Aug. 18, 1936. K. SIEG 2,051,319

CORRUGATOR

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FIG. 1.

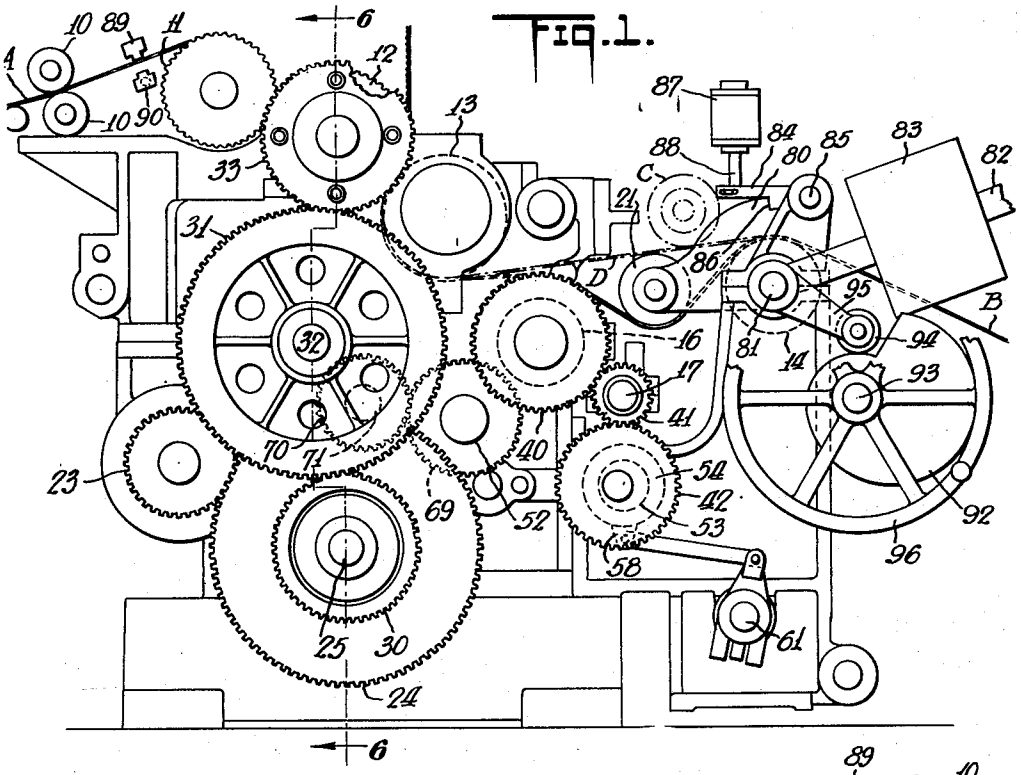
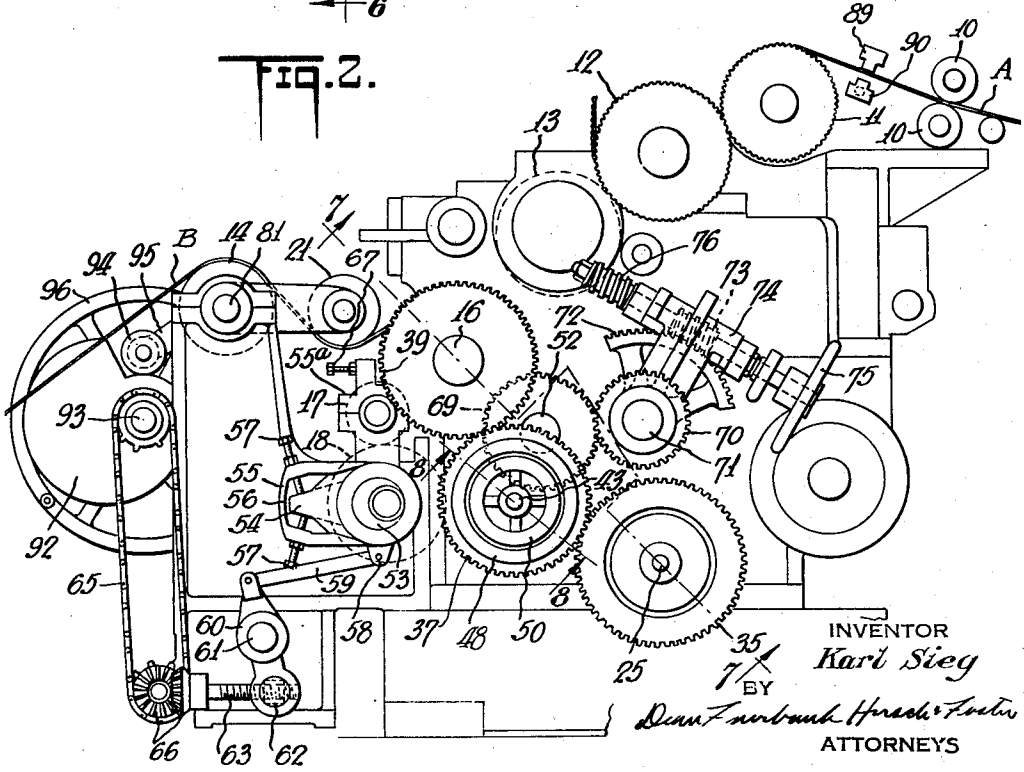


FIG. 2.



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Fig. 3.

