

Dec. 30, 1930.

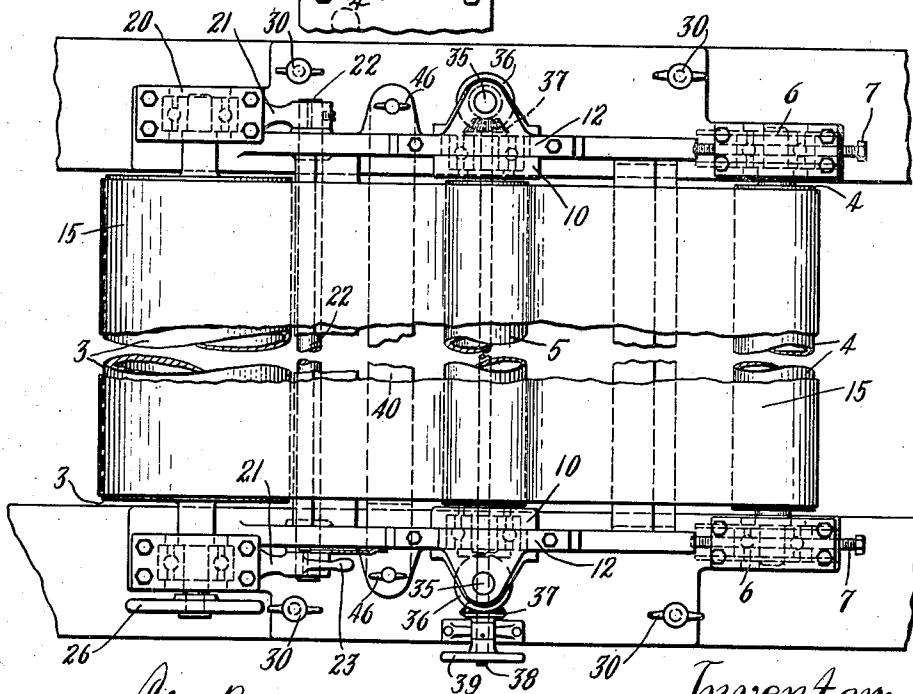
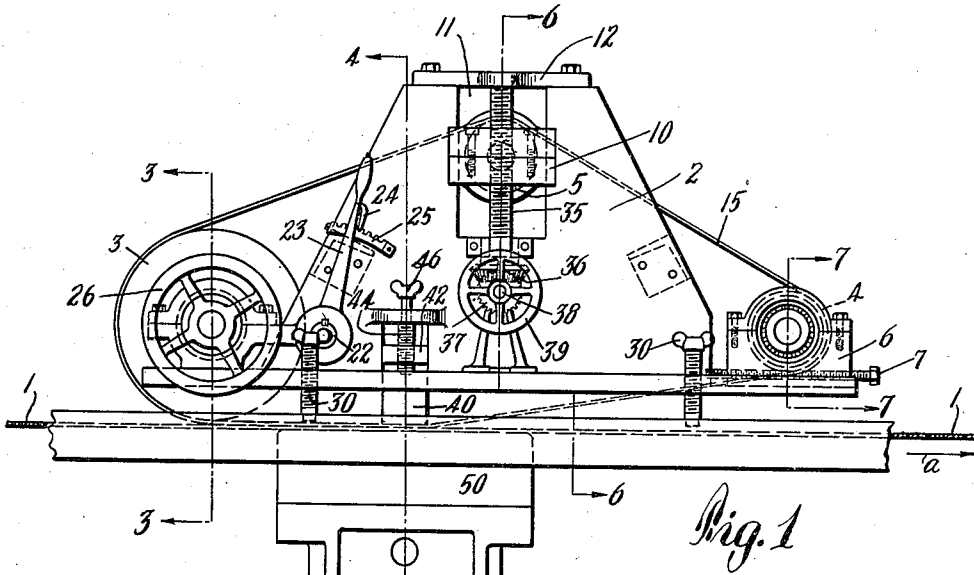
J. H. TRASK

1,787,218

METHOD OF AND MEANS FOR MAKING DECORATED PAPER

Filed Oct. 22, 1928

4 Sheets-Sheet 1



Inventor:
Jesse H. Trask.

by
Wright Brown Quincy May
Att'ys.

