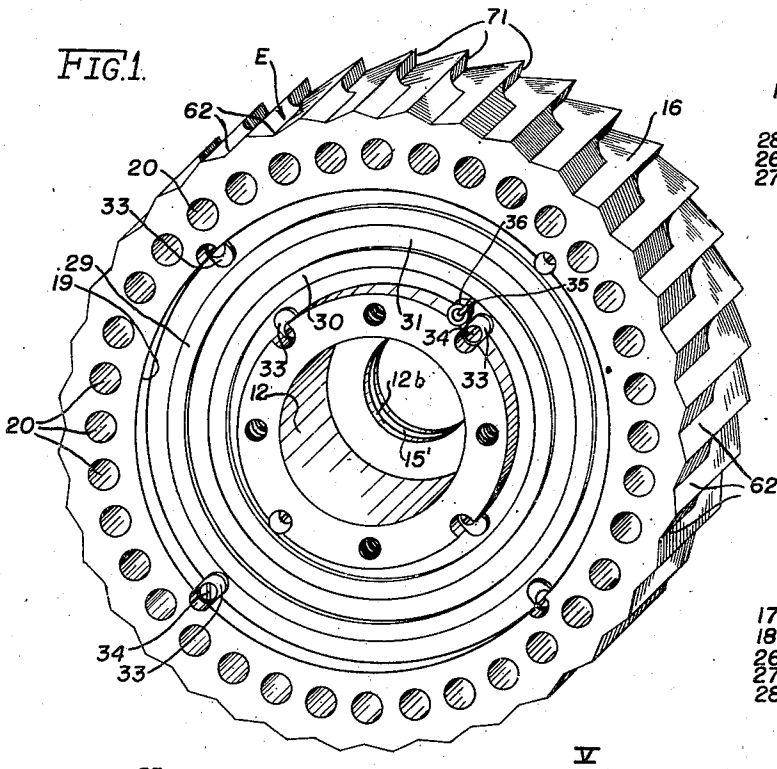
March 4, 1947. J. R. McLAUGHLIN 2,416,706

COMPRESSION DRUM FOR FORMING COTTON AND THE LIKE

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FIG. 1.



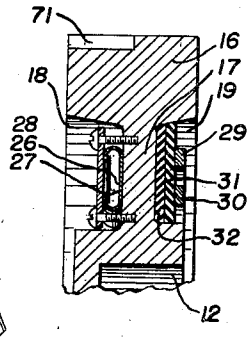


FIG. 3.

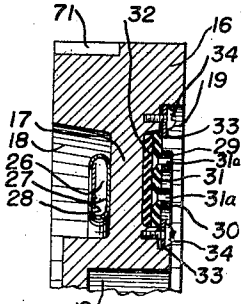


FIG. 4.

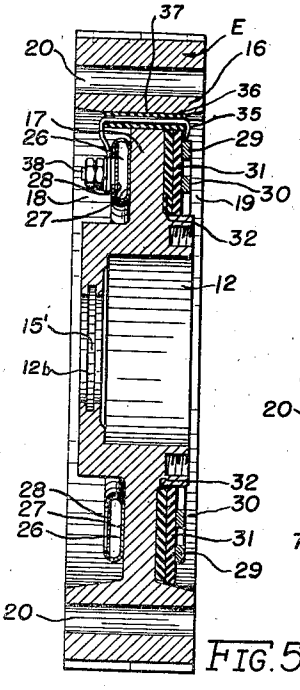


FIG. 5.

