Aug. 27, 1974 L. A. BRENNER 3,832,213
METHOD FOR APPLYING GLUE TO LEADING AND TRAILING EDGES OF A WRAPPER SHEET
Original Filed March 13, 1970 4 Sheets-Sheet 1

FIG. 1

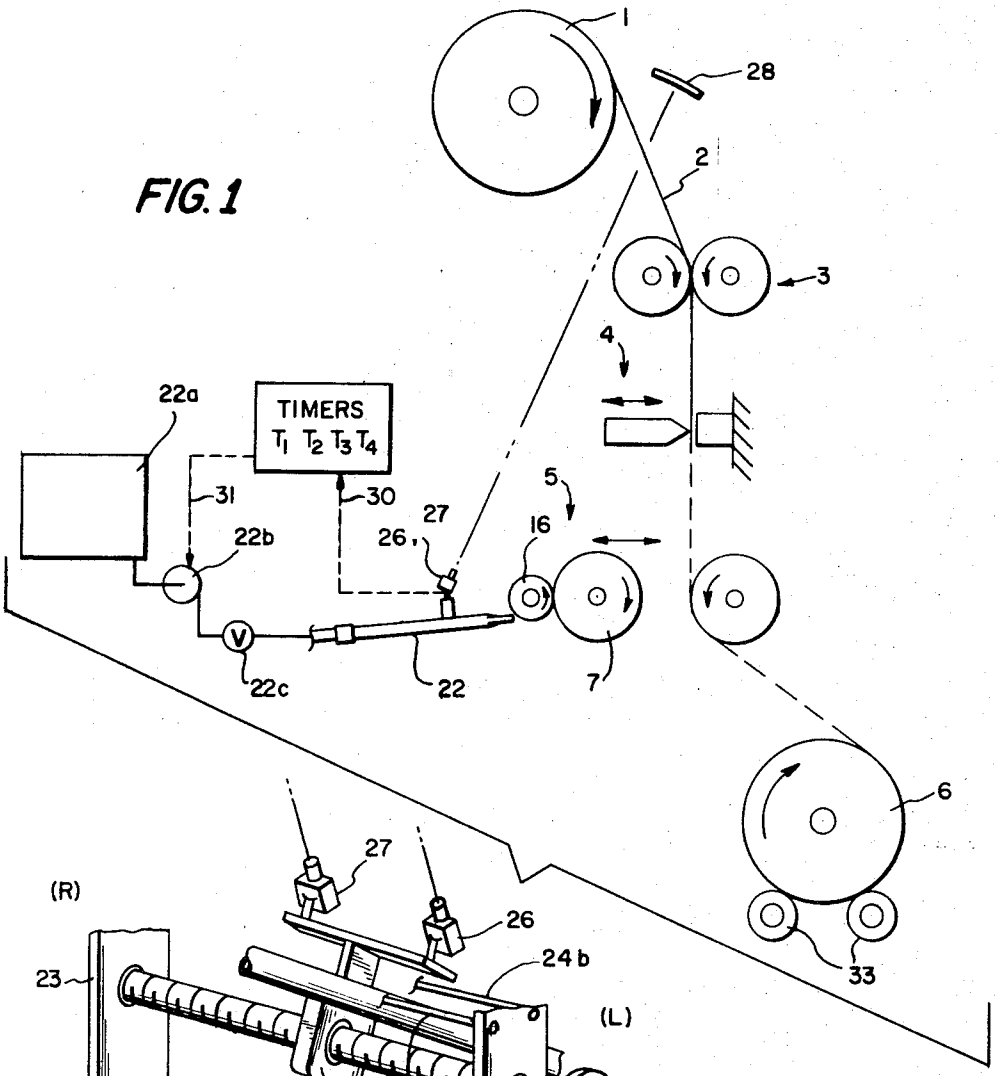


FIG. 4

Aug. 27, 1974 L. A. BRENNER 3,832,213
METHOD FOR APPLYING GLUE TO LEADING AND TRAILING EDGES OF A WRAPPER SHEET
Original Filed March 13, 1970 4 Sheets-Sheet 2

