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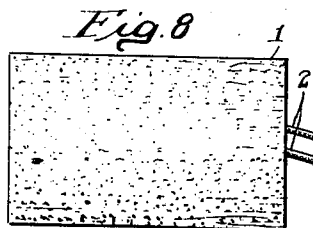
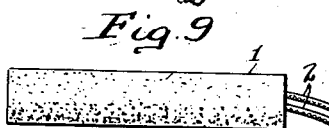
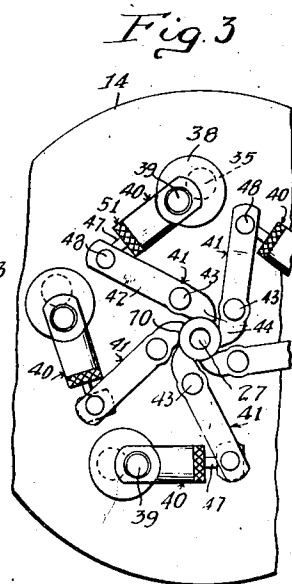
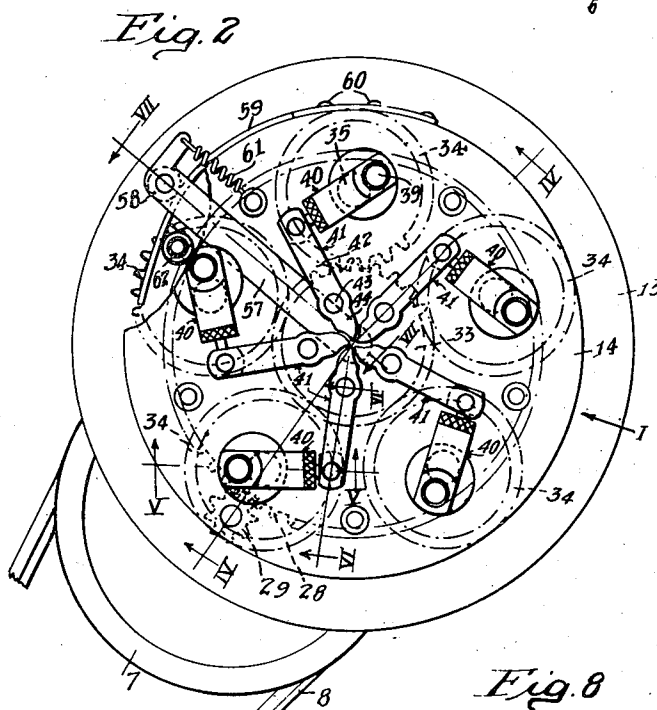
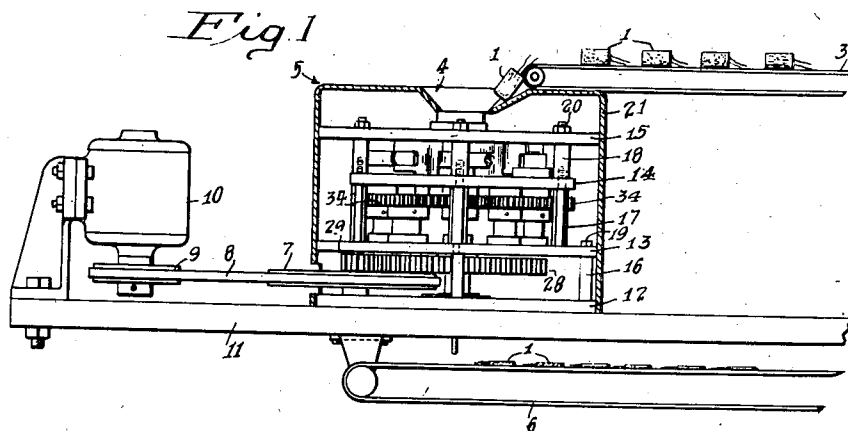
J. L. WEBB

