

May 8, 1923.

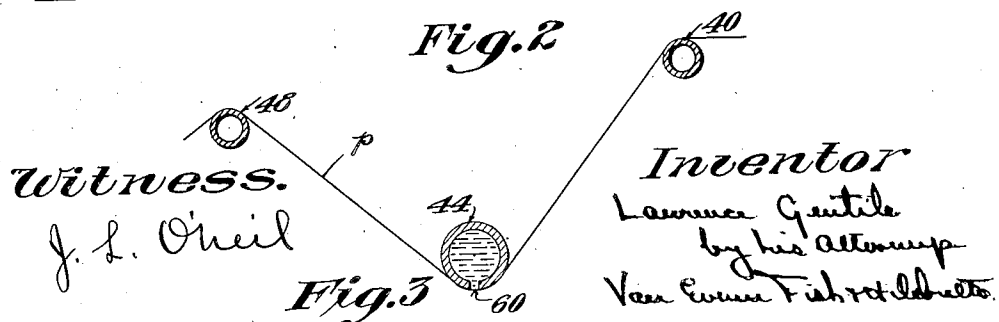
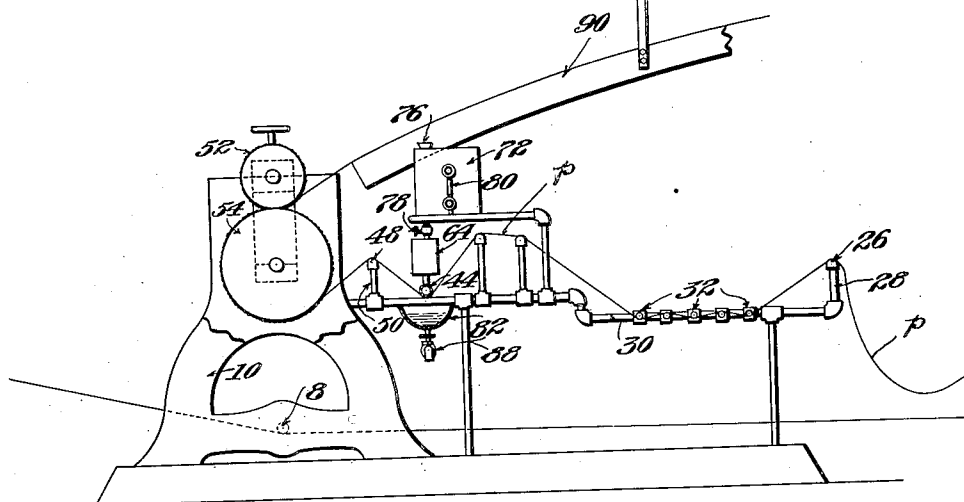
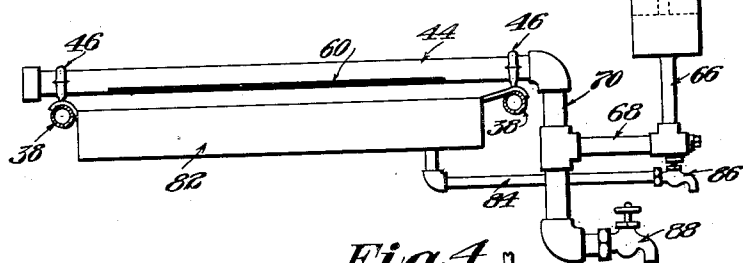
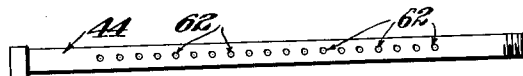
1,454,376

L. GENTILE

PAPER TREATING MACHINE

Filed Aug. 26, 1918

3 Sheets-Sheet 2



Witness.

J. L. O'Neil

Inventor

Lawrence Gentile
by his Attorney
Vern Everett Fish et al.

by his Attorney.

Van Curen Fish & Lobster.

May 8, 1923.