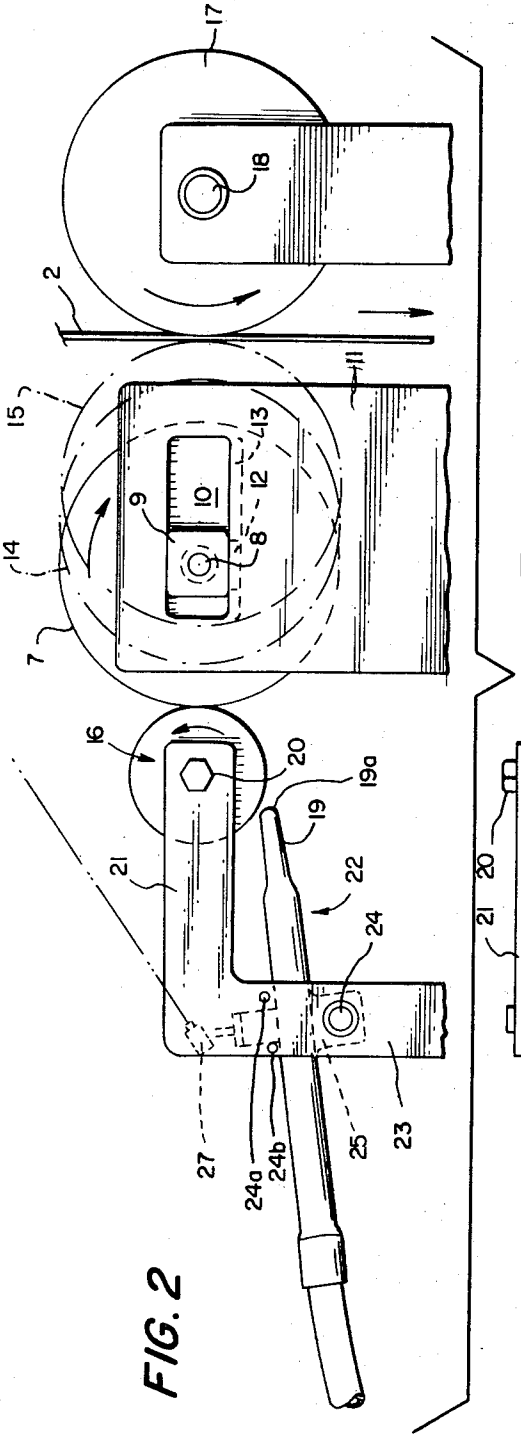


FIG. 2

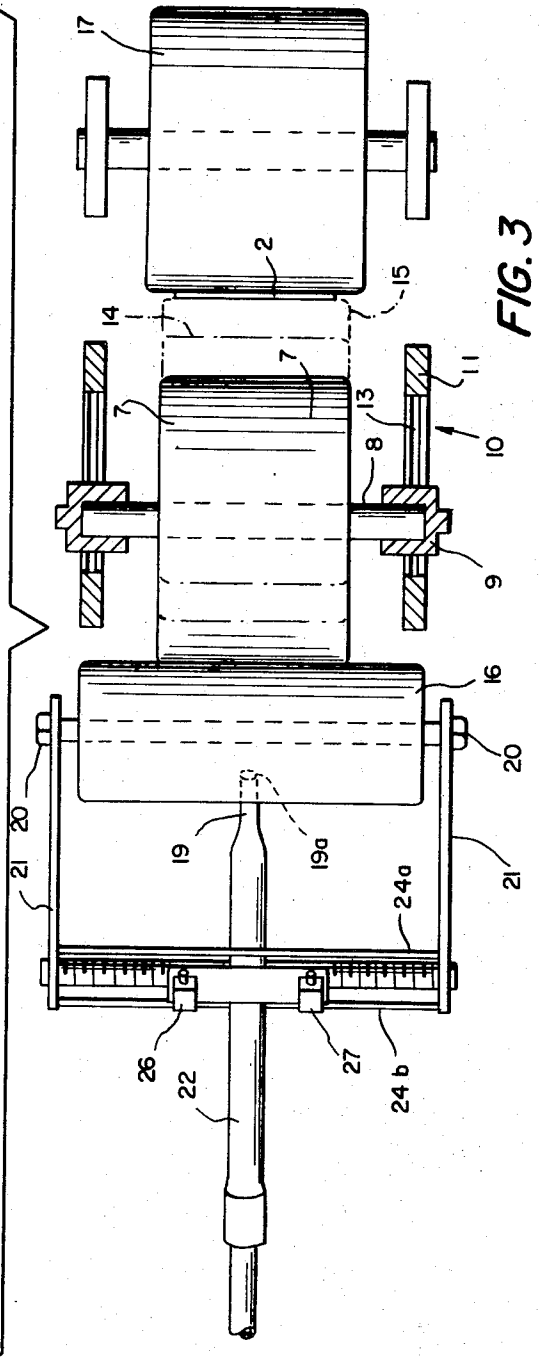
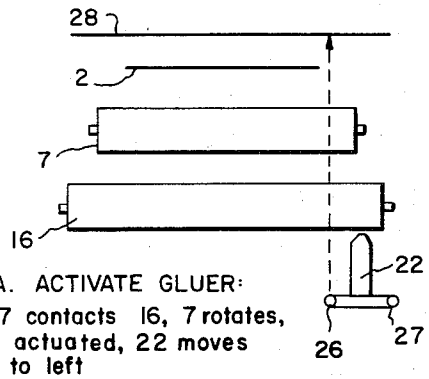
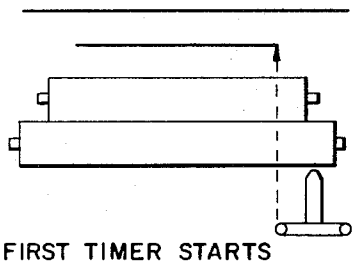


