

E. E. STONE.
 STARCHING MACHINE.
 APPLICATION FILED OCT. 27, 1909.

984,864.

Patented Feb. 21, 1911.

6 SHEETS—SHEET 1.

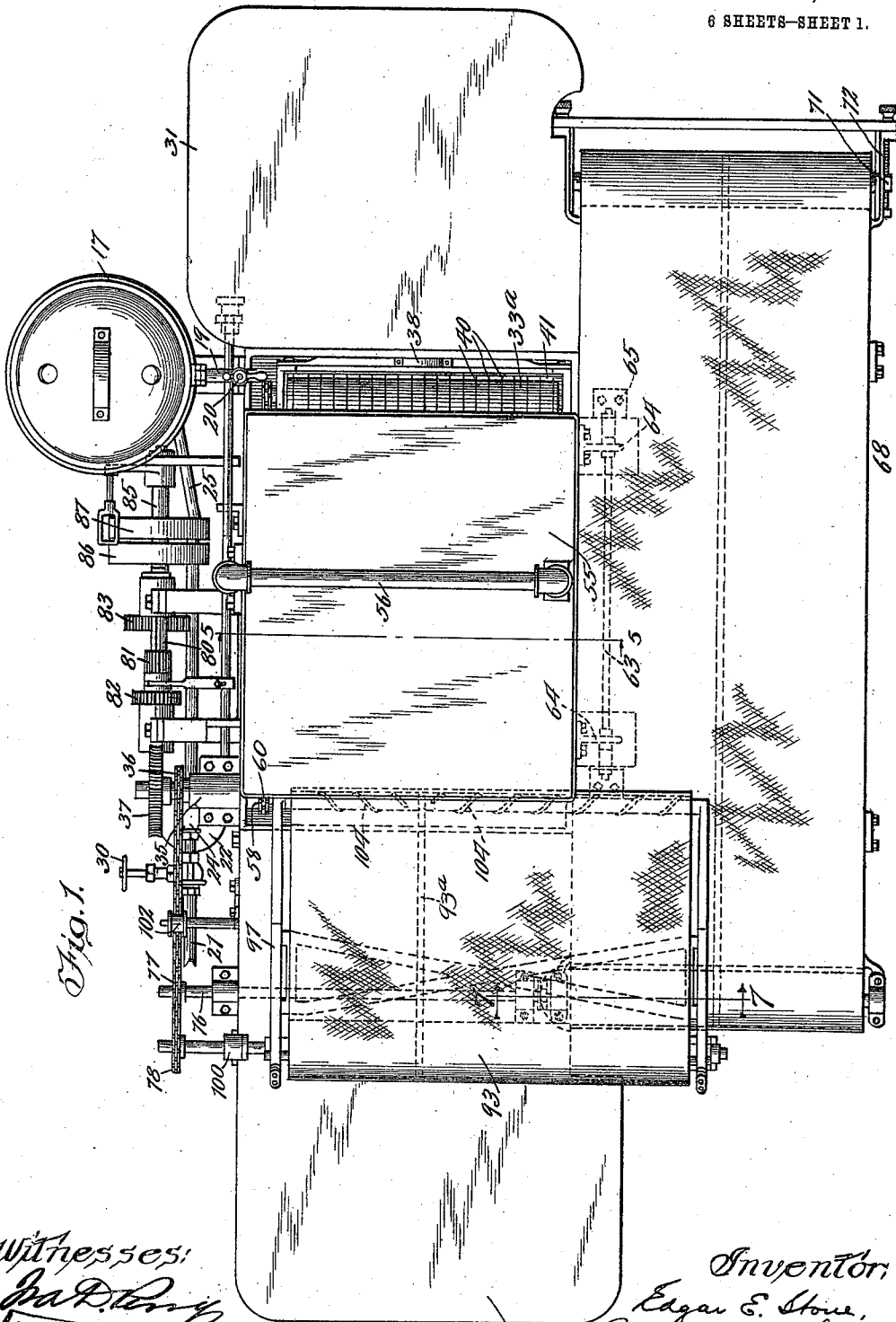


Fig. 1.

