described and claimed.

Of the accompanying drawings:—Figure 1 is a plan view, partly broken out and partly in section, illustrating the machine in one of its embodiments, which machine can be utilized for carrying out my improved method. Fig. 2 represents a section on line 2—2 of Fig. 1. Figs. 3 and 4 represent, respectively, sections on lines 3—3 and 4—4 of Fig. 1. Fig. 5 is a detail perspective view of one of the breakers, to illustrate how said breaker may be rotatively adjusted to bring a new breaking edge into use.

Similar reference characters indicate the same, or similar parts in all of the figures.

A suitable framework for the machine is indicated at 10. A main shaft 11, mounted in bearings 12, is actuated by a driving belt 13, running on a pulley 14, secured to said shaft. By means of suitable gearing 111, a counter-shaft 112 is actuated, said shaft 112 having a cam 15 for actuating and vertically reciprocating a knife frame 16, said frame having a knife 17 which coöperates with a lower fixed knife 18 to cut a web of paper into sheets. The web or strip of paper is indicated at *a*, and is led from a reel 19, removably mounted on suitable supports, said web or strip then leading between guide-rolls 20, under a gravity tension roll 21, which is free to move up and down along slightly inclined guide cleats 22, carried by uprights 23, mounted on a base 24. The web or sheet then passes over guide rods or rolls 25, then over a triangular breaker 26, which is mounted on brackets 27 secured to the frame, then over a roll 28, between feed rolls 29 and 30, then between guide plates 31 and 32, to the plane of operation of the cutters, and then over the delivery incline 33, a hood or cover being usually employed to guide the cut sheets down the incline and on to a table 35.

All of the mechanism so far described, excepting the breaker 26, constitutes parts of a well known type of machine for cutting webs of paper into sheets, and with the few following exceptions, said machine does not need further description herein. It is to be understood, of course, that this type of cut-

ting machine operates the feed rolls intermittently, so that there is no progressive movement of the web during the time that the upper knife 17 is coöperating with the lower knife 18, to shear the paper. The standards 23 which carry the cleats 22 are mounted on the base 24 so as to constitute a frame which may be moved away from immediate proximity to the cutting machine, for convenience in placing new reels of paper in position. The tension roll 21 moves up and down in the cleats by gravity, to preserve a practically uniform tension on the web during the times that the web is being fed and held stationary by the rolls 29, 30.

The breaker 26 is shown as triangular, but obviously, it might have any other suitable shape in cross section. By making it triangular, it can be so rotated and secured as to present a new sharp edge over which the paper is drawn. The paper on the reel 19 is wound with its gummed or coated side outermost, and, consequently, it is the back or uncoated surface of the paper which runs in contact with the breaker. By drawing the paper sharply over the angular edge of the breaker, the coating on the outer side thereof is broken minutely along lines substantially parallel with the edge over which said paper is drawn. This removes tendency of the paper to curl up again, so as to reassume the form which it had while in the roll and during the seasoning of the coating.

I will now describe the method and machine whereby the coating is again broken on lines transverse to those caused by the breaker 26. Below the table 35 are suitably mounted shafts 36, on which are secured pulleys 37, the upper portions of which extend through openings in the table. There are several pairs of these pulleys, three of them as shown in Fig. 3. On said pulleys are mounted tapes 38, and these tapes are caused to travel in the direction indicated by the arrow in Fig. 2, by means of a belt 40 running over a pulley 39, secured to one of the shafts 36, said belt also running on a pulley 41 on the shaft 11. Coacting upper tapes 42 are mounted on pulleys 43, secured to shafts 44, mounted on suitable bearings 45 above the table, the two shafts 44 and 36 being geared together by pinions 46. The table 35 extends beyond the coacting tapes 38 and 42, as best indicated in Fig. 1, and from said extension of the table, the cut sheets which are deposited thereon by the said tapes, are fed laterally by any suitable means. With the machine as illustrated, the lateral feeding of the sheets is effected by hand. When the sheets are started laterally, as described, they are taken by a blanket, or sheet conveyer 50, as best illustrated in Figs. 3 and 4. This conveyer at present, consists of a long sheet of strong paper, which at one end is rolled on a reel 51, passing from said reel under a guide roll 52, over another guide roll 53, then over a table 54 and the quadrangular breaker 55, which is supported by the far edge of said table. The conveyer then passes under a drum 56, over a long delivery table 57 and a drum 58, and is wound up on a reel 59. Of course, when this form of conveyer is employed, and the blanket has been wound up on the reel 59, the two reels 59 and 51, are substituted, one for another, and the end of the blanket then run again over the delivery table 57 and connected to the winding reel. The reason why I at present prefer to use such a blanket as described, instead of an endless conveyer, is that the tension of said blanket causes it to wear somewhat rapidly over the quadrangular breaker. A long strip of paper can be used for the blanket for as long a time during one pass of said blanket from one reel to the other, as the life of an endless conveyer would be. It takes no longer to interchange the reels 51, 59, than to put a new endless conveyer in place, if as long. And of course, the long blanket used in the manner described can be reversed many times before it is worn out.

