July 3, 1923.

1,460,891

A. H. DE VOE

SEWING MACHINE

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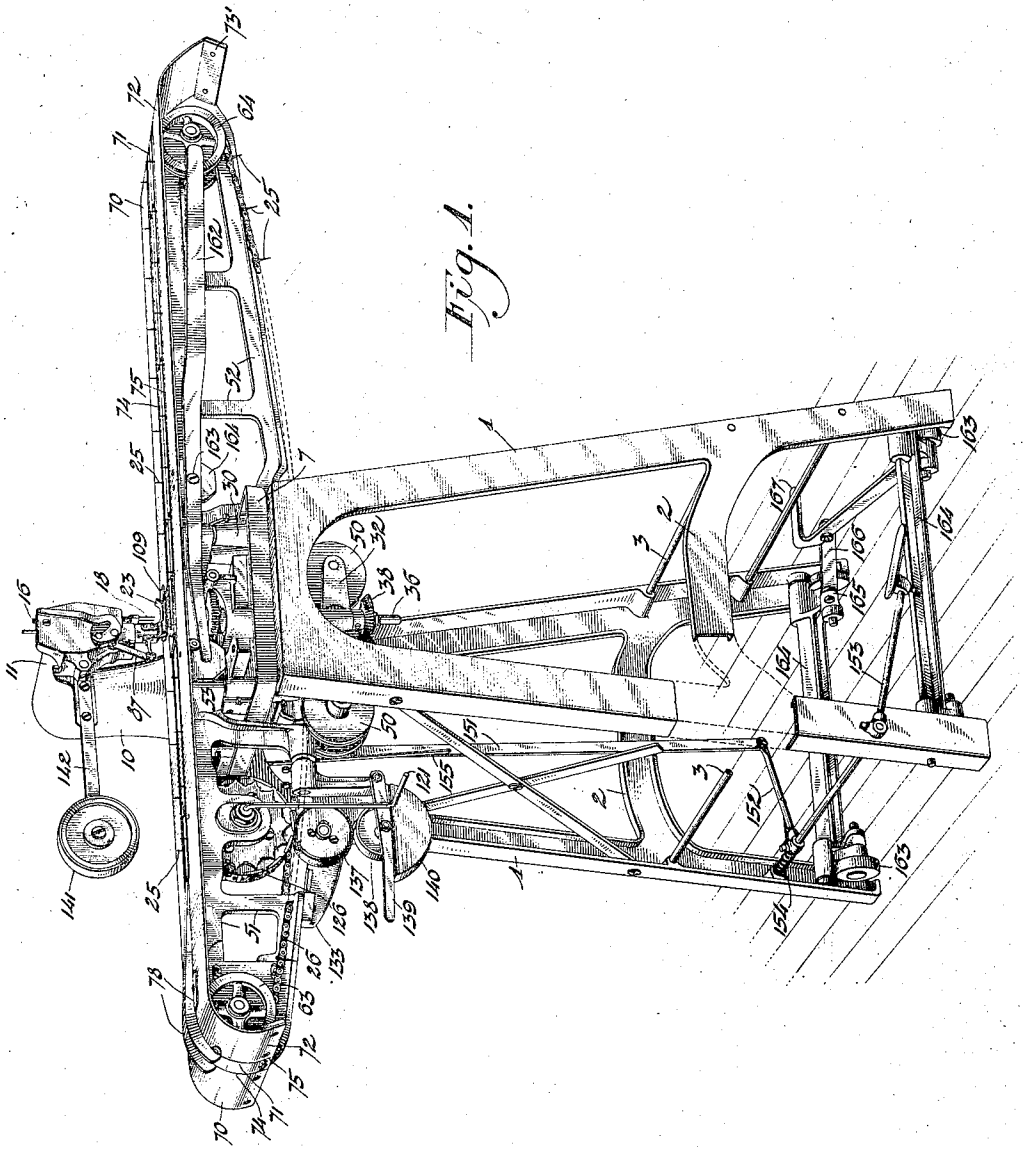


Fig. 1.

WITNESSES:

