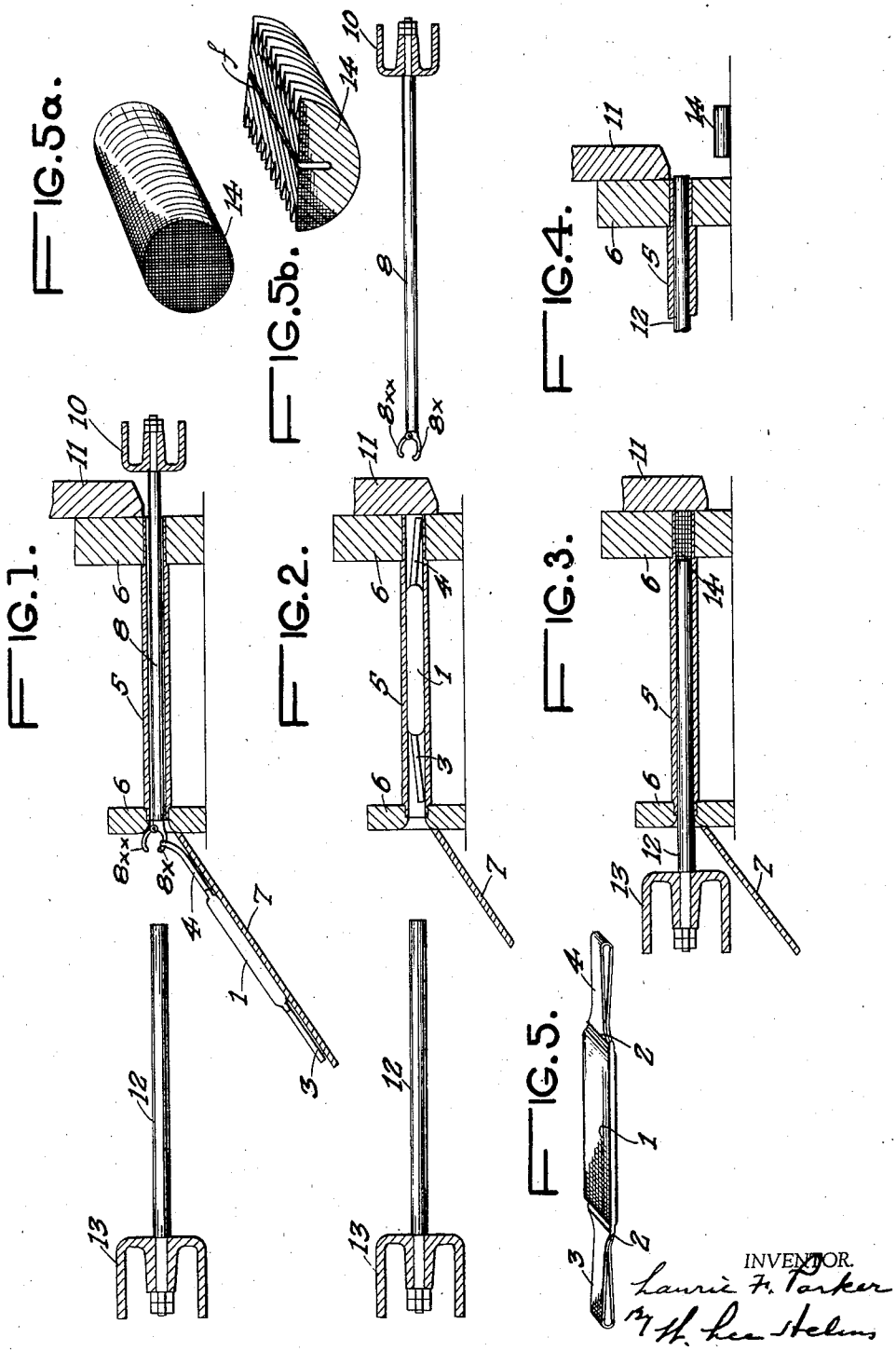
July 18, 1939. L. F. PARKER 2,166,665

APPARATUS FOR MANUFACTURING COMPRESSED SANITARY PADS

Filed July 16, 1938 3 Sheets-Sheet 1



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FIG. 8.

