

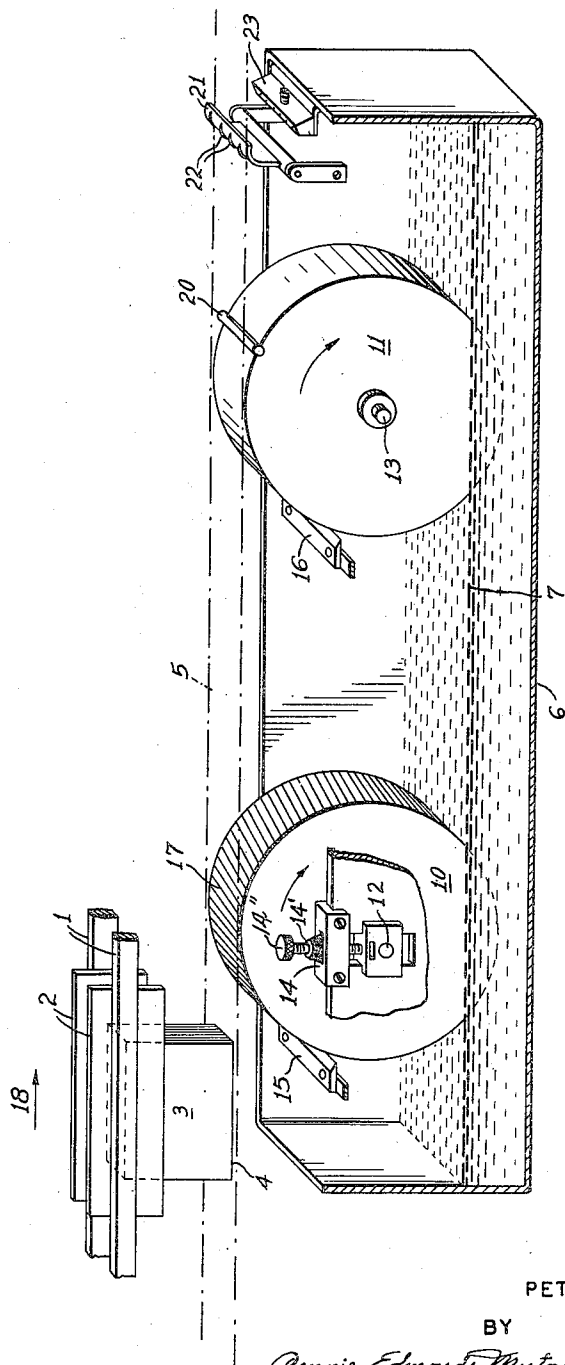
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MACHINE FOR APPLYING ADHESIVE TO THE BINDING EDGES OF BOOKS

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MACHINE FOR APPLYING ADHESIVE TO THE
BINDING EDGES OF BOOKS

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1

This invention relates to book binding, and especially to the application of adhesives to the binding edges. My invention is particularly concerned with the application of adhesive-forming aqueous emulsions or latices to the binding edges of page-blocks while held in supporting clamps and provides an improved apparatus and method for this purpose.

In accordance with a method of my invention, I spread the edges of the pages and work the latex over and into the edges in a sort of mechanical kneading operation. This action forces the latex to wet the pages and thereby to facilitate the subsequent application of a regulated quantity of the latex. In a subsequent operation, I pass the previously wet binding edge over a flowing sheet or layer of the same adhesive-forming latex to form a heavy even coating. The coating thus formed is thicker than the final coating required and in the next operation I remove the excess giving the final uniform thin layer. The accomplishment of the final uniform layer within the close tolerances necessary to achieve rapid drying and maximum strength is one of the important aspects of my invention.