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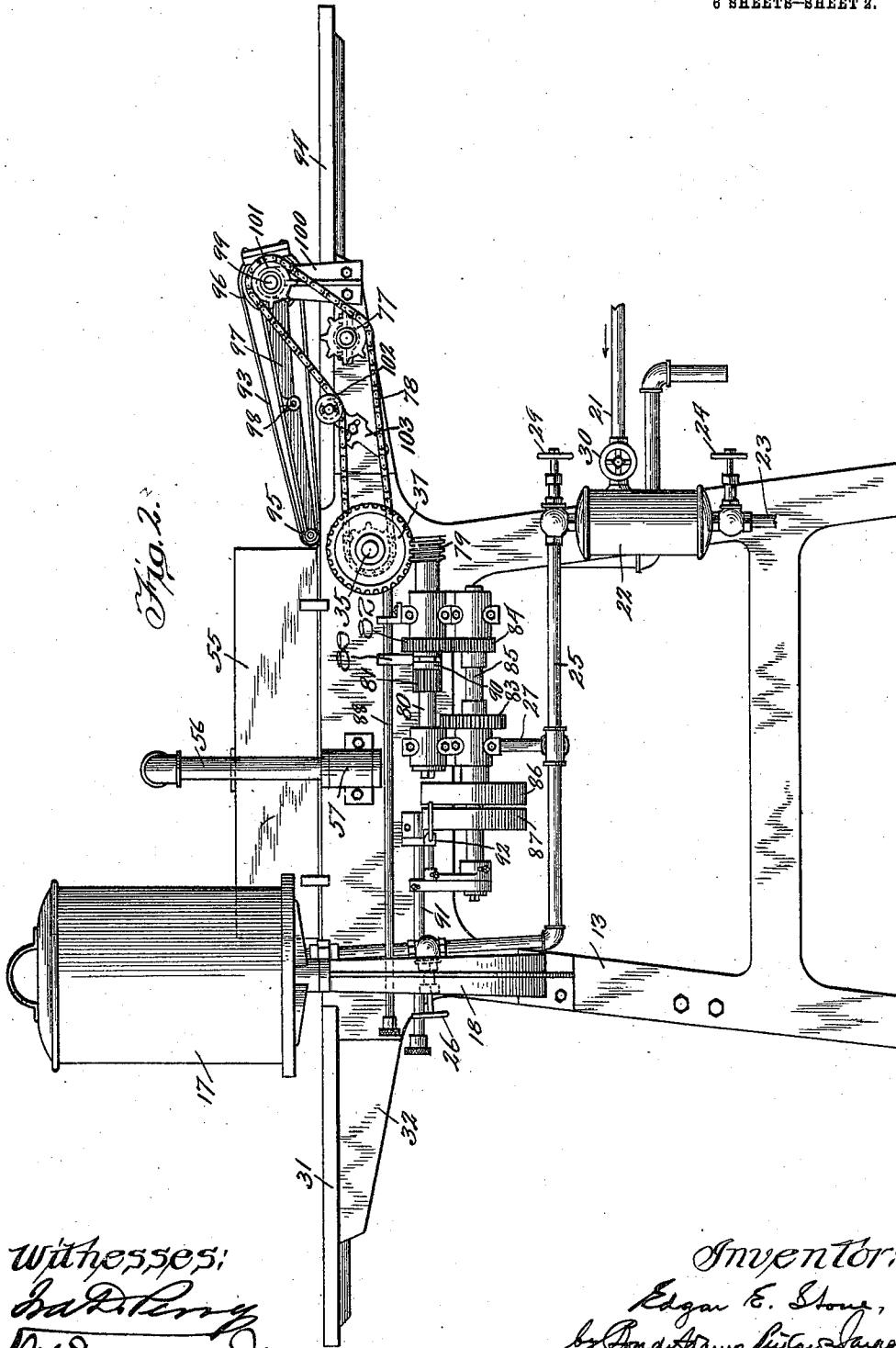
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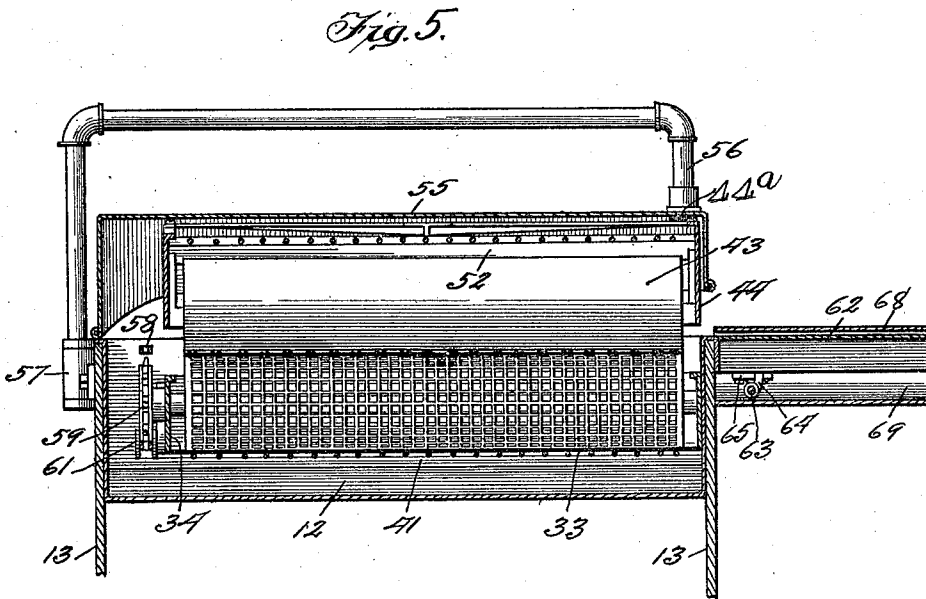
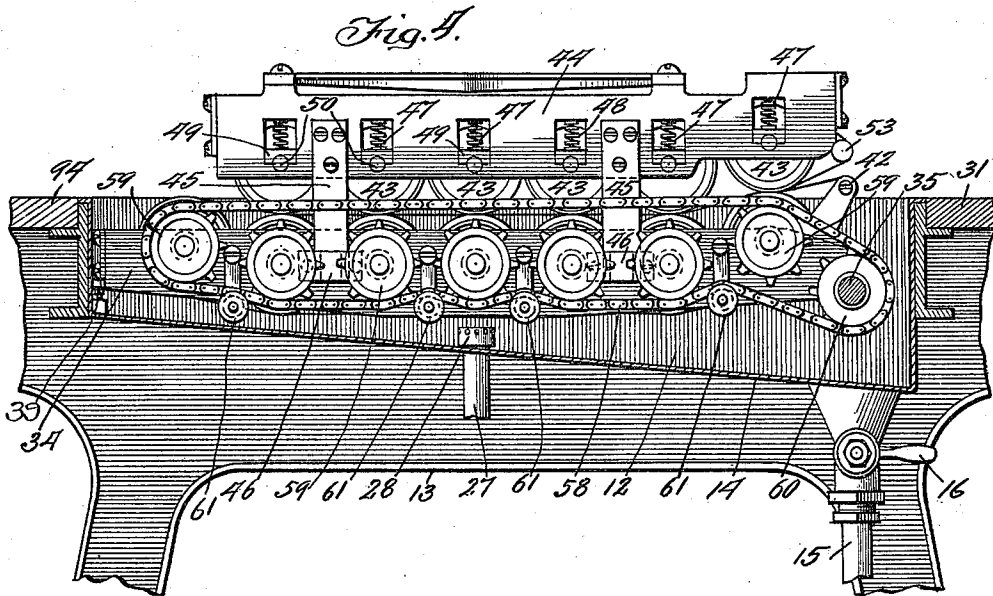
