

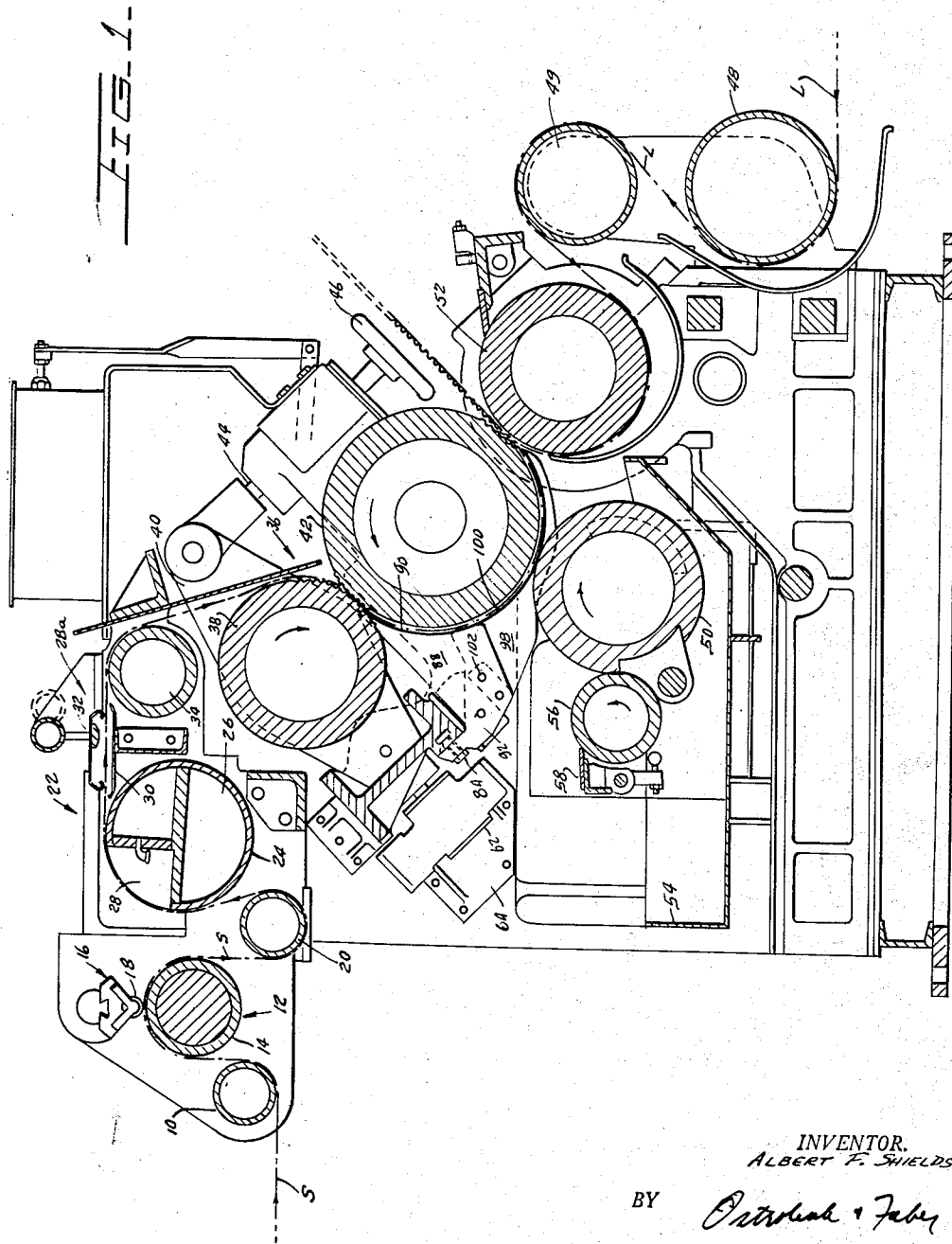
June 21, 1955

A. F. SHIELDS
CORRUGATER GUIDE MEMBER

2,711,206

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2 Sheets-Sheet 1



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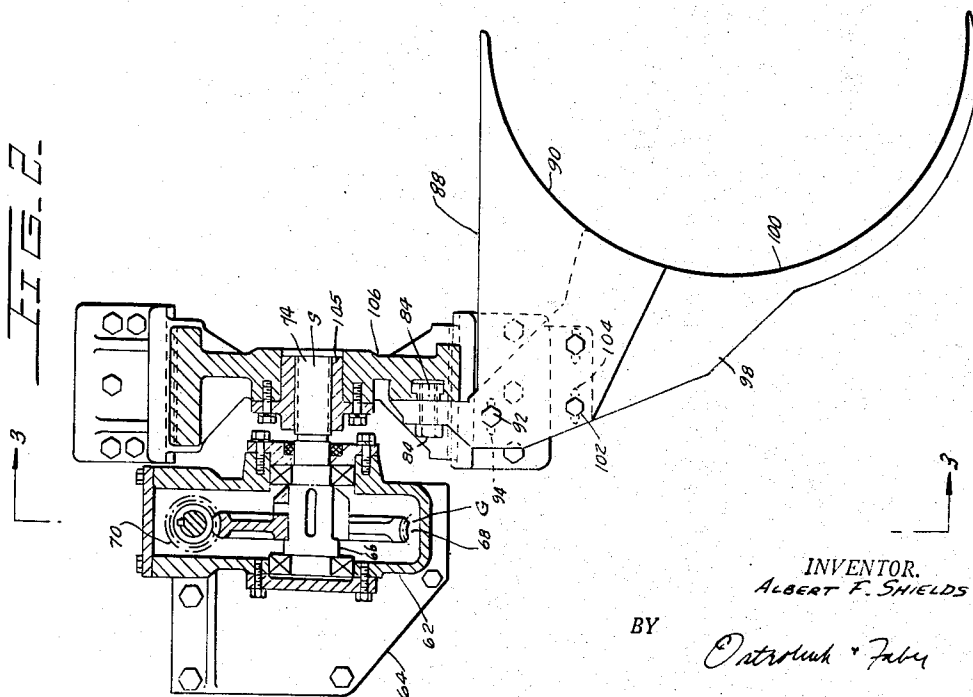
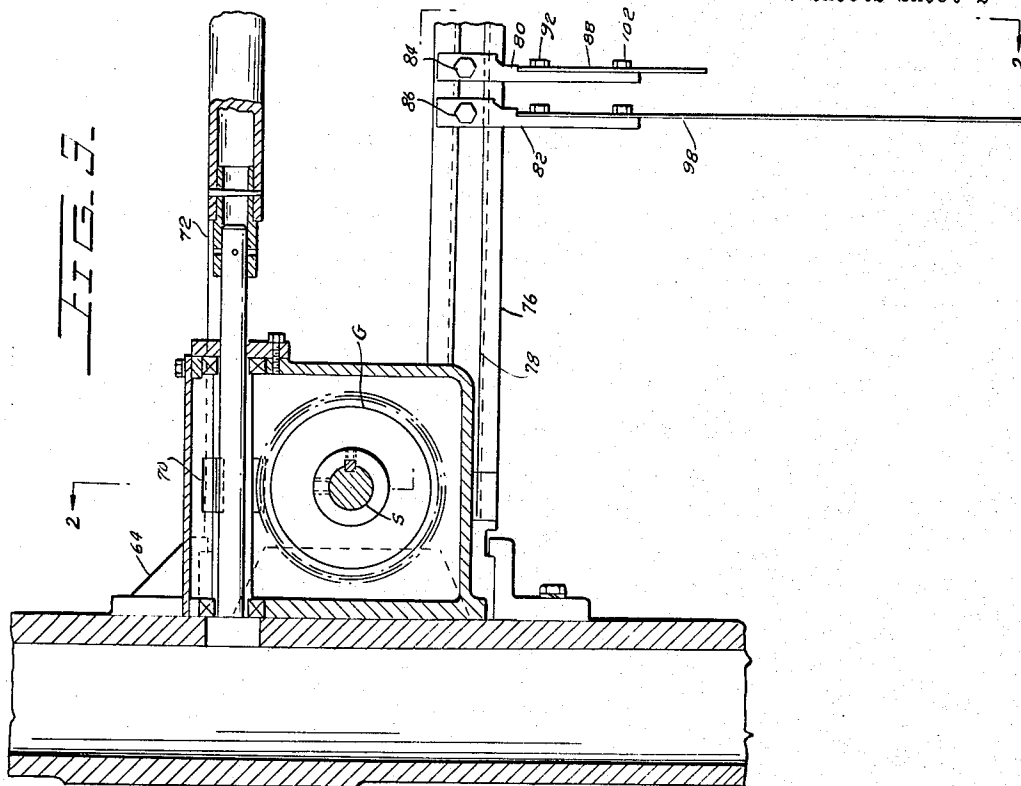
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CORRUGATER GUIDE MEMBER

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7 Claims. (Cl. 154—31)

The present invention relates to a roller type machine for processing sheet stock into corrugated paper and in particular to an arrangement for positively guiding the sheet stock between coacting rollers of the machine in a manner minimizing interference with machine operation and avoiding production of faulty or unsatisfactory corrugated products.