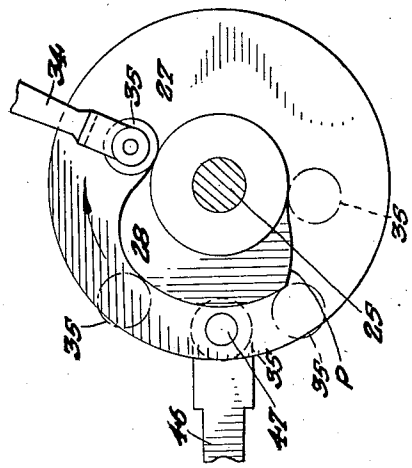


FIG. 9.

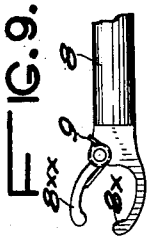


FIG. 6.

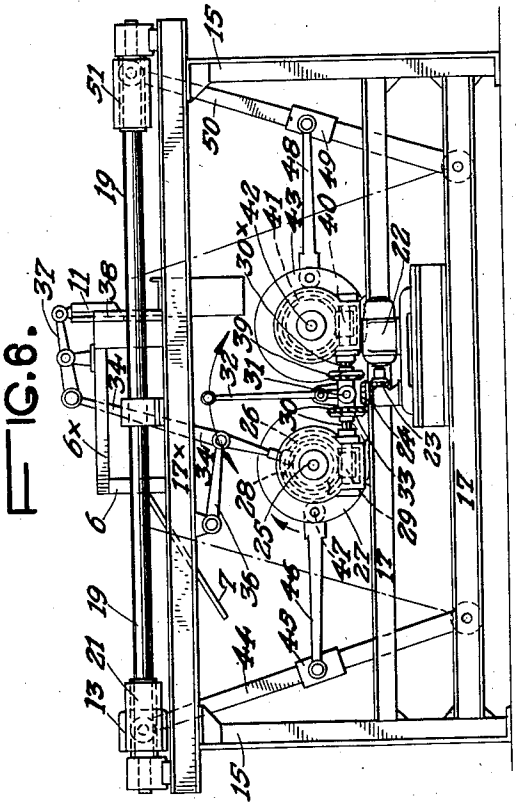
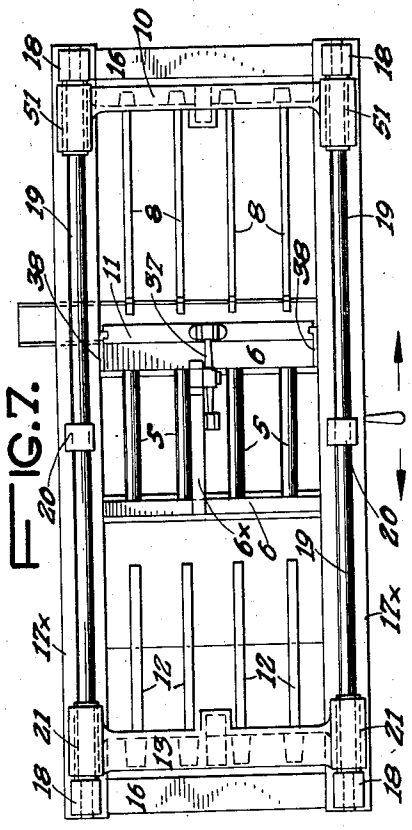


FIG. 7.



