

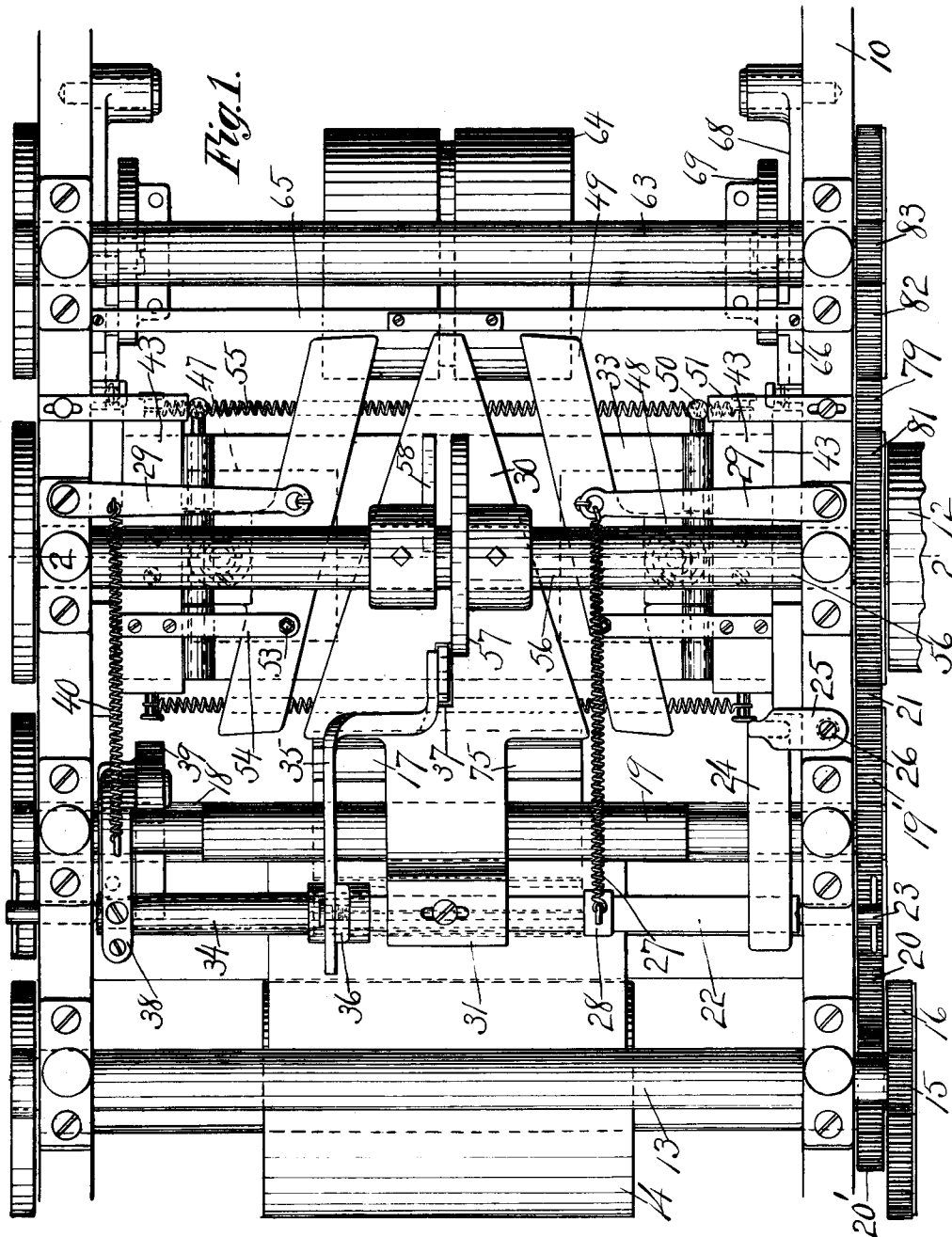
H. B. COOLEY.
TUBING MACHINE.

APPLICATION FILED APR. 8, 1910.

Patented Aug. 6, 1912.

4 SHEETS—SHEET 1.

1,034,879.