FIG. 3

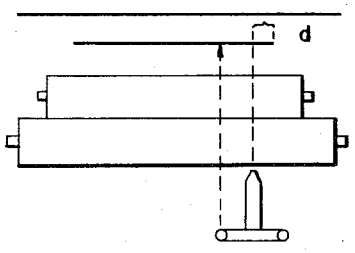
I. LEADING EDGE SEQUENCE



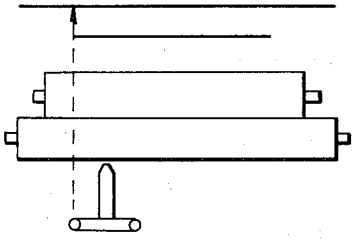
A. ACTIVATE GLUER:
7 contacts 16, 7 rotates, 26 actuated, 22 moves to left



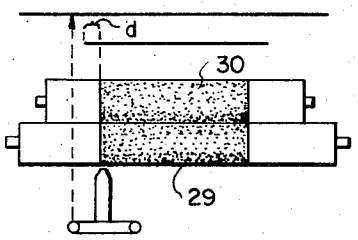
B. FIRST TIMER STARTS



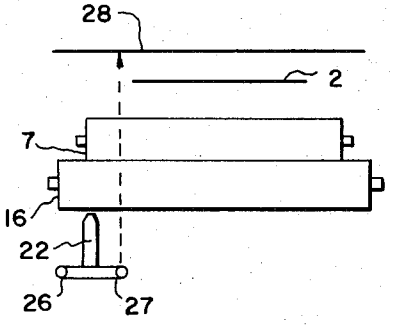
C. GLUE STARTS



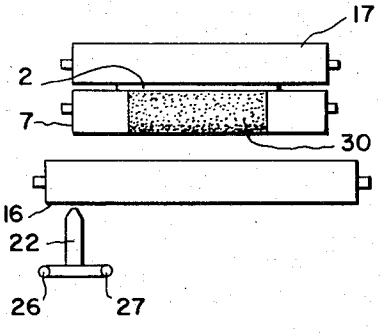
D. SECOND TIMER STARTS



E. GLUE STOPS



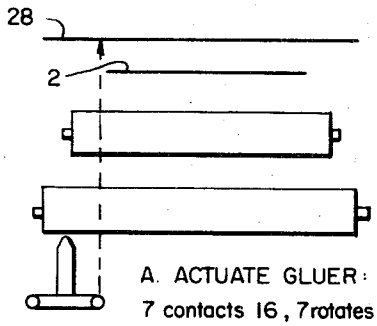
F. LIMIT SWITCH:
7 stops& retracts 22 stops 26 deactivted



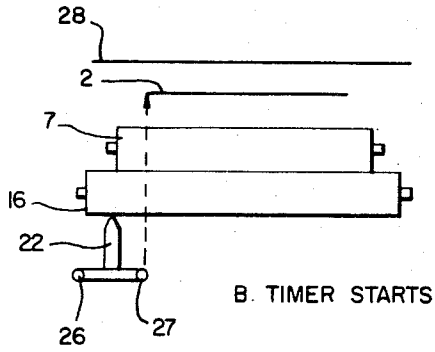
G. LEADING EDGE GLUED

FIG. 5 I

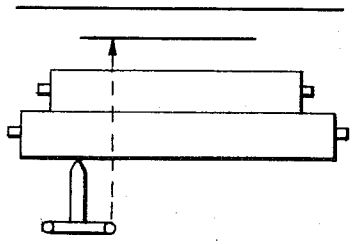
II. TRAILING EDGE SEQUENCE



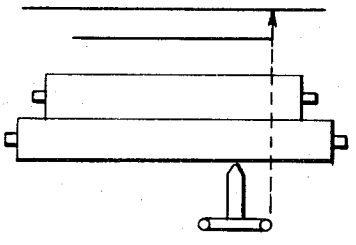
A. ACTUATE GLUER: 7 contacts 16, 7 rotates, 26 actuated, 22 moves to right



