United States Patent

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[54] **APPARATUS FOR FORMING CATAMENIAL NAPKINS**

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[21] Appl. No.: **92,109**

[52] **U.S. Cl.** ..... **19/144 S**

[51] **Int. Cl.** **A61l 15/00**

[58] **Field of Search** ....19/144.5, 144; 128/290; 18/5, 18/13 D, 16.5, 19 A, 35, 42 R, 42 J, 44, 12 DH, 23; 264/109, 119, 293, 294, 299; 425/398, 412

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[57] **ABSTRACT**

Apparatus for forming permanently curved catamenial napkins having compressed troughts or channels on its effective top surface defining a compacted tampon-like ridge between the channels, and a longitudinal channel on its convex bottom surface. The apparatus also functions to generate lateral creases adjacent to the napkin ends to facilitate folding inwardly of the end portions when packaging.

17 Claims, 8 Drawing Figures

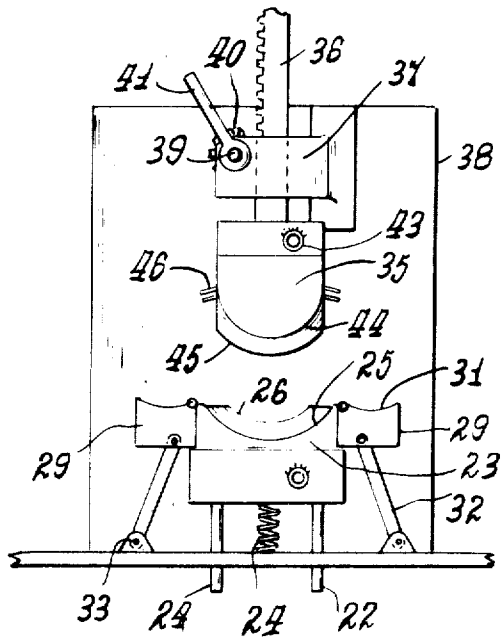


Fig. 1.

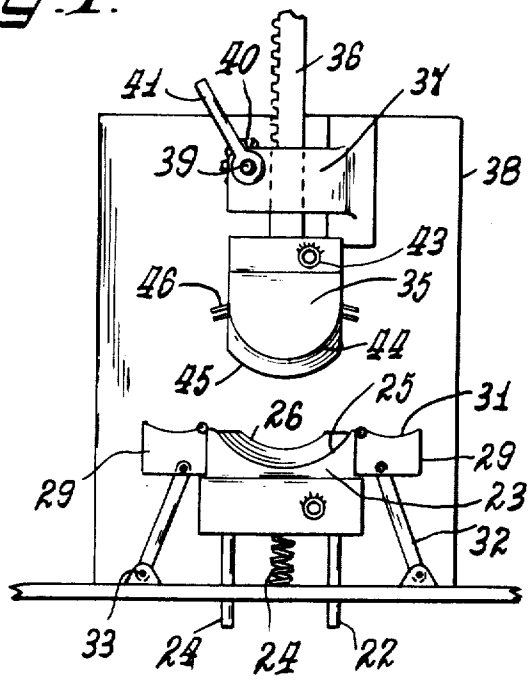
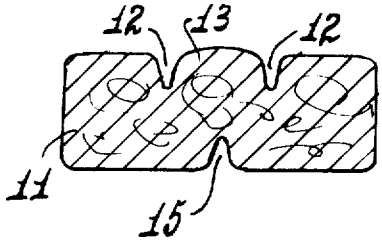


Fig. 4.



