

Nov. 12, 1940.

G. W. CHARTERS

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COATING EVENING MEANS FOR PAPER LAMINATING MACHINES

Filed Jan. 15, 1940

2 Sheets-Sheet 1

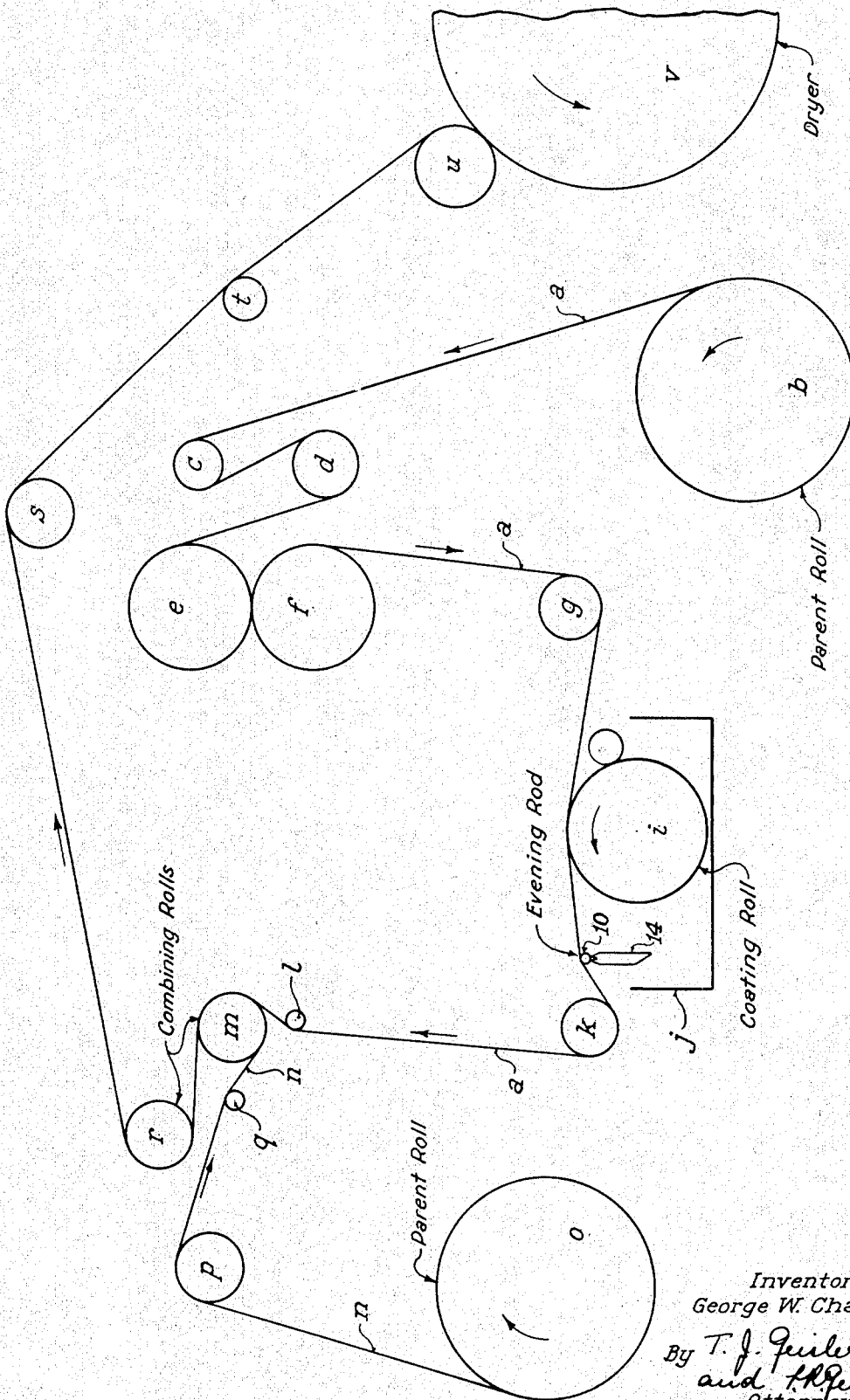


Fig. 1

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2 Sheets-Sheet 2

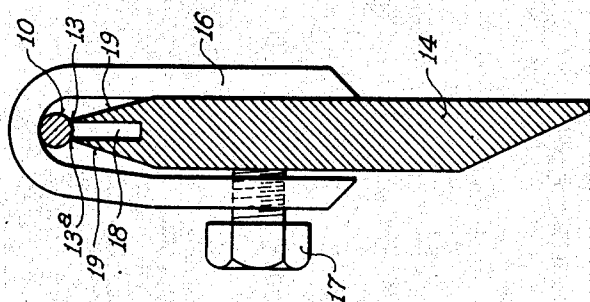


Fig. 3

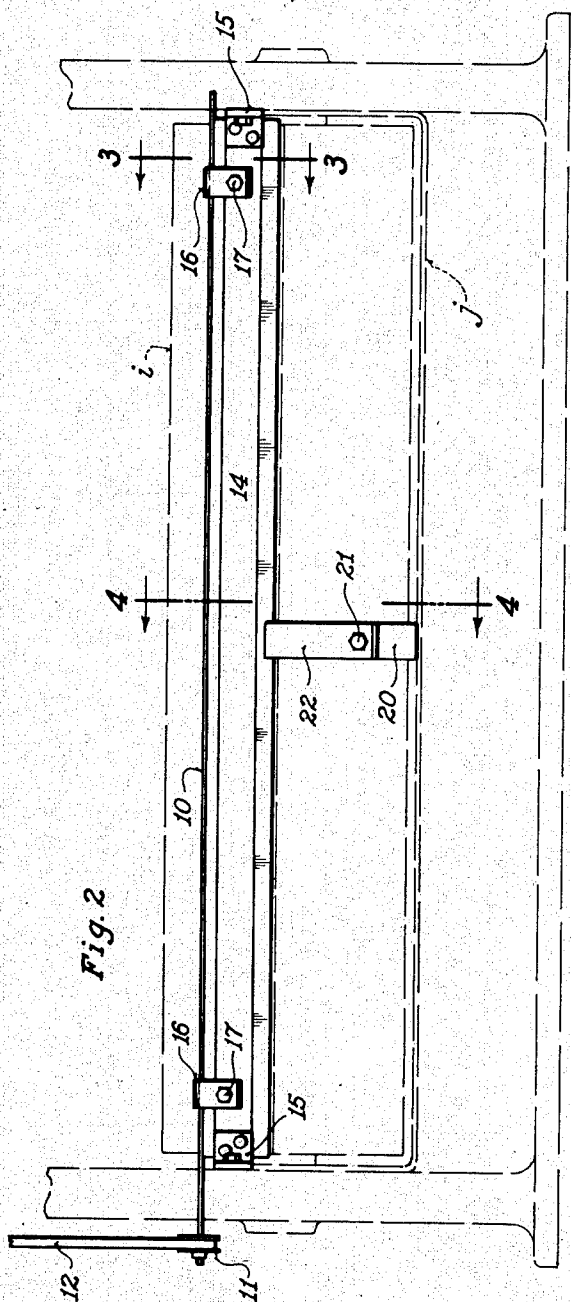


Fig. 2

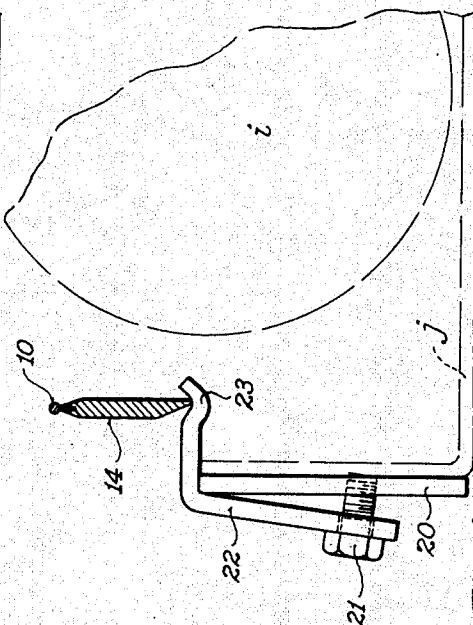


Fig. 4

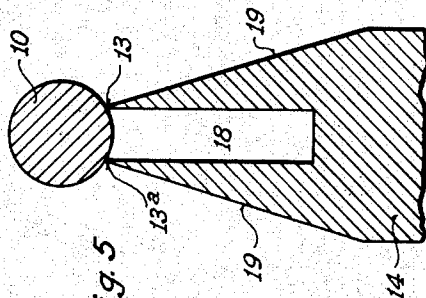


Fig. 5

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UNITED STATES PATENT OFFICE

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COATING EVENING MEANS FOR PAPER
LAMINATING MACHINES

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Application January 15, 1940, Serial No. 313,897

5 Claims. (Cl. 91—33)

My invention relates to a so-called laminating machine by which two sheets of paper, imposed one on the other, are fastened together by an intermediate cementing agent. Laminated machines are used for making moisture-proof sheets. In these sheets, the cementing agent is asphalt which is liquified by heat and applied to one of the two sheets, which are then pressed together by being run over "combining rolls". Laminated asphalt sheets are used to provide a moisture-proof covering for certain merchandise which must be protected against moisture, and for other purposes. Therefore, the film of asphalt between the two laminated sheets must completely cover their joined faces. If the film of asphalt does not do so, but leaves streaks without any film of asphalt, moisture will eventually strike through such uncovered and unprotected portions of the sheets, and, if the enclosed article is susceptible to moisture, cause damage.