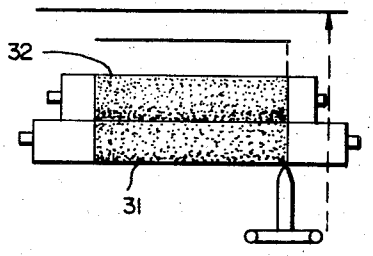
B. TIMER STARTS



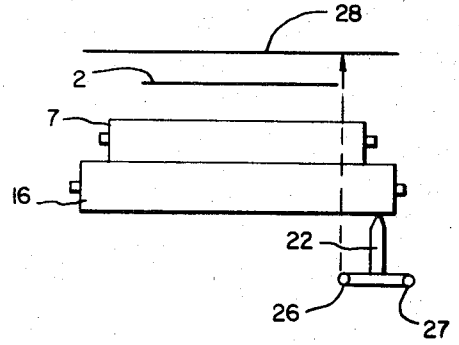
C. GLUE STARTS



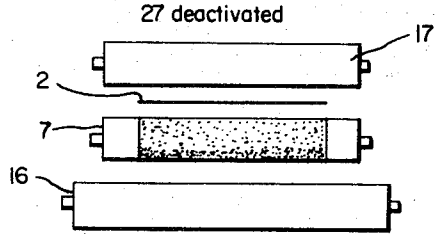
D. TIMER STARTS



E. GLUE STOPS



F. LIMIT SWITCH: 7 stops & retracts, 22 stops 27 deactivated



G. TRAILING EDGE GLUED

FIG. 5 II

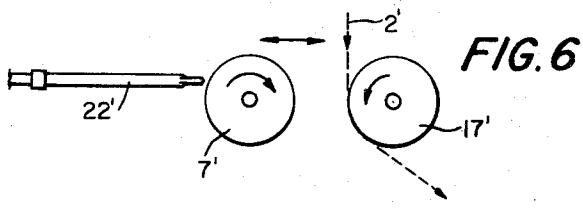


FIG. 6

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3,832,213

METHOD FOR APPLYING GLUE TO LEADING AND TRAILING EDGES OF A WRAPPER SHEET

Lawrence A. Bremer, West Chester, Pa., assignor to Beloit Corporation, Beloit, Wis.

Original application Mar. 13, 1970, Ser. No. 19,419, now Patent No. 3,688,735. Divided and this application May 9, 1972, Ser. No. 251,843

Int. Cl. B05c 1/00; B41k 1/22

U.S. Cl. 117—44 5 Claims

ABSTRACT OF THE DISCLOSURE

Glue is applied to a roller by means of a glue supply head which traverses the length of the roller. The flow of glue can be initiated and terminated at predetermined times during a single traverse thus providing a layer of glue on the roller neatly and occupying a predetermined length of the roller. The layer is then transferred to the wrapper sheet. Where the glue is to be transferred to a leading edge, the glue flow is initiated and terminated at times to give a glue layer which is less in width than the width of the wrapper sheet. When the glue is to be transferred to a trailing edge, the width of the glue layer is equal to the width of the wrapper sheet. The device preferably includes photodetector means moveable with the glue supply means to initiate and terminate the glue flows a set time after the side edges of the wrapper sheet are detected by the photodetector means.

This is a division of application Ser. No. 19,419, filed Mar. 13, 1970, now U.S. Pat. No. 3,688,735.

The invention relates to a system of applying glue. More particularly, the invention relates to a method and apparatus for applying glue to both the leading and trailing edges of a protective wrapper sheet used to wrap the outer periphery of large rolls of paper, such as newsprint rolls.

In the manufacture of paper, such as newsprint, it is customary to supply it in the form of large rolls which are individually enclosed in a wrapper sheet which is secured to the paper roll by glue adhesive applied to the trailing edge of the wrapper, or applied to both the leading and trailing edges. It is preferable to apply glue to the leading edge as well as the trailing edge to avoid the necessity of manually guiding the leading edge of the wrapper sheet up and around the paper roll until it is caught in its own nip. The glue present on the leading edge of the wrapper sheet will key the wrapper sheet to the roll and obviate the necessity of employing operators to manually guide the wrapper sheet around the paper roll. It is, of course, essential to apply glue to the full width of the trailing edge of the wrapper sheet in order to effectively enc'ose the paper roll and prevent unintentional tearing of the wrapper sheet. However, the presence of glue across the full width of the leading edge of the wrapper sheet is generally undesirable since it frequently happens that glue passes over the outer edge of the paper roll thus adhering together several convolutions of paper. This causes waste and difficulty in preparing the paper roll for ultimate use.

It is an object of the present invention to provide an apparatus and method for applying a uniform layer of glue to the leading and trailing edges of a wrapper sheet. It is a further object of providing such a method and apparatus wherein the uniform layers of glue of varying widths can be provided. It is still a further object to provide such a method and apparatus wherein a first uniform layer having a width less than that of a wrapped sheet is applied to the leading edge thereof, and a second uniform layer having a width equal to that of the wrapper sheet is applied to the trailing edge thereof.