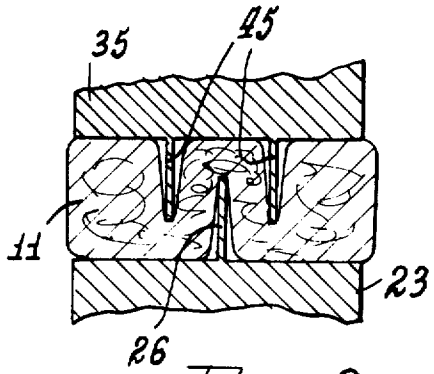
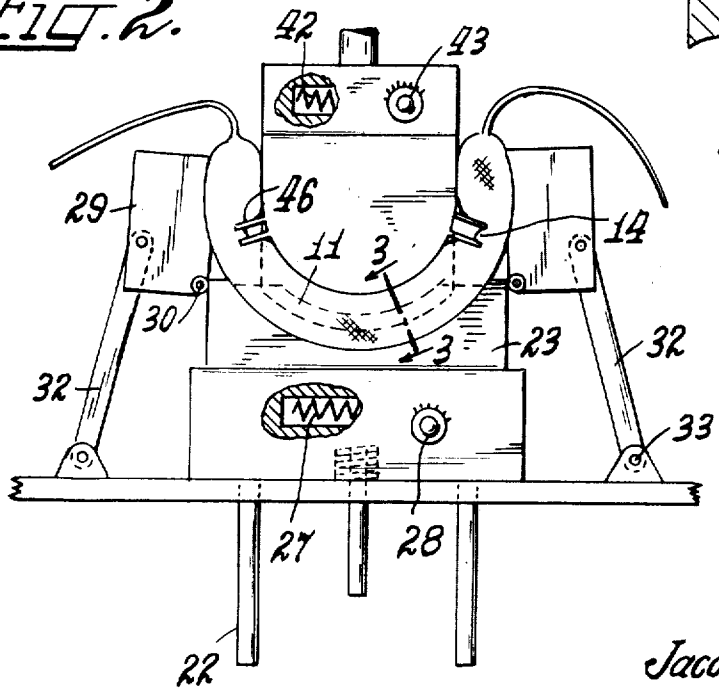


Fig. 3.

Fig. 2.



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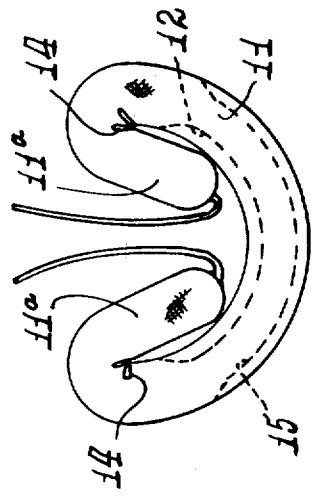
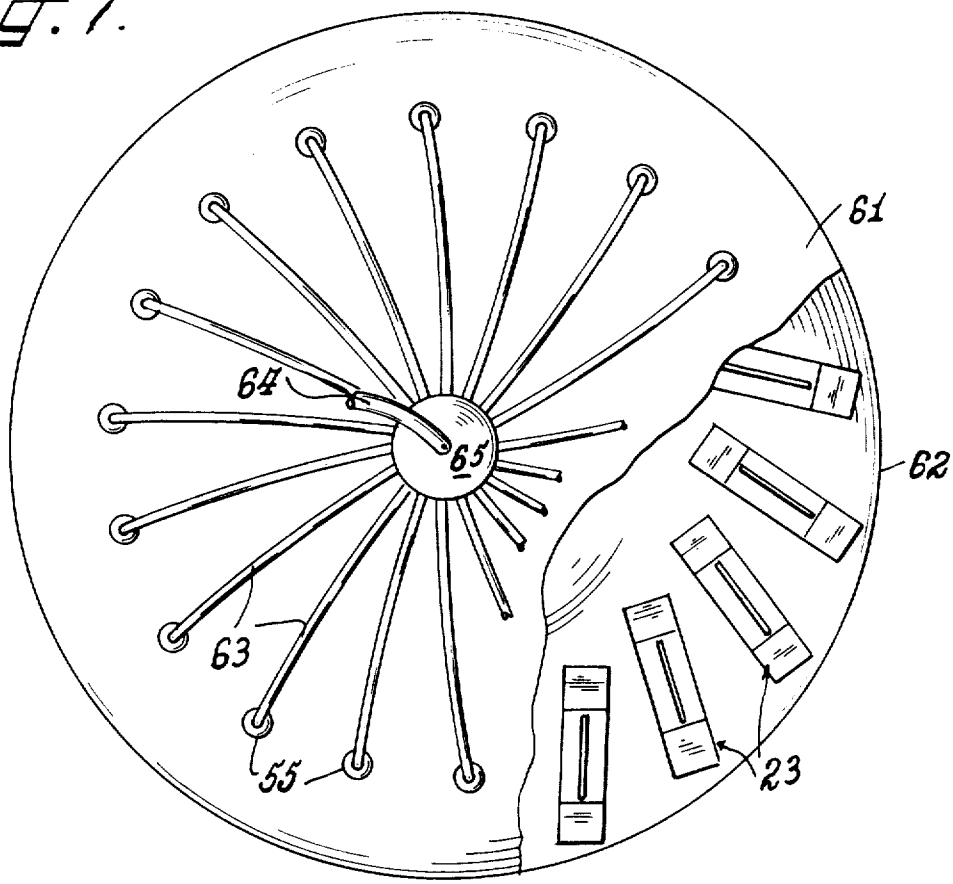


FIG. 5.