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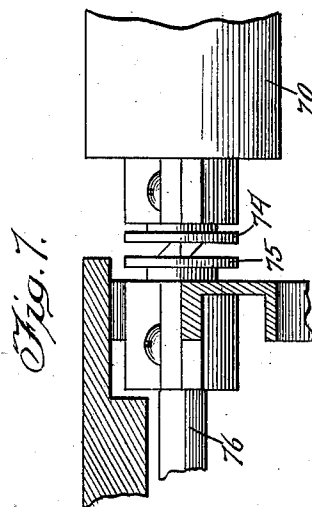
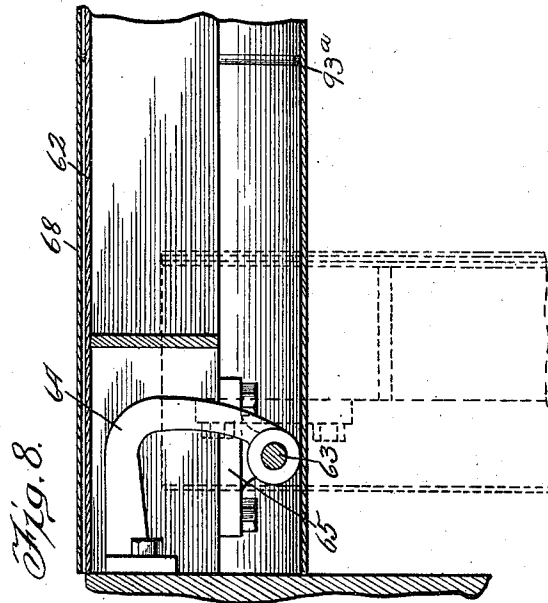
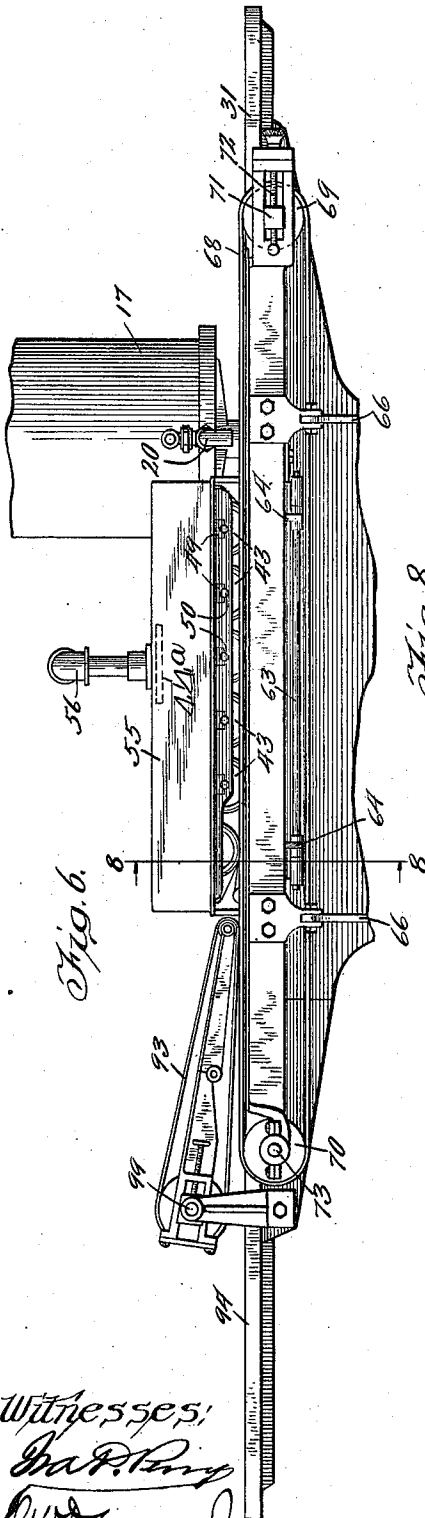
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6 SHEETS—SHEET 5.