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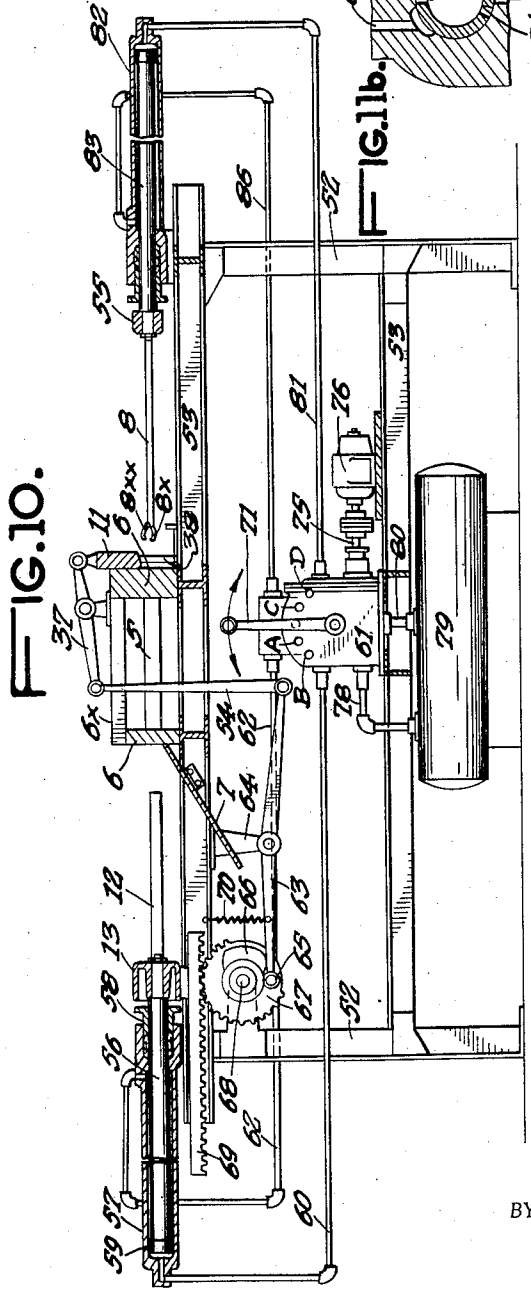


FIG. 10.

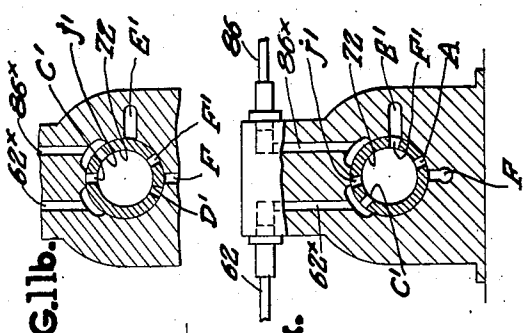


FIG. 11b.

FIG. 11a.

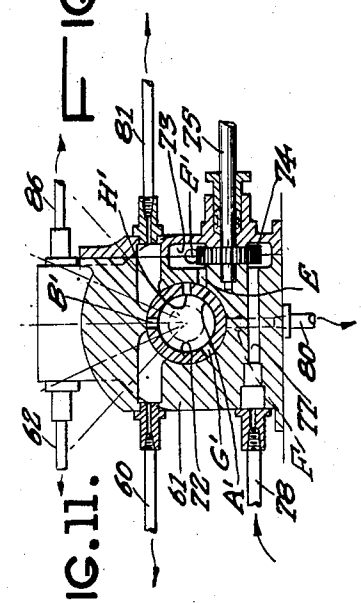


FIG. 11.

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APPARATUS FOR MANUFACTURING COMPRESSED SANITARY PADS

Laurie F. Parker, Noroton, Conn.

Application July 16, 1938, Serial No. 219,531

9 Claims. (Cl. 18—16)

The present invention relates to means for compressing sanitary napkins of a usual type incorporating a cotton fibre filling, a gauze wrapper and loose ends for fastening purposes, generally with a tie-belt, into a form-retaining, preferably cylindrical, block, and in such manner that the ends of the napkin, which may be looped ends, are disposed at the ends of the block and may be pulled away from each other in restoring the napkin to its original form. Thus, by means of the invention, a napkin having a body portion 9" long and 3¼" wide, with a thickness of 1", the body portion having looped ends of gauze, each approximately 6" long and of the width of the gauze enveloping the fluffy cotton body portion, may be compressed into a cylindrical block ⅞" in diameter and 2" long, with the remarkable characteristic that by pulling upon the looped ends, present in highly compressed form at the ends of the block, the napkin may be partially restored to original position and completely restored by grasping the body at opposite ends and moving the ends rapidly in opposite directions by a "shaking" procedure, whilst imparting tension upon the body lengthwise.

The invention will be described with reference to the accompanying drawings, in which:

Figure 1 is a schematic view showing in longitudinal section a compression tube, a hook-pull within the tube, a napkin engaged by the hook-pull, a compression piston and certain associated parts.

Figure 2 is a view similar to Figure 1, showing the position of the parts immediately following operation of the hook-pull.

