(No Model.)

2 Sheets—Sheet 1.

F. M. WATKINS.

STARCHING MACHINE.

No. 351,674. Patented Oct. 26, 1886.

Fig. 1.

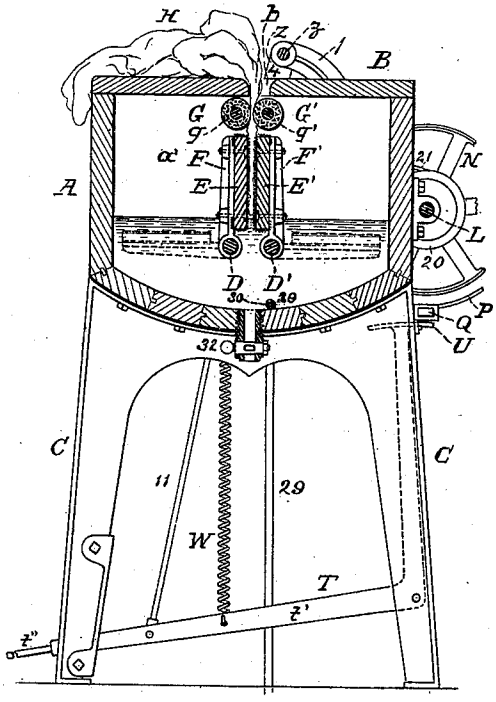


Fig. 2.

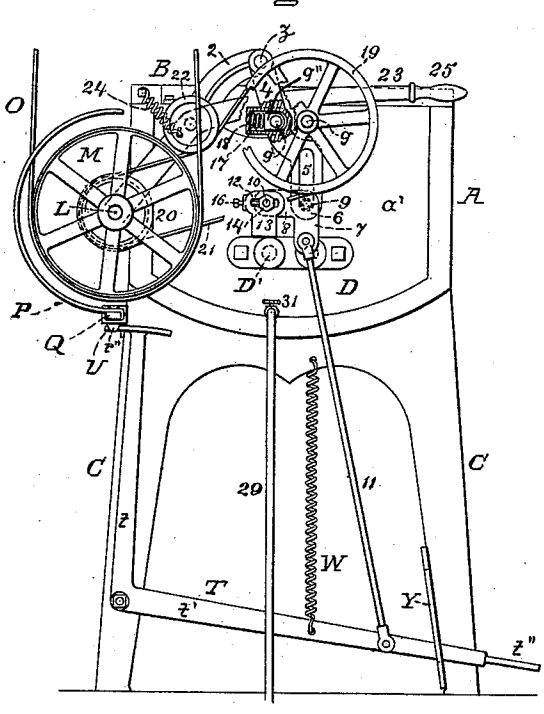


Fig. 3.

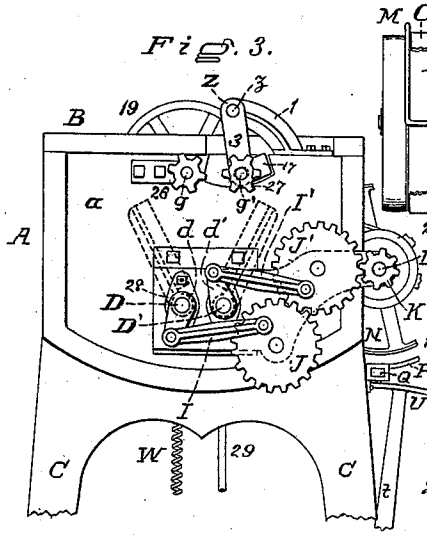
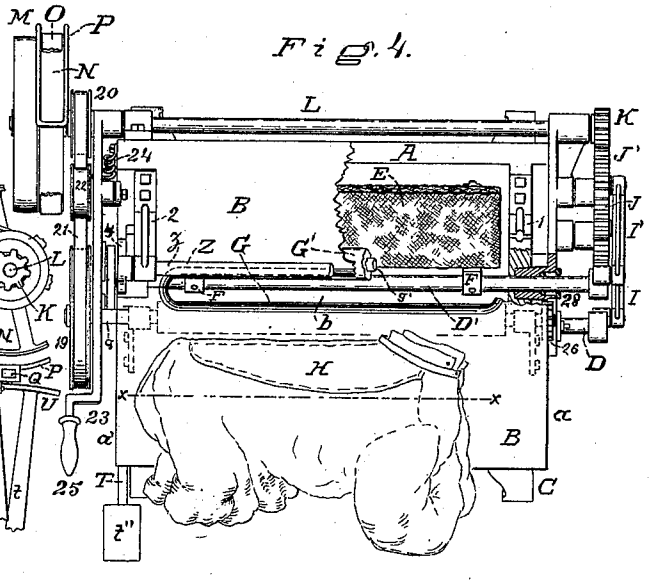


Fig. 4.