Witnesses:

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Henry B. Cooley,
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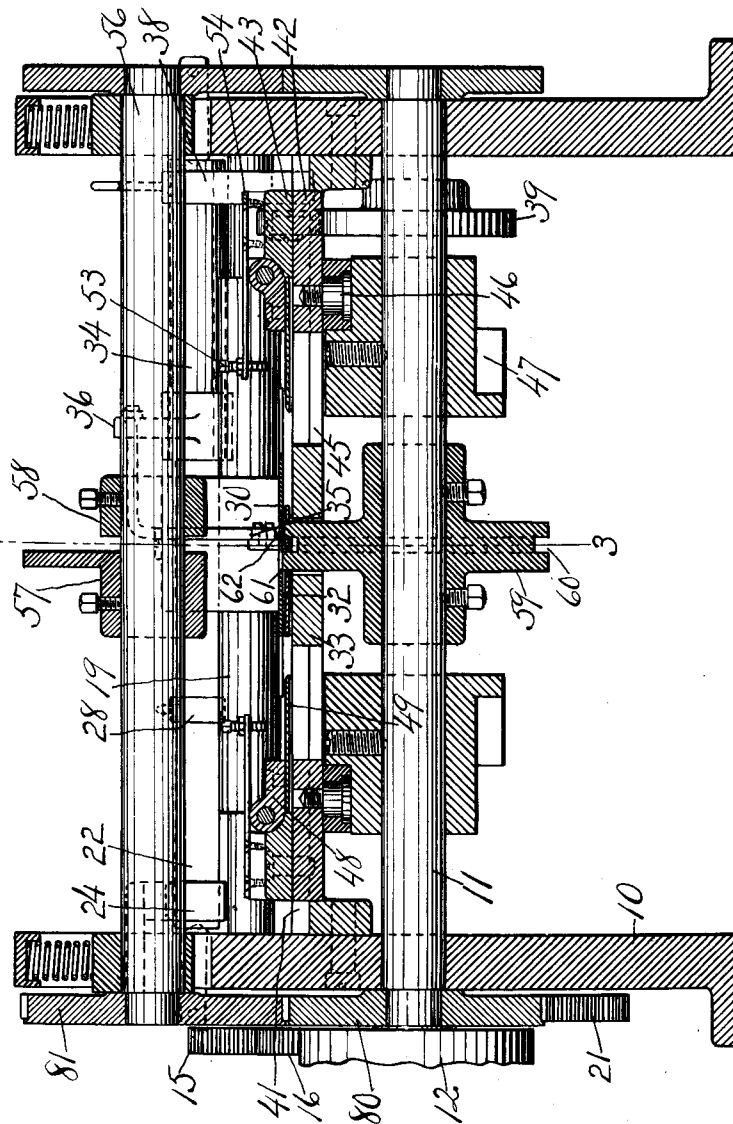
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4 SHEETS—SHEET 2.

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Fig. 2.



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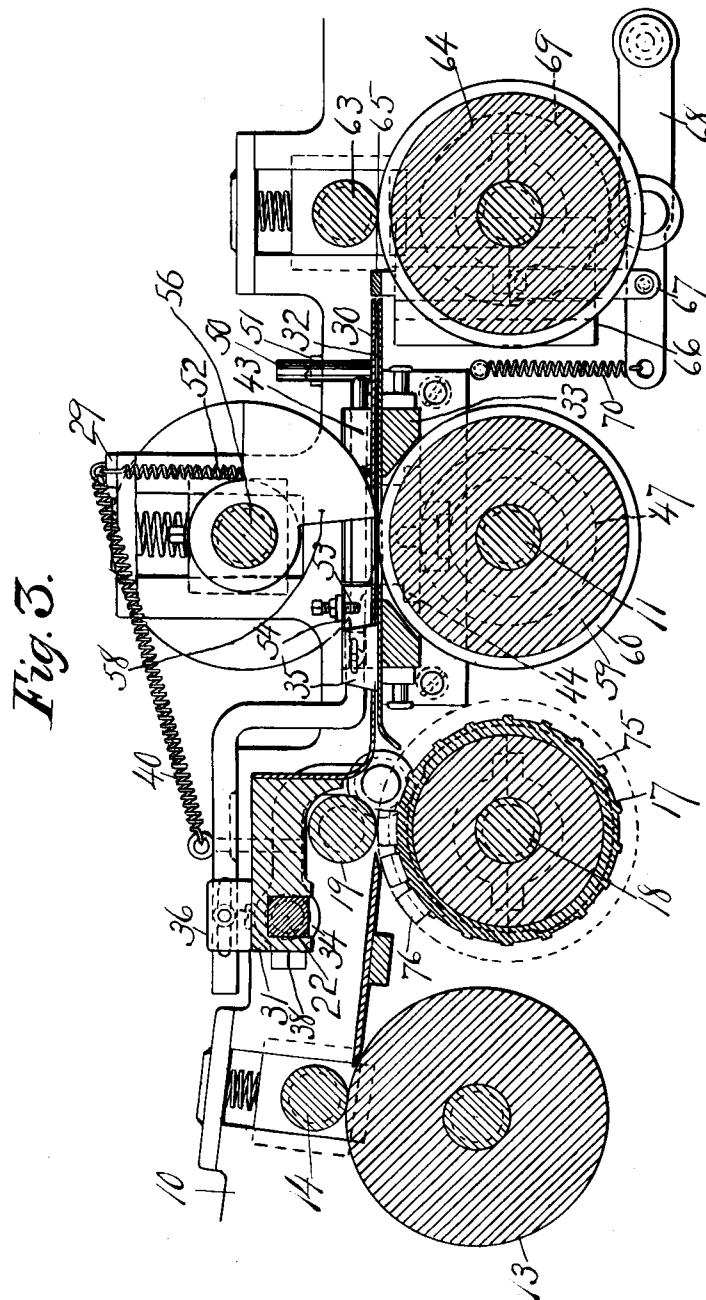
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