These and other objects of the invention will become apparent from the following description including the drawings in which:

FIG. 1 is a generalized diagrammatic view of apparatus used to apply a wrapper sheet to a paper roll;

FIG. 2 is a side elevation of a glue applying device according to the invention;

FIG. 3 is a top view of the glue applying device of FIG. 2;

FIG. 4 is a perspective view of a portion of the device shown in FIG. 2 showing the arrangement of photodetector means on a glue spreader;

FIG. 5I (A–G) is a diagram depicting the leading edge sequence of operation of the device of FIG. 2 and FIG. 5II (A–G) is a diagram depicting the trailing edge sequence;

FIG. 6 is a diagrammatic view of an alternative glue applying device according to the invention.

The method and apparatus of the invention are utilized in a roll wrapping system depicted diagrammatically in FIG. 1. The system comprises a wrapper sheet dispenser which includes a supply of wrapper sheet, in this case a roll **1** on which is wound a continuous length of wrapper sheet stock **2**, which is usually paper, but can comprise any suitable protective sheet material. The dispenser also includes a pair of nip rolls **3** which advance the wrapper sheet stock **2** from the supply roll **1** past a cutter **4** shown as a knife moveable against the wrapper stock positioned at an anvil. The system also includes a gluer **5** according to the present invention which provides a layer of glue on the leading and trailing edges of the wrapper sheet. After passing the gluer **5**, the wrapper is guided into contact with a paper roll **6** to be wrapped at the wrapping station of the system. The dashed line between the cutter and paper roll **6** shows the path of travel of a wrapper sheet to the paper roll. The glued leading edge of the wrapper sheet is brought into contact with the paper roll and rotation thereof pulls the wrapper around the paper roll. After a suitable length of wrapper sheet has been metered from the supply roll, the cutter is actuated and the wrapper, after glue is applied to the trailing edge, is wrapped around the paper roll to provide a finished product.

The system shown is conventional, except for the gluer to be described in detail subsequently and it is to be understood that the gluer according to the invention is useful in other conventional systems wherein a wrapper sheet is passed from a wrapper supply station to a roll wrapping station. Other systems are well known in the art and are disclosed, for example, in Paper Trade Journal, Feb. 3, 1969, pages 38 et seq., which disclosure is incorporated herein by reference.

The gluing device according to the present invention generally comprises a roller mounted for rotation about its horizontal axis, means to rotate said roller, glue supply means to apply a stream of glue to the periphery of said roller, means to move said glue supply means longitudinally of said roller during rotation thereof to traverse the length of said roller to provide a layer of glue thereon, transfer means to transfer said layer of glue to a wrapper sheet at a gluing location, said transfer means comprising said roller and having a gluing position wherein said glue is transferred to said wrapper sheet at said gluing location and a glue applying position wherein said glue is applied to said roller.

The device can be used to apply glue to the leading and trailing edges of a wrapper sheet by applying a first portion of glue to a roller by laterally traversing the roller with a stream of glue directed on said roller from a first point laterally inwards of a first end of said roller to a second point laterally inwards of the other end of said

roller to provide a first layer of glue on said roller, said first layer being less in width than the width of said wrapper sheet, applying said glue of said first layer to the leading edge of said wrapper sheet at said glue applying station to provide an area of glue thereon which does not extend to either side edge of said wrapper sheet, applying a second portion of glue to said roller by laterally traversing the roller with said stream of glue directed on said roller to provide a second layer of glue on said roller, said second layer being substantially equal in width to the width of said wrapper sheet, and applying the glue of said second layer to the trailing edge of said wrapper sheet at said glue applying station to provide an area of glue thereon which extends to the side edges of said wrapper sheet.

A gluing device according to the invention useful in the system shown in FIG. 1 is shown in detail in FIGS. 2–4. A glue roller **7** is journaled for rotation on shaft **8** in blocks **9** which are moveable horizontally in a slot **10** provided in support member **11**. Blocks **9** are restrained from lateral movement out of slot **10** by a key **12** which rides in groove **13**. Blocks **9** are moveable horizontally between three positions by an arm (not shown) actuated by an air cylinder. In the first position, shown in solid lines, glue roller **7** engages glue spreading roller **16** and rotation of the glue roller **7** causes rotation of the glue spreading roller **16** which is free to rotate. In a third position, shown by dashed lines **15**, the glue roller **7** is brought into close proximity to a back-up roller **17** rotatable on shaft **18** mounted for rotation in a suitable support member, not shown. The back-up roller **17** can be driven at the same speed as glue roller **7** or may be free to rotate. Alternatively, the back up roller may be replaced by a smooth flat surface since it is not required that the glue roller and back up roller engage the wrapper sheet **2** which passes therebetween. The back up roller and glue roller are spaced sufficiently close together in the third position **15** such that the glue roller contacts the wrapper sheet **2** to transfer glue from the glue roller to the wrapper sheet. The peripheral speed of the glue roller and the back up roller, if driven, are each equal to or greater than the linear speed of the wrapper sheet. In an alternative arrangement, the glue roller **7** is moveable only between the first and second positions and the back up roller (or surface) is moveable from the position shown in the drawings to the left to a position in close proximity to the second position of the glue roller **7**, the system otherwise operating in the same manner.