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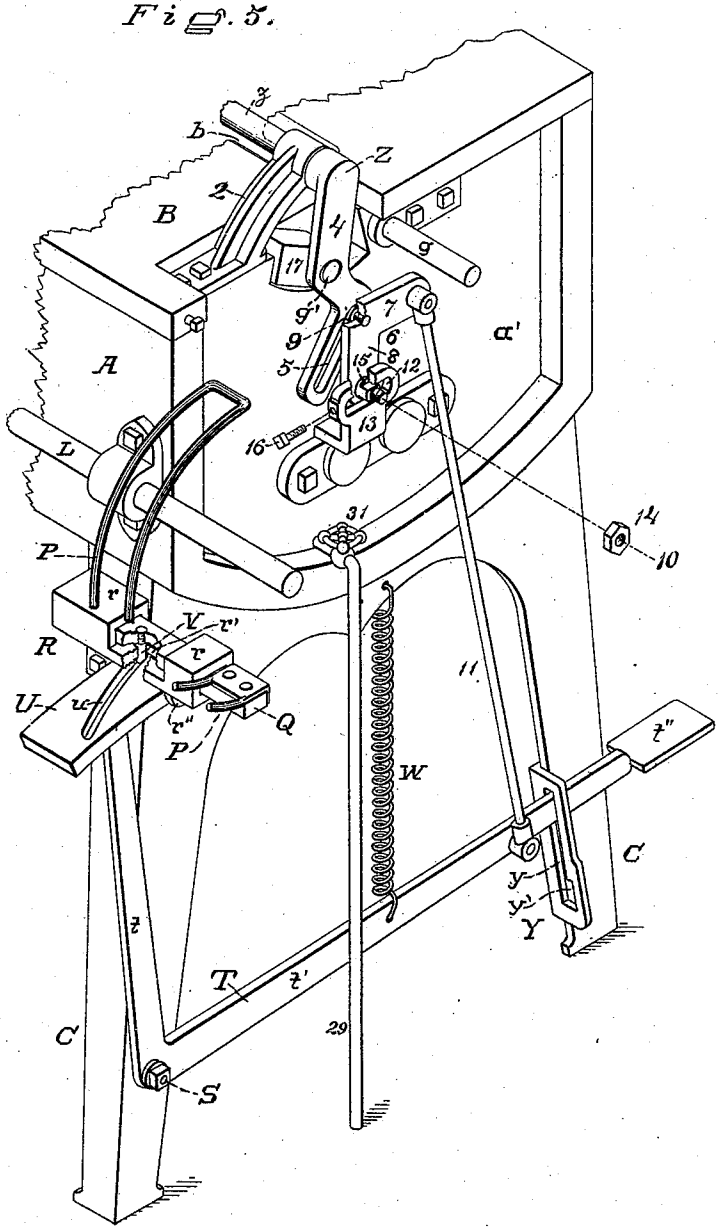
(No Model.) 2 Sheets—Sheet 2.

F. M. WATKINS.

STARCHING MACHINE.

No. 351,674. Patented Oct. 26, 1886.

Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANK M. WATKINS, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO JOHN T. WEIGHELL, OF SAME PLACE.

STARCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 351,674, dated October 26, 1886.

Application filed November 7, 1885. Serial No. 182,096. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. WATKINS, of Cincinnati, Hamilton county, Ohio, have invented a new and useful Improvement in Starching-Machines, of which the following is a specification.

My invention consists in certain features of novelty, which are hereinafter particularly pointed out in the claims, being first fully described with reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the machine. Fig. 2 is an elevation of one end of the same, and Fig. 3 an elevation of the other end. Fig. 4 is a top view of the machine, showing the shirt lying on the same as folded for starching. Fig. 5 is a perspective view of the same parts as are shown by elevation in Fig. 2.

In all of the figures portions of the machine have been broken away for convenience of representation.

