J. N. HAHN.

CORRUGATED PAPER MAKING MACHINE.

APPLICATION FILED AUG. 2, 1915.

1,264,506.

Patented Apr. 30, 1918.

7 SHEETS—SHEET 1.

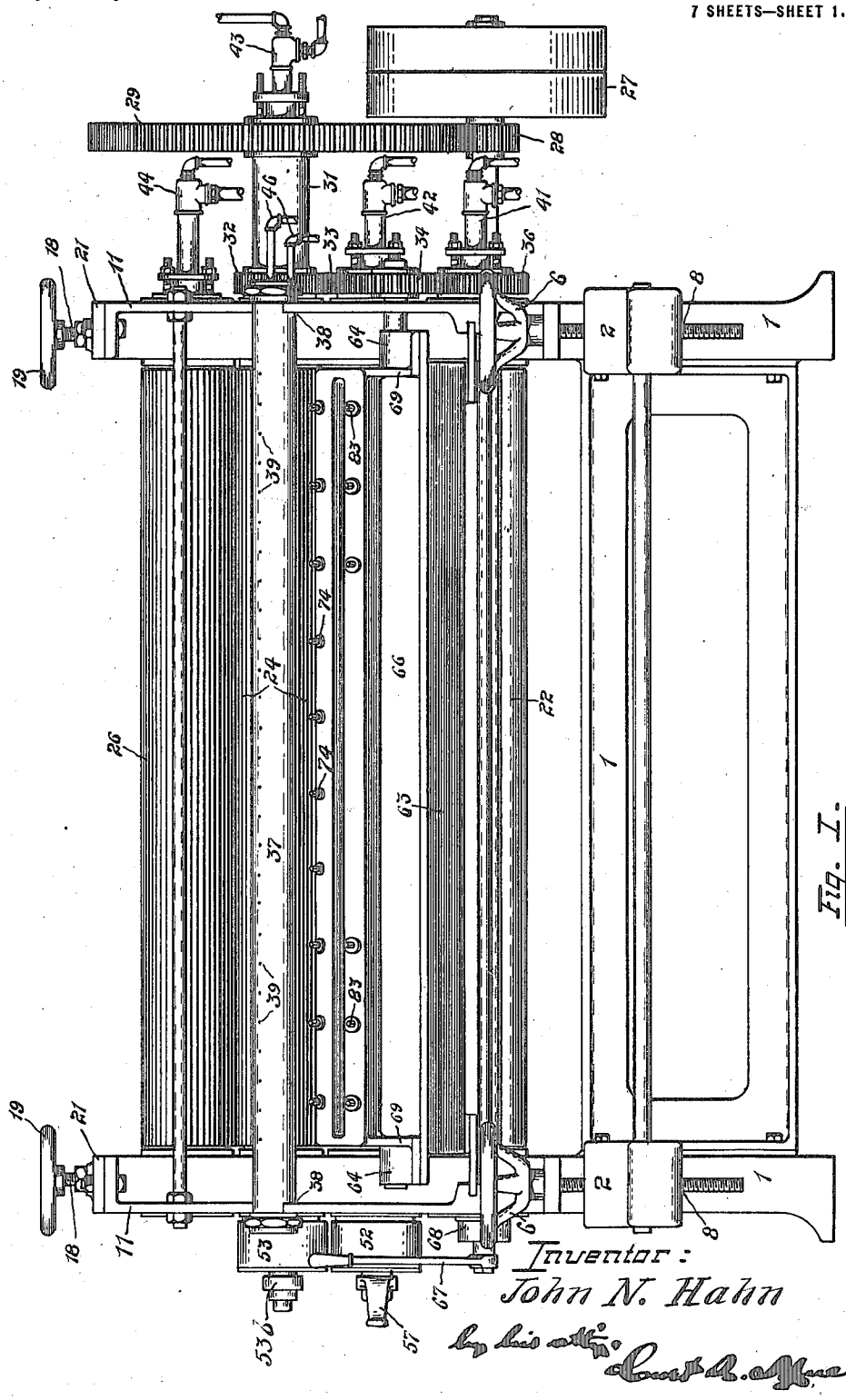


Fig. 1.

Inventor:
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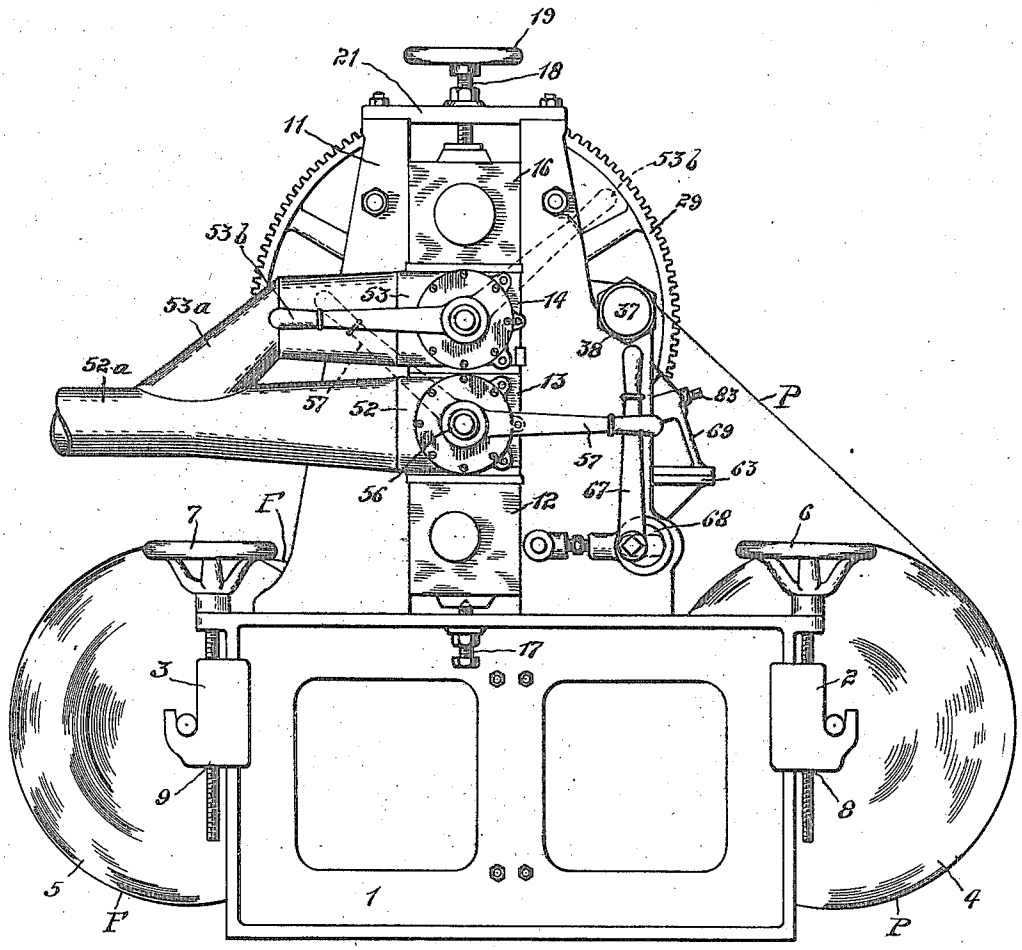


