Jan. 11, 1955 H. R. LYONS 2,699,098

METHOD AND APPARATUS FOR FORMING PAPER STICKS OR THE LIKE

Filed April 25, 1952

4 Sheets-Sheet 1

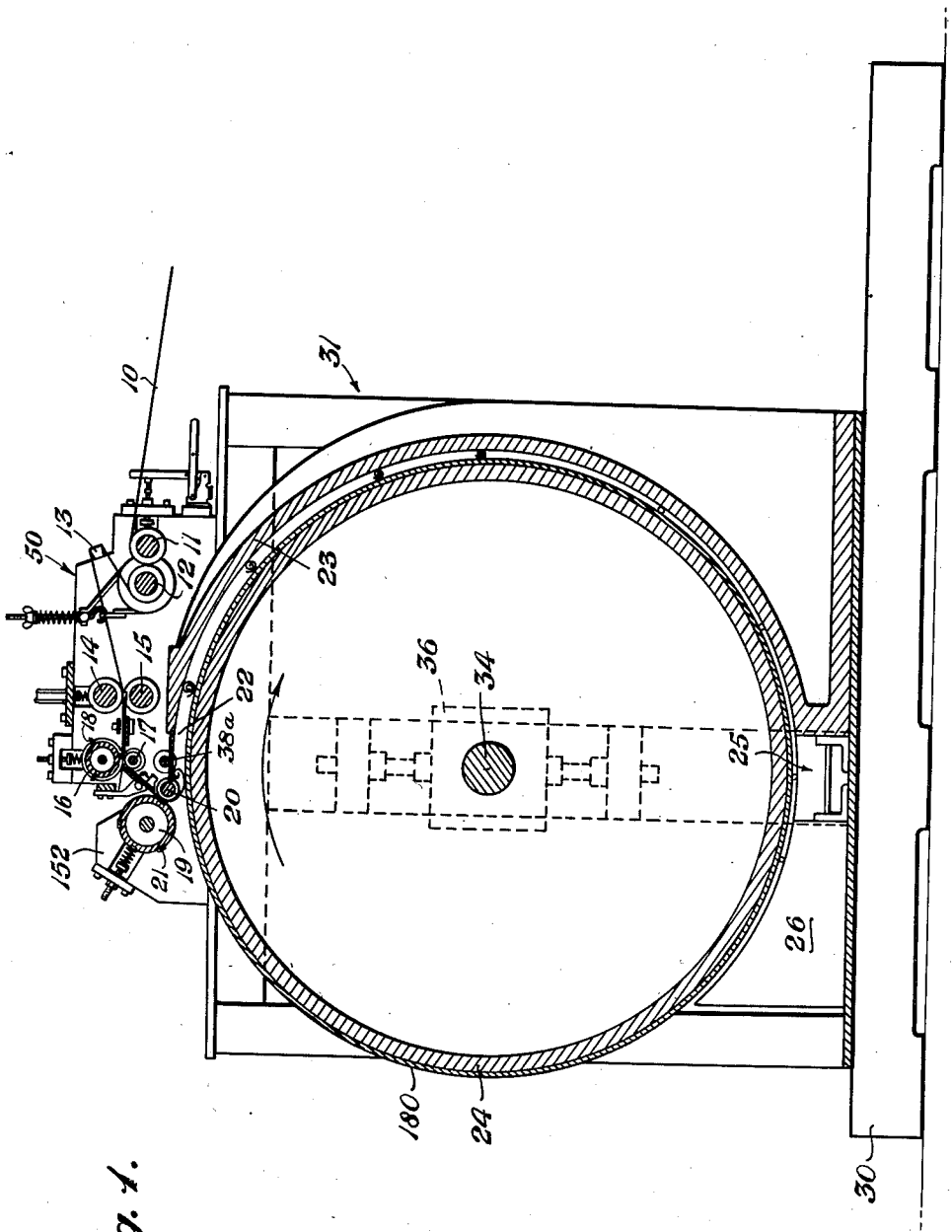


Fig. 1.