A may represent a box or tank, which is partly filled with starch-paste, and is provided with a cover, B, and is supported on legs C. Within the box A are two parallel rock-shafts, D D′, which extend between and are journaled in the ends *a a′* of the box. The rock-shafts D D′ carry paddles E and E′, respectively, the said paddles being secured to their respective rock-shafts by being attached to arms F F′ of the same. The rock-shafts D D′ being, by means of suitable mechanism, reciprocated in opposite directions, the paddles E E′ are caused to alternately rise toward and fall away from one another, so as in their highest position to press together, and in their lowest position to dip beneath the surface of the starch-paste in the tank A. When the paddles E E′ are brought together, their upper edges come underneath a pair of rollers, G G′, which extend from end to end of the box A, and are capable, by means of suitable mechanism, of being brought together or moved apart. A slot, *b*, is made in the lid B directly over the space left between the rollers G G′ when they are separated, as shown in Figs. 3, 4, and 5.

The shirt H is prepared for starching by having its sleeves folded back and the wristbands brought around so as to lie within the collar, as shown in Fig. 4. The fore part of the shirt is then let down through the slot *b* and between the rollers G G′, which are held apart until the bosom and wristbands of the shirt have passed down below them, and are then closed together, as shown in Figs. 1 and 2, so as to grip the shirt about on the line *x x* in Fig. 4. The paddles E E′ are now set in motion, so as to fall and rise alternately between the positions (shown by dotted lines in Fig. 1) in which they dip into the starch-paste, and the positions (shown by strong lines in same figure) in which they press together, so as to squeeze the fore part of the shirt between them, and thereby drive into its fibers the starch-paste which has adhered to their surfaces. When, by this means, the bosom and wristbands have become thoroughly saturated with starch-paste, the rollers G G′ are rotated, so as to wring out the surplus starch-paste from said bosom and wristbands, and at the same time expel them from the tank A.

The paddles E E′ are preferably of wood, for the sake of lightness and stiffness, and are preferably faced with cloth, so as to increase their capacity for taking up starch-paste.

The rollers G G′ are preferably faced with india-rubber, so as to have an elastic and non-absorbent surface.

The rollers G G′ discharge the several distinct functions of a clamp for clamping the goods to be starched, a wringer for wringing out the surplus starch, and an ejector for ejecting the starched goods from the machine.

The mechanism (shown in Figs. 3 and 4) which I prefer to employ for reciprocating the rock-shafts D D′ may be described as follows: The rock-shafts D D′ pass through and project beyond the end *a* of the box A, and on their parts which so project are provided with cranks *d d′*, which, by means of connecting-rods I I′, are connected to crank-wheels J J′, respectively. The crank-wheels J J′ are of the same diameter and gear together, and the crank-wheel J′ also gears with a pinion, K, on the drive-shaft L, which extends along the back of the tank A. Rotation of the drive-shaft L thus causes the crank-wheels J J′ to rotate synchronously with each other, but in opposite directions. The means of connection between the rock-shafts D D′ and their respective crank-wheels J J′ are so proportioned and arranged that such synchronous rotation

in opposite directions of said crank-wheels causes reciprocation in opposite directions of the said rock-shafts and their attached starching-paddles between the position in which said paddles press together and the position in which they dip into the starch-paste. The drive-shaft L, to one end of which is fastened the pinion K, carries on its other end, side by side with one another, a fast pulley, M, and a loose pulley, N. A belt, O, can be shifted from one to another of these pulleys, so as to stop or start the machine, by means of a device which is shown in Figs. 2 and 5, and which may be described as follows: The loop or fork P, which incloses and guides the belt O, is attached to a slide-bar, Q, which is capable of moving parallel to the drive shaft L by sliding in boxes *r* of a supporting-bracket, R, which is fastened to one of the legs C on which the tank A is supported. Attached to the same leg lower down, by means of a pivot, S, is a bent lever, T, whose arms *t* and *t'* extend, respectively, upward and forward from the pivot S. The upwardly-extending arm *t* carries at its top a plate, U, whose upper surface is concentric with the pivot S and comes a little beneath the sole-plate of the bracket R.

