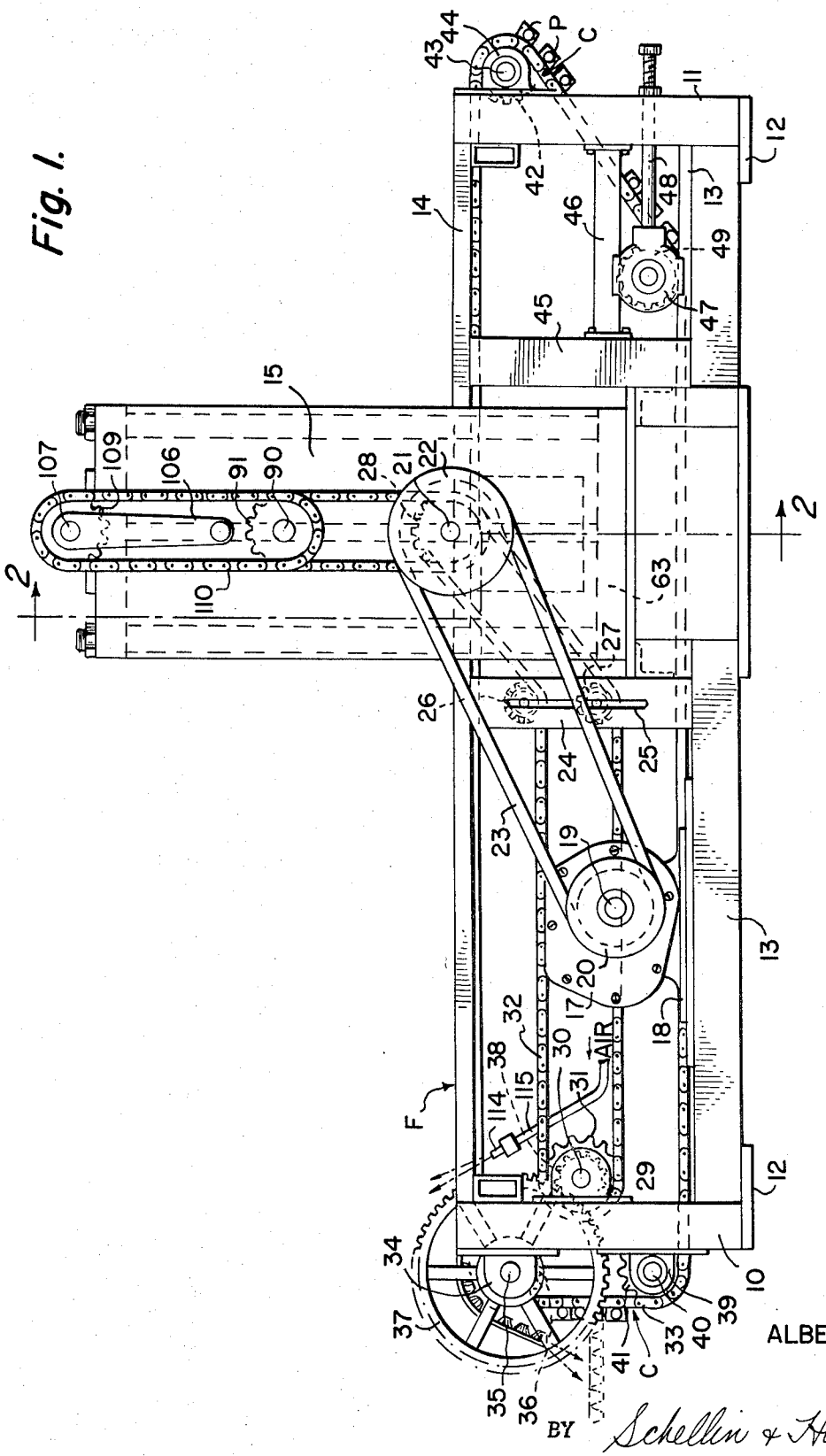
May 18, 1971 A. L. EHE 3,579,399

METHOD AND APPARATUS FOR ASSEMBLING A PLURALITY OF PAPER CUPS IN TRAY FORMATION AND GLUING THEM TOGETHER

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Fig. 1.



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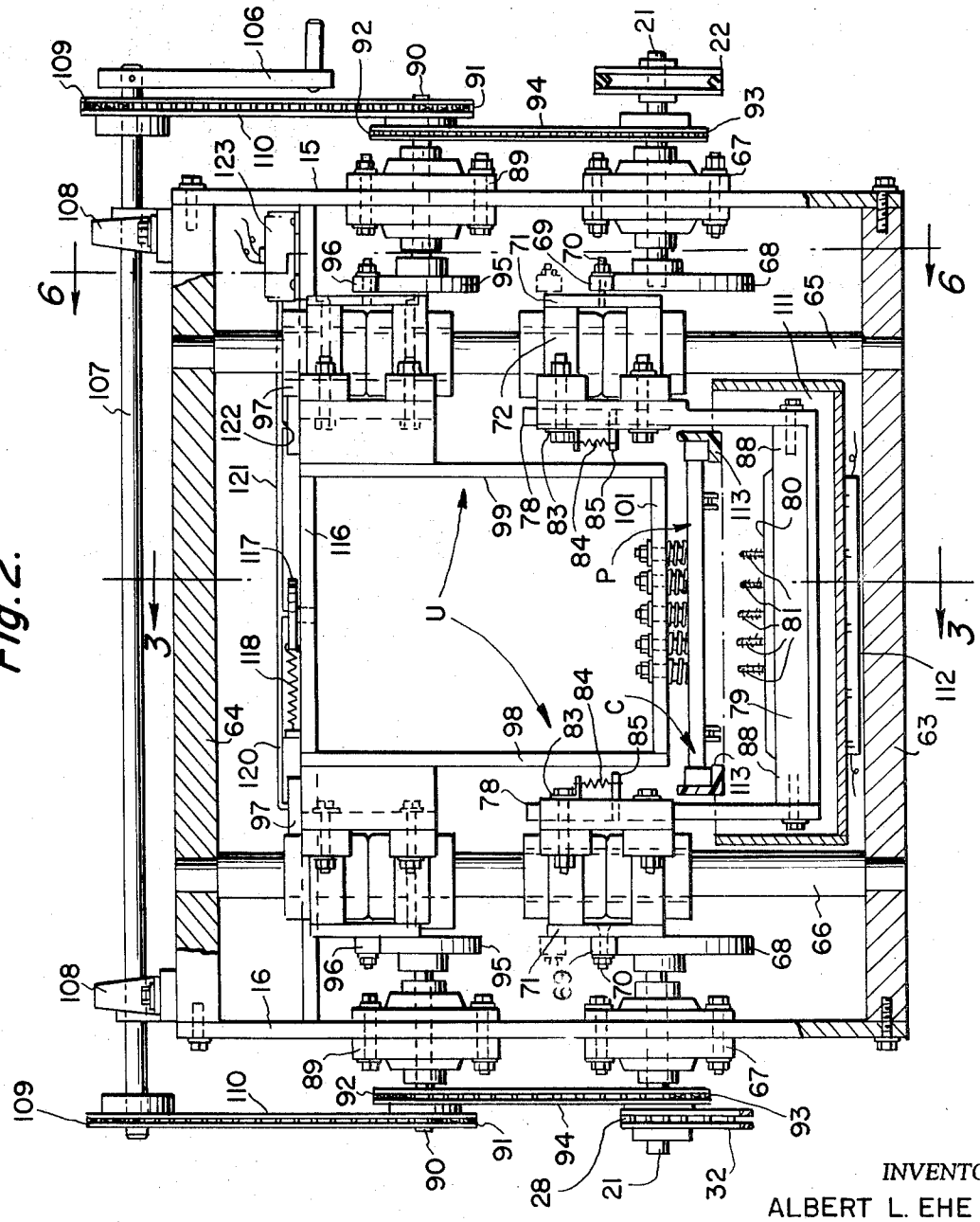
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Fig. 2.