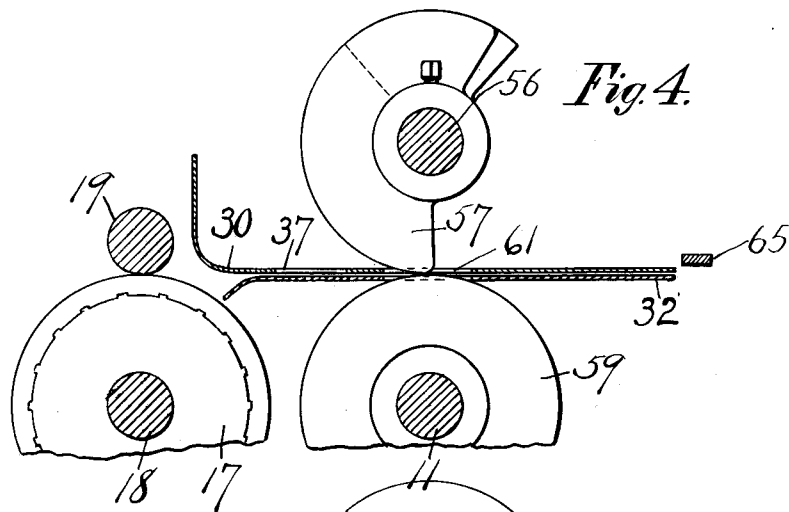


Fig. 4.

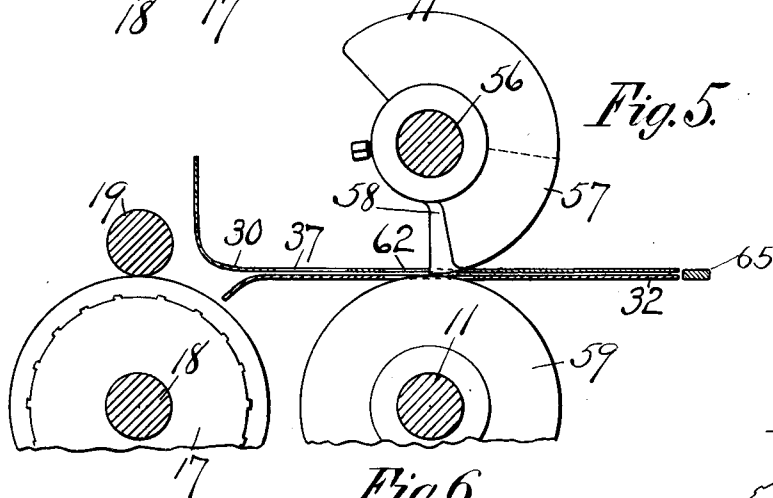


Fig. 5.

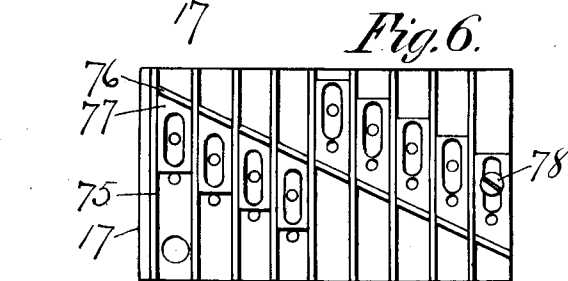


Fig. 6.

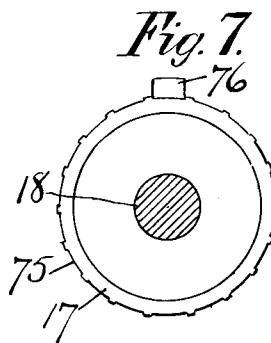


Fig. 7.