Dec. 30, 1930.

J. H. TRASK

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4 Sheets-Sheet 2

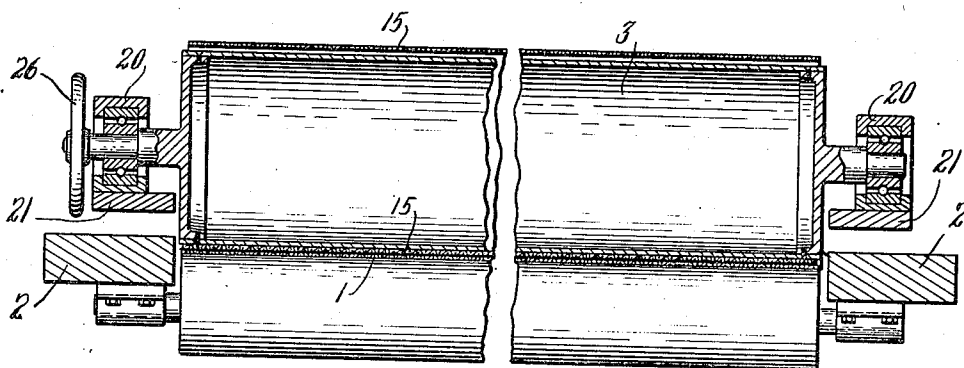


Fig. 3

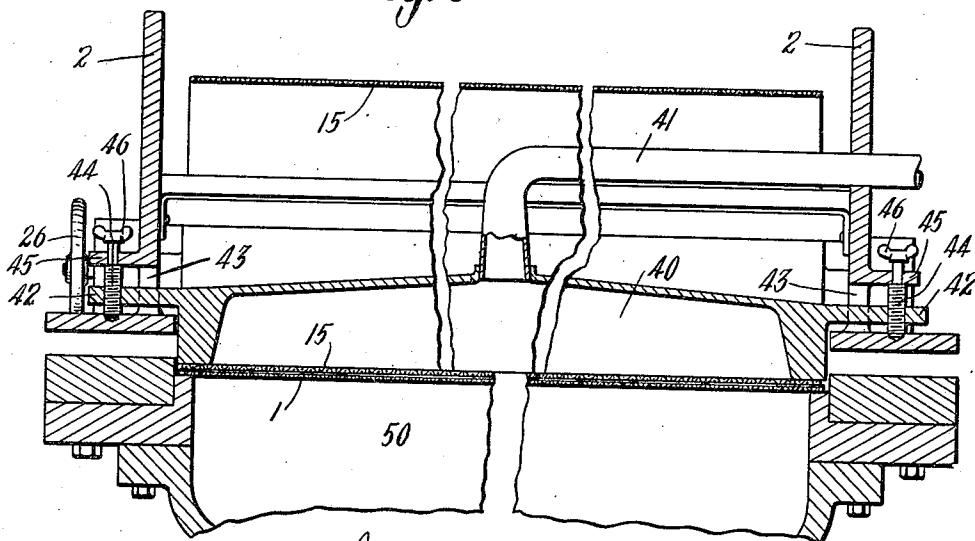


Fig. 4

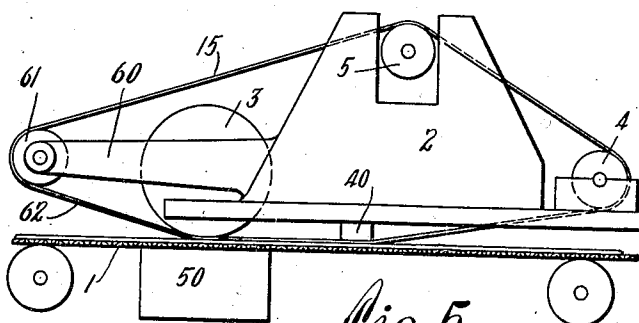


Fig. 5

Inventor:

Jesse H. Trask.

by
Wright Brown Quincy & May
Att'ys.