In the device shown, the glue is applied to the glue roller **7** by means of a glue provided on a glue spreading roller **16** from a glue supply head **19** which is moveable longitudinally of the glue spreading roller **16**. The glue spreading roller is mounted for rotation on a shaft **20** in a fixed support member **21**. Alternatively, the roller **16** may be moveable between a first position as shown in the drawings and a second position to the right thereof to be in engagement with glue roller **7** when that roller is in the second position **14**. In that event, roller **7** is not required to be moveable into the first position shown. Thus, roller **7** can be moveable between the second and third position or fixed in which case both the glue spreading roller **16** and the back up roller **17** (or back up surface) are each moveable to engage the fixed glue roller **7**.

A glue spreading member **22** located adjacent the glue spreading roller **16** receives glue pumped from a reservoir **22***a* by means of a pump **22***b* as shown diagrammatically in FIG. 1 and omitted from FIGS. 2–4 for simplicity. Glue spreader **22** is supported in a rear portion **23** of support member **21** such that the glue spreading head **19** is in close proximity to glue spreading roller **16** to direct a flow of glue through aperture **19***a* to the periphery thereof. The glue spreader is also moveable from side to side in the sense of FIG. 4 such that the glue spreading head is moved longitudinally of the glue spreading roller from end to end thereof. The glue spreader **22** is moved by means of a threaded shaft **24** which cooperates with a threaded member **25** integral with glue spreader **22**. Shaft **24** is journaled for rotation in members **23** and is driven by a reversible motor, not shown. Rods **24***a* and **24***b* prevent the spreader **22** from rotating about shaft **24**.

In an alternative arrangement shown in FIG. 6, the glue spreading roller can be omitted and the glue stream applied directly to glue roller **7'**. In this case, only two positions are required: a first position, shown in FIG. 6, where the glue roller **7'** and back up roller **17'** are out of contact and roller **7'** adjacent glue supply means **22'** at a gluing location, and a second position where the rollers are in contact. Thus, the single roller **7'** can be fixed and roller **17** moveable, or vice versa as shown.

The device described thus far can be operated manually to provide a uniform layer of glue of any desired width on the wrapper sheet. Commencing at a point where the glue spreading head is located at one end of glue spreading roller **16**, and glue roller **7** are in contact, glue roller **7** is rotated by a motor, not shown, whereupon glue spreading roller **16** is rotated. Lateral movement of glue spreader **22** is then commenced and, at any desired time, the flow of glue is initiated whereupon a layer of glue is begun to be formed on the surface of glue spreading roller **16**. The glue flow rate and rate of motion are chosen such that a uniform layer of glue is spread on the surface of glue spreading roller **16** which layer increases laterally in size as the glue spreader moves longitudinally of the roller surface. After the layer is of sufficient size, the flow of glue is stopped by closing a valve **22***c* (FIG. 1) or by stopping pump **22***b* to provide a first layer of desired extent on glue spreading roller **16**. The first layer of glue is simultaneously transferred to glue roller **7** by virtue of the contact therebetween. After the glue flow is terminated, the rollers are kept in contact for at least a short time interval to permit the last portion of fresh glue applied to the glue spreading roller **16** to be applied to the glue roller **7**. The glue roller **7** is then disengaged from the glue spreading roller **16** by being moved into the second position **14**.

To transfer the glue layer from the glue roller **7** to a wrapper sheet, the appropriate portion of the wrapper sheet—the leading or trailing edge—is introduced between glue roller **7** and back up roller **17**. The wrapper is advanced between the rotating rollers to transfer a uniform layer of glue thereto.

It will be seen that the device can provide any width of uniform glue layer on the wrapper sheet. Thus the device can be operated to provide a glue layer on the leading edge which is less than the width of the wrapper stock, and to provide a full length glue layer for a trailing edge. Thus, the device provides a method and apparatus for applying glue to both the leading and trailing edges of a wrapper sheet without the disadvantages mentioned above.

In a preferred form of the invention, the device is provided with means to automatically apply appropriate glue layers to the leading and trailing edges of wrapper sheets. This is accomplished by providing photodetector means to move with the glue spreader to detect the side edges of the wrapper sheet. After the side edge has been detected, the glue flow is initiated or terminated as the case may be and thus the amount of glue applied to the glue roller is a function of the width of the wrapper sheet. The time between detection of the side edge and initiation or termination of the glue flow can be set at any desired interval with conventional timers and the timers can be set such that a layer of glue of narrow width is provided on the glue roller when glue is to be transferred to a leading edge, and a wider layer of glue is provided for transfer to a wrapper sheet. A system for performing these functions is shown diagrammatically in FIG. 1 and in more detail in FIGS. 2–4.