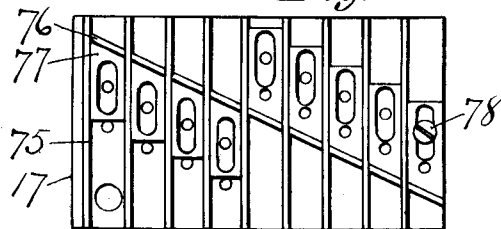
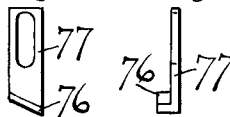


Fig. 8. Fig. 9.

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UNITED STATES PATENT OFFICE.

HENRY B. COOLEY, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE AMERICAN PAPER GOODS COMPANY, OF MONTCLAIR, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TUBING-MACHINE.

1,034,879.

Specification of Letters Patent.

Patented Aug. 6, 1912.

Application filed April 8, 1910. Serial No. 554,099.

To all whom it may concern:

Be it known that I, HENRY B. COOLEY, a citizen of the United States, and a resident of New Britain, in the county of Hartford and State of Connecticut, have invented a new and Improved Tubing-Machine, of which the following is a specification.

My invention relates to the class of machines more especially designed for folding paper or the like into various shapes and for securing its edges or other parts to produce tubes and similar devices, and the object of the invention is generally to provide a machine of this class having numerous novel features of advantage and utility.

A machine embodying the invention in one of its forms is shown in the accompanying drawings, in which—

Figure 1 is a plan view of a portion of a tubing machine embodying my invention, with parts in the relative positions assumed just at the time a sheet has reached its place to be folded. Fig. 2 is a view in cross-section through the machine on a plane denoted by the dotted line 2—2 of Fig. 1, parts beyond being omitted. Fig. 3 is a detail view in lengthwise section through the machine on a plane denoted by the dotted line 3—3 of Fig. 2. Fig. 4 is a diagrammatic view illustrating the adjustable feature of the feed wheels, one wheel being shown as having just reached a position to engage a sheet. Fig. 5 is a like view, but showing the other wheel as just leaving the sheet. Fig. 6 is a detail view showing the construction of the gummer cylinder, a part of which is shown developed on a flat plane. Fig. 7 is a detail end view of the gummer cylinder. Figs. 8 and 9 are detail views illustrating the construction of the gummers.

In the accompanying drawings the numeral 10 denotes the frame of the machine composed of any suitable material and of any desired shape, in the embodiment herein shown this including members forming the sides of the machine and suitably spaced apart to receive the mechanism therebetween, which sides may be joined and rigidly secured together by any suitable means. These sides are formed to receive boxes or bearings for shafts, feed rolls, etc. which are driven in any suitable manner, in the con-

struction herein shown the several rolls and shafts being driven one from another by means of intermeshing pinions and gears.

The numeral 11 denotes the main shaft mounted at its ends in the sides of the frame and having at one end outside of the frame a driving pulley 12 to receive a belt, by means of which the machine may be driven.

My improvement relates especially to the mechanism for folding and for gumming the sheets and the feed devices therefor, and for this reason, only so much of the machine as embodies such mechanism is shown herein. This mechanism includes rolls, usually arranged in pairs, for causing the sheet to travel through the machine, these rolls in some instances performing other functions.

A pair of feed rolls 13—14 are suitably mounted in the side parts of the frame, the upper roll being driven as by means of a pinion 15 meshing with a gear 16 secured to the lower roll, the latter being driven through a train of intermeshing gears, hereinbefore mentioned, extending to the main shaft 11, said gears being suitably disposed and arranged to cause rotation of the several parts in proper directions and to feed the sheets at the required speed.

A gummer 17 in the form of a cylinder is mounted on a gummer shaft 18 supported in the side parts 10, a roll 19 to cooperate and in contact with the gummer being mounted in the side parts of the frame. A pinion on this roll meshes with a gummer gear 19' on the gummer shaft, said gear meshing with an intermediate gear 20 between it and the feed roll 14, said intermediate gear meshing with a pinion 20' on said feed roll shaft for the purpose of driving it. The gear 19' is driven from the shaft 11 by means of an intermediate gear 21.