The prevalent practice in the manufacture of single faced corrugated paper of the type including a liner adhesively secured to the crowns of a corrugated sheet is to provide a pair of intermeshing corrugating rollers for corrugating the sheet stock and a liner applying roller arranged to cooperate with an adjacent corrugating roller for pressing the liner or facing sheet against the crowns of the corrugated sheet. The axes of the respective rollers usually are arranged parallel to each other and spaced so that the corrugated sheet travels approximately one-half of the circumference of the intermediate corrugating roller prior to reaching the liner applying roller.

In order to hold the sheet stock in substantial registry with the intermediate corrugating roller, it has been customary to provide a series of curved and continuous guide fingers or strips designed to permit the application of an adhesive to the respective crowns of the corrugated sheet during travel to the liner applying roller. Usually the guide fingers extended from the line of intermeshing of the corrugated rollers approximately to the line of tangency between the intermediate corrugating roller and the cooperating liner applying roller. As is apparent, these guide strips interfere with the action of the intermeshing corrugating rollers as well as with an adhesive applying roller normally arranged along the feed path to the liner applying roller and at a location spaced before the latter along the feed path. In attempting to minimize this interference, resort has been made to narrow guide strips of relatively light and thin material. However, due to the continuous rubbing of the rollers and the wearing effect of the sheet stock, it has been necessary to frequently replace the guide strips.

Accordingly, it is an object of the present invention to provide a novel sheet guiding arrangement for a machine adapted to the manufacture of single faced corrugated paper, obviating one or more of the aforesaid difficulties. In particular, it is another object of the present invention to provide guide fingers assuring the requisite positive guidance of sheet stock being sequentially processed through a corrugating machine, yet minimizing interference with operation of the respective mechanisms of the machine.

In machines of the aforesaid character, the guide fingers or strips inherently cause a swath or region of the corrugated paper to remain uncorrugated, the same swath being missed by the glue or adhesive applying roller. This arrangement resulted in products which exhibited the shortcomings of not being corrugated or glued along a substantially continuous swath or course, resulting in structural weakness.

Therefore, it is a further object of the present inven-

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tion to provide a machine for making single faced corrugated paper including guide mechanisms for the corrugating adhesive applying and liner applying rollers which are arranged relative to each other to assure joining of the liner to the corrugated sheet in regions of the sheet corrugated during passage through the corrugating rollers.

Briefly, certain objects of the present invention are realized by the provision of first and second guide fingers offset with respect to each other and arranged adjacent the intermediate corrugating roller. One of the guide fingers is arranged to extend toward the line of intermeshing between the respective corrugating rollers and is provided with an arcuate guide surface substantially complementary to and spaced from a portion of the intermediate corrugating roller and assuring positive guidance of the sheet stock along this portion of the roller. The other of the guide fingers extends towards the line of tangency between the cooperating liner applying roller and the intermediate corrugating roller and likewise includes an arcuate guide surface arranged to define the remaining portion of the angular guide or feed path between the point of intermeshing of the respective corrugating rollers and the line of tangency between the intermediate corrugating roller and the liner applying roller.

In accordance with a further feature of the present invention, the respective offset guide fingers, or a number of pairs of offset guide fingers arranged at spaced intervals longitudinally of the cooperating corrugating and liner applying rollers, are individually mounted on a common support for adjustment into registry with respective circumferential grooves provided on the appropriate rollers.

As a still further aspect of the invention, provision is made for the adjustment of the respective pairs of guide fingers relative to each other so that the guide fingers of a pair cooperate to define a continuous arcuate guide path between the line of intermeshing of the corrugating rollers and the line of tangency between the intermediate corrugating roller and the liner applying roller.

The brief description and many other salutary advantages will occur to those skilled in the art as the description proceeds. In order to render the understanding complete and lucid and further to comply with the statutes relating to the same and to point out precisely where I have made a patentable advance in the arts and sciences I have described the invention in all its details in connection with a specific embodiment thereof shown in the accompanying drawings and set forth in the description. In the drawings:

Figure 1 is a longitudinal sectional view taken through an illustrative corrugating machine embodying features of the present invention.

