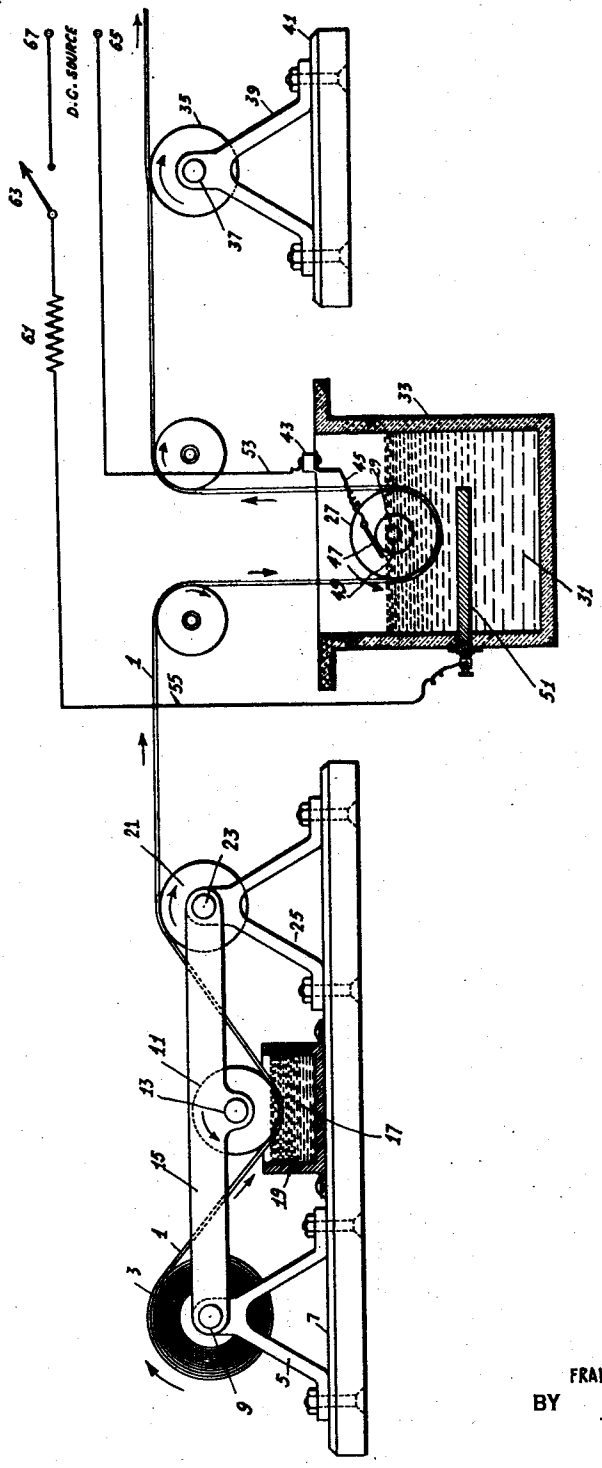
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ELECTROPLATING OF WAX

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ELECTROPLATING OF WAX

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The present invention relates to a method and system for providing a thin but uniform coating of wax upon the surface of a sheet of paper or other appropriate surfaces, such as a fabric, for example.

More particularly, the invention is directed to a method and means by which wax or other particles of appropriate type held in colloidal suspension may be separated and then coated upon the surface of a sheet of paper or other suitable supporting surface by an electroplating process. Such a form of paper or supporting fabric is particularly suited for and adapted to use in connection with facsimile recording of the general character claimed and described in my copending application, Serial No. 324,411, filed December 7th, 1928, and also as disclosed in my copending application, Serial No. 324,421 filed December 7th, 1928 jointly with Richard Howland Ranger, wherein a method and means has been disclosed for recording pictures and the like on a surface coated with a waxy or similar and equivalent substance. In such a process, if heat is projected against the supporting surface coated with wax or other suitable and appropriate material, it causes the wax coating on the surface to be absorbed by the paper stock or material, and thus produces what has become known in the art as a "latent" image of the recorded picture. After the "latent" image has been produced, a finished picture may be provided by moving an ink coated roller over the entire surface of the recorded sheet, since the ink from the roller is then absorbed by the portions of the paper where the wax has been melted into the paper by the hot air so as to form the "latent" image. After the picture has been produced as a "latent" image and the ink has been applied, it is then usually advisable to "flash" the picture, meaning to subject the entire surface to heat of a predetermined character for the purpose of causing all of the wax not originally subjected to heat action to be absorbed into the paper, so that a picture which is truly permanent in its nature is produced.

However, in conjunction with wax coated papers of the type hereinbefore known and used, it has been found that where the wax coating has been applied by processes heretofore known, as by coating wax on the paper surface by a dipping action, the wax has been absorbed by the paper to a large extent, so that the paper is not as sensitive to heat of the necessary and desired degree as would be the case if the wax were coated, suspended, or carried on the very outermost surface of the paper sheet or other suitable support surface.