INVENTOR

Herbert R. Lyons

BY KARL W. FLOCKS

ATTORNEY

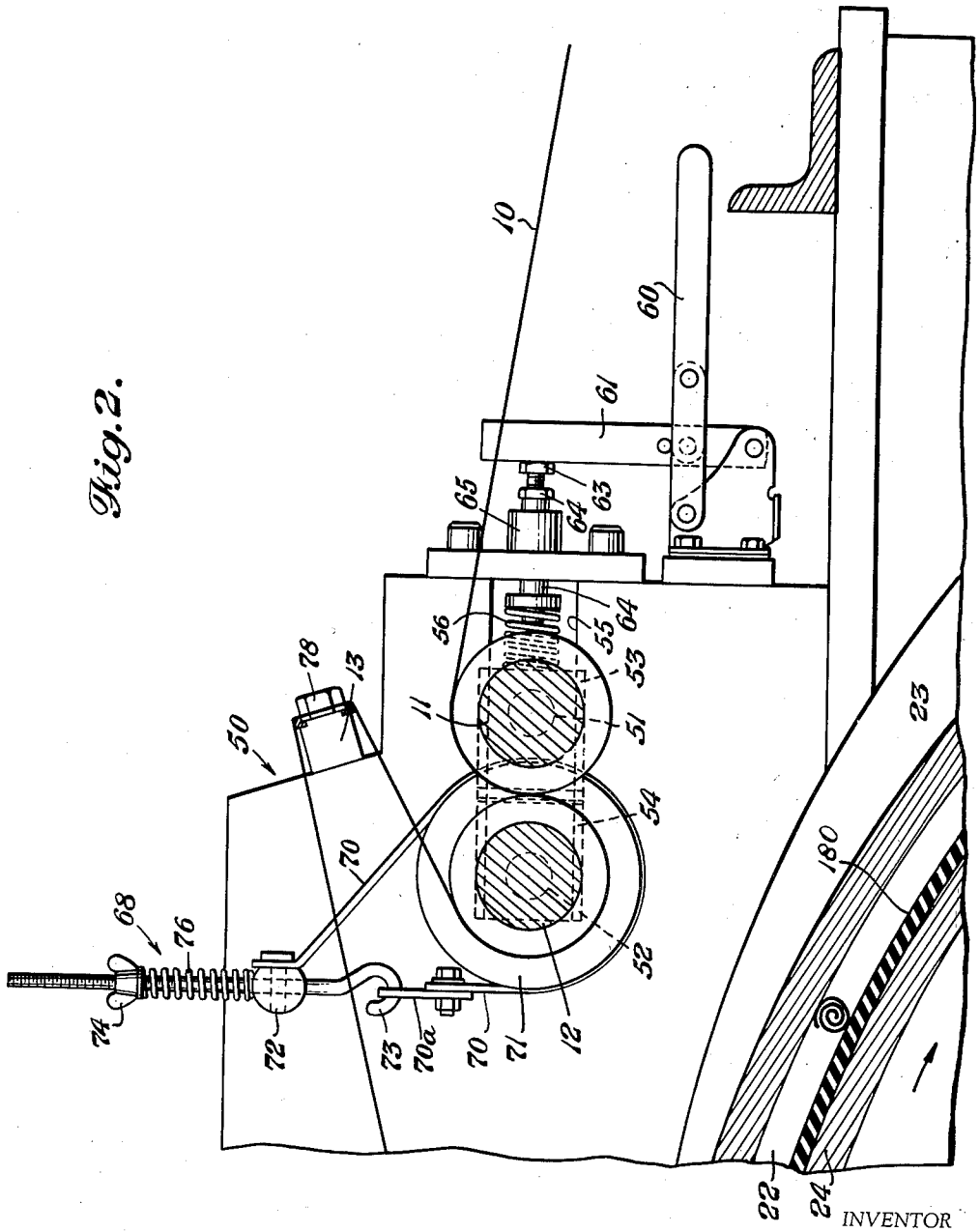
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Fig. 2.



INVENTOR
Herbert R. Lyons

BY Karl W. Flocks

ATTORNEY

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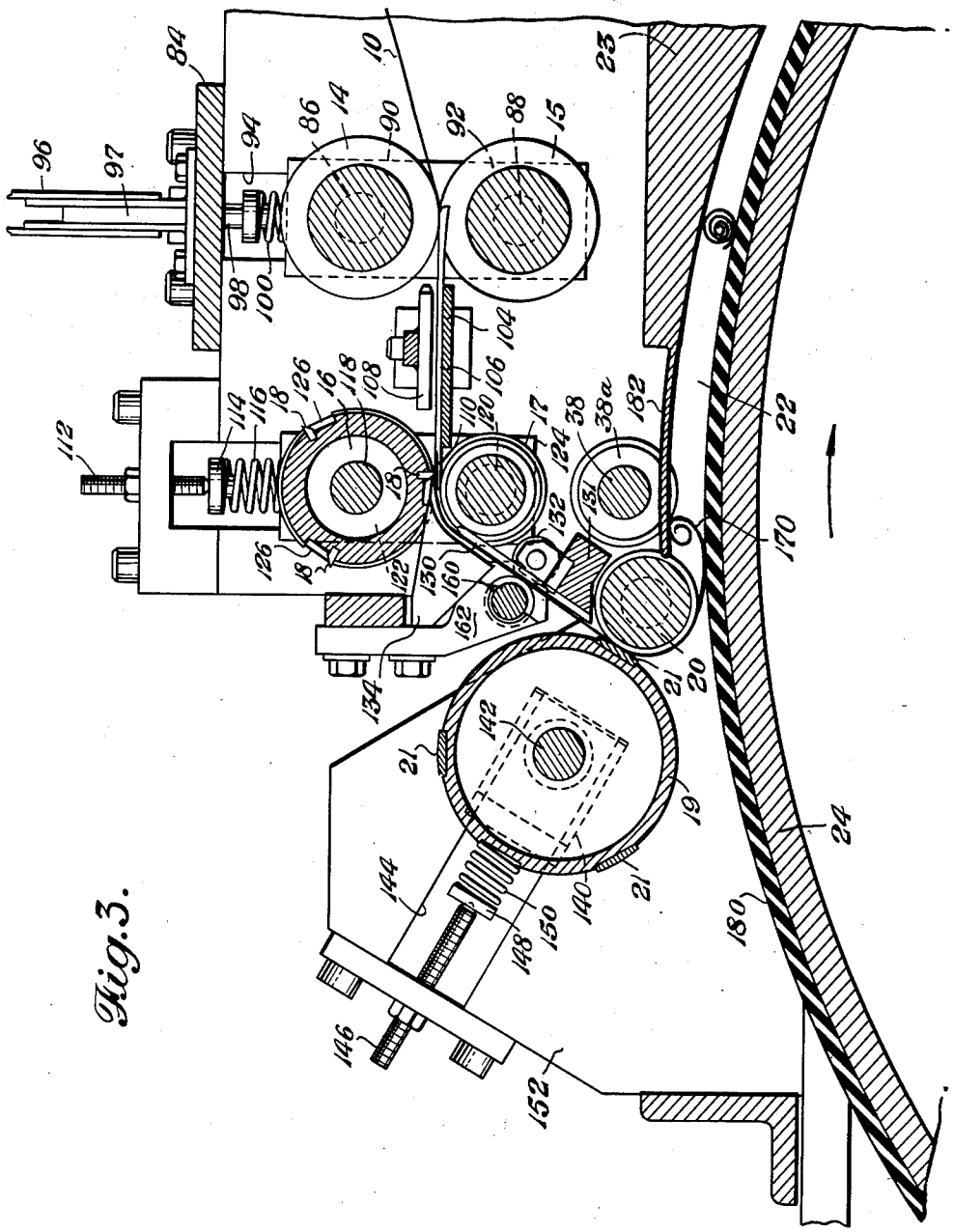


Fig. 3.