Dec. 30, 1930.

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4 Sheets-Sheet 3

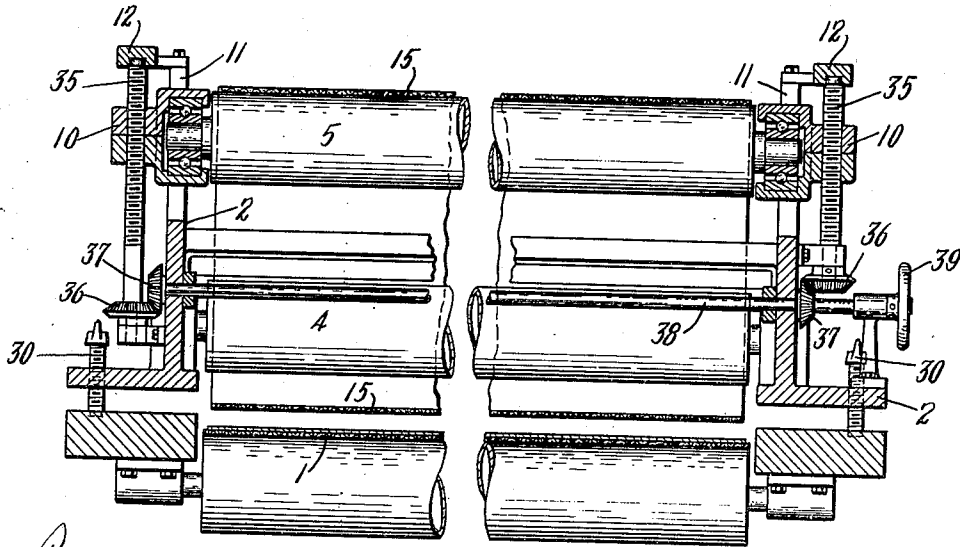


Fig. 6

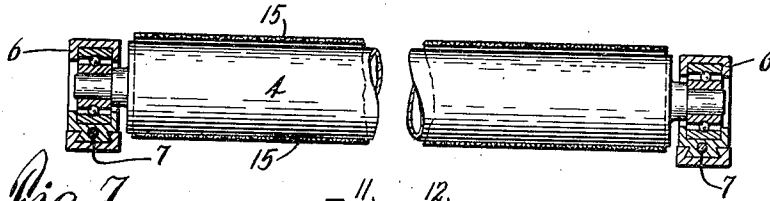


Fig. 7

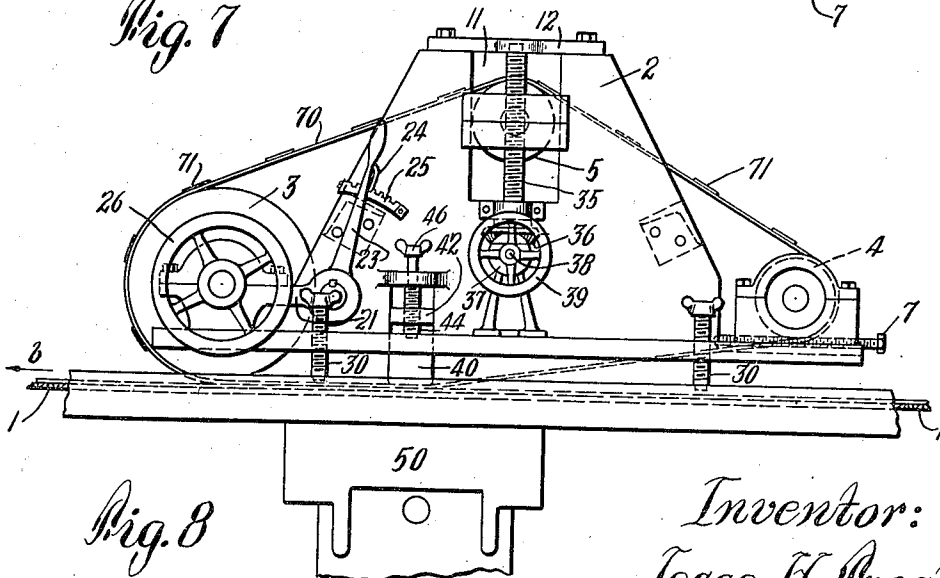


Fig. 8

Inventor:
Jesse H. Trask.

My
Wright Brown Quincy & May