A former bar 22 is preferably removably mounted in the side parts of the frame, in the construction herein shown this bar being held between the ends of bar supporting studs or screws 23 mounted in the side parts and having their inner ends tapered to fit recesses in the opposite ends of the bar. This bar has a permissive turning movement on the studs 23, a stop arm 24 bearing a stop plate 25 being secured to the bar, said plate overlying the frame of the machine and

having if desired a stop screw 26 by means of which the position of the bar may be adjustably determined.

A former bar spring 27 secured at one end to a former bar spring arm 28 and at the other end to a folding blade spring arm 29 extending from the side of the frame holds the stop screw 26 against the side part of the frame. A former 30 is secured to the former bar 22 in any suitable manner, as herein shown a former base 31 being adjustably secured to the bar and the former being removably secured to the base, whereby formers of different size and shape may be readily employed. This former is of a shape to determine the shape of the article to be folded in the machine, the former herein shown being tapered as seen in Fig. 1 of the drawings.

A supporting plate 32 is located directly beneath the former, in position to provide sufficient space for the sheet and to permit its free movement into and out of said space. This supporting plate is secured to a cross-bar 33 extending across the frame and secured to the side parts thereof. This plate is preferably of such shape and size that the gummed edge of the sheet will overhang and lie beyond the edge of the plate. A holder sleeve 34 is loosely mounted on the bar 22 and supports a holder 35 adjustably secured to a holder block 36 fast to the bar. This holder is so located that its free end may engage, through a holder slot 37 in the former 30, with a sheet passing along the space between the former 30 and supporting plate 32 to temporarily retain the sheet against movement while it is being operated upon by the folding mechanism. The meeting edges of the blank may be notched to provide space within which the holder will be located when the edges of the sheet are folded together and thus prevent its interfering with the folding operation. A holder cam arm 38 secured to the sleeve 34 projects into position to be operated by the holder cam 39, the end of the arm being suitably equipped for such cam operation. This cam is secured to the gummer shaft 18 and is suitably formed and timed to raise the holder sufficiently to permit passage of the sheet and then to press the sheet against the plate 32 and hold it as above described. One end of a holder spring 40 is suitably connected with the arm 38 to retain it in contact with said cam, the opposite end of the spring being secured to one of the folding blade spring arms 29, of which there are two, one secured to each side part of the frame.

The cross-bar 33 has openings 41 extending from each end in which guides 42 are located, each of these guides being secured in any suitable manner to a slide 43 resting on the upper surface of the bar, each guide

having guide flanges 44 located in undercut portions 45 forming part of the openings 41. Studs 46 are secured to each of the guides, these studs bearing rollers engaging folding blade cams 47 secured to the shaft 11. A folding blade base 48 is pivotally secured to each of the slides 43 and a folding blade 49 is secured to each of the bases 48. The working edges of these folding blades are arranged to cooperate with the former 30 to fold a sheet over its edges as the blades are forced toward each other, in the preferred manner of operating and as herein shown the folding starting at the heel or rear part of the blade and working gradually toward the front along the edge, although to all appearance in operation the entire movement is practically instantaneous. The pivot of each of the blades bears a post 50 adapted to contact with a strike 51 adjustably secured to the frame of the machine, these posts, when the slides 43 are in their rearmost positions, or farthest apart, holding the blades in their lowermost positions. Folding blade springs 52 are secured one to each blade, the upper ends of these springs being secured to the folding blade spring arms 29. These springs hold the blades in their upward positions and against stop screws 53 adjustably mounted in the stop arms 54. Springs 55 suitably secured at their ends to studs on the slides 43 draw the slides toward each other and the cams 47 force the slides apart against the tension of said springs.

A feed shaft 56 is suitably mounted in the side parts of the frame immediately over the shaft 11 and this feed shaft bears feed wheels 57—58 cooperating with a feed wheel 59 on the shaft 11. The feed wheel 59 is round, having its entire edge projecting through an opening in the cross-bar 33. In the preferred form of construction and as shown herein this wheel 59 has two edges formed by a groove 60, each edge cooperating with one of the feed wheels 57 or 58.