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L. GENTILE

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3 Sheets-Sheet 3

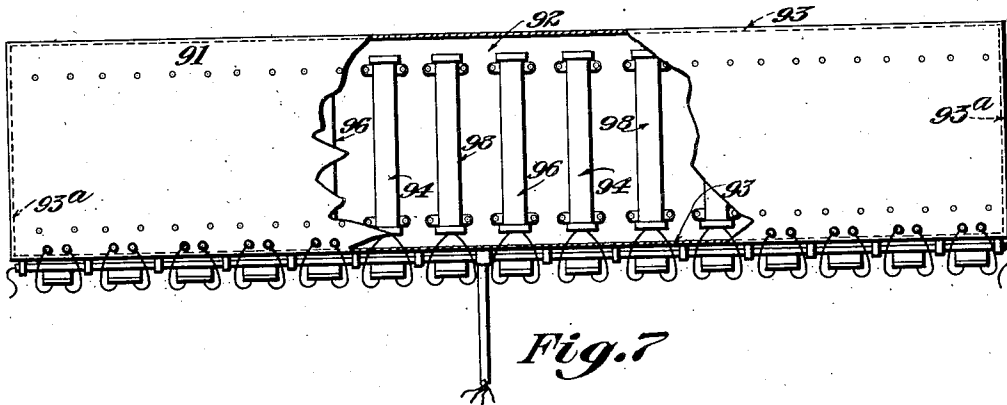


Fig. 7

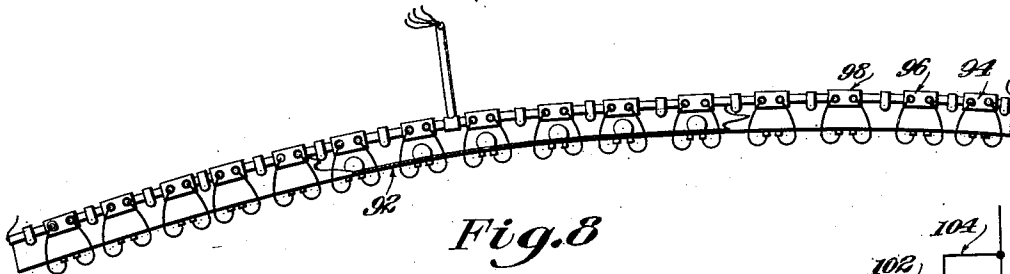


Fig. 8

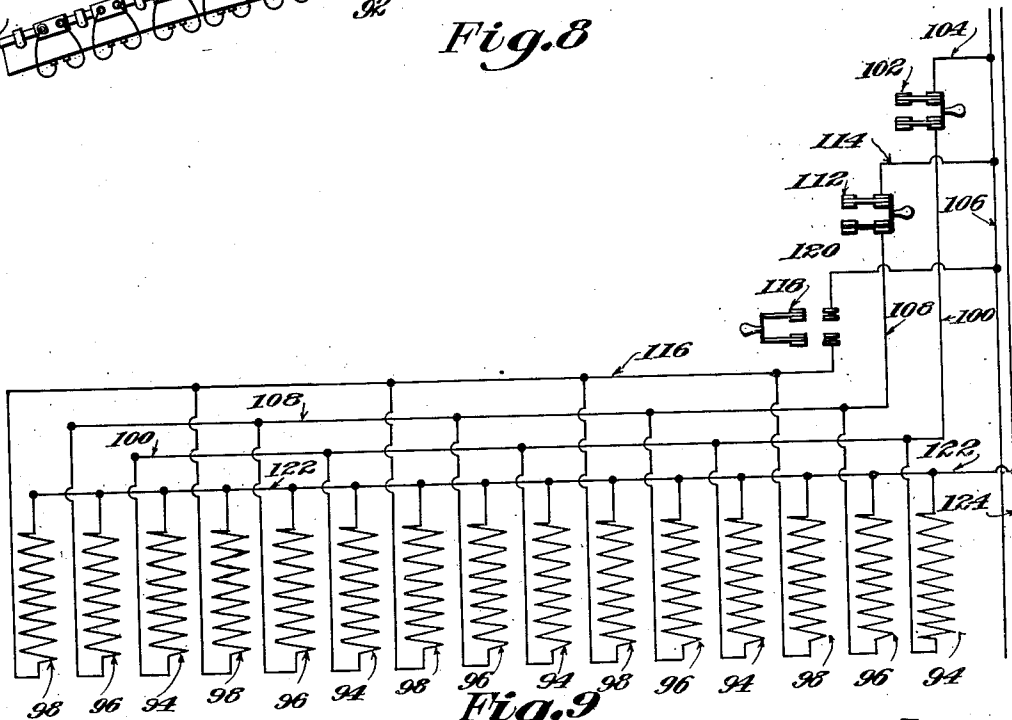


Fig. 9

Witness

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Van Curen Fish & Sheets

Patented May 8, 1923.

1,454,376

UNITED STATES PATENT OFFICE.

LAWRENCE GENTILE, OF MELROSE, MASSACHUSETTS, ASSIGNOR TO LESTER P. WINCHENBAUGH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PAPER-TREATING MACHINE.

Application filed August 26, 1918. Serial No. 251,384.

To all whom it may concern:

Be it known that I, LAWRENCE GENTILE, a citizen of the United States, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Paper-Treating Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to paper treating machines and, more particularly, to machines for applying dye, stain or other coloring liquid to paper or similar materials such as pasteboard and cardboard.

The primary object of the invention is to improve the construction and mode of operation of machines for applying coloring liquid to paper or similar materials with a view of securing more artistic results, of increasing of flexibility of such machines, and the rapidity of their output, and of reducing the expense of the operation.

With this object in view certain features of the invention relate particularly to improvements in the construction and mode of operation of the mechanism for applying the coloring liquid to the paper whereby various improved results are secured.

The devices for drying the paper after the coloring liquid is applied thereto employed heretofore in machines of this class have been rather complicated in construction, expensive to manufacture, and have occupied a great deal of valuable space in the manufacturing plant. The construction of these devices has been such that the paper has dried very slowly and the drying operation has taken considerable time and added a great deal to the cost of treating the paper. Certain features of applicant's invention relate to a novel and improved drying device which is simple and compact in construction, and which will operate to dry the paper much more quickly and efficiently than such devices heretofore produced.