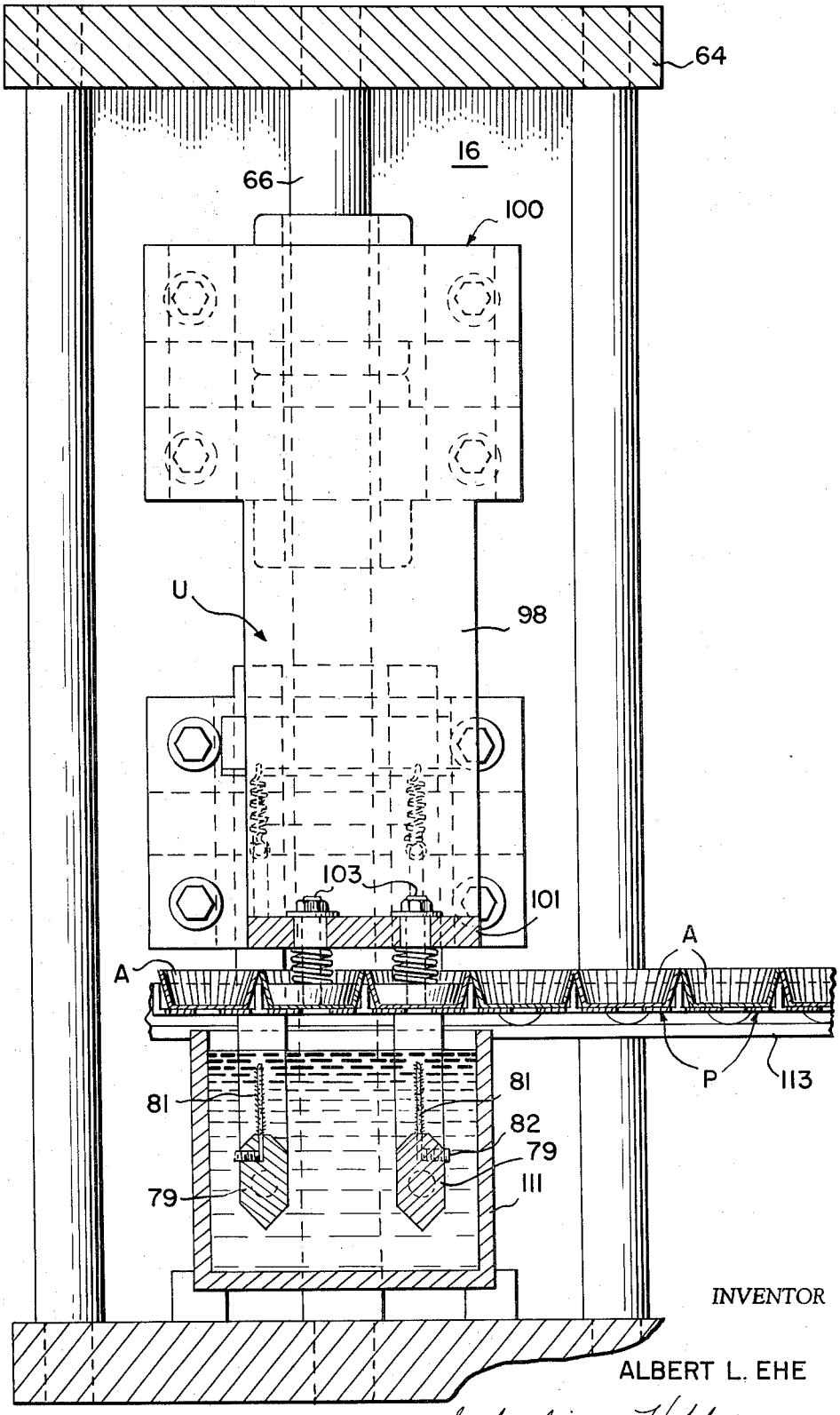


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Fig. 3.



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Fig. 4.