The feed wheels 57—58 are cut away for a portion of their peripheries, this cutaway portion being of sufficient extent to allow movement of the folding blades to fold the sheet over the former 30. The circularly formed edges of the wheels 57—58 pass through openings 61—62 in the former and these wheels are so located with respect to the wheel 59 that their peripheries close together to move a sheet along the space between the former and the supporting plate 32. The wheels 57—58 are rotatable adjustable upon the feed shaft 56, one of said wheels as 57 being adjusted in one direction so that the edge of its circularly formed peripheral portion will be in position to engage the periphery of the wheel 59 at the proper time to start outward movement of a sheet from within the space between the

former and the supporting plate, the other wheel as 58 taking hold of the sheet an instant later. This other wheel as 58, however, is adjusted in the opposite direction on the shaft so that its peripheral edge will retreat from the wheel 59 to stop feed of a sheet at the proper time into said space, the wheel 57 releasing its hold an instant earlier. From this construction it will be seen that one of the wheels is adjusted to start outward movement of a sheet from within the space at the proper time and the other to stop inward movement of a sheet into said space at the proper time, both wheels then releasing their grip upon the sheet after it has been folded, it being understood that the sheet entering the space between the former and supporting plate closely follows the sheet leaving said space, the feed wheels in a single rotation moving a sheet out of said space and a succeeding sheet into the space, the latter in position to be folded. Rolls 63—64 take the sheets from the feed wheels 57—58 and 59 and make such disposition of them as may be desired for further operation or otherwise.

A stop bar 65 is mounted at each end upon slides 66 supported for vertical movement in the side parts of the frame, these slides being connected as by links 67 with levers 68 properly equipped for reciprocation by cams 69. Springs 70 secured at one end to a stationary part of the machine and at the other end to the levers 68 hold the latter with their rolls in contact with the cams 69. The cams are so shaped that the stop bar 65 is moved opposite the space between the former 30 and supporting plate 32 at such times as the front edge of sheets approach this point, so that the sheets will be forced against the edge of the bar that forms a stop to properly position the sheets for folding. When the folding blades have folded a sheet and while still in contact therewith the bar is raised just sufficiently to allow said sheet to pass underneath it, the upper surface of the sheet sliding against the blades and bar that thus prevent the gummed edges from separating.

A portion only of the gummer or gummer cylinder is shown herein, this being sufficient for an understanding of its construction, which construction readily adapts the cylinder for work upon sheets having their edges disposed at various angles with respect to each other or even parallel one with another. This cylinder 17 has lengthwise extending grooves 75 forming narrow ribs between said grooves. Gummers 76 secured within said grooves project slightly beyond the surface of the cylinder in position to receive the gum from any suitable source. Each gummer has a base 77 adjustable lengthwise in a groove, a screw 78 projecting through a slot in the base serving to

adjustably secure the gummer in position. It will be understood that the gummers are arranged to apply the gum or adhesive along the proper part of the blank being formed.

The gum box for supplying the gummers is not described herein, as any well-known form of gum box known to those skilled in the art may be employed.

In the operation of the device, a sheet is delivered from the rolls 13—14 to the gummer 17 and its cooperating feed roll that grasp the sheet and carry it toward the folding devices. As the gummer rotates the gummers 76 come in contact with one edge of the sheet applying gum to the under side thereof. The gummer and its cooperating roll project the sheet into the space between the former 30 and supporting plate 32, the holder 35 at this time being raised.

The parts having been moved to assume the relative positions shown in Figs. 1, 2, and 3, a sheet will have been placed in proper position for folding, at which time it pauses momentarily in its travel through the machine. At this time the bar 65 is in position where it stopped advance of the sheet, and the holder 35 has been just engaged with the sheet to hold it during the folding operation, and the folding blades 49 are just ready to begin their forward or folding movement. It will be understood that all of the cams for operating these several parts are properly shaped and timed to effect the required movement of a part at the proper time. The cams for operating the folding blades are so shaped and formed that one blade completes its inward or folding movement just prior to the other, so that one edge of the sheet will be folded on top of the other edge, and the gummed surfaces thus brought together. These blades are now carried forward by the slides 43, the posts 50 retreating from the strikes 51, allowing the blades to be raised under the pull of the springs 52 until arrested by the stop screws 53. In the further movement of the slides the blades fold the edges of the sheet over the former 30, the cutaway portion of the feed wheels 57—58 permitting this operation. The blades remain in this position during a part of the succeeding movement of the sheet and for the purpose of holding the gummed edges of the blank together until acted upon by other parts of the machine serving the same purpose.

Just after the blades have brought the two edges of the sheet together the advance edge of the feed wheel 57 encounters the sheet and thereafter the wheel 58 encounters said sheet. The sheet is by this action of the feed wheels moved from the former underneath the bar 65 which has been raised to allow passage of the sheet. Closely following the folded sheet a succeeding sheet

is moved by the rolls and gummers hereinabove described into the place occupied by the folded sheet and closely following it. The advance part of the rolls 57—58 move the folded sheet out of the space and the rear part of said wheels engage the unfolded sheet and move it into position, so that as the folded sheet is moved out an unfolded sheet immediately follows it and takes its place, the rolls 63—64 continuing the movement of the folded sheet. The bar 65 is brought down into position just before the front end of the unfolded sheet reaches this point and thus stops the advance of the unfolded sheet. As the folded sheet passes out the bar 65, being raised just sufficiently to allow this movement, by contact with the sheet, presses the folded edges together and holds them in this position until they are received between the rolls 63 and 64.