G. L. Jenna

Walter L. Pipes

INVENTOR

Albert H. DeVoe

BY Henry J. Miller

ATTORNEY

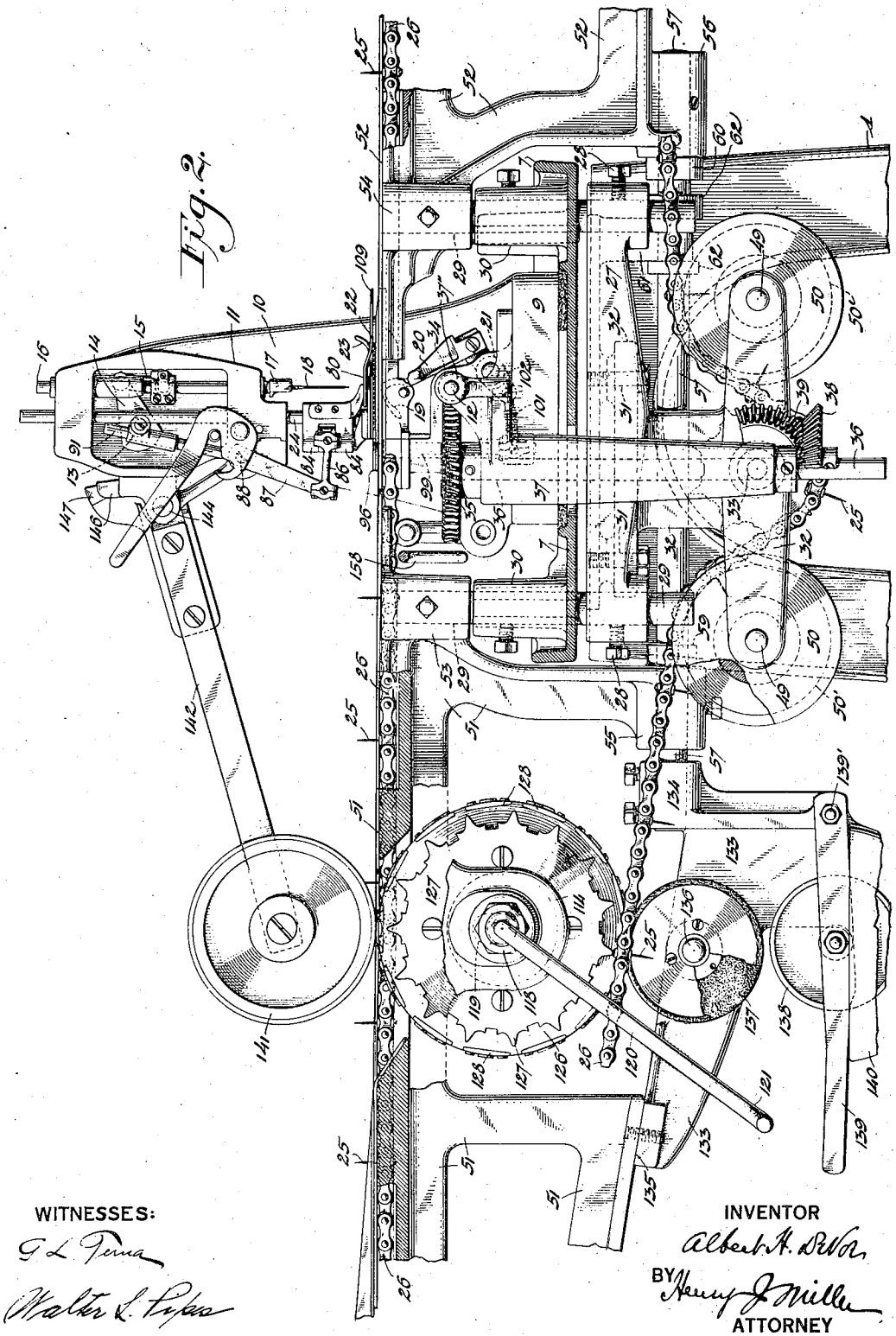
July 3, 1923. 1,460,891

A. H. DE VOE

SEWING MACHINE

Filed June 22, 1918 7 Sheets-Sheet 2

Fig. 2.



WITNESSES:

