No. 646,032. Patented Mar. 27, 1900.

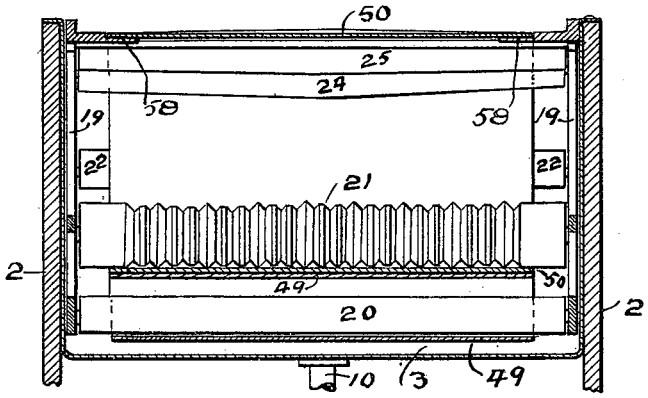
W. A. NEWTON.

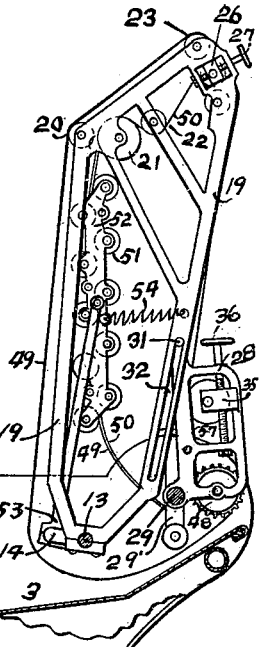
STARCHING MACHINE.

(Application filed Oct. 18, 1898.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 7





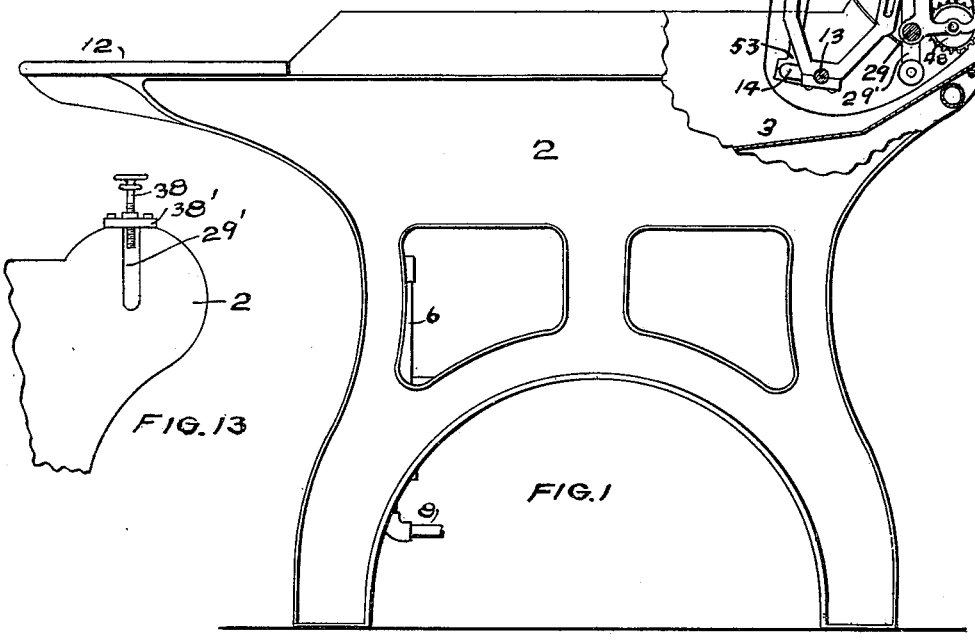


FIG. 1

FIG. 13

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W. A. NEWTON.

STARCHING MACHINE.

(Application filed Oct. 18, 1898.)

(No Model.) 3 Sheets—Sheet 2.