The various features of the invention will be readily understood from the accompanying drawings illustrating a machine embodying the invention in its preferred form and the following detailed description of the constructions therein shown.

In the drawings Figure 1 is a view in side elevation of a machine embodying the

invention; Fig. 2 is a view in side elevation partly broken away and partly in section of a portion of the machine; Fig. 3 is a detail sectional view illustrating certain parts of the color applying mechanism; Fig. 4 is a view in end elevation partly in section illustrating certain parts of the color applying mechanism; Fig. 5 is a detail underside plan view illustrating one of the parts shown in Fig. 4 detached from the machine; Fig. 6 is a view similar to Fig. 5 illustrating a slightly different construction; Fig. 7 is a detail underside plan view partly broken away illustrating the drying device; Fig. 8 is a view in side elevation partly broken away and partly in section illustrating the drying device; and Fig. 9 is a diagrammatic view illustrating the electrical connections for the drying device.

In the machine embodying the invention as illustrated in the drawings the paper to be treated indicated at P is carried by and delivered from a roll 2 provided with trunnions mounted to turn in bearings 4 secured to a supporting bar 6 forming a part of the frame of the machine. The paper as it is delivered from the roll 2 passes under a guide bar 8 having its ends secured in spaced uprights 10, and under a second guide bar 12 having its ends secured in spaced uprights 14, and thence passes over a guide bar 16 having its ends secured in arms formed on the uprights 14 from which it is delivered to a pair of drawing rolls.