Figure 3 is a view similar to Figure 2, showing the position of the parts following operation of the compression piston.

Figure 4 is a detailed view, showing the position of the compression piston after a final ejecting movement of the compressed block.

Figure 5 is a perspective view, schematically showing the napkin structure in its original form.

Figure 5A is a perspective view, schematically showing the napkin structure in its compressed block form.

Figure 5B is a fragmentary perspective, showing a section of the partially compressed napkin to indicate the accordion plait movement of the napkin body during the compression.

Figure 6 is a view in elevation of one embodiment of the apparatus in which the movement of the compression piston and the preceding movement of the hook-pull is effected by cams and levers.

Figure 7 is a plan view of the structure shown in Figure 6.

Figure 8 is an enlarged view of one of the power wheels and the cam carried thereby, the latter operating means for moving a compression resistance member into and out of closing relation to each napkin-receiving cylinder.

Figure 9 is an enlarged detailed view showing the construction of the hook end of the hook-pull.

Figure 10 is a view similar to Figure 6, but partly in section, showing a modified embodiment of the machine employing hydraulic means for operating each compression piston and each hook-pull.

Figure 11 is a sectional elevation of the combined pump and control valve structure for the hydraulic cylinders, showing the valve in neutral position with respect to the compression end of the hydraulic cylinders which receives the compression piston and the similar end of the hydraulic cylinders which actuates the hook-pull.

Figure 11A is a vertical section through the valve casing on a line at the rear of that shown by Figure 11 illustrating the ports controlling idle or positioning movements of the compression piston and hook-pull. In this figure, the valve ports are in position to cause flow of fluid under pressure for return of the compression piston following a power stroke thereof.

Figure 11B is a view similar to Figure 11A, showing the rotary valve member in neutral position.

Referring to Figure 5 of the drawings, it will be seen that the preferred form of the napkin comprises a gauze generally rectangular in body 1, which may be of any desired length, width and thickness, and which more often is of the size hereinbefore specified or thereabouts. Within the gauze is an absorbent material, preferably absorbent cotton, in layers so combed that the fibres extend longitudinally of the body. In practice, a knitted gauze tube is employed and when the central section thereof is filled with cotton batting in such manner that the structure has a well defined, generally flat, opposed sides formation, with a thickness which may be approximately 1", the ends of the gauze are folded backward and stitched at points 2, forming loops 4.

The principle of operation of the machine may be quickly visualized by reference to Figures 1 to 4 of the drawings. A plurality of cylinders 5, of which one is shown, are held between supporting frame members 6, these members being

apertured. Carried by the frame member at the receiving end of cylinder 5 is preferably placed an inclined shelf 7, and projected within tube 5 is the hook-pull which comprises a rod 8 having at one end a fixed hook 8x above which is pivoted a movable hook 8xx normally held in open position as by the spring 9 shown in Figure 9. One loop 4 of the napkin is hung upon the fixed hook member 8x. On the end of rod 8 opposite the hook is a rod-carrier 10.

The parts being in the position of Figure 1, rod-carrier 10 is moved to the right. In such movement, contact of the movable hook 8xx with the bevelled face of the flared entrance end of the adjacent frame member 6 will cause the hook to be closed in opposition to its spring and the continued movement of rod 8 will carry the napkin wholly within the tube as shown in Figure 2, and, finally, as the hooked end of rod 8 leaves the rear end of the tube, spring 9 will open hook 8xx and the loop of the napkin will be released. Should a very short portion of the loop protrude at the time it is released, it will automatically move back into the tube for the reason that it will be under strong tension and the release of the tension will cause its retraction. At this point, a compression resistance plate 11 will be moved downward to the position of Figure 2 to close each tube. Thereupon, the compression piston 12 on carrier 13, there being as many pistons as tubes, will move forwardly in a power stroke and will continue its movement until a predetermined resistance to such movement is met with at the time when the napkin is finally in compressed form.

The napkin being very substantially greater in width than the diameter of the tube, it will be realized that when it is pulled into the tube there will be formed in the napkin structure one or more longitudinal folds generally indicated by the line *f*, Figure 5B. These longitudinal folds are not to be considered as compression folds, however, inasmuch as they do not change the length of the napkin body which remains in the tube substantially the same or even somewhat longer (due to the pull thereon) as that of the original structure.