Figure 2 is an enlarged detail of the guide fingers constructed and mounted in accordance with the principles of the present invention.

Figure 3 is a fragmentary sectional view taken along the line 3—3 of Figure 2 and looking in the direction of the arrows.

Referring now specifically to the drawings, there is illustrated a machine for the manufacture of single faced corrugated paper which may be a final product or may be delivered to a further machine for facing the unfaced side of the corrugated paper. The sheet S to be corrugated is passed over a tensioning roller 10 and into a straw or sheet trimming assembly 12 including a trimming roller 14 and a trimming head 16 having a cutting roller 18. Thereupon the sheet S is passed over an idler roller 20 to a sheet moistener assembly, generally designated by the reference numeral 22. The sheet moistener assembly embodies a steaming roll 24 including a steam chest 26 and having a segmental cut-out 28 over which the sheet passes. The steam chest 26 is supplied with

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steam at a proper temperature whereby as the sheet S passes over the steam roller 24 it is preheated and prepared for a corrugating operation. After passing over the steam roll 24, the sheet S is fed through a guideway 28a including a plate 30 and shield 32 whereupon the sheet is passed over a suitable feed roller 24 positioned above the corrugating unit, generally designated by the reference numeral 36.

The corrugating unit 36 includes a pair of intermeshing corrugating rollers 38, 40 each of which has its external peripheral surface provided with grooves or ridges, which when in engagement along a line of intermeshing, impart corrugations to the sheet S passing therethrough. The roller 38 is mounted on suitable stationary bearings and is preferably supported for adjustment toward and away from the corrugating roller 40 as and for example by means of a pivoted supporting bracket 42 and an adjusting coupling 44 operated from a hand wheel 46 accessible exteriorly of the machine. Suitable provision may likewise be made for adjusting the corrugating rollers 38, 40 axially relative to each other. In many applications the axial adjustment of the rollers may be essential to assure that the corrugating rollers have their respective axes in perfect parallelism and with the teeth in exact intermesh to thereby avoid cutting or crushing of the sheet S during high speed operation.

The facing sheet or liner L is fed toward the corrugating roller 40 for assembly with the corrugated sheet S by suitable pre-heat rollers 48, 49 arranged one above the other. The liner L passes over these rollers prior to being extended about the liner applying or pressure roller 52 arranged in cooperating relation with the corrugating roller 40 along a line of tangency substantially coplanar with the line of intermesh and the respective axes of the rollers 38, 40, 52.

Below the corrugating roller 40 and along the feed path prior to the liner applying roller 50 is a silicate or adhesive transfer roller 50 fed with adhesive from a suitable pan 54, provision being made for application of a uniform coating of the adhesive or silicate by means of a doctoring roller 56 and a scraper assembly 58. The silicate or transfer roller 50 applies the adhesive to the crowns of the corrugated sheet as it passes from the line of intermesh between the corrugated rollers 38, 40 and the line of tangency of the corrugating roller 40 and the liner applying roller 50.

As is apparent to those skilled in the art, the described arrangement is capable of corrugating the sheet S and adhesively securing to one face of the corrugated sheet a liner L, the resultant product being accessible beyond the corrugating rollers 40 and the liner applying roller 52 for further processing, as and for example by providing a liner on the corrugated face opposite the liner L, or for cutting into appropriate lengths.

In accordance with the principles of the present invention, a guide arrangement is provided for holding the sheet S in the proper relationship with respect to the intermediate corrugated roller 40 during travel along the arcuate path from the corrugating roller 38 to the liner applying roller 50. This guide arrangement includes a housing 62 supported by a plate or bracket 64 on the main upright frame of the single faced corrugating machine. Journaled within the housing 62 transversely thereof is a stub shaft 66 which carries a worm gear 68 driven from a worm 70 connected via a coupling shaft 2 to a similar worm and gear arrangement on the opposite side of the machine. A suitable hand wheel or the like is provided for manual adjustment of worm 70. Integral with the stub shaft 66 is a threaded portion 74 projecting outwardly from the housing 62 and engaging a nut 105 fastened in bracket 106 which supports an elongated mounting plate 76. The mounting plate is provided with a guideway 78 extending parallel to and spaced from the axis of the rollers 38, 40 and 50. Adjustable along the mounting plate 76 are spaced pairs of supporting brackets

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80, 82, only one pair being illustrated for the purposes of clarity. The brackets 80, 82 may be fixed at adjusted positions longitudinally of the roller assemblies by the provision of suitable securing elements such as the bolts 84, 86 having their respective heads 84', 86' commensurate in cross-section with the cross-sectional area of the guideway 78. The adjustable bracket 80 carries a first guide finger 88 which extends generally toward the line of intermesh between the corrugating rollers 38, 40 and is at least partially accommodated within a suitable circumferential slot formed in the periphery of the corrugating roller 38.