INVENTOR
Herbert R. Lyons.

BY Karl W. Flocks
ATTORNEY

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METHOD AND APPARATUS FOR FORMING PAPER STICKS OR THE LIKE

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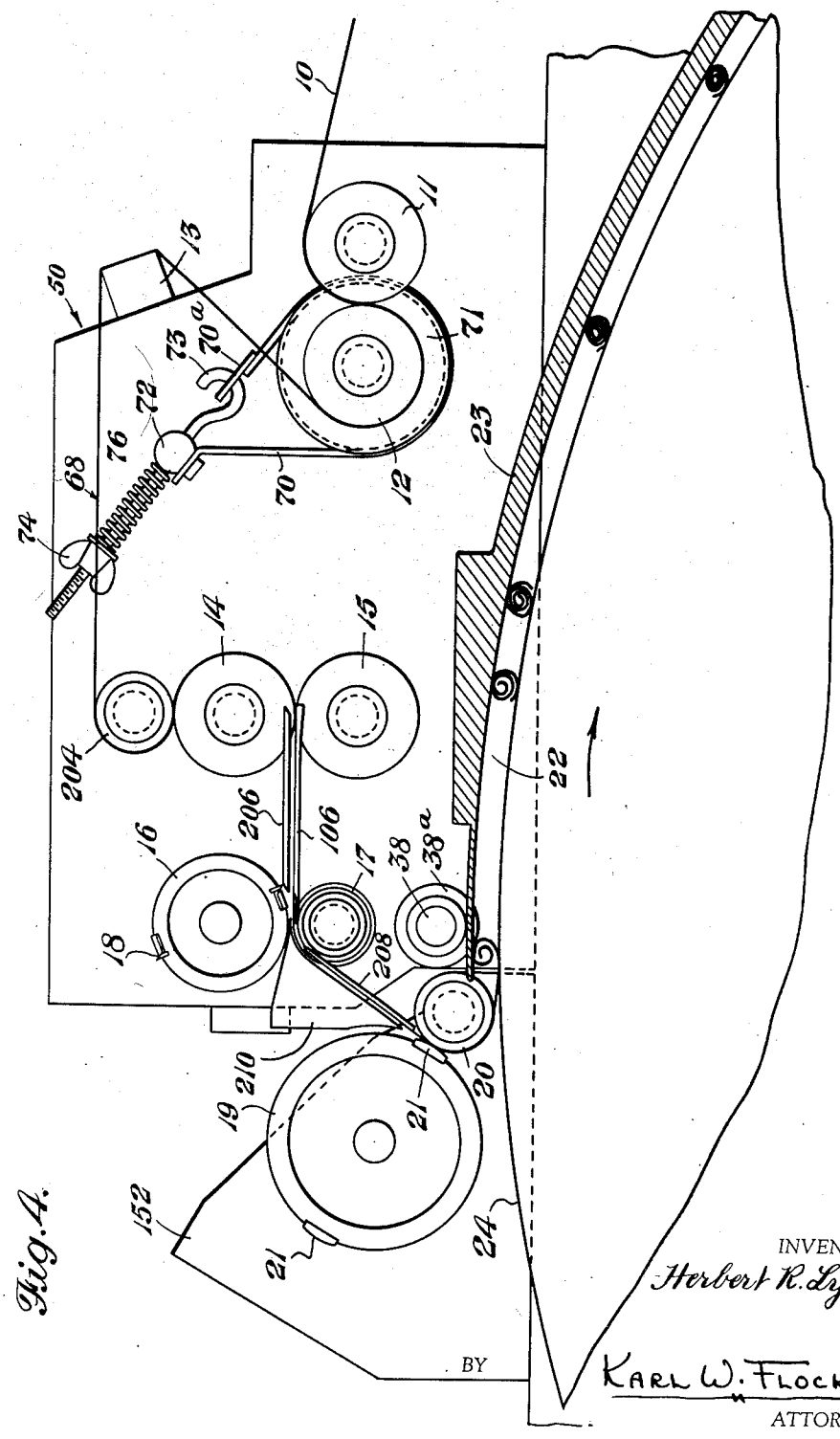


Fig. 4.

INVENTOR
Herbert R. Lyons

BY
KARL W. FLOCKS
ATTORNEY

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2,699,098

METHOD AND APPARATUS FOR FORMING PAPER STICKS OR THE LIKE

Herbert R. Lyons, Akron, Ohio, assignor to The Diamond Match Company, New York, N. Y., a corporation of Delaware

Application April 25, 1952, Serial No. 284,269

15 Claims. (Cl. 93—1)

This invention relates to the method and apparatus employed in the manufacture of paper sticks from a sheet material. More particularly, this invention relates to the method and apparatus employed in the manufacture of paper confection sticks from paper sheet material or the like, in which the paper material is tightly rolled to form a rigid body.

Prior to the instant invention, the heretofore known apparatus employed in fabricating rolled objects from paper or the like have generally been of the type which incorporated unwieldly and complicated mechanical systems, including various types of drives and controls. The method of fabricating a rolled object from paper with such apparatus was not only difficult to carry out, but also time-consuming, both of which resulted in a costly operation.

