July 2, 1940. N. ELAM ET AL 2,206,170

STARCHING MACHINE

Filed April 12, 1939 4 Sheets-Sheet 1

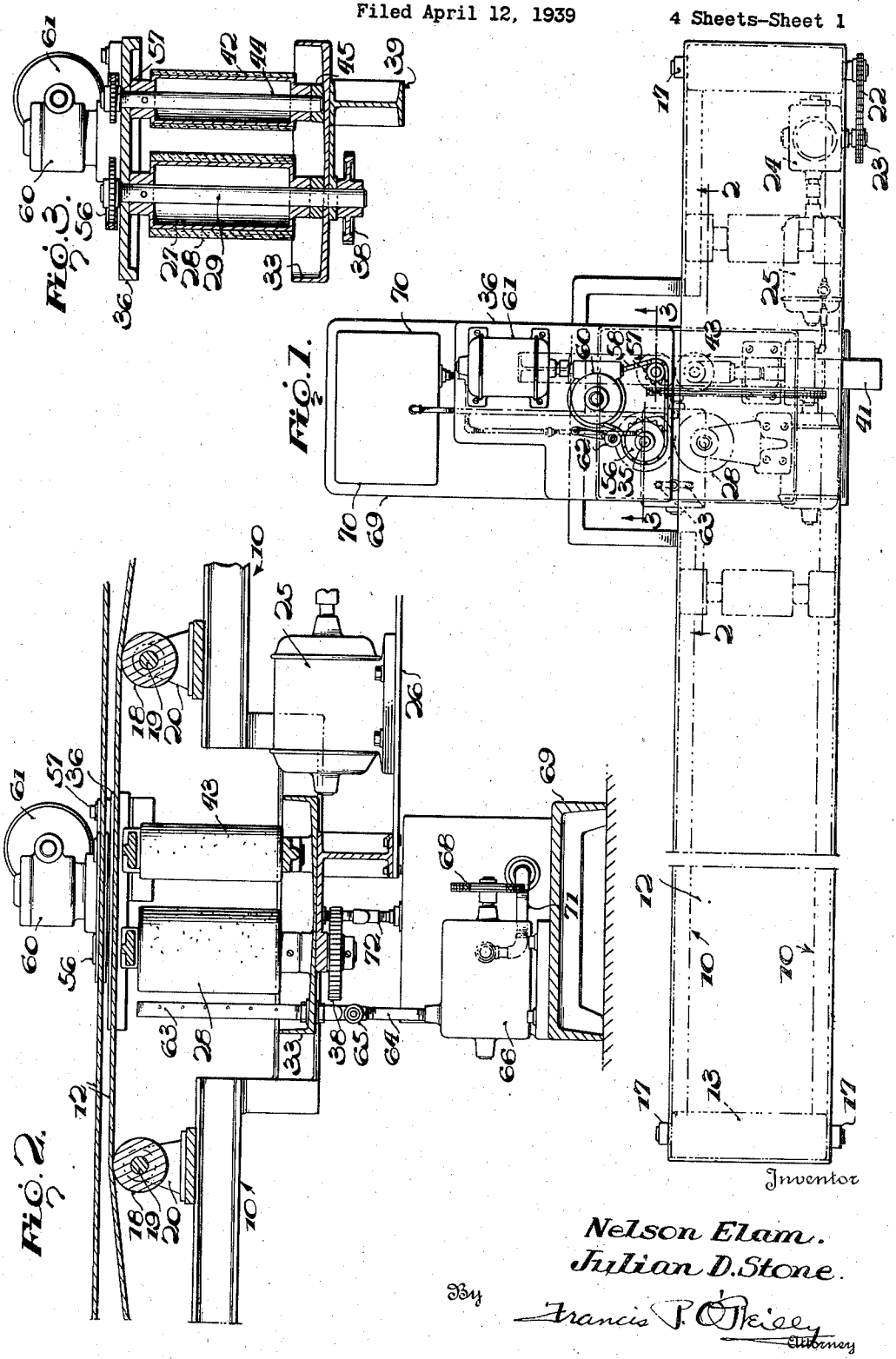


Fig. 3.