Attys.

Dec. 30, 1930.

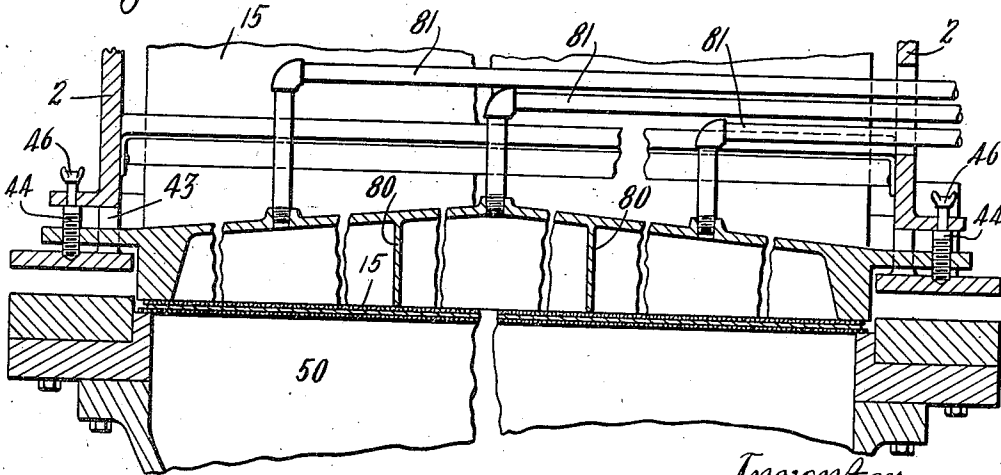
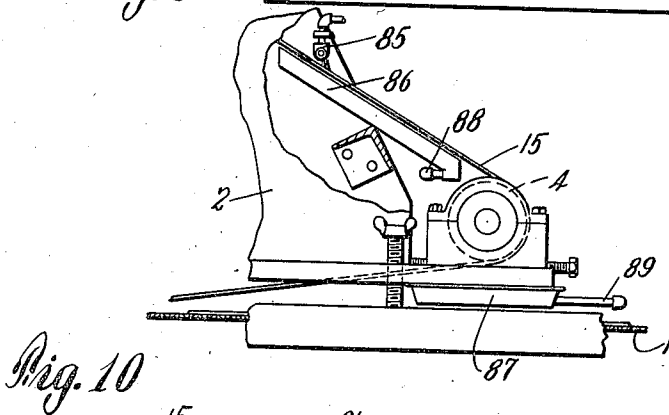
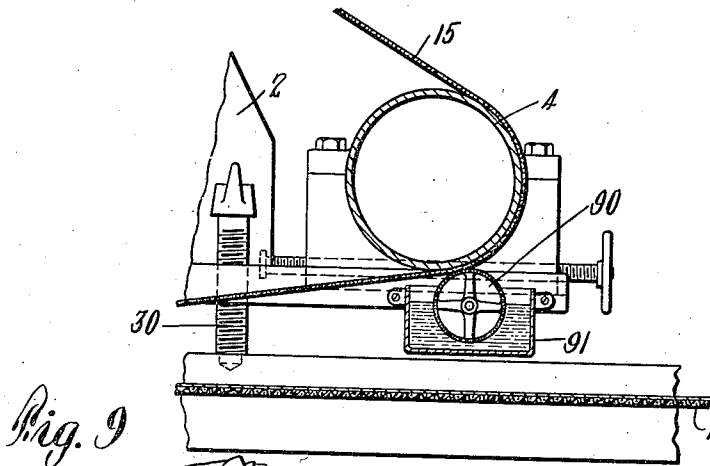
J. H. TRASK

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4 Sheets-Sheet 4



Inventor:

Jesse H. Trask.

by
Wright Brown Quincy May
Att'ys.