At the end of the compression stroke compression resistance plate 11 is raised and the compressed napkin is quickly ejected by the movement of compression piston to final position in its active stroke, as shown in Figure 4. The compressed napkin 14 then falls upon a suitable reception member such as a moving belt or basket.

In the form shown in Figures 6 to 8 inclusive, the machine comprises a primary frame built up of the riser 15, cross support 16 and longitudinal frame member 17, 17x. Carried at the top corners of the structure are the heavy apertured bosses 18 which receive the reduced end of two guide rods 19 extending longitudinally of the structure, additional guide bosses being provided at 20. These guide bosses hold the guide rods in fixed position. At the left-hand end of the structure the guide rods receive the apertured bearing bosses 21 of a cross head 13 which, in turn, carries a suitable number of compression pistons 12. These pistons are connected to the cross head in the manner shown in Figures 1 and 2. The frame work supports at its top the vertically extending frame members 6 which may be reinforced by an overhead plate 6x. The compression cylinders 5 are associated with the frame members 6 in the manner shown in Figures 1 to 3 inclusive.

Suitably mounted on the frame structure near its base is a motor 22 on the drive shaft of which is a bevelled gear 23 which drives a horizontal bevelled gear 24. On transverse shaft 25 is a worm wheel, only diagrammatically shown in Figure 6 at 26. The shaft also has fixed thereto a power disk or wheel 27 which carries at one face thereof the cam 28. Referring to Figure 6 it will be seen that worm wheel 26 is in mesh with the worm 29 on a shaft 30 and free on the shaft is the slide bracket 31 adapted to be moved by hand lever 32 whereby a bevelled gear 33 keyed on shaft 30 may be moved into and out of engagement with bevelled gear 24.

The parts being in the position of Figures 6 and 7, it may be assumed that four napkins have each been drawn into an appropriate compression cylinder lying therein as shown in Figure 2 and that the bevelled gears 24 and 33 are in contact, the cam 28 lying in the position of Figure 8. The wheel 27 rotates in the direction of the arrow and before the compression pistons 12 enter the compression cylinders cam 28 will throw upwardly a lever 34, the lower end of the lever carrying a roller 35 engaging the periphery of the cam, and the lever being guided by a swing arm 36, the upper end of lever 34 being pivoted to a rock arm 37 which, in turn, is pivoted to compression resistance plate 11, the latter being channeled at its edges to receive key plates 38 carried by the right-hand frame members 6. After compression resistance plate 11 moves downwardly to the position of Figures 2 and 3, the compression pistons will enter the compression cylinders and will continue their compression strokes to the position of Figure 3. At that point the roller 35 will be met with a sharp descending point *p* of the cam (Figure 8) and lever 34 will very quickly drop, raising the compression resistance plate, whereupon the pistons will eject the compressed napkin and they may fall, for example, into a receptacle 38, Figure 6, whereupon the operator throws handle 32 to neutral position, followed by such movement as to carry bevelled gear 33, which is keyed on shaft 30x into engagement with bevelled gear 24. Shaft 30x carries a worm 40 in mesh with a worm wheel only schematically indicated in Figure 6 at 41 on a shaft 42 which carries a power wheel 43.

The connection between the first-named power wheel 27 and the cross head 13 comprises a lever 44 on which is a sleeve 45 to which is pivoted an arm 46 pivoted, in turn, at 47 to power wheel 27.

The function of power wheel 43 is to drive the hook-pulls. To this end there is pivoted to power wheel 43 an arm 48 which, in turn, is pivoted to sleeve 49 on a lever arm 50, the latter at its top being pivoted to a cross head 10 having bearing bosses 51 sliding on the guide members 19. The hook-pulls are secured to the cross head in the manner shown in Figures 1 and 2.

When the lever 32 is moved to the right, the action of power wheel 43, link 48 and lever 50, will cause the hook-pulls to enter the compression tubes and move to the position of Figure 1, whereupon lever 32 is moved to neutral position; the loops of the napkin are placed on the hooks and lever 32 is again moved to the right to complete the rotation of power wheel 43 so that the hook-pulls will be withdrawn from the compression cylinders and the movable hooks 8x will automatically open to release the napkin loops as hereinbefore described.