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6 SHEETS—SHEET 6.

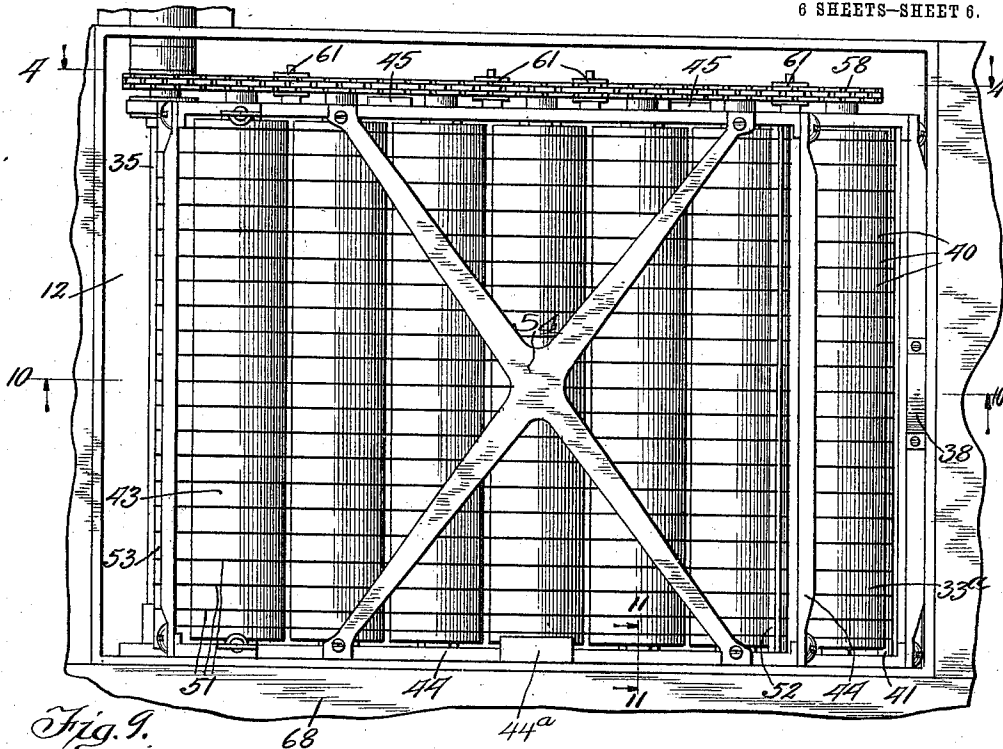


Fig. 9.

Fig. 10.

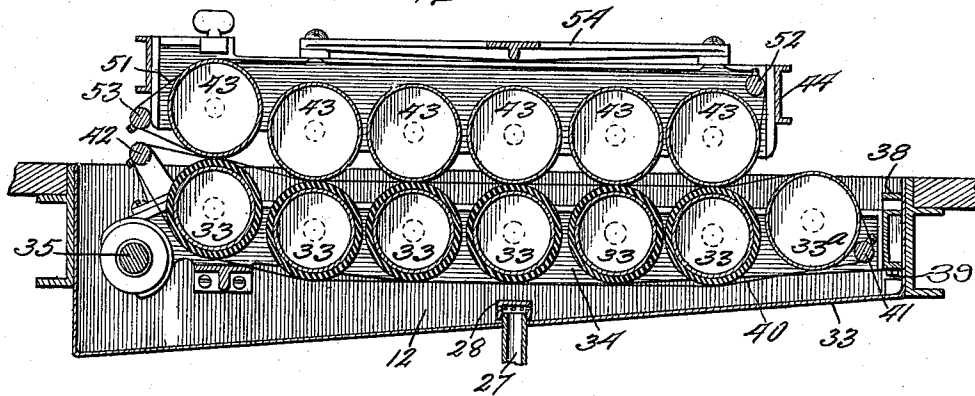
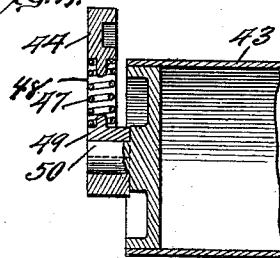


Fig. 11.