My invention provides in combination with a means for conveying a succession of book page-blocks held in clamps of a pair of rollers immersed in an adhesive-forming latex, with means on one roller for working the latex into the ends of the pages, means in operative connection with the next roller for applying a uniform layer of the latex over the previously-applied latex, and means for spreading the final layer of latex to a thickness within close specified tolerances. In accordance with the invention, the books traveling along the conveyor means encounter an applicator roller preferably driven at the same speed as the travel of the page-blocks having a multiplicity of diagonally disposed ribs which bear against the ends of the pages and effect a riffling or spreading thereof and a working of the latex into and over the edges of the pages. This roller is preferably mounted on resiliently adjustable bearings and so positioned that the peripheral surface is a slight distance above the plane of travel of the binding edges of the page-blocks. The roller is partly immersed in a body of the latex and a doctor blade is provided to remove the excess material. A second applicator roller is mounted in the direction of travel of the conveyor, preferably driven at a greater speed than the speed of travel of the conveyor. The second applicator is also immersed in a body of the same latex. A wiper blade or doctor for

2

the second roller is set to retain a relatively thick layer of latex on this roller. At a position just beyond the point of tangency of the roller with the plane of travel, a small rod is mounted in contact with the second roller. This rod wipes up the latex and causes it to form a sort of waterfall and the rod and roller are adjusted so that the binding edges pass through the adhesive on top of the waterfall but do not touch the rod or roller. This permits the adhesive to be applied in a heavy uniform coating. In order to regulate the final thickness of the latex within relatively narrow limits, I provide a scraper which is set to bear lightly against the binding edges and remove the excess latex. I have found an exceptional accurate and dependable means to accomplish this objective. I use a resilient blade which permits the bearing or metering surface to make automatic adjustment to compensate for variations in the irregularities of the binding edges. I form the scraping surface with ribs and grooves which regulate the thickness of the latex retained on the binding edges.

These and other novel features of the invention will be better understood after considering the following discussion taken in conjunction with the single figure of the accompanying drawing, in which is shown in perspective a somewhat diagrammatic arrangement of apparatus.

Any suitable conveyor means 1 and clamps 2 which hold the page-blocks 3 for books may be used. A succession of the page-blocks 3 are passed along so that the binding edges 4 thereof embrace the plane of travel 5. Below this plane of travel a receptacle 6 provided with a body of latex adhesive material 7 is positioned. While my method and apparatus are adaptable to the utilization of various latices for forming the adhesive on the binding edges of the page-blocks, I have found the latices formed of a copolymer of vinylidene chloride and acrylonitrile with a plasticizer particularly advantageous.

The applicator rollers 10 and 11 are mounted on shafts 12 and 13 with bearing means 14 for vertical adjustment and are preferably driven in the direction of travel of the conveyor, roller 10 at the same peripheral speed as the conveyor but roller 11 at greater speeds. The bearing means 14 preferably include a block of resilient rubber 14' in which the adjustment screw 14'' is mounted so that the roller 10 can adjust itself to variations in the binding edges. These rollers are immersed in the body of latex and as they rotate they encounter the scrapers or doctor blades 15 and 16 which remove the excess material.

Roller 10 has an exterior surface provided with a multiplicity of fine ribs 17 and is set so that these ribs extend some 0.0020 to 0.0030 of an inch above the plane of travel 5 of the binding edges to the end that the ribs bear against and spread apart or ruffle the ends of the pages, thereby working the aqueous emulsion or latex into and over the edges. This kneading or working action of the roller 10 results in a positive wetting of the pages and conditions them to receive a uniform and thick layer of the material in the next applicator operation.

As the page-blocks travel along in the direction shown by the arrow 18, they next pass over applicator roller 11 but do not come into direct contact therewith. At a point beyond the point of tangency of the roller and plane, a small rod 20, say $\frac{1}{8}$ inch in diameter, is mounted to contact with the cylindrical surface of the roller. This rod wipes up the latex, causing it to flow thereover in a sort of waterfall and the roller and rod are so positioned that the binding edges of the books travel through this so-called waterfall without actually coming into contact with the roller or rod. The roller 11 preferably travels at a speed 10 to 20 per cent faster than the speed of the conveyor to carry such an amount of latex that the amount flowing over the rod travels at about the conveyor speed. The sharp breakaway of the latex from the binding edge caused by the waterfall results in applying a heavy even coating thereon. Without the rod, the gradual breakaway between the latex on the roller and on the binding edge causes stream lines to form, leaving undesirable patterns on the binding edge. By reason of the uniform and thick layer of adhesive thus applied, I am able to remove the excess and obtain a final uniform but relatively thin layer of the material on the binding edges.