A pin, V, fastened rigidly to the slide-bar Q, passes down through a slot, *r'*, in the sole-plate of the bracket R and projects into an oblique groove, *u*, in the upper face of the plate U. Depression and elevation of the forwardly-extending arm *t'* of the bent lever T cause, respectively, a forward and a backward motion of the other arm, *t*, and the plate U. The direction of the groove *u* in the plate U is such that by the engagement of one or other of its walls with the pin V the forward motion of the plate U causes the slide-bar Q and its attached belt-guiding fork P to be moved in such a direction as to shift the belt O from the loose pulley N to the fast pulley M, while the backward motion of the plate U operates in a similar manner to shift said belt in the reverse direction. The plate U, in thus moving backward and forward, is supported against the sidewise thrust of the pin V in the groove *u* by sliding on one side against the adjoining leg of the tank A, and on the other side against a lug, *r''*, which projects downwardly from the sole-plate of the bracket R. A spiral spring, W, tends to draw up the arm *t'* of the bent lever T, and thereby tends to hold the machine to the inactive condition, and to restore it to that condition at the instant of its release from the opposing depression of the arm *t'*. To facilitate such depression of the said arm, it is provided with a treadle, *t''*, at its front end. The arm *t'*, near its front end, passes through and is guided by a slot, *y*, in a fixed plate, Y. When the said arm is depressed so as to set the machine in action, it can be pushed to one side, so that its upper edge catches under the upper edge of a notch, *y'*, near the bottom of the slot *y*. The arm *t'* being thus held down, the machine will continue to run until the said arm is pushed out of said notch and allowed to be drawn up by the spiral spring W.

The mechanism I prefer to use for imparting the requisite motions to the gripping and wringing rollers G G' may be described as follows: The shaft *g* of the forward roller, G, is journaled in the ends *a a'* of the box or tank A. The shaft *g'* of the rear roller, G', is journaled in a swinging frame, Z, so as to enable the rear roller, G', to be brought against or separated from the forward roller, G. The swinging frame Z consists of a rock-shaft, *z*, journaled in standards 1 and 2, and having at each end a downwardly-extending arm, 3 or 4, in which is journaled the corresponding end of the roller-shaft *g'*. The arm 4 is prolonged downwardly below the roller-shaft *g'*, and in its lower part is provided with a slot, 5. A bent lever, 6, carries at the junction of its two arms, 7 8, a roller, 9, which, by the rocking of said bent lever 6 on a pivot, 10, at the end of its arm 8, is made to traverse in the slot 5, and by pressing against one or other of the walls of said slot to move the swinging frame Z backward or forward. To effect such rocking motion of the bent lever 6, the end of its arm 7 is connected by a rod, 11, to the treadle-arm *t'*, and the positions of the working parts above described are such that elevation and depression of the treadle-arm *t'* cause, respectively, the separation and the coming together of the rollers G G'. The starching-paddles D D' are thus brought into action at the same time that the shirt is clamped between the rollers G G'. The pivot 10 passes through a slot, 12, in a supporting-plate, 13, which is rigidly attached to the box A. A nut, 14, is screwed onto the end of the pivot 10, so as to press against one side of the plate 13 and to cause a shoulder, 15, on the pivot 10 to press against the other side of the said plate, thereby clamping the pivot 10 to the plate 13. By loosening the nut 14 and moving the pivot 10 one way or the other in the slot 12, and then screwing up the nut 14 again, the pivot 10 can be adjusted backward or forward, so as to adjust the limit of forward motion of the roller G', which can thus be made to grip the shirt with any desired pressure. To enable the pivot 10 to support the backward thrust, which is brought upon it when the shirt is being gripped, a set-screw, 16, is tapped into the plate 13 at the back of the slot 12, and screwed forward until its end presses against the back of the said pivot. The ends of the roller-shaft *g'* are journaled in boxes *g''*, which are contained in recesses 17 of the arms 3 and 4. Each of said boxes is capable of sliding backward and forward in its corresponding recess, but is held normally forward by the pressure of a spiral spring, 18, which is placed between the back of the box and the back of the recess. By this means the roller G' is enabled to yield a little in gripping the shirt, so as to avoid undue strain of any of the parts of the roller-

shifting mechanism, and the breakage of buttons on the shirt.