Fig. 1.

Fig. 2.

Inventor

Nelson Elam.
Julian D. Stone.

By Francis P. O'Neill
Attorney

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STARCHING MACHINE

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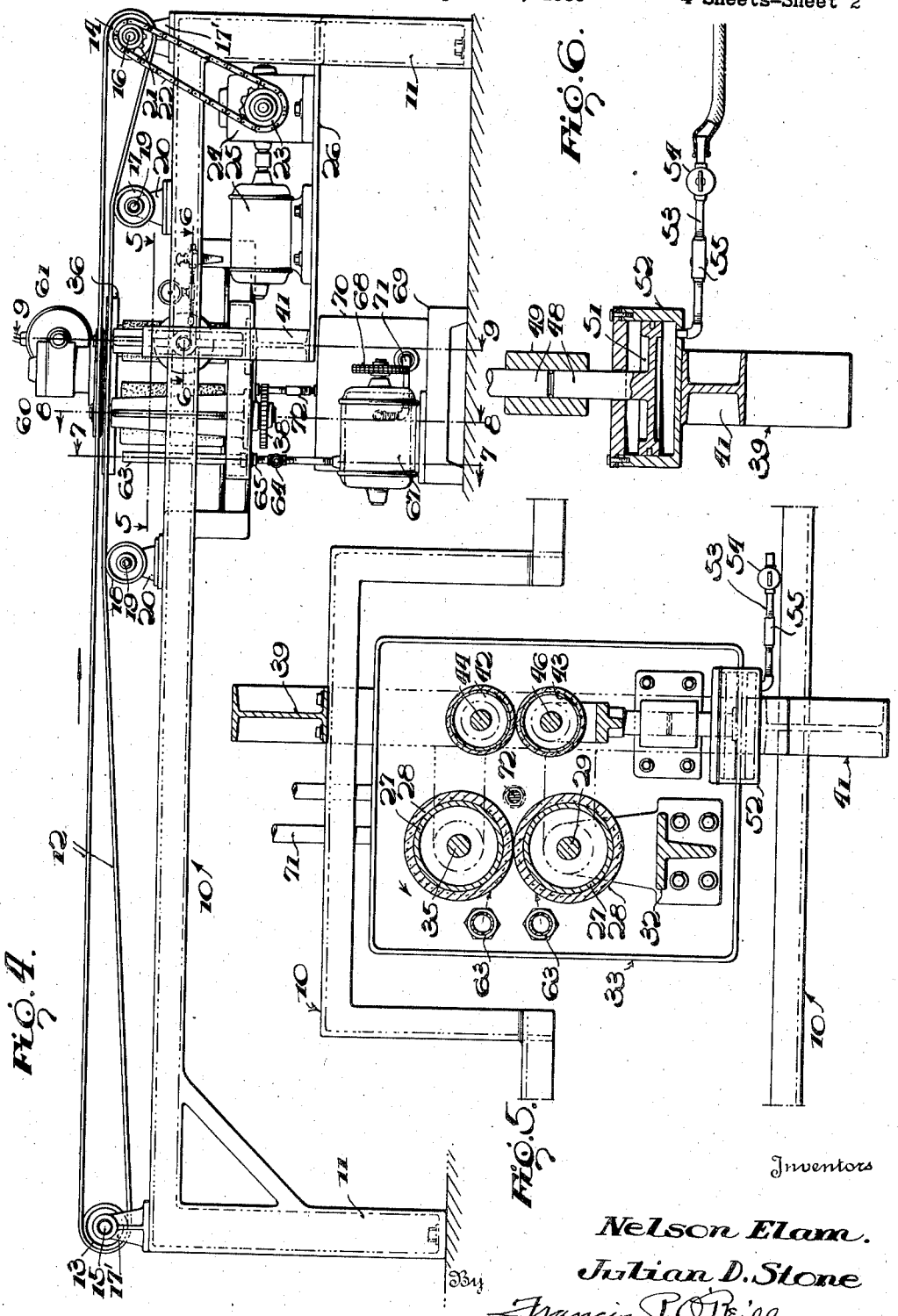


Fig. 4.

Fig. 6.

Fig. 5.