2,263,909

MACHINE FOR FORMING TAMPONS

Original Filed June 29, 1936

2 Sheets-Sheet 1



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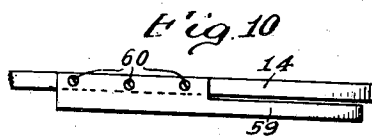
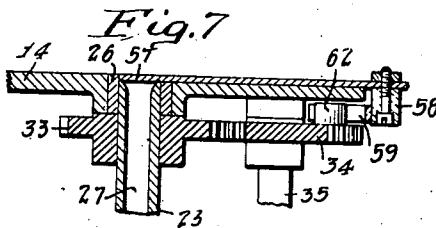
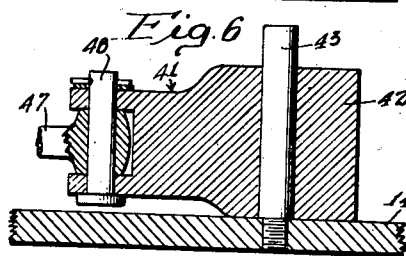
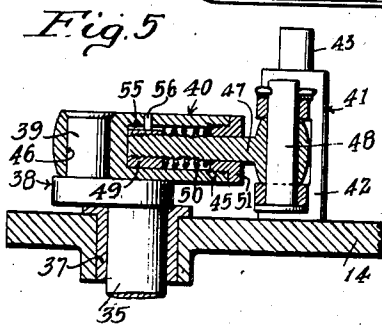
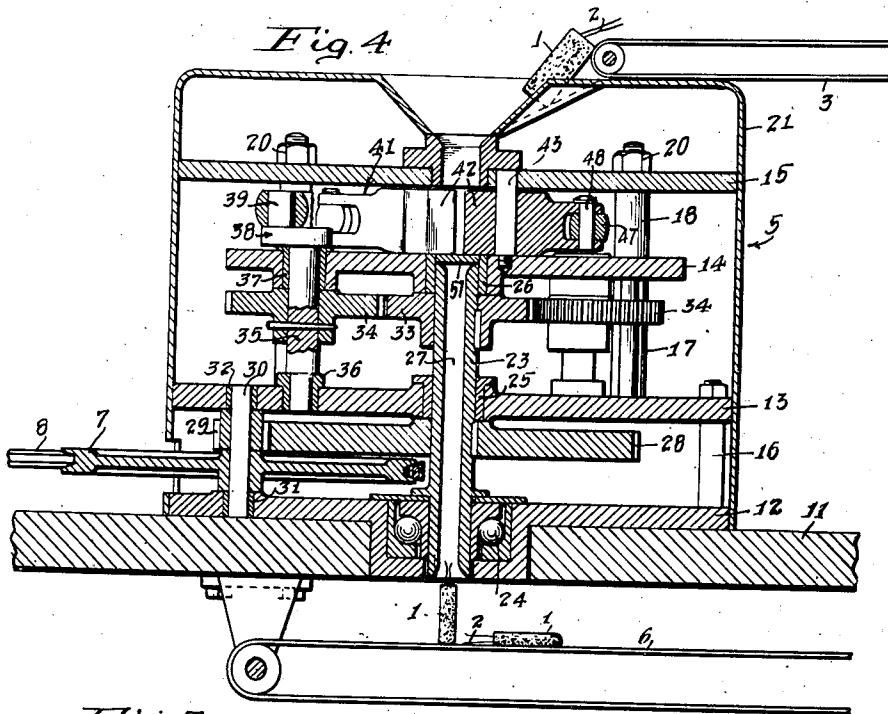
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UNITED STATES PATENT OFFICE

2,263,909

MACHINE FOR FORMING TAMPONS

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Original application June 29, 1936, Serial No. 87,866. Divided and this application January 14, 1939, Serial No. 250,983

11 Claims. (Cl. 18—16)

This invention relates to the manufacture of bodies of fibrous material such as cotton for use in absorbing moisture and fluids in body cavities and to methods and machines for forming such bodies. It has to do more specifically with the manufacture of vaginal tampons which consist of cylindrical or prismatic bodies of cotton or similar absorbent fibrous material compressed laterally substantially to the limit of compressibility of the material. Such tampons are relatively rigid, compact and self-retaining, retaining their compressed dimensions so long as they remain dry but when wetted they quickly expand and become soft and absorbent.