At a suitable distance beyond the applicator roller 11 in the direction of travel of the conveyor, I mount a scraper blade 21 with a rounded upper surface having spaced contacting ribs 22 in such position that they bear lightly against all of the binding edges, notwithstanding slight variations in the surfaces thereof and in their positions on the conveyor. I achieve this positive light contact of the ribs 22 with the binding edges by providing a thin springy resilient blade with sufficient give to effect automatic adjustments. The blade may be made of stainless steel or a hard bronze. The projections or ribs actually contact the binding edges while the intervening spaces meter or regulate the thickness of latex retained on the binding edges. The rounded parting surface of the blade causes the latex to pull together under surface tension and fill in the lines left by the ribs 22. In order to prevent drying of the latex on the blade 21, I mount the sprayer 23 and discharge a fine mist therefrom against the blade.

I claim:

1. Apparatus for applying a latex adhesive-forming material to the binding edges of the page-blocks of books including a conveyor means for passing a succession of page-blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane which comprises, a roller applicator immersed in a body of latex rotatably mounted and so positioned with respect to said plane that the peripheral surface which carries the adhesive is held out of direct contact with the binding edges, a small rod fixedly mounted and positioned in engagement with the peripheral surface and placed ahead of the point of tangency of the roller adjacent the

plane and in the direction of travel of the page-blocks, said rod being so positioned below the common plane its periphery is not contacted by the page blocks, whereby the rod causes a waterfall of latex to form, and through which the binding edges of the page blocks are passed.

2. Apparatus for applying a latex adhesive-forming material to the binding edges of the page blocks of books including a conveyor means for passing a succession of page blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane, which comprises, a latex applicator positioned to contact the binding edges and formed so as to spread the ends of the pages and work the latex into and over the ends, and a second applicator means beyond the first-mentioned latex applicator and spaced from and out of contact with the binding edges, said second applicator means including an operable member for carrying a layer of latex and a dam element cooperating with and extending transversely of said operable member for obstructing the latex and causing the same to build up at said element and flow thereover creating a waterfall or cascade, the crest of which is in said common plane and is adapted to apply a second coating of adhesive-forming material in a uniform layer as the conveyor carries the page blocks through the waterfall while moving in the common plane.

3. Apparatus for applying a latex adhesive-forming material to the binding edges of the page blocks of books including a conveyor means for passing a succession of page blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane which comprises a latex applicator positioned to contact the binding edges and formed so as to spread the ends of the pages and work the latex into and over the ends, means beyond the latex applicator and spaced from and out of contact with the binding edges adapted to create a waterfall or cascade of latex to apply a second coating of adhesive-forming material in a uniform layer, and means for finally wiping off excess latex to leave a coating of predetermined thickness on the page blocks, whereby the conveyor in moving along the common plane passes the page blocks into contact with the roller and scraper and through the waterfall without contact with the waterfall applicator.

4. In an apparatus for applying a latex adhesive-forming material to the binding edges of the page blocks of books, including a conveyor means for passing a succession of page blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane which comprises, a roller applicator immersed in a body of latex, said roller having ribs disposed on the surface that applies the latex and being so positioned with respect to said plane that the ribs bear against the binding edges and spread the ends of the pages and work the latex into and over the ends, an applicator means spaced from and out of contact with the page blocks for applying an additional layer of the latex as a waterfall over the binding edges, and a flexible scraper having a binding edge engaging face which has spaced contacting ribs projecting from said face to bear lightly against the binding edge so regulate the thickness of the latex left on the binding edges and constituting means for resiliently holding said face against the binding edges,

5

whereby the conveyor in moving along the common plane passes the page blocks into contact with the roller, through the waterfall without contact with the waterfall applicator and thereafter into contact with the scraper.

5. Apparatus for applying a latex adhesive-forming material to the binding edges of the page blocks of books, including a conveyor means for passing a succession of page blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane, comprising a roller applicator rotatably mounted and partially immersed in a body of latex and so positioned with respect to the plane that the peripheral surface which carries the adhesive is held out of direct contact with the binding edges, a small rod fixedly mounted and positioned to engage the peripheral surface and placed ahead of the point of tangency of the roller with a second plane parallel to and slightly below and out of contact with the said common plane which embraces the binding edges, in the direction of travel of the page blocks, said rod being out of contact with said common plane, said roller applicator being adapted to be rotated at a speed in excess of the speed at which the page blocks are being conveyed, so that a body of liquid forms between the respective points of tangency of the peripheral surface of the roller applicator and the rod with said second plane, said rod being arranged to cause the latex to form a waterfall thereover, the surface of said body of liquid and the crest of the waterfall lying in the common plane which embraces the binding edges of the passing page blocks, contacting the binding edges and affecting an application of latex thereto.