Inventors

Nelson Elam.

Julian D. Stone

Francis P. O'Reilly Attorney

July 2, 1940. N. ELAM ET AL 2,206,170

STARCHING MACHINE

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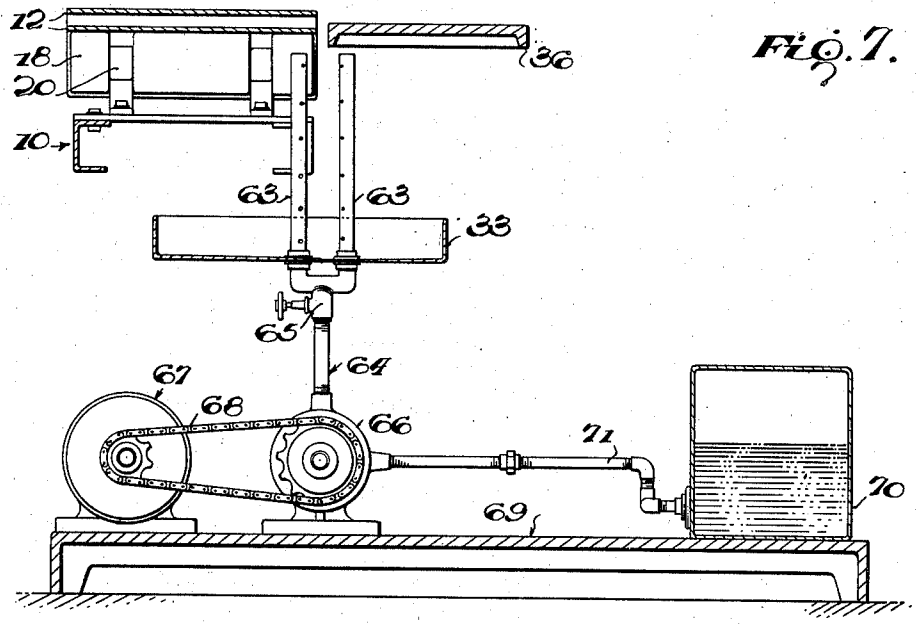


Fig. 7.

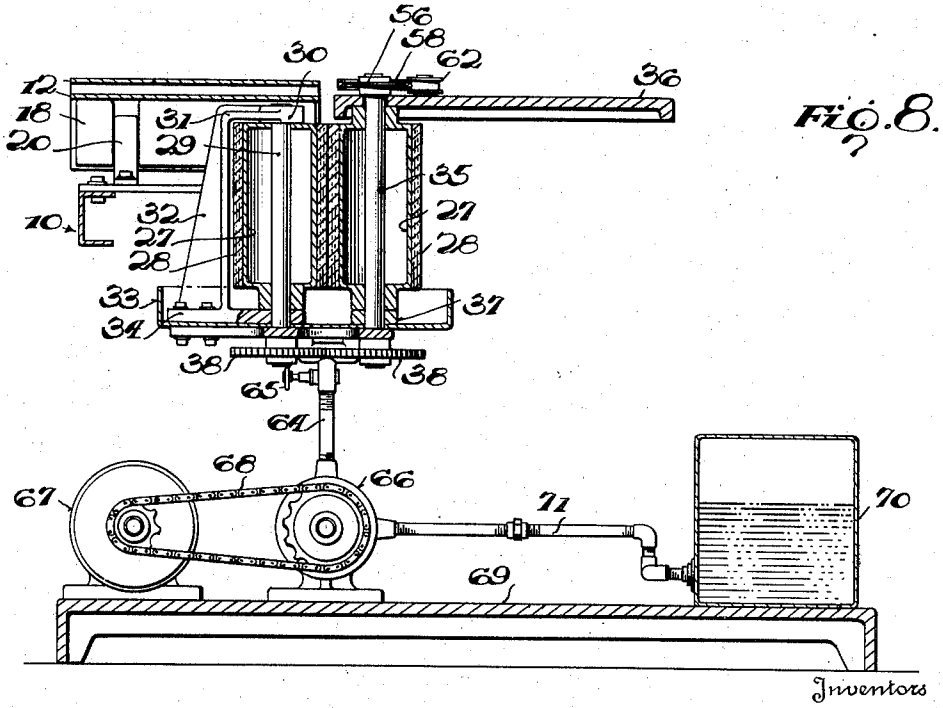


Fig. 8.

