METHOD OF APPLYING AND DRYING ADHESIVE

Edwin G. Staude, Minneapolis, Minn.

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The present application is a continuation in part of application Serial No. 201,045, filed April 9, 1938, for Method of applying and drying adhesive.

This invention relates to a method for obtaining high speed drying of any suitable adhesive material, including thermo-plastic adhesives, water-soluble adhesives and adhesives which must be wet by a suitable liquid in order to be re-softened by the user to make them adherent. The adhesive is applied while articles are being consecutively fed at high speed.

An object of the invention is to hasten drying of adhesive applied to articles while being fed in a machine such, for example, as a box-folding or a box-making or a box-gluing machine or an envelope machine, toward a delivery point, and to so quickly dry the adhesive that it will no longer accidentally become adherent, and so adequate drying will occur while the article is in the machine and so that it is unnecessary to reduce the speed of the machine. Insofar as I am aware, quick drying to the point where the adhesive will no longer accidentally adhere has not been accomplished by those machines which use hot air applied by fan or oven. My present method uses neither heat nor a fan for drying and has therefore numerous advantages over the older schemes.

This invention broadly relates to a method for applying adhesive to the surfaces of articles requiring the application thereto of an adhesive which, following application and drying, can be brought to adhesive condition by remoistening or by the application of heat or other means. The articles to which adhesive may be applied by my method may include a web of paper or paper blanks, and the method operates to quickly dry the adhesive after its application, and to assure that the applied adhesive is sufficiently dried so that it will no longer accidentally adhere.

A valuable use of this invention is in the application of thermo-plastic adhesives to cartons moving at high speed in a machine, for example, to cartons used for liquid containers, for example, to the bottoms of paper milk containers. A valuable use is also in gumming and quickly drying the sealing flaps of open-side or open-end envelopes, but it is understood that the invention is not limited to the use of any particular type of adhesive or to the articles to which the adhesive is applied.

In applying adhesive to envelopes, the most common practice is to first feed the envelope blanks in overlapped relation and gum the entire exposed sealing flap surface as the blank advances through the machine, and later to expose the gummed surfaces to either gas or electric heat, supplemented by a blast of air from a fan to remove the vapor or moisture from the gum or adhesive. This procedure is unsatisfactory for various reasons, principally the time it takes to dry.

All liquid adhesives have a certain solvent content which must be absorbed or evaporated before the adhesive is sufficiently dry to prevent accidental or premature sticking of the adhesive area or surface to another article or to another part of the same article. In instance, premature sticking of the sealing flap of an envelope.

I am aware that bronzing machines first print on a “sizing” consisting of a prepared waterproof varnish. This is not done for the purpose of making a final product which is to be adhesively attached, after suitable treatment by a user, and the sizing is not water-soluble, nor is it a thermo-plastic adhesive, nor is it used for the purpose herein. Over this sizing-varnish a bronze powder is dusted. In the bronzing process, however, there was no problem of removing solvents by absorption. It is only necessary to add a product that is not soluble in water, and in sufficient amount to cover up the surface. The actual drying takes several hours. The solvent in the varnish must escape and it does this by slowly soaking up the bronze powder and escaping to the atmosphere while the bronze dries, embedded in the transparent varnish.

There is no gluing problem here. Nothing to be reliqued for an adhesive purpose later. Dextrine flour dusted on a liquid water-soluble adhesive or dry thermo-plastic adhesive added to liquid thermo-plastic material is different from bronzing because, in the case herein, the adhesive quality must be maintained. By the dusting of powdered adhesive onto moist adhesive previously applied, and by properly working the dusted material in, the moisture immediately or quickly penetrates the powder and forms a paste which is too dry to adhere.

Inventors in the past have sought to apply adhesive by using a varnish “sizing” upon which they dusted powdered adhesive, such as dextrine flour, with the idea that the dextrine flour would adhere to the varnish “sizing,” which is not soluble in water. The result, however, is that the “dextrine flour” that adheres to the “sizing” becomes soaked with varnish, which makes a product that is insoluble in water and is therefore im-

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practical. Thus, if a moisture-proof base is used, the addition to that base of the gum results in a moisture-insoluble product.

I have discovered and developed a process for applying various kinds of adhesives to various articles to obtain quick drying and produce a quality of work quite superior to that obtained in the ordinary manner wherein, in the case of envelopes having the necessary amount of adhesive, at least two minutes are required for the adhesive to dry sufficiently before the sealing flap can be folded over and placed in a box without premature accidental sticking.