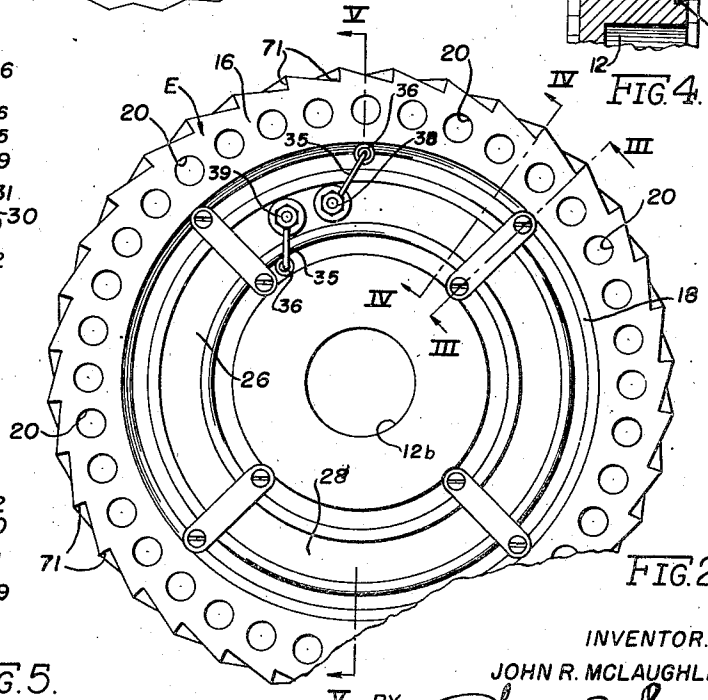


FIG. 2.

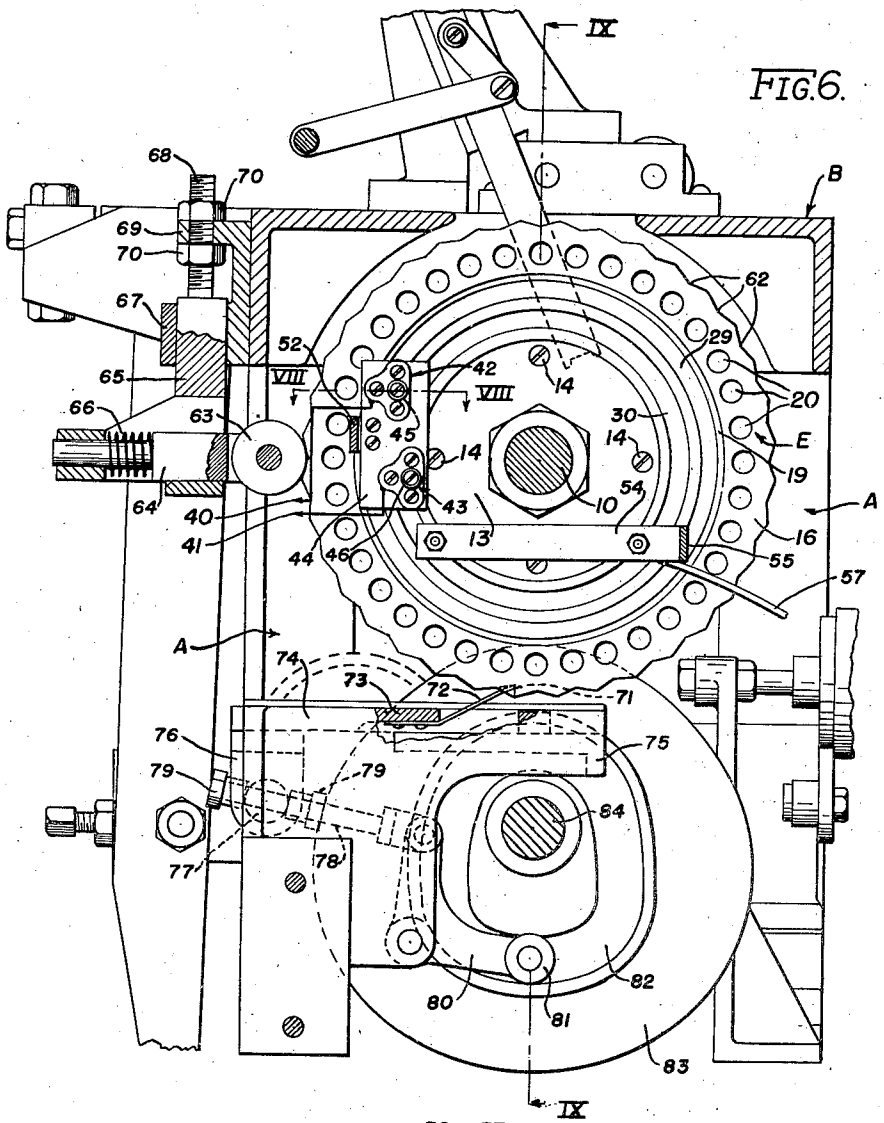
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COMPRESSION DRUM FOR FORMING COTTON AND THE LIKE

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FIG. 6.