FIG. 6.

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Fig. 7.



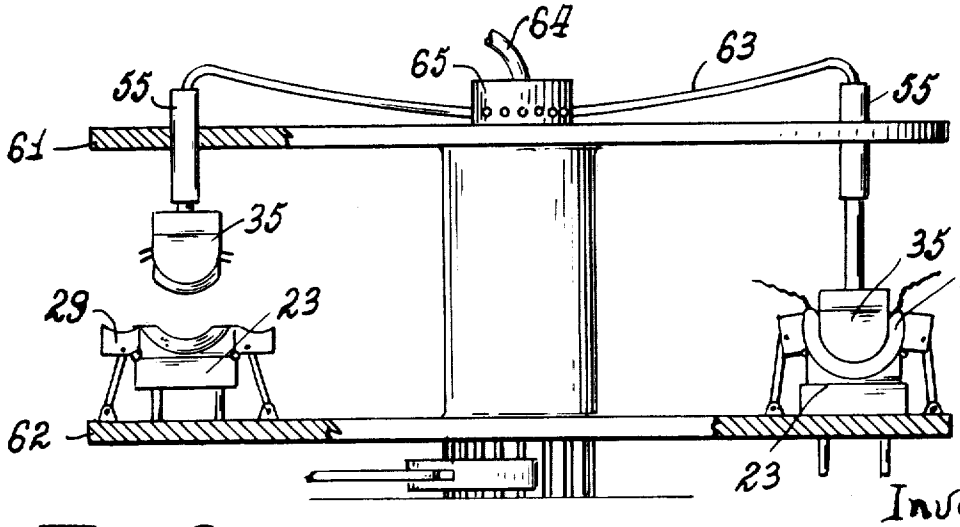


Fig. 8.

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APPARATUS FOR FORMING CATAMENIAL NAPKINS

The invention pertains to apparatus for forming catamenial napkins. Specifically, the apparatus includes dies, between which a napkin is arranged, movable toward and away from each other so as to perform compression of selected areas only of the napkin. In the embodiments disclosed herein the dies function to generate two laterally spaced apart longitudinal channels in the top effective surface of the napkin while forming said napkin into an exaggerated U-shaped longitudinal arch that will conform substantially to any curvature of the crotch of a wearer. The dies also generate a longitudinal channel in the bottom or convex face of the arched napkin which is useful to enable the napkin to fold downwardly into an inverted "U" when arranged between the thighs of a wearer. Furthermore, to facilitate packaging, the dies generate lateral creases inwardly of each end of the napkin to permit the end portions thereof to be folded over inwardly over the body of the napkin and thereby preserve the U-shape arch during packaging and shelf life.

Such a catamenial napkin is shown in my U.S. Pat. No. 3,411,504, issued Nov. 19, 1968.

It is therefore an object of the invention to provide apparatus of the character referred to.

Another object is to provide napkin forming apparatus comprised of relatively movable dies between which a napkin is arranged and by means of which the napkin is formed into an exaggerated U-shaped longitudinal arch.

Another object is to provide co-operating dies, one of which includes movable wing portions for co-operating with crease inducing ribs on the other die.

Another object is to provide co-operative dies with means to generate, by compression, longitudinal channels in a napkin arranged between them.

Another object is to provide apparatus of the character referred to which is not difficult or expensive to manufacture or operate and which is very efficient in use.

Other objects and advantages of the invention will become apparent with reference to the following description and accompanying drawings.

In the drawings:

FIG. 1 is a front elevational view of the die assembly, in open position, having manual operating means associated with it.

FIG. 2 is an enlarged elevational view of the die assembly in closed position, showing a napkin between the dies.

FIG. 3 is a transverse sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a transverse sectional view of the formed napkin.

FIG. 5 is an elevational view of the napkin as formed in the die assembly.

FIG. 6 is a fragmentary elevational view of a series of die assemblies carried on endless conveyors for automatic napkin production.

FIG. 7 is a top plan view, partly broken away, of a circular form of automatic machine.

FIG. 8 is a vertical sectional view of the FIG. 7 assembly, showing parts in elevation.