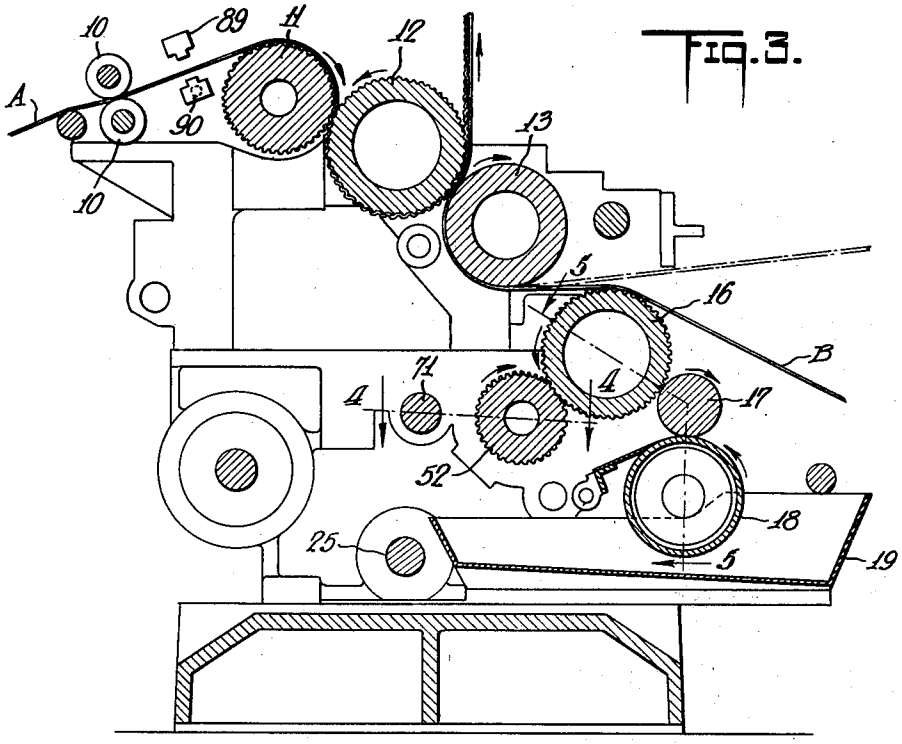


Fig. 4.

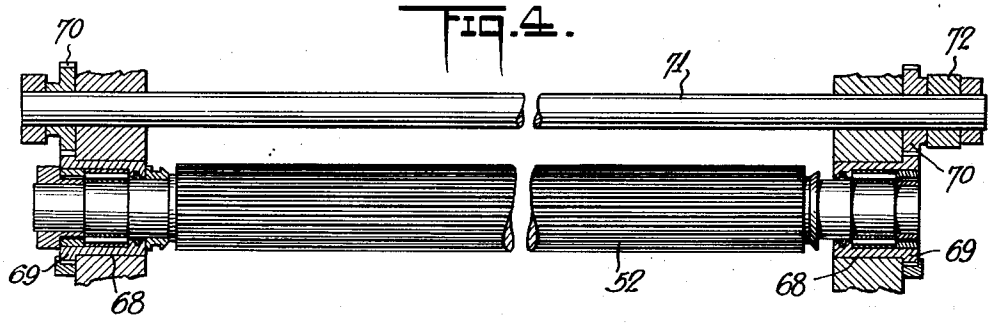
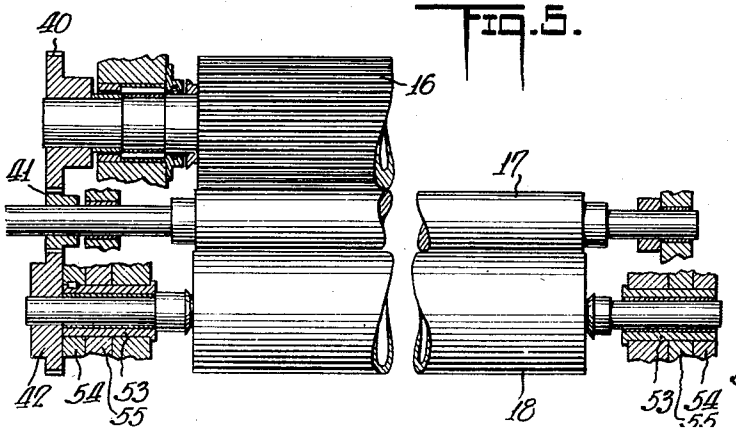


Fig. 5.



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FIG. 6.

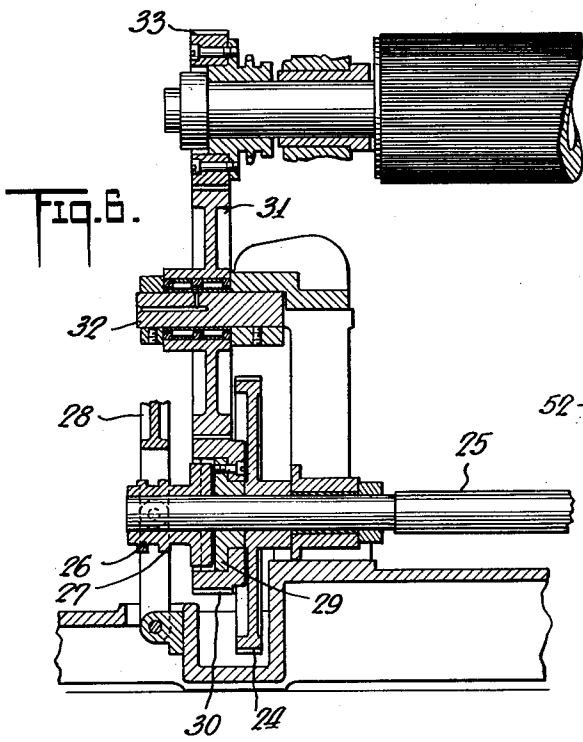
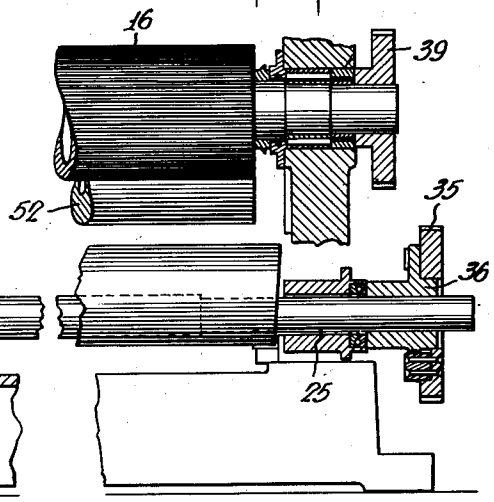


FIG. 7.