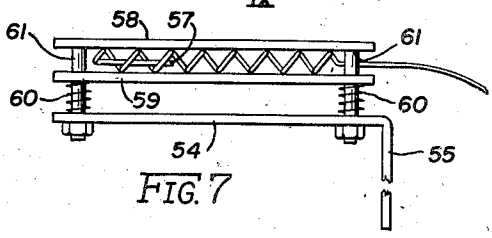


FIG. 7

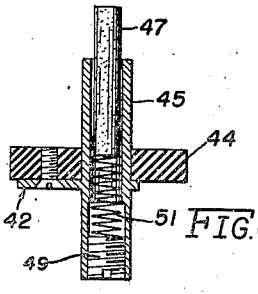


FIG. 8.

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COMPRESSION DRUM FOR FORMING COTTON AND THE LIKE

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FIG. 9.

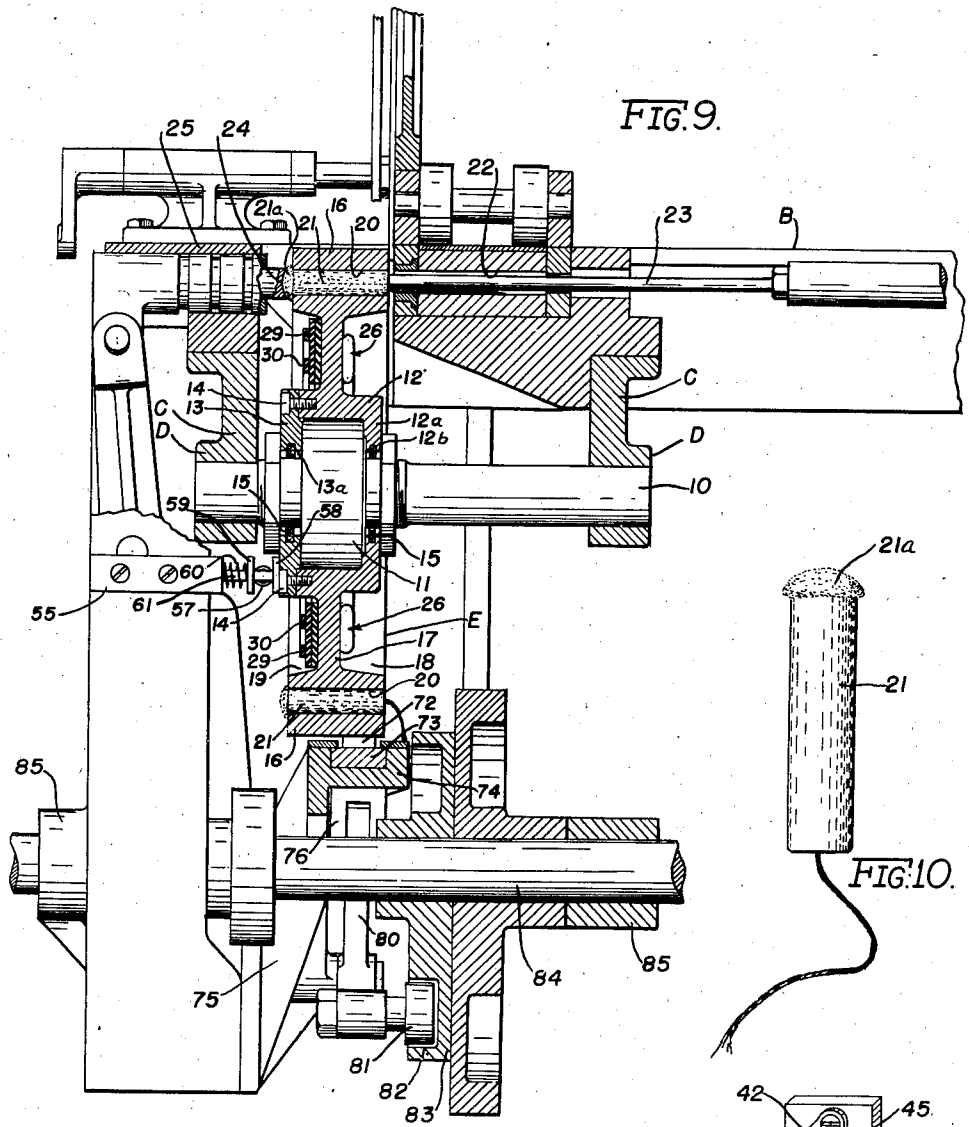


FIG. 10.