The menstrual napkin, best shown in FIG. 5, comprises a rectangular pad 11 of loosely matted fibrous material such as cotton, fluffed paper, crepe wadding, or other highly moisture absorbent material, which is subjected to heat and moisture and pressure so as to be formed substantially arch shaped. When so formed it more readily conforms to the shape assumed when mounted in place in the crotch of the wearer. In fact, the curvature is such that it must be opened outwardly when mounted in place, thus avoiding the formation of lateral creases or wrinkles that so frequently occur when a flat or slightly curved napkin is used. The top surface is provided, by compression, with a pair of laterally spaced apart longitudinal grooves or channels 12 (FIG. 4) defining between them a compacted central ridge 13 that functions in the manner of a tampon when fitted into place within the vulva. Inwardly of each end of the napkin there is formed, also by heat, moisture and compression, at least one lateral groove or crease 14 that weakens the structure to a degree that permits the end portions 11*a* to be folded over inwardly for convenience of packaging and storing. Also, a compressed groove 15 may be formed on the bottom or convex side of the napkin to facilitate its assuming a substantially U-shaped laterally when in place between the thighs of the wearer.

The formation of the arch, the grooves, the ridge and the creases is best accomplished by use of the herein disclosed manual and automatic apparatus.

The manually actuated apparatus, best shown in FIGS. 1 and 2, comprises a rigid base 21 having a pair of guide posts 22 telescoped therein and projecting upwardly therefrom and upon which is secured a lower die 23. A spring 24, arranged between the base and die 23 normally retains the die elevated from the base. This die 23 is elongated and has a concave upper surface 25 formed with an upstanding longitudinally centered rib 26. A suitable heating element 27 is enclosed in the die and is suitably connected with a source of electric current through a rheostat control 28, operable to control the flow of current to the heating element.

A pair of wings 29 is hingedly connected, as at 30, one to each end of die 23. These also have a concave effective surface 31. Each is pivotally connected respectively to the upper end of a link 32 the lower end of which is pivotally connected to the base, as at 33. The operation and function of these wings will be described presently.

An upper die 35 is mounted for vertical reciprocation toward and away from the lower die 23. In this embodiment this upper die is carried on the lower end of a vertical rack 36 guided in a bearing 37 carried by an upstanding wall 38. The bearing 37 also journals a shaft 39 carrying, on one end, a gear 40 that is meshed with the rack and, on its other end, a hand crank 41, or other suitable manual or automatic drive means. It should be evident that upon rotation of shaft 39 the upperdie is carried toward and away from the lower die 23. The upper die also carries a heating element 42 that is connected with an electric current source through a rheostat 43 operable to regulate the degree of heat generated by heating element 42. The upper die 35 has a convex effective bottom surface 44 arched to conform with the concave surface 25 on the lower die 23.

A pair of laterally spaced apart longitudinal ribs 45 are formed on the convex surface of the upper die. Said die also carries on each end, a pair of radially project-

ing ribs **46** disposed to cooperate with the wing dies **29** in a manner to be described presently.

In operation, electric current is applied to the heater elements of both dies to heat same to about 300° F. A flat catamenial napkin **11**, having first been moistened with water or steam, is laid upon the lower die **23** with its end portions overlying the wings **29**. The upper die **35** is then carried downwardly against the napkin and both dies, with the napkin between them, are advanced so as to carry the lower die into the lowermost position as shown in FIG. **2**. Pressure of from about 3 to 6 lbs. is maintained on the upper die so as to cause the ribs **45** on the upper die and the rib **26** on the lower die to compress the napkin to form longitudinal grooves **12** and **15** therein, as best shown in FIG. **3**.

While the lower die **23** is being depressed, the connecting links **32** cause the wings **29** to rock upwardly about their hinge connections **30** to press the end portions of the napkin firmly against the radial ribs **46** and form the lateral creases **14** in the napkin. Pressure is maintained for about from **2** to **12** seconds after which time the upper die is returned to its elevated position and the lower die returns to its initial elevated position and the napkin is removed. The napkin will now retain its exaggerated arched condition with the pair of longitudinal channels **12** in its concave surface defining between them the centrally located and compacted tampon-like ridge **13**, and a longitudinal centrally located channel **15** on its convex surface to facilitate lateral down folding of the napkin into an inverted U-shape when in place between the thighs of the wearer.

In the automatic apparatus disclosed in FIG. **6**, upper and lower related endless conveyors **51**, **52**, are provided. The upper conveyor **51** is trained over suitable sprockets and it carries a plurality of upper die assemblies **35** which in this instance are operated by pressurized fluid. As shown, an endless air conduit **53** is contiguous with the conveyor **51** and it is suitably connected to a source of pressurized fluid. Obviously, any suitable means may be provided to deliver pressurized fluid to the conduit **53**. Each upper die assembly is connected through a valve **54** with the conduit **53**. Normally the valves are closed and the die **35** is held elevated by spring means **55** in the piston-cylinder assembly. As the conveyors advance to the right in unison, with the napkin between the dies, the valve levers **54a** strike a pin **57** and are opened to admit fluid into the respective cylinder-piston assemblies **56** to urge the related dies **35** downwardly with the desired pressure for forming the overall described napkin. This open condition remains until the die assembly has traveled the requisite distance and time when a second pin **58** is engaged by the valve lever **54*a*** to close the valve whereupon the die **35** returns to its initial position and the formed napkin is removed or ejected by any desired means.

