No. 768,353. PATENTED AUG. 23, 1904.

E. WAITE.

PAPER MAKING MACHINE.

APPLICATION FILED DEC. 5, 1900.

NO MODEL.

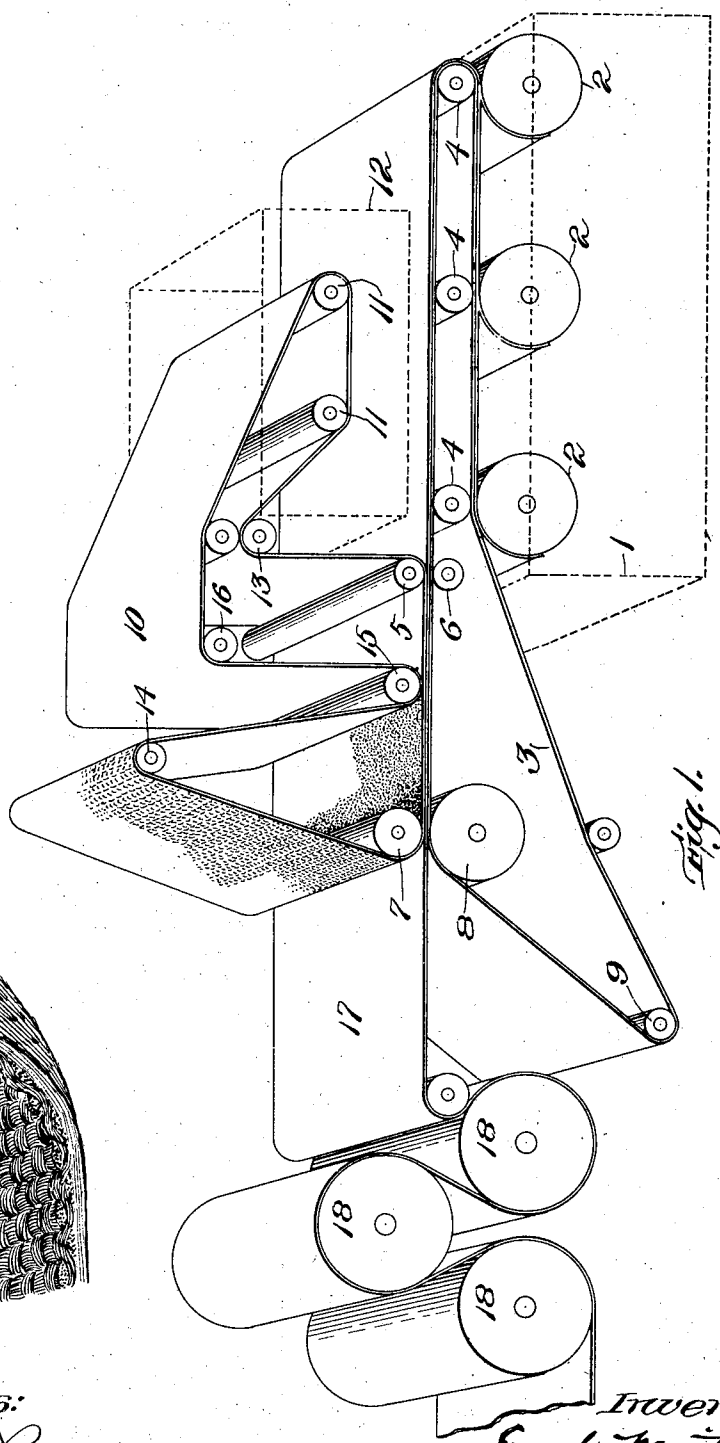


Fig. 1.

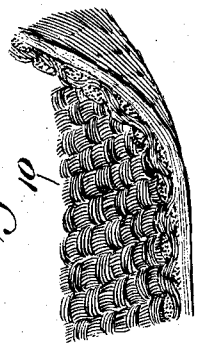


Fig. 2.

Witnesses:

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Attorneys.

No. 768,353. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

ENOCH WAITE, OF FRANKLIN, MASSACHUSETTS.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 768,353, dated August 23, 1904.

Application filed December 5, 1900. Serial No. 38,734. (No model.)