Consequently, it is one of the objects of the present invention to provide paper stick forming apparatus having a relatively simple construction and requiring no special skills to operate.

Another object of the present invention is to provide a method of manufacturing paper sticks or the like from a sheet material in which the stick forming operation is performed quickly, smoothly and efficiently.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a vertical sectional view of one form of the present invention;

Fig. 2 is an enlarged detail in section of the initial paper feeding means and the paper curling means, shown in Fig. 1;

Fig. 3 is an enlarged detail in section of the paper feed rolls, perforating means and paper break-off means shown in Fig. 1; and

Fig. 4 is a vertical sectional view of a modified form of the invention.

Referring to the drawings, and particularly Fig. 1, the operation of the stick forming apparatus to be described hereinafter, is generally illustrated.

An extended paper sheet or web **10** is advanced from a suitable paper source (not shown) to a pair of tension or idler rolls **11**, **12**, where it is fed therebetween. From the rolls **11**, **12** the paper web extends over and around the edges of a bar **13** and therefrom is fed to a pair of rubber covered driven rolls **14**, **15**. The driven rolls **14**, **15** receive the web **10** from the bar **13** and serve as the feeding means therefor, drawing the web from the idler rolls **11**, **12** over the bar **13** and advancing it to perforating rolls **16**, **17**. As the feed rolls **14**, **15** pull the paper web **10** over and around the edges of the bar **13**, the paper structure is strained in a manner such that when the web is subsequently broken into individual paper sheets, each sheet will have a curling effect. The upper perforating roll **16** has suitably inserted therein one or more knives **18**, displaced around the roll periphery and extending thereabove. As the paper web is advanced through the perforating rolls **16**, **17**, the knives **18** cause a perforation to be cut therein. The paper web is then advanced to break-off rolls **19** and **20**. The break-off rolls **19** and **20** rotate at the same peripheral speed but at a greater speed than the advancing web, thereby causing the break-off bars **21** located on the surface of the roll **19** to tear off the paper at the perforation as the web advances between the rolls **19** and **20**. The resulting single sheet of paper, which had been previously pulled

around the edges of the bar **13** and thereby internally strained, is then advanced by the roll **20** to a compacting channel **22** which is located between a stationary platen **23** and a suitably covered rotatable drum **24**. The curling paper sheet is carried by the rotating drum **24** around the compacting channel **22**, which is gradually reduced in size with respect to the platen **23** and drum **24**. As the curled sheet is rolled around the gradually reducing compacting channel **22** by the drum **24**, it is compacted into a tight and rigid stick element. A wetting means **25** located near the end of the compacting channel **22** is provided to bond the outer layer of the rolled and compacted paper stick, while an ironing plate **26**, located adjacent the wetting means **25** serves to supplement the bonding operation.

Referring now to Fig. 1, a base **30** is shown supporting the stick forming apparatus. A frame **31** positioned on the base **30** has suitably mounted therein the rotatable drum **24** and the stationary platen **23**. The drum **24** and platen **23**, which are formed with cylindrical surfaces, are disposed in eccentric relation and define therebetween the gradually reducing compacting channel **22**. The rotatable drum **24** is mounted on a stationary shaft **34** which is suitably journalled in an adjustment plate **36** shown in dotted lines in Fig. 1, the adjustment plate being adapted to adjust the eccentricity of the cylindrical surface of the rotatable drum **24** with respect to the cylindrical surface of the stationary platen **23**.

The operating rolls which feed, perforate and tear the web into the individual sheets, are disposed in a roll frame generally indicated at **50** which is mounted on the frame **31**. A drive gear **38** journalled in the frame **50** is driven by a suitable power means (not shown) and is adapted to drive the operating rolls through a series of appropriate gearing.

The stick forming operation begins by feeding the paper web **10** from a suitable paper source (not shown), to the roll frame **50** which is mounted on the frame **31**. Referring to Fig. 2, the paper web **10** extends into the roll frame **50** and is engaged by the tension or guide rolls **11** and **12**. The tension or guide rolls are geared directly together, but are not driven by any power means, functioning chiefly as guide means conducting the paper web to the bar **13**. The rolls **11** and **12** are adjacently mounted in the frame **50** and are suitably covered to aid in transferring the paper web **10** therebetween. As shown in Fig. 2, the web **10** extends over roll **11**, down between the rolls **11** and **12**, then around roll **12** and back to the bar **13**, which, in effect, reverses the normal direction of feed of the web **10**.

Trunnions **51** and **52**, formed integral with rolls **11** and **12**, respectively, are mounted in the frame **50** by journal blocks **53**, **54**, which are adapted to be suitably inserted into a journal slot **55**. The rolls **11**, **12** are maintained in their operative position against each other by a compression spring **56**, which abuts against the outside journal block **53**. The compression spring **56** is locked into position by an operating handle **60**, which is secured to the frame **50**. The handle **60** is adapted to move a lever **61** into engagement with an adjusting screw **63** which, in turn, engages an internally threaded member **64**. The member **64** extends through a bearing member **65** and is suitably secured to the compression spring **56**. It is apparent that movement of the handle **60** in the position shown in Fig. 2 will lock the journal blocks **53**, **54**, which carry the trunnions **51**, **52**, securely in place, thereby locking the rolls **11**, **12** in the frame **50**.