Fig. II.

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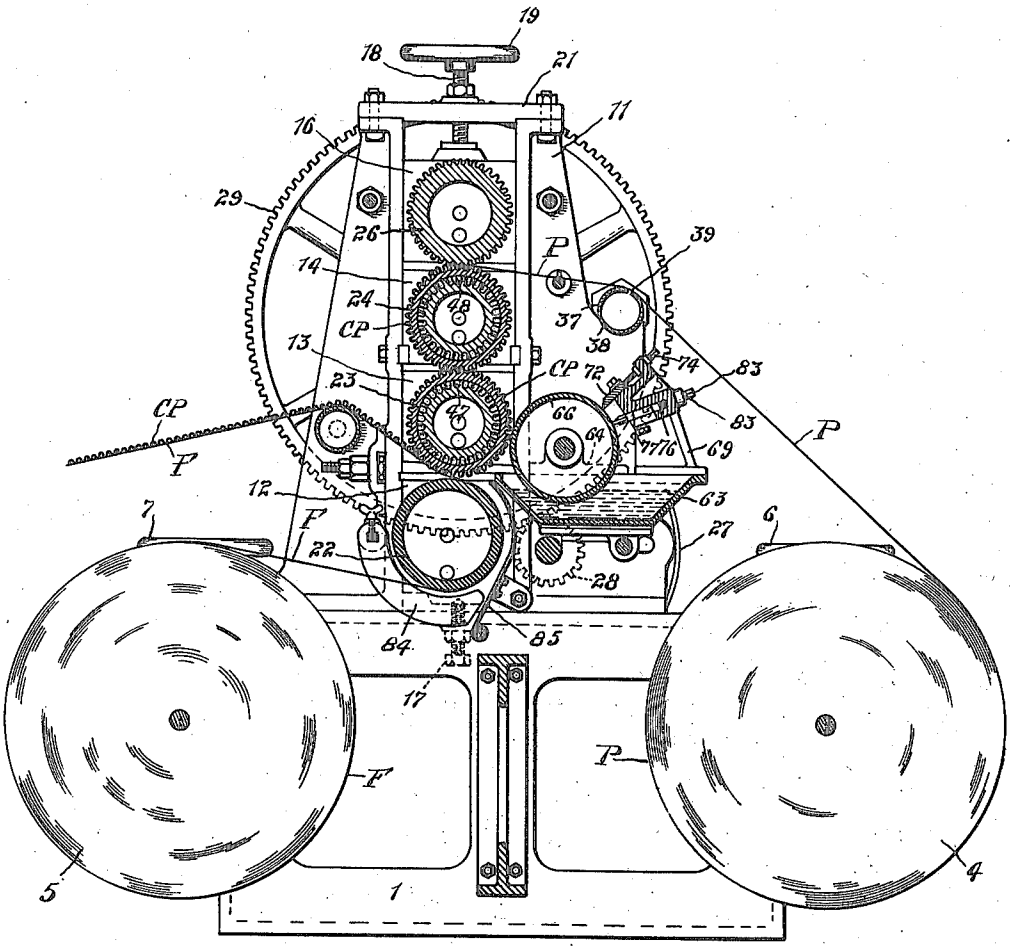


Fig. III.

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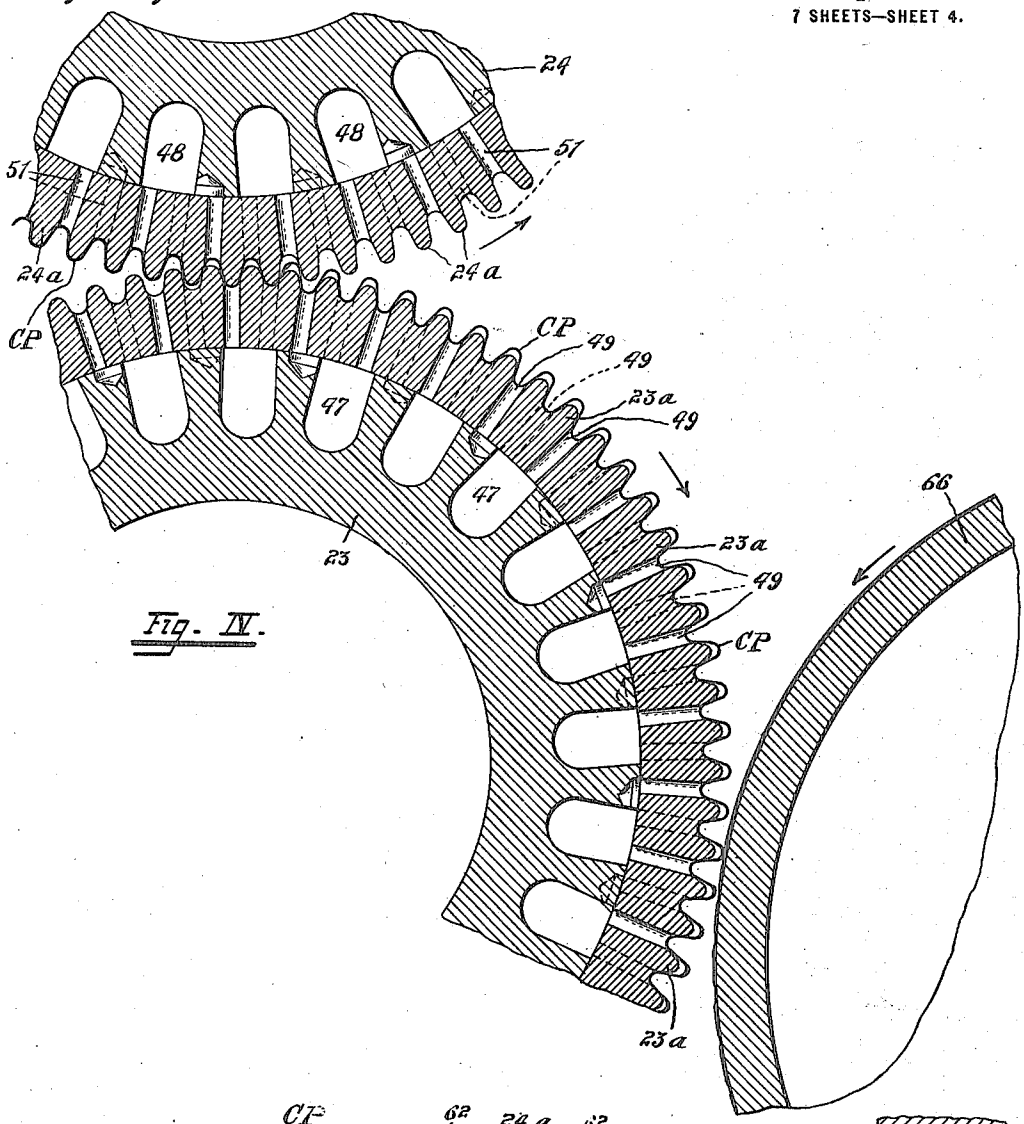