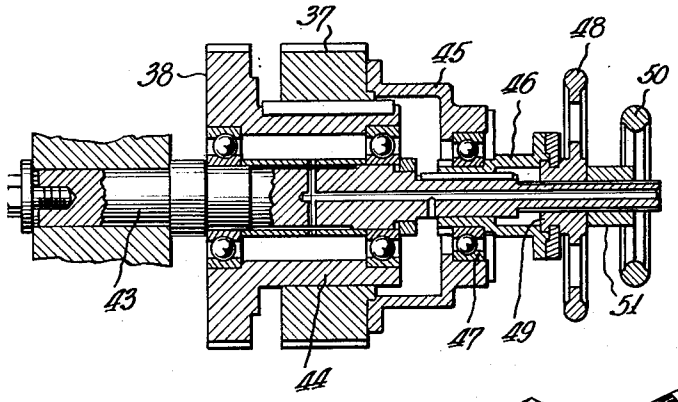


FIG. 8.

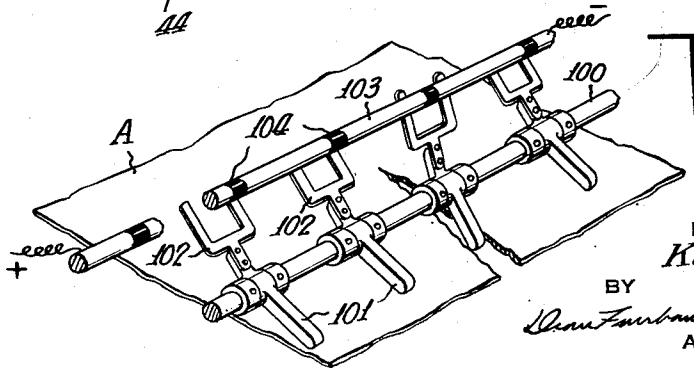


FIG. 9.

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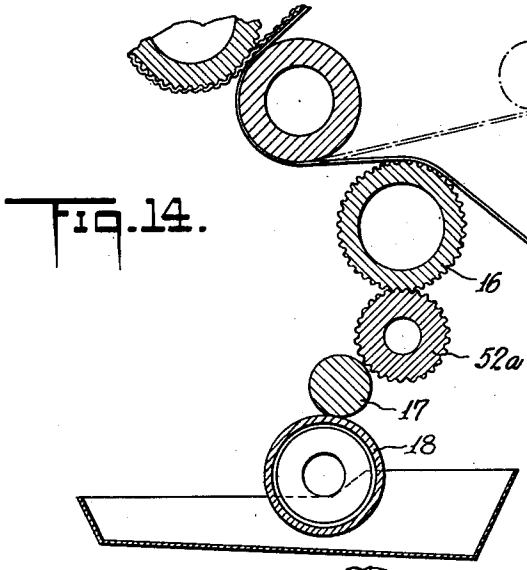


Fig. 14.

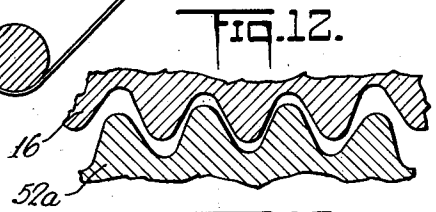


Fig. 12.

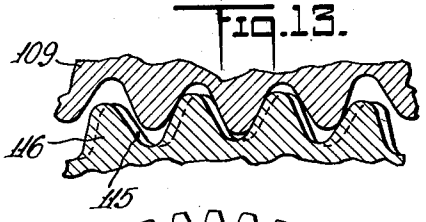


Fig. 13.

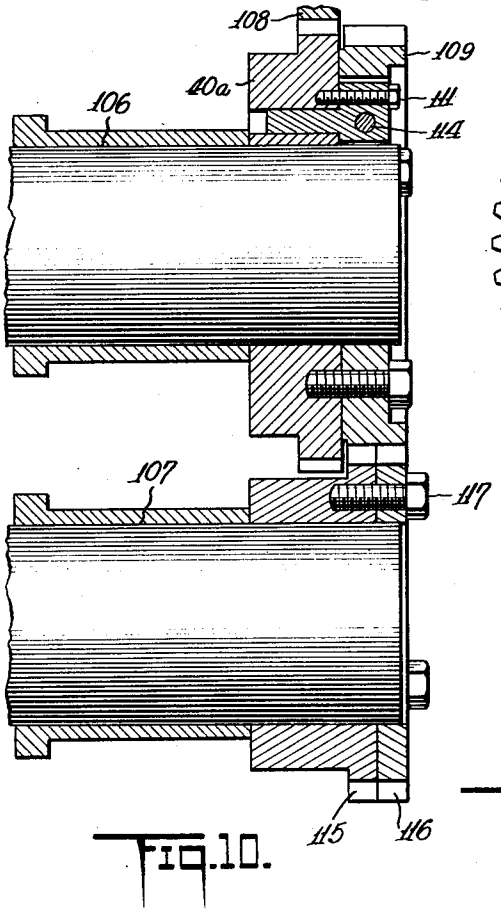


Fig. 10.

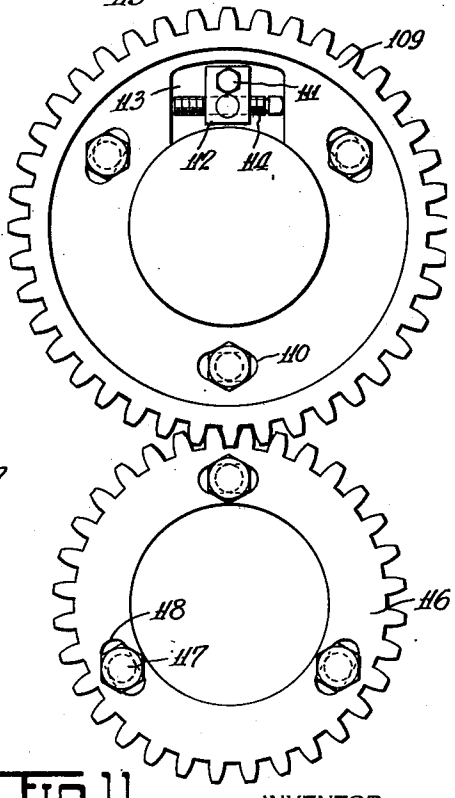


Fig. 11.