To rotate the rollers G G′, so as to wring out the shirt and expel the same from the machine, I prefer to employ the mechanism about to be described. The roller-shaft *g* projects beyond both ends of the box A, and on one of its extremities carries a fast pulley, 19. (See Figs. 2 and 4.) Around this fast pulley and another fast pulley, 20, on the drive-shaft L, passes a belt, 21, which is normally so slack as not to transmit motion from the pulley 20 to the pulley 19, but may be made to effect such transmission by being tightened over said pulleys by means of a tightening-roller, 22. This roller is carried by a lever, 23, which is journaled on the drive-shaft L, and is normally held by a spiral spring, 24, to the position in which the roller 32 does not operate to tighten the belt. To enable the lever 23 to be thrown into the position for tightening the belt, it is provided at its front end with a handle, 25. The roller-shaft *g*, to one extremity of which the pulley 19 is fastened, carries on its other extremity a cog-wheel, 26, which, when the roller G′ is brought forward and the roller-shaft *g* set in rotation, gears with and drives a similar cog-wheel, 27, on the corresponding extremity of the roller-shaft *g′*, so as to cause the rollers G and G′ to rotate synchronously and in opposite directions.

The rock-shafts D D′, where they pass through the end *a′* of the tank A, are surrounded by stuffing-boxes 28, to prevent leakage of the starch-paste.

A steam-pipe, 29, passes into the tank A, and is perforated, as at 30, to allow steam to escape into said tank. A valve, 31, serves to regulate the amount of steam which thus escapes. A mixture of starch and water having been put into the tank, the steam is turned on, so as to boil said mixture and convert it into starch-paste. The steam is then turned off, so as to allow the starch-paste to cool to the right temperature, at which it is finally maintained by turning the steam partly on.

A tap or spigot, 32, in the bottom of the tank A, enables any surplus or residual starch-paste to be drawn or blown out.

I claim as new and of my invention—

1. The combination, with the starch-tank and a clamp for supporting therein the article to be starched, of the beaters or paddles E E′, incapable of movement in the planes of their working-surfaces, and means for imparting thereto a to-and-fro motion, substantially as and for the purpose set forth.

2. In a starching-machine, the combination, with the tank and a clamp for supporting therein the article to be starched, of the beaters or paddles E E′, rock-shafts D D′, to which they are respectively secured, confined against lateral movement, and means for synchronously oscillating said shafts in opposite directions, substantially as set forth.

3. In a starching-machine, the combination, with the tank, the beaters, and the shaft to which said beaters are secured, journaled athwart the tank, of the driving-shaft, gearing connecting said driving-shaft and rock-shafts, a fast and loose pulley upon said driving-shaft, and a belt-shifter for shifting the belt from one to the other, substantially as set forth.

4. In a starching-machine, the combination, with the tank A and the beaters E E′, of the relatively movable wringing-rollers G G′ and means for bringing them together and moving them asunder, substantially as described.

5. In a starching-machine, the tank, the beaters, and means for vibrating said beaters, the relatively movable wringer-rollers, and means for changing their distance asunder, in combination with a single treadle and connections between said treadle and the means for vibrating the beaters and moving the rollers, substantially as and for the purpose set forth.

6. In a starching-machine, the combination of beaters E E′, shafts D D′, carrying said beaters and journaled in and athwart the starch-tank, and having cranks *d d′*, match-gear crank-wheels J J′, rods I I′, connecting said crank-wheels with cranks *d d′*, and means for optionally rotating said crank-wheels, substantially as and for the purpose explained.

7. In a starching-machine, the combination of beaters E E′, journaled in the starch-tank, means for optionally vibrating said beaters, roller G, in fixed bearings and having optional connection with the driving power, roller G′, movable to and from the roller G, and cog-wheels 26 and 27, secured to the respective rollers G G′, and adapted to intermesh when said rollers are brought into close proximity, substantially as and for the purpose set forth.

8. In a starching-machine, the combination of stationary driving-roller G, driven roller G′, journal-boxes *g″*, swinging frames Z, rock-shaft *z*, arms 3 4, the latter having slot 5, recesses 17, secured to said arms 3 4 and receiving and guiding the boxes *g″*, springs 18, holding said boxes forward in recesses 17, bent lever 6, having adjustable fulcrum 10, and stud or roller 9, engaging in slots 5, treadle T, and rod 11, connecting the treadle and lever 6, substantially as and for the purposes specified.

In testimony of which invention I hereunto set my hand.

FRANK M. WATKINS.

Attest:

RANKIN D. JONES,

A. P. KNIGHT.