Inventors

Nelson Elam.
Julian D. Stone.

By Francis P. O'Neill
Attorney

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STARCHING MACHINE

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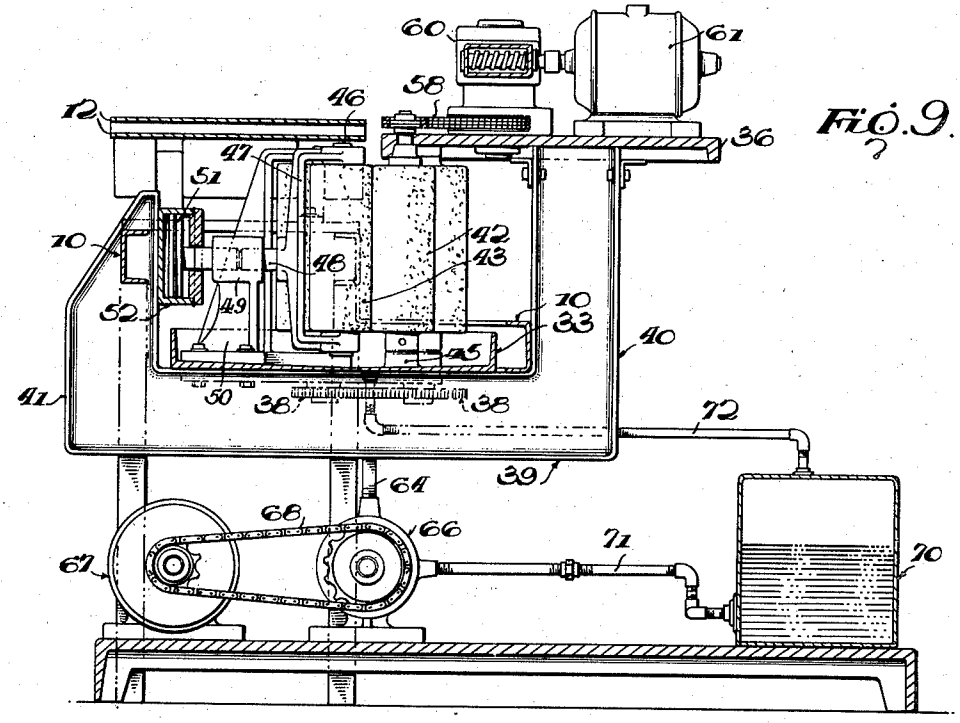


Fig. 9.