As the unfolded sheet reaches its position the holder 35 is actuated to press against the sheet and hold it while being folded. The blades 49 will be drawn back during the latter part of the movement of the folded sheet from the folder. As the blades are drawn back the posts 50 encounter the strikes 51, which action lowers the blades so that the incoming or unfolded sheet passes over the top of the blades, when the operation above described will be repeated.

Should the sheet become jammed between the former and supporting plate, the spring 27 will allow the former to rise sufficiently to avoid injury by reason of such jamming or wedging action, and by unscrewing one of the studs 23 the bar 22 and former may be readily taken out of the machine and the obstruction removed.

The roll 64 is driven by means of an intermediate gear 79 meshing with the main gear 80 on the shaft 11, said gear 79 meshing with the gear 82 on the shaft of the roll 64, the latter gear meshing with the pinion 83 on the shaft of the roll 63. The feed shaft 56 is driven by means of a feed gear 81 meshing with the main gear 80.

The construction is such that extreme rapidity in the operation of the machine is secured. The sheet itself is stationary during the folding operation, it simply pausing in its movement to permit the folding to take place, which operation is performed almost instantaneously, this pause in the operation of the machine being scarcely perceptible. The entire movement of the sheet is obtained by means of rolls so that the rapidity of operation is of the highest order.

I do not limit the invention and the scope of the following claims to the foregoing illustration and description of the preferred form in which it has been embodied.

I claim:

1. A former plate supported in a fixed position and having converging edges, means

for delivering a sheet to said plate, means for stopping the travel of the sheet, means for folding the sheet about the edges of the plate with the edges of the sheet overlapping one another, and means applied to opposite sides of the folded blank for removing it from said plate.

2. A tube forming mechanism including folders and a former plate, means for operating said mechanism, a roll supported in position to make contact with a sheet to deliver it to said mechanism and to remove it therefrom, said roll being cut away to permit movement of said folders to fold the sheet about said former plate.

3. A tube forming mechanism with means for operating it, said mechanism including folders and a former plate, a roll for supplying a sheet to said mechanism and to remove it therefrom, said roll being supported to engage said sheet and being also formed in sections adjustable one with respect to the other, said sections also being formed to provide a space to permit movement of said folders to fold a sheet about said former plate.

4. A tube forming mechanism including folders and a former plate, means for operating said mechanism, a roller feed shaft, a roller consisting of sections mounted on said shaft and adjustable in opposite directions to provide a space to permit movement of said folders to fold a sheet about the former plate, said sections being supported and arranged to engage a sheet and deliver it to said mechanism, and to engage and deliver it therefrom.

5. A former plate, folders to fold a sheet about the opposite edges of said plate, and a pair of cooperating rolls arranged to deliver a sheet to said plate and to remove it therefrom, one of said rolls being positioned to engage said sheet and cut away to permit movement of said folders to fold the sheet.

6. A former plate having converging edges, folding blades located in operative positions to said plate, means for feeding a sheet to said plate and blades, means for operating the blades to fold the sheet about the edges of the plate with the edges of the sheet overlapping one another, and means applied to opposite sides of the folded blank for removing it from the plate.

7. A pair of slides, means for causing the slides to travel toward each other, means for supporting the slides, folder blades mounted on the slides, a former plate located between the blades when the latter are normally at rest, means to cause the blades to rise as they approach each other, means to check the rising movement before the blades finish their travel toward each other, and means for supplying a sheet to and removing it from said plate.

8. A pair of slides, means for moving the

slides toward each other, means for supporting the slides, a folder blade pivotally supported on each slide, means for causing the blades to rise as they approach each other, means for checking said rising movement before the blades finish their movement toward each other, a former plate located between the blades when normally at rest, and means for applying a sheet to and removing it from said former plate.

9. A former plate having an opening therein, a feed roll located below said plate, a cooperating feed roll supported above the plate, one of said rolls projecting through the plate, said rolls causing travel of a sheet to and from said plate, and one being cut away on its periphery to permit movement of the folders during the folding operation, and means for folding a sheet about the edges of said plate.

