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J. A. CONSTANCE
METHOD OF COATING PAPER

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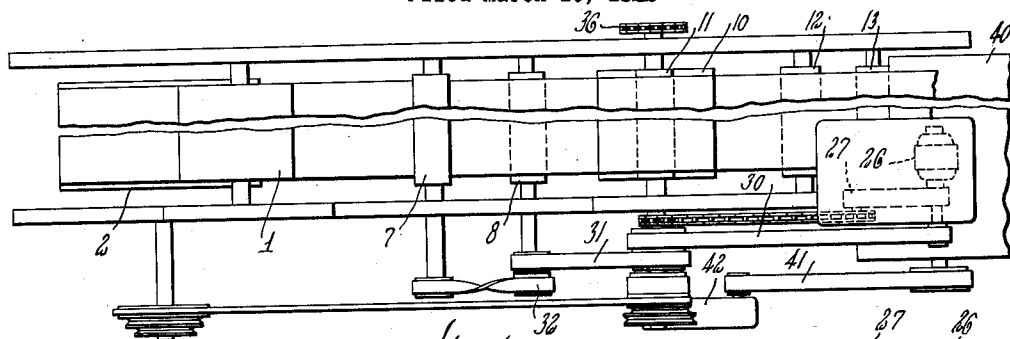
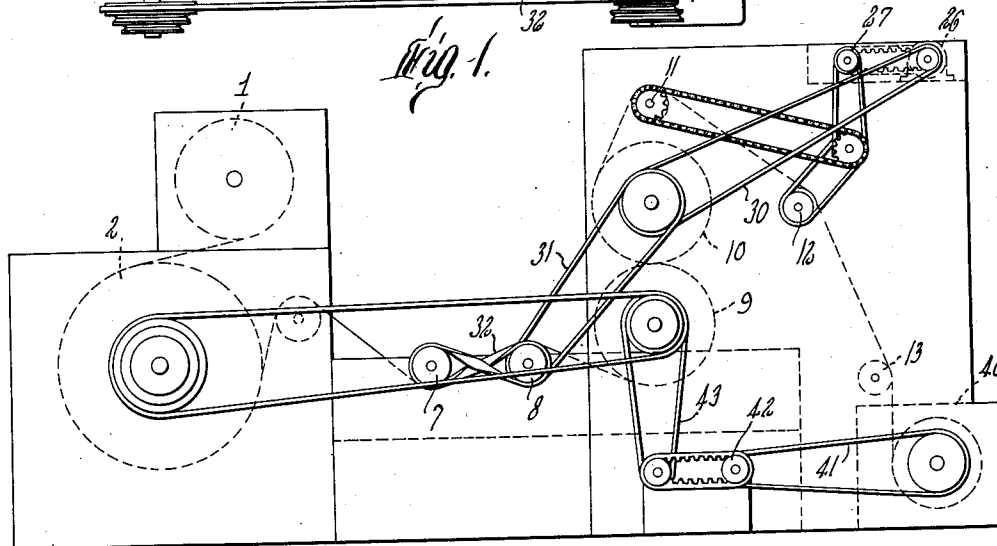


Fig. 2.

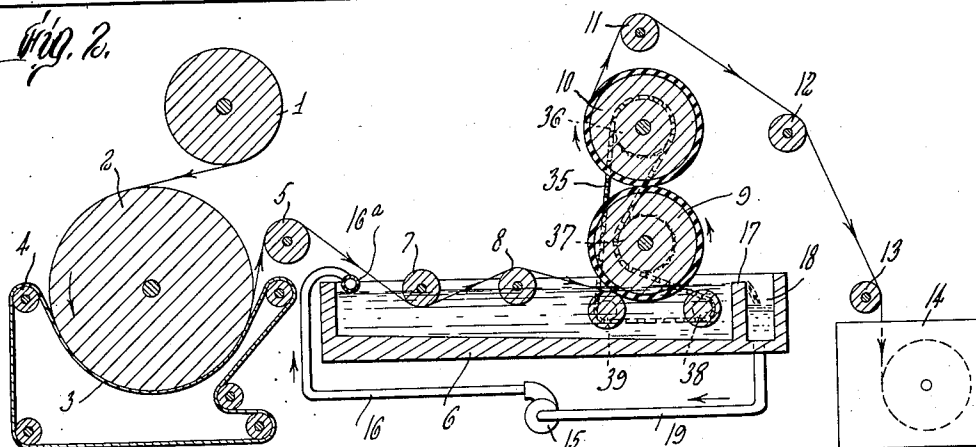


Fig. 3.

Inventor
Joseph A. Constance
by Wright Brown Quincy May
Attys.