In the embodiment illustrated in Figures 10 to

11B inclusive, I provide a suitable frame work comprising uprights 52, suitable cross members (not shown), and longitudinal frame members 53. On the top of the structure is mounted the inclined shelf 7, apertured frame members 6, compression tubes 5, reinforcing bar 6x, compression resistance plate 11, rock arm 37 and rock arm operating link 54. The compression pistons 12 are carried by the cross head 13 such as described with reference to the structure of Figures 6 and 7 and the pull-hooks may be carried by a cross head similar to that shown at 10 in the preceding figures, or by a bar apertured to receive the hook-pulls as shown at 55, Figure 10.

The cross head 13 carrying the compression pistons 12 is connected to one or more pistons, one being generally sufficient, and preferably disposed at the longitudinal center of the cross head. It will be understood that the cross head 13 and carrying bar 55 will have at their respective ends apertured bosses to slide upon guide rods, all in the manner of the structure shown in Figures 6 and 7. In Figure 10 the piston is shown at 56 disposed in a hydraulic cylinder 57 from the end of which is a suitable packing gland closed by a usual type of apertured gland ring 58. The piston has a head 59 and the cylinder to the left of the head is formed with an inlet port communicating with a pipe 60 leading to the valve casing 61. For return of the piston after a power stroke, the cylinder toward its right-hand end is formed with a port communicating with a pipe 62 leading to the upper portion of the valve casing. In the present embodiment, the compression resistance plate 11 is actuated through the movement of a lever 63 pivoted on a bracket 64 and also pivoted to link 54. The left-hand end of the lever carries a roller 65 adapted to be engaged by a cam 66 attached to a pinion 67 on a shaft 68. In mesh with the pinion is a rack 69 carried by cross head 13. A spring 70 engages lever 63 and holds roller 65 in engagement with the periphery of cam 66. In the position of the parts shown in Figure 10, a power compression stroke of piston 56 will, through rack 69, pinion 67 and cam 66, effect a preliminary descent of the compression resistance plate 11 and the retention of the plate in such position until the end of the normal compression action upon the napkins, whereupon the cam will leave roller 65 and spring 70 will retract plate 11.

To effect the compression stroke, operation of a rotary valve, which is hollow, is effected through handle or valve lever 71. The rotary valve is shown at 72. Within the valve casing 61 is a pump chamber 73 containing any suitable pump. For simplicity of illustration, the form of pump illustrated comprising intermeshing gears of which one is shown at 74, Figure 11, the drive being effected through a shaft 75 leading to a motor 76. The casing is formed with a feed aperture at 77 communicating with a pipe 78 communicating with a tank 79. This tank may be under slight pressure to cause the flow of oil or other liquid to the pump chamber, or the pump chamber may be primed and the suctional effect of the gears utilized to cause the inflow of oil, or, as an alternative, the oil may flow to the pump chamber by gravity. When the lever is turned to the left from its neutral position to position A valve port A' will be brought into communication with casing port E and valve port B' will be brought into communication with pipe 60. The fluid under pressure, therefore, will cause a power stroke of the piston 56. At the same time valve port C' will be moved into communication with casing port 62x (Figure 11B) leading to pipe 62 and the oil in front of piston 59 will communicate with relief port F of the casing causing the oil to be returned through pipe 80 to tank 79. When lever 71 is moved to position B valve port B' will be closed and likewise port A' will be closed. At the back end of the valve, however, pressure inlet E' of the casing will be brought into communication with valve port F' as shown in Figure 11A, so that the oil under pressure will flow through valve port C', duct 62x, pipe 62 and into the cylinder 57 to return the piston. The return oil will flow through pipe 60, valve port B', relief duct G' and pipe 80.

When lever 71 is moved to position C valve port B' will communicate with pipe 81 and valve port H' will communicate with casing port E leading to the pump chamber, oil will flow through pipe 81 to cylinder 82 in which is headed piston 83 carrying cross head 55. A power stroke will thus be given to the hook-pulls. At the same time, the oil for return in cylinder 82 will pass through pipe 86, valve port C', valve port F' and relief duct F, to pipe 80.