It is, therefore, an object of my invention to provide a method and means by which a wax or other appropriate form of substance, preferably held in colloidal suspension, may be coated upon a paper or other suitable support surface, and, at the same time, remain only on the outermost surface thereof and not be absorbed into the paper stock.

A further object of my invention is to provide a method and means by which this coating process confining the wax or other suitable material to the outermost surface of the paper or support surface may be conveniently carried on by an electroplating process, by which it is possible through the use of an electric current to coat the outermost surface of the paper stock.

Still a further object of my invention is to provide a method and means by which a paper stock may be coated with a waxy substance without the danger of varying the degree and thickness of coating, and by which an even distribution of the wax particles over the entire surface is attainable.

Still a further object of my invention is to provide a method and means by which a waxy substance may be coated upon a paper with a minimum amount of difficulty, and, at the same time, provide a means by which a uniformly consistent thickness of coating on the paper surface is attained.

Still another object of my invention is to provide a method and means by which wax or other appropriate substances may be coated upon a paper in a continuous manner without the need of resorting to manual procedure.

Still other objects of my invention are to provide a method and system, to be herein-

after described, by which wax or other material held in colloidal suspension may be coated upon a paper, which is simple in its method and construction, a system which is inexpensive to install, conveniently operated, fool-proof in its operation, as well as a system which requires a minimum amount of space for installation.

Still other and ancilliary objects of my invention will become apparent and at once suggest themselves to those skilled in the art to which the invention relates by a reading of the following specification when taken in conjunction with the accompanying drawing, by which I have disclosed in a conventional manner one form of apparatus which may be provided for coating wax or other suitable material upon a paper stock or other suitable surface.

To refer now more particularly to the drawing, I have shown a paper 1 as carried upon a roller 3, rotating in the direction shown by the arrow, which is supported from a support means 5 carried upon a suitable base member 7 so that the roller 3 may be turned on a spindle 9 extending therethrough in any appropriate and desired manner for the purpose of unwinding the paper, which is usually supplied to the consumer in a roll.

As the paper is drawn from the roller 3, it passes, in the direction shown by the arrow adjacent to the paper, over a second roller 11 carried upon a spindle 13 extending through the center thereof, and supported by a support member 15 carried from the support 5 for the roller 3. As the paper stock 1 passes over the roller 11, rotating in the direction shown by the arrow, it is arranged to pass through a water solution or bath 17 contained within the container 19, also supported on the base member 7. Thus, the paper becomes well saturated with water and is in a moistened or wet state as it passes from the roller 11 over a third roller 21, which is carried by the spindle 23 extending therethrough and supported from the support member 25, also supported from the base member 7.

Thus, as the paper leaves the roll 21, it passes, in the direction shown by the arrow, over a roll 27 rotating at any desired and predetermined speed in the direction of the arrow and driven from a support spindle 29 extending longitudinally therethrough from a prime mover to provide rotational movement thereof (not shown). The speed at which the roller 27 must turn will be hereinafter set forth in more particular, but it should be noted that a speed which is convenient and which will allow each portion of the paper stock 1 to be immersed within the solution or colloidal suspension 31 carried within the container 33 for a sufficient time that it may be coated with the colloidal suspension 31 through an electroplating action, to be hereinafter described, is proper.

As the paper stock passes from the roller 27, it is directed over still another roller 35 carried upon a spindle member 37, which is mounted in a support member 39 supported from the base member 41, and is then drawn in the direction shown by the arrow to pass through a water rinsing bath (not shown) and then to any appropriate form of drying means, such as a series of festoon racks, so that the coating which is placed upon the paper may be conveniently dried and the paper stock also dried since it has become wet while passing through the water bath 17 and the colloidal suspension 31.

As has been illustrated in a diagrammatic manner by the accompanying drawing, I have arranged a contact point 43 on the container 33, which holds the colloidal suspension 31, and from this contact through a lead wire 45 I have connected a brush 47 which contacts with a conducting ring 49 so that an electric current impressed upon the terminal 43 through a connection 53 with a source of potential connected at 65 may pass through the conductor 45, the brush 47, and the conducting ring 49 to the roller 27. The roller 72, in accordance with the showing herein, will then serve as an anode member for an electroplating process, and it will be seen that the paper stock 1 in passing over the roller 27 is continually in contact with this metallic roll and therefore with the anode member of the electroplating system.

As a cathode member for the system, I have connected the usual type of electrode 51 with a source of potential through conductor 55, resistor 61, and a switch 63, for the purpose of connecting the source of potential. The cathode member 51, in the case herein illustrated, is preferably formed as a relatively large plate extending substantially the entire width of the roll 27 so that all portions of the paper stock rotating over the roller 27 may be plated with the waxy substance contained as a colloidal suspension 31 within the container 33.