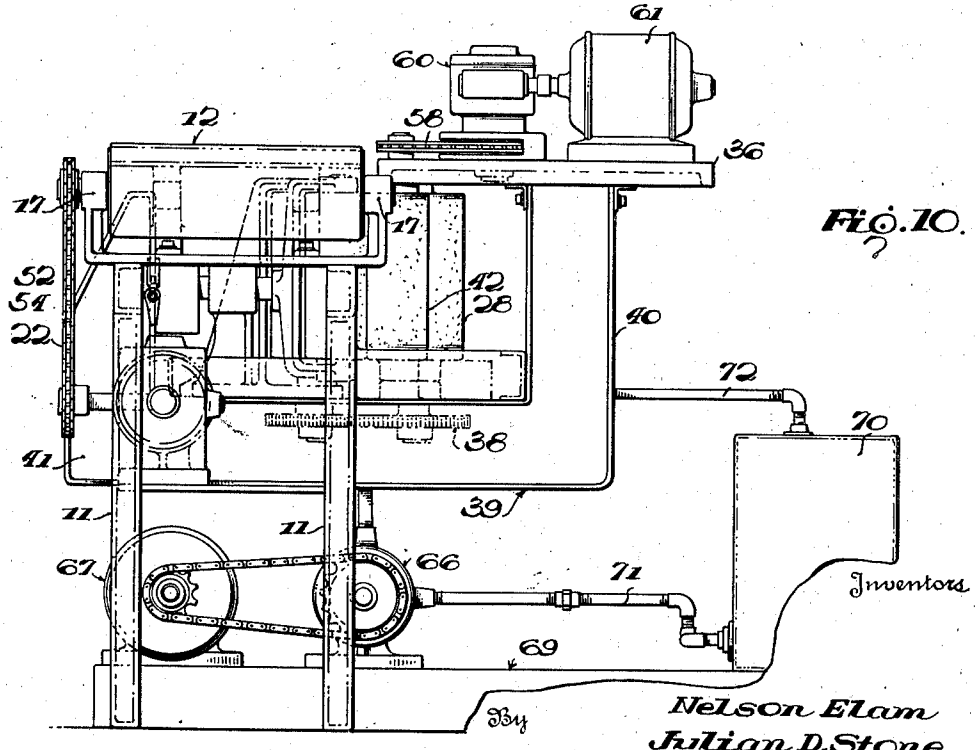


Fig. 10.

Inventors

Nelson Elam

Julian D. Stone.

By Francis P. O'Reilly Attorneys

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UNITED STATES PATENT OFFICE

2,206,170

STARCHING MACHINE

Nelson Elam and Julian D. Stone, Nashville, Tenn., assignors to White Way Laundry, Nashville, Tenn., a corporation of Tennessee

Application April 12, 1939, Serial No. 267,511

10 Claims. (Cl. 91—49)

Our invention relates to starching machines.

An important object of the invention is to provide a machine of the above-mentioned character, which will operate continuously, for starching the collars, cuffs, and bands of shirts and parts of other articles.

A further object of the invention is to provide a machine of the above-mentioned character, so constructed that the application of the starch to desired portions of the shirt or other article may be regulated, so that the starch will not be improperly applied to portions of the shirt which it is not desired to starch.

A further object of the invention is to provide a machine of the above-mentioned character which will apply the starch to portions of a shirt or the like in a manner to cause the starch to properly penetrate the fabric.

A further object of the invention is to provide a machine of the above-mentioned character having means to wring the excess starch from the treated portions of the shirt or the like so that the shirt will be ready for ironing, after being passed through the machine.

A further object of the invention is to provide means for collecting the excess starch and returning the same to the supply tank.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a plan view of a starching machine embodying my invention,

Figure 2 is a longitudinal vertical section taken on line 2—2 of Figure 1,

Figure 3 is a vertical section taken on line 3—3 of Figure 1,

Figure 4 is a side elevation of the machine,

Figure 5 is a horizontal section taken on line 5—5 of Figure 4,

Figure 6 is a horizontal section through the pressure cylinder and associated elements, on line 6—6 of Figure 4,

Figure 7 is a transverse vertical section taken on line 7—7 of Figure 4,

Figure 8 is a similar view taken on line 8—8 of Figure 4,

Figure 9 is a similar view taken on line 9—9 of Figure 4,

Figure 10 is an end elevation of the machine.

In the drawings wherein for the purpose of illustration is shown a preferred embodiment of our invention, the numeral 10 designates a horizontal support, carried by vertical legs 11. Extending over the horizontal support 10, preferably throughout its entire length, is an endless belt or traveling support 12, preferably formed of a rubberized fabric. This endless belt passes about rolls 13 and 14, mounted upon shafts 15 and 16, within bearings 17'. These shafts are journaled in stationary bearings 17. The upper run of the endless belt 12 is horizontal, while the intermediate portion of the lower run is held elevated by rolls 18, carried by shafts 19, journaled in stationary bearings 20. The intermediate portion of the lower run in thus held elevated so that it will pass over and clear the starch applying rolls and associated elements.

The shaft 16 is driven by a pulley 21, engaged by a belt 22, extending downwardly to engage a pulley 23, driven by speed reducing gearing 24, in turn driven by a motor 25. The gearing 24 and motor 25 are fixedly mounted upon a horizontal support 26.