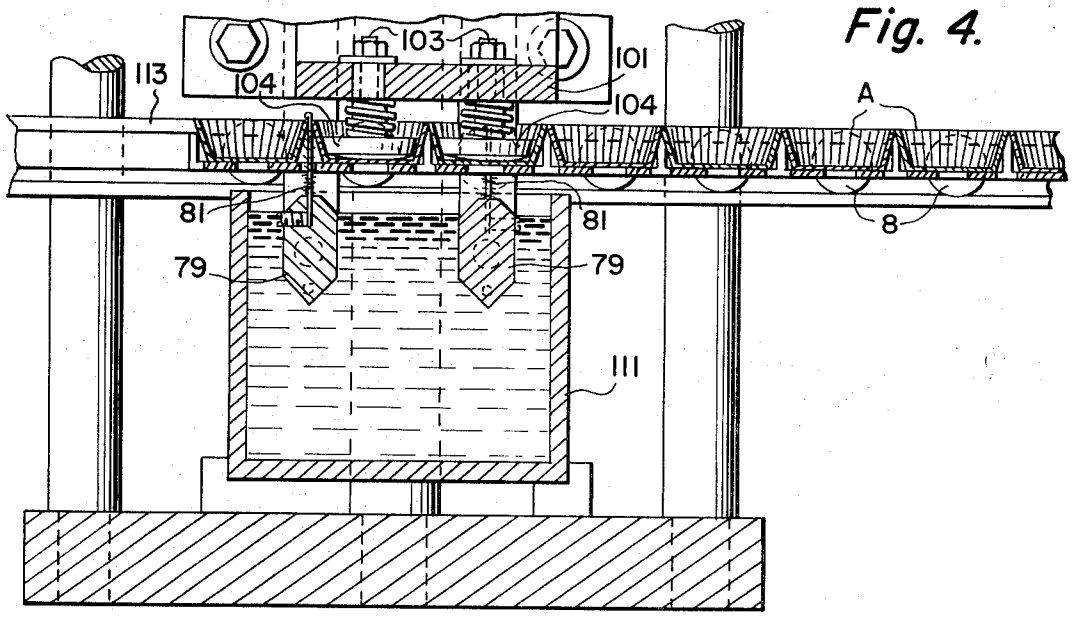
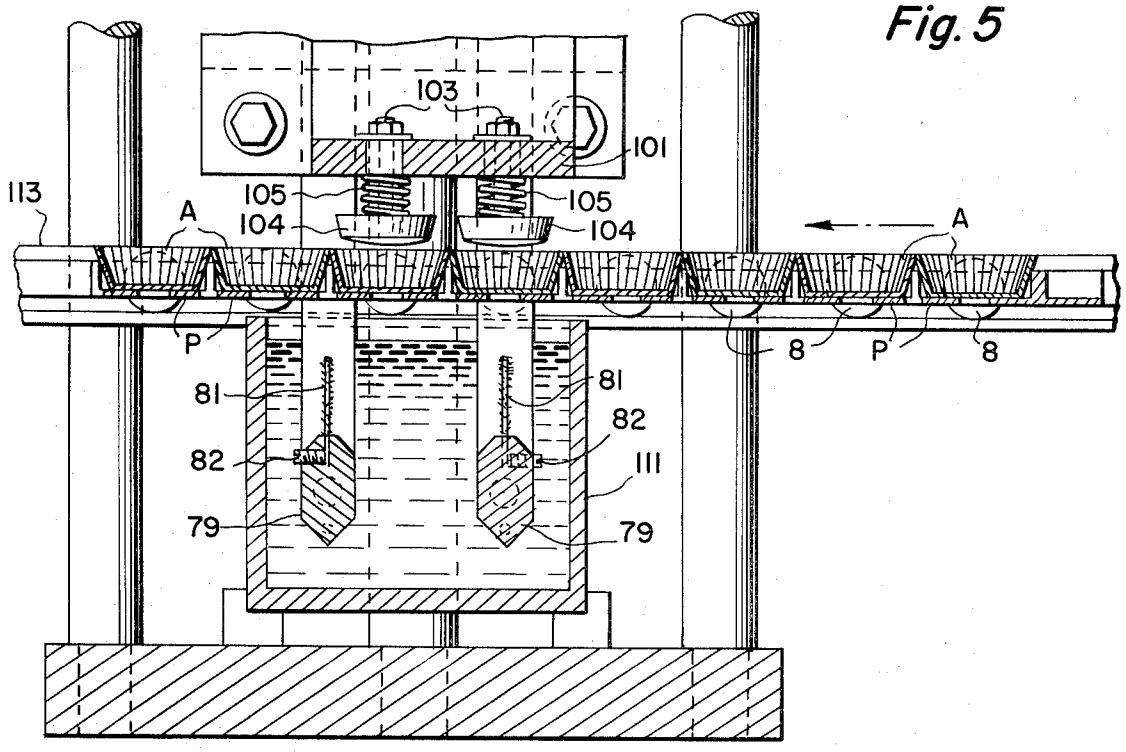


Fig. 5



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Fig. 7.

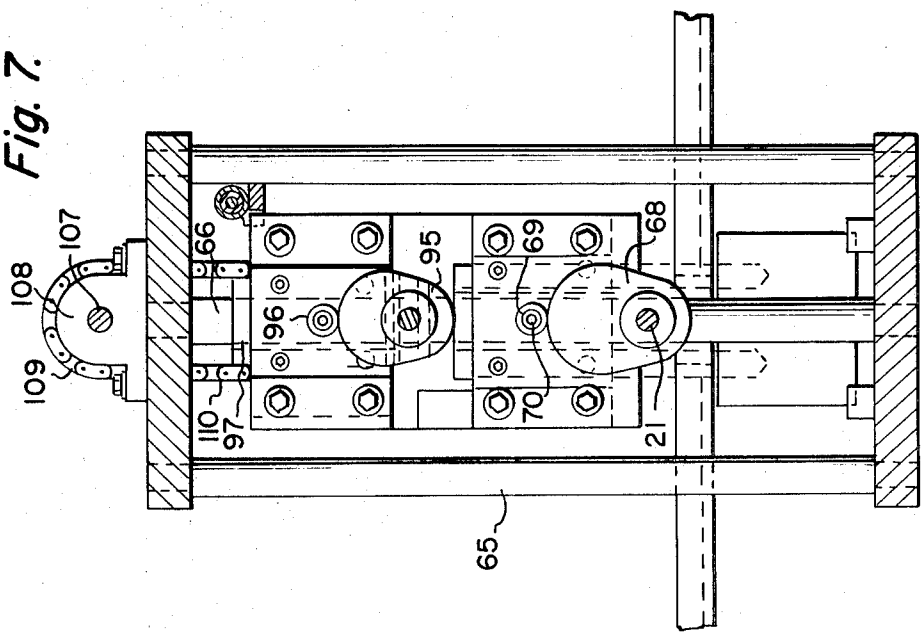
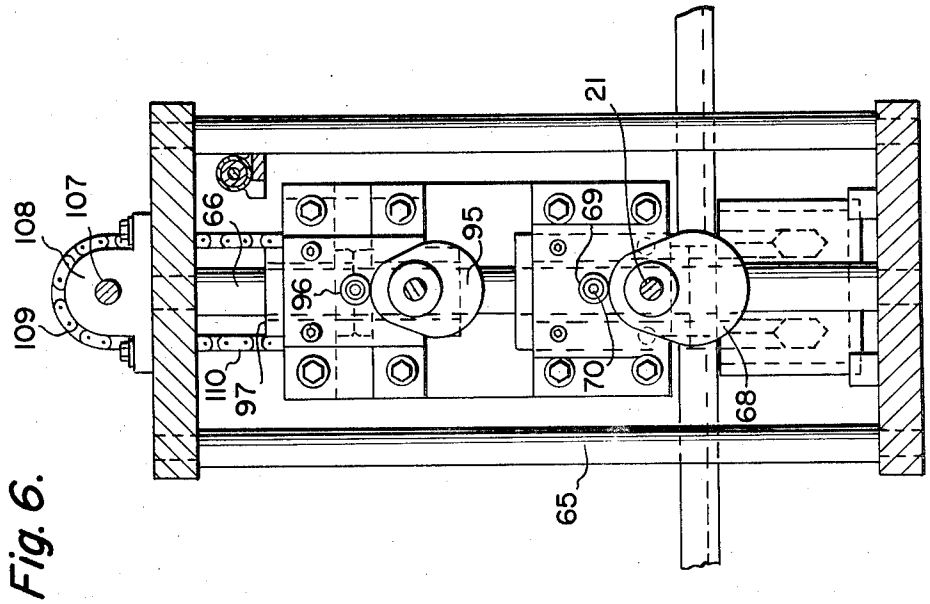


Fig. 6.



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Fig. 8.