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UNITED STATES PATENT OFFICE.

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STARCHING-MACHINE.

984,864.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed October 27, 1909. Serial No. 524,911.

To all whom it may concern:

Be it known that I, EDGAR E. STONE, a citizen of the United States, residing at Lawton, in the county of Comanche and State of Oklahoma, have invented certain new and useful Improvements in Starching-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in starching machines, and the objects of my improvement are, first, the provision of a construction whereby a fabric may be starched to a predetermined line; second, to afford a table at one side of the starch tank for supporting parts of articles which it is not desired to starch; third, to provide traveling means parallel with the path of the articles being treated to support and carry such parts of such articles as are not to be starched; fourth, to produce a construction not requiring the operative to put his hands into the starch and in which the starch may be boiling hot at all times if preferred; and, fifth, to obviate the employment of a solid belt between the fabric to be starched and the contents of the starch reservoir.

An important feature of my invention consists in a construction requiring that the articles to be starched travel in the upper stratum of the starch as distinguished from starching machines in which the article to be treated is carried down into and up out of the starch reservoir.

With the above and other objects in view, my invention consists in the novel features and in the novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings forming a part of this specification, and particularly pointed out in the claims hereunto appended.

It will be understood that changes, variations and modifications in the details of the invention, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages thereof.

In the accompanying drawings, Figure 1 is a plan view of my improved starching machine; Fig. 2 is a side view thereof, showing the right-hand side of the machine, the feed end of the machine being at the left as shown in said figure; Fig. 3 is an end view showing the discharge end of the machine; Fig. 4 is a partial longitudinal section taken on line

4—4 of Fig. 9; Fig. 5 is a partial cross-section on line 5—5 of Fig. 1; Fig. 6 is a partial side view showing the left-hand side of the machine; Fig. 7 is an enlarged detail, being a partial sectional view on line 7—7 of Fig. 1; Fig. 8 is an enlarged detail, being a partial transverse vertical section on line 8—8 of Fig. 6; Fig. 9 is a partial plan view of the parts shown in Fig. 4; Fig. 10 is a longitudinal section on line 10—10 of Fig. 9; and Fig. 11 is an enlarged detail, being a partial vertical section on line 11—11 of Fig. 9.

Referring now to the drawings for a more detailed description of the embodiment of my invention therein shown, 12 indicates the starch reservoir or bath, which is carried in the upper portion of a suitable stand or frame 13, as best shown in Fig. 4. Said reservoir is provided with a bottom 14, which slopes toward one end where it is provided with a drain-pipe 15 through which the starch in the reservoir may be withdrawn when desired.

16 indicates a valve by which the discharge through the drain-pipe 15 may be controlled.

17 indicates a starch-tank supported by a bracket 18 suitably secured to the stand at the right-hand side thereof near the end of the reservoir 12 farthest from the drain-pipe 15, as best shown in Fig. 2. Said tank is provided with a spout 19, which discharges into the reservoir and is controlled by a cock 20, as shown in Fig. 1. Thus starch from the tank 17 may be supplied to the reservoir 12 as desired.

21 indicates a steam inlet-pipe, which connects with a tank 22 suitably supported by the stand 13, as shown in Fig. 2. Said tank is provided with a discharge pipe 23 controlled by a valve 24 and is connected by a pipe 25 with the starch-tank 17 through which steam may be introduced into said tank.

26 indicates a valve in the pipe 25.

27 indicates a pipe leading from the pipe 25 to the reservoir 12, into the bottom of which it opens, as shown in Fig. 4, being provided with a perforated cap 28 for the admission of steam to said reservoir.

29 indicates a valve in the pipe 25 adjacent to the tank 22 for controlling the passage of steam from the tank 22 to said pipe, as shown in Fig. 2.

30 indicates a valve in the pipe 21 for con-

trolling the admission of steam to the tank 22. By this construction the admission of steam to the reservoir or to the tank 17 may be accurately regulated.

5 31 indicates the feed-table, which extends across the left-hand end of the machine, as shown in Fig. 2, and supports the articles to be starched. Said table is preferably supported on a bracket 32 connected with the
10 stand 13.

33 indicates a series of lower rolls, which are arranged transversely of the machine and are supported in a rectangular frame 34 which is fitted in the reservoir 12, and
15 the dimensions of which are substantially the same as those of the reservoir. Said frame is hinged at one end upon a shaft 35 extending transversely through the starch reservoir and projecting at one side of the
20 frame of the stand, as best shown in Fig. 1. The projecting end of the shaft 35 carries a sprocket-wheel 36 and a worm-wheel 37 for purposes which will be hereinafter set forth. The opposite end of the frame
25 32 is provided with a handle 38 by which it may be conveniently lifted, as shown in Fig. 10.