UNITED STATES PATENT OFFICE

JESSE H. TRASK, OF WAUSAU, WISCONSIN

METHOD OF AND MEANS FOR MAKING DECORATED PAPER

Application filed October 22, 1928. Serial No. 314,038.

This invention has for its object to produce decorated paper, more especially by forming thereon designs or figures in color and during the process of manufacture of the paper, although the same general method may be employed for forming figures or designs simulating watermarks or which are not in color different from the remainder of the paper.

This purpose is accomplished by leading in superposed relation to the partially dried web of pulp formed on the paper machine, an endless marking member, which if the marking is to be in color, is provided with means for depositing colored paper stock onto the web in the desired designs or configuration, and then withdrawing the marking member while preventing the pulp from adhering thereto and separating out from the body of the web. Where impressions only are desired no stock need be deposited by the marking member which may be provided with impression elements by which the marking is effected.

For a more complete understanding of this invention, reference may be had to the accompanying drawings in which

Figure 1 is a side elevation of one form of the mechanism shown as applied to a Fourdrinier machine.

Figure 2 is a top plan of the same.

Figures 3 and 4 are detail sections on lines 3—3 and 4—4 of Figure 1.

Figure 5 is a diagrammatic side elevation illustrating a modification.

Figures 6 and 7 are sections on lines 6—6 and 7—7, respectively, of Figure 1.

Figure 8 is a view similar to Figure 1, but showing an impression marker.

Figure 9 is a fragmentary section at the head roll end of the mechanism illustrating a modified construction in which a surface coating may be applied to one face of the paper.

Figure 10 is a fragmentary side elevation showing a device for cleaning the belt or marking member.

Figure 11 is a section somewhat similar to Figure 4, but showing a flow chest divided transversely of the paper so that marking different in color or other desired characteristic

may be made in different portions of the width of the paper simultaneously.

Referring first to Figures 1 to 4, at 1 is indicated a Fourdrinier wire of a paper machine preferably moving when the machine is operating in the direction of the arrow *a* (Figure 1). Mounted above this wire is a frame member 2 which carries the marking mechanism. This frame member is provided at one end with a relatively large roll 3 and at the opposite end with a head roll 4. Intermediate between these rolls and adjacent to the upper portion of the frame 2 is a roll 5. The roll 4 is shown as journaled in bearings 6 at opposite ends, these bearings being adjustable horizontally by means of the adjusting bolts 7. The roll 5 is shown as journaled in bearings 10 at opposite ends which are adjustable vertically, the bearings 10 being shown as slidable in slots 11 extending downwardly from the upper edge of the frame 2. The upper ends of these slots may be closed by means of the plates 12. Passing about the rolls 3, 4 and 5 is a flexible endless marking member or stencil belt 15 having openings therethrough in the desired design or pattern formation.