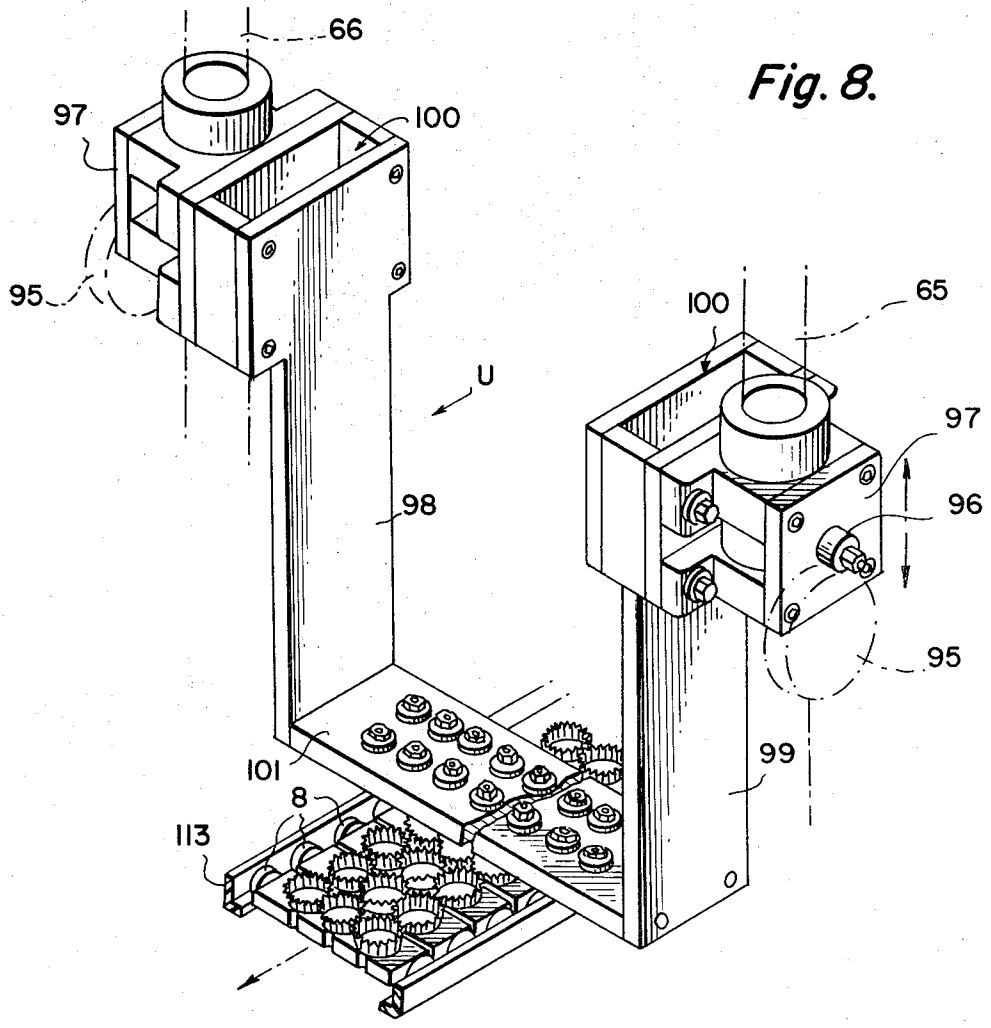
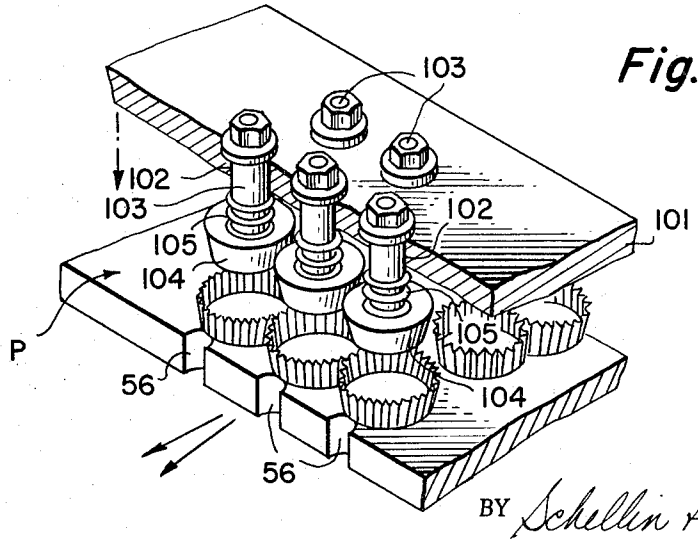


Fig. 9.



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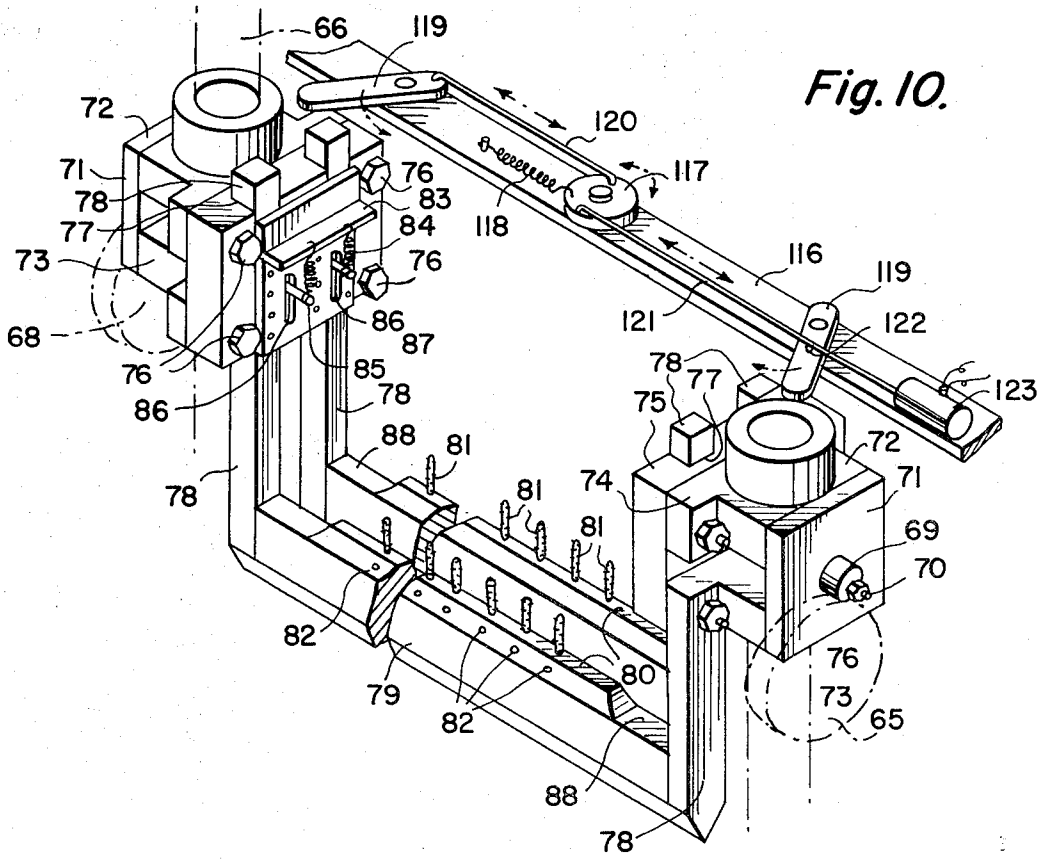


Fig. 10.