Asphalt is a more or less tacky material, even when quite hot. It is necessary to provide a means whereby the asphalt may be applied uniformly to one of the laminated sheets, so as to coat the same completely; and it is further necessary, in order to avoid waste of asphalt, that the coating be varied in thickness according to requirements. At the same time, the coating must be uniformly and evenly applied, so as to provide a moisture-repellent layer or film completely covering the whole area of the sheet.

The means heretofore provided for spreading the asphalt coating on the sheet according to the prior art known to me, failed in their operation. These prior means, briefly described, include a rod of small diameter over which the sheet is drawn as it leaves the coating element. The rod is rotated in opposite direction from that in which the sheet travels. The rod is termed an "evening rod" because of its function, which may be said to be similar to that of a "doctor" as the latter term is commonly employed in papermaking devices.

Being of small diameter, the rod must be rotatably supported along its entire length; otherwise it will bend downwardly along its middle portion in response to the weight of its unsupported middle portion, and thus bend away from the sheet, and no evening of the asphalt coating applied to the sheet would result. Therefore, the rod is supported in a bracket-like bearing along its entire length, said bracket having a semicircular groove formed in its upper face, such groove being concentric, and covering and contacting a substantial portion of the circumference of the

evening rod; and one of the edges of said grooves is intended to function as a scraper, removing the asphalt and dirt particles which might adhere to the rod. It is essential that the evening rod be kept absolutely smooth and clean; in other words that all surplus asphalt and grit be removed from its surface. In practice, the arrangement of the devices heretofore employed for this purpose permit more or less small portions of asphalt to be dragged in, by the rotation of the rod, between its circumference and the semicircular groove in which it bears. This is due to the relatively broad surface or shoulder which the top of the rod-supporting bar constitutes in front of the semi-circular groove in which the evening rod bears. Particles of dirt likewise are dragged in between the rod and its bearing. In consequence, the rod when so mounted fails to produce constant even and uniform distribution of the asphalt over the entire area of the sheet. This face is readily discernible by holding the sheet up against a light. Translucent streaks will be plainly seen, showing that there is no asphalt between the sheets at the streaks, and such a laminated sheet is in consequence unfit for use as a moisture excluding medium.

My invention consists in the providing of a horizontally supported bar, the top of which is provided with two longitudinally-extending, vertical knife-edges, spaced apart by a relatively narrow vertical groove. On these knife edges, there is rotatably supported an evening rod of slightly greater diameter than the width of said groove. In this way, when the evening rod is rotated, one of said knife-edges will function to scrape off from the cylindrical surface of the rod all asphalt and dirt adhering thereto; but should some asphalt, or particles of dirt, get by the first knife-edge, such would be caught and scraped off the surface of the rod by the second knife-edge, into the channel between the two knife-edges, and as a result the evening rod is kept perfectly clean and smooth so that it can efficiently perform its duty.