The roll 3 may be raised or lowered at will and for this purpose it is shown as journaled in bearings 20 at opposite ends, each of which is carried at the end of an arm 21 fixed to a rock shaft 22 which extends across the width of the frame. On one side of the frame this rock shaft has fixed thereto a handle 23 which may be rocked to any desired position through a desired angular range and there held by suitable means such as a releasable dog 24, which may be engaged with any selected portion of a curved rack bar 25 carried on one face of the frame member 2. The frame member itself is supported on the frame of the paper machine and may be adjusted toward or from the upper face of the Fourdrinier wire by any suitable means, as the adjusting screws shown at 30 adjacent to the corners of the frame. By suitable adjustment of these screws the frame may be so positioned as to bring the belt 15 into the desired relation with the Fourdrinier wire. When in operative position on the paper ma-

chine, this frame is so positioned that when the handle 23 is swung to the left hand position, as shown in Figure 1, the belt 15 where it passes about the roller 3, rides on the web of pulp lying on the Fourdrinier wire so that as this Fourdrinier wire is moved in normal operation of the paper machine, the belt 15 is caused to move therewith, the rollers 3, 4 and 5 being rotated by frictional engagement therewith. The shaft of the roll 3 may be provided with a hand wheel 26 by which its rotation may be started before it is brought down against the paper web.

When it is desired to stop the motion of the belt 15, this may be done by throwing the hand lever 23 to the right, as shown in Figure 1, so as to raise the roller 3 from its lowered position, raising the belt 15 out of contact with the web.

Adjustment of the bearing blocks 6 in which the roller 4 is journaled may be caused to control the steering of the belt, so that it may remain in proper position on the rolls during its travel. Vertical adjustment of the bearings 10 insures the proper tension being applied to the belt. As shown the blocks 10 are connected for simultaneous adjustment. For this purpose each of the blocks 10 has threaded therethrough a screw shaft 35 having a beveled gear 36 at its lower end. Each bevel gear engages a similar gear as 37 on a horizontal shaft 38, which extends beyond one side of the frame member 2 and carries any suitable device by which this shaft 38 may be rotated, as, for example, a hand wheel 39.

After passing around the roller 3 the belt 15 passes beneath a flow chest or box 40, which extends across the frame 2 and has an open lower edge across which the belt 15 passes. As shown best in Figure 4, this stock chest or box 40 extends for substantially the entire width of the stencil belt and is provided with a supply pipe 41 through which paper stock of the desired color may be fed, and if desired under pressure, into the interior of the box where it may escape through the openings of the stencil belt onto the upper face of the web of pulp. This mechanism should be placed on a paper machine at such a point that the flow box 40 deposits on the web after it has been fully formed, but before it is completely dry. The particular place where this should be done depends on various factors, such as the character of the stock, the speed of travel of the Fourdrinier wire, the sharpness with which it is desired to have the designs or figures marked on the paper, and whether or not it is desired to produce the designs on one side only, or have them shown on both sides in the finished paper. The sharpness of the outline of the designs is greater where the web of pulp is more nearly dry at the time the coloring material is applied thereto. Likewise when the pulp

is quite dry when the marking furnish is applied, the design is marked on one side only of the finished paper. A short fibered pulp is usually preferable as a furnish for the box 40 as it fills in well, though water colors, white wash, clay, starch, or other suitable materials may be used with or without fiber.

The stencil belt should be of very flexible material, such as rubber or rubber cloth, preferably somewhat rough on its lower face to make frictional driving contact with the paper web when engaged therewith, and it should approach the web quite gradually in order that it may not act to displace the formed fibers of the web on initial contact therewith. It is also desirable that its contact be made where it is not flexed to any substantial angle as the edges of the stencil openings should be as flat as possible in order to avoid the presentation of projecting edges or points to the formed web which might puncture or otherwise injure it. Likewise the withdrawal of the marking stencil should also be effected gradually and without abrupt change of angular relation to minimize any tendency to pick the fiber or dislodge it from the web.