Fig. IV.

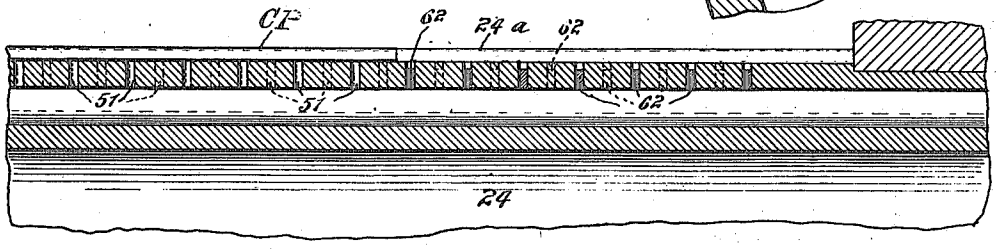


Fig. XI.

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7 SHEETS—SHEET 5.

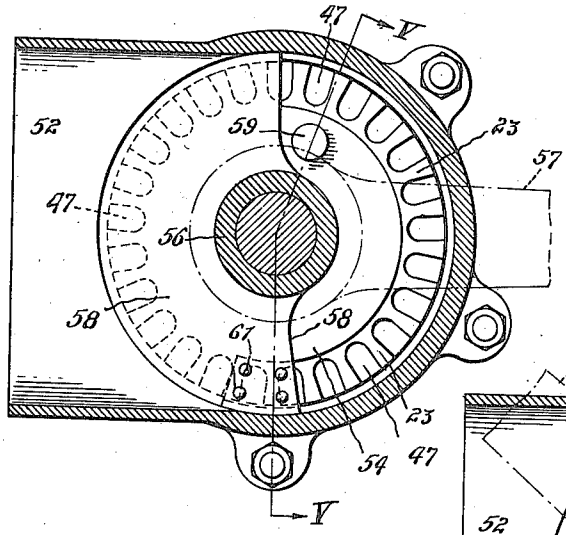


Fig. VI.

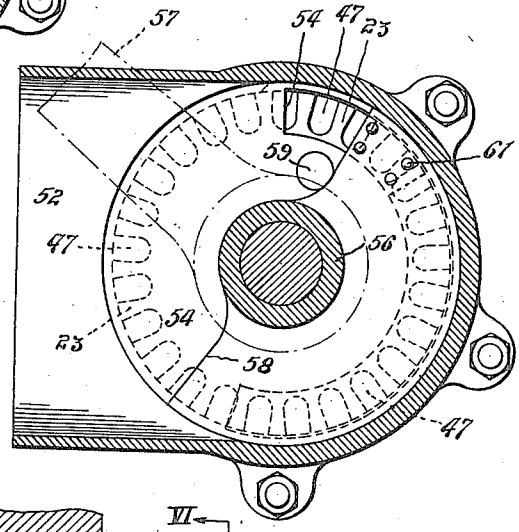


Fig. VII.

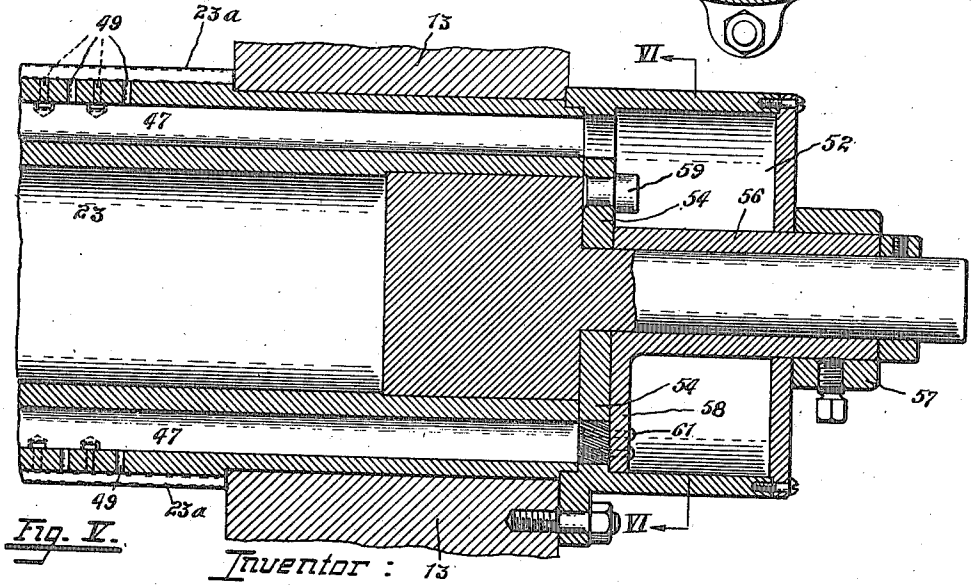


Fig. V.