To all whom it may concern:

Be it known that I, ENOCH WAITE, a citizen of the United States, residing at Franklin, in the county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Paper-Making Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to machines which are designed to form a continuous web of paper from a mass of pulp. Heretofore in such machines various arrangements have been adopted to produce a variety of paper characterized by having considerable thickness and by having an upper surface covered with numerous prominences usually disposed in close and regular succession. There are various important uses in the arts for such a paper, among which may be mentioned the manufacture of cops for yarn used in spinning and other textile operations. Such cops are formed by rolling a semicircular sheet of the paper upon itself into a conical form having walls of the desired thickness to insure sufficient strength. The yarn is then wound spirally over the surface of the cop, and it is essential that the said surface shall afford sufficient frictional hold on the yarn to prevent the same from slipping toward the small end of the cop and in consequence becoming entangled and failing to be drawn properly off the cop. Another use for such paper is in the wrapping of articles of a somewhat fragile character where a certain amount of cushioning effect is desired, and it becomes a matter of importance to obtain this effect to a sufficient degree with the use of a minimum amount of stock in the paper employed.

The constructions with which I am familiar which have hitherto been employed to produce a paper with the kind of surface described are deficient in at least two important respects. First, they occasion excessive wear and injury to certain portions of the mechanism of the machine itself; secondly, they do not produce a paper having a satisfactory surface, or even if the surface is fairly satisfactory when the paper is formed in the machine it has been found that when such paper is rolled up into a cop or otherwise subjected to pressure the quality of the surface becomes greatly impaired.

It is the object of my improvement to prevent wear and injury to the parts of the machine and at the same time produce a paper having a permanent surface fully adapted to the desired uses.

Further aims will appear in the course of the following description.

The invention will first be described with reference to the accompanying drawings, which illustrate the best embodiment of the device that I have yet contrived, and afterward the distinguishing characteristics of the invention will be particularly pointed out and defined in the claims at the close of this specification.

In the drawings, Figure 1 is a perspective view of a paper-making machine made in accordance with my invention. Fig. 2 is a perspective view of a portion of the upper apron.

In the drawings, 1 represents the pulp-vat, in the upper part of which are set the usual suction-rolls 2. In the present case three such rolls are shown, which operate to combine three layers of pulp into a single web of the same; but the invention is equally applicable to machines having more or fewer suction-rolls.

The endless apron, commonly known as the "long felt," on which the web of pulp is formed from the successive layers deposited by the suction-rolls is designated 3. It passes between the suction-rolls and their corresponding couch-rolls 4, thence back over the couch-rolls, between rolls 5 and 6, thence by a straight run of some little length to the press-rolls 7 and 8, thence downward from the press-rolls over an idle roll 9, and finally back to the pulp-vat.

An upper apron is indicated at 10. It passes around rolls 11 in a washing-box 12, sustained above the pulp-vat, coming out from the washing-box over the roll 13 and thence downward between the rolls 5 and 6 and between the press-rolls 7 and 8. From the press-rolls the upper apron returns over carrying-rolls 14, 15, and 16 into the washing-box. Thus the upper apron closely overlies the long felt throughout the straight run of the latter be-

tween the rolls 5 6 and the press-rolls 7 8. This arrangement is for the purpose of evening the web of pulp carried by the long felt, so that when it passes through the press-rolls it shall form a web of paper of uniform thickness. Such a web of paper is indicated at 17 as issuing from the press-rolls and at that point separating itself from the long felt and passing between hot drying-rolls 18.

Heretofore it has been attempted to impart to the paper which has been formed by the press-rolls a roughened surface of the character hereinabove described by passing it while still upon the surface of the long felt between an additional pair of rolls, one of which is covered with wire; but it has been found that the wire soon cuts into the felt and necessitates replacing the entire length of the latter, inasmuch as it is difficult or impossible to piece the felt without rendering the paper produced by the machine imperfect. Another defect in such a construction as has just been mentioned is that the paper is found to be too dry when it passes through the second set of press-rolls to take a good impression.