Where the stencil belt is lifted from the wire there is a strong tendency for the web to adhere thereto, it being well known to those skilled in the paper industry that any member contacting with the wet web and having any substantial solid surface presented thereto, tends to retain the web thereon. As the stencil belt has considerable areas presenting solid surfaces, therefore, special means must be provided for preventing the web from being raised from the Fourdrinier wire, adhering to the stencil belt when the stencil belt is withdrawn from the wire. A very effective means of preventing such adherence, which of course would act to greatly damage if it did not indeed destroy the web, comprises a suction box of any suitable or usual type, such as is shown at 50. This suction box is positioned beneath the Fourdrinier wire at the flow box and where the stencil, after passing beneath the flow box, is gradually lifted from the upper face of the Fourdrinier wire. This suction box acts to hold the web on the Fourdrinier wire, freeing it from the stencil belt, which passes away from the Fourdrinier wire and around the head roll 4. The stock box 40 is shown as adjustable vertically independently of the frame 2. For this purpose, as shown in Figure 4, it may have end portions 42, which extend through openings 43 in the frame member 2 and through which are threaded adjusting screws 44 journaled in plate portions 45 and provided with winged heads 46 above the portions 45 by which they may be turned so as to raise or lower the member 40.

In some cases it may be found desirable to

cause the stencil, as it passes about the roll 3, to be presented more gradually to the web than it is possible were it permitted to engage over a substantial arc of the roll 3, thus minimizing the chance of the edge portions of the stencil at the openings projecting outwardly and injuring the more or less wet web passing beneath the roll 3. Where this is found desirable the frame 2 may be provided with extension arms 60 supporting an end roll 61, as shown in Figure 5, over which the stencil 15 passes on its way to the roll 3. This roll 61 acts to hold a lower stretch 62 of the belt 15 away from contact with the roll 3 over a substantial arc so that it is presented flatter to the web of pulp than where it is permitted to contact over a more substantial arc of the circumference of the roll 3.

If desired the flow box may be divided into a plurality of compartments as by the transverse partitions shown at 80 in Figure 11, each compartment having its own stock supply pipe 81, so that stock having different colors or having other characteristics may be supplied to the different compartments thus to deposit through the openings of the marking belt over different widthwise portions thereof, thus to obtain corresponding diversity of marking widthwise of the paper.

It may also be found desirable to employ means for cleaning the marking belt. In Figure 10 a stiff water spray 85 is shown for this purpose, pans 86 and 87 with drain pipes 88 and 89, respectively, being shown beneath the upgoing stretch of the belt and beneath the head roll to protect the paper being marked from the water of the spray.

When it is desired to form a mark simulating a watermark, where no marking stock is to be applied to the paper, the construction shown in Figure 8 may be employed. In this construction, it will be noted, that the marking member comprises an endless belt 70, which passes about the rolls 3, 4 and 5, which may be mounted, as previously described, in the frame member 2. This marking member 70, instead of being a stencil belt, is provided with elements 71 on the outer face thereof of the shape of the figures or designs which it is desired to show on the finished paper. This belt may, if desired, be made of wire screen such as the Fourdrinier wire. When this belt is brought down into operative relation to the web of paper, these elements 71 press thereon and impart the desired marks thereto. Preferably the roll 3 is positioned toward the dry end of the machine, the direction of rotation of the Fourdrinier wire being shown by the arrow *b*. The suction box 50 is employed as previously described where the belt 70 is lifted from the Fourdrinier wire so as to hold the web of paper to the Fourdrinier wire and prevent its adhesion to the marking belt.

In Figure 9 is shown a modified construc-

tion particularly intended to coat the surface of the paper uniformly, for example with china clay, pulp different from that of the paper, as, for instance, a bleached pulp on a cheaper paper web of "broke" or the like, coloring material, surface sizing, or other desired materials. To this end the belt as it passes about the head roll 4 contacts with a pick-up cylinder 90 of wire-gauze or other suitable material which is rotatable partly submerged in a vat 91 containing the desired coating material. This cylinder 90 is rotated by frictional contact with the marking belt and as it rotates it picks up coating material from the vat 91 and deposits it on the outside face of the belt, the belt in turn depositing this material on the surface of the paper above the suction box. If desired the cylinder 90 may be drained internally so as to function as a cylinder mold of a cylinder or wet paper machine and from which a web of pulp is removed by the marking belt which acts with relation to this cylinder as a blanket.