The lower conveyor **52** carries plates **59** that mount the lower die assemblies **23**. It is understood that the two conveyors travel at uniform speeds and that the upper and lower dies are in vertical alignment when the upper die assembly is lowered to form a napkin arranged between them. This assembly may be arranged at the discharge end of the napkin fabricating machine **60** and cycled to its discharge rate so as to receive flat napkins as they are discharged therefrom and complete them as herein described.

FIGS. **7** and **8** show a circular type of apparatus wherein the upper and lower die assemblies **35** and **23** respectively, are mounted respectively on upper and lower rotary discs **61**, **62**, which are indexed as for example, by a reciprocable pawl and ratchet combination shown in FIG. **8**, to syncronize with the output of flat napkins from a napkin fabricating machine. Like numerals identify parts corresponding with the previously disclosed structures. Preferably, the die assemblies are arranged as shown so as to increase the capacity of the discs. The actuating piston-cylinder assembly **55** of each die assembly receives pressurized fluid through radial lines **63** connected to an axial supply line **64**, which includes suitable multiple valve means **65** to control the feed of pressurized fluid to selected valve assemblies during the indexed rotation of the discs.

Although I have described preferred embodiments of the invention, in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as details of the structures may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact constructions described.

I claim:

1. Apparatus for forming a catamenial napkin comprising, in combination, dies movable relative to each other and between which a catamenial napkin is arranged, said dies being arcuately shaped on opposed faces, means operable to move one of said dies toward and away from the other, means on at least one of said dies to compress selected areas only of said napkin, movable end die portions on one die, and means to move the end die portions toward one another to fold end portions of the napkin inwardly when the dies are moved toward each other.

2. The apparatus recited in claim **1**, in which the compression means on the die comprises spaced ribs on the effective face thereof.

3. The apparatus recited in claim **2**, in which the other die has means thereon to compress a transverse groove in the napkin to facilitate its being folded laterally.

4. The apparatus recited in claim **1**, in which both dies have means to compress selected areas of the napkin.

5. Apparatus for forming a catamenial napkin comprising, in combination, a base, a lower die movably mounted on said base, means normally holding said die elevated above said base, means to guide said die for vertical reciprocation relative to the base, a movable upper die arranged above and normally spaced from the lower die to admit a napkin therebetween, means operable to move said upper die toward and away from the lower die and to cause both dies to move in the direction of the base when the dies are brought together with the napkin between them, means on the upper die to generate longitudinal grooves in one face of the napkin when the dies are brought together under pressure, wing dies movably mounted at the ends of the lower die and over which end portions of the napkin extend, and means to move said wing dies upwardly relative to the lower die.

6. The apparatus recited in claim **5**, in which the upper die carries means to cooperate with the wing dies to generate at least one lateral crease in each end portion of the napkin.

7. The apparatus recited in claim 5, in which means is provided to rock the wing dies in an upward direction when the lower die is moved toward the base.

8. The apparatus recited in claim 5, in which the means to generate the longitudinal grooves comprises ribs on the effective face of the upper die.

9. The apparatus recited in claim 5, in which the opposed faces of the dies are arcuately shaped in a longitudinal direction.

10. The apparatus recited in claim 5, in which means is provided on the lower die to generate a longitudinal groove in the napkin when the dies are brought together under pressure.

11. The apparatus recited in claim 5, in which heater elements are contained in each die.

12. The apparatus recited in claim 5, which includes a plurality of upper and lower dies and a source of pressurized fluid and valve controlled piston-cylinder assemblies provided to periodically lower selected of the upper dies.

13. The apparatus recited in claim 5, in which upper and lower endless conveyors are provided and a series of upper dies are carried by the upper conveyor and a series of lower dies are carried by the lower conveyor.

14. The apparatus recited in claim 13, in which means is provided to supply pressurized fluid to the upper dies to actuate the same.

15. The apparatus recited in claim 5, in which upper and lower disc assemblies are provided, and a plurality of upper and lower dies are mounted respectively on the upper and lower disc assemblies.

16. The apparatus recited in claim 15, in which common means is provided to supply pressurized fluid to the upper dies to actuate same.

17. The apparatus recited in claim 15, in which means is provided to index rotation of the disc assemblies.

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