May 6, 1930. V. N. MAGILL 1,757,204

METHOD OF AND MECHANISM FOR WATERMARKING AND CUTTING PAPER

Filed Dec. 11, 1928 2 Sheets-Sheet 1

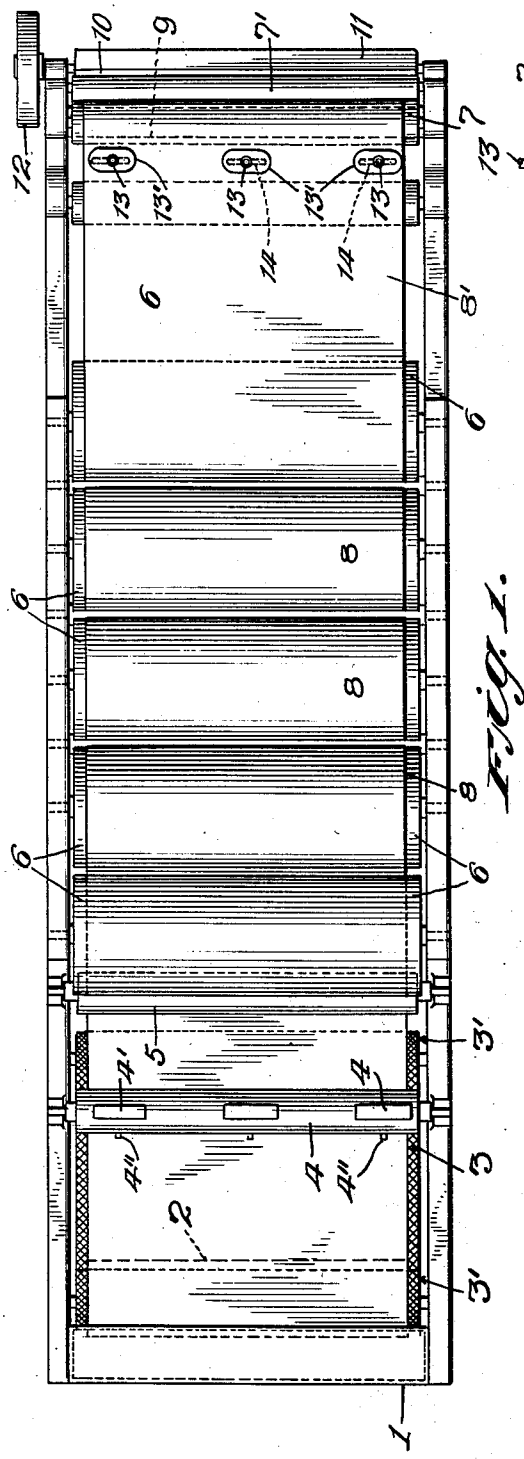


Fig. 1.