When lever 71 is moved to position D the relief ports will be closed and valve port J' will communicate with casing port E' leading to the pump chamber and valve port J' therefore will deliver oil under pressure to port C', thence to duct 86x to pipe 86. At the same time, the return oil will flow through pipe 81, valve duct B' and valve port A' to the return duct F and to return pipe 80.

By means of the invention a sanitary napkin is enormously compressed so that it appears in wrapped form somewhat like the commonly sold 5¢ candy unit embodying 10 or more candy lozenges applied face to face and enclosed in a tubular wrapper. At the same time, the manner in which the napkin is handled enables it to be restored to original form in a few seconds of time merely by dislodging the compressed loops at the ends of the block, pulling upon and to elongate the accordion-plaited structure, and then rapidly flexing the main absorbent body, while it is under tension by pull upon the loops or the points of the body at which the loops are stitched. By the manner in which the absorbent body is compressed, the body can be restored to original form without derangement of the fibres because the accordion-plait compression moves the fibres in the direction of their length, and the restoring tension is also longitudinally of the fibres and thus in the direction of their greatest strength.

I claim:

1. In apparatus for manufacturing compressed sanitary pads, a compression cylinder, pad engaging means adapted to enter the cylinder at one end for projection at the opposite end thereof, means for reciprocating said pad engaging means, a piston and means for reciprocating the same within the cylinder, said means acting to withdraw the piston from the cylinder, and means effective to close the cylinder at the end thereof opposite from the end entered by the piston, preliminary to movement of the piston into the cylinder.

2. In apparatus for manufacturing compressed sanitary pads, a compression cylinder, a piston adapted to enter the cylinder, a hook-pull adapted to pull a napkin into the cylinder, a retractable closure for that end of the cylinder at the end

thereof opposite from the end entered by the piston, means for projecting and retracting the hook-pull, means for projecting and retracting the piston, and means for moving the retractable closure into and out of operative position.

3. In apparatus for manufacturing compressed sanitary pads, a cylinder, power-operated means for pulling a sanitary pad endwise into the cylinder, a piston, and means for reciprocating the piston in the cylinder, and means effective to close the end of the cylinder at the end thereof opposite from the end entered by the piston, during part of said reciprocation.

4. In apparatus for manufacturing compressed sanitary pads, a cylinder, power-operated means for pulling a sanitary pad endwise into the cylinder, said means comprising a normally open hook member adapted to be closed by contact with a surface adjacent the inlet end of the cylinder and to automatically open upon retraction from the cylinder, a piston, cylinder closing means at that end of the cylinder opposite from an end adapted for entry of the piston, and means for reciprocating the piston within the cylinder.

5. Apparatus for manufacturing compressed sanitary napkins constructed in accordance with claim 4 in which the hook member comprises a rod carrying a fixed hook and a pivoted hook adjacent thereto, and a spring for normally holding the pivoted hook in open position.

6. In apparatus for manufacturing compressed sanitary napkins, spaced vertical frame plates, a plurality of parallel cylinders supported by said plates, a crosshead and a plurality of pistons carried thereby and in register with one end of the cylinder assembly, a cross head and a plurality of pull hooks in register with the opposite end of the cylinder assembly, means for independently reciprocating the cross heads, and retractable means for closing one end of the cylinder assembly opposite from that end of the piston assembly in register with the pistons.

7. Apparatus for manufacturing compressed sanitary napkins constructed in accordance with claim 4, in combination with hook closing means comprising a retractable cylinder closure member having a cam face for engagement by the hook member.

8. In apparatus for manufacturing compressed sanitary pads, a frame, parallel guide rods carried at the upper end of the frame, opposed cross heads movable on said rods, an assembly of spaced pistons on one cross head, an assembly of spaced pull rods on the other cross head, an assembly of spaced cylinders intermediate the pistons and pull rods the cylinders at one end being adapted to receive the pistons, retractable means for closing the opposite end of each cylinder, hooks carried by the pull rods and power means for reciprocating each cross head.

9. Apparatus for manufacturing compressed sanitary pads constructed in accordance with claim 8 in which the cylinder closing means comprises a slide plate, in combination with means, timed with the power means for reciprocating the cross heads, and adapted to move the slide plate into active position upon a compression movement of the pistons and to retract the slide plate at the end of the compression movement of the pistons.

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