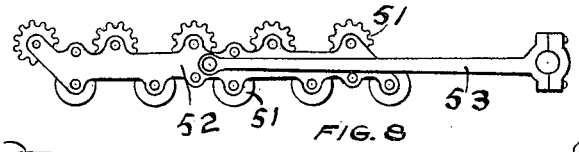

FIG. 8

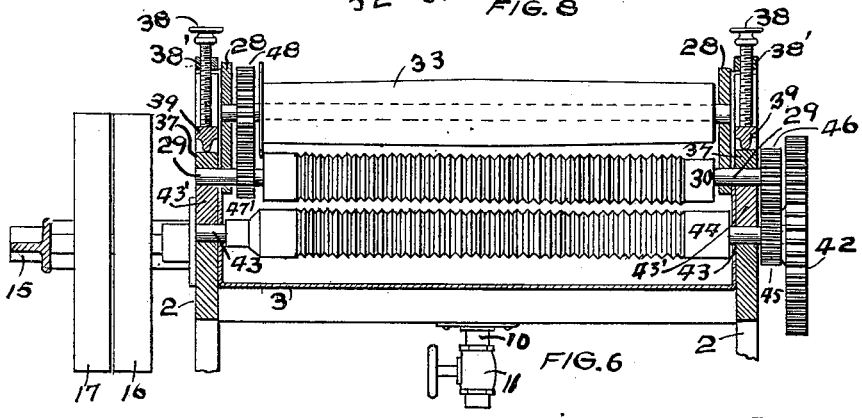

FIG. 6

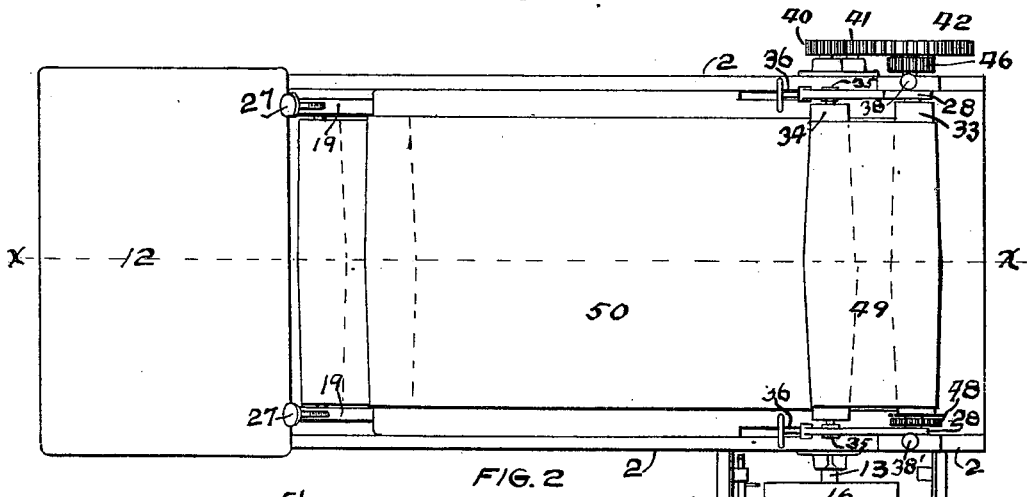

FIG. 2

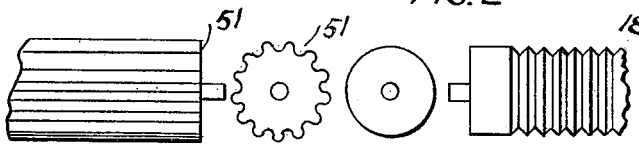

FIG. 9 FIG. 10 FIG. 11 FIG. 12

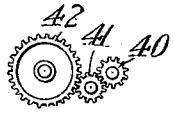

FIG. 14.

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No. 646,032. Patented Mar. 27, 1900.

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STARCHING MACHINE.

(Application filed Oct. 18, 1898.)