The further details of my invention are hereinafter fully described with reference to the accompanying drawings.

In the drawings:

Figure 1 is a schematic side elevation of a paper laminating machine embodying my invention;

Figure 2 is a diagrammatic front elevation of the same machine, the evening rod, and the support therefor being shown in full lines while the cooperating parts of the machine are shown in lighter broken lines;

Figure 3 is a vertical transverse section taken on a line 3—3 of Figure 2 but drawn on a larger scale;

Figure 4 is a transverse section taken on the line 4—4 of Figure 2 with portions of the pan holding the coating material and the coating roll shown in broken lines. This figure also illustrates means for lifting the evening rod-supporting bar at the middle thereby to give the evening rod a crowning effect; and

Figure 5 is a greatly-enlarged transverse sectional view of the evening rod and the knife edges of the upper portion of its supporting bar.

Referring first to Figure 1 and the general arrangement of the various rolls and parts of the laminating machine, thereby illustrated, the sheet of paper *a* which is to receive the coating of asphalt (or similar laminating material) is drawn off the parent roll *b*. The sheet *a* passes from the roll *b* over the guide rolls *c*, *d*, *e*, *f*, and *g* to the coating roll *i*. The coating roll *i*, is partly submerged in a pan *j*, containing the coating material, specifically the liquid or liquified asphalt, said pan being understood to be heated when asphalt is used as a coating material.

Referring also to Fig. 2, to one end of the evening rod 10 is keyed a pulley 11 which is connected by a belt 12 to suitable means (not shown) for imparting rotary motion to the evening rod in a direction opposite to that in which the paper sheet *a* travels.

Due to the length of the evening rod and its small diameter and the requirement that it be held firmly against the coated side of the sheet passing over it, it is necessary that the rod be supported along its entire length. As above mentioned, it is essential that the asphalt (or the coating material) applied to the coated sheet by the roller *i*, be constantly, evenly distributed over the entire area of the sheet; otherwise, a certain amount of asphalt which the evening rod removes from the sheet will cling to the cylindrical surface of the evening rod and tend to build up ridges of the asphalt, thus rendering the evening rod inefficient as a doctor for removing all surplus of material from and also evenly spreading such material over the surface of the sheet.

The evening rod 10, preferably made of stainless steel, is supported along the entire length by a bar 14 preferably made of softer metal such as bronze. Thus this bar instead of the evening rod will sustain the wear of the surface.

The bar 14 is supported at its ends by angular brackets 15, removably attached to the frame of the machine as illustrated in Figure 2.

The upper portion of the bar 14 is provided with two parallel vertical knife edges 13, 13a spaced apart by an intermediate vertical groove 18 of substantial depth as illustrated by Figures 3 and 5. Assuming the evening rod 10 to be $\frac{1}{4}$ or $\frac{5}{32}$ inch in diameter, the width of the groove 18 should be approximately $\frac{3}{8}$ inch. A pair of U-shaped clamps 16 and clamping screws 17 hold the evening rod 10 on the supporting knife edges 13, 13a of the bar 14; the clamps 16 being arranged so as to permit the evening rod to be rotated within them. The preferred construction of the upper portion of the bar 14 is illustrated by Figure 3. The sides of its upper portions are beveled substantially as shown at 19—19 in Figures 3 and 5 to facilitate the maintaining of the knife edges 13, 13a sharp. By making the supporting bar of softer material and beveling its upper sides as mentioned, the knife edges,

13, 13a may be readily kept sharp by running a round file of slightly greater diameter than the width of the slot 13 back and forth over and between the knife edges.

I provide the two knife edges 13 and 13a spaced apart by an intermediate groove 18 of substantial depth as mentioned, so that when the evening rod is rotated, one of said knife edges 13, will function to scrape off from the cylindrical surface of the rod all asphalt and dirt adhering thereto. But should some asphalt or particles of dirt get by the first knife edge, such would be caught and scraped off the surface of the rod by the second knife edge 13a and the surplus coating or grit scraped off by the second knife edge 13a will be discharged in the groove 18 which may be cleaned from time to time as necessary. In this manner the evening rod 10 will be kept clean and smooth so that the efficient performance of its duty is assured.