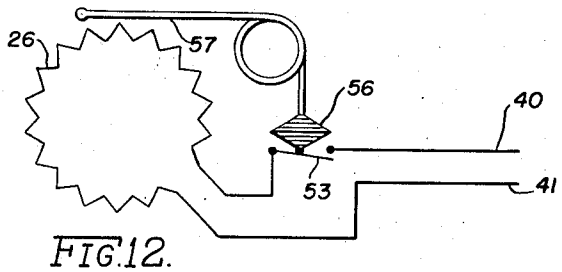


FIG. 12.

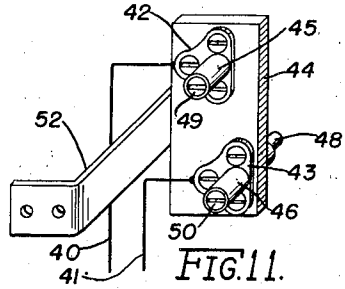


FIG. 11.

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Patented Mar. 4, 1947

2,416,706

UNITED STATES PATENT OFFICE

2,416,706

COMPRESSION DRUM FOR FORMING COTTON AND THE LIKE

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Application October 23, 1942, Serial No. 463,093

9 Claims. (Cl. 18—5)

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The present invention relates to apparatus wherein pieces of cotton or like fibrous material are adapted to be compressed into firmly compacted, form-sustaining wads or plugs such as are used for sanitary purposes.

More especially the apparatus above-mentioned is preferably in the form of a drum that is provided with a continuous series of pockets into which a plunger device delivers compressed wads of cotton which do not have the form-sustaining properties of the finished articles. While in the pockets of the drum, the compressed wads of cotton are maintained in their compressed state while being subjected to the desired degree of heat for a period of time so that when the wads are discharged from the apparatus they will be in a form-sustaining state.

The present invention has particular reference to the structure of the drum, and the means for heating the same, and one of the objects hereof is the provision of a structure of the character contemplated herein that is novel as well as compact in the arrangement of its parts.

Another object of this invention is to provide means for effectively heating the drum during rotative movement of the latter, and for controlling the temperature of said drum in an automatic manner.

Still another object is to provide a structure of the kind disclosed that is capable of continuous step-by-step operation.

An additional object is to provide means for indexing the intermittent movement of the drum to register the material-receiving pockets successively with a wad feeding structure.

Further objects, aims, and advantages of these improvements will be apparent to persons skilled in the art after the invention is understood from the within description. Among these further objects may be mentioned that it is an aim to provide a device that possesses a high degree of novelty; is effective in performing its functions; is made of sturdy parts so that it will withstand severe usage; and which is comparatively economical to manufacture.

It is preferred to accomplish the above-mentioned objects and to practice this invention in substantially the manner herein fully described and as more particularly pointed out in the appended claims, reference being herein made to the accompanying drawings that form a part of this specification.

In the drawings:

Figure 1 is a perspective view of a cotton compression drum embodying the features of the present invention.

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Figure 2 is a fragmentary face view of the drum shown in Figure 1.

Figure 3 is a fragmentary sectional view of the drum taken substantially along line III—III of Figure 2.

Figure 4 is a fragmentary sectional view taken substantially along line IV—IV of Figure 2.

Figure 5 is a sectional view taken substantially along line V—V of Figure 2.

Figure 6 is an elevation partly in section showing the compression drum mounted in a frame, together with instrumentalities for feeding cotton to it and effecting its compression.

Figure 7 is a side elevation of a thermostat assembly utilized in conjunction with the drum shown in Figs. 1 and 2.

Figure 8 is a sectional view of the contact brush assembly taken along line VIII—VIII of Figure 6.

Figure 9 is a sectional view of the drum assembly taken substantially along line IX—IX of Figure 6.

Figure 10 is a side view in elevation of a complete compressed tampon after removal from the drum shown in Figure 1.

Figure 11 is a perspective view of the brush contact assembly detached from the drum.

Figure 12 is a wiring diagram of the drum heater and the thermal control therefor.

The drawings, which are to be understood as being more or less of a schematic character, disclose a typical or preferred form in which the invention may be made, and in these drawings like reference characters are employed to identify the same parts in the divers views.