This is a division of my application Serial No. 87,866, filed June 29, 1936, entitled Tampon and method of and machine for forming it.

An object of the invention is to produce a compressed tampon in shape approximating a cylinder or a prism in which the fibrous material is compressed substantially radially inwardly from all sides whereby the tampon when moistened is free to expand radially substantially uniformly in all directions from the axis of the tampon. Such a tampon expands more uniformly and fully than does one made by compressing a mass of fibrous material in one or two directions only.

Another object is to increase the speed and reduce the cost of making laterally compressed tampons.

Another object is to provide an automatic machine capable of operating continuously to compress tampons.

Various other objects and features of the invention will become apparent from the following detailed description which refers to the drawings.

In the drawings:

Fig. 1 is an elevation view of a complete machine in accordance with the invention with part of the casing broken away to show the interior mechanism, the view being taken in the direction I in Fig. 2;

Fig. 2 is a plan view of the compressing machine with the upper frame plate removed to show the compressing jaws;

Fig. 3 is a partial view similar to Fig. 2 with the mechanism in a different phase of its operation;

Fig. 4 is a vertical sectional view of the main portion of the machine, the section being taken along the line IV—IV of Fig. 2;

Fig. 5 is a detail sectional view through one of the links actuating the compressing levers,

the section being taken along the line V—V in Fig. 2;

Fig. 6 is a sectional view through one of the compressing levers, the section being taken along the line VI—VI of Fig. 2;

Fig. 7 is a detail sectional view showing the tampon supporting gate, the section being taken along the line VII—VII of Fig. 2;

Fig. 8 is a side view of a cylindrical tampon adapted to be compressed in accordance with the invention;

Fig. 9 is a side view of the tampon after being compressed in my machine; and

Fig. 10 is a detail elevation view of certain elements of the machine which appear in plan in Fig. 2.

The machine to be described operates on loose, approximately cylindrical tampons such as shown in Fig. 2 and functions to compress such tampons laterally by applying pressure at a plurality of circumferentially spaced areas to a smaller diameter, as shown in Fig. 9. The tampons shown in Figs. 8 and 9 comprise a body of fibrous material 1 having a pull string 2 imbedded therein. The loose tampons shown in Fig. 8 may be formed in any desired manner and the pull string 2 may be anchored in any desired manner, such methods not constituting a part of the present invention. However, the loose tampons shown in Fig. 8 may be conveniently formed by winding a strip of cotton into a loose roll of desired dimensions.

The machine shown in Fig. 1 is adapted to receive large, loose, cylindrical tampons 1, compress them into compact form and discharge them. Thus, as shown in Fig. 1, the loose tampons may be continuously delivered by a belt conveyor 3 to the hopper or chute 4 of a compressing machine 5, from which after compression they drop onto a second conveyor belt 6 which carries them away to be packed. The unit 5 is provided with a pulley 7 which may be driven through a belt 8 from the pulley 9 of an electric motor 10. Both the motor 10 and the compressing unit 5 may be supported upon a suitable bench or table 11.

Referring now to Fig. 4, the compressing machine 5 comprises a supporting frame consisting of a base plate 12 which may be anchored to the supporting table or bench 11 in any convenient manner, a second plate 13 positioned above the base plate 12, a third plate 14 positioned above the plate 13, and an upper plate 15 positioned above the third plate. The plate 13 is supported from the plate 12 by pillars 16 and plates 14 and

15 are connected together and supported from the plate 13 by pillars 17 and 18. The pillars 16 may be threaded at their lower ends into the plate 12 and have reduced threaded portions at the upper end which pass through apertures provided therefor in the plate 13 and are locked to the plate 13 by nuts 19. The pillars 17 may likewise have reduced end portions threaded in the plate 13 and reduced upper end sections which pass through apertures provided therefor in the plate 14 and screw into the lower ends of the pillars 18, the latter having reduced upper end sections which pass through the plate 15 and are provided with retaining nuts 20. A cylindrical dust cover 21 fits about the plates 12, 13 and 15 and extends over the top of the plate 15 and is shaped to define the chute 4. However, cover 21 does not form any part of the frame of the machine.