I have found in practice that when a wide sheet of paper is to be coated, the edges of the sheet are likely to become more tightly stretched than the central portion of the sheet and in order to insure uniform pressure of the evening rod over the entire width of the sheet and thus enable the rod effectively to perform its function of distributing and evening up the coating applied to the sheet, I provide means for slightly raising the middle of the supporting bar 14 and by so doing give the evening rod a crowning effect as it were. A middle strap 20 is fastened to a side of the pan *j*. An angular lever 22 is fulcrumed on the strap 20 and the upper extremity of this lever is formed as at 23 so as to provide a seat for the bottom edge of the supporting bar 14. A screw 21 is inserted through the lower end of the lever 22 and threaded into the strap 20 and serves to hold the lever in position as arranged. By manipulating the screw 21 the angular lever 22 may be adjusted so as to exert leverage on the bottom, edge of the supporting bar 14 and thus raise the same slightly.

The above described details of construction of my invention are merely such as I found convenient; but the same may be varied as deemed expedient, so long as the principle of my invention be adhered to.

I claim:

1. In a laminating machine having devices for moving and guiding the sheet to be treated, and means for applying a coating to one side of the sheet, a device for evening the application of the coating comprising, a horizontally-supported bar, the top of which is provided with two longitudinally-extending knife-edges spaced apart by a relatively narrow vertical groove of substantial depth, an evening rod of slightly greater diameter than the width of said groove and supported on said knife-edges, the end of the sheet on leaving said coating means passing over said evening rod, and means for rotating said rod in the direction opposite to the travel of the sheet.

2. In a laminating machine having devices for moving and guiding the sheet to be treated, and means for applying a coating to one side of the sheet, a device for evening the application of the coating comprising, a horizontally-supported bar, the top of which is provided with a central, longitudinal, vertical, relatively narrow groove of substantial depth, the exterior sides of the top of the bar converging towards the edges of said groove respectively and forming knife-edges therewith, an evening rod of slightly greater di-

ameter than the width of said groove and supported on said knife-edges, the end of the sheet on leaving said coating means passing over said evening rod, means for holding said evening rod rotatable on said knife-edges, and means for rotating said rod.

3. The combination described in claim 1 with the spacing of said knife-edges and the diameter of said evening rod being approximately $\frac{1}{2}$ and $\frac{3}{32}$ respectively.

4. In a laminating machine having devices for moving and guiding the sheet to be treated, and means for applying a coating to one side of the sheet, a device for evening the application of the coating comprising, a horizontally-supported bar, the top of which is provided with two longitudinally-extending knife-edges spaced apart by a relatively narrow vertical groove of substantial depth, said bar adapted to be slightly convexed upwardly in a vertical plane, an evening rod of slightly greater diameter than the width of said groove and supported on said knife-edges, the end of the sheet on leaving said coating means passing over said evening rod, means for holding said evening rod rotatable on said knife-edges, means for rotating said rod, means for slightly

raising the evening rod at the center, thereby to convex the same slightly, upwardly, longitudinally.

5. In a laminating machine having devices for moving and guiding the sheet to be treated, and means for applying a coating to one side of the sheet, a device for evening the application of the coating comprising, a horizontally-supported bar, the top of which is provided with a central, longitudinal, vertical, relatively narrow groove of substantial depth, the exterior sides of the top of the bar converging towards the edges of said groove respectively and forming knife-edges therewith, an evening rod of slightly greater diameter than the width of said groove and supported on said knife-edges, the end of the sheet on leaving said coating means passing over said evening rod, the spacing of said knife-edges and the diameter of said evening rod being approximately $\frac{1}{2}$ and $\frac{3}{32}$ respectively, means for holding said evening rod rotatable on said knife-edges, means for rotating said rod, means for slightly raising the evening rod at the center, thereby to convex the same slightly, upwardly, longitudinally.

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