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7 SHEETS—SHEET 6.

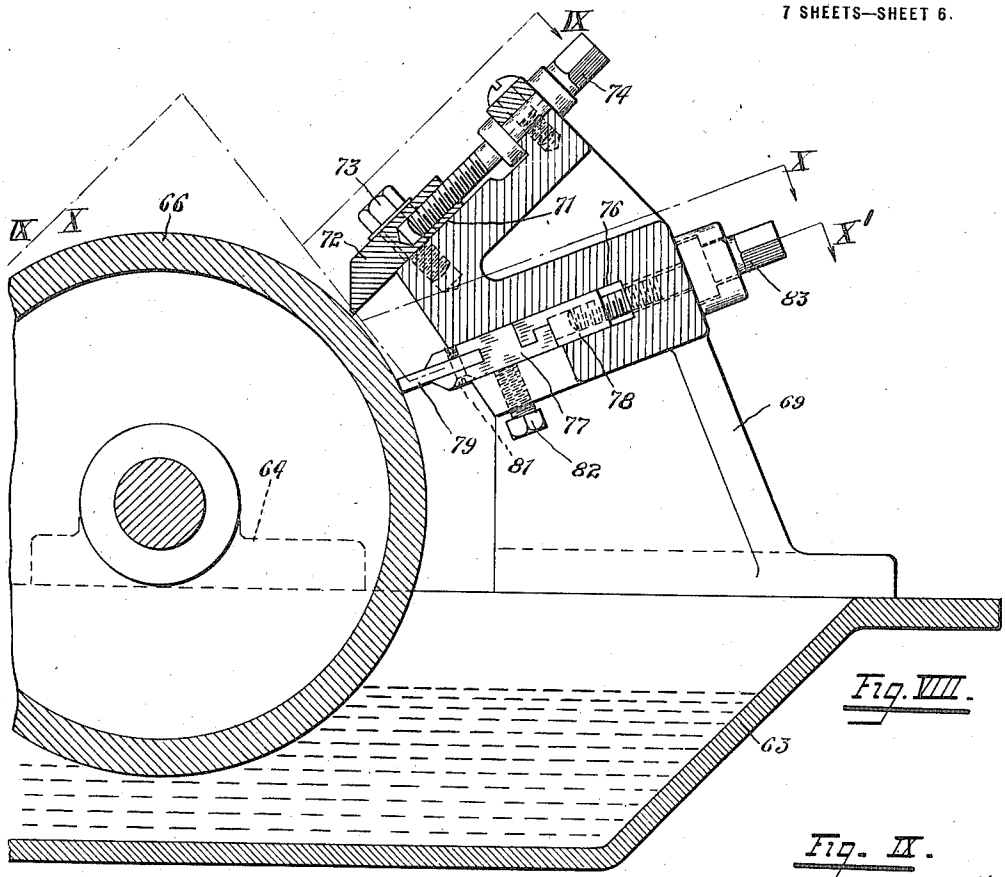


Fig. VIII.

Fig. IX.

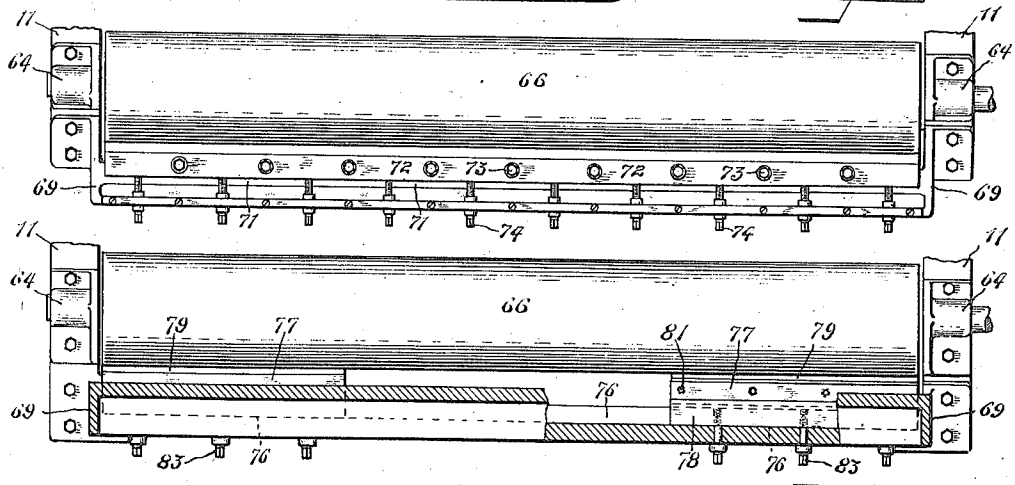


Fig. X.

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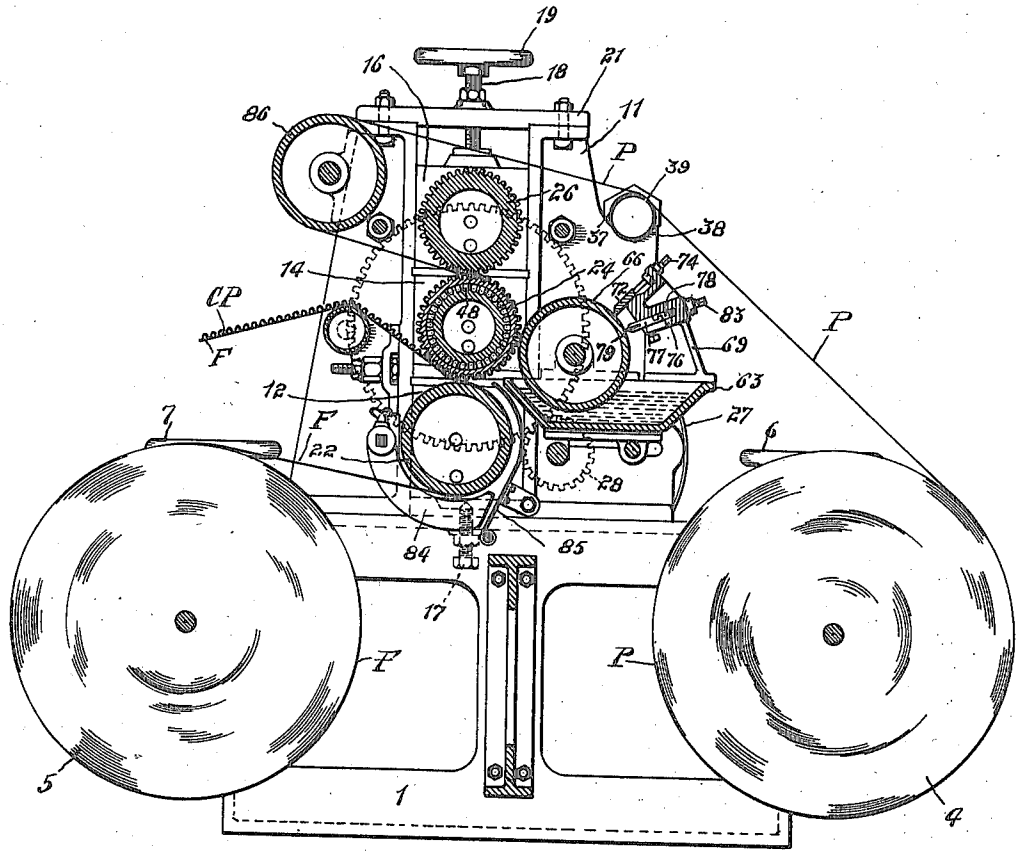