Centrally disposed within the machine is a shaft 23 which is rotatably mounted by a ball bearing 24 in the plate 12 and by bushings 25 and 26 in the plates 13 and 14, respectively. The ball bearing 24 supports the weight of the shaft and the parts connected thereto in addition to absorbing lateral thrust. The bushings 25 and 26 merely absorb the lateral thrust of the shaft. Shaft 23 is hollow to provide a central passage 27 through which compressed tampons are dropped onto the conveyor belt 6. The shaft 23 has keyed thereto a large gear 28 which meshes with a pinion 29 keyed to the shaft 30 which supports the drive pulley 7. The shaft 30 is rotatably supported in bushings 31 and 32 in the plates 12 and 13, respectively. It is apparent, therefore, that shaft 23 is rotated through pinion 29 and gear 28 in response to rotation of the drive pulley 7. The shaft 23 also has keyed thereto between the plates 13 and 14 a small gear 33 which meshes with five gears 34 positioned in planetary fashion concentrically about the shaft 23, each gear 34 being pinned to a shaft 35 rotatably supported in bushings 36 and 37 in the plates 13 and 14, respectively. These shafts extend through and beyond the bushings 37 above the plate 14 and terminate in crank arms 38 having crank pins 39 which actuate the tampon compressing members.

Thus referring to Fig. 2, each crank pin 39 is coupled through a pitman 40 to the end of the long arm 41 of a lever 42 fulcrumed on a stationary pin 43 and having a short arm 44, the inner end of which constitutes one of the tampon compressing jaws. As the shafts 35 rotate, the levers 42 are oscillated back and forth between the positions shown in Fig. 2 and Fig. 3, respectively. In Fig. 3 the jaws are in open position in which there is ample space between them to receive the uncompressed tampon and in Fig. 2 the jaws are shown in fully closed position in which they have compressed the tampon substantially to the limit of compressibility of the material of which it is constructed.

Referring now to Fig. 5, which shows in detail the construction of the pitmans 40, each pitman consists of an elongated member 45 having a transverse journal 46 in one end to receive the associated driving pin 39 and having a longitudinal recess in the other end, this recess receiving a rod 47 which is pivotally connected at its outer end by a pin 48 to the bifurcated end of the long arm 41 of the associated lever 42. The rod 47 is threaded on its inner end into a bushing 49 which is fitted for longitudinal sliding movement within the member 45 and bears against a helical

compression spring 50 which is retained by a bushing 51 threaded into the outer end of the member 45. The spring 50 is relatively stiff and normally maintains the inner end of the rod 47 against the end of the recess in member 45. The function of this spring is to permit the pitman to yield slightly in response to excessive resistance to movement of the associated lever 42 and prevent stalling of the driving motor or breakage of the machine. Resiliently yieldable pitman rods are quite essential in a machine of the type described for the reason that the tampons are compressed substantially to the limit of compressibility of the material and, if an oversized tampon were introduced or should some solid object be introduced between the jaws, the jaws would be prevented from assuming their closed position, as shown in Fig. 2 and some part of the machine would then be broken if the driving motor did not stall. The tension of the spring 50 may be adjusted by disconnecting the rod 47 from the associated lever and screwing the rod in or out of the bushing 49. To prevent rotation of the bushing 49, the latter is provided with a longitudinal slot 55 into which a pin 56 projects from the member 45.

The pins 43 upon which the levers 42 are fulcrumed may be screwed into threaded apertures provided therefor in the plate 14, as shown in Fig. 6. The upper ends of these pins 43 may extend into apertures provided therefor in the upper plate 15 so that they are supported at both ends.