As the cut sheets are passed laterally off from the table 35, they are engaged by the blanket or conveyer 50 and carried over the breaker 55. Of course, the sheets are deposited on the table 35, gummed side up, and they therefore pass on to the conveyer 50 gummed side up. To hold the sheets in contact with the blanket so that they will be bent sharply over the outer edge of the breaker 55, I employ a wide holding or bending belt 60, which is preferably of strong textile material, said belt 60 extending not only under the drum 56, hereinbefore mentioned, but also over drums 61 and 62, these drums being so mounted as that the lower stretch of the belt can be drawn practically at a right angle over the breaker 55. Said belt 60 is, of course, driven at a speed in unison with the speed of travel of the conveyer 50, and the lower stretch of the belt 60 runs in close contact with said conveyer 50 from a point substantially midway of the table 54, down to the lowermost portion of the periphery of the drum 56. As the sheets are on the upper surface of the conveyer 50, they, of course, travel along with the horizontal portion of the conveyer which runs over the delivery table 57.

Below the drum 56 is a drum 63 which is secured to a shaft 64 (see Fig. 3) said shaft having a beveled pinion 65 at its outer end (see Fig. 1), said pinion meshing with a beveled gear 66 on the shaft 11. Consequently the drum 63 is positively driven. On said drum 63 is mounted a belt 64, the other end of which runs over one end of the drum 58, or a pulley of the same

diameter, mounted on a shaft 68. On the shaft 68 is also a pulley 69 (see Fig. 1). A pulley 70 on the shaft of the winding reel 59 is connected by a belt 71 with the pulley 69, whereby the conveyer blanket is wound up.

To guide the sheets to position to be taken by the coacting portions of the conveyer and holding belt 60, I employ suitable fingers connected to a bar 72 (see Figs. 1 and 3). The fingers are indicated at 73, and are preferably yielding strips of metal. To aid in engaging the sheets with the conveyer, I employ a bar 74 having loosely mounted rollers or wheels 75, which run on the upper surface of the blanket conveyer.

As the sheets are carried along between the blanket conveyer and the holding belt 60, they are bent sharply over an angular corner of the breaker 55, so that the coating on the sheets will be broken minutely on lines transverse to the lines of breaking imparted by the first breaker 26. The rapid travel of the blanket conveyer over the breaker 55 eventually wears the angular corner. To bring a new breaking edge into position, I preferably mount the ends of the breaker 55 in rectangular sockets in castings 80, which are supported on the table 54. Each end of the breaker 55 has crossing holes 81. At each end, a pin 82 is passed through either one of the holes 81 into sockets of the castings 80. When a corner of the breaker is worn, the pins 82 may be lifted out, the bar 55 raised from the castings and given a quarter rotation, and the pins 82 dropped back into place.

Obviously, the breaker 55 might have a different shape in cross section. For instance, it might have the triangular form of the breaker 26. And, of course, the breaker 26 may be rotatively secured in position by means similar to that employed for securing the breaker 55. I therefore do not limit myself to the specific forms of the breakers illustrated, the essential features of the breakers being that each shall present a sharp edge over which the paper is drawn with the coated side outermost.

The principle of operation is, that the long strip or web of paper which is at one side coated, as with an adhesive gum, and which has been left for a considerable time in the form of a roll, to season, is passed through the machine rapidly and continuously, the back of the paper (the uncoated side) passing over a sharp-edged bar which is termed a breaker herein, because it causes the coated side to be minutely broken. In the preferred operation of the method, and in the preferred form of the machine, the web then passes to a cutter which automatically severs the web into sheets of uniform size. These sheets are then passed laterally, in a direction preferably at a right angle to that in which the paper traveled when being first broken and cut, the sheets in this second direction of movement passing over another breaker which is similar in its action to the first one, excepting that the breaking action occurs crosswise of the sheets.