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July 3, 1923. 1,460,891

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SEWING MACHINE

Filed June 22, 1918 7 Sheets-Sheet 3

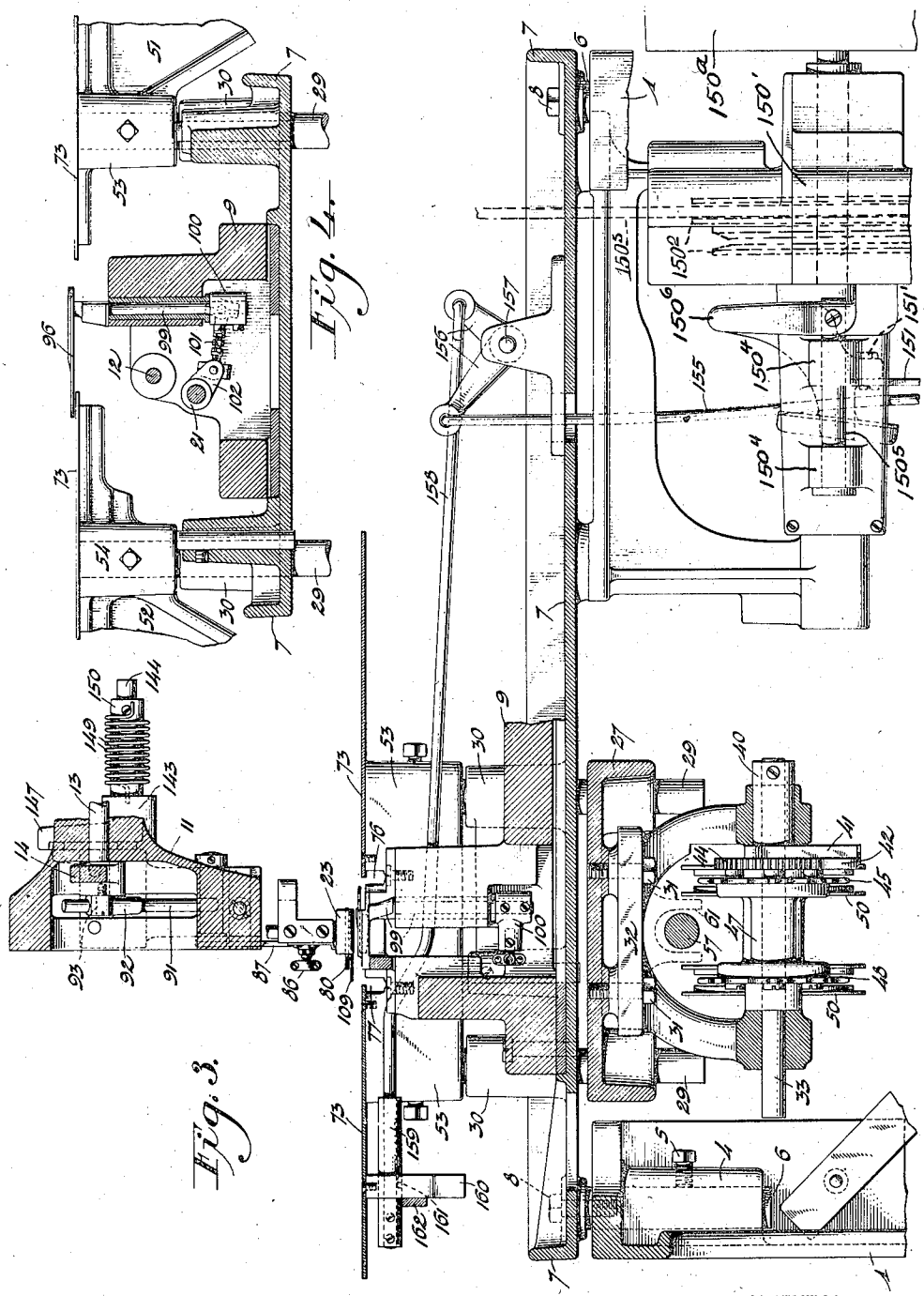


Fig. 4.

Fig. 3.

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July 3, 1923. 1,460,891

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SEWING MACHINE

Filed June 22, 1918 7 Sheets-Sheet 4

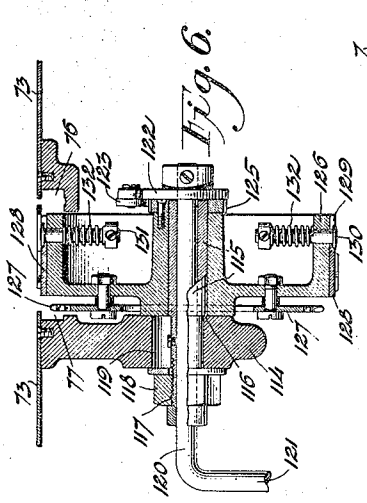


Fig. 6.

Fig. 5.

WITNESSES:

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July 3, 1923. 1,460,891

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SEWING MACHINE

Filed June 22 1918 7 Sheets-Sheet 5

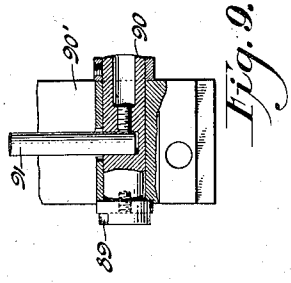


Fig. 9.

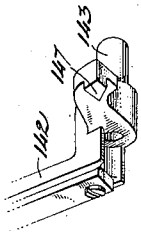


Fig. 8.

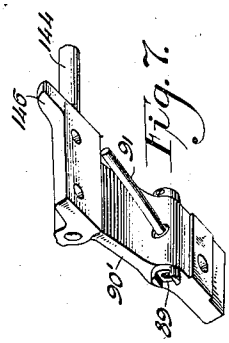


Fig. 7.