39 indicates vertically-adjustable screws for supporting the free end of the frame
30 34, said screws being fitted in suitable blocks in the ends of the reservoir so as to underlie the end of the frame, as best shown in Fig. 10. By adjusting said screws the normal position of the lower set of rolls may be
35 varied so as to vary the extent to which the articles treated are submerged in the starch.

As best shown in Fig. 10, the rolls of the lower set, except the first rolls 33^a, are metal rolls covered with checked rubber, or
40 other suitable material, but the first roll 33^a is not so covered. Furthermore, the end rolls are set slightly higher than the intermediate rolls so that articles in being fed into the machine extend slightly downward
45 and when delivered move in a slightly inclined upward direction.

40 indicates a series of parallel endless cords, which run on the several rolls 33—33^a around guides 41—42 arranged parallel
50 with and outside of the end rolls, as shown in Fig. 10. The guides 41—42 are perforated at intervals, as shown in Fig. 5, the several cords passing through the perforations so that they are held the proper distance apart.
55

43 indicates a second series of rolls, which coact with the lower rolls 33 and are arranged above them in a rectangular frame 44. Said frame is of suitable size to support the journals of the rolls 43 and is removably secured to the lower frame 34 by
60 bars 45 which are secured at one side of said frame 44 and project downward, as best shown in Fig. 4, their lower ends fitting
65 into suitable sockets formed by clips 46

fixedly secured to the adjacent side of the lower frame 34. By simply lifting the upper frame they may, therefore, be detached from the lower frame and removed. The upper rolls 43 are yieldingly pressed down
70 upon the lower rolls, upon which they respectively rest, by springs 47 which are fitted in openings 48 in the sides of the frame 44 and bear upon bearing blocks 49 which rest upon the journals 50 of the rolls
75 43, as best shown in Fig. 11. This construction is employed at both ends of each of the rolls 43 so that said rolls are pressed yieldingly downward against their cooperating rolls 33. The rolls 43 are not driven posi-
80 tively, but are caused to rotate by reason of their engagement with the rolls 33. The rolls 43 also are provided with endless cords 51 in the same manner as the rolls 33, said cords passing around said rolls 43 and be-
85 ing supported in the ends of the frame 44 by transverse guides 52—53 similar to the guides 41—42, as shown in Fig. 10. The guide 53 is arranged adjacent to and parallel with the guide 42, so that the cords
90 traveling around said guides act to deliver the articles after they have passed between the sets of rolls. The frame 34 is so set that when in operative position the lower rolls rotate in the starch in the reservoir, being
95 submerged therein, as the reservoir is practically filled with starch. The lower portions of the upper rolls extend into the starch so that the two sets of rolls together
100 operate to carry the articles down under the surface of the starch in the reservoir and thoroughly incorporate it in the articles treated. By checking the surfaces of the rolls 33 as indicated in Fig. 5 pockets are
105 formed which hold the starch and cause it to be forced into the fibers of the fabric, when the fabric passes between any pair of rolls, thus insuring its proper incorporation in the fabric.

54 indicates a brace provided at the upper side of the frame 44, as shown in Figs. 9 and 10.
110

55 indicates a hood or cover, which is adapted to fit over the upper frame 44, as best shown in Fig. 5.
115

56 indicates a swinging rod or arm mounted in a suitable bearing 57 at the right-hand side of the stand, as shown. Said rod serves to hold the left-hand side of the upper frame 54 down to prevent the lifting of said side of the frame by the passage of the articles between the sets of rolls. When in operative position the depending free end of the arm 56 overlies a plate 44^a carried by the upper frame 44, as best shown in Figs. 5 and 9,
120 but it may be swung away from over the upper frame to permit of the removal of the hood.
125

The several lower rolls 33—33^a are positively connected together for driving pur-
130

poses by means of a link belt or sprocket-chain 58, which runs over a series of sprocket-wheels 59, with which said rolls are provided at one end, as shown in Fig. 4, and also over a sprocket-wheel 60 carried by the shaft 35. The chain 58 is guided and held properly in position by a series of idlers 61, as also best shown in Fig. 4, said idlers being suitably carried by the lower frame 34, as shown. Obviously, when the shaft 35 is rotated the chain 58 will be driven and will drive the several rolls 33—33^a and the latter will in turn drive the upper rolls 43.

62 indicates a table provided at the left-hand side of the machine and extending longitudinally thereof adjacent to the ends of the rolls 33 and 43, as best shown in Fig. 5. Said table is mounted so that when in operative position its upper surface is substantially level with the upper surface of the reservoir and feed-table 31, but when not in use it may be folded down at one side of the stand, as shown in dotted lines in Fig. 8. The arrangement of the table 62 is best shown in Figs. 1 and 8, from an inspection of which it will be seen that a pivot-shaft 63 is provided for said table, which is supported in brackets 64 secured at the left-hand side of the stand, said pivot-shaft also engaging brackets 65 carried by the table. The brackets 64 extend laterally far enough to enable the table 62 to swing freely into and out of operative position.