A photodetector system including a first photolight and photodetector **26** and a second photolight and photodetector **27** is mounted on top of the glue spreader **22** and

is moveable therewith. As shown best in FIG. 1, the photo detector system is positioned to direct light to impinge upon a photoreflective surface **28** located between the wrapper supply roll **1** and the wrapper dispenser nip rolls **3** and behind the path of travel of the wrapper stock relative to the photodetector system. The light path is uninterrupted except when the wrapper stock interrupts same. The photodetector system is positioned such that when glue spreader **22** is positioned towards the right (R, FIG. 4) end of the glue spreading rol'er **16** beyond a point corresponding to the right end of the glue roller **7**, the first photolight and photodetector **26** is also located beyond that point. Thus, when the glue spreader is actuated and moved towards the left, the first photodetector will receive light reflected from surface **28** until the light is interrupted by the first side edge of the wrapper. The glue flow is initiated a given time after this interruption of light and may be initiated automatically by the use of a conventional timer T_1. Interruption of the light is indicated by a signal **30**, indicated by dashed line, from detector **26** to the timers. Timer T_1 is simply set, in dependence upon the linear velocity of the glue spreader along the glue roller, to start the glue flow at a point corresponding to the point at which it is desired to locate the glue layer on the wrapper sheet. Glue flow is initiated by a signal, indicated as dashed line **31**, from timer T_1 to pump **22***b*. The wrapper sheet is guided from the dispenser past the gluing station to be in proper position when contacted with the glue roller to receive the glue layer in the proper location. In the case of a leading edge, the glue flow is initiated by pump **22***b* at a point which corresponds to a point inwards of the first edge of the wrapper sheet, while for a trailing edge, the glue flow is initiated at a point corresponding to the first edge of the wrapper sheet. After additional movement of the glue spreader to the left, the photodetector will re-detect light reflected from surface **28** after the light passes the other edge of the wrapper sheet. The glue flow is terminated a given time after this light is re-detected and may be terminated automatically by a conventional timer T_2. Timer T_2 is set to terminate the glue flow by signal **30** to pump **22***b* at any desired point which will be inwards of the wrapper sheet side edge in the case of a leading edge and at the side edge in the case of a trailing edge. The glue spreader continues its motion to the left until it reaches a limit switch which readies the glue spreader for a return cycle. On the return cycle, the first photodetector system **26** is de-activated and a second system **27** is activated and used as in the case of the first system, to apply a uniform layer of glue onto the glue roller for transfer to a wrapper sheet. Timers T_3 and T_4 are conveniently used for the return cycle in the same manner indicated for timers T_1 and T_2, but using a signal **30** from photodetector **27**. It is convenient to utilize a first traverse of the glue spreader to apply a relatively narrow width of glue for a leading edge and a second, opposite, traverse to apply a wider width for a trailing edge. Operation of the device in this manner to apply glue to the leading and trailing edges of a wrapper sheet will now be described with reference to FIG. 5, which depicts the various stages of the process in diagram form.

With the glue spreader **22** at its right-hand position (Stage 1A) the gluing device is actuated by moving glue roller **7** into contact with glue spreading roller **16**, rotating glue roller **7** which causes rotation of glue spreading roller **16**, activating first photodetector means **26**, and moving glue spreader **22** to the left. The first photolight **26** is directed to reflective surface **28** located in the wrapper dispenser station as best shown in FIG. 1. When the photolight is interrupted by wrapper sheet **2** in the dispenser, station (IB) a timer is started and after a set time, the glue flow is initiated (IC) either manually or automatically by conventional means. The time is set such that the glue flow starts at a point corresponding to a point inward of the side edge of the wrapper sheet a distance "*d*" which distance is chosen to be at least sufficient to prevent glue from running out over the edge of the paper roll when the glued leading edge of a wrapper sheet is applied to a paper roll. When the light is remade by passing the other side edge of the wrapper stock at the dispenser station, a second timer is initiated (ID) and, after a set time has passed, the flow of glue is terminated (IE) again at a point a distance "*d*" inwards of the other side edge of the wrapper sheet. At this point, a uniform layer of glue **29** having the desired width has been provided on glue spreading roller **16** which layer is simultaneously transferred to the glue roller **7** to provide a glue layer **30** thereon available for transfer to the leading edge of a wrapper sheet. The glue spreader **22** continues its motion to the left until it reaches its limit position at which a second photolight **27** is directed at surface **28** outside the left edge of the wrapper sheet **2**. When the spreader reaches its limit position, the spreader stops, the first photodetector **26** is deactivated and roller **7** retracts back to the position shown in (IA). Rotation of roller **7** may stop if desired. The reversing motor used to drive the glue spreader is also conveniently reversed at this time in preparation for the return cycle. A conventional limit switch may be provided to perform these functions automatically.