The numeral 27 designates a pair of vertical starch applying rolls, having their peripheries covered by an absorbent compressible fibrous material, such as a felt covering or facing 28. The contacting faces of the rolls 27 are arranged adjacent to and slightly outwardly of one longitudinal edge of the endless conveyor 12. One roll 27 is mounted upon a vertical shaft 29, the upper end of which is journaled in a bearing 30, carried by a horizontal arm 31, secured to a vertical bracket 32. This vertical bracket is rigidly secured upon the bottom of a starch collecting pan 33. The lower end of the shaft 29 is journaled in a bearing 34, carried by the bottom of the pan 33. The companion roll 27 is rigidly mounted upon a vertical shaft 35, the upper end of which is journaled in a bearing carried by a horizontal platform 36, while the lower end of the shaft 35 is journaled in a bearing 37 carried by the bottom of the pan 33. The two rolls 27 are both rigidly mounted upon their shafts 29 and 35 and these shafts extend downwardly below the bottom of the pan 33 and have gears 38, rigidly secured thereto, and in mesh with each other. The rolls 27 therefore turn in unison in opposite directions, as indicated by the arrows.

The starch collecting pan 33 may be rigidly supported by any suitable means, and the same is mounted upon a stationary horizontal I-beam 39 serving to support the platform 36, through the medium of part 40. This I-beam 39 is rigidly suspended from the horizontal support 10. The I-beam 39 has at one end an upstanding portion 41, as shown.

Arranged upon the leading sides of the rolls 27 are wringer rolls 42 and 43, the peripheries of which are preferably covered with rubber, similar to the ordinary wringer rolls of the usual clothes wringer. The rolls 42 and 43 are vertical and the roll 42 is rigidly mounted upon a vertical shaft 44, the upper end of which is journaled in a bearing carried by the platform 36, and

its lower end is journaled in a bearing 45 carried by the pan 33. The companion wringer roll 43 contacts with the roll 42 and this companion roll has a vertical shaft 46, the opposite ends of which are journaled in a vertical yoke 47, which is rigidly mounted upon a horizontal bar 48. The bar 48 is square in cross-section and is mounted to slide horizontally in a guide-sleeve 49, also having its bore square in cross-section. This guide-sleeve is secured to a bracket 50 which is mounted within and bolted to the bottom of the pan 33. The bar 48 is adapted to reciprocate in a straight line, and it is secured to a plunger 51, having a sliding air-tight fit within a cylinder 52. This cylinder 52 is rigidly secured to the upstanding portion 41 and is therefore held stationary. Air under suitable pressure is supplied to the cylinder 52 behind the plunger through a pipe 53, and the supply of this air under pressure is regulated by a valve 54, and 55 is a gauge indicating the degree of pressure. This air pressure shifts or urges the wringer roll 43 toward the wringer roll 42, and provides a resilient means for this purpose, which is adjustable. Other forms of resilient means might be employed, such as a spring arranged behind the plunger 51.

The shaft 35 and the shaft 44 both extend above the platform 36, and have sprocket wheels 56 and 57 rigidly secured thereto, and these sprocket wheels are engaged and driven by a sprocket chain 58, engaging a sprocket wheel 59, to be driven by speed reducing gearing 60, which is driven by a motor 61, mounted upon the platform 36. The tension of the sprocket chain 58 may be regulated by any suitable means, such as an idler sprocket wheel 62.

Arranged upon the trailing sides of the starch applying rolls 27 are vertical starch applying or spraying elements 63, in the form of vertical pipes, apertured upon their sides next to the rolls 27. The apertures are so positioned that the starch is sprayed upon the peripheries of the rolls 27 at points spaced from the point of contact between the rolls 27, so that the starch will be applied directly to the rolls 27 rather than directly upon a portion of the shirt or the like to be starched. The apertured spraying devices or pipes 63 are vertical and extend throughout the entire length of the vertical rolls 27 and are connected with a pipe 64, having a valve 65. The pipe 64 is connected with the outlet side of a rotary pump or compressor 66, driven by a motor 67 through the medium of belting 68. This motor and pump are mounted upon a horizontal support 69. The numeral 70 designates a tank for holding the liquid starch solution or material, and a draw-off pipe 71 is connected with the tank 70 and leads to the intake side of the pump 66. A return pipe 72 is connected with the pan 33 and discharges into the tank 70.