(No Model.) 3 Sheets—Sheet 3.

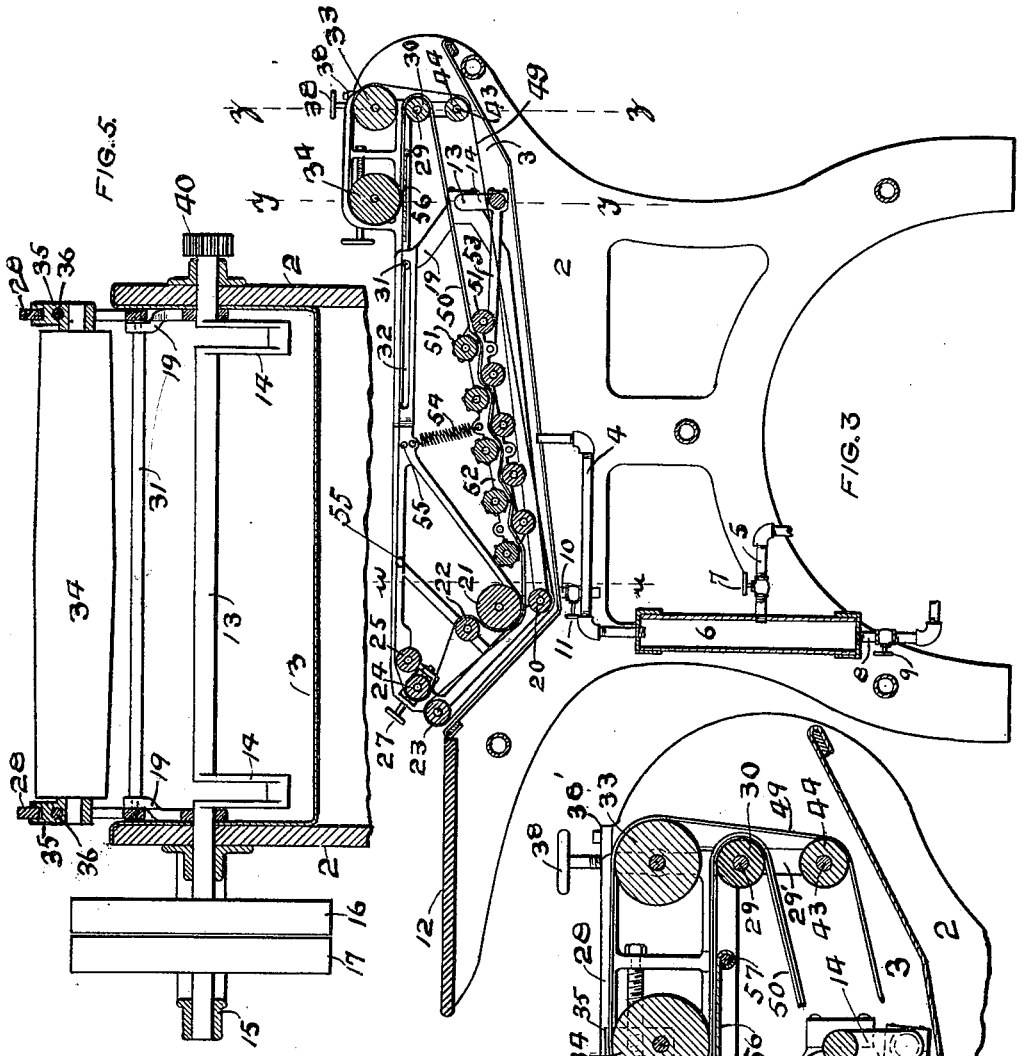

FIG. 5.

FIG. 3.

FIG. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM A. NEWTON, OF MINNEAPOLIS, MINNESOTA.

STARCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,032, dated March 27, 1900.

Application filed October 18, 1898. Serial No. 693,884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. NEWTON, of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Starching-Machines, of which the following is a specification.