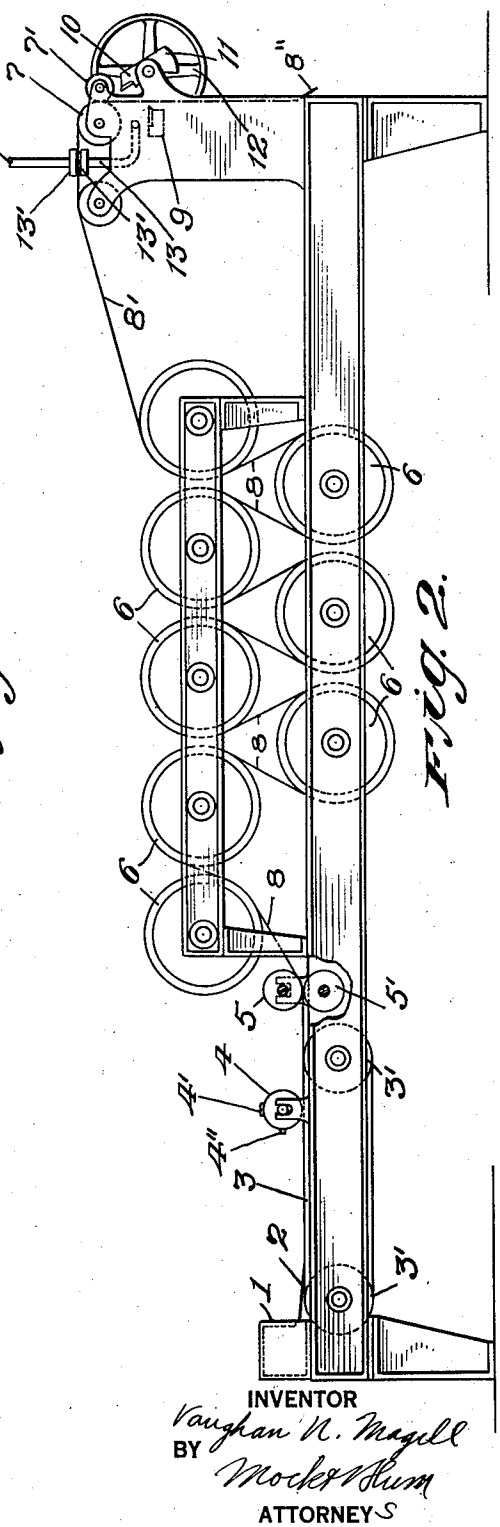


Fig. 2.

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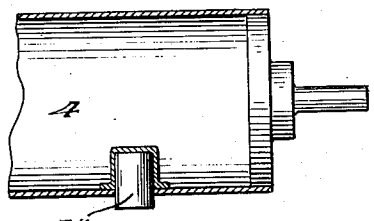


Fig. 3

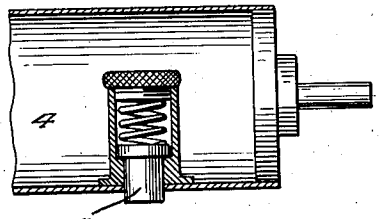


Fig. 4.

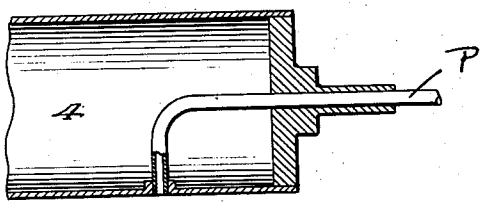


Fig. 5.

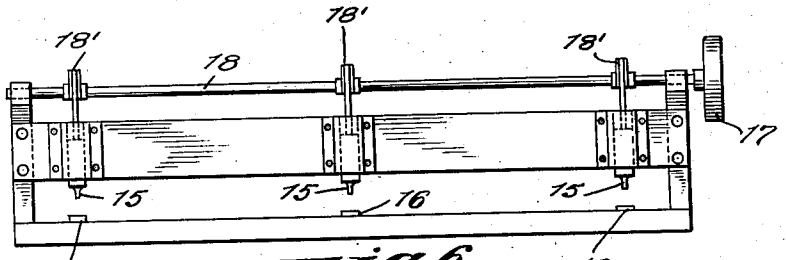


Fig. 6.

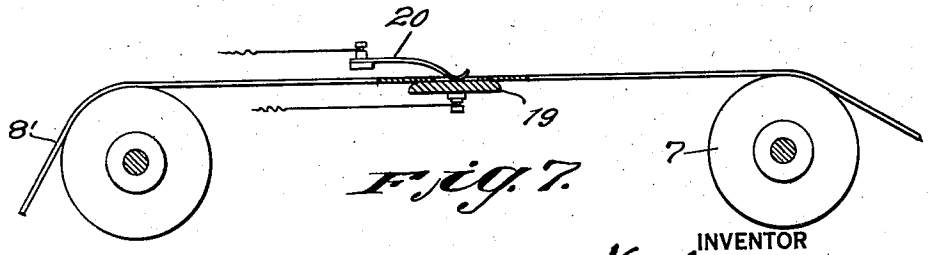


Fig. 7.

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UNITED STATES PATENT OFFICE

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METHOD OF AND MECHANISM FOR WATERMARKING AND CUTTING PAPER

Application filed December 11, 1928. Serial No. 325,344.