These drawing rolls, indicated at 18 and 20, are provided with trunnions mounted in bearings carried by the uprights 14 and are geared together by means of intermeshing gears 22 and 24. The drawing rolls may be formed with smooth peripheral faces or the peripheral faces of the rolls may be roughened or corrugated if it is desired to emboss the paper before it is delivered to the color applying devices. As illustrated in the drawing the paper passes from the guide bar 16 over the drawing roll 18, then between the two drawing rolls and under the drawing roll 20. From the drawing rolls the paper passes over a guide bar 26 secured at its ends to uprights 28 mounted on supporting bars 30, and from this guide bar is delivered to a tension device.

This tension device consists of a series of parallel guide bars 32, each secured at

its ends to the supporting bars 30 and arranged relatively close together. The paper passes from the guide bar 26 alternately under and over tension bars 32, which exert a very considerable frictional drag or resistance to the passage of the paper as it is drawn past the bars.

From the tension device the paper passes over a guide bar 34 secured at its ends to uprights 36 mounted on supporting bars 38, and over a second guide bar 40 secured at its ends to uprights 42 mounted on the supporting bars 38. From the guide bar 40 the paper passes under a color delivery pipe 44 secured at its ends by clamps 46 to the supporting bars 38 and having an opening or a series of openings in its underside extending lengthwise thereof through which the coloring matter is delivered on the paper. The paper passes from beneath the color delivery pipe 44 over a guide bar 48 having its ends secured to uprights 50 mounted on the supporting bars 38, and thence passes to a second pair of drawing rolls 52 and 54. These drawing rolls are provided with trunnions mounted in bearings carried by the uprights 10, and are geared together by means of inter-meshing gears 56 and 58. The paper passes from the guide bar 48 underneath the drawing roll 54 and then between the two drawing rolls.

The coloring liquid is supplied to the color delivery pipe 44 through suitable connections from a color holding reservoir. When it is desired to deliver the coloring liquid on the paper throughout substantially the whole width of the paper so as to give the paper a solid uniform coloring, the color delivery pipe 44 is formed with a long, narrow opening or slit, as indicated at 60 in Fig. 4, through which the coloring liquid is delivered on the paper. When, however, it is desired to apply the coloring matter to the paper in stripes, the pipe 44 is formed with a series of color delivery openings, as indicated at 62 in Fig. 5. These openings may be varied in width or in their relative arrangement to secure any desired width or relation of the stripes of color formed on the paper. To change the manner in which the coloring liquid is applied to the paper it is only necessary to detach the color delivery pipe which is applied to the machine and to substitute therefor another color delivery pipe having color delivery openings of different size or arrangement.

The color delivery pipe 44 is provided with a smooth contact face against which the pipe runs so that the paper will run across the contact face of the pipe without undue frictional resistance. The guide bars 40 and 48 are arranged relatively to the color delivery pipe 44 so as to form a bight or

loop in the paper with the delivery pipe located within the end of the loop. The guides are also preferably arranged relatively to the color delivery pipe so that the run of paper between the guide bar 40 and the pipe makes quite a sharp angle to the run of paper between the pipe and the guide bar 48 and that as a result the paper contacts with the pipe for a considerable number of degrees about the periphery of the pipe. As clearly shown in Fig. 3 the opening or openings in the delivery pipe are preferably arranged substantially in a central relation to the surface of the pipe with which the paper contacts, so that the paper engages the pipe for some distance on each side of the openings. As the paper is drawn by the drawing rolls 52 and 54 through the tension device across the various guide bars and under the color delivery pipe, on account of the resistance exerted by the tension bars on the paper before it reaches the delivery pipe, the paper is drawn taut between the guide bars 40 and 48 and is held with considerable pressure against the contact surface of the delivery pipe. With this construction the paper forms a bight the central portion of which extends about the smooth contact face of the color delivery pipe and acts as a seal to the color delivery pipe preventing the passage of the coloring liquid between the delivery pipe and the paper, with the result that the coloring liquid is delivered upon the paper only at the openings in the pipe as the paper passes these openings.