Another way of defining the action is that the first breaker is mounted transverse to the grain of the paper and that of the coating, while the second breaker is substantially parallel with the grain of the paper and that of the coating. But since the paper in its travel through the machine changes its direction of movement, one breaking action is transverse of the grain, while the other breaking action is parallel with the grain, or transverse of the first line of breaking. Hence, the coating is broken in two directions, so that it remains on the paper only in the form of minute particles which are not sufficiently continuous in any direction to cause the sheets to curl. Therefore, the sheets may be readily handled for any purpose, such as running them through a printing press for the manufacture of labels.

The cut sheets are removed from the conveyer 50 as it passes over the table 57, on to stacking tables 85, in any manner preferred, as by hand manipulation.

There is a reason for the first breaker 26 being triangular in cross section, and the second breaker being quadrangular in cross section, and for mounting the first breaker in such position relatively to the guides for the web that the paper will be more sharply bent over the edge of the breaker 55. This reason is that it is desirable to get out of the paper first the tendency to reassume the direction of curl which it had when rolled up for seasoning. Hence, the paper is given a sharper bend over the first breaker than it requires over the second one. The two breakers coact to render it certain that the sheets, when cut from the web, will remain flat, because, by bending the paper over a sharp edge, first in one direction, and then in a direction at an angle to the first movement, the coating is minutely broken in different directions.

I claim:—

1. A machine for straightening coated paper, comprising in its construction a supporting reel for the web of paper, a cutter for severing the web into sheets, a sharp-edged breaker over which the paper is drawn, said breaker being located intermediate the reel and cutter, a second breaker beyond the cutter, and means for bending the sheets laterally over the second breaker.

2. A machine for straightening coated paper, comprising in its construction a supporting reel for the web of paper, a cutter for severing the web into sheets, a sharp-

edged breaker over which the paper is drawn, said breaker being located intermediate the reel and cutter, means for causing the cut sheets to travel in a direction at an angle to the path of movement when being first broken, a second breaker, and means for drawing the sheets over said second breaker.

3. A machine for straightening coated paper, including in its construction a table, means for straightening a web and cutting it and delivering the sheets on said table, a conveyer extending laterally from said table, and means for subjecting the sheets to a second straightening action while carried by said conveyer.

4. A machine for straightening coated and dried paper, comprising a breaker, means for drawing the paper over the breaker, said breaker being substantially at a right angle to the direction of travel of the paper, a second breaker, and means for drawing the paper laterally over said second breaker.

5. A machine for straightening coated paper, comprising in its construction a table, a breaker at one edge of the table, a paper strip and means for passing it over said table and breaker and down over the front of the latter, and an endless holding belt bearing on the portion of the said paper strip over said breaker.

6. A machine for straightening coated paper, comprising in its construction a table, a breaker at one edge of the table, a conveyer passing over said table and breaker and down over the front of the latter, a holding belt bearing on the portion of the conveyer over said breaker, and an elongated delivering table over which said conveyer passes after leaving the holding belt.

7. A machine for straightening coated paper, comprising in its construction a reel support, means for cutting into sheets a web of coated paper carried by said reel, a breaker intermediate the reel and cutter, a table for receiving the sheets from the cutter, means for transferring the sheets away from said table at an angle to that of their delivery unto said table, said means including a conveyer, a breaker over which said conveyer passes, and a holding belt for pressing the sheets and conveyer down on said breaker.

8. The method of straightening coated and dried paper, consisting in breaking it backwardly first in one direction and then in another direction, one line of break being at right angles to the length of the web and the other line of break being at right angles to the first mentioned line of break.

9. The method of straightening coated and dried paper, consisting in breaking it backwardly first in one direction and then in another direction, one line of break being at right angles to the grain of the paper and the other line of break being parallel to the grain of the paper.

10. The method of straightening coated and dried paper, consisting in progressively bending it backwardly over two breakers, one breaker being substantially transverse to the grain of the paper and the other being substantially parallel with said grain.

11. The method of straightening coated and dried paper, consisting in progressively bending it backwardly over two breakers, one breaker being substantially transverse to the grain of the paper and the other being substantially parallel with said grain and cutting the paper between said bending operations.

12. The method of straightening coated and dried paper consisting in progressively bending it backwardly over two breakers, one breaker being substantially transverse to the grain of the paper and the other being substantially parallel with said grain, the first bend being sharper or more abrupt than the second.

In testimony whereof I have affixed my signature, in presence of two witnesses.

FRED L. HOLT.

Witnesses:
J. R. SPRING,
C. K. ASHE.