To apply the glue layer **30** to the leading edge of a wrapper sheet, the wrapper dispenser rolls **3** are activated to advance the leading edge through the gluing station at which time the glue roller **7** is moved into contact with the wrapper (IG) sheet to transfer the glue layer thereto. This is conveniently done automatically by means of a timer started by activation of the wrapper dispenser rolls. After the glue has been transferred to the leading edge of the wrapper, the glue roller **7** is retracted, conveniently controlled by a timer, into its second position **14** shown in FIG. 2 out of contact with both the wrapper sheet and the glue spreading roller. The gluing device is now ready to begin the second gluing stage to provide glue for the trailing edge of the wrapper sheet.

The glued leading edge of the wrapper is advanced into the nip of the unwrapped paper roll being rotated by wrapping drums **33** and the glued leading edge carries the wrapper around the roll.

The glue roller **7** of the gluing device will then be provided with a layer of glue for the trailing edge in a manner similar to the leading edge layer, except that the device employs a second photodetector system **27** and the timers are set to give a wider layer **31** on the glue spreader roll to provide a glue layer **32** on the glue roller which is substantially the same width as the wrapper sheet. At the limit position of the glue spreader (IIF) the first photolight is directed at surface **28** outside of the right edge of the wrapper sheet **2**.

After an appropriate length of wrapper sheet has been dispersed, the cutter **4** is actuated the dispenser rolls **3** deactivated, and the glue roller **7** is moved into engagement with back up roller **17** to transfer glue to the trailing edge of the wrapper sheet. Both operations may be done manually but are preferably done automatically by a timer which is actuated when the dispenser rolls are actuated, and is conveniently the same timer used to activate the leading edge gluing operation. Alternatively, the trailing edge gluing sequence can be initiated manually by a switch which will initiate a timer and cause the gluing roller to engage the trailing edge of the wrapper sheet. After a set time, the timer actuates the cutter **4**, stops dispenser rolls **3**, and retracts the gluing roller **7**.

A doctor blade may be provided to contact glue roller **7** at any convenient time to scrape excess glue therefrom. The doctor is conveniently used after an edge is glued when the glue roller **7** is in position **14** out of contact with both the wrapper sheet and the glue spreading roller **16**. A similar doctor blade can be provided for the glue spreading roller.

As mentioned above, it is not necessary to employ two gluing rollers although this arrangement is preferred to provide a more uniform glue layer on the wrapper sheet. In the event that a single roller is used, the photodetector system can be the same as that described above.

While the invention has been described in detail in connection with preferred embodiments hereof, it is to be understood that variations and modifications can be effected within the spirit and scope of the invention.

What is claimed is:

1. A method of applying glue to the leading and trailing edges of a wrapper sheet which moves relative to a glue applying station which process comprises the steps of applying a first portion of glue to a rotating roller by laterally traversing the rotating roller with a stream of glue directed on said roller from a first point laterally inwards of a first end of said roller to a second point laterally inwards of the other end of said rotating roller to provide a first layer of glue on said rotating roller, said first layer being less in width than the width of said wrapper sheet; applying said glue of said first layer to the leading edge of said wrapper sheet at said glue applying station to provide an area of glue thereon which does not extend to either side edge of said wrapper sheet; applying a second portion of glue to a rotating roller by laterally traversing the rotating roller with said stream of glue directed on said rotating roller to provide a second layer of glue on said rotating roller, said second layer being substantially equal in width to the width of said wrapper sheet; and applying the glue of said second layer to the trailing edge of said wrapper sheet at said glue applying station to provide an area of glue thereon which extends to the side edges of said wrapper sheet.

2. A method according to claim 1 wherein said first and second layers of glue are each applied directly from said rotating roller, respectively, to the leading and trailing edges of said wrapper sheet.

3. A method according to claim 1 wherein said first and second layers of glue are each transferred from a rotating roller to a further rotating roller from which said first and second layers of glue are applied, respectively, to the leading and trailing edges of said wrapper sheet.

4. A method according to claim 1 comprising the further step of removing remaining glue from said rotating roller after disengaging said rotating roller from the trailing edge of the wrapper sheet.

5. A method according to claim 1 wherein the first layer of glue is applied by lateral traversal in a first direction and wherein the second layer of glue is applied by lateral traversal in an opposite direction.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,832,213 Dated August 27, 1974

Inventor(s) Lawrence A. Brenner

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading:

The correct spelling of the inventor's last name is --Brenner--

Signed and sealed this 5th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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