The draft rolls 18 and 20 operate to draw the paper from the supply roll 2 so as to keep the paper slack between the rolls 18 and 20 and the guide bar 26, as clearly shown in the drawings. The frictional resistance to the passage of the paper before it reaches the color delivery pipe is therefore wholly controlled by its engagement with the guide bar 26, the tension bars 32 and the guide bars 34 and 40. The resistance exerted by these guide bars and the tension bars is sufficient to cause the paper to be drawn against the contact surface of the color delivery device with the proper pressure without any liability of tearing the paper.

The coloring liquid is delivered to the pipe 44 from a receptacle 64 mounted on the upper end of a pipe section 66, connected at its lower end with the outer end of a pipe section 68. The inner end of the pipe section 68 is connected with a vertical pipe section 70 having a connection at its upper end with the outer end of the pipe 44. The amount of coloring liquid delivered upon the paper, and the tint or shade given thereto will depend to a large degree upon the pressure exerted by the coloring liquid at the delivery openings in the pipe 44. The pressure depends upon the height of the

coloring liquid in the receptacle 64. In the present machine means is provided for maintaining the coloring liquid in the receptacle 64 at a substantially constant level during the operation of the machine so that a substantially constant pressure will be exerted by the coloring liquid at the delivery openings in the pipe 44, and that the coloring liquid will be delivered uniformly upon the paper and give a uniform coloring thereto throughout the length of the paper treated. The coloring liquid is supplied to the receptacle 64 from a reservoir 72 through an outlet pipe 74 secured at its upper end in the base of the reservoir and projecting downwardly therefrom into the receptacle 64, as is clearly shown in Fig. 4. When the machine is in operation the reservoir 72 is tightly closed so that no air can enter the same except through the pipe 74, the filling opening in the cover of the reservoir then being closed by a stopper 76. With this construction the coloring liquid will be delivered from the reservoir 72 into the receptacle 64 on the well known principle of barometric feed, and the coloring liquid will be maintained in the receptacle 64 at a level substantially even with the lower end of the delivery pipe 74.

The reservoir 72 rests on a support 77 and the vertical position of the reservoir may be changed to vary the height at which the coloring liquid is maintained in the receptacle 64 to produce variations in the pressure of the coloring liquid at the color delivery openings in the pipe 44. The reservoir 72 may be adjusted vertically by inserting a block or plate of any desired thickness between the reservoir and said support, or in any other suitable or convenient manner.

The outlet pipe 74 is provided with a stopcock 78 by which the flow of the coloring liquid through the outlet pipe may be cut off when desired, and the reservoir 72 is provided with a gage glass 80 for indicating the depth of the coloring liquid in the reservoir.

In order to catch the coloring liquid discharged from the color delivery pipe 44 when the paper is removed from contact therewith, a trough 82 is secured at its ends to the supporting bars 38 beneath the color delivery pipe. This trough is provided with an outlet pipe 84 having a drain-cock 86 mounted on the outer end thereof.

The pipe 70 is provided with a drain-cock 88 by means of which the receptacle 64, the color delivery pipe 44 and the pipes 66, 68 and 70 may be drained of the coloring liquid when desired.

The drawing rolls 52 and 54 may be provided with smooth peripheral surfaces so that they will act merely as draft rolls. In the construction illustrated in the drawing,

however, these rolls are provided with roughened surfaces so that they will emboss the paper as the paper is drawn between the rolls.

The paper impregnated to a greater or less extent with the coloring liquid after being delivered from between the draft rolls 52 and 54 passes over a drying device indicated generally in the drawing by the reference numeral 90. This drying device in the construction illustrated consists of a substantially closed elongated housing or chamber having a series of heating units mounted therein and arranged so that the paper passes over the upper wall of the housing in contact therewith. As illustrated in the drawing, this housing or chamber is constructed with upper and lower walls 91 and 92, side walls 93, and end walls 93^a all of which preferably consist of sheet metal plates. The lower wall of the housing and the side and end walls thereof may be sheathed with asbestos or other suitable non-conducting material so that the heat developed within the housing will be more effectively retained. The upper wall, however, is left uncovered so that the heat will be transmitted rapidly from its upper surface. Upon the plate 92 forming the lower wall of the housing are mounted within the housing a series of electrical heating units indicated at 94, 96 and 98, uniformly distributed longitudinally of the housing so that the plate 91 will be heated uniformly throughout its length.