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METHOD OF COATING PAPER

Joseph A. Constance, Millers Falls, Mass., assignor to Brightwater Paper Company, Adams, Mass., a corporation of Delaware, and Millers Falls Paper Company, Millers Falls, Mass., a corporation of Massachusetts

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This invention relates to the coating of paper, and more particularly to the coating of typewriter paper in such a manner that it may be made readily erasable. In order to make such paper readily erasable it is provided with a thin size coating which covers both the valleys and hills of the paper surface and protects the paper substance from access by constituents of the ink which otherwise would stain it and render the writing indelible.

One important object of the present invention is to provide a method of applying the coating material by which such material may be applied to the necessary thickness uniformly in a single pass of the paper, thus materially cheapening the application of the coating which heretofore has required a plurality of surface coating treatments.

A further object is to provide a method by which the paper is exposed to the air after an initial application of the coating material has been applied, after which a second coating operation is effected, all in a single pass of the paper.

Still another object is to so support the paper during the applications of the coating material thereto that breakage or wrinkling of the paper web is avoided.

Another object is to provide a method in which the coating material is passed in a continuous flow, and while the coating bath is maintained with a relatively narrow range of viscosity.

Further objects and advantages will appear from a further description of an embodiment of the invention as shown in the accompanying drawings in which

Figure 1 is a top plan view of the coating mechanism and adjacent parts.

Figure 2 is a side elevation of the same.

Figure 3 is a longitudinal sectional view showing the drive mechanism.

Referring to the drawings, at 1 is shown a roll of paper in web form which is passed about a pasting drier roll 2 between the surface of this roll 2 and a continuous belt 3 which is supported on rollers 4 so arranged as to hold the paper web against the roll 2 for a considerable arc of its periphery. From the pasting roll the paper passes over a guide roll 5 and downwardly into a size tub or vat 6 beneath a dip roll 7 by which the web of paper is passed beneath the surface of the sizing liquid. From this dip roll 7 the paper web passes out from the sizing liquid over an emergence roll 8 from which it again passes downwardly beneath the surface of the sizing liquid and beneath a lower rubber-coated size

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roll 9. The paper web passes upwardly around the periphery of the lower size roll 9 and through the nip between this roll 9 and an upper rubber-coated size roll 10, from which it passes over a guide roll 11 and then over the guide rolls 12 and 13 into a suitable drier at 14.

The sizing liquid in the size tub or vat 6 is caused to flow in the general direction of the passage of the web of paper through the tub or vat. For this purpose it may be circulated as by a pump 15 entering into the size tank through the pipe 16 and distributor pipe 16a and flowing over a wall portion or dam 17 at the opposite end of the tub or tank into an overflow portion 18 of the tank from which it is withdrawn by the pump 15 through the pipe 19.

Best results have been experienced using casein or gum arabic size, preferably with a small amount of titanium oxide to whiten the coating. For the purpose of this invention, which is to apply a coating which will render the paper readily erasable, the viscosity of the size must be kept within rather close limits, preferably between 30 and 35 seconds, using a 45 M. L. pipette at 80° F. If the viscosity is under 30 seconds, the paper produced does not properly erase because the typewriter ink penetrates into the fibers of the paper and on removal of the typewriter ink, the surface of the sheet is damaged. If the viscosity is over 35 seconds, the typewriter ink comes off the paper so easily that when erasure is attempted, or if it be filed in a crowded letter file, smudging of the paper from the ink results.

The viscosity of the coating bath varies as the process is being carried out, sometimes increasing and sometimes decreasing so that almost constant attention is needed to maintain it within proper limits.

The function of the emergence roll 8 is first to support the stretch of paper between the dip roll and the size roll which otherwise would sink into the bath and tend to wrinkle or break due to the weight of the coating flowing on top of it. This emergence roll also tends to smooth out any wrinkles which might start to form between it and the dip roll on one side and between it and the size roll on the other side. It also lifts the paper out of the sizing bath and exposes it momentarily to the air which apparently produces an incipient hardening of the surface which is found to be important in applying the desired coating in such a manner that indelibility of the paper results. It is also important that both of the sizing rolls be positively driven and it is also important that the various driving means for

the paper web be driven at such relative velocities that the paper is maintained under the proper tension throughout the passage through the coating mechanism in order to avoid wrinkles in the paper and possible breakage.