The compression drum of this invention is mounted in a suitable frame which preferably consists of upright supports A to the upper portions of which a horizontal bed B is secured, and depending from said bed there are spaced hangers C, C, which have horizontally bored bearing bosses D, D, at their lower ends. The shaft 10 which supports the drum has its end portions journalled in these bosses, and intermediate its ends said shaft 10 is provided with a cylindrical ball-bearing 11 as shown in Figure 9 and said shaft is threaded upon each side of said ball-bearing.

The drum, as shown in Figure 9, is designated as a whole as E and preferably is a metal casting of somewhat wheel-shape in cross-section. The central portion of the drum has a hollow cylindrical hub 12 the inside diameter of which is such that it will fit around the ball-bearing 11 of the

shaft, and one of the side faces of this hub 12 is open and is provided with a closure plate 13 that is removably secured in place by bolts 14 screwed into the edge of the cylindrical wall of the hub 12. The closure plate 13 and the opposite wall 12a of the hub are provided with alined openings 13a and 12b respectively that surround the shaft 10 upon each side of and adjacent the ball-bearing 11, and felt oil-sealing disks 15, 15, are interposed between the edges of said openings and the shaft in grooves 15'.

The rim or felly 16 of the wheel-shaped drum E is of substantial thickness, and it is joined to the cylindrical wall of the hub 12 by an annular web 17 so that the drum is provided upon its side faces with annular channels 18 and 19 that occupy the space between the hub 12 and the rim 16 and are separated from each other by the web 17 the faces of said web forming the bottoms of the channels 18 and 19. An annular series of open end bores serving as pockets 20 are formed transversely through the rim 16 and are disposed with their axes parallel to each other and parallel to and in a row that is concentric to the axis of shaft 10.

The cotton or other fibrous material is formed into individual wads 21 in a shaping chamber 22 on the bed B of the support and after being compressed into a compact cylinder each wad 21 is forced out of said chamber 22 into a pocket 20 of the drum which has been alined therewith during a momentary pause in the rotation of the drum. The end of the wad 21 protrudes out of the end of its pocket 20 opposite the chamber 22 and it has a head 21a formed on it by means of a shaping plunger 24 that reciprocates in a holder or bearing 25 on the bed opposite the chamber 22. Any suitable mechanism may be provided for actuating the ejector plunger 23 and the head shaping plunger 24, and such need not be described herein since it forms no portion of the present invention.

The drum E is preferably heated to the desired temperature by an electric heating element 26 that is of an annular or ring-like shape and is disposed in the channel 18. The element 26 is enclosed in an annular housing 27 of a wide or flattened U-shape in cross section which electrically insulates the element from the web 17 and the outer open portion of the housing is closed by a suitable piece of flat annularly shaped material 28. Concentric rings 29 and 30 of copper or other highly conductive metal are attached to an annulus 31 of insulating material by rivets 31a and said annulus 31 is backed by a second flat ring of insulating material 32. The concentric metal rings 29 and 30 provide annular contact members, and when assembled with the insulating rings 31 and 32 are mounted in the channel 19 of the drum E by means of washers 33 that overlap the edges of the insulating members and are held in position by screws 34 in the manner shown in Figure 4.

The annular metal contact members 29 and 30 are electrically connected with the heating element 26 by short wire conductors 35 that lead through insulating bushings 36 fitted into holes 37 that are bored transversely through the web 17 of the drum E as shown in Figure 5, the ends of said wires 35 being connected respectively to the contact members 29 and 30 and to binding posts 38 and 39 that are mounted upon the housing 27—28 which insulates the heating element 26. The inner ends of these binding posts 38 and 39 are in electrical connection with the heating element 26 within the housing 27—28.

The electric current is fed from a suitable source by means of conductors 40—41 to brush mounting plates 42 and 43 that are secured to an insulating block 44 and are provided with transversely disposed tubes 45 and 46 that project upon both sides of the block 44 and carry brushes 47 and 48 in their interiors. Plugs 49 and 50 are screwed into the outer ends of said tubes 45 and 46 and springs 51 which are interposed between said plugs and the inner ends of the brushes 47 and 48, urge said brushes into intimate contact with the contact rings 29 and 30 on the drum E so that there will be a continuous flow of electric current through the heating element 26 during rotation of the drum E. The insulating block 44 carrying the brushes 47 and 48 is supported adjacent the drum E by an angular bracket or arm 52 that is attached to an adjacent portion of the supporting frame in which the apparatus is mounted.