This invention relates to starching-machines that are particularly adapted for starching collars, cuffs, and like small articles; and the invention relates especially to improvements upon the starching-machine shown and described in Letters Patent No. 599,132, granted February 15, 1898, to Daniel H. Newton.

The objects of the present invention are, first, to improve the arrangement of the driving-rolls, to prevent the squeezing of the belts or the goods between the same and yet to properly drive said belts; second, to improve the construction of both driving and guide rolls, whereby the belts are made to run evenly; third, to improve the construction and relative arrangement of the working or rubbing rolls and to provide an auxiliary support therefor for the purpose of drawing the rolls toward the top of the machine when the same is raised, and, fourth, to permit the employment of heavier belts by providing for the thorough saturation and loading thereof with starch.

The invention consists generally in a starching-machine of the construction and combinations of parts hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side view, parts being broken away, of a starching-machine embodying my invention, the working members thereof being raised. Fig. 2 is a plan view thereof. Fig. 3 is a sectional view on the line *x x* of Fig. 2. Fig. 4 is an enlarged detail taken from Fig. 3. Fig. 5 is a transverse section substantially on the line *y y* of Fig. 3, but enlarged. Fig. 6 is a transverse section substantially on the line *z z* of Fig. 3. Fig. 7 is a similar section on the line *u u* of Fig. 3. Fig. 8 is an enlarged side view of the working or rubbing rolls. Figs. 9 and 10 are detail views of the upper rolls shown in Fig. 8. Figs. 11 and 12 are detail views of the carrying-rolls, which also serve as driving-rolls. Fig. 13 is a detail of the frame. Fig. 14 is a detail view showing the positions of the driving-gears.

In the accompanying drawings, 2 is the frame of the machine, and 3 is a vat supported in said frame and adapted to contain liquid starch. For the purpose of heating the starch in the vat I provide a steam-pipe 4, connected to the lower part of the vat, and this pipe is preferably supplied with steam from the pipe 5 through the steam-trap 6. The pipe 5 is preferably provided with a valve 7, and the trap 6 is provided with the drip-pipe 8, having a suitable valve 9. The vat is also preferably provided with the discharge-pipe 10, having a suitable valve 11. Any other suitable means may, however, be provided for heating the vat. The frame 2 is preferably provided at one end with an operator's table 12. The frame and the sides of the vat preferably extend above the level of the table, as shown. Mounted in bearings in the rear end of the vat is the driving-shaft 13, which is provided within the vat with the cranks 14. (See Fig. 5.) The shaft 13 extends through suitable bearings in the frame of the machine outside of the walls of the vat, and the end of the shaft is preferably supported in the U-shaped extension 15, secured to or formed integrally with the frame 2. (See Figs. 2, 5, and 6.) The shaft 13 is provided with the fast and loose pulleys 16 and 17, and a suitable belt-shifter 18 is preferably arranged upon the frame extension 15, by means of which the driving-belt may be shifted from one pulley to the other, as desired. Mounted upon the shaft 13 as a pivot is the frame 19, corresponding substantially to the movable frame in Patent No. 599,132, hereinbefore referred to. At the forward or movable end of the frame are the belt-guiding rolls 20, 21, 22, 23, 24, and 25, preferably arranged substantially as shown in Fig. 3 of the drawings. All of said rolls are preferably mounted in suitable bearings in the frame 19. When the frame 19 is in its normal position in the vat, the roll 20 is in position near the bottom of the vat, with the roll 21 a short distance above it. The roll 22 is preferably arranged a short distance above and in front of the roll 21. At the forward end of the frame are the rolls 23, 24, and 25, preferably arranged at different levels,