Fig. XII.

Inventor:
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by his atty.

UNITED STATES PATENT OFFICE.

JOHN N. HAHN, OF CLEVELAND, OHIO.

CORRUGATED-PAPER-MAKING MACHINE.

1,264,506. Specification of Letters Patent. Patented Apr. 30, 1918.

Application filed August 2, 1915. Serial No. 43,071.

To all whom it may concern:

Be it known that I, JOHN N. HAHN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Corrugated-Paper-Making Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

This invention pertains to corrugated paper making machines and more particularly to a number of specific improvements any of which may or may not coöperate with any other.

It has been discovered in connection with the art of making corrugated paper that the sheet will stretch just after the stiffening conformation has been imparted thereto unless it is prevented from doing so. When the corrugated sheet is not so hindered it tends to flatten out with the undesirable result that there are fewer corrugations to the foot measure and that each is less stiff. Heretofore, a device in the form of an arcuate finger has been employed for the purpose of holding the freshly corrugated sheet against one or more similarly corrugated rolls adapted to convey it farther along. Such fingers have frequently proved troublesome and unsatisfactory. One of the improvements comprised by this invention is the employment of a suction force for constantly holding the heated corrugated sheet in mesh with a corrugated conveying surface from the time when the impression of its corrugations became effected until after the facing has been applied thereto, to thus insure the maintenance of the desired shape. A further object is to so control the suction force, when employed with the cylindrical rolls commonly used, as to have it effective only along such portion of the roll's surface as happens to be in contact with the sheet, and agreeably to have the suction force automatically commence and cease at the moments of delivery to and from the roll. Still another object is to limit the suction effect to the same width of conveying surface as that of the selected paper sheet.

Experience has demonstrated moreover, that irregularities in the form of gaps or edge tears manifest themselves in the case of the corrugated sheet so that when the adhesive is later applied preparatory to affixing a facing, such sticky substance became spread upon the conveyer at such points with obviously unfortunate results. Another improvement now made patent is to have the corrugations of the conveyer which carries the sheet past the gluing device somewhat shorter, that is of lesser extent of projection, though otherwise fitted to the corrugations in the paper. By adjusting the glue dabber so that it will barely contact the outermost portions of the corrugated sheet, the avoidance of an inadvertent deposit upon the conveyer may be assured.

The adjustment of the gluing device just referred to constitutes a further improvement presented by this invention. One scraper is provided for limiting the amount of glue deposit. In some cases however, corrugated sheets are narrower than the width of the conveyer or the extent of the gluing device and in such event it is desirable not to have such device functionate beyond the edges of the sheet. To accomplish this I have provided a pair of additional members which are adjustable toward each other from either side for the purpose of entirely preventing any deposit of adhesive therealong.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

Adverting to the drawings:—

Figure I is a front elevation of a machine embodying my invention and showing the paper supply removed.

Fig. II is an end elevation of the machine showing the location of the principal feature of my invention and certain other parts in running position.

Fig. III is a vertical cross section through the middle of the machine.

Fig. IV is an enlarged detail view mainly in section showing the relation of the two features of my invention.

Fig. V is an enlarged axial section of one end of one of the corrugated rolls taken on the lines of two radii which are not in line.

Fig. VI is a section on line 6—6 of Fig.

V looking in the direction of the arrows and showing the parts in ordinary running position.

Fig. VII is a view corresponding to Fig. VI, showing certain parts in an altered location to be assumed as the starting position.

Fig. VIII is an enlarged detail view partly in section of certain scraping mechanism.

Fig. IX is a view along line 9—9 of Fig. VIII.

Fig. X is a view showing one end of the mechanism of Fig. VIII sectioned on line 10—10 and the other section on line 10—10′.

Fig. XI is a vertical section (enlarged) showing how a certain peripheral area may be obstructed to the suction effect.

Fig. XII is a view corresponding to Fig. III showing a modified embodiment of my invention.

Inasmuch as the initial narration of the three distinct features of my present invention clearly indicated that no special concern was to be had with any other details of construction, the latter will be very tersely described and conceded to be old and well known to the art.

General description.