10. A supporting plate with an opening therein, a former plate having an opening therein, said plates being located to provide a space therebetween, a roll with its periphery projecting through the opening in the supporting plate, a cooperating roll with its periphery projecting through the opening in the former plate, one of said rolls being cut away for a portion of its periphery to permit movement of folding members, and means for folding a sheet about the edge of the former plate.

11. Former bar supports, a former bar mounted to turn on said supports, a former secured to said bar, means for yieldingly holding the former in its operating position, a supporting plate, means for supplying sheets between the former and said plate and for removing them therefrom, and means for folding a sheet about the edges of the former.

12. A supporting plate, a former plate located with a space between it and the supporting plate, means for supplying a sheet to said space, a holder to engage the sheet and prevent its movement, means for operating the holder, and means for folding a sheet about the edges of said plate.

13. A supporting plate, a former plate located to provide a space between it and the supporting plate, said former plate having an opening, a holder projecting through said opening to engage a sheet and press it against the supporting plate, means for feeding a sheet into said space to be engaged by the holder, means for removing the sheet from the space, and means for folding a sheet over the edges of the former plate.

14. A supporting plate, a former plate located to provide a space between it and the supporting plate, said former plate having an opening for a holder and an opening for a feed roll, a feed roll projecting through the opening in the former plate to cause the travel of a sheet in said space, said roll

being cut away in a portion of its periphery to permit pause of the sheet during folding operation, a holder projecting through the opening in the former plate to stop movement of the sheet in the space, means for operating the holder, and means for folding a sheet about the edges of the former plate.

15. A former bar mounted to turn upon its supports, a former plate secured to said bar and having an opening for a holder, a holder rotatably mounted on the former bar and projecting through said opening, means for operating the holder, means for supplying a sheet to said plate and for removing it therefrom, and means for folding a sheet about the edges of the former plate.

16. A former plate, means for supplying a sheet to the plate, a stop arranged to intercept the sheet and position it with respect to the plate, such stop being arranged to permit passage of the sheet in contact therewith, means for operating the stop, means for folding a sheet about the edges of the former plate and means for removing a sheet therefrom.

17. A former plate, a feed roll for supplying a sheet to said plate, said feed roll being cut away for a portion of its periphery to permit pause of the sheet in its travel, a stop to intercept the movement of the sheet and positively position it with respect to the former plate, means for operating the stop, means for operating the feed roll, and means for folding a sheet about the edges of said plate.

18. A former plate, folding blades supported on opposite sides of the plate, means for moving the blades toward each other, means for raising them to fold a sheet over the edges of said plate, a feed roll to supply a sheet to said plate and to remove it therefrom, said roll being cut away for a portion of its periphery to permit pause of the sheet during folding operation, a stop to positively determine the position of the sheet with respect to the former plate, and means for operating the stop.

19. A former plate having openings therein, feed rolls for supplying a sheet to said plate, one of said rolls projecting through an opening therein and being cut away to permit a pause of the sheet, means for folding a sheet about the edges of said plate, means for removing the sheet therefrom, a holder projecting through one of the openings in said plate, means for forcing the holder against the sheet, and means for withdrawing the holder from said sheet.

20. A former plate having a narrow opening therein, a narrow roll adapted to intermittently project through said opening to deliver a sheet to said plate and to remove it therefrom, means for rotating said roll, means for folding a sheet about the edge of the plate, and a second roll supported to in-

termittently engage the opposite side of the folded sheet from the first roll.

21. A former plate supported in a fixed position and having a narrow opening, a roll projecting through said opening to deliver a sheet to said plate and to remove it therefrom, said roll being cut-away to permit movement of the folders, folders movable over the edge of said plate to fold the sheet, means for operating the folders, and means for rotating said roll.

22. A former plate, a roll supported in operative position with respect to said plate; means for folding a sheet about said plate, and a roll supported in operative position with respect to said plate to feed a sheet thereto and to press against the folded portion to remove the sheet from said plate.

23. A former plate, a roll supported in operative position with respect thereto to engage the outer surface of one fold of a

folded sheet, means for folding a sheet about said plate, and a roll positioned to feed the sheet to said plate and to engage the outer surface of the other fold of said sheet in the movement of the sheet over said former plate.

24. A former plate having a narrow opening therein, a narrow roll adapted to intermittently project through said opening and positively driven to deliver a sheet to said plate and to remove it therefrom, means for folding a sheet about the edge of said plate, and a roll positively driven and positioned to intermittently engage the outer surface of the sheet opposite that engaged by the first mentioned roll.

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Witnesses:

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