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Patented Aug. 18, 1936 2,051,319

UNITED STATES PATENT OFFICE

2,051,319

CORRUGATOR

Karl Sieg, Philadelphia, Pa., assignor to Samuel M. Langston Co., Camden, N. J., a corporation of New Jersey

Application April 16, 1935, Serial No. 16,570

15 Claims. (Cl. 154—31)

In a type of machine commonly employed for making single faced corrugated paper from a corrugated sheet and a surface sheet, there are employed three rollers, two having corrugated and intermeshing ridges or teeth for corrugating one sheet, and the third having a smooth cylindrical surface and acting to press the surface sheet against the crowns of the corrugated sheet while the latter is in engagement with one of the corrugating rollers, whereby the two sheets are permanently connected by adhesive connecting the crowns of the corrugations of the corrugated sheet to the surface sheet.

Heretofore it has been the universal practice in machines of this type to apply the adhesive to the crowns of the corrugations before the two sheets are brought together and while the corrugated sheet is traveling with the middle roller from the point where the corrugations are formed to the point where the surface sheet is applied.

Experience has demonstrated the practical necessity of supporting the corrugated sheet along this portion of the path of travel and this is done by means of a series of guide fingers. These fingers prevent the use of an adhesive applying means which will act along the full lengths of the corrugations across the width of the sheet, and therefore the adhesive is applied to the crowns only on the portions thereof between successive guides. The result has been that the final product has had narrow sections lengthwise thereof corresponding in position to that of the guides and along which the two sheets are not adhesively connected. There is less structural strength along these lines and breaking or bending of the product or separating of the sheets along these lines may occur.

The main object of my invention is to overcome these defects and to produce a product at commercially high speed and in an economical manner and in which each corrugation is adhesively secured along its entire length to the surface sheet.

In the type of machine above referred to it has been necessary to so form the guides that the corrugated sheet might sag or bulge a slight extent away from the corrugating roller along the portion of its travel where the adhesive was applied, so that in case the paper should break adhesive would not be applied to the corrugating roller. This often results in a slight variation in the size or height of the corrugations produced in the final product. Such variation is objectionable because if the single faced corrugated sheet is to be used in making a double faced sheet the low corrugations may not contact with the second surface sheet and the high ones may be crushed down. In either of these events the resistance of the double faced sheet to bending is reduced.

A further object of my invention is to permit of close retention of the corrugated sheet in the corrugations of the roller on which it is formed until the surface sheet is applied, so that there will be no opportunity for variation in the size of the corrugations.

It has been proposed to apply the adhesive to the surface sheet in transverse spaced strips which will register with the crowns of the corrugations when the two sheets come together, but so far as I am aware no machine has ever been built and put into commercial use, prior to my invention and which operated on this principle.

As an important feature of my invention I provide improved means for applying the strips of adhesive, and including means for preventing the forming of a coating of adhesive, such as silicate of soda, from building up in the applying roller. Such a coating, if permitted to build up, eventually requires that the machine be shut down and the coating scraped off from the corrugated surface of the applying roller, which is a long and tedious job.

As another feature of my invention I provide improved means which will prevent the application of strips of adhesive to the surface sheet and thus prevent such adhesive from being transferred to the corrugating roller, if the corrugated sheet should break or when the end of the sheet is reached.

As a further feature I provide an electric control which will not be operated when a hole in the sheet passes the control mechanism, but will operate when the sheet is broken or tears in two or the end is reached.

As a further feature I provide means whereby the amount of adhesive applied by the corrugated applying roller may be varied by varying the extent of intermeshing of said corrugated applying roller and another corrugated roller. In its preferred embodiment such means includes a special form of gearing which will prevent back lash or lost motion between the two rollers even though the degree of intermeshing of said rollers be varied.

As another feature of the present invention there is provided new and improved means operable while the machine is running or is at rest for adjusting and registering the adhesive ap-

plying mechanism with respect to the rollers which corrugate one of the sheets.

Various other objects and advantages will be apparent from the following description and from an inspection of the accompanying drawings in which:

Fig. 1 is a side elevation of a machine embodying the present invention, portions being broken away,

Fig. 2 is an elevation of the other side of the machine with portions of the machine broken away,

Fig. 3 is a longitudinal vertical section of the machine looking in the same direction as Fig. 1,

Fig. 4 is a sectional detail taken on the line 4—4 of Fig. 3,

Fig. 5 is a sectional detail taken on the line 5—5 of Fig. 3,

Figs. 6 and 7 are transverse sections showing details of portions of the machine,

Fig. 8 is a sectional detail taken on the line 8—8 of Fig. 2,

Fig. 9 is a perspective view showing a part of an electric control means applicable to stop application of adhesive if the sheet breaks.

Fig. 10 is a longitudinal section through the gear which may be employed for driving the corrugated adhesive applying roller and the coacting corrugated roller.

Fig. 11 is an end view of the gearing shown in Fig. 10,

Fig. 12 is an enlarged sectional detail showing the two corrugated rollers in partly unmeshed position,

Fig. 13 is an enlarged sectional detail of the gears for driving said corrugated rollers and adjusted to prevent back lash when the rollers are partially separated, and

Fig. 14 is a section similar to a portion of Fig. 3, but showing a different arrangement of the parts for applying adhesive to the surface sheet.

The present invention is illustrated as adapted to a machine designed for the manufacture of single faced corrugated paper, which may constitute the final product or which may be delivered to another machine or portion of a machine to have an additional liner or facing sheet adhesively secured thereto.