My invention relates to a new and improved method of and mechanism for water-marking and cutting paper.

One of the objects of my invention is to form a web of paper having a water-mark impressed thereon at spaced points thereof and to cut the web into lengths in each of which the said water-marks will be located at a prede mined point.

Another object of my invention is to provide a method of and mechanism for controlling the cutting operations by means of the web of paper itself.

Another object of my invention is to impress the water-mark upon a sheet of pulp while forming openings or other irregularities in said sheet of pulp, and then drying the pulp and causing the said opening or irregularities to control the cutting of the web into separate pieces.

Other objects of my invention will be set forth in the following description and drawings which illustrate a preferred embodiment thereof, it being understood that the above general statement of the objects of my invention is intended merely to generally explain the same and not to limit it in any manner.

Fig. 1 is a plan view of a paper making machine employing my improvements.

Fig. 2 is a side elevation.

Fig. 3 is a detail elevation showing one method of connecting the perforating plug to the dandy roll.

Fig. 4 shows a different form of perforating plug.

Fig. 5 is a detail section showing how the holes of the pulp can be formed by means of air suction.

Fig. 6 shows another embodiment for forming the control holes in the web.

Fig. 7 is another embodiment showing how the cutting mechanism can be electrically controlled.

Heretofore in cutting a web of paper which has been water-marked, it has been difficult to accurately perform the cutting operation so that the water-mark would be located at the proper point of each severed sheet.

According to my invention, openings or other irregularities are formed in the web of paper before it is cut, and these openings or other irregularities are caused to control the cutting operation.

As shown in Figs. 1 and 2, a box 1 is provided to which a supply of pulp is fed from any suitable source. The pulp is caused to flow out of a slot in the box 1 upon an apron 2 made of rubber. The pulp flows upon the usual endless wire screen 3, which passes over pulleys 3′, which are caused to turn by any suitable means. A dandy roll 4 is provided of the usual type, and this is caused to freely turn as the screen 3 and the pulp pass under the same.

A water-mark 4′ is connected in the usual manner to the dandy roll 4 so that said water-mark is impressed into the web of pulp at regular intervals. In addition, the dandy roll 4 is provided with a perforating plug 4″. This plug 4″ operates to perforate the web of pulp at a series of regular spaced intervals, each said perforation being spaced the same distance from the corresponding adjacent water-mark. After the web of pulp has been impressed with the water-mark, it passes between two rolls 5 and 5′ which are of the usual type, and the web of pulp 8 is then passed around the drums 6 which are heated by steam in the usual manner. The dry web of paper 8′ is then passed over a guide roll between the shoes 13′ of an air pipe which has branches 13, one of said branches being above the web 8′, and the other being below the web 8′. The paper is cut by means of the shearing action provided by a fixed knife 9 and a revolving knife 10, said revolving knife 10 being connected to the frame 11. A pulley or fly-wheel 12 is caused to continuously turn, and a suitable clutch of the well known type (not shown in the drawings) is provided whereby the said pulley 12 can be connected whenever desired to the frame 11 to actuate the same to cut the web. The web of paper 8′ passes between the feed roll 7 and 7′ and continues downward as shown by the line 8″. The operation of this device is as follows:—

One or more of the lugs 4″ can be provided upon the dandy roll 4. These lugs operate to form a perforation or perforations

14 in the web of paper. If the web of paper is imperforate, then air under pressure cannot enter from the upper branch 13 to the lower branch 13. When however, the perforation or perforations 14 pass underneath the opening in the head 13′ of the upper branch of the air pipe, then air under pressure can enter the lower head 13′ to operate the clutch which causes the revolving pulley L to operate the cutting knife so as to sever a sheet of paper from the web. While I have specifically shown the formation of openings in the web of paper, I wish to cover the formation of any irregularity of any type in the web of paper (other than an opening) whereby the movement of the web of paper will automatically cause the cutting operation to take place at the proper time.

The result of this pre-determined cutting operation is to locate the water-mark in each severed sheet of paper at a pre-determined point thereof. The branches 13 of the air pipe can be adjusted so as to control the operation of the cutting device at any proper time.