Objects, features and advantages obtained by the use of my gumming and drying process are many, some of which are the following:

First.—There are only a few blanks in transit during the gumming and drying operation, instead of more than five hundred in the case of the conventional dryer, so that when obliged to shut down the machine for a few minutes there will be a loss of only a few blanks, instead of more than five hundred, which frequently, under the old conditions, will be spoiled because of over-drying and curling.

Second.—The entire operation herein is accomplished in a linear space of about three feet, instead of in more than one hundred feet for a prior art machine of equal capacity.

Third.—There is no annoyance by the use of drying heat, either gas or electric, which often causes stiffening heat in a room in which usually from fifty to more than one hundred machines are operating, especially in hot weather. If the room is air-conditioned it produces a terrific load on the air conditioner, at practically prohibitive expense. On damp days it requires about twice as long to sufficiently dry a sealing flap, as on dry days.

Fourth.—My process controls the total amount of adhesive by varying the amount of liquid adhesive application. For example, I apply a certain amount of the liquid adhesive, so regulated or calculated and applied that when dry adhesive is afterwards added thereto, quick drying is obtained and the total amount of adhesive needed for proper adhesion is obtained.

Features of the invention include, separately and in various combinations: The use of powdered adhesives of various kinds added to liquid adhesives of various kinds in a manner to quickly dry the latter and obtain a required total amount of adhesive; the rubbing or working of powdered adhesive into liquid adhesive to obtain quick drying and a smooth and even distribution and mixing of the materials; the rubbing in by a movement in the same direction as the direction of travel of the article; the rubbing in by means which travels at a greater speed than the speed of travel of the article; the removal of surplus powdered adhesive by the use of Mohair material; the removal of such surplus by means which travels at right angles to the direction of feed of the article; the removal of surplus by a rapidly traveling means; the removal by means traveling more rapidly than the article being operated upon; the application of powdered material by brushes and throwing the material downwardly; the application by brushes between which the material is delivered, one of which brushes rotates in the same direction as the article, and the other of which rotates in an opposite direction; having one brush rotate faster than the other to prevent piling up of powder and to keep the brushes clean; the submission of the applied adhesive to a plurality of successive "working" operations for removal of the surplus; and the removal of accidental accumulations of powder from the face of the article opposite to that face to which the powdered adhesive is applied.

In the drawings I have shown my gumming method applied to a conventional type of envelope machine in which the open and envelope blank is advanced and the adhesive applied at the proper point, and in which the various folds are made. While the blank is traveling I apply the liquid adhesive to the sealing flap in a sufficient amount, and apply the powdered adhesive and press or work the same into the liquid adhesive, and then wipe off the surplus powder.

Objects, features and advantages of the invention will appear in the description of the drawings, and in said drawings,

Figure 1 is a plan view illustrating a preferred form of the invention and showing the sequence of the operations and the location of the various devices,

Figure 2 is a side elevation, parts being broken away to more clearly show the construction;

Figure 3 is a vertical transverse section on the line 3—3 of Figure 2;

Figure 4 is a vertical transverse section on the line 4—4 of Figure 2;

Figure 5 is a vertical transverse section on the line 5—5 of Figure 4;

Figure 6 is a vertical transverse section on the line 6—6 of Figure 2;

Figure 7 is a vertical transverse section on either line 7—7 or line 7a—7a of Figure 2;

Figure 8 is a vertical section on the line 8—8 of Figure 2;

Figure 9 is a plan view of an open-end center seam envelope to which the sealing flap gum has been applied, showing the envelope as before the sealing flap is folded preparatory to boxing.

Referring first to Figure 2, numeral 1 designates an ordinary feed hopper provided with a feed wheel 2 having a friction feed surface 3, in this instance adapted to feed one envelope per revolution in timed relation.

In practice this feeder is not used at this point, but will be placed at another point in the machine. The feeder is shown here merely to indicate that the blanks are fed in timed relation to an adhesive-applying mechanism, herein comprising an adhesive-applying wheel 5, a wheel 6 for holding the blank against the adhesive-applying wheel, an adhesive transfer wheel 7, and flow regulators 8 and 9.

The article, sheet material, web material, or envelope is fed forward by means of a pair of belts 10 and 11. The lower stretch of the upper belt and the upper stretch of the lower belt coast to advance the envelope or other article. Any suitable feeding means may be used, depending on the type of article being handled.