As stated before herein, it is desirable to control the degree of temperature to which the cotton wads 21 are subjected while being heated in the drum E. This is accomplished by interposing a switch element 53 in the conductor 40 as shown in Figure 12, which said switch 53 is actuated by suitable thermo-responsive devices that are placed close to the drum E where they are within the influence of the heat radiating from said drum. The temperature control devices just mentioned are carried upon the lateral arm 54 of an angular bracket 55 projecting from the supporting frame of the apparatus, and said devices comprise a diaphragm member 56 having operative connection with the switch 53 and actuated by a liquid or gas filled thermometer 57 that is coiled between spaced plates 58 and 59, the latter of which is urged towards the former by springs 60 surrounding the studs 61 upon which said plates 58 and 59 are carried.

During operation of the apparatus, the drum E is rotated step-by-step to successively register the pockets 20 with the discharge end of the shaping chamber 22 to receive the compressed and shaped cotton wads 21 therefrom, and, in order to insure exact registration of these portions of the apparatus, the drum E is provided with angular undulations or corrugations 62 upon a portion of its circumferential edge. These corrugations 62 are engaged by the roller 63 of an indexer plunger 64 that is reciprocably mounted in an adjustable carrier 65 and is yieldably urged in an outward direction towards the drum E by a spring 66. The carrier 65 is slidably mounted in a bracket or bearing 67 on the supporting bed B and is provided with a threaded shank 68 that extends through a smooth bore in a stationary lug 69 and it is maintained in divers adjusted positions by nuts 70.

The intermittent or step-by-step rotation of the drum E is accomplished by providing a continuous series of angular ratchet teeth 71 upon the circumferential edge of the drum E, preferably alongside and corresponding in number with the corrugations or undulations 62. These ratchet teeth 71 are engaged by a spring pawl 72 projecting from a slide 73 that reciprocates in a suitable guideway 74 on the upper portion of a bracket 75 anchored to the supporting frame of the apparatus. The slide 73 has pendent lugs 76 that are bored transversely to journal a rock-spindle 77 in them, and said rock-spindle 77 has a transverse hole to receive a pitman 78 that

may be adjusted longitudinally therethrough by nuts 79, 79, threaded on said pitman. This pitman 78 derives its motion from a bell-crank 80 to one of the arms of which it is pivotally connected, and the other arm of said bell-crank 80 carries a roller 81 operating in a cam-groove 82 on a disk 83 that is secured to and moves with a rotatable shaft 84 suitably journaled in bearings 85 on the supporting frame of the apparatus. The rocking of the bell-crank 80, through the medium of the rotating cam disk 83, will reciprocate the slide 73 thereby causing the spring pawl 72 to engage successive ratchet teeth 71 and rotatably move the drum E in a step-by-step manner. At the end of each rotatable step or movement of the drum E, the indexer roller 63 is urged by its spring 65 into the deeper portion of each corrugation 62 on the edge of said drum E, thereby registering a pocket 20 with the discharge portion of the pre-forming chamber 22.

The temperature of the drum E, which is controlled by the thermo-responsive devices described, is of proper degree to prevent marring or destroying the fibers of the cotton wads 21, yet it is hot enough to cause the fibers to adhere to each other in such manner that when the wads are removed from the drum E they will inherently retain the shapes into which they have been compressed in their travel through this apparatus.

While this invention is described in detail in its present preferred form or embodiment, it will be obvious to those skilled in the art, after understanding the improvements, that various changes and modifications may be made therein without departing from the spirit or scope thereof. It is aimed in the appended claims to cover all such changes and modifications.