Provision is made for controlling the heat developed within the housing and transmitted to the plate 91 so that the plate may be heated to just the right temperature to dry the paper quickly without injury to the same. To this end the heating units are arranged as to their electrical connections in groups, the units 94 constituting one group, the units 96 a second group, and the units 98 a third group. These groups are connected with the main circuit wires in parallel and the members of each group are connected with each other in series, and switches are provided for cutting each group into or out of connection with the main circuit wires independently of each of the other groups. As shown clearly in Figs. 7, 8 and 9, the units of the several groups are interspaced so that not only are the heating units taken as a single series uniformly distributed throughout the length of the housing, but the units of each group are also uniformly distributed throughout the length of said housing. Fig. 9 illustrates clearly the electrical connections for the heating units. As illustrated in this figure one of the terminals of each of the heating units 94 is connected with a wire 100, one end of which is connected with one terminal of a switch 102, the other terminal of which is

connected with one end of a wire 104, having its other end connected with the main circuit wire 106. One terminal of each of the heating units 96 is connected with a wire 108, one end of which is connected with one terminal of a switch 112. The other terminal of the switch 112 is connected with one end of a wire 114, the other end of which is connected with the main circuit wire 106. One terminal of each of the heating units 96 is connected with a wire 116, one end of which is connected with one terminal of a switch 118, the other terminal of which is connected with one end of a wire 120, having its other end connected with the main circuit wire 106. The other terminal of each of the heating units, 94, 96 and 98, is connected with a wire 122, one end of which is connected with the main circuit wire 124. The three groups of heating units are thus connected with the main circuit conductors in parallel, and the units of each group are connected with each other in series. By means of the switches, 102, 112 and 118, each of the groups of heating units may be cut in or out of connection with the main circuit conductors independently of the others. It will be noted that whether any one, any two or all of the groups of units are cut in, the units which are energized will be uniformly distributed throughout the length of the housing and a very uniform distribution of heat within the housing will be secured.

The plate 91 forming the upper wall of the housing is convexly curved upwardly so that a bow is formed in the paper in its passage over the upper surface of this plate. In the construction shown the entire housing has a convex upward curvature. The paper is drawn from the drying device by means of a pair of draft rolls 126 and 128. It is important that the paper in its passage over the drying device be kept taut and in close contact with upper surface of the plate 91 throughout the length of the plate. The draft rolls 52 and 54 and the draft rolls 126 and 128 are located somewhat below the respective ends of the drying device so that a bend is formed in the paper intermediate the two sets of rolls. The rolls 126 and 128 in drawing the paper taut between said rolls and the rolls 52 and 54 tend to straighten this bend and thereby draw the paper down against the upper surface of the plate 91 with considerable pressure. The strain exerted on the paper by these rolls also tends to straighten the bow in the paper intermediate the ends of the plate 91 so that the paper is pressed against the upper surface of said plate substantially throughout its entire length.

The paper after passing from the drying device may be rolled up on a roll or subjected to any further treatment desired. In the illustrated construction the paper passes

from the drying device to a cutting mechanism for cutting the paper into sheets. This cutting mechanism is of a well known construction and comprises the draft rolls 126 and 128 hereinbefore described and a rotary cutter 130. The paper after being cut into sheets is deposited upon a table 131.