Having thus described certain embodiments of this invention, it should be evident to those skilled in the art that various changes and modifications might be made therein without departing from the spirit or scope of this invention, as defined by the appended claims.

I claim:

1. The method of making a marked paper, which comprises bringing a stencil against one face of a formed and partially dried web, passing marking material through said stencil against said web, and then withdrawing said stencil while preventing adhesion of the web thereto.

2. The method of making a marked paper, which comprises progressively forming and drying a web of pulp, gradually bringing to one face of said web before it is completely dry a stencil moving with the web, projecting marking material through said stencil onto the web, and then withdrawing said stencil while subjecting said web to suction from the opposite face.

3. The combination with a paper forming screen, of a marking member movable into and out of contact with a formed and partially dried web of pulp on said screen, and means for applying suction to the opposite face of said screen where said marking member is being moved out of contact with the web to prevent adhesion of the web to said member.

4. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent to said wire after the formation and before the web thereon is completely dried, an endless marking member carried by said frame and having a portion thereof arranged to engage the web and travel therewith, and means acting where said member moves away from said web at the end of said

contacting portion to prevent adhesion of the web thereto.

5. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent to said wire after the formation and before the web thereon is completely dried, an endless marking member carried by said frame and having a portion thereof arranged to engage the web and travel therewith, and a suction box on the opposite side of said wire where said member moves away from said wire at the end of said contacting portion.

6. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent thereto, an endless stencil belt carried by said frame, means on said frame for pressing a portion of said belt against a formed web on said wire, means for applying marking stock to the upper face of said belt at said portion to pass through the openings thereof and mark the web, and means for applying suction to the lower face of the web at said portion.

7. The combination with the Fourdrinier wire of a paper machine, of a marking mechanism comprising a frame positioned adjacent to said wire, an endless marking member carried by said frame, rolls journaled in said frame and about which said member passes, said mechanism including means for presenting a portion of said member closer to a web on said wire than the remainder thereof, means for adjusting said presenting means toward and from said wire to bring said member into contact with a pulp web thereon to be driven by the motion of said wire, or to be lifted out of contact therewith, and a suction box beneath said wire opposite to said portion where it leaves said web when driven thereby.

8. The combination with the Fourdrinier wire of a paper machine, of a marking mechanism comprising a frame positioned adjacent to said wire, an endless flexible stencil member carried by said frame, rolls journaled in said frame and about which said member passes, said mechanism including means for presenting a portion of said member closer to a web on said wire than the remainder thereof, means for adjusting said presenting means toward and from said wire to bring said member into contact with a pulp web thereon to be driven by the motion of said wire, or to be lifted out of contact therewith, means for conducting colored furnish to the upper face of said stencil to pass there-through onto said web, and a suction box beneath said wire opposite to said portion where it leaves said web when driven thereby.

9. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent to said wire after the formation and before the web thereon is completely dried, an endless marking member carried by

said frame and having a portion thereof arranged to engage the web and travel therewith, means acting where said member moves away from said web at the end of said contacting portion to prevent adhesion of the web thereto, and means for cleaning the face of said member which engages the web while out of contact therewith.

10. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent thereto, an endless belt carried by said frame in position to engage a face thereof with a formed web on said wire, means for applying material to said belt to be deposited thereby onto said web, and means for applying suction to the lower face of said web where said material is being deposited.

11. The combination with a Fourdrinier wire of a paper machine, of a frame positioned adjacent thereto, an endless belt carried by said frame in position to engage a face thereof with a formed web on said wire, means for applying coating material to said face of said belt to be deposited thereby onto said web, and means for applying suction to the lower face of said web where said material is being deposited.

12. The combination with a Fourdrinier wire of a paper machine, of an endless marking member positioned to have a portion thereof engage a web of wet pulp on said wire and travel therewith, and means acting where said member moves away from said wire at the end of said contacting portion to prevent adhesion of the web thereto.

In testimony whereof I have affixed my signature.

JESSE H. TRASK.