In the specific form shown in the drawings, a sheet A to be corrugated is advanced by feed rollers 10 and caused to pass between a pair of intermeshing corrugating rollers 11 and 12 which have the peripheries thereof provided with longitudinally extending corrugations including grooves and ridges. The corrugated paper is held in contact with the periphery of the corrugating roller 12 along a portion of the periphery by suitable guide means (not shown), and passes between the roller 12 and a smooth surface pressure roller 13 to press the liner or surface sheet B against the corrugated sheet.

Means are provided for applying adhesive directly to the surface sheet B in strips extending across said sheet and spaced at intervals corresponding to the distance between successive teeth of the rollers 11 or 12, said means being spaced from the corrugating rollers 11 and 12 and the pressure roller 13. The sheet B is delivered from a suitable supply roll or other source (not shown), and is passed over an idler 14 and into contact with the smooth surface pressure roller 13.

The adhesive applying mechanism is disposed between the pressure roller 13 and the idler 14, and includes an adhesive applying roller 16 disposed on the lower side of the traveling surface sheet B and cooperating with a smooth surface transfer roller 17 which receives adhesive from a smooth surface pick-up roller 18, the lower portion of which is immersed in a pan 19 containing silicate of soda or other suitable adhesive. On the opposite side of the traveling surface sheet B there is provided a guide in the form of an idler roller 21 which presses downwardly against the paper to bring the surface sheet B in contact with a substantial portion of the periphery of the adhesive applying roller 16. In order that the adhesive be applied to the surface sheet B in strips extending across the sheet and spaced at intervals corresponding to the distance between successive teeth of the corrugating roller 12, the roller 16 is provided with teeth, the spaces between said teeth being substantially equal to the distance between successive teeth of the roller 12.

The adhesive applying roller 16 is driven in synchronism with the roller 12 so that the space between adjacent adhesive strips applied to the liner B will correspond to the distance between the teeth on the roller 12.

The transmission between the drive and the corrugating rollers and adhesive applying mechanism is such as to permit the driving of the adhesive applying mechanism while the corrugating rollers are shut down. This is highly advantageous in such cases as for instance where the operator of the machine may desire to go to lunch or temporarily shut down the machine for any other purpose. If the adhesive applying mechanism is shut down, the adhesive thereon may dry and render the subsequent operation of the machine difficult. The cleaning of the adhesive applying mechanism for such a short shut down takes a long time and is therefore not practical.

In the specific form shown, there is provided a main drive pinion 23 (Figs. 1 and 6) driven by any suitable source of power and meshing with a gear 24 keyed to a main drive shaft 25 on one side of the machine. The transmission between the drive shaft 25 and the corrugating rollers 11 and 12 is on said side of the machine, and includes a jaw clutch 26 (Fig. 6) having one element 27 splined to said shaft and movable axially therealong by means of a suitable operating handle 28, and a cooperating clutch element 29 secured to a gear 30, said clutch element 29 and gear 30 being loosely mounted on said shaft. The gear 30 meshes with an idler gear 31 supported on a stud 32 and meshing with a gear 33 mounted on the shaft of the corrugating roller 12. This roller 12 drives the cooperating corrugating roller 11 through the intermeshing corrugations of these two rollers.

The transmission between the drive shaft 25 and the adhesive applying mechanism is on the other side of the machine and includes a gear 35 (Figs. 2 and 7) which is connected to a gear spider 36 keyed or otherwise fixed to the drive shaft 25, and which meshes with an idler gear 37 (Fig. 8) which in turn drives an idler spur gear 38 coaxially therewith. This gear 38 meshes with a spur gear 39 fixed to the shaft of the adhesive applying roller 16. The rotation of the adhesive applying roller 16 causes the rotation of the transfer roller 17 and the pick-up roller 18 through intermeshng gears 40, 41 and 42 on the shafts of the applying roller, the transfer roller and the pick-up roller respectively (Figs. 1 and 5).

By means of this arrangement, the clutch 26 may be moved to disengage the operation of the two corrugating rollers 11 and 12 while continuing the operation of the adhesive applying mechanism so that the adhesive thereon is not permitted to dry thereon. The gear ratios of the transmission from the drive to the corrugating rollers and the adhesive applying mechanism, are such that the peripheral speed of the roller 16 will be substantially equal to the peripheral speed of the corrugating roller 12.

Means are provided for circumferentially adjusting the roller 16 in respect to the roller 12, and if desired, while the machine is running, so that the adhesive strips on the surface sheet B will come directly opposite to or in registry with the crowns of the corrugated sheet between the roller 12 and the pressure roller 13. For that purpose, the gears 35 and 37 have helical teeth, and the gear 37 is movable axially to cause the rotation of the adhesive applying roller 16 with respect to the corrugating roller. As shown the gear 38 is loosely mounted on a fixed stud shaft 43 (Fig. 8) through suitable bearings, and is provided with a hub or sleeve portion 44 upon which the helical gear 37 is splined for axial movement therealong.

For moving the helical gear 37 axially, there is provided a sleeve 45 having a flange portion at one end secured to the helical gear 37 and connected near the other end to a thrust sleeve 46 by means of a thrust bearing 47. This thrust sleeve 46 is splined to the stud shaft 43 so as to be axially movable therealong and fixed against rotation, and has spaced shoulders at its inner end engaging opposite sides of the thrust bearings 47, whereby said bearings, said sleeve 45, and said helical gear 37 are movable axially with said thrust sleeve 46. At the outer end of said thrust sleeve 46 is a hand wheel 48 threaded on to the stud shaft 43 and having a flange 49 at one end thereof extending into a groove formed in the thrust sleeve 46 whereby said hand wheel is rotatable with respect to the thrust sleeve 46 and is movable therewith in an axial direction. When the hand wheel 48 is turned, it is moved axially on the threaded stud shaft 43, carrying with it the helical gear 37. One of the helical gears 35 and 37 is substantially longer than the other so as to permit a substantial relative axial movement without bringing said gears out of mesh. The axial movement of the gear 37 causes said gear to advance or retard with respect to the helical gear 35, and therefore causes the corresponding change in the spur gears 38 and 39 and the desired circumferential adjustment of the adhesive applying roller 16 with respect to the corrugating roller 12.