and the roll 24 being preferably mounted in movable boxes 26, provided with adjusting-screws 27. (See Fig. 2.) The roll 24 is preferably mounted in movable boxes for the purpose of permitting it to be moved to tighten the belt that passes over said roll. At the opposite or rear end of the vat is the auxiliary frame 28, which is pivoted upon the shaft 29 of the roll 30. (See Figs. 1, 2, and 4.) The forward end of the frame 28 is provided with a rod 31, engaging slots 32 in the frame 19. When the frame 19 is turned down to a horizontal position within the vat, the rod 31 slides along to the rear end of the slots 32. (See Fig. 3.) The auxiliary frame then occupies the position in relation to the frame 19 shown in said Fig. 3. When the frame 19 is turned up out of the vat, the frame 28 moves with it, the rod 31 sliding forward and upward in the slots 32 until it reaches the ends of said slots, when it forms a support to prevent further movement of the frame 19 and hold said frame in an elevated position, as illustrated in Fig. 1 of the drawings. As before stated, the auxiliary frame 28 is pivoted upon the shaft 29 of the roll 30, and two other rolls 33 and 34 are mounted in said frame 28. The roll 34 is preferably mounted in the longitudinally-sliding blocks 35, and adjusting-screws 36 are mounted in bearings in said frame and pass through said blocks 35, and by means of said screws said blocks and the roll 34 may be adjusted longitudinally of the auxiliary frame 28.

The frame 2 is provided in its opposite walls with the vertical slots 29′, and when the vat 3 is placed in position between the two parts of the frame 2 the roll 30 and a lower roll 44, having a shaft 43, have already been put in position, with the ends of the shafts of the rolls projecting through the walls of the vat. The shaft 43 is inserted into the lower ends of the slots 29′, and above said shaft 43 blocks 43′ are arranged in the slots 29′, the upper ends of the blocks 43′ forming the bearing for the ends of the shaft 29. Above the shaft 29 blocks 37 are arranged, bearing upon said shaft. A bar 38′ is secured to the frame, extending across each of the slots 29′, and screws 38 pass through threaded openings in the bars 38′, and their lower ends bear upon the blocks 39, that in turn bear upon the blocks 37 in the slots 29′. This construction facilitates the placing of the rolls 30 and 44 in position, and at the same time provides means for taking up the wear of the bearings.

The end of the shaft 13 opposite that which is provided with the driving-pulley is provided with a suitable pinion 40, which engages another pinion 41, mounted upon a stud secured upon the frame 2, and the pinion 41 in turn engages a gear 42, mounted upon the shaft 43 of the roll 44. (See Figs. 2 and 6.) The shaft 43 is provided with a pinion 45, that engages with a pinion 46 upon the shaft 29 of the roll 30, and the opposite end of the shaft 29 is preferably provided with a pinion 47, that engages the pinion 48 upon the shaft of the roll 33. By this means it will be seen that the rolls 44, 30, and 33 are positively driven at all times through the motion of the main shaft 13. The rolls 33, 34, 23, and 24 are all preferably made crowning or larger at the center and tapering toward both ends, as shown clearly in connection with the roll 34 in Fig. 5 of the drawings. The advantage of this is that the belts are made to run evenly upon the rolls and are centrally held upon said rolls without stretching the edges of the belts. The rolls 33, 30, and 44 are preferably not in contact nor in such close proximity as to cause any squeezing of the belts or of the goods between the belts while the machine is in use. By arranging the roll 22 at a point above the roll 21 a pocket or reservoir is formed and maintained at all times between the two belts at the feed end of the machine. The belts are both endless, and the lower belt 49 passes around the roll 23, under the roll 21, between the series of rubbing-rolls 51, hereinafter described, around the roll 30, under and over the roll 34, over the roll 33, around the roll 44, under the roll 20, and to the roll 23. The other belt 50 passes from the roll 24, over the roll 22, under the roll 21, between the rubbing-rolls 51, around the roll 30, over the roll 25, and to the roll 24. I also provide the two series of rubbing-rolls 51, alternately arranged and mounted in a light frame 52. These rolls may be smooth or corrugated or of any other preferred form. In Figs. 9 and 10 I have shown the rolls 51 longitudinally corrugated, and in Fig. 8 I have shown the upper rolls mounted in a frame 52, longitudinally corrugated, while the lower rolls are smooth. A connecting-rod 53 is pivotally connected to the frame 52, one at each side of the frame, and these rods are connected to the crank 14 of the driving-shaft 13. A coiled spring (one or more) 54 is preferably connected to the frame 52 and also to the frame 19, (see Fig. 3,) and this spring forms an auxiliary support for the frame 52 and serves to draw the frame toward the top of the machine when the rolls 51 are released from the belts. The action of these rolls upon the articles being fed through the machine is fully described in the patent to Daniel H. Newton, above referred to. In the top of the frame 19 I provide one or more transverse rods 55, which act as a support for the upper belt while the machine is in operation. The rolls 30 and 44, which serve largely to drive or draw the belts through the machine, are preferably separated to avoid wear on the belts and so that the belts and the articles between them are not squeezed by passing between said rolls, and for the further purpose of preventing the squeezing of the starch out of the belts and goods I prefer to provide said rolls with a series of circumferential grooves, as shown in Figs. 6 and 12. These grooves or corrugations serve to prevent contact except at the thin edges of the ribs between the rolls and