Before the web can be perforated, broken off to form individual sheets, and the sheets introduced into the compacting channel **22**, the web must be first extended around the edges of the bar **13**, at which point the pulling of the web around the bar **13** by the driven rolls **14**, **15** results in the outer surfaces of the web being stretched and the inner surfaces compressed, thereby causing the web fibers to be strained. It is apparent that when the strained web is cut into the individual sheets, a curling of the paper results. This curling phenomena is necessary in order that an individual paper sheet, when introduced into the compacting channel, may effectively begin the rolling and compacting operation. The bar **13** is secured to the frame **50** by bolts **78** and, as seen in

Fig. 2, is located above and to the right of guide roll 12. It is obvious then, as the web is advanced from the roll 12 and pulled around the edges of the bar 13 by the feed rolls 14, 15, the paper web fibers are strained, which effect results in the individually curled paper sheets.

In order to adjust the tension of the web 10 as it is pulled by the feed rolls 14, 15 from the guide or tension rolls 11, 12 and around the bar 13, a web tensioning means generally indicated at 68 is provided. Referring again to Fig. 2, the web tensioning means 68 is shown comprising a strap 70 fitting around a wheel element 71 secured to the trunnion 52. The strap 70 is secured at one end to a stud 72, which is attached to the roll frame 50. An eye 70*a*, secured to the other end of the strap 70, engages a hook 73 which slidably extends through the stud 72. An adjustable wing nut 74 threadedly engages the upper portion of the hook 73 and compresses a spring 76 which abuts against the stud 72. It is apparent that the correct tension for the web 10 necessary to strain the fibers of the paper as the web is pulled over the bar 13 may be arrived at by turning the wing nut 74. The effect of turning the nut 74 is to either raise or lower the hook 73 with respect to the stud 72. If the hook 73 is raised, the strap 70 will tend to tighten around the wheel 71, thereby causing the roll 12 to turn more slowly. The roll 11, which is geared directly to the gear 12, will also tend to turn more slowly, the result being a tightening effect on the feeding paper. Thus, the curling effect of the paper, when cut into individual sheets, can be controlled by the web tensioning means 68.

After the paper web has been pulled around the edges of the bar 13 by the feed rolls 14, 15, it is advanced to rolls 16, 17 for the next operation. The feed rolls 14, 15 are rubber covered to aid in transferring the paper therebetween and are driven by the drive gear 38 through suitable gearing. A plate 84 extends across the roll frame 50 and encloses the feed rolls 14, 15 within the frame 50. The feed rolls are rotatably secured to the frame 50 in a manner similar to rolls 11, 12. That is, feed roll trunnions 86, 88 are journalled in bearing blocks 90, 92, which are, in turn, slidably disposed in a slot 94. An actuating handle 96 is secured to the plate 84 and is adapted to move a lever 97 which, in turn, moves a slidable element 98 against a compression spring 100. The spring 100 abuts against the top bearing block 90 and thereby keeps the feed rolls securely locked in the frame 50.

The feed rolls 14, 15 feed the paper web to the perforating rolls 16, 17 where the paper is suitably perforated prior to introduction to the break-off rolls 19, 20. Positioned between the feed rolls 14, 15 and the perforating rolls 16, 17 and secured to the frame 50 is a guide element consisting of a plate 104 and guide fingers 106, 108. The guide finger 106 is located directly adjacent the perforating roll 16 and includes a grooved portion 110 which is positioned between similarly grooved portions formed on the lower perforating roll 17. The grooved portions defined by the guide finger 106 and the lower perforating roll 17 are disposed in a manner to receive the perforating knives 18 of the upper perforating roll 16 and thereby aid in the perforating operation. The perforating rolls 16, 17 are driven by the roll drive gear 38 through suitable gearing and are mounted on the frame 50 in a manner similar to rolls 11, 12 and 14, 15. A threaded element 112, bearing on a spring plate 114, compresses a spring 116 which securely locks perforating roll shaft 118 and guide roll shaft 120 in journal blocks 122, 124.

The upper perforating roll 16 has disposed therearound one or more perforating knives 18 which are locked in place by elements 126. The knives 18 are equidistanced from each other around the surface of roll 16, and thereby will perforate the advancing paper web in such a manner that the distance between each perforation will be the same. This insures equal paper sheets after the break-off stage and eventually equal-sized paper sticks. As the paper web advances between the guide fingers 106 and 108, the knives 18 on the perforating roll 16 contact the web at the grooved portion 110 and the grooved portion of the lower perforating roll 17, thereby perforating the web. The perforated paper web is then guided around the top surface of the lower perforating roll 17 and onto a guide finger 130. The guide finger 130, which is grooved to correspond to the grooved finger 106 and grooved perforating roll 17, is secured to a block 131, which, in turn, is secured to the frame 50 by suitable means. A guide roll 132, which is also secured to the frame 50 by suitable means, combines with a guiding plate 134 in aiding the guide finger 130 in guiding the paper web to the break-off rolls 19 and 20.

The break-off rolls 19 and 20, which are adapted to break the paper web at the perforations into individual paper sheets, are also driven by the main driving gear 38 through suitable gearing. The upper break-off roll 19 is mounted in a frame 152 by a bearing block 140, which carries the break-off roll trunnion 142 and which is inserted in the slot 144. A threaded element 146 extending through the frame 152 abuts against a spring plate 148 which compresses a spring 150. The spring 150 bears against the bearing block 140 and by means of the threaded element 146 is adapted to secure the roll shaft 142 in the frame 152.

The upper break-off roll 19 has disposed therearound one or more break-off bars 21 which are adapted to engage the advancing web along with the lower break-off roll 20 and thereby break the paper web into individual sheets. The lower break-off roll 20, which is suitably mounted in the frame 152, is geared to rotate in the opposite direction and at the same speed as the upper break-off roll 19. Since the paper web advances at a slower speed than the break-off rolls 19, 20 rotate, the break-off bars 21 secured to the upper break-off roll 20 will rotate at a greater speed than the speed of the advancing paper web. It is apparent that, as the break-off bars 21 contact the lower break-off roll 20 and grip the paper web therebetween, the difference in the speed of movement between the paper web and break-off rolls 19, 20 will cause the paper web to be broken off at the perforation cut therein by the perforator rolls 16, 17.