Looking first to Figs. I and II the machine will be seen to comprise any suitable type of support 1 which carries guided at opposite ends and in both front and rear a pair of brackets 2 and 3 respectively adapted to support in open bearings the spindles of a pair of paper rolls 4 and 5 respectively. Such rolls may be properly elevated and brought to a level position by means of front and rear hand wheels 6 and 7 which have a threaded connection at 8 and 9 with the movable brackets 2 and 3. Mounted upon opposite ends of the supports 1 are a pair of frames each comprising a pair of standards 11. Each of these is spaced apart and provided with opposed guideways for the reception and superpositioning of four journal boxes 12, 13, 14 and 16, all of which clearly appears in Fig. II. The adjustment of the journal boxes from below may be accomplished through the medium of two set-screws 17 and from above by means of screw threaded connections 18 which the hand wheels 19 have through the upper cross braces 21. The alined journal boxes 12, 13, 14 and 16 support the journals of a plain pressure roll 22, corrugated cooperating roll 23, corrugating roll 24 and enmeshed corrugating roll 26 respectively. Drive is had from the pulley 27 through a pinion 28 to a gear 29 on the shaft of the corrugating roll 24. The gear 29 carries a collar 31 around with it and this latter communicates power successively to a gear 32, thence to the gear 33 which is on the shaft of the corrugated roll 23, thence to the gear 34 which is on the shaft of a necessary adhesive supplying roll to be later described, and finally to the gear 36 which is on the shaft of the plain drying roll. The presence of the usual moisture supplying idler roller 37 mounted in any approved manner in bearings 38 on the upper front of the machine is here specified. This roller is shown in Figs. I and III to be supplied with perforations 39 in order to permit steam to exude therethrough to thereby soften the paper coming from the roll 4 preparatory to imparting the corrugations thereto. As is customary, the rolls 22, 23, 24 and 26 are hollow and may be supplied with steam through the pipe connections 41, 42, 43 and 44 respectively as may be seen in Figs. I and III. Likewise steam is to be conducted to and from the roller 37 through two pipes each designated as 46.

Means for preventing glue dabbing of corrugated roll.

An inspection of Fig. IV discloses corrugations 24^a upon the corrugating roll 24 of given height adapted to coact with corrugations of similar height upon the corrugating roll 26 to impart corrugations of corresponding height to the paper, hereinafter designated by the letter P. It will be noticed, moreover, that the corrugations 23^a which are fashioned upon the periphery of the corrugated roll 23 are of lesser height so that when the corrugated paper is transferred from the roll 24 to the roll 23 its outermost projecting portions are necessarily spaced some distance beyond the outermost portions of all corrugations which happen to be inclosed thereby. Manifestly, therefore, a glue dabbing device nicely adjusted to barely contact such outermost portions of a passing corrugated sheet will fail of contact with the corrugations 23^a in the event of gaps or tears in the paper likely to expose them. In this manner the very objectionable likelihood heretofore encountered of having the adhesive substance deposited upon a corrugated roll is avoided in a simple, feasible and economical fashion.

Suction appliances.

According to the preferred selection illustrated in Fig. III the corrugated roll 23 and corrugating roll 24 are fashioned circumferentially with longitudinally extending cavities 47 and 48 respectively which are of an arbitrary width so as to correspond substantially with the near limits of any two corrugations having a single third corrugation therebetween as is well seen in Fig. IV. Each of the cavities communicate outwardly with three of the depressions between the corrugations through three ducts 49 and 51 respectively. These cavities serve as manifolds as will presently appear. Every third

one of the ducts 49 and 51 must have its inner end undercut in a lateral direction in order to communicate with a given cavity. It is obviously preferable to have all of the grooves in the periphery of both of the rollers 23 and 24 in communication with the suction cavities 47 and 48 though it should be understood that the manner in which such communication can be structurally accomplished may be varied according to the width or shape of the cavities. The near ends of the rolls 23 and 24 as viewed in Fig. II are provided with annular hollow extended compartments or hoods 52 and 53 respectively which are adapted to have communication with any of the cavities 47 or 48 as the case may be. Leading from the hoods 52 and 53 are a pair of pipes 52ª and 53ª each of which is connected with a suction fan not shown. As a matter of simplicity, in view of the fact that the interior constructions of the hoods 52 and 53 are identical though reversed, only the one which is applied to the cylinder 23 will be described. Directing attention, therefore, to Figs. V, VI and VII it is apparent from an inspection of the former that the hood 52 forms an air tight fit with the cylinder 23 and the bearings of its journal box 12. Substantially one-half of the cavities 47 are constantly closed by a stationary member 54, the disposition of which is purposely such as to always preclude any suction effect over that portion of the periphery of the roll which does not happen to be conveying a sheet of corrugated paper or, in other words, happen to be enabled to be temporarily covered by a corrugated sheet during transit. A glance at either Figs. VI or VII shows that the member 54 is so arranged as to preclude the communication of a suction effect through those cavities 47 which are disposed to the left while looking in the direction determined by Figs. III, VI and VII. It may be noticed, moreover, that the corrugated roll 23 is mounted and employed to convey the corrugated sheet only during that arcuate extent which is complementary to that between the nearly diametrically opposite radial edges of the member 54. This specific limited engagement of the corrugated sheet C P with the roll over which it passes is apparent in Figs. III and IV. During the approach toward the roll 23 on the part of the advanced edge of the freshly corrugated sheet it is desirable to still further limit and therefore intensify the suction effect to those few series of longitudinally alined ducts 49 which open through the corrugated periphery nearest the point of reception of the approaching sheet. To this end I have provided means in the nature of a movable shutter adapted to coöperate with the member 54 whereby to increase or diminish within given limits the peripheral area of the roll 23 over which the suction is effected. By observing Fig. V a sleeve is seen to project into the hood 52 and to carry outwardly thereof a manipulating lever 57. The inner end of the sleeve 56 is fashioned as a semi-circular flange 58 which has a sliding engagement with the member 54 such that any movement imparted to the lever 57 tends to rotate the flange 58 and cause it to increase or decrease the number of cavities 47 which are exposed to the suction draft. In order to determine in precise degree the movement of the flange or shutter 58 toward closing of additional cavities a stop 59 is provided. Located as appears in Figs. V, VI and VII this stop is engaged by the shutter 58 when the lever 57 has been swung upwardly to close all the cavities 47 except three, and as was previously stated those three over which the approaching corrugated sheet must first pass. Secured to the forward edge of the shutter 58 by means of rivets is a block 61. This block is disposed the same distance from the axis and is of slightly greater width than the cavities 47 and furthermore of a thickness corresponding to that of the member 54. The purpose of the block 61 is to prevent a suction current issuing through the annular space which is opposite those cavities 47 which it is desired at the time of starting to have temporarily closed as seen in Fig. VII.