6. Apparatus for applying a latex adhesive-forming material to the binding edges of the page-blocks of books including a conveyor means for passing a succession of page-blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane which comprises, a roller applicator immersed in a body of latex, said roller having ribs on the peripheral surface thereof disposed diagonally with respect to the binding edges of the page-blocks and bearing against said binding edges to spread the ends of the pages and work the latex into and over said ends and a roller applicator immersed in a body of latex and rotatably mounted and so positioned with respect to said plane that the peripheral surface which carries the adhesive is held out of direct contact with the binding edges, a small rod fixedly mounted and adapted to contact the peripheral surface and said rod being positioned ahead of the point of tangency of the peripheral surface with a second plane parallel to and adjacent to that of the common plane of the binding edges and in the direction of travel of the page blocks, said rod being positioned out of contact with said common plane and arranged to cause the latex to form a waterfall thereover which contacts the binding edges and effects an application of latex thereto.

7. Apparatus for applying a latex adhesive-forming material to the binding edges of the page-blocks of books including a conveyor means for passing a succession of page-blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common plane which comprises, a roller applicator immersed in a

6

body of latex, said roller having ribs on the peripheral surface thereof disposed diagonally with respect to the binding edges of the page-blocks and bearing against said binding edges to spread the ends of the pages and work the latex into and over said ends, an applicator means for applying an additional layer of latex as a waterfall over the binding edges, and a flexible scraper having a binding edge-engaging face which is serrated to regulate the thickness of the latex left on the binding edges and constituting means for resiliently holding the serrated face against the binding edge.

8. Apparatus for applying a latex adhesive-forming material to the binding edges of the page-blocks of books including conveyor means for passing a succession of page-blocks while held in clamps, attached to said conveyor, so that the binding edges embrace a common plane, comprising a roller applicator immersed in a body of latex and rotating at a peripheral surface speed substantially equal to the lineal surface speed of the page-blocks, said roller having ribs on the peripheral surface thereof disposed diagonally with respect to the binding edges of the page-blocks and lightly bearing against said binding edges to slightly spread the ends of the pages and work the latex into and over said ends, and means including a second roller applicator disposed beyond said first-named roller applicator for applying additional latex to said binding edges, said second roller applicator rotating at a peripheral surface speed in excess of the lineal surface speed of the page-blocks and being spaced from and out of contact with said binding edges, said second roller carrying a thick layer of said additional latex on its periphery through which the binding edges of the blocks pass, whereby said additional latex is applied to said binding edges in a relatively thick uniform layer.

9. Apparatus for applying a latex adhesive-forming material to the binding edges of the page-blocks of books including a conveyor means for passing a succession of page-blocks while held in clamps, attached to said conveyor, so that the binding edges thereof embrace a common horizontal plane, which, comprises, a roller applicator immersed in a body of latex, rotatably mounted and so positioned with respect to said plane that the peripheral surface, which carries a thick layer of latex, is out of direct contact with the binding edges, said peripheral surface is tangent to a second plane adjacent and parallel to said common plane, a small rod fixedly mounted and adapted to contact the peripheral surface of the roller, said rod being positioned beyond the point of tangency of the peripheral surface of said roller with the second plane, and in the direction of travel of the page blocks, said roller applicator being adapted for rotation at a speed such that the peripheral surface thereof is in excess of the lineal speed of the conveyed page blocks.

10. Apparatus for applying an adhesive-forming material to the binding edges of the page blocks of books including conveyor means for passing a succession of page-blocks while held in clamps attached to said conveyor so that the binding edges thereof embrace a common plane which comprises, an operable member carrying a layer of adhesive-forming material, said member being disposed out of contact with the binding edges and a dam element also disposed out of contact with the binding edges and cooperating with and extending transversely of said operable member for obstructing said adhesive-forming material

and causing the same to build up at said element and flow thereover whereby a waterfall or cascade is created, the crest of which contacts the binding edges and through which the said binding edges are passed.

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