Fig. 11.

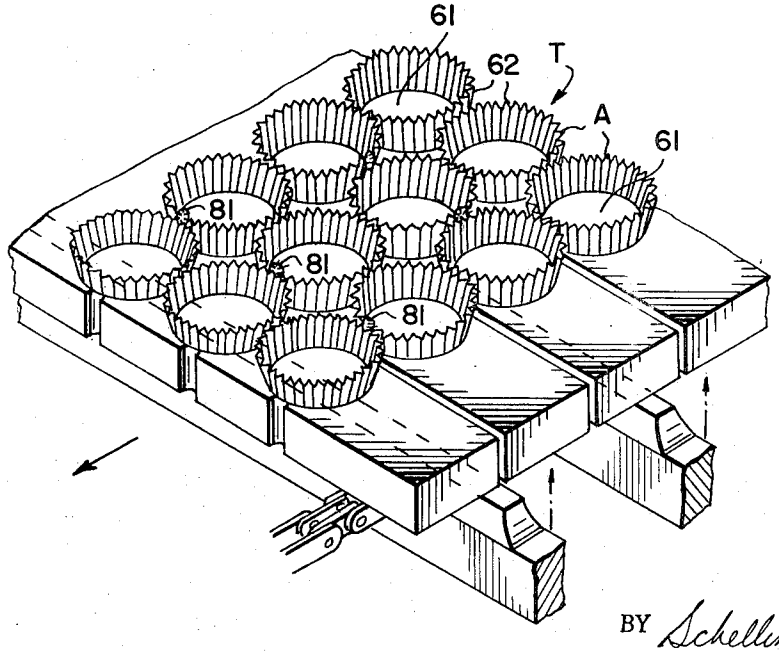
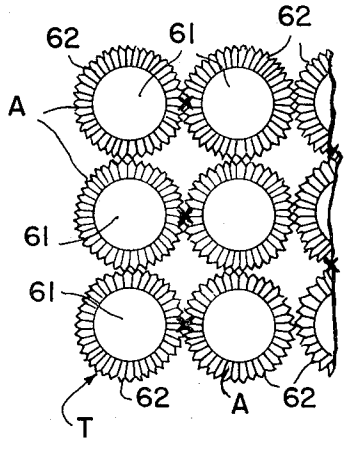


Fig. 12.



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Fig. 13.

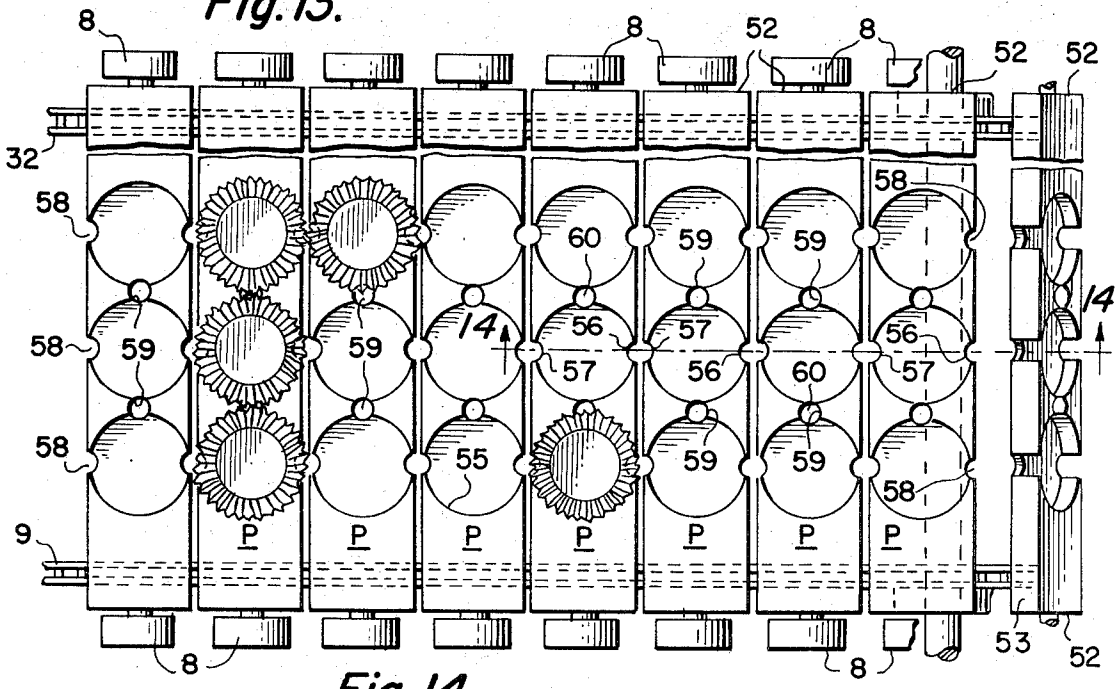


Fig. 14.

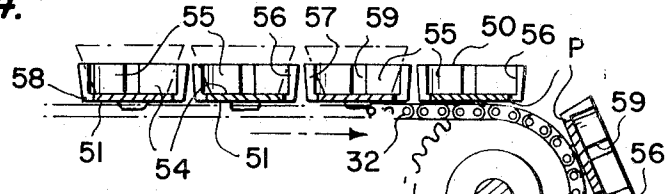
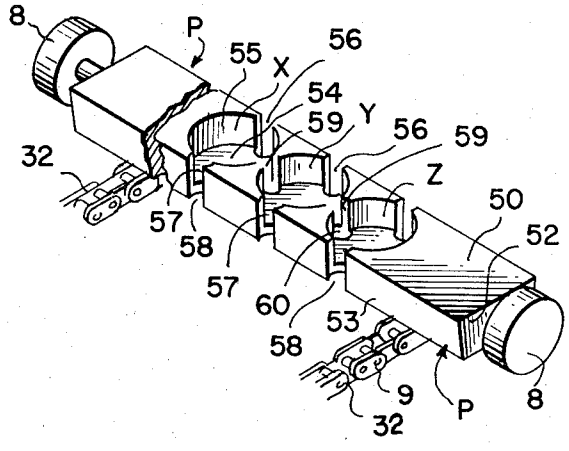
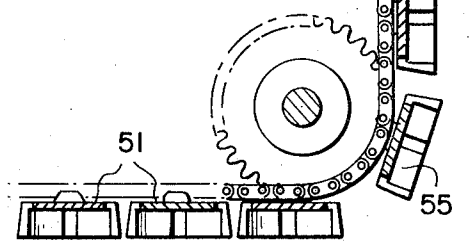


Fig. 15.