As best seen in Figure 2, the finger or strip 88 includes an arcuate guide surface 90 complementary to a portion of the periphery of the corrugating roller 40 and cooperating therewith to define part of an arcuate guide path between the line of intermeshing of the corrugating rollers 38, 40 and the line of tangency between the corrugating roller 40 and the liner applying roller 52. The guide finger or strip 88 is adjustably supported on the bracket 80 for movement toward and away from the respective rollers in a plane normal to the axes of the rollers by the provision of suitable bolts 92 extensible through elongated slots 94 provided in the finger proper and receivable within complementary threaded holes provided in the bracket 80.

Accordingly, the guide surface 90 of the finger 88 can be appropriately positioned relative to the periphery of the roller 40 to provide the desired positive guiding of the sheet S during travel, and further permitting periodic adjustment as the surface 90 of the guide finger wears due to frictional contact with the sheet S. Laterally offset relative to the guide finger 88 and arranged in a plane parallel to the latter is a further guide finger 98 which extends toward the line of tangency between the corrugating roller 40 and liner applying roller 52 and terminates below the plane of the axes of the respective rollers.

As best seen in Figure 1, the adhesive applying roller 50 is provided with a circumferential slot in the periphery thereof to permit the extension therebeyond of the guide finger 98. This guide finger likewise includes an arcuate guide surface 100 which is adapted to form a substantial continuation of the guide surface 90 and to cooperate therewith in defining the arcuate guide path between the corrugating roller 38 and the liner applying roller 52. Suitable provision is made for adjusting the guide surface 100 into the desired position by the provision of bolts 102 which extend through suitable slots 104 in the guide finger 98 and are received in tapped holes in the supporting bracket 82. As previously stated, as many additional pairs of offset guide fingers 88, 98 may be provided as are required to assure the desired positive guiding of the corrugated sheet S as it travels to the liner applying roller 52.

By the offset arrangement of the respective pairs of guide fingers defining the guide path, the resultant corrugated product will not include swaths which are both uncorrugated and unadhered to the liner L. This obviates the difficulty which heretofore resulted in structural weakness of the corrugated paper produced by corrugating machines incorporating guide fingers arranged generally in a single plane and extending from the line of intermeshing of the corrugating rollers to the point or line at which the liner presses against the crowns of the corrugated sheet previously provided with the necessary adhesive.

It has been found that where there are grooves in a corrugating roll the medium S will not be as well formed in that intermediate area as at other points. However, if the groove in the applicator roll 50 is shifted axially so that it does not line up with the imperfect corrugations of S, then a uniform adhesive pattern will still be obtained due to the thickness of the adhesive film and a uniformly bonded single faced board will result. On the other hand, if to the imperfect forming of the medium S is

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added the uncertain adhesive application of the grooved portion of roll 50 then, most certainly, an imperfectly bonded strip and a weakened board will result.

The adjustable arrangement of the supporting or mounting plate 76 with the brackets 80, 82 permits the guide fingers 88, 98 to be brought into registry with the accommodating circumferential slots on the corrugating roller 38 and on the adhesive applying roller 50. The support for the mounting plate 76 further assures the proper alignment of the guide fingers relative to their respective slots while providing through suitable gearing arrangement 70, 68 and 74 means for collectively adjusting all the brackets 82 and 80 and associated fingers 98 and 88 in a direction substantially perpendicular to the plane of the axes of the rolls 38, 40, 52.

In this connection it is to be noted that the respective rollers may go out of parallelism due, for example, to warping or distortion of the machine frame or setting of the foundations upon which the machine stands. Accordingly, by the provision of an independent adjustment for the guide fingers relative to the respective rollers, it is possible to obtain the requisite guiding action without excessive wearing of the fingers and without disrupting the operation of the machine.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a machine for facing a corrugated sheet with a liner, a pair of intermeshing corrugating rollers, a liner applying roller adjacent one of said corrugating rollers, a first guide finger extending toward the other of said corrugating rollers for holding said sheet in engagement with said one corrugating roller in the region of said other corrugating roller, and a second guide finger extending toward said liner applying roller for holding said sheet in engagement with said one corrugating roller in the region of said liner applying roller, said first and second guide fingers being laterally offset from each other and being supported in substantially parallel planes.