The paper stock which is being operated upon is frequently of less width than the corrugated rolls. In order to furnish a specific illustration, when such a narrow sheet is passing over, say the roll 23, it of course fails to entirely cover the same and in consequence leaves a certain number of the ducts 49 exposed or open to thereby neutralize in large part the effectiveness of the suction force. To overcome the difficulty thus presented, I have chosen for disclosure in this application what is perhaps the simplest and most economical mode of independently stopping-up such of the ducts 49 as are to remain uncovered during some particular job and this regardless of any variation in the number thereof. It should be understood that any adjustable means for variously restricting the number of ducts through which the suction force is effective may be adopted. A scrutiny of Fig. XI discloses those ducts 49 which pass through that peripheral area of the roll 23 that is laterally beyond the side edges of the sheet C P to be closed by small plugs 62 fitted therein. Upon the completion of the job which determined the number of ducts at either one or both ends which it was required to have had closed, the plugs 62 are merely tapped down into the bottom of the ducts until they become sufficiently loosened to permit the suction to draw them out through the cavities 47 and thus reëstablish communication

through all the ducts and cavities preparatory to setting up for the next succeeding job.

Scraping mechanism.

Mounted across the front of the machine about opposite the corrugated roll 24, or that roll which is provided with the shorter teeth, is a pan 63 for containing the adhesive substance such as glue. Figs. VII, IX and X are to be studied in connection with this paragraph. The pan 63 supports bearings 64 for the reception of the shaft of a dabbing roller 66. The adjustment of the pan 63 toward or away from the roll may be accomplished by a lever 67 in eccentric connection therewith at 68. This lever is shown in Fig. I and in Fig. II. It is manifest that the movement of the pan 63 may carry the dabbing roller 66 in such proximity to the crowns of the passing corrugated sheet as practice may dictate to be best. It has long been recognized that the manner of controlling the supply of glue to be carried around by the roller 66 is of importance. Various ways have been devised, though to my knowledge none with that assurance against waste which my arrangement affords. As was earlier mentioned, paper stock is often supplied to machines of this character which is of lesser width than the width of the roll. Accordingly it is not only wasteful but more likely to be troublesome if the glue dabbing roller is capable of functionating across its entire width, that is, supplied with glue entirely therealong. With this in mind I have contrived a pair of auxiliary scrapers for engagement with opposite ends of the roller 66 and made them adjustable relative to each other as well as toward the roller. In this manner the space therebetween may be made to equal the width of the paper stock which is being corrugated. The pan 63 furthermore carries a support 69 having a surface 71 sloping toward the roller 66. A regulatory scraper 72 is adjustably mounted and adapted to be fixed upon the surface 71 by means of a cap screw 73 passing through a slot therein, and having a screw threaded connection with the support 69. Upon loosening the screw 73 the adjustment of the scraper 72 may be effected by means of the member 74 which is in transverse threaded connection therewith, as clearly appears in Fig. VIII. Further consideration of this same figure reveals that the support 69 is provided below the location of the scraper 72 and at each end with diagonally extending slots 76 in which are located for sliding movement two pairs of interlocked members 77 and 78. The interlocking relationship of the members 77 and 78 is so contrived that the members 77 may be additionally slid crosswise in a direction toward or away from each other. A rubber scraper 79 is removably secured to each of the members 77 by means of cap screws 81. The fixing of the members 77 within the slots 76 is accomplished by means of the screws 82 and the concerted movement of the members 77 and 78 toward the rollers 66 after the screws 82 have been loosened is effected by means of the members 83 which pass through the support 69 and are in screw threaded connection with the members 78. It is to be understood that the scrapers 79 serve to entirely remove the glue from so much of the surface of the roller 66 as they have been adjusted to yieldingly engage. The scraper 72 on the other hand is merely to restrict between the limits set by the scrapers 79 the amount of glue which is to pass upwardly beyond to reach the crowns of the corrugated sheet.

Operation.

When the machine has been started and the web of plain paper P which is to be corrugated has been conducted over the moisture supplying roller 37 and inserted between the corrugating rolls 24 and 26 the latter will continue to draw it around through its prescribed course of travel. After the paper has had the corrugations imparted to it by reason of the meshing of the corrugations on the rolls 24 and 26 it is important that such corrugated formation be absolutely maintained as imparted in order to prevent the stretching before the paper again becomes dry. In the meantime, as the freshly corrugated sheet begins to emerge to the rear of the point of coaction of the rolls 24 and 26 the suction effect is immediately concentrated at that point in order not to permit the sheet to spring away from the corrugating roll 24. Thereafter as the sheet continues downwardly around the left side of the corrugating roll 24 the operator gradually moves the lever 53^b downwardly until the entire left side of the roll 24 is exposed to the suction effect. In this wise the corrugated sheet is constantly held in mesh until it reaches the point of transfer to the corrugated roll 23 when the same operation is repeated, namely, the gradual downward movement of the lever 57 in order eventually to expose the entire right side of the corrugated roll 23 and thus continue to hold the corrugated sheet in mesh and therefore continue to maintain its shape. During the course of travel of the paper over the roll 23 which has the smaller teeth the outermost portion of the corrugated paper are dabbed with glue from the surface of the roller 66. By this means the web of facing paper F will have been conducted between the end guides 84, around the under side of the pressure roll 22, thence between it and the pressure fingers 85 to meet the oncoming corrugated sheet C P. This it does while it is still positively held in mesh and just prior

to being released on passing the point at which the alined series of ducts 49 of any particular groove move behind the member 54 and shutter 58. Such is the position in which they are seen in Fig. VI. In other words, the web of paper P, after having become corrugated, has been continuously held in mesh until the facing web F became pressed against the glued surface thereof, to thereafter of itself permanently hold such corrugations to the desired shape and of the desired stiffness.

The modification which Fig. XII illustrates consists merely in the omission of the corrugated roll 23. In such event the two different webs of paper must necessarily approach the machine differently and therefore an additional guide roller 86 is seen along the upper rear side of the machine around which the web of paper which is to become corrugated is additionally passed prior to being drawn between the corrugating rolls. This manner of practising that feature of my invention which has recourse to a suction appliance precludes the possibility of employing corrugations of less height upon that roll against which the glue roller 66 functionates.

I claim:

1. A corrugated paper making machine comprising a corrugated roll upon which a corrugated paper sheet of lesser width is adapted to travel, a glue pan of corresponding width as said roll, a dabbing roller intersecting said pan, extending across the width of the roll and adapted to just dab the outermost projecting surfaces of said corrugated paper sheet outside and above the confines of said pan, a pair of scrapers firmly engaging opposite ends of said dabbing roller and adapted to preclude the functioning of the same beyond each side edge of the passing corrugated sheet, means for adjusting said scrapers toward said dabbing roller, and means for adjusting said scrapers toward each other.