After receiving the adhesive from the adhesive-applying wheel 5, the web or article or blank travels past the "duster station," which includes (see Figures 4 and 5) a slowly revolving 3/4" mesh tubular screen 12, into the center of one side of which the adhesive dextrine or gum flour is fed from a hopper by a spiral hand 13 through a circular opening 14 of that side. As the screen 12 slowly revolves in the casing 12a (Figure 5) the dextrine or gum flour is dusted onto brushes or rollers 14 and 15. One of these rollers travels somewhat faster than the other and assists in coming out or equalizing the flow of the gum flour to obtain a more uniform application or
distribution of the dextrine or gum flour in the moist adhesive.

One brush preferably runs faster than the other for the purpose of keeping the surfaces of the brushes clean, to prevent piling up of the powder within the bristles. However, it is not absolutely necessary that one brush be operated faster than the other, because the brushes may merely act to deposit or forcibly throw the dry material down upon the wet material.

The application of the powdered material by brushes 14 and 15 is not absolutely necessary. The adhesive is sometimes dropped directly upon the blank. There is, therefore, no intention to entirely limit the invention to the use of brushes, although the use of brushes is desirable, and when used they are preferably operated as above set forth.

In using powdered material it is necessary to apply rather a substantial layer, for example, a layer approximately \( \frac{1}{2} \) inch in thickness. This layer lies on the surface. Absorption by capillary attraction of the solvent in the liquid adhesive is too slow. I therefore provide a pair of squeeze rolls 16 and 17. The squeeze roll 17 has the same surface speed as the speed of travel of the blank or article and assists in feeding the same. However, the squeeze roll 16, operating at the same surface speed as the squeeze roll 17, is adjusted to engage the powdered material, which has covered the liquid adhesive, the powdered adhesive is rolled into a flat cake similar to a stick of gum, and practically all of the powdered material is worked off in cakes, often producing an uneven and useless product. I find, however, that by speeding up the squeeze roll 16 to make its speed greater than that of the speed of travel of the blank, I get a sort of "wiping" effect and can squeeze in or "force" the dextrine or gum flour into the moist adhesive without producing a "caked" condition. Moreover, this procedure quickly causes the "paste" or sticky stage to disappear.

I believe myself the first to obtain high speed drying solely by the application of dry powdered adhesive substance of any nature to wet or liquid adhesive substance of substantially the same or suitable nature, to obtain quick drying. I believe myself the first to discover the necessity of working the dry adhesive into the wet substance to obtain quick drying, instead of merely allowing the powder to settle in, or to mix by gravity dispersion.

I therefore intend to cover herein, in addition to other steps, the step of working the dry adhesive into the wet adhesive after the application of the wet adhesive, and believe myself the first to use this step with the other steps mentioned, for any kind of adhesive, whether it be thermo-plastic, or nonthermo-plastic. The essence of this step is the agitation or mixing or mechanical distributing action to increase the drying speed and obtain uniformity of thickness and improved adhesive quality. The dry powdered adhesive is forced into the liquid adhesive to quickly absorb the solvent of the liquid adhesive to the point where the outer surface will no longer be in a condition to accidentally stick to the other article or thing.

I wish it understood that the terms "rubbing in," "pressing in," "working in," and "forcing in," all relate to distribution by mechanical means. This can be accomplished by any suitable means and there is no intention herein to be limited to the character of the means which is employed. The steps of working in, rubbing, pressing or fording or smoothing out are new. Insofar as I am aware, no one before I made the invention described in my Patent No. 2,130,866, had ever conceived that drying of adhesive could be accomplished at high speed by the means broadly disclosed therein, and therefore I believe that no one has ever discovered that forcing in, rubbing in, working in or pressing in of dry into wet adhesive additionally hastens drying and conditions the mix for the prompt and proper wiping off of surplus.

The expressions "rubbing in," "pressing in," "working in," "forcing in" are meant to mean distribution, in which mechanical means contacts, presses or enters the adhesively treated area after the dry material has been added to the wet material and serves to obtain uniform distribution of the one material in the other, this function being accomplished by the use of force acting directly within or by pressure directly upon the mixture. This new method differs from merely throwing the dry against the wet material, and has advantages in producing more rapid drying and more even distribution of the dry in the wet material and in conditioning the mix for a prompt and proper wiping off and/or finishing.