What is claimed is:

1. An apparatus for forming and compressing fibrous material into catamenial tampons embodying a rotatable drum having a peripheral rim portion provided with an annular series of material-receiving open bores serving as pockets; means for successively closing one end of said bores, plunger means confronting said bore and closing means with said drum therebetween for compressing fibrous material in said bores, an electric heating element mounted on a lateral face of said drum below said peripheral rim and adjacent said pockets; an annular contact member mounted on the other face of said drum and having electrical connection with said heating element; stationary electric current conducting means alongside said drum having operative connection with said contact member during rotation of said drum; thermo-responsive means adjacent said heating element; and a switch interposed in said current conducting means and having operative connection with said thermo-responsive means, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

2. An apparatus for forming and compressing fibrous material into catamenial tampons embodying a rotatable drum provided with annular channels; a rim beyond said channels having an annular series of material-receiving pockets; an electric heating element mounted in one of said channels adjacent said rim; annular contact means mounted in another channel in electrical connection with said heating element; and

stationary electric current conducting means alongside said drum in operative connection with said annular contact means, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

3. An apparatus for forming and compressing fibrous material into catamenial tampons embodying a rotatable drum provided with annular channels upon its opposite sides and having an annular series of material-receiving pockets; an annular electric heating element mounted in one of said channels adjacent said pockets; annular contact means mounted in the other channel in electrical connection with said heating element through the body of said drum; and stationary electric current conducting means alongside said drum in operative connection with said annular contact means, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

4. An apparatus for forming and compressing fibrous material into catamenial tampons embodying a rotatable drum provided with annular channels and having an annular series of material-receiving pockets adjacent one of said channels; an electric heating element in one of said channels; annular contact means mounted in another channel in electrical connection with said heating element; stationary electric current conducting means alongside said drum in operative connection with said annular contact means; and thermo-responsive devices adjacent said heating element, said devices adapted to control the flow of current in said electric conducting means, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

5. A drum for forming and compressing fibrous material into catamenial tampons embodying a rotatable hub; a rim spaced from said hub and provided with a series of material-receiving pockets; a web connecting said hub and rim; said hub, rim and web together forming axially alined annular channels upon opposite sides of the drum; an annular electric heating element mounted in one of said channels and adapted to heat said rim; spaced annular contacts mounted in the other channel; conductor means extending through said web and establishing electrical connection between said contacts and said heating element; stationary terminal brushes engaged with said contacts; and conductors leading to said brushes from a source of electric current, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

6. A drum for forming and compressing fibrous material into catamenial tampons embodying a rotatable hub; a rim spaced from said hub and provided with a series of material-receiving pockets; a web connecting said hub and rim; said hub, rim and web together forming axially alined annular channels on the sides of said drum; an annular electric heating element mounted in one of said channels and adapted to heat said rim; spaced annular contacts mounted in the other channel; conductor means ex-

tending through said web and establishing electrical connection between said contacts and said heating element; stationary terminal brushes engaged with said contacts; conductors leading to said brushes from a source of electric current; a switch interposed in one of said conductors; and thermo-responsive means adjacent said drum adapted to actuate said switch, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

7. A drum for forming and compressing fibrous material into catamenial tampons embodying a rotatable hub; a rim spaced from said hub and provided with a series of material-receiving pockets; a web connecting said hub and rim; said hub, rim and web together forming an annular channel in a side of the drum; an annular electric heating element mounted in said channel and adapted to heat said rim; means establishing an electric circuit through said heating element; a switch in said circuit means; and devices controlled by the temperature of said drum for intermittently actuating said switch, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

8. A drum for forming and compressing fibrous material into catamenial tampons embodying a rotatable hollow hub of cylindrical shape and open on one side; a plate closing the open side of said hub; said plate and the opposite wall of said hub having alined openings; a shaft extending through said openings; an enlargement on said shaft housed within said hub; a rim spaced from said hub and provided with a plurality of material-receiving pockets; a web connecting said rim to said hub; an electric heating element mounted on one side of said web; annular contacts mounted on the other side of said web and electrically connected to said heating element; and means for supplying electric current to said annular contacts, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

9. A drum for forming and compressing fibrous material into catamenial tampons embodying a rotatable hub of hollow cylindrical shaft and open at one side; a plate closing the open side of said hub; said plate and the opposite wall of said hub having alined openings; a shaft extending through said openings; an enlargement on said shaft housed within said hub; a rim spaced from said hub and provided with a plurality of material-receiving pockets; a web connecting said rim to said hub; an electric heating element on one side of said web; annular contacts mounted on the other side of said web and electrically connected to said heating element; means supplying electric current to said annular contacts; a switch interposed in said current supplying means; and thermo-responsive devices for actuating said switch, whereby said material receiving pockets are maintained heated to preset the fibrous material in its compressed form corresponding to the shape of said pockets in said drum.

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