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Patented May 18, 1971

3,579,399

METHOD AND APPARATUS FOR ASSEMBLING A PLURALITY OF PAPER CUPS IN TRAY FORMATION AND GLUING THEM TOGETHER

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Int. Cl. B31b *31/12;* B32b *1/62*
U.S. Cl. 156—293 6 Claims

ABSTRACT OF THE DISCLOSURE

A method of assembling a plurality of paper cups in tray formation and gluing them together in said assembled relation together with apparatus for carrying out the method. The method consists essentially of the steps of: arranging a plurality of paper cups in a series of tray units, each of a predetermined cup number and formation, moving said tray units through a gluing station at which the cups are held in position relative to one another; applying glue to engaging cup portions; and discharging finished trays. The apparatus comprises, as characteristic elements an endless conveyor; cup receiving plates carried by the conveyor; a gluing station including a supply of heated glue below the upper ply of the conveyor, devices for holding cups in position in the plates while glue is applied, and glue applying means in the form of a gang of upright pile coated wires; means for indexing the conveyor with a stepped motion; mechanism for operating the cups holding devices and glue applying means in proper relation to movement of the conveyor, and a block out device for rendering the gluing means ineffective on certain predetermined steps to provide trays in a separated state.

BACKGROUND OF THE INVENTION

The present invention relates to the corrugated or crimped paper cups that are widely used in the merchandising of candy and comparable food items and is concerned primarily with the assembly and joinder of a plurality of such cups in a tray like formation so as to facilitate the simultaneous depositing of a corresponding number of pieces of candy thereinto.

While it has been proposed to provide a tray in which a plurality of cups are drawn from a sheet and integrally connected this invention is founded on the belief that a better tray is provided, and the demands of the candy industry better satisfied, if the paper cups are individually formed and subsequent to their formation, assembled and joined together in a tray like structure.

The invention has, as an important object, the provision of a method in which a plurality of the cups are assembled in a series of tray units, the units moved through a gluing station at which glue is applied to engaging portions of the cups and finished trays discharged after drying of the glue.

It is important that the cups be firmly held in position while the glue is applied to insure that portions of adjacent cups properly engage one another. Thus another objective is to provide, in a method of the type noted, the step of holding the cups in position during application of the glue.

Paper cups commonly utilized in the candy industry have acquired more or less a standard and conventional shape. A typical cup comprises a flat bottom and an upwardly flaring peripheral wall. Generally speaking, the bottom is circular and the wall is conical and corrugated. With this cup construction in mind, a further object in view is to provide, in a method of the character indicated, the step of applying glue to engaging cup portions from below and within the spaces defined by the flaring walls.

Yet another object is to provide a method of the kind aforesaid in which a supply of glue is maintained in a heated condition and small quantities thereof withdrawn and applied upwardly to engaging cup portions.

In practicing the subject method the cups are arranged in rows and an individual tray is made up of a desired number of each rows. It is evident that in a continuously operating method provision must be made to block out the glue applying means at certain intervals to provide trays that are separate one from another. Thus another object is to provide, in a method of the type noted, the step of rendering the glue applying means inoperative at predetermined intervals.

It is evident that apparatus must be provided for carrying out a method founded on the above objects. Thus another highly important object of the invention is to provide paper cup tray forming and gluing apparatus, comprising an endless conveyor that is indexed with a step by step motion; a plurality of cup holding plates carried by the conveyor with each plate having a desired number of cup receiving recesses in a desired pattern; a supply of an adhesive such as glue at what is herein referred to as the gluing station below the upper ply of said conveyor; cup holding devices movable downardly to engage cups on a plate and hold them firmly in position at the gluing station; glue applying means movable upwardly from the glue supply; and operating connections for the cup holding devices and glue applying means to cause them to operate in properly timed relation to indexing of the plates on the conveyor.

The application of the glue is a highly important phase if not the very heart of the subject apparatus. Thus, another object is to provide, in apparatus of the character noted, glue applying means in the form of a gang of upright pile coated wires similar to a conventional pipe cleaner. The wires are completely immersed in the glue and then moved upwardly so that the upper end portions thereof pass through the spaces between engaging cups and are forced between engaging cup portions to deposit the spots of glue carried by the upper end portions between the engaging cup portions.

In a practical embodiment the gang of wires are mounted on a plurality of spaced bars which together define a unit. Operating connections are provided for reciprocating this unit upwardly and downwardly. It is necessary to block off upward travel of a row if such wires at certain predetermined intervals so that a unit of cups will not be glued to a next adjacent row. Thus another important object is to provide, in apparatus of the type noted, block out means and associated controls therefor, for rendering the glue applying means inoperative at selected intervals.

Proper positioning of the paper cups is also of importance. Thus another object is to provide, in apparatus of the type noted, cup holding plates having cup receiving recesses shaped and dimensioned to receive a particular size of paper cup so that the upper portions adjacent to the free edges thereof engage with the corrugations interlocked. This end is achieved by forming each cup receiving recess as a cylindrical wall and flat bottom. The cup holding devices urge the bottoms of the cups against the bottoms of the recesses with the resulting action causing the upper portions of the conical walls to properly interengage.

Another object in view is to provide, in apparatus of the character aforesaid, cup holding devices including members which are yieldably urged against the cup bottoms. This end is achieved by including springs in the operating connections to the cup holding devices.

Yet another object is to provide, in apparatus of the type noted, a glue supply that is heated. This makes it possible to employ a quick setting glue.

Various other more detailed objects and advantages of the invention, such as arise in connection with carrying out the above noted ideas in a practical embodiment, will in part be one apparent and in part be hereinafter stated as the description of the invention proceeds.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawings wherein:

FIG. 1 is a view in side elevation of paper cup gluing apparatus embodying the precepts of this invention.

FIG. 2 is a transverse vertical section taken about on the plane represented by the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary longitudinal section taken about on the plane represented by the line 3—3 of FIG. 2 depicting the glue applying means in its immersed position.

FIG. 4 is detailed section taken about on the plane of FIG. 3 showing the glue applying means in upraised limit of movement.

FIG. 5 is a sectional detail similar to FIG. 4 illustrating the cup holding devices and glue applying means in their fully retracted positions.

FIG. 6 is a detail, mostly in elevation but partially in section, taken about on the plane represented by the line 6—6 of FIG. 2 and depicts one position of the operating connections for the cup holding devices and glue applying means.

FIG. 7 is a view similar to FIG. 6 illustrating another position of the operating connections.

FIG. 8 is a detailed perspective of the cup holding devices and operating connections therefor.

FIG. 9 is another detailed perspective of the cup holding devices with parts broken away and shown in section.

FIG. 10 is a detailed perspective of the glue applying means and the operating connections therefor.

FIG. 11 is a detailed perspective of a cup holding plate depicting the glue applying wires in phantom.

FIG. 12 is a fragmentary plan view of a portion of a finished tray.

FIG. 13 is a plan of cup holding plates with cups positioned in some of the recesses therein.

FIG. 14 is a detailed section taken about on the plane represented by the line 14—14 of FIG. 13; and

FIG. 15 is a detailed perspective of a cup holding plate element.