the belts, and thereby prevent the squeezing of the belts or the forcing of the starch therefrom. It will be noted also that the power-driven rolls 33, 30, and 44, over which the belts pass, are not in contact one with another, so that there can be no squeezing of the belts by their passage between the driving-rolls. The crowning of the rolls 33, 34, 23, and 24 serves to make the belts run evenly upon all of the rolls. The separation of the belts at the forward end of the machine, which is effected by passing one of said belts over the roll 22, forms a pocket between said belts at the forward end of the machine in which the starch will accumulate, and through the starch in this pocket the articles must be passed before they are grasped by the portions of the belts that are running close together. (See Fig. 3.) For the purpose of providing a support for the upper belt 50 at a point substantially under the roll 34, I arrange a plate 56 upon the auxiliary frame 28, preferably securing the same upon a transverse rod 57. (See Fig. 4.) This plate, together with the rods 55, serves to support the upper stretch of the upper belt without creating any considerable friction between said belt and said support, and the portion of this belt between the roll 34 and the roll 25 serves as a delivery-table for the articles and from which they may be removed by the operator.

The roll 21 is preferably corrugated, (see Fig. 7,) and I prefer to arrange the corrugations as shown in this figure of the drawings. It will be noted that the edges of the ribs of two-thirds of the corrugations are trimmed off slightly, so that ordinarily only the edges of the untrimmed corrugations will be in contact with the belt. The ends of all the corrugated rolls are preferably of the same diameter as those portions of the rolls having the corrugations, so that the edges of the belts are supported upon the end portions of said rolls. The upper portion of the frame 19 is preferably provided with the inwardly-projecting edges 58, which form supports for the edges of the belt 50.

The general operation of the machine is the same as that of the machine described in the Daniel H. Newton patent, hereinbefore referred to. By using the crowned rolls, over which the belts pass, I secure perfect control of said belts and cause the same to run evenly upon the rolls at all times. As the driving-rolls are not in contact with one another the starch is not squeezed out of the belts and goods by the passage of the belts between the rolls, and as the belts are in contact with the driving-rolls only at the thin edges of the ribs extending circumferentially on said rolls the pressure between the belts and the rolls does not force the starch out of the belts and goods, there being no contact, and consequently no pressure, between the belts and the rolls at the spaces between the circumferential ribs. As the delivery side of the upper belt passes over small rods which form supports therefor any sticking of this part of the belt to its support is avoided.

As the construction herein shown and described may be varied to a considerable extent without departing from the principle of my invention, I do not limit myself to the details of such construction.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, in a starching-machine, of two endless belts to receive the articles between them, a starch-vat through which said belts pass and circumferentially-corrugated driving-rolls engaging said belts, said driving-rolls being suitably separated, substantially as described and for the purpose set forth.