The length of a paper sheet and its corresponding diameter are controlled solely by the peripheral distance between the perforating knives 18 on the perforating roll 16. The length of the paper sheet may then be varied by changing the distance between the perforating knives 18. Accordingly, the change can be accomplished by two methods. One is to change the number of equally spaced knives on the perforating roll 18 and the other is to change the diameter of the roll. It is apparent that a corresponding change must also be effected in the break-off roll 19.

If it is desired to cut the perforations in the paper web at shorter intervals, the modified perforator and break-off rolls can be utilized. The modified perforator rolls and break-off rolls will employ a greater number of knives and break-off bars than that illustrated in Fig. 3 and will result in a smaller diameter finished compacted stick. In those instances, when the paper web is perforated in shorter intervals, it is necessary to employ an intermediate guide roll 160 between the perforator roll and the break-off roll. The intermediate guide roll 160 is suitably journalled in a bearing block 162, which is secured to the frame 50, and makes contact with the paper web directly above the guide roll 132. It is apparent that the guide roll 160, in those instances where the length of a perforated sheet is too short to have only one perforation between the perforator roll and the break-off roll, will insure the continuous feeding of the paper web to the break-off rolls 19, 20. Thus, if a perforated section exists between the guide roll 160 and the perforator rolls 16, 17 at the time the break-off operation is performed, the guide roll 160, in conjunction with the guide roll 132, will prevent tearing along that perforation and will, in addition, guide the paper web to the break-off rolls 19, 20 for the next break-off operation.

After each individual paper sheet is broken off from the paper web, it is advanced around the lower break-off roll 20 to the gradually reducing compacting channel 22 defined by the stationary platen 23 and the eccentrically mounted drum 24. A curling roll 38*a*, mounted on the drive shaft 38 and geared to rotate in a direction opposite to that of the drum 24, extends through the platen 23 into the compacting channel 22. The curling roll 38*a*, which is disposed immediately adjacent the opening of the compacting channel, is adapted to contact the newly admitted paper sheet and thereby insures that the sheet curls on itself as it enters the compacting area.

It is apparent that as an individual paper sheet 170, whose fibers have been previously strained on the bar 13, is introduced into the compacting channel 22, the rota-

tion of the curling roll **38***a* will be sufficient to encourage the curling effect of the strained paper sheet. The compacting operation which results in the finished compacted paper stick is then begun by the action of the rotating drum rolling the curling paper sheet **170** on the stationary platen **23**.

Referring again to Fig. 1, the curling paper sheet **170**, which has been received in the compacting channel **22**, is shown being carried around the compacting channel **22** by the rotating drum **24**. Due to the eccentricity of the drum **24** with respect to the stationary platen **23**, the channel **22** progressively decreases, and thereby causes the compacting paper sheet to be progressively decreased in diameter as it is rolled around the channel **22** by the drum **24**.

As the drum **24**, which is provided with a suitable surface **180**, rolls the curling paper sheet around the cylindrical surface of the platen **23**, the sheet **170** is tightly compacted into a rigid paper stick. As the compacted paper sheet nears the end of channel **22**, the free end of the newly formed paper stick is conveniently wetted by the wetting means **25** and is thereby bonded to the stick body. The newly formed stick member is finally rolled by the rotating drum **24** between the ironing plate **26** and the drum **24**, which movement serves to finish the bonding operation and thereby complete the stick forming operation.

The operation of the apparatus described hereinabove is as follows:

A web of paper **10** is directed through the tension or guide rolls **11**, **12** and around the edges of the bar **13** to the feed rolls **14**, **15**. At this point, the feed rolls **14**, **15**, which are actuated by the drive gear **38**, engage the paper web **10** and feed it to the perforating rolls **16** and **17**, which also are driven by the drive gear **38**. The feed rolls **14**, **15**, in feeding the paper web, act to pull the web from the guide or tension rolls around the bar **13**, effecting a strain therein. The strained web is then perforated by the perforator rolls **16**, **17**, broken into individual sheets by rolls **19** and **20**, and fed into the compacting channel **22** where they are engaged by the curling roll **38***a* and the drum **24**. The compacting operation forms the stick elements after which the outer layers thereof are bonded. The finished sticks are then removed from the compacting channel.

Referring to Fig. 4, which illustrates a modified form of the invention, the paper web **10** is shown advancing around the tension or guide rolls **11**, **12** to the bar **13** in a manner similar to that illustrated in Figs. 1 and 2.

Secured to the guide roll **12** is the web tensioning means **68**, which, as shown in Fig. 4, is identical in structure to the web tensioning means shown in Fig. 2. However, in the modified form of the web tensioning means, the stud **72** is mounted in the frame **50** such that the hook **73** passing therethrough is inclined. The hook **73** in the inclined position faces upwardly and engages the eyelet **70***a* which is secured to the strap **70**. The strap **70** is secured to the stud **72** on the left side as seen in Fig. 4 and has its free end with the eyelet attached extending around the portion of the roll **12** which is nearest guide roll **11**. Instead of acting as a brake, the effect of the modified arrangement of the web tensioning means is to exert a drag on the web and thereby insure the necessary tension in the web as it extends around the bar **13**.

From bar **13** the web **10** advances to an idler roll **204** suitably mounted in the frame **50** and positioned adjacent the topmost point of feed roll **14**. The idler roll **204** serves as an additional guiding means for the web and furthermore tends to reduce the stresses set up in the web by the feeding action of the rolls **14**, **15**.