Referring now to the drawings and first more particularly to FIG. 1, the apparatus of this invention is shown as including a supporting framework identified in its entirety by the reference character F. The latter comprises end uprights 10 and 11 (two of each) upstanding from any appropriate supports such as feet 12. Extending between each upright 10 and 11 on one side is a horizontal strut 13 at the bottom. There is another similar horizontal support on the other side of the machine (not illustrated). There are also two top horizontal supports 14 extending between the end uprights 10 and 11.

Mounted on the frame F are a pair of vertical standards or side plates 15 and 16 as shown in FIGS. 2 and 3.

A source of power such as an electric motor is shown at 17. The latter is supported from a base 18 which in turn is supported by the lower struts 13. The drive shaft 19 of the motor 17 drivably carries a pulley 20 at one end. A pair of shafts 21 are journalled in side plates 15 and 16. A pulley 22 is drivably mounted on one shaft 21 and a belt 23 passes over the pulleys 20 and 22. Thus, the shaft 21 on one side is driven from the motor 17.

Extending between the struts 13 and 14 on each side of the frame F is a vertical supporting member 24. The latter is formed with a vertical slot 25. Mounted on member 24 in an adjustable manner, due to the slot 25, are a pair of idler or guide sprockets 26 and 27. Drivably carried by one shaft 21 is a sprocket 28. Supported from end plate 29 carried by end uprights 10 is a shaft 30 which drivably carries a sprocket 31 at one end. A drive chain 32 passes around sprocket 31, below guide sprockets 26 and 27, and about sprocket 28. Thus the shaft 30 is driven from the shaft 21.

An endless conveyor is referred to in its entirety by the reference character C. It comprises two chains 32 and 9 (FIG. 13) one being at each side of the machine. Extending between the chains 32 and 33 are a plurality of plates each of which is identified by the reference character P and one of which is depicted in FIG. 15. A roller 8 is rotatably mounted at each end of each plate P.

Referring again to FIG. 1, outstanding from the end uprights 10 are a pair of ears 34 (FIG. 1) between which is journalled a shaft 35. The latter drivably carries a pair of small sprockets 36 over which passes the chains 32 and 9. The shaft 35 also drivably carries a large gear 37 that meshes with a pinion 38 drivably mounted on the shaft 30. Thus the conveyor engaging sprockets 36 are driven from the shaft 30.

Also outstanding from the uprights 10 adjacent to the lower ends thereof are a pair of ears 39 between which extends a shaft 40. A pair of idler sprockets 41 are carried by the shaft 40 and the chains 32 and 9 pass thereover. Another pair of idler sprockets 42 are carried by a shaft 43 extending between ears 44 which outstand from the end uprights 11. Chains 32 and 9 of conveyor C also pass over these idler sprockets 42.

On each side of the machine there is a second vertical supporting member 45 extending between the struts 13 and 14. Extending between each of the members 45 and the upright 11 at that side is a horizontal guide 46. Slidably mounted on each guide 46 and the strut 13 therebeneath is a sprocket carrier 47 the position of which is adjustable through the medium of the rod 48. A sprocket 49 is carried by the carrier 48 and the chains 32 and 9 pass over the sprocket 49.

Referring now more particularly to FIGS. 13, 14 and 15, the construction of a plate P will be described. It is first notable that the number of cup receiving recesses in each plate may vary with the design of any particular machine. Also that the number of plates making up any tray unit may also vary. The present invention is illustrated and described with each plate P formed with one row of twenty-four-recesses, each adapted to receive a paper cup.

As shown in FIGS. 13 and 15 each plate P is of elongated rectangular formation defined by a top surface 50, bottom face 51, (FIG. 14) end faces 52 and side faces 53. Opening into each plate P from the top face 50 are three of the twenty-four recesses, X, Y and Z, the number being so confined to facilitate illustration and description. Each of the recesses X, Y and Z is defined by a flat circular bottom 54 and a cylindrical wall 55. The wall 55 of recess X is interrupted by two slots 56 and 57 which open onto the side faces 53 and are continued through the bottom wall 54 to provide notches 58. The recess Z is similar to recess X but recess Y, the central one, has a second pair of slots 59 which interrupt adjacent cylindrical walls 55 of the recesses X and Y at one side, and Y and Z at the other. These slots 59 are continued through the bottom walls 54 as holes 60.

At this point it is deemed advisable to refer to details of a paper cup and a tray, which is formed from a plurality of such cups. FIG. 12 illustrates a portion of a tray T comprising a plurality of cups A. While the cups may be of any shape presenting a flat bottom and an upwardly flaring wall the invention has in mind, as the preferred embodiment, a cup A having a flat circular bottom 61 and a corrugated or crimped conical wall 62 integral therewith. It is evident that with the dimensions of the recesses X, Y and Z properly correlated to a particular size of paper cup when the bottoms 61 of the cups are forced against the bottom walls 54 of the recesses, the conical walls 62 will be disposed so that the upper portions of adjacent cups engage with the corrugations intermeshing.

As shown in FIG. 2 the standards 15 and 16 are anchored to a base plate 63 at the bottom and an overhead

supporting plate **64** at the top. The shaft **21** at each side is journalled in the respective plates or standards **15** or **16** by a bearing assembly **67**. Drivably carried by each shaft **21** at its wind end is a cam **68** (FIGS. 6 and 7).

Positioned above, and riding over each cam **68** is a follower roller **69**. The latter is journalled on a stub shaft **70** carried by a vertical bar **71** of a slide assembly. Referring now to FIG. 10, this assembly includes a pair of slide blocks **72** and **73** (one pair on each side) which are spaced apart and formed with openings receiving guide rods **65** and **66**. Each of the blocks **72** and **73** has a pair of feet **74** secured to inner plates **75** by bolts **76**.

Each inner plate **75** is formed with a pair of vertical recesses **77** which open onto the inner face thereof. A corresponding shaped rod **78** is received in each of these recesses. Each pair of the rods **78**, that is one on one side and one on the other side are joined by a cross bar **79**. Each of the latter has an upraised central part **80** from which upstand a plurality of coated wires **81** each being adjustably mounted in a bar **79** by a setscrew **82** (FIG. 3).

An angle iron **83** has one flange extending over the rods **78** and closing the recesses **77**. The angle iron **83** also has an inwardly extending flange to which are secured the upper ends of springs **84**. The lower ends of the latter are anchored to pins **85** which project through slots **86** formed in a plate **87** that also overlies the rods **78** and closes the slots **77** below the angle iron **83**.

It is evident that each slide assembly comprising plate **71**, blocks **72** and **73**, inner plate **75**, angle iron **83** and plate **57** may slide as a unit on either guide rod **65** or **66**. Moreover each rod **78** is connected to each slide assembly by a spring **84** and pin **85**. Thus as a cam **68** rotates, the follower **69** in engagement therewith is raised to impart a corresponding movement to the slide assembly. This movement is imparted with a yielding action through the springs **84** to the rods **78** which in turn carry the gluing wires **81**.

The upraised portions **80** of the cross rods **79** leave surfaces **88** at each side which constitute abutments that engage the lower forces of the conveyor C to limit upraised movement of the cross bars **79** as shown in FIG. 2. However, should any additional upward movement be imparted to the slide assemblies it is accommodated by the springs **84**.