Since the vibration of the machine and the end thrusts of the helical gears are apt to accidentally turn the hand wheel 48 and cause the movement of the adhesive applying roller 16 out of proper registry, there is provided a locking hand wheel 50 having a hub portion 51 threaded onto the stud shaft 43 and adapted to abut the hub of the hand wheel 48 so as to jam said latter wheel in locking position against the threads on the stud shaft 43.

As the teeth of the adhesive applying roller 16 travel in contact with the surface sheet B, a portion of said adhesive is transferred to the surface sheet while the excess adhesive is forced down along the sides of the teeth. In order to prevent the collection of adhesive between the teeth, which adhesive may eventually set or become dry, there is provided a squeeze roller 52 which is provided with teeth corresponding and meshing with the teeth of the roller 16, and which has a drive connection with said roller 16 through said intermeshing teeth. The teeth of the roller 52 are such as to substantially fill the space between the teeth of the roller 16 when in intermeshing relationship. For that purpose, the crowns of the teeth of the roller 52 are convexly curved to conform with the concave bases of the spaces between adjacent teeth of the roller 16 so that the adhesive is forced from the sides of the teeth of the roller 16 and is collected at said bases as the two sets of teeth come into intermesh. From the bases, the adhesive is forced longitudinally along the ends of the roller 16 by the intermeshing teeth, so that the teeth of said roller 16 are substantially freed of adhesive before a new layer of adhesive is applied thereto.

In order to regulate the amount of silicate transferred to the adhesive applying roller 16, the shaft of the pick-up roller 18 is journaled in an eccentric bushing 53 (Figs. 2 and 5) on opposite ends of said shaft. Keyed on to each of said bushings 53 is a pointer arm 54 and loosely embracing said eccentric bushing is a bracket 55 having an arm 55a on which is journaled the shaft of the transfer roller 17. The arm 54 extends between the arms of a yoke 56 on the bracket 55, and the angular position of this pointer arm with respect to the bracket 55 is adjusted by means of a pair of adjusting screws 57.

The bracket 55 also has a lug 58 pivotally connected to one end of an adjusting arm 59, the other end being pivotally connected to one end of a crank lever 60 secured to a rock shaft 61. This crank lever 60 may be swung about its pivotal support by means of a nut 62 swivelled to the other end of said lever and threaded on to a shaft 63. Ths shaft 63 is rotated by means of a suitable hand wheel (not shown) through a sprocket drive 65 and intermeshing bevel gears 66. By means of this arrangement, the extent of contact between the pick-up roller 18 and the transfer roller 17 is effected by adjusting the angular position of the arm 54 with respect to the bracket 55, this being done by means of the adjusting screws 57. This relative angular rotation causes the eccentric bushing 53 to be rotated so that the arm 54 of the bracket 55 is raised or lowered, and the transfer roller 17 consequently moved to or from the pick-up roller 18.

When it is desired to regulate the extent of contact between the transfer roller 17 and the adhesive applying roller 16, the lever 60 is moved into adjusted position through the operation of the sprocket drive 65 to rotate the bracket 55, thereby swinging the transfer roller 17 about the axis of the pick-up roller 18 and towards or away from the adhesive applying roller 16. Fine adjustments in the position of the transfer roller 17 may be effected through an adjusting screw 67 disposed on the outer end of the arm 55a and impinging the frame structure of the machine.

In order to regulate the extent of intermesh between the rollers 16 and 52, the shaft of the roller 52 is journaled at both ends in eccentric bushings 68 (Figs. 1, 2 and 4). These bushings have connected thereto gears 69 meshing with gears 70 fixed to the ends of an adjusting shaft 71. This shaft 71 at one end also carries a segmental gear 72 meshing with a worm 73 enclosed in a suitable casing 74 and operated by means of a hand wheel 75. Between the segmental gear

72 and the worm 73 and encircling the shaft of said worm, there is provided a spring 76 which forms a safety device operating in case the paper should break and pass between rollers 16 and 52. The rotation of the hand wheel 75 causes the rotation of the segmental gear 72 and the rotation of the eccentric bushings 68 through the intermeshing gears 69 and 70, thereby causing the squeeze or wiper roller 52 to be moved towards or away from the roller 16.

As another feature of the present invention, new and improved means are provided for causing the traveling surface sheet B to move out of contact with the roller 16 upon a break in the continuity of the paper A. For that purpose, the guide roller 21 is journaled at one end of an arm 80 (Figs. 1 and 2) fixed to a rock shaft 81 to which may be loosely mounted the idler roller 14. The arm 80 is urged in a clockwise direction by a lever 82 fixed to the rock shaft 81 and having a counterweight 83 adjustable therealong.

A latch device is provided for positively holding the roller 21 in guide position against the paper B to hold said paper in contact with the roller 16 and against the action of the counterweight 83. This latch device includes a latch lever 84 mounted on a pivot pin 85 and having a shoulder 86 adapted to engage a corresponding shoulder formed by a notch in the arm 80. Means are provided to release the latch lever 84 from locking engagement with the arm 80 when the paper breaks or the end of the roll is reached. As shown there is provided a solenoid 87 having a link 88 pivotally connected to the outer end of the lever 84 and operated through an electric eye or photoelectric device 89. This device 89 is disposed on one side of the line of travel of the paper A and is of standard type having a light-responsive or photoelectric tube exposed through the opening of an eye or tube directed transversely to the line of travel of the paper A. Disposed on the other side of the paper A is a source of light 90. The details of the photoelectric device, and the wiring circuits thereof form no portion of the present invention and may be of any standard type.