The roller 17 may be run at substantially the same speed as the feeding speed of the blank to help carry the blank along, and the roller 16 should then run, say 25% faster. At this speed it will work the dry adhesive or dry powdered adhesive into the liquid adhesive to cause very quick absorption of the moisture and very quick drying of the adhesive area. The roller 17, of course, could be run 50% faster than the roller 17 or than the speed of the blank, just so it runs faster, and of course the speed may be varied to suit conditions.

I believe myself the first to quickly dry thermo-plastic adhesive in a high speed machine, and to discover a method for doing it. Thermo-plastic adhesive material comes in the form of fine powder. To prepare the material for liquid application, 60% by volume of acetone may be added to this powder. After the powder is dissolved by the acetone or other solvent, it produces a thin, fluid paste which can be quickly applied by any roller or by the usual glue-applying mechanism. It is necessary, in handling thermo-plastic adhesive in which some solvent is used such as acetone, to quickly evaporate or take up sufficient of the liquid solvent to obtain quick drying.

Liquid milk is now sold in paper cartons. One of the difficulties is to prevent leakage of the cartons at the bottom. At present these bottoms are glued by a special adhesive which is waterproof after drying. Boards of Health of various cities require that the adhesive be of vegetable type, but such adhesives are not entirely satisfactory.

Thermo-plastic adhesive seems to overcome all existing objections. Its use prevents leaking, and the material is not objected to by the Boards of Health. It makes a tighter package, provided the adhesive can be applied to the carton when it is made, and can be properly dried. The present invention provides a method by which such an application and quick drying can be accomplished. It is advantageous to apply the thermo-plastic adhesive in a box-folding machine to speed up production. It is objection-
able to have messy glue-pots around a milk packing plant.

Under the old methods it takes about two and one-half minutes to sufficiently evaporate the solvent for the thermo-plastic adhesive. The solvents used most frequently are acetone or alcohol. Waiting for this evaporation naturally slows up production in the manufacture or folding, etc. of cartons, which, of course, has herebefore been a scheme prohibitive.

I have succeeded by the method set forth herein, in applying thermo-plastic adhesive and drying it instantly and thereafter operating on the carton to cut and crease the same and fold the carton. Such an operation on a high speed gluing and folding machine is impractical if the thermo-plastic adhesive cannot be placed on the carton and substantially instantly dried, and I have succeeded in accomplishing this quick drying.

Since the carton is about twelve inches long in direction of travel, it would ordinarily require 600 feet of web belt to dry the present adhesive. This is impractical because the machine must have a capacity of not less than 300 cartons a minute.

I have provided a process by which the thermo-plastic adhesives can be applied to the bottom flaps or other flaps or portions of the carton and dried. It will, of course, be understood that after applying the adhesive to the cartons, the cartons are delivered in knock-down condition to the dairy where they are then opened up by machinists. The bottom flaps are then closed over a mandrel and by the application of heat the thermo-plastic is softened and the bottom flaps are sealed. Thus, the thermo-plastic adhesive is by heat instantly reduced to adhesive condition and the proper seal is made which is impervious to most fluids which are usually packaged in paper containers.

A thermo-plastic material or glue suitable for the purpose herein is sold under the trade name of “Vinylite Remsimat” and the solution of the resin in vinylite in acetone is called “Vinylseal.”

After the article has passed the squeeze rollers 16 and 17, the flap is passed under a swiftly traveling belt 18, preferably having a surface covered with thick mohair. The blank or article is held against the belt by a roller 19. The roller 18 is adapted to travel in the same direction as that of the envelope blank or article. The mohair-covered belt 18 travels in a direction transverse to the direction of travel of the blank, preferably at right angles to that direction, and is adapted to remove the surplus powdered material. The object in operating the belt in a direction at right angles to the line of feed is to remove the surplus powdered material out of the path of the traveling article as quickly as possible.

Moreover, in order to pass the article or material to which adhesive is to be applied, under the belt 18, it is necessary to open the belt 18 at very high speeds, otherwise the article will not pass underneath, because the mohair-covered belt 18 travels at an angle to the direction of travel of the envelope or other article.

It will be noted that numeral 16c designates a mohair-covered belt similar to that shown at 18. It is somewhat wider and is adapted to remove the final loose powder 70 and polish the surface. In Figure 8 there is shown a mechanism similar to that of Figure 7, except that the mohair-covered belt arrangement operates on the underside of the blank to completely remove any powdered material that may have accidentally accumulated on the opposite side of the blank.