The power for driving the various rolls is derived from a driving motor 26 (shown in Figure 1) which drives a continuously variable speed changer 27. This motor drives the upper size roll 10 through the belt 30. From the upper size roll a belt drive 31 goes to the emergence roll 8 and from the emergence roll through a cross belt at 32 and roll 7 is driven. The lower sizing roll 9 is power driven from the upper size roll through the endless chain drive 35; the chain passing about a sprocket wheel 36 on the shaft of the upper size roll 10, partly around a sprocket wheel 37 on the shaft of the lower size roll 9 and then around tension sprocket wheels at 38 and 39 and back to the sprocket wheel 36. It is very important that both of these size rolls be positively driven, which is a departure from the usual practice where one of the rolls is driven through its frictional contact with the paper. However, since the coating applied renders the paper slippery, it is necessary to drive both size rolls in order that the paper may be passed through the nip without displacement of the coating material on the paper surface. The guide rolls 11 and 12 are driven from the change speed mechanism 27 in order that the paper may be maintained under the proper tension, neither too great nor too little, as it passes through the coating mechanism. The drier at 40 which receives the paper after it passes the guide roll 13 is also positively driven and at an adjustable velocity through a belt 41 from a continuously variable speed changer 42 which as shown is driven from the lower size roll 9 through a belt 43.

The temperature of the drier 14 is important, as if it is too high at the start of the drying operation, the paper is sticky and if it is too high toward the end, the paper is made brittle. For best results the temperature at the entering end should not be above 75° F., but this temperature may be increased as the drying proceeds until at the completion of the drying operation the temperature may be up to 200° F.

By the use of the mechanism shown herein, the necessity for multiple passage of the paper through the coating mechanism has been eliminated and a satisfactory erasable paper produced in a single pass of the paper.

The speed at which the paper may be passed through the drying mechanism depends upon the character of the paper employed and may run from 200 to 250 feet per minute. The thickness of the coating may be regulated by spacing of the size rolls which may be adjusted as is well known in the art, the drive shown permitting this.

From the foregoing description of the method it should be evident to those skilled in the art that various changes and modifications may be made without departing from the spirit or scope of this invention.

This application is a continuation in part of my application Serial No. 152,527 filed March 29, 1950, now abandoned.

I claim:

1. The method which comprises passing a web of paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath and while said bath is maintained at a viscosity between

the limits of 30 and 35 seconds using a 45 M. L. pipette at 80° F., passing the coated web through the nip between size rolls, and then drying the paper, the size being selected from the group consisting of casein and gum arabic.

2. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits 30 and 35 seconds using a 45 M. L. pipette at 80° F., passing the paper thus coated through the nip between a pair of driven size rolls, and then drying the coated paper to a moisture content of approximately 5% and at an initial drying temperature not exceeding 75° F., the size being selected from the group consisting of casein and gum arabic.

3. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits 30 and 35 seconds using a 45 M. L. pipette at 80° F., passing the paper thus coated through the nip between a pair of driven size rolls, and then drying the coated paper to a moisture content of approximately 5% and at an initial drying temperature not exceeding 75° F. which may be increased to not exceeding 200° F. when the drying has been completed, the size being selected from the group consisting of casein and gum arabic.

4. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits 30 and 35 seconds using a 45 M. L. pipette at 80° F., passing the paper thus coated through the nip between a pair of driven size rolls, and then drying the coated paper to a moisture content of approximately 5% and at an initial drying temperature not exceeding 75°, the size being selected from the group consisting of casein and gum arabic.

5. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits 30 and 35 seconds using a 45 M. L. pipette at 80° F., passing the paper thus coated through the nip between a pair of driven size rolls, and then drying the coated paper to a moisture content of approximately 5% and at an initial drying temperature not exceeding 75° which may be increased to not exceeding 200° when the drying has been completed, the size being selected from the group consisting of casein and gum arabic.

6. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits of 30 and 35 seconds using a 45 M. L. pipette at 80° F. while feeding and pressing the paper from both faces beyond its treatment in the sizing bath, and then drying the paper, the size being selected from the group consisting of casein and gum arabic.

7. The method which comprises passing paper beneath the surface of a sizing bath a plurality of times between which the paper is exposed to the air outside of said bath, said bath being maintained at a viscosity between the limits of

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30 and 35 seconds using a 45 M. L. pipette at 80° F. while feeding and pressing the paper from both faces beyond its treatment in the sizing bath, and then drying the paper to a moisture content of approximately 5% at an initial drying temperature not exceeding 75° F., the size being selected from the group consisting of casein and gum arabic.

Number
1,240,154
1,994,750
2,140,498

5

Number
13,970

References Cited in the file of this patent 10

UNITED STATES PATENTS

Number	Name	Date
149,316	Karcheski	Apr. 7, 1874

6

Name	Date
Sanburn	Sept. 11, 1917
Callan	Mar. 19, 1935
Dreyer	Dec. 20, 1938

FOREIGN PATENTS

Country	Date
Great Britain	of 1914