The feed rolls **14**, **15** which are provided for advancing the paper web **10** from the rolls **11**, **12**, bar **13** and roll **204**, feed the web between guide fingers **106**, **206** and then to the perforating rolls **16**, **17**. After the suitable perforations are made in the web, it is directed between guide finger **208** and guide plate **210** to the break-off rolls **19**, **20**. The break-off roll **19**, which includes bars **21**, has the same peripheral speed as the roll **20** but both rolls **19** and **20** are adapted to rotate faster than the speed of the advancing web. Due to this difference in speed, the web will be broken off at the perforations by the break-off bars **21** as the web is gripped between the roll **20** and the bars. As shown in Fig. 4, only two break-off bars are utilized on the upper break-off roll **19**.

Accordingly, only two perforating knives **18** are employed in the perforating roll **16**.

If a shorter paper sheet is desired, which will result in a smaller diameter paper stick, a modified form of the roll frame **50** illustrated in Fig. 4 can be utilized, whereby the frame **50** is lifted upwardly, being pivoted on the drive shaft **38**. This movement has the effect of reducing the distance between the perforating rolls and the break-off rolls. Accordingly, the perforator roll **16** and break-off roll **19** must be replaced with rolls which incorporate the correspondingly increased or decreased number of knives and break-off bars or, as discussed previously, rolls having different diameters can be employed. The guide plate **210** and the guide finger **208** may also be replaced by an appropriate plate and finger to correspond in size to the distance between the perforating and break-off rolls set by the upwardly pivoted frame **50**.

After the break-off operation, the individual paper sheets are introduced into the compacting channel where they are initially engaged by curling roll **38***a* and drum **24**. The drum **24** then operates to roll the curling paper sheets around the stationary cylindrical surface of the platen whereby the paper sticks are formed and bonded.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. Apparatus for forming paper sticks or the like from a continuous web of paper, comprising frame means, means mounted on said frame means for feeding a continuous web, means for straining one face of said continuous web, means for pulling said strained web, means for separating said continuous web into sheets of predetermined size and permitting said strained sheets to curl, and means for rolling and compacting said curled sheets to form a series of paper sticks.

2. Apparatus for forming paper sticks or the like from a continuous web of paper, comprising means for feeding a continuous web, means for straining one face of said continuous web, means for pulling said strained web, means for separating said continuous web into sheets of predetermined size and permitting said strained sheets to curl, means for rolling and compacting said curled sheets to form a series of paper sticks, frame means for supporting said means for feeding, straining and separating within the vertical projection of said compacting means.

3. The structure recited in claim 2, said means for rolling and compacting comprising a stationary outer platen and a moving inner platen and being located below said means for feeding, straining and separating whereby all the exposed moving parts are located at the top of the apparatus.

4. Apparatus for forming paper sticks or the like from a continuous web of paper, comprising means for feeding a continuous web, means for perforating said continuous web at spaced intervals, means for separating said perforated web at the perforations, means for rolling and compacting said sheets to form a series of paper sticks, frame means for supporting said separating means, and frame means supporting said perforating means and adjustably mounted with respect to said frame means for supporting said separating means to vary the distance between said separating means and said perforating means thereby compensating for various sheet sizes.

5. The structure recited in claim 4, wherein said frame means supporting said perforating means is pivotally mounted.

6. In an apparatus for forming paper sticks or the like, a stationary generally cylindrical platen, a rotatable drum mounted eccentric thereto and forming therewith a compacting channel, and adjustable means operatively connected to said drum for changing the position of said drum thereby varying the eccentricity of said drum with respect to said platen and thereby varying the size of said compacting channel, said adjustable means comprising an adjustably movable fixed shaft about which said drum is adapted to rotate, means for adjusting said fixed shaft comprising an adjustment plate, said fixed shaft being journaled in said adjustment plate and means for moving said adjustment plate.

7. In an apparatus for forming paper sticks or the like from a sheet material, a supporting frame, a stationary

generally cylindrical platen mounted in said frame, a rotatable drum mounted in said frame adjacent said platen and eccentric thereto and forming therewith a gradually reduced compacting channel, a roll frame supported by said supporting frame, said roll frame having mounted therein means for feeding paper sheets to said compacting channel, said feeding means including a pair of guide rolls, an elongated bar secured to said roll frame and disposed above said guide rolls, said guide rolls guiding a paper web therebetween to said bar in a manner such that the direction of feed of said paper web is opposite to the normal direction of feed, means for perforating said paper web and means for separating said perforated paper web into separate sheets, said separate paper sheets being introduced into said compacting channel where they are rolled and compacted into paper sticks.

8. Apparatus for forming paper sticks or the like, comprising a frame, a stationary generally cylindrical platen mounted in said frame, a rotatable drum mounted in said frame adjacent said platen and eccentric thereto, and forming therewith a gradually reduced compacting channel, means supported by said frame for processing a continuous web of paper, said processing means including a bar around which the paper web is extended, perforating rolls, feeding rolls pulling the web around the edges of said bar and advancing it to said perforating rolls for perforating the web, break-off rolls for breaking the web into individual paper sheets and for introducing said paper sheets into said compacting channel, said feed rolls, perforating rolls and break-off rolls adapted to be driven by a common driving means.