As the current from the source of direct current potential herein illustrated is connected, the positive terminal is connected with the connection point 43 so that the roller 27 serves as the anode for the system, and the cathode member 51 is connected through the resistor 61 and switch 63, above named, with the negative source of potential at 67. Thus, as the switch 63 is closed and current is permitted to flow, it is found, with a waxy colloidal suspension 31 contained within the container 33, which suspension, for illustration purposes, may be assumed to be formed from substantially one part by weight of wax to 100 parts of water formed into a colloidal suspension by a well known

process of agitation and beating so as to break the wax particles into minute form, that the wax contained in suspension will at once start to collect upon the anode 27 since it has been determined that in such a colloidal suspension the wax particles assume a negative charge and, therefore, through the law of attraction and repulsion, tend to collect upon the anode member. Since the anode member is surrounded by the paper stock 1, of course, the wax particles at once tend to collect upon the paper stock instead of the anode. The time period for collecting the wax upon the surface of the paper stock varies in accordance with the separation of the anode and cathode members, upon the concentration of wax in the colloidal suspension, and the potential applied across the electrodes. For a separation of the electrodes of approximately three inches, and with a 110 volt potential applied, it has been found that time of the order of one minute is sufficient, when using the above illustrated solution, to provide the desired coating on the electrodes, and, therefore, the roll 27 is driven at a speed such that it takes substantially one minute for any given point on the paper stock to advance beneath the lower portion of the roll 27 nearest the cathode member 51. However, for different potentials applied, different separations of the electrodes and different concentration of wax, the time element may vary, and I, therefore, have expressed the above time relationship of speed to the concentration of solution, potential applied, and separation of the electrodes merely by way of example, and not in a limiting sense.

After the paper stock has passed beyond the roll 35, it is advisable to again pass the paper through a rinsing bath of clear water (not shown) to remove the adhering film of plating solution. The paper is then directed to suitable dryers, as above mentioned, and such dryers should preferably be arranged so that the paper may hang in a vertical direction thereon so that all water may drip from the same in a minimum amount of time.

It will be noted in connection with the above described method that the wax coating obtained by this process has a rather dull and granular appearance. In order to form a highly polished surface, it is, therefore, advisable to buff the entire waxed paper surface after it has dried sufficiently, by means of a buffing wheel covered with a soft cotton felt.

The above described method using a colloidal suspension of wax and water of a one percent concentration, above suggested, forms a thin coating upon the paper stock through the electroplating action, and should thicker coatings be desired, the concentration of the wax in the plating bath may be varied by increasing the percentage of wax held in suspension, by varying and increasing the time element during which each portion of the paper stock is subjected to the plating action, or by decreasing the separation of the electrodes, or by increasing the applied potentials, or by varying any or all of the above named quantities. Similarly, should a still thinner coating be desired, the above named variable quantities may be changed in the reverse order.

In connection with the above named suggestions, it should be noted that by an electroplating process of the above described type, that the wax is not absorbed into the paper, or, in other words, the paper does not become impregnated with a waxy substance, but, on the other hand, the wax remains substantially on the surface of the paper so that when the paper is later subjected to heat, in the manner above suggested, the wax will be absorbed very readily by the paper and a more sharply defined "latent" image may be attained and sharper definition of picture outlines will occur when the ink is applied to the surface.

Still other and further modifications of my invention will at once become apparent and suggest themselves to those skilled in the art to which the invention relates, and I, therefore, have illustrated the accompanying apparatus, as shown in the drawing, merely by way of example, and not in a limiting sense, since I may resort to other modifications of the invention in so far as all modifications which I make fall fairly within the spirit and scope of the hereinafter appended claims.

Having now described my invention, what I claim and desire to secure by Letters Patent is the following:

1. The method of coating a surface with a waxy substance which includes passing a paper stock through a colloidal suspension of wax, applying electric current potentials to said paper through said substance and thereby electrically wax coating the surface of said paper by the separation of the wax from said colloidal suspension.

2. The method of coating a fibrous surface with a waxy substance which comprises passing a paper stock through a colloidal suspension of wax, applying electric current potentials to said paper through said colloidal suspension, and electrically separating the wax from said colloid and thereby coating the surface of said paper stock with a thin layer of wax.

3. The process of coating paper with wax which comprises passing the paper through a colloidal suspension of wax, and passing a current through said suspension and said paper for coating the wax on the surface thereof.

4. The method of coating a fibrous surface or the like which includes passing the paper

through a water bath, passing the moistened paper through a colloidal suspension of wax, and electroplating wax from said colloidal suspension upon the surface of said paper.

5. The method of coating paper and the like which comprises passing the paper through a water bath, passing the water moistened paper through a colloidal suspension of wax, electroplating wax from said colloidal suspension upon the surface of said paper to form a wax coating on the surface thereof only, and rinsing the wax coating paper after plating the wax on the surface thereof.

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