2. The combination with a machine for making single face corrugated paper including a main roller having a grooved periphery, a first auxiliary roller cooperating with said main roller along a line of intermeshing for corrugating a sheet, and a second auxiliary roller cooperating with said main roller along a line of tangency for applying a liner to the corrugated sheet, a pair of fingers disposed in parallel offset planes normal to the axis of said main roller for guidingly engaging said sheet along the path of travel between said first and second auxiliary rollers, one of said fingers extending toward and terminating adjacent said line of intermeshing and including a guide surface substantially complementary to a portion of said main roller, and the other of said fingers extending toward and terminating adjacent said line of tangency and including a guide surface substantially complementary to a further portion of said main roller.

3. In a machine for facing a corrugated sheet with a liner, first and second rollers intermeshing and serving to corrugate a sheet, a third roller cooperating with said second roller and serving to apply a liner to the crowns of the corrugations of said sheet, said first and third rollers being provided with circumferential grooves laterally offset with respect to each other, and a guide finger at least partially nested within each of said circumferential grooves and extending along the circumference of said second roller.

4. In a machine for facing a corrugated sheet with a liner, first and second rollers intermeshing and serving to corrugate a sheet, a third roller cooperating with said second roller and serving to apply a liner to the crowns of the corrugations of said sheet, said first and third rollers

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ers being provided with a pair of circumferential grooves laterally offset with respect to each other, a finger adapted to be at least partially nested within each of said circumferential grooves, each of said fingers including a guide surface adapted to engage said sheet along its path of travel between said first and third rollers, and means including a common support fixing said fingers in an adjusted position wherein said guide surfaces define an arcuate guideway for said sheet coextensive with said path of travel intermediate said first and third rollers.

5. In a machine for facing a corrugated sheet with a liner, a pair of intermeshing corrugated rollers, a liner applying roller adjacent one of said corrugated rollers, a first finger extending toward the other of said corrugated rollers for holding said sheet in engagement with said one corrugating roller in the region of said other corrugating roller, a second finger laterally offset from and parallel to said first finger and extending toward said liner applying roller for holding said sheet in engagement with said one corrugating roller in the region of said liner applying roller, said first and second fingers having guide surfaces adapted to cooperate with each other in an adjusted position to define a continuous arcuate path for said sheet coextensive with the periphery of said one corrugating roller intermediate said other corrugating roller and said liner applying roller, and means for supporting said first and second fingers in said adjusted position.

6. In a machine for facing a corrugated sheet with a liner, a pair of intermeshing corrugated rollers rotatable about spaced and parallel axes, a liner applying roller adjacent one of said corrugating rollers and rotatable about a further axis parallel to said spaced and parallel axes, said liner applying roller and the other of said corrugating rollers being provided with longitudinally spaced pairs of circumferential grooves, the respective grooves of each pair extending in offset planes normal to the respective axes, pairs of guide fingers adapted to be at least partially accommodated in the respective pairs of grooves, means operatively connected to each pair of guide fingers and mounting same for movement longitudinally of said one corrugating roller for adjustment relative to the respective pair of grooves, and further means operatively connected to the guide fingers of each pair and mounting same for movement transversely of said one corrugating roller for adjustment into a cooperating position wherein said pairs of guide fingers define an arcuate feed path for the corrugated sheet.

7. The combination with a machine for making single faced corrugated paper including a main roller having a grooved periphery, a first auxiliary roller cooperating with said main roller along a line of intermeshing for corrugating a sheet, and a second auxiliary roller cooperating with said main roller along a line of tangency for applying a liner to the corrugated sheet, a pair of fingers adapted to be disposed in parallel offset planes normal to the axis of said main roller for guidingly engaging said sheet first between said first and second auxiliary rollers, one of said fingers extending toward and terminating adjacent said line of intermeshing and including an arcuate guide surface, the other of said fingers extending toward and terminating adjacent said line of tangency and including another arcuate guide surface, a common support for said pair of fingers, means operatively engaging said common support and including detachable securing elements mounting said fingers for adjustment into said parallel offset planes, and further means operatively connected to said fingers and forming a part of said last-named means mounting said fingers for adjustment into a predetermined position wherein said arcuate guide surfaces define a feed path along a substantial portion of said main roller.

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