Referring for the moment to Fig. 1, the tampons 1 may be supplied continuously to the compressing machine 5 by the belt conveyor 3 and the tampons may be so spaced along the belt relative to the speed of the latter as to drop a tampon into the hopper 4 periodically as the compressing jaws assume their open position, as shown in Fig. 3, the tampons falling directly from the chute 4 into space between the open jaws. It is necessary, however, to support the tampons at the level of the jaws until the jaws close sufficiently to engage the tampons. To this end, a tampon supporting gate is provided immediately below the jaws, this gate consisting of a flat bar 57 which is slidable longitudinally in a recess or groove provided therefor in the upper face of the plate 14. The upper end of the bushing 26 is also cut away on one side to accommodate the gate 57, the inner end of the gate being rounded as shown in Fig. 2 to fit against the bushing. The gate member 57 extends radially with respect to the axis of the shaft 23 out beyond the plate 14 and is provided on its outer end with an actuating roller 58 which extends down below the plate 14 into the path of an actuating spring lever 59 which, as shown in Fig. 10, is supported at one end to the periphery of the plate 14 as by screws 60.

Referring now to Fig. 2, the spring lever 59 normally rests loosely against the roller 58 when the gate member 57 is in innermost position, the latter being retained in this position by a tension spring 61 anchored to the plate 14. The spring lever 59 extends beyond the gate member 57 into a position to be periodically intercepted by a roller 62 mounted upon one of the gear wheels 34, as shown in Fig. 7. The roller 62 is so positioned on the gear 34 as to intercept the spring lever 59 and move it outward, thereby moving the gate member 57 outward as the compressing jaws open so that before the jaws reach their fully open position, as shown in Fig. 3, the inner end of the gate member 57 is retracted

away from the passage 27 in the shaft 23, permitting the compressed tampon to drop away from the compressing jaws. As the roller 62 continues its travel it passes beyond the end of the spring lever 59, permitting the gate member 57 to be snapped back by the spring 61 and close the upper end of the passage 27 by the time the compressing jaws have fully opened and a new tampon has been delivered thereto.

It will be observed from inspection of Figs. 2 and 3 that the tips of the short arms 44 of the levers 42, which constitute the compressing jaws, have compressing motions which may be resolved into rotary and radial components with respect to the central axis of the machine. However, the rotary components of the motions of these jaws produce no compressing effect on a tampon positioned therebetween for the reason that the latter is freely supported by the jaws and rotates in response to the rotary components of movements of the jaws. Therefore, the only force that is effective to compress the tampon is that resulting from the radial components of the movements of the jaws. As a result, the compression in the tampon is the same as would result if a plurality of jaws were forced radially inwardly toward the common axis without having any rotary component whatsoever. This is an advantageous feature of the machine since any rolling or twisting compressive force on the tampons tends to wrap or twist the fibers so that they do not re-expand, when wetter, as freely as they do when the compression is substantially radial.

In order to provide a larger opening for receiving the loose tampons, the inner sides of the short arms 44 of the levers, when the latter are in open position as shown in Fig. 3, may be made somewhat concave as indicated at 70 to provide a slightly larger opening. However, as soon as the levers have progressed an appreciable distance in their compressing movement, the concave faces 70 no longer touch the tampons, the tips only of the short arms 44 bearing against the tampons.

It has been found that, although in a machine as described pressure is applied to a tampon at five distinct circumferentially spaced areas, the resulting tampon has a surface that is relatively smooth and is really more cylindrical than prismatic in shape, as would be expected. This probably results from the fact that in their compressing movement the jaws rotate slightly over the surface of the tampon, applying the pressure at slightly different points thereon during the different stages of compression. Obviously, it is not essential to employ five compressing jaws as shown. The number may be increased or may be reduced but the larger the number of jaws employed the more nearly cylindrical the finished tampon will be.

Although the invention has been described in detail with reference to a particular construction, many modifications and departures from the particular machine shown may be made while still employing the essential principles and features of the invention. The invention is therefore to be limited only as set forth in the appended claims.