Likewise, the lugs 4″ can be located at different points of the dandy roll 4 so that sheets of any desired length can be cut as desired. Likewise, if desired a plurality of lugs could be arranged in different relative positions upon the dandy roll 4, with respect to the water-mark 4′ so as to cut a plurality of sheets of different length in series, the length of each series of sheets being equal to the circumference of the dandy roll. Likewise, dandy rolls of different diameters may be employed. Generally speaking, the length of each sheet will be equal to the circumference of the dandy roll, although as before specified, the sheets may be cut in series, the members of which are of different lengths, the total length of each series being equal to the circumference of the dandy roll which is employed.

As shown in Fig. 3, the lug 4″ may be made of rubber or any other suitable material which can be inserted into a socket formed in the dandy roll.

As shown in Fig. 4, the lug 4″ may be operated upon by a compression spring. As shown in Fig. 5, the perforating lugs may be omitted and they may be replaced by a pipe P which is connected to any suitable source of low pressure so that this pipe will operate to produce one or more perforations in the web of pulp. That is, when the pipe is in contact with the pulp, it will suck up a small quantity of the pulp to form the desired opening. The pipe P can be connected by a suitable revolving joint to a suction pump, which is caused to intermittently operate at the proper time.

Fig. 6 shows a different perforating device which can be located in front of the rolls 5 and 5′. This perforating device comprises punches 15 and dies 16 between which the web of paper passes. The punches 15 are mounted in a vertically slidable head which is operated by means of the links 18′ connected to the shaft 18. Said shaft 18 is actuated by pulleys 17 by means of a suitable clutch. This clutch can be intermittently thrown into operation by any suitable mechanical or electrical means operated by the dandy roll. As shown in Fig. 7, an electrical device may be used for operating the cutting mechanism. A stationary metallic contact 19 is provided and a movable spring contact 20 is also provided, these contacts being connected to the terminals of a source of electric current. When the perforations in the web pass underneath the spring contacts 20, they descend to complete the circuit so that the cutting mechanism is then operated.

Likewise, if desired, metallic members can be inserted into the web, at the places where perforations are formed by the mechanism previously described, and said metallic members will close the circuit, in combination with the finger or fingers 20 at the proper time. Likewise, if desired, the compressed air passing through the lower branch 13 can be caused to directly operate the cutting mechanism.

It is to be understood that the use of such metallic members, or any other irregularities in the paper web, is equivalent to the use of perforations, which have been specifically mentioned as illustrating one embodiment of my invention. Any difference in the structure of the paper web which can be utilized to control cutting mechanism, may be considered as a control irregularity.

Likewise, certain aspects of the invention are useful for other purposes than water-marking paper and cutting the water-marked web at pre-determined points.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions can be made without departing from the spirit of my invention.

I claim:

1. A method of cutting water-marked paper which consists in forming irregularities in a web of paper while the water-marks are being impressed, and then causing said irregularities to control the cutting operation.

2. A method of water-marking and cutting a web of paper which consists in impressing a series of water-marks thereon, and forming irregularities in the web of paper at pre-determined points with respect to said water-marks, and causing said irregularities to control the cutting operation.

3. In the art of cutting paper, that step in the art which consists in causing control irregularities in the web of paper to control the operation of cutting mechanism.

4. In combination, means for impressing

water-marks on a web of paper, means for forming irregularities in the web of paper while the same is being water-marked, cutting mechanism and control means for said cutting mechanism of which said irregularities form a part.

5. In combination, means for impressing water-marks on a web of paper, means for forming holes in the said web of paper, cutting mechanism and control means for said cutting mechanism of which said holes form a part.

6. In combination, means for impressing water-marks on a web of paper, means for forming holes in the said web of paper, cutting mechanism and control means for said cutting mechanism of which said holes form a part, said controlling means also including a source of air under pressure from which air can escape through said openings.

7. A dandy roll having a water-mark thereon, and means associated with said dandy roll and adapted to form irregularities in a web of paper which is acted upon by said dandy roll.

In testimony whereof I affix my signature.

VAUGHAN N. MAGILL.