The various parts of the machine illustrated are driven from a main driving shaft 132. On this shaft is mounted a pulley 134 connected by a belt 136 with a pulley 138 secured to a counter-shaft 140 mounted in bearings in standards 142. Upon the shaft 140 is mounted a second pulley 144 connected by a belt 146 with a pulley 148 secured to a shaft 150 mounted in bearings carried by the standards 10. Upon the shaft 150 is mounted a gear 152 meshing with a gear 154 secured to the trunnion at one end of the roll 52. Upon the shaft 150 is mounted a second pulley (not shown) connected by a belt 156 with a pulley 158 secured to the trunnion at one end of the roll 20. Upon the driving shaft 132 is mounted a second pulley 160 connected by a belt 162 with a pulley 164 mounted on a counter-shaft 166. To this shaft is secured a second pulley (not shown) connected by a belt 168 with a pulley 170 mounted on a shaft 172 journaled in bearings carried by the standards 127. Upon the shaft 172 is mounted a gear 174 meshing with a gear 176 secured to the trunnion at one end of the roll. Upon the shaft 172 is also mounted a pulley 178 connected by a belt 180 with a pulley 182 mounted on a shaft 184 journaled in bearings in the standards 127. A gear 186 is secured to the shaft 184 and meshes with an intermediate gear 188 which in turn meshes with a gear 190 secured to the trunnion at one end of the rotary cutter 130.

Having described the nature and object of the invention, and having specifically described a machine embodying the invention in its preferred form, what is claimed is:

1. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact having a curved contact face for engagement with the paper, and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device cooperating with said device to form a bight in the paper and arranged so that the sides of said bight extend in directions tangent to the curved contact face of the delivery device, draft mechanism for drawing the paper past the guides and color delivery device and a tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and tending to retard the movement of the

paper so that the paper is drawn taut against the color delivery device by the cooperative action of the draft mechanism and the tension device.

2. A machine for applying coloring liquid to paper, having, in combination, a color delivery device against which the paper runs in contact having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, and means for maintaining a substantially constant pressure of the coloring liquid on the paper at the color delivery openings.

3. A machine for applying coloring liquid to paper, having, in combination, color holding devices comprising a color delivery device against which the paper runs in contact having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, and means for maintaining the coloring liquid at a substantially constant level in the color holding devices to maintain a substantially constant pressure of the coloring liquid on the paper at the color delivery openings.

4. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device and before the coloring liquid has dried thereon, and means for embossing the paper after it leaves the color delivery device.

5. A machine for applying coloring liquid to paper having, in combination, means for applying the coloring liquid to the paper in quantities sufficient to allow the liquid to impregnate the paper, and pressure devices engaging opposite sides of the paper for embossing the paper after it leaves the color delivery device.

6. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in contact having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, a tension device arranged to act on the paper before it reaches said delivery device, guides for the paper arranged on opposite sides of the delivery device and cooperating therewith to form a bight in the paper, and means including drawing rolls for maintaining the paper in a slackened condition just before it reaches the tension device.

7. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact having one or more color

delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, a supply roll, a tension device, means including drawing rolls for drawing the paper from the supply roll and maintaining the paper in a slackened condition just before it reaches the tension device, guides on opposite sides of the color delivery device and drawing rolls cooperating with said guides and tension device to cause the paper to contact with the delivery device with considerable pressure.

8. A machine for applying coloring liquid to paper having, in combination, a color applying device, embossing rolls arranged to act on the paper after it leaves the color applying device, and a drying device arranged to dry the paper after it is acted upon by the embossing rolls.

9. A machine for applying coloring liquid to paper having, in combination, color applying devices, drawing and embossing rolls for drawing the paper past the color applying devices and for embossing the paper during its engagement therewith, a drying device for receiving the paper from said drawing rolls, drawing rolls arranged to draw the paper past the drying device, and cutting mechanism to which the paper is delivered from the latter drawing rolls.

10. A machine for applying coloring liquid to paper having, in combination, color holding devices comprising a color delivery device against which the paper runs in contact having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, and means for maintaining the coloring liquid in the color holding devices at a substantially constant level above said color delivery openings during the color applying operation.

11. A machine for applying coloring liquid to paper having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device cooperating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and tending to retard the movement thereof so that the paper is held firmly in operative contact with the delivery device by the co-operative action of the draft

mechanism and the tension device during the operation and means for feeding the paper to the tension device.