I claim:

1. In a machine for compressing tampons, a plurality of jaws positioned symmetrically about a common vertical axis, means for dropping tampons between said jaws, a gate member posi-

tioned below said jaws for supporting tampons dropped between said jaws in position to be compressed by the jaws, means movably supporting each of said jaws for movement toward and away from said common axis, means for simultaneously moving said jaws first toward and then away from said axis to cause them to first engage, then compress and then release a tampon positioned therebetween, and means for opening said gate member in timed relation with said jaws to permit compressed tampons to drop away from said jaws when the latter open.

2. A machine as described in claim 1, in which said means for dropping tampons between said jaws includes a chute above said jaws and having its lower end centrally positioned immediately above said jaws for guiding tampons between said jaws.

3. In a machine for compressing tampons, a plurality of compressing members positioned symmetrically about a common axis, said compressing members comprising tampon-contacting arms pivotally supported for swinging movement about individual axes symmetrically disposed about and parallel to said common axis, means for simultaneously swinging said arms about their respective axes to cause the ends of said arms to periodically approach and then recede from said common axis, whereby they first engage, then compress and then release a tampon positioned therebetween.

4. A machine as described in claim 3, in which the tampon-contacting arms extend at angles to radii of said common axis when the arms are in open position and extend substantially radially toward said common axis when rotated to fully compress a tampon positioned therebetween.

5. A machine as described in claim 3, in which the tampon-contacting arms extend at angles to radii of said common axis when the arms are in open position and extend substantially radially toward said common axis when rotated to fully compress a tampon positioned therebetween, said arms constituting the sole supporting means for a tampon during compression of the tampon therebetween.

6. In a machine for compressing tampons, a plurality of compressing members positioned symmetrically about a common axis, said compressing members comprising levers fulcrumed for oscillation about axes parallel to said common axis and symmetrically disposed thereabout, each lever consisting of a short arm adjacent said common axis for contacting and compressing a tampon positioned at said common axis, and a long arm more remote from said common axis, driving means, and means coupling said long arms of all said levers to said driving means for oscillating said levers in synchronism with each other.

7. A machine as described in claim 6, in which said coupling means comprises a driving link for each lever connecting to the long arm of its associated lever, each of said driving links being resiliently yieldable in response to predetermined force applied thereto to limit the reactive force of said levers on said driving means to a predetermined value.

8. In a machine for compressing tampons, a plurality of compressing members, positioned symmetrically about a common axis, said compressing members comprising levers fulcrumed for oscillation about axes parallel to said common axis and symmetrically disposed thereabout, each lever consisting of a short arm adjacent said

common axes for contacting and compressing a tampon positioned at said common axis and a long arm more remote from said common axis, a master drive shaft, a plurality of driven shafts, one for each lever, disposed about said master drive shaft, means coupling said driven shaft to said master shaft for rotation therewith, crank arms on said driven shafts, and pitman rods coupling each crank arm to the long arm of the associated lever for oscillating said levers in response to rotation of said master drive shaft.

9. A machine as described in claim 8, in which said pitman rods are resiliently yieldable longitudinally to limit the reactive force of said levers on said crank arms to a predetermined value.

10. In a machine for compressing tampons, a plurality of compressing members positioned symmetrically about a common vertical axis, a hollow master drive shaft positioned below said compressing members and coaxial with said common axis, said hollow shaft functioning as a discharge passage for tampons released by said compressing members, means for rotating said master drive shaft, a gear secured to said master drive shaft for rotation therewith, a plurality of

and meshing therewith, supporting shafts for said plurality of gears, said shafts being keyed to said gears for rotation thereby, and means coupling each shaft to one of said compressing members for moving said compressing members toward and away from said common axis in response to rotation of said shafts, and means for rotating said master shaft.

11. In a machine for compressing substantially cylindrical tampons, a plurality of jaws positioned symmetrically about a common central axis, means supporting each jaw for movement about an individual axis spaced from said central axis, means for simultaneously moving all said jaws about their individual axes between outer and inner positions, respectively, each jaw having a working face angularly disposed to a radius drawn through the face from the associated individual axis, said face being approximately normal to a radius of said common axis when the jaw is in outer position, said working faces on the different jaws together defining a discontinuous wall and each of said jaws being approximately wedge shaped with said working face constituting one face of the wedge.

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