Positioned on each standard **15** and **16** above the respective bearing **67** is a second bearing **89** (FIG. 2). Journalled in each bearing **89** is a shaft **90**. Drivably mounted on each of the latter are a pair of sprockets **91** and **92**. Each shaft **21** carries a sprocket **93**. A drive chain **94** passes over each set of sprockets **92** and **93** at one side to drive the shaft **90** at that side from the shaft **21**.

Drivably mounted on the inner end of each shaft **90** is a cam **95**. Above and riding on the latter is a cam follower **96** that is carried by a slide **97**. Each of the latter slides on either of the guide rods **65** or **66**.

A U-shaped cup holder is identified in its entirety by the reference character U (FIGS. 2 and 8). The cup holder U comprises a pair of vertical side bars **98** and **99**, the upper ends of which are connected to the slides **97** by the box like connectors **100**.

The holder U also includes a bottom cross piece **101** connected to the side bars **98** and **99**. The cross piece **101** is formed with a plurality of openings **102** (FIG. 9) corresponding in number and relation to the recesses including X, Y and Z in plate P. Slidably positioned in each opening **102** is a bolt **103**. The lower end of each bolt **103** carries a conical cup engaging member **104** having a dome shaped bottom. Interposed between each of the latter and the cross piece **101** is an expansion coil spring **105**.

It is evident that rotation of the cams **95** causes reciprocation of the cup holder U. Downward movement of the latter urges the members **104** against the bottoms **61** of the cups with a yielding action to hold the cups in position in the recesses including X, Y and Z.

To the end of providing for normal operation to insure that parts are in proper position for indexing of the conveyor a crank handle **106** is provided. It is drivably mounted on a shaft **107** that is journalled in bearing **108** carried by the top plate **64**. A sprocket **109** is drivably mounted on the shaft **107** at each side and a drive chain **110** passes over each sprocket **110** and a corresponding sprocket **91**. Thus rotation of crank handle **106** imparts movement to the other operating parts.

As illustrated in FIG. 2, a supply for glue is shown in the form of an open top pan **111**. This is located at the gluing station below the top ply of the conveyor C. It is of sufficient depth to provide for the complete immersion of the cross bars **79** and wires **81** carried thereby in the glue. It may be heated in any appropriate manner as by the heating means indicated at **112**.

Referring now to FIG. 1, it is to be understood that mechanism not a part of this invention is effective to withdraw cups from vertically arranged magazines and deposit each individual cup in the recesses X, Y and Z, etc. in the plates P so that each recess receives such a cup. This is done before the plates reach the gluing station.

The conveyor C is indexed with a step by step motion by indexing mechanism which, in itself, is not a part of this invention because such mechanisms are well known. At the gluing station and preferably throughout its extent the upper ply of conveyor C is supported by the reception of rollers **8** in channel or L shaped horizontal support and guide rails **113** as shown in FIG. 2.

As mentioned above the glue is a quick drying glue and the discharge end of the conveyor C, which is at the left hand side of FIG. 1 (speaking with reference to the showing of the drawings) is spaced from the gluing station a distance sufficiently great to permit the glue to dry in the time of travel from the gluing station to the discharge end. Immediately in advance of the latter is an air nozzle **114** (FIG. 1) which is mounted on frame F and connected to a suitable supply of air under pressure by a tube **115**. If desired a plurality of air nozzles **114** may be employed. These air nozzles literally blow completed trays T free of the plates P.

The apparatus so far described would be effective to glue together all of the cups A in a row as defined by a plate P and each such row to the next adjacent row. Thus the result would be one continuous tray. As the purpose of the invention is to provide discrete trays T, such as ones comprising seventy-two cups in a formation of twenty-four by three, mechanism is provided for blocking off the row of wires **81** which effect the gluing together of adjacent rows at selected intervals.

This mechanism is depicted at the upper right hand side of FIG. 10. It comprises a transverse bar support **116** the ends of which are anchored to the standards **15** and **16** (FIG. 2) at one side of rods **78** with the upper surface of bar **116** lying substantially in the plane of the upper ends of rods **78**. Referring now again to FIG. 10 which may be considered in conjunction with FIG. 2, a disc **117** is mounted in freely pivoted relation on the upper face of bar **116**. A tension spring **118** has one end anchored to bar **116** and its other end to disc **117**. It normally retains the disc **117** in a middle or central position.

A pair of abutment arms **119** are pivotally mounted on the upper face of bar **116**, one each side, and each abutment arm has an end portion that projects from the side of bar **116** so that in one position it engages the upper end of a rod **78** to preclude upward movement thereof. A link **120** connects the end of one arm **119** remote from its projecting end to disc **117** and a push rod **121** has one end connected to disc **117** at a point diametrically opposite to its connection with link **120**.

Push rod **121** is connected to the other abutment arm **119** at **122** and is continued outwardly beyond this connection with its free end ring connected to the armature of a solenoid **123**. The latter is under the influence of a control (not illustrated) which energizes the solenoid at

selected times to move the projecting portions of abutment arm **119** over the upper ends of one pair of rods **78** to inhibit the upward or gluing stroke of the latter. When the solenoid **123** is deenergized, spring **118** returns abutment arm **119** to the position of FIG. 10.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact constructions, mechanisms and devices illustrated and described because various modifications of these details may be provided in putting the invention into practices within the purview of the appended claims.

What is claimed is:

1. In the production of paper cup trays, the method comprising the steps of: assembling a plurality of paper cups each of which has a flat bottom and an upwardly flaring peripheral wall in a tray like unit with upper wall portions of each cup engaging similar wall portions of adjacent cups whereby cup bottoms are spaced from one another and adjacent wall portions flare upwardly into engagement with one another; moving said tray like formation through a gluing station; firmly holding said cups in said formation at said gluing station by clamping the upper faces of said bottoms and at the same time applying glue to and between upper engaging portions of said walls from the spaces between the wall portions of adjacent cups and from a location below the cup bottoms, said walls being glued together only at the top where they engage with the remainder of the walls being out of engagement and free of one another.

2. The method of claim **1** in which each cup has a circular bottom and a corrugated conical wall with upper portions of the walls of adjacent cups being urged into intermeshing engagement by said cup holding operation.

3. In the production of paper cup trays, the method comprising the steps of: assembling a plurality of paper cups in a series of tray units arranged horizontally, each of said cups having a circular bottom and a corrugated conical wall with upper portions of the walls of adjacent cups in engagement; indexing said tray units with a step by step motion through a gluing station; firmly holding said cups by engaging the bottoms thereof from the upper face of the tray at the gluing station and, at the same time applying glue from the underface of the tray unit to engaging wall portions.

4. The method of claim **3** in which the bottoms of the cups are held from both the upper and lower faces thereof to force the corrugations of engaging wall portions into meshing engagement.

5. The method of claim **3** in which the conical walls of adjacent cups define tapered spaces through which the glue is applied to the engaging wall portions.

6. The method of claim **3** together with the step of heating the glue before application at the gluing station.

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