The light 90 is continuously turned on but during normal paper travel the paper A is interposed in the path of light rays so that the photoelectric device 89 is not actuated. When the paper A breaks or the end thereof has been reached, the light rays from the source 90 will be projected into the electric eye to actuate the same and operate a relay (not shown) in the circuit of the solenoid windings, thereby causing the solenoid link 88 to be drawn upwardly (Fig. 1). This causes the movement of the latch lever 84 out of engagement with the arm 80 and the rotation of said arm in a clockwise direction under the action of the counterweight 83. This effects the movement of the roller 21 into the dotted position C shown, so that the paper B will, under its traveling tension, assume the position indicated at D and in its movement towards the contacting portions of the rollers 12 and 13 will be spaced away from the adhesive applying roller 16.

As the weight may be heavy, to insure quick and positive movement, means are provided whereby the idler roller 21 may be manually restored into its original guide position. For that purpose, there is provided a cam 92 mounted on a shaft 93 and cooperating with a cam roller 94 mounted on the outer end of an arm 95 fixed to the rock shaft 81. The shaft 93 is rotated by means of a large hand wheel 96 and causes the arm 80 to be swung in a counterclockwise direction (Fig. 1) until the latch lever 84 has fallen into locking position with said arm and the roller 21 is in proper paper guiding position.

The use of a single electric eye might cause operation of the solenoid and the disengagement of the paper from the adhesive applying roller if a small hole in the sheet should pass the path of the light rays. Ordinarily it is not desirable to stop the application of adhesive except in case the end of the sheet is reached or the sheet is torn in two or breaks. Therefore there may be employed a series of the electric eyes arranged across the width of the sheet and with the circuits thereof connected in series so that the releasing mechanism will not operate except when light flows to all of the electric eyes. A mechanical form of circuit closer is illustrated somewhat diagrammatically in Fig. 9. Supported above the sheet A between the rollers 10, 16 and 11 is a bar 100 having loosely pivoted thereon a plurality of levers each having one end portion 101 resting upon the sheet. There may be any desired number of these, but ordinarily three will be sufficient, one adjacent to each edge portion of the sheet and one nearer the center. The opposite end of each of the levers is in the form of a U-shaped circuit closer 102 and is normally disposed adjacent to but out of contact with a sectional electric conductor rod 103. This rod is made up of a series of sections insulated from each other and the insulation sections 104 are disposed between the two branches of the corresponding U-shaped circuit closers 102.

With the levers all supported on the sheet, the circuit closers will be out of contact with the rod 103 and no current can flow through the latter. If there is a small break or tear in the paper so that one of the levers may swing as shown in Fig. 9, the circuit will not be closed and no current can flow unless all of the levers may swing which would indicate that the paper is broken across its entire width or the end of the sheet has been reached. With all of the levers down the circuit closers will all be in contact with the rod 103 and the current may flow around all of the insulation sections 104 through the bridging conductors. The current thus flowing through the rod may operate the solenoid 87 and stop the application of adhesive to the sheet as previously described.

Various other means might be employed which would prevent the operation of the solenoid upon the passage of a hole in the paper, but which would cause its operation when there is a break across the entire width.

In the construction shown in Fig. 3 the adhesive is transferred to the corrugated applying roller 16 by a smooth surfaced roller 17 and the excess of adhesive is removed from between the corrugations by the corrugated roller 52.

In the form shown in Fig. 14 there are employed substantially the same elements, but the roller 52a is mounted between the applying roller 16 and the transfer roller 17. In this arrangement the amount of adhesive is controlled by relatively adjusting the rollers 16 and 52a to vary the extent of intermeshing of the two rollers, both of which are corrugated. The intermeshing controls the amount of adhesive which is left on the applying roller 16 and prevents the building up of any layer of adhesive in the grooves between the corrugations of the applying roller. The amount of adhesive left on the ends of the teeth of the applying roller will be varied by the adjustment of these rollers toward and from each

other as will be apparent from Fig. 12. To adjust the two rollers so that they do not fully and completely intermesh would obviously leave a back lash or lost motion, and in order to prevent this there is provided the gearing shown in Figs. 10 and 11. The shaft of the applying roller is mounted in a sleeve 106, while the shaft of the breaker rollers 52a is mounted in a sleeve 107. The power is delivered to the shaft through a gear 40a from a driving gear indicated at 108. Coaxial with the gear 40a and rigidly but adjustably connected thereto is a gear 109. The gear 109 is provided with slots 110 for receiving bolts 111, and the gear 40a is provided with a lug 112 within a socket 113 in the gear 109. Extending through the lug is an adjusting bolt 114 which by being rotated may cause adjustment of the gear 109 in respect to the gear 40a, and when adjusted the two gears may be rigidly clamped by the bolts 111.

Meshing with the gear 103 are two similar coaxial gears 115 and 116 normally locked together by bolts 117 extending through slots 118 in the outer gear 116. When the rollers 16 and 52a are fully in mesh the gears 115 and 116 are so positioned that the teeth of one are in accurate registry with the teeth of the other so that the gears 115 and 116 act as a single gear. When the rollers 16 and 52a are separated to a slightly unmeshed position then the bolts 117 are loosened and the gear 116 is rotated slightly so as to in effect widen the teeth of the combined gear 115, 116 and narrow the interdental spaces. In this way the combined gear 115 and 116 will be caused to properly mesh with the gear 109 without any back lash.

The extent of the relative adjustment of the gears 115, 116 will be varied dependent upon the extent of complete or partial meshing with the gear 109. By adjusting the gear 109 in respect to the gear 40a and by adjusting the gear 116 in respect to gear 115, accurate driving relationship will be maintained, and when the rollers 16 and 52a are partly out of mesh the teeth will not contact with each other and no power will be transmitted directly from one to the other. The transmission of power will be through the gears.