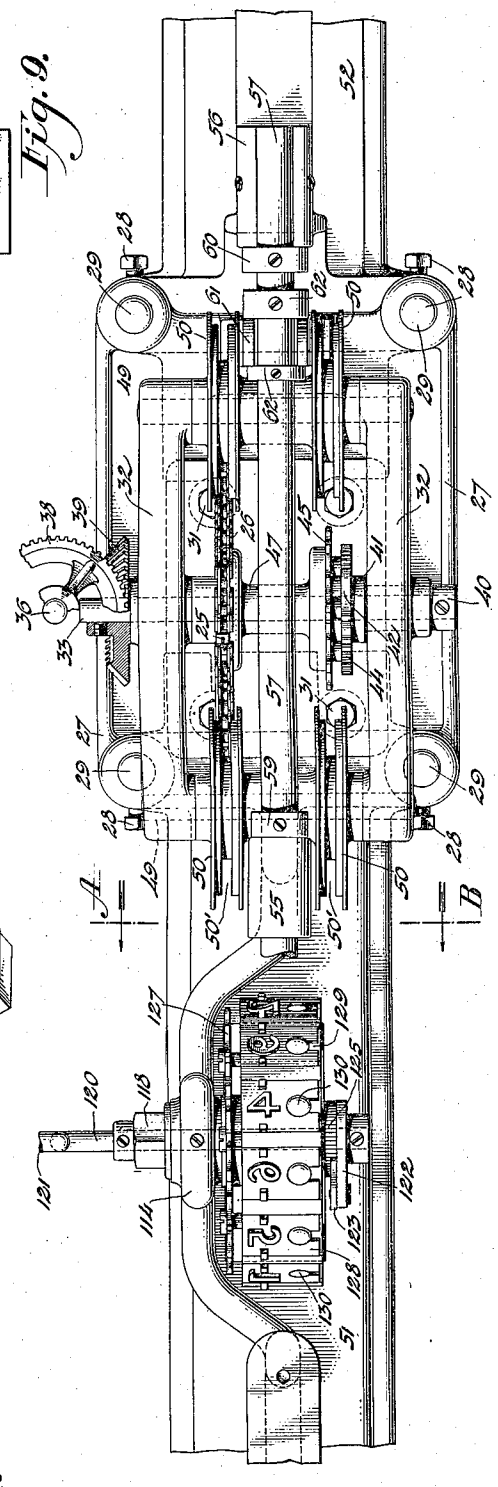


Fig. 10.

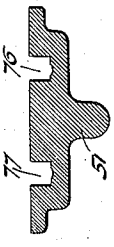


Fig. 11.

WITNESSES:

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SEWING MACHINE

Filed June 22, 1918 7 Sheets-Sheet 6

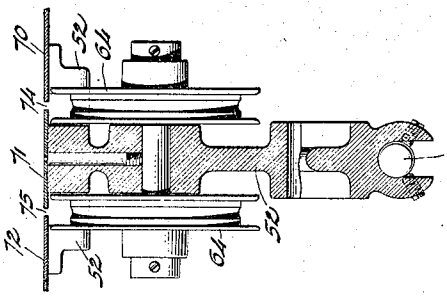


Fig. 14.

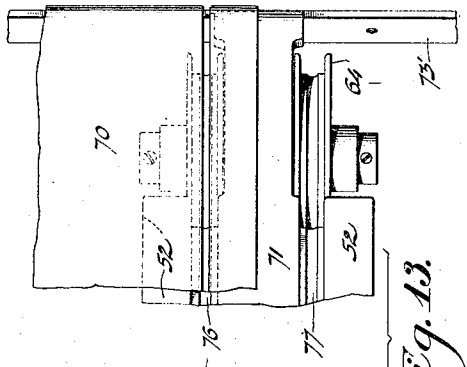


Fig. 13.

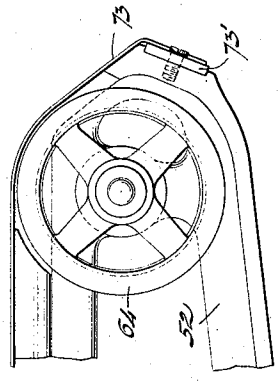
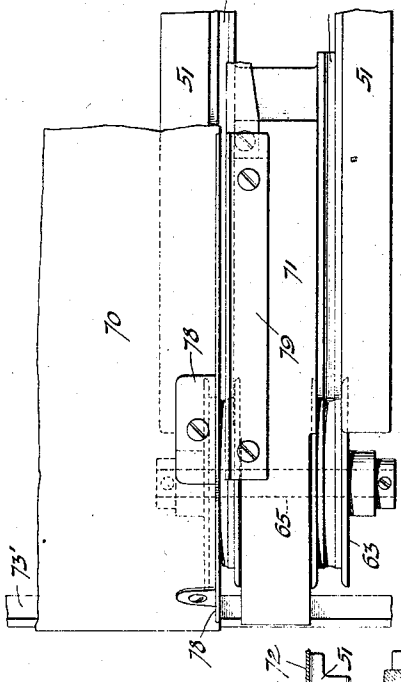