The operation of the machine is as follows:

The endless conveyor 12 is continuously driven in the direction of its arrow, during the operation of the machine and is independently operated by the motor 25, at a suitable speed. The starch solution, under suitable pressure, is withdrawn from the tank 70 and fed by the rotary pump 66 through the pipe 64, with the valve 65 being suitably adjusted to regulate the amount of the starch solution passing through the pipe 64. This starch solution is accordingly supplied to the perforated pipes or spraying elements 63, under suitable pressure, and is sprayed by these apertured pipes on the peripheries of the vertical rolls 27. Since these peripheries are covered by absorbent material, the starch solution is absorbed by the peripheries of the rolls 27, and will be transmitted thereby to the material to be starched. The rolls 27 are positively geared together, while roll 43 is driven from roll 42 by contact. The shirt is now folded or arranged upon the take-up end of the endless conveyor 12 and has its collar, cuffs, and bands, to be starched, hanging over the edge of the conveyor 12 next to the starching roll. As the shirt approaches the starching rolls the operator can conveniently and accurately conduct the parts to be starched between the rolls 27 and then between the wringer rolls 42 and 43. Since the peripheries of the rolls 27 are absorbent and have the starch solution sprayed thereon, they will be saturated with this solution and by contacting with the opposite faces of the portion of the fabric to be starched, will thoroughly apply the starch solution to the fabric. This solution is applied to both faces of the fabric under pressure and will thoroughly penetrate the pores of the fabric. As the shirt travels toward the wringer rolls, the starched portion of the fabric will pass between the wringer rolls 42 and 43 and be subjected to a high degree of pressure, for removing the excess starch solution, and by the time the shirt has reached the leading end of the conveyor 12 it will be ready for ironing. The excess starch solution passing from the starch applying rolls 27 and the wringer rolls will be collected in the pan 33 and be returned to the tank 70.

While we have shown the starch applying rolls, wringer rolls, and starch spraying devices as vertically arranged, the invention is not restricted to this precise arrangement, as they may be inclined from the vertical. It is preferred to have them vertical, although we contemplate arranging them horizontally. It is also preferred to spray the starching solution upon the exterior of the periphery of the starch applying rolls although the invention is not necessarily restricted to this feature, as the starching solution might be sprayed directly upon the fabric to be starched or applied to the peripheries of the starch applying rolls 27 by other means, as from the interior thereof. It is also preferred to have the starch applying rolls covered with an absorbent compressible or resilient material, although the invention is not necessarily restricted to this feature. In the preferred arrangement, the vertical disposition of the starch applying rolls and associated elements, beneath the elevation of the upper run of the endless conveyor, renders it convenient in the operation of the machine, to guide or conduct parts of the shirt or other articles to be starched, between the starch applying rolls and associated elements.

It is to be understood that the forms of our invention herewith shown and described are to be taken as preferred examples of the same and that various changes in the shape, size, and arrangement of parts, may be resorted to, without departing from the spirit of our invention or the scope of the subjoined claims.

Having thus described our invention, what we claim is:

1. In a starching machine, approximately vertical opposed starch applying rolls, means for holding the rolls in place and rendering the space between the rolls accessible in a downward direction at the tops of the rolls, means to rotate the rolls, and means traveling at an elevation above

the approximately vertical rolls and supporting and advancing the work so that a portion of the work may depend from the means and pass downwardly between the upper ends of the starch applying rolls to engage between the peripheries of the starch applying rolls.

2. In a starching machine, generally vertical opposed rolls, means holding the rolls in position and affording access to the substantially contacting faces of the rolls in a downward direction at the top of the rolls, spaced starch solution spraying devices arranged near the rolls, and means traveling at an elevation above the rolls and spraying devices and serving to support and advance the work so that a portion of the work may depend from the supporting means and pass between the spaced spraying devices and downwardly between the tops of the rolls for engagement between the faces of the rolls.

3. In a starching machine, generally vertical opposed rolls, means for holding the rolls in position and leaving the inner portions of the peripheries of the rolls uncovered at the top of the rolls, starch solution spraying means arranged near the rolls, and means operating at an elevation above the rolls and spraying means and serving to support and advance the work with a portion of the work depending therefrom so that it may pass in a downward direction between the tops of the rolls and engage between the peripheries of the rolls.