The spacing of the teeth of the rollers 16 and 52a is indicated to an exaggerated degree in Fig. 12 and the effective widening of the teeth of the combined gear 115, 116 with corresponding narrowing of the interdental spaces is indicated to an exaggerated degree in Fig. 13.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying adhesive to the crowns of said teeth, and a roller having circumferentially spaced teeth meshing with said first mentioned teeth for removing adhesive from the sides of said latter teeth and disposed on the returning side of said adhesive applying roller between the region where said latter roller comes into engagement with said surface sheet and said last mentioned means.

2. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying elongated roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and extending substantially along the entire length of said roller, said teeth being adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, a smooth transfer roller for applying adhesive to the crowns of said teeth, means for applying adhesive to the surface of said transfer roller, and a corrugated roller disposed between the point of application of the adhesive from said adhesive applying roller and said transfer roller on the returning side of said adhesive applying roller, and having circumferentially spaced teeth meshing with said first mentioned teeth substantially throughout their entire length for removing adhesive from the sides of said latter teeth, said rollers having a driving connection through said intermeshing teeth.

3. A machine for making corrugated paper, including a pair of corrugating rollers adapted to corrugate an advancing sheet therebetween, an adhesive applying roller for applying adhesive to an advancing surface sheet in strips extending across said latter sheet and at spaced intervals therealong corresponding to the corrugations formed on said first mentioned sheet, an idler roller, means tending to move said idler roller from the normal path of movement of said surface sheet, means for positively pressing said roller against said paper against the action of said last mentioned means, and means operable in response to a break in the continuity of the sheet to be corrugated for releasing said pressing means to permit said idler roller to be moved under the action of said first mentioned means to space said surface sheet from said adhesive applying roller.

4. A machine for making corrugated paper, including a pair of corrugating rollers adapted to corrugate an advancing sheet therebetween, an adhesive applying roller for applying adhesive to an advancing surface sheet in strips extending across said latter sheet and at spaced intervals therealong corresponding to the distance between the corrugations of said first mentioned sheet, a pivotally mounted arm, a guide roller carried by said arm, a counterweight tending to move said guide roller away from the normal path of movement of the traveling surface sheet, means for positively holding said guide roller against the action of said counterweight to maintain said surface sheet in contact with said adhesive applying roller, and means automatically operable upon a break in the continuity of the sheet to be corrugated for disengaging said holding means for permitting said guide roller, under the action of said counterweight, to so move that said surface sheet is withdrawn from contact with said adhesive applying roller.

5. A machine for making corrugated paper, including a pair of corrugating rollers adapted to corrugate an advancing sheet therebetween, an adhesive applying roller for applying adhesive to an advancing surface sheet in strips extending across said latter sheet and at spaced intervals therealong corresponding to the distance between the corrugations of said first mentioned sheet, a guide roller, means for holding said guide roller in contact with a traveling surface sheet to maintain said latter sheet in contact with said adhesive applying roller, a plurality of circuit closers arranged in electrical series across the width of the sheet, and a solenoid operable upon operation of all of said circuit closures and

upon a break across the entire width of the paper to be corrugated for disengaging said holding means and permitting said guide roller and said latter sheet to move out of contact with said adhesive applying roller.

6. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller for applying adhesive to an uncorrugated advancing surface sheet in strips extending thereacross and at spaced intervals therealong corresponding to the distance between the corrugations of said first mentioned sheet, a rock shaft, an arm connected to said rock shaft, a guide roller on said arm, a pivotally connected latch lever adapted to lock said arm into guiding position with the traveling surface sheet in contact with said adhesive applying roller, a solenoid having a link connected to said latch lever, and means operable in response to a break in the continuity of the sheet to be corrugated for energizing said solenoid to release said latch lever, whereby said surface sheet is caused to withdraw from contact with said adhesive applying roller.

7. A machine for making corrugated paper, including means for corrugating an advancing sheet, means for applying adhesive to an advancing surface sheet in strips extending thereacross and at spaced intervals therealong corresponding to the distance between the corrugations of said first mentioned sheet, said surface sheet having a line of travel adjacent to said adhesive applying means, an idler roller spaced from said corrugating means and said adhesive applying means and disposed adjacent to the path of travel of said surface sheet, means for pressing said roller downwardly against said surface sheet to maintain said latter sheet firmly in contact with the adhesive applying means, and means automatically operable upon a break in the continuity of the sheet to be corrugated for moving said idler roller to cause said surface sheet to be withdrawn from contact with said adhesive applying roller.

8. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, and means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller for delivering the adhesive to one of the other rollers.

9. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, and means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller, said transfer roller engaging the teeth of said second roller and applying adhesive to the latter.

10. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, and means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller, both said transfer roller and second roller engaging the teeth of said applying roller.

11. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller, and a pick-up roller for applying adhesive to said transfer roller.

12. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller, and a pick-up roller for applying adhesive to said transfer roller, and said transfer roller applying adhesive to said second roller.

13. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller for delivering the adhesive to one of said above mentioned rollers, and means for adjusting said applying roller and said second roller relatively to vary the extent of meshing of the teeth.

14. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller,

means for adjusting said applying roller and said second roller relatively to vary the extent of meshing of the teeth, and gearing for driving one of said toothed rollers from the other while preventing direct contact of the teeth of one with the teeth of the other when partly unmeshed.

15. A machine for making corrugated paper, including means for corrugating an advancing sheet, an adhesive applying roller having teeth on the periphery thereof circumferentially spaced in accordance with the spacing of the corrugations of the corrugated sheet, and adapted to come successively into engagement with a traveling surface sheet to apply adhesive to said latter sheet in spaced transverse strips thereacross, means for applying to and controlling the amount of adhesive on said applying roller, said means including a second roller having teeth meshing with those of said applying roller, and a transfer roller, means for adjusting said applying roller and said second roller relatively to vary the extent of meshing of the teeth, a pair of meshing gears connecting said toothed rollers, each gear being circumferentially adjustable in respect to its roller, and means for varying the effective width of the teeth of one gear to maintain said gear properly meshed while said rollers are partly unmeshed, whereby the teeth of said rollers are prevented from direct contact.

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