66 indicates a folding brace of which there are two each having a knuckle-joint 67 for holding the table 62 in operative position, as shown in Fig. 3.

The table 62 is provided with an endless apron 68, which extends longitudinally thereof, as shown in Fig. 1, said apron traveling on rollers 69—70 provided at the ends of the table. The roller 69 is preferably mounted in adjustable bearings, being provided with blocks 71 engaged by screws 72, so that the tension of the apron may be regulated as desired by moving the roller 69 lengthwise of the table. The roller 70 is mounted on a shaft 73, the inner end of which is provided with a clutch-member 74 which engages a corresponding clutch-member 75 carried by a drive-shaft 76 mounted near the discharge end of the machine and extending transversely thereof, as best shown in Fig. 1. The shaft 76 carries a sprocket-wheel 77, which aligns with the sprocket-wheel 36 and is driven by a link belt 78 which also engages the sprocket-wheel 36, as best shown in Fig. 2. Thus the chain 78 operates to drive the shaft 76 and through it the roller 70 when the table 62 is in operative position. The construction of the clutch-members 74—75 is such, however, that they may be disengaged by simply folding the table 62 down out of operative position, and when said table is so folded the

roller 70 is not driven and consequently the apron 68 is stationary.

The shaft 35 and through it the other traveling parts of the apparatus are driven through the worm-wheel 37 which is engaged by a worm 79 mounted on a longitudinally-extending counter-shaft 80 suitably mounted at the right-hand side of the machine, as shown in Fig. 2. Said shaft carries a small pinion 81 and a larger pinion 82, which are movable longitudinally thereof, being mounted on a feather so that they rotate therewith. The purpose of this construction is to enable one or the other of the gears 81—82 to be moved into mesh respectively with one or the other of gears 83—84 carried by a main drive-shaft 85 which is mounted adjacent to and parallel with the counter-shaft 80 and is provided with fast and loose pulleys 86—87 by which it is driven from any suitable source of power. Obviously, when the gear 82 is moved into mesh with the gear 84 the counter-shaft 80 and the worm 79 are driven at slow speed, whereas when the pinion 81 is in mesh with the gear 83 said counter-shaft is driven at a higher speed, the speed of the chain 78 varying accordingly. For the purpose of shifting the gears 81—82, a longitudinally-movable rod 88 is provided, which carries an arm 89 having a fork which fits in a groove in a collar 90 connected to said gears, and mounted on said counter-shaft, as best shown in Fig. 2.

91 indicates a rod, which carries a belt-shifter 92 for shifting the belt which runs on the fast and loose pulleys 86—87. The rods 88 and 91 are arranged conveniently adjacent to the feed-table 31 so that the operator may readily shift the belt or control the speed of the drive-chain 78.

93 indicates the delivery apron, which is arranged at the delivery end of the machine, extending from a point near the guides 42—53 outward toward a delivery table 94, being inclined in an upward direction so that the articles delivered to the apron 93 by the starching rolls are deposited upon the table 94. The apron 93 extends beyond the left-hand side of the machine, as shown in Fig. 3, so that it projects over the side apron 68 to enable it to support such parts of the articles treated as are not starched as they pass from the starching rolls. The apron 93 is carried by a small inner roll 95 and a larger outer roll 96, which are carried at the inner and outer ends, respectively, of a folding frame 97. The frame 97 is in two sections connected by knuckle-joints 98, the outer section being connected with the axis 99 of the roll 96. The arrangement is such that when the two sections of the frame 97 are in alinement the frame is rigid and holds the apron 93 under the proper tension, but by breaking the joints 98 the two sections of the frame 97 may be folded and turned up

about the axis 99 so as to expose the upper surface of the table 94 which lies under the apron 93 when the latter is in its normal or operative position. The shaft or axis 99 of the roll 96 is adjustably mounted in suitable standards 100 secured to the frame of the machine, and is parallel with the shaft 35. At its right-hand end it carries a sprocket-wheel 101 which is in line with the sprocket-wheels 77 and 36, and the chain 78 engages said sprocket-wheel 101 so that the roller 96 is also driven by said chain. Thus the apron 93 also is driven from the main drive-shaft 85. For the purpose of guiding the apron 93 it is provided on its under side with a rope 93^a, or equivalent device, which extends longitudinally thereof and is preferably arranged intermediate the edges of the apron. Said rope fits in grooves in the rolls 95 and 96, as best shown in Fig. 3. The apron 68 is guided in the same way.