4. In a starching machine, an endless conveyor belt having an upper run for receiving and advancing the work which has a portion depending from the longitudinal edge of the upper run, opposed rolls arranged at an elevation beneath the upper run and having their line of contact disposed adjacent to the longitudinal edge of the upper run, means for holding the opposed rolls in place and leaving the inner portions of the peripheries of the rolls uncovered at the tops of the rolls, the arrangement being such that the portion of the work depending from the endless conveyor may pass in a downward direction between the tops of the rolls and engage between the peripheries of the rolls, and means for supplying a starch solution.

5. In a starching machine, an endless conveyor having an upper run for receiving and advancing the work with a portion of the work extending beyond the longitudinal edge of the upper run, opposed rolls for coaction with the endless conveyor and having their line of contact adjacent to the longitudinal edge of the upper run, means for holding the rolls in place and leaving their line of contact at the tops of the rolls uncovered, the arrangement being such that the portion of work depending from the endless conveyor may pass in a downward direction between the tops of the rolls and engage between the peripheries of the rolls, and a starch solution applying device arranged near said longitudinal edge.

6. In a starching machine, a generally horizontal endless conveyor having an upper run for receiving and advancing the work which extends beyond one longitudinal edge of the upper run, up-standing opposed starch applying rolls having their line of contact arranged adjacent to said longitudinal edge, starch solution applying means arranged adjacent to said longitudinal edge, up-standing opposed wringer rolls having their line of contact adjacent to said longitudinal edge to receive the starched work therebetween, and means to drive one starch applying roll and one wringer roll.

7. In a starching machine, a generally horizontal endless conveyor having an upper run for receiving and advancing the work which extends beyond one longitudinal edge of the upper run, up-standing starch applying rolls having their line of contact disposed adjacent to said longitudinal edge, a starch solution supplying device arranged adjacent to said longitudinal edge, up-standing wringer rolls having their line of contact arranged adjacent to said longitudinal edge, a tray arranged beneath all of said rolls and the starch solution supplying device for collecting the excess starch solution, a tank for holding the starch solution, a return pipe connecting the tray and tank, and a pump having its intake side connected with the tank and its outlet side connected with the starch supplying device.

8. In a starching machine, a generally horizontal endless conveyor having an upper run serving to support and advance the work with the work extending beyond one longitudinal edge of the upper run, substantially vertical starch applying opposed rolls having their upper ends disposed at an elevation beneath the upper run and having their line of contact adjacent to said longitudinal edge and having their periphery covered by an absorbent material, gearing connecting the rolls so that they turn in unison in opposite directions, spaced substantially vertical nozzles arranged near the starch applying rolls for supplying a starch solution to the same at points spaced from their line of contact, substantially vertical opposed wringer rolls disposed upon the leading side of the starch applying rolls and having their upper ends at an elevation beneath the upper run and their line of contact adjacent to the said longitudinal edge, means to drive one starch applying roll and one wringer roll, means for supplying the starch solution under pressure to the spraying devices, and means for catching the excess starch solution.

9. In a starching machine, generally vertical opposed starch applying rolls, generally vertical opposed wringer rolls arranged upon the leading side of the starch applying rolls, yielding means to shift one wringer roll toward the other wringer roll including a cylinder for receiving a gas and a plunger to reciprocate therein, and means for supporting and advancing the work and having an edge disposed adjacent to the lines of contact of the starch applying rolls and the wringer rolls.

10. In a starching machine, approximately vertical opposed starch applying rolls having peripheries of compressible absorbent material, means for holding the rolls in close relation so that the compressible absorbent material is placed under compression when the work passes between them, said means leaving the inner portions of the peripheries of the rolls uncovered at the tops of the rolls, a generally horizontal conveyor operating near the top of the rolls and serving to support the work, the work projecting beyond the edge of the conveyor and being adapted to be passed in a downward direction between the tops of the rolls to engage between the peripheries of the rolls, and means for applying a starch solution to the peripheries of the rolls.

NELSON ELAM.
JULIAN D. STONE.