2. The combination, in a starching-machine, of the two endless conveyers or aprons, means for saturating said conveyers or aprons, and circumferentially-corrugated driving-rolls engaging said conveyers or aprons and driving the same without squeezing the moisture or starch therefrom or from the goods carried between said conveyers or aprons, for the purpose set forth.

3. The combination, in a starching-machine, of the two endless belts to receive the articles between them, a starch-vat through which said belts pass, carrying-rolls for said belts, and a driving-roll around which the engaged portions of the two belts pass, said driving-roll being circumferentially corrugated to prevent the squeezing of the starch from said belts, substantially as described.

4. The combination, in a starching-machine, of the two endless belts or aprons to receive the articles between them, with a starch-vat through which said belts pass, the carrying-rolls for said belts, and the circumferentially-corrugated driving-rolls 30 and 44 over which said belts pass, and said driving-rolls being separated and the engaged portions of the two belts passing over and around the roll 30, as and for the purpose specified.

5. The combination, in a starching-machine, of the starch-vat, with two endless belts or aprons to receive the articles between them, the driving-rolls for said belts, the working rolls operating upon the engaged parts of said belts within said vat, the circumferentially-grooved roll 21 provided in said vat, and the deflecting-roll 22 for the upper belt, whereby a starch-pocket is formed above said roll 21, as and for the purpose specified.

6. The combination, of the two endless belts or aprons, with means for saturating the same with starch, the crowned carrying-rolls for said belts, means for adjusting and alining said crowned rolls, and the circumferentially-corrugated driving-roll over which the engaged parts of the two belts pass, and suitable rubbing or working means operating upon the engaged parts of said belts, substantially as described.

7. The combination, in a starching-machine, of the tank or vat, with the two endless belts or aprons provided therein and between which the articles are carried, the driving-rolls, the pivoted frame carrying said belts and rolls, and the reciprocating working frame having parts operating upon the engaged parts of said belts and within said pivoted frame, and the spring or springs 54 substantially supporting the weight of said reciprocating frame and its parts within said pivoted frame, as and for the purpose specified.

8. The combination, with the frame and the vat therein, of the two endless belts or aprons, the driving and carrying parts therefor within said vat, the working devices provided within said vat to operate upon the engaged parts of said belts, the pivoted frame carrying said working parts, and the carrying parts for said belts whereby all thereof may be lifted from said vat, the auxiliary frame, the smoothing-plate 56 provided therein, and the rods provided in said pivoted frame beneath the upper part of the upper belt, substantially as described.

9. In a starching-machine, the combination, with the vat, of the endless belts having engaged parts operating in the same direction, working devices, a starch-pocket formed between said belts and interposed between said working devices and the receiving end of said belts, and the circumferentially-corrugated roll further interposed between said working devices and said starch-pocket and having corrugations of different lengths as described, and for the purpose set forth.

10. The combination, with the vat, of the two endless belts operating therein, and between which the articles are carried and by which they are delivered upon the upper part or stretch of the upper belt, the frame for said belts, and the upper part of said frame being provided with ledges 58 whereon said upper stretch laps, said frame being also provided with a cross rod or rods to additionally support said upper stretch, substantially as described.

11. In a starching-machine for collars and cuffs, the combination, with the frame, of the vat, the circumferentially-corrugated driving-rolls 30 and 34 arranged within said vat, the crowned guiding-roll 33, arranged above the same, the gears 47 and 48 connecting said driving-roll 30 and said guiding-roll 33 and arranged within the vat, the gears connecting the driving-rolls 30 and 44 upon the exterior of the vat, the two endless belts supported and guided in said vat by said crowned roll and other like rolls therein, said belts passing over said rolls 30 and 44 and being driven thereby, substantially as described.

In testimony whereof I have hereunto set my hand, this 13th day of October, 1898, at Minneapolis, Minnesota.

WILLIAM A. NEWTON.

In presence of—
A. C. PAUL,
RICHARD PAUL.