I have ascertained in the course of experiments that it is practicable to employ in a paper-making machine of the kind described an upper apron susceptible itself of imparting to the paper formed from the web of pulp passing through the press-rolls the desired roughened surface. Specifically I employ an upper apron having a working surface of coarse woven material, and I prefer for this purpose bagging made of jute-strands. Preferably, also, such woven material will be backed by a layer of felt, the latter being caused to unite with the woven facing by a suitable mode of manufacture—such, for example, as repeatedly driving or forcing a numerous gang or series of needles having roughened or toothed sides through a loose bat of felt superposed upon the bagging. By this means a part of the fibers of the felt-bat are caused to enter the meshes of the woven material.

In passing between the press-rolls the pulp is forced into the interstices of the bagging and is thereby molded into a series of prominences of somewhat regular character and pattern, but not too regular—that is to say, the prominences have not a perfectly smooth and curving contour, but exhibit many minor angularities. Further, the entire surface of the paper becomes covered with minute scores, corresponding with the fibers of the strands of the bagging. Also when the pulp is compressed by the press-rolls numerous loose ends of the pulp fibers enter between the fibers of the bagging and escape, becoming matted down into the general surface of the paper. In consequence the paper produced, and especially the prominences thereof, are covered with minute stiff filaments, or, in other words, the paper possesses a surface of what may be termed a "hairy" texture made up of such loose ends of fiber. These fibers therefore form short hooks or spurs and largely increase the frictional holding power of the paper upon yarn or the like wound upon it. At the same time the general surface from which these individual fiber ends project is solidly compacted by the pressure of the press-rolls and is not liable to become ragged or disintegrated by repeated handling and use. Such projecting fibers also increase the cushioning effect of the paper when used for certain other purposes above referred to. The product thus characterized is not herein claimed, it being described and claimed in an application for United States Letters Patent filed by me November 30, 1900, Serial No. 38,125.

By the use of an apron which itself is adapted to impart the desired roughened character to the paper being made, and particularly by the use of an apron having a surface of coarse woven material, all danger of injury to the long felt is avoided.

By the use of an apron composed of a backing of felt and a face of jute-fiber bagging or equivalent material the same apron is rendered available both for the making of ordinary paper and for the production of the improved roughened paper herein described. It is only necessary to reverse the apron upon its carrying-rolls in order to utilize it in either desired manner. A large saving in expense is thus effected, especially where a single machine is in use, and the drawbacks incident to transferring and storing an additional apron are avoided.

Another advantage is that the bagging supports the felt and prevents it from unevenly stretching, and thereby injuring the quality of the paper. The bagging is especially adapted to withstand the severe drubbing which the apron constantly receives in the washing-box, the ordinary apron wearing out in one or two weeks, while the compound apron herein described lasts from a month to six weeks.

What I claim is—

1. In a paper-making machine, in combination, the long felt and devices coöperating therewith to form a web of pulp, the upper apron acting independently of the forming devices traveling in unison with the long felt, resting in contact with the face of the said pulp and having a surface of interwoven fibrous material of coarse texture between the threads and fibers of which portions and fibers of the paper enter, whereby a roughened surface is imparted to the paper that is being made, and the rolls whereby the apron and felt are compressed together with the paper between them, substantially as described.

2. In a paper-making machine, the combination of devices for feeding a web of pulp, press-rolls to which such web is fed, and a reversible apron passing between the press-rolls and having on one side a surface of woven

material adapted to impart a roughened surface to the paper that is being made, and on the other side a surface of felt which may be used to produce a smoother surface on the paper, substantially as described.

3. In a paper-making machine, the combination of devices for feeding a web of pulp, press-rolls to which such web is fed, and a reversible apron passing between the press-rolls and having on one side a surface of jute fiber adapted to impart a roughened surface to the paper that is being made, and on the other side a facing of felt which may be used to impart a smoother surface to the paper.

4. In a paper-making machine, in combination, the suction-rolls, the long felt receiving the web of pulp from the said suction-rolls, the upper apron acting independently of the forming devices traveling in unison with the long felt, resting in contact with the face of the pulp thereon, and having a surface of interwoven fibrous material of coarse texture, and between the threads and fibers of which portions and fibers of the pulp enter, whereby a roughened surface is imparted to the paper that is being made, and the rolls whereby the apron and felt are compressed together with the paper between them.

In testimony whereof I affix my signature in presence of two witnesses.

ENOCH WAITE.

Witnesses:

ENOCH E. WAITE,

LEPINE HALL RICE.