9. In an apparatus for forming paper sticks or the like from a sheet material, a pair of guide rolls guiding a continuous web of paper therebetween, a pair of feed rolls, an elongated bar disposed above said guide rolls and adapted to have the web pulled around the edges thereof by said pair of feed rolls thereby straining the fibers of said web, said feed rolls feeding said web to a perforator roll located downstream from said bar and provided with knives therein adapted to cut perforations at intervals in said web, a break-off roll having break-off bars formed thereon, located downstream from said perforator roll, receiving said strained and perforated web and adapted to break off individual paper sheets therefrom, cylindrical means for receiving said strained sheets, and drum means mounted eccentrically in said cylindrical means for rolling and compacting said sheets into paper sticks.

10. Apparatus for forming paper sticks or the like, comprising a stationary platen formed with a cylindrical surface, a rotatable drum formed with a cylindrical surface mounted in eccentric relationship with respect to said platen and forming therewith a gradually reduced compacting channel, and means disposed adjacent said drum and platen for processing a continuous web of paper, said processing means including guide rolls adapted to receive the paper web therebetween, a bar disposed above said guide rolls, driven feed rolls located downstream from said bar adapted to pull said paper web through said guide rolls and around the edges of said bar, thereby straining the fibers of said paper, perforator rolls receiving said web from said feed rolls adapted to perforate the web, break-off rolls receiving the perforated web from said perforator rolls adapted to break the web into individual paper sheets, and a curling roll disposed near the entrance of said compacting channel and adapted to engage the individual paper sheets as they are introduced into said compacting channel and thereby insure that said sheets curl on themselves.

11. Apparatus for forming paper sticks or the like, comprising a supporting frame, a stationary generally cylindrical platen mounted in said frame, a rotatable drum mounted in said supporting frame adjacent said platen and eccentric thereto and forming therewith a gradually reduced compacting channel, a roll frame mounted on said supporting frame having mounted therein a pair of guide rolls receiving an extended paper web, an elongated bar secured to said roll frame and disposed above said guide rolls, a pair of feed rolls pulling said web around the edges of said bar thereby straining the fibers of said web, a pair of perforator rolls mounted in said roll frame located downstream from said feed rolls and receiving said web and cutting perforations therein at spaced intervals, a pair of break-off rolls rotatably mounted downstream from said perforator rolls, one of said break-off rolls having break-off bars secured thereto, said break-off rolls adapted to rotate at a different speed than the speed of the advancing paper web, thereby causing said break-off bars to break off from the web at the perforations individual paper sheets for introduction into said compacting channel.

12. Apparatus for forming paper sticks or the like, comprising a supporting frame, a stationary generally cylindrical platen mounted in said frame, a rotatable drum mounted in said frame adjacent said platen eccentric thereto and forming therewith a gradually reduced compacting channel, a roll frame supported by said supporting frame having mounted therein guide rolls, a bar secured to said roll frame and disposed above said guide rolls, driven feed rolls mounted in said roll frame downstream from said bar, said feed rolls pulling an extended paper web through said guide rolls and around the edges of said bar thereby straining the fibers of said paper, a pair of perforator rolls mounted in said roll frame receiving said web from said feed rolls, one of said perforator rolls having knives positioned therein adapted to perforate the paper web at spaced intervals, a pair of break-off rolls rotatably mounted downstream from said perforator rolls, one of said break-off rolls having break-off bars secured thereto, said break-off rolls having the same peripheral speed but adapted to rotate at a greater speed than the advancing paper web, thereby causing said break-off bars to break off individual paper sheets from the web at the perforations, said break-off rolls adapted to introduce the individual paper sheets into said compacting channel, and a curling roll mounted in said roll frame and extending into said compacting channel, said curling roll adapted to engage said individual paper sheets and thereby insure that said sheets curl on themselves.

13. Apparatus for forming paper sticks or the like, comprising a supporting frame, a stationary generally cylindrical platen mounted in said frame, a rotatable drum mounted in said frame adjacent said platen eccentric thereto and forming therewith a gradually reduced compacting channel, a roll frame supported by said supporting frame having mounted therein guide rolls, a bar secured to said roll frame and disposed above said guide rolls, driven feed rolls mounted for rotation in said roll frame downstream from said bar, said feed rolls pulling an extended paper web through said guide rolls and around the edges of said bar thereby straining the fibers of said web, web tensioning means mounted in said roll frame braking the movement of said guide rolls thereby causing the feed rolls to exert more tension on said web, perforator rolls mounted in said roll frame receiving said web from said feed rolls, one of said perforator rolls having knives positioned therein adapted to perforate the paper web at spaced intervals, break-off rolls rotatably mounted downstream from said perforator roll, one of said break-off rolls having break-off bars secured thereto, said break-off rolls adapted to rotate at a greater speed than the speed of the advancing paper web thereby causing said break-off bars to break off individual paper sheets from the web at the perforations, and a curling roll mounted in said roll frame and extending into said compacting channel, said curling roll adapted to engage the paper sheets as they are introduced into the compacting channel thereby insuring that said paper sheets curl on themselves.

14. A method of forming a series of paper sticks or the like from a continuous web, comprising continuously advancing a web of paper, continuously stretching one face of said web to strain the fibers thereof, perforating said strained web at spaced intervals while advancing the web, continuously breaking off individual sheets from said strained perforated web at the perforations, permitting said strained sheets to curl, rolling and compacting said curled sheets into relatively rigid stick elements.

15. A method of forming a series of paper sticks or the like from a continuous web, comprising continuously advancing a web of paper, continuously guiding said web and stretching one face of said web to strain the fibers thereof, perforating said strained web at spaced intervals while advancing the web, continuously breaking off individual sheets from said strained perforated web at the perforations, and increasing the velocity of the severed and strained sheets during the breaking operation, per-

mitting said strained sheets to curl, rolling and compacting said curled sheets into relatively rigid stick elements, wetting and bonding the outer layer of each stick element to the body thereof thereby continuously forming paper sticks.

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