2. A corrugated paper making machine comprising a pair of opposed rolls having corrugated peripheries between which a paper sheet is adapted to be impressed, a third roll provided with a periphery fashioned with corrugations of lesser projection than the corrugated paper sheet adapted to be conveyed upon the same, a gluing device extending across the width of the passing sheet on said third roll and adapted to just dab the outermost projecting surfaces of said sheet, and a plurality of means for variously controlling the supply of glue at different points along said device, one such means being adapted to limit the supply of glue deposited by said device, another of such means being adapted to wholly obstruct the depositing of glue beyond one end of the sheet.

3. A corrugated paper making machine comprising a hollow corrugated roll upon which a corrugated paper sheet is adapted to travel, the periphery of said roll being provided with parallel series of longitudinally alined apertures in communication with the interior, and suction means in communication with said apertures.

4. A corrugated paper making machine comprising a corrugated roll upon which a corrugated paper sheet is adapted to be carried, an interior portion of said roll being hollow and in communication through the periphery of said roll in longitudinally extending rows alternately arranged around the periphery with respect to peripheral portions equally spaced from the axis of the roll, and suction means operatively connected with such hollow interior.

5. A corrugated paper making machine comprising a corrugated roll upon which a corrugated paper sheet is adapted to be carried, an interior portion of said roll being hollow and its exterior fashioned with ducts in communication therewith and opening through the periphery thereof between adjacent pairs of corrugations, and suction means operatively connected with such hollow interior.

6. A corrugated paper making machine comprising a cylindrical roll having a corrugated periphery upon which a corrugated paper sheet is adapted to travel, interiorly located longitudinally extending cavities arranged around said mold, said roll periphery being fashioned with series of ducts in communication with said cavities respectively and opening through such peripheral surface, and a suction draft tube in connection with said cavities.

7. A corrugated paper making machine comprising a pair of conveyers with which opposite sides of a sheet of paper are adapted to engage, suction means for maintaining such engagement and means for limiting the suction effect to the covered portions of said conveyers.

8. A corrugated paper making machine comprising a corrugated roll, means for rotating the same and adapted to draw a paper sheet thereover, a suction agency operatively connected with said roll to hold such sheet in mesh therewith, and means for arresting the suction effect over changing cylindrical areas depending upon the point where the sheet is being delivered to or from the roll.

9. A corrugated paper making machine comprising a conveyer and adapted to carry a paper sheet, a suction agency operatively connected with said conveyer to hold such sheet in position thereon, and means for arresting the suction effect periodically over various areas.

10. A corrugated paper making machine

comprising a pair of corrugated rolls, means for rotating the same in opposite directions, and suction means for continuously holding opposite sides of a given portion of an endless corrugated sheet in mesh successively with oppositely disposed sides of said rolls respectively.

11. A corrugated paper making machine comprising a corrugated conveyer adapted to convey a corrugated sheet, and suction means operatively connected below the surface of said conveyer and adapted to hold the elevations and depressions of such sheet firmly in mesh with the depressions and elevations of said conveyer respectively.

12. A corrugated paper making machine comprising a corrugated roll upon which a corrugated sheet is adapted to be carried, the periphery of said roll being fashioned with ducts arranged therearound, a suction agency adapted to communicate with such ducts, and automatically operating means for breaking such communication at predetermined intervals with different of said ducts.

13. A corrugated paper making machine comprising a rotatable roll upon which a paper sheet is adapted to travel, a suction device operatively connected through the periphery of said roll to hold the sheet in position thereon, and means for automatically restricting the suction effect within predetermined limits upon said periphery.

14. A corrugated paper making machine comprising a conveyer upon which a paper sheet is adapted to travel, a suction contrivance for creating a suction effect through the surface thereof, and means for restricting the extent of application of said suction effect in the direction of movement.

15. A corrugated paper making machine comprising a conveyer upon which a paper sheet is adapted to travel, a suction contrivance for creating a suction effect through the surface thereof, and adjustable means for obstructing a predetermined extent of such surface from the application of said suction effect.

16. A corrugated paper making machine comprising a hollow roll over a portion of which a paper sheet is adapted to travel, the peripheral surface of said roll having apertures in communication with the interior, the ends of said roll being closed, suction means in communication with said roll, and a device interposed between said apertures and suction means, adapted to cut the suction effect from the exposed surface of said roll.

17. A corrugated paper making machine comprising a corrugated roll of given width along which a corrugated paper sheet of lesser width is adapted to be carried, a gluing roller extending along said roll and adapted to barely dab across the passing eminences of the corrugated sheet in mesh therewith, a pair of yielding scrapers spaced apart at opposite ends of said roll and adapted to so engage said roller as to preclude the transfer of glue therefrom, means for adjusting said scrapers toward and away from said gluing roller, and means for adjusting said scrapers toward and away from each other, whereby they may be spaced apart a distance corresponding to the width of a given paper sheet.

18. A corrugated paper making machine comprising a hollow corrugated roll of given width upon which a corrugated paper sheet of lesser width is adapted to travel, said roll being provided with peripheral ducts, and a plurality of plugs for stopping up a corresponding number of said ducts at one end of such roll and beyond the side edge of the passing sheet, said plugs being adapted to be driven into and withdrawn through the hollow interior of the roll.

19. A corrugated paper making machine comprising a conveyer upon which a paper sheet is adapted to travel, said conveyer having openings, a suction contrivance for creating a suction effect through the surface thereof, and means for obstructing the suction effect through different series of said openings over predetermined areas of said conveyer.

20. A corrugated paper making machine comprising a hollow roll having peripheral apertures and adapted to carry a paper sheet, a hood at one end of said roll in communication with said apertures, a suction device operatively connected with said hood, and a shutter for arresting the suction effect over various peripheral areas.

21. A corrugated paper making machine comprising a corrugated roll having separate internal cavities and a plurality of peripheral apertures in communication with each of said cavities, a hood at one end in communication with said cavities such that the latter serve as manifolds, a suction device operatively connected with said hood, and an adjustable shutter for restricting the suction effect to a given number of said cavities whereby to restrict the suction effect to a predetermined peripheral surface of the roll.

Signed by me, this 28th day of July, 1915.

JOHN N. HAHN.