12. A machine for applying coloring liquid to paper having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device co-operating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a frictionally acting tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and tending to retard the movement thereof so that the paper is held firmly in operative contact with the delivery device by the co-operative action of the draft mechanism and the tension device during the operation and means for feeding the paper to the tension device.

13. A machine for applying coloring liquid to paper having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device co-operating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a tension device past which the paper is drawn by said draft mechanism acting frictionally on the paper before it reaches said delivery device and tending to retard the movement thereof so that the paper is held firmly in operative contact with the delivery device by the co-operative action of the draft mechanism and the tension device during the operation and means for feeding the paper to the tension device.

14. A machine for applying coloring liquid to paper having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device and forming a bight in the paper by its engagement therewith, draft mechanism for drawing the paper past the color delivery device, a tension device past which the paper is drawn by said draft mechanism

arranged to engage the paper before it reaches said delivery device and tending to retard the movement thereof so that the paper is held firmly in contact with the delivery device by the co-operative action of the draft mechanism and the tension device during the operation and means for feeding the paper to the tension device.

15. A machine for applying coloring liquid to paper, having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device co-operating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and constituting the sole means by which the movement of the paper is retarded against the action of said draft mechanism and co-operating with said draft mechanism to hold the paper firmly in contact with said delivery device and means for feeding the paper to the tension device.

16. A machine for applying coloring liquid to paper, having in combination a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device co-operating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and tending to retard the movement thereof, the side of the paper opposite that engaged by said delivery device at the point of contact of the delivery device therewith being free and unobstructed and the draft mechanism and tension device co-operating to hold the paper firmly in contact with the delivery device and means for feeding the paper to the tension device.

17. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact, having a smooth contact face for engagement with the paper

and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, guides for the paper on opposite sides of the delivery device cooperating with said device to form a bight in the paper, draft mechanism for drawing the paper past the guides and color delivery device, a tension device past which the paper is drawn by said draft mechanism arranged to engage the paper before it reaches said delivery device and tending to retard the movement thereof so that the paper is held firmly in operative contact with the delivery device by the cooperative action of the draft mechanism and the tension device during the operation, and means for feeding the paper to the tension device.

18. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in contact, having one or more color delivery openings therein, through which the coloring liquid is discharged on the paper at its point of contact with said device, a tension device arranged to act on the paper before it reaches said delivery device, guides for the paper arranged on opposite sides of the delivery device and cooperating therewith to form a bight in the paper and means for feeding the paper to the tension device.

19. A machine for applying coloring

liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact, having one or more color delivery openings therein through which the coloring liquid is discharged on the paper at its point of contact with said device, a supply roll, a tension device, means for drawing the paper from the supply roll and feeding the same before it reaches the tension device, guides on opposite sides of the color delivery device, and means for feeding the paper after it passes said guides and the color delivery device cooperating with said guides and tension device to cause the paper to contact with the delivery device with considerable pressure.

20. A machine for applying coloring liquid to paper having, in combination, a color delivery device against which the paper runs in rubbing contact having a smooth curved contact face for engagement with the paper, and one or more color delivery openings passing through said contact face through which the coloring liquid is discharged on the paper at its point of contact with said device, and guides for the paper on opposite sides of the delivery device cooperating with said device to form a bight in the paper and arranged so that the sides of said bight extend in directions tangent to the curved contact face of the delivery device.

LAWRENCE GENTILE.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,454,376, granted May 8, 1923, upon the application of Lawrence Gentile, of Melrose, Massachusetts, for an improvement in "Paper-Treating Machines," an error appears in the printed specification requiring correction as follows: Page 5, lines 35 and 36, claim 4, strike out the words "and before the coloring liquid has dried thereon" and insert the same to follow the word "device" in line 37; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of June, A. D., 1923.

[SEAL.]

WM. A. KINNAN,
Acting Commissioner of Patents.