102 indicates an idler carried in an adjustable bracket 103 for regulating the tension of the chain 78 and holding it properly in engagement with the several sprocket-wheels driven by it. When the apron 93 is in operative position, its inner end projects slightly beyond the adjacent end of the starch reservoir 12, as shown in Fig. 1, but when said apron is folded up out of the way in the manner above described it exposes said end of the reservoir and permits free access to the parts therein and also permits the frame 34 which carries the lower set of rolls to be swung up out of the reservoir in the manner hereinbefore explained. For the purpose of keeping the apron 93 properly extended, the inner roller 95 is provided with oppositely-extending spiral beads 104, as shown in dotted lines in Fig. 1.

To summarize the operation of the apparatus—in starching a shirt for example, the bosom, neckband and cuffs are fed between the upper and lower sets of starching rolls, the remaining parts of the shirt which are not to be starched, projecting at the left-hand end of said rolls and resting upon the side apron 68, the speed of which is the same as that of the starching rolls. The parts being starched are carried horizontally in the upper portion of the starch, which is thoroughly incorporated therein in the manner previously described, and the shirt is carried along until it is received by the delivery apron 93, which carries it up away from the starching rolls and deposits it upon the delivery table 94. Where collars or other articles which are completely starched are treated they may, of course, be fed between the rolls at any point between their ends. The operator may at any time stop the machine by operating the belt-shifting rod 91, or, if desired, may change the speed of the several aprons simultaneously by operating the change speed-rod 88. When access is

desired to the reservoir, the frame 97 is swung up out of the way and is preferably folded. The frame carrying the upper set of rolls is removed by simply lifting it, the bars 45 being lifted out of the sockets which hold them. The lower set of rolls may then be swung up out of the reservoir by grasping the handle 38 and swinging the frame about the shaft 35, thus exposing the entire reservoir without interfering with the adjustments of the several rolls or disconnecting them from the machine, or from the driving mechanism. When starching collars or other articles to be wholly starched, the side table 68 may, if desired, be swung down out of the way in the manner already described.

That which I claim as my invention, and desire to secure by Letters Patent, is,—

1. A starching-machine, comprising a starch-reservoir, a traveling apron at one side thereof to carry parts of articles to which starch is not to be applied, a folding support for said apron, and means operating in said reservoir to apply starch to such portions of such articles as are to be treated.

2. A starching-machine, comprising a starch-reservoir, rolls operating in said reservoir for applying starch to the articles treated, driving mechanism for driving said rolls, a folding table at one side of said reservoir, a traveling apron carried thereby, and means for driving said apron from said driving mechanism.

3. A starching-machine, comprising a starch-reservoir, rolls operating in said reservoir for applying starch to the articles treated, driving mechanism for driving said rolls, a folding table at one side of said reservoir, a traveling apron carried thereby, and means for automatically connecting said apron with said driving mechanism when said table is in operative position and for disconnecting said apron when said table is folded.

4. A starching-machine, comprising a starch-reservoir, means operating in said reservoir for applying starch to the articles treated, a table at one side of said reservoir for supporting parts of the articles treated, and a delivery apron adapted to receive and discharge articles after they have passed through said reservoir, said apron extending over said table.

5. A starching machine, comprising a starch-reservoir, a plurality of sets of rolls exposed at one end operating therein for conducting the articles treated through the starch in said reservoir, a traveling apron at one side of the reservoir to carry parts of articles to which starch is not to be applied, a folding support for said apron, and means for driving said rolls.

6. A starching machine, comprising a starch-reservoir, a plurality of sets of rolls exposed at one end to afford a path for por-

tions of articles being treated, said rolls operating in said reservoir for conducting the articles treated through the starch in said reservoir, a traveling apron at one side of the reservoir to carry parts of articles to which starch is not to be applied, a folding support for said apron, means for driving said rolls, and means for driving said apron.

7. A starching machine, comprising a starch-reservoir, rolls operating in said reservoir for applying starch to the articles treated, a traveling apron at one side of said reservoir to carry parts of the articles to which starch is not to be applied, a folding support for said apron, driving mechanism for driving said rolls, and means for driving said apron from said driving mechanism.

8. A starching machine, comprising a starching-reservoir, means operating in said reservoir to apply starch to such portions of articles as are to be treated, a traveling apron at one side of the reservoir to carry parts of articles to which starch is not to be applied, a folding support for said apron, and a delivery apron adapted to receive and discharge articles after being starched.

9. A starching machine, comprising a starch reservoir, a plurality of rolls operating in said reservoir for applying starch to the articles to be treated, a traveling apron at one side of the reservoir to carry parts of articles to which starch is not to be applied, a folding support for said apron, a delivery apron adapted to receive and discharge articles after being starched, and mechanism for driving said rolls.

10. A starching machine, comprising a starch-reservoir, a plurality of rolls operating in said reservoir for applying starch to the articles to be treated, a traveling apron at one side of the reservoir to carry parts of articles to which starch is not to be applied, a folding support for said apron, a delivery apron adapted to receive and discharge articles after being starched, mechanism for driving said rolls, and means for driving said delivery apron.

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