The arrangement of the squeeze rolls is shown in Figure 6. Upper and lower belt stretches 10 and 11 advance the blank or article 20 between the rolls. The lower squeeze roll 17 is mounted on a shaft 21 in a bearing 22 and is driven by a spur gear 23 meshing with a spur gear 24, secured to a shaft 25, operating in a bearing 26, the shaft 25 being secured to the upper squeeze roll 16. The difference in diameter of gears 23 and 24 speeds up the squeeze roll 16 a sufficient amount for the purpose hereinbefore described.

In Figure 7 there is shown the general construction of one means by which the method of removing the surplus dextrine or gum flour can be carried out. The mohair-covered belt 18 is driven by a pulley 27 running over an adjustable idler 28 and around idler 31. This pulley 27 is running over a shaft 29 which is driven by a gear 30. A scraper 33 is provided for cleaning the surface of the roller 19.

A screw conveyor 35 is provided in the bottom of the hopper for carrying the surplus powdered adhesive back to the intake hopper 31 (Figure 4). This mechanism for moving the powdered adhesive from hopper to hopper is not shown. The pulley 27 is mounted on a shaft 30 and is driven through a reducing gear mechanism by a high speed motor shown at 35 in Figure 7.

On the underneath wiper, as shown in Figure 8, substantially the same mechanism is used as that on the overhead wiper, and a roller 28 traveling at blank surface speed is used to hold the envelope or other article well against the mohair-covered belt 18. The roller 40 is mounted on a shaft 41, operating in a bearing 42, and is driven from any suitable source.

To hold the blank up while passing beneath the brushes 14 and 15, there is provided (see Figure 4), a series of narrow rolls 43, having spaces 44 between them to permit the dextrine or gum flour to fall through into the hopper 45 when the blank 20 or other article is not directly beneath the said brushes 14 and 15. In order to keep the screen clean, there is provided an idler brush 46 (see Figures 4 and 5) mounted on a shaft 47, and revolving loosely in bearings 48 and 49. The bristles 50 of this brush enter the openings of the screen mesh and clean same. There is also provided a loose roller 51 or ball to further assist in agitating the material 62 and 63, and over the screen mesh with the dextrine or gum flour or any other powdered adhesive. The mesh screen 12 is made up in cylindrical form and has two plate-like side walls 52 and 53 (see Figure 4). The wall 52 has a circular opening 55 loosely traversed by a cylindrical tubular extension 56 of the hopper 31, in which cylindrical extension spiral screw 13 operates.

The spiral screw 13 is provided with a shaft 57 operating in a bearing 58 and driven by any suitable source of power. The side wall 63 of the screen 12 is provided with an inwardly directed hub 59 to receive powder 70, and polished against rotation by the thumb-screw 61. This shaft 50 telescopes or rotates within the shaft 57 to provide separate drives respectively for the screen 12 and the spiral screw 13. In practice the pitch of the spiral screw is so constructed
that the screen 12 may be attached directly to the shaft 91.

The brushes 14 and 15 are mounted on suitable shafts 82 provided with bearings 83. The shafts 82 are driven from any suitable source.

The usual supporting rollers 85 are provided for the upper stretches of the belt 11 and the pressure roller 86 for holding down the lower stretches of the belt 11.

It will be understood that this invention can be used in conjunction with any suitable type of machine, including a gluing machine, and any type of folding machine, wherein adhesive is to be applied to articles fed by the machine, and wherein drying is only obtained by the application of liquid adhesive and then dry powdered adhesive to the liquid adhesive to quickly give a dry adhesive area before it passes from the machine and without slowing the high speed operation of the machine.

It is further understood that the lateral wiping of the t-shaped passageway may be used for removing surplus materials of other kinds from flat articles as they are fed at high speed. The high speed operation of the wipers to draw the surplus granular or powdered material laterally in a direction at right angles to the line of feed is considered per se to involve a new step in the process by which to obtain new and better results and to involve new ideas of means.

My discoveries of how to quickly dry by addition of powdered material to the liquid material and of a way to mix the material and remove surplus and to smooth the surface of the adhesively-treated areas all at high speed, are believed to involve entirely new principles in this art.

Another feature which is claimed per se is the use of the elements 16 and 17, or their equivalent, one operating at higher speed than the other to act as a kind of spatula for smoothing and working the powdered material in before action by the transverse high speed surplus removers, wipers and polishers or polishers.

Another feature of the invention relates to the application of the adhesive to a part of the article which projects laterally of the means which feeds or advances it.

Another feature relates to the use of consecutively placed and operated surplus removing and/or polishing means, and to the scheme by which one of these means has a greater surface area of contact than the other, and/or the scheme in which the one having the lesser surface contact acts first upon the mixture of the adhesives to remove the surplus and smooth the same.

Another feature relates to the operation of the brush 15 at greater speed than the brush 14, and having its surface speed greater than that of the material and moving in the same direction, to the operation of the roll 16 (as a working-in means) in the same direction as the movement of the material and at a greater surface speed than that of the area of mixed adhesives being acted upon.

Another feature relates to the manner of applying the liquid adhesive. Another feature relates to the use of elements 17 and 18 for supporting the projecting portion of the article while the material is being applied, mixed and worked in, and while the surplus is being removed from the top and/or bottom of the blank, and while the mixed adhesive coating is being smoothed. It is understood that insofar as support is concerned, during the wiping off of the surplus, etc., elements 18 and 48 are substantially equivalents.

Another feature per se is the use of a polishing means 48 acting on the adhesive-coated area or surface after action thereon by a surplus removing and polishing element, or polishing elements, and while the surplus removing means 18 is operating on the underside of the blank.

Another feature is the use of mohair or angora, which material I have discovered, after experiments with a number of materials, to have properties particularly adapted for brushing off of the material mentioned herein.

I claim as my invention:

1. A process for quickly drying adhesive applied to articles in motion in a machine comprising, applying consecutively to the same region of the article while in motion in said machine, a wet adhesive substance and then a dry adhesive substance in excess, and then working said dry adhesive into the wet adhesive to provide a dry area of material which can be rendered adhesive by suitable after-treatment, working in the dry adhesive by application of sliding pressure, at a greater speed than that of the article and in the same direction as that of the motion of the article, and then removing the surplus dry adhesive.

2. A process for quickly drying adhesive applied to articles in motion in a machine comprising, applying consecutively to the same region of the article while in motion in said machine, a wet adhesive substance and then a dry adhesive substance in excess, then working said dry adhesive into the wet adhesive to provide a dry area of material which can be rendered adhesive by suitable after-treatment, and working in the dry adhesive by application of force tending to drag the material in the same direction as that of motion of the article, and at a speed greater than the speed of the travel of the article, and then removing the surplus.

3. A process for quickly drying adhesive applied to sealing flaps of envelopes while in motion in a high speed machine, comprising the steps of applying to the sealing flap of an envelope over the required area a water-soluble liquid adhesive and a water-soluble dry powdered adhesive of a character and in an amount in excess to quickly dry the wet adhesive, working said dry adhesive into the wet adhesive in the direction of travel of the envelope flap and at a speed greater than the surface speed of said envelope flap to thin out the dry adhesive and force a part of the dry adhesive uniformly into the wet adhesive and then removing the surplus dry adhesive.

4. A process for quickly drying adhesive applied to articles while in motion in a high speed machine, comprising the steps of applying to the article over the required area a liquid adhesive of a character which after drying can be rendered adhesive by suitable after-treatment, and then a dry powdered adhesive in character like that of the wet adhesive and in an amount in excess of that needed to quickly dry the wet adhesive, working the dry adhesive into the wet adhesive in direction of travel of the article and at a speed greater than the surface speed of said article to thin out the dry adhesive and to force a part of it uniformly into the wet adhesive, and then removing the surplus dry adhesive.

5. A process for quickly drying adhesive applied to articles while in motion in a high speed machine, comprising the steps of applying con-
secutively to the same area of each article and over a required area, a liquid adhesive and then applying a dry powdered adhesive of the same kind and in an amount in excess needed for quickly drying the wet adhesive, working said dry adhesive into the wet adhesive by the application of force to drag the applied dry adhesive in the direction of travel of the article and at a speed greater than the surface speed of the article to thin out the dry adhesive and force a part of it uniformly into the wet adhesive, and then removing the surplus dry adhesive, the application of the dry to the wet adhesive and the working in of the dry into the wet adhesive constituting the sole means by which quick drying is accomplished, and said drying being accomplished before the articles reach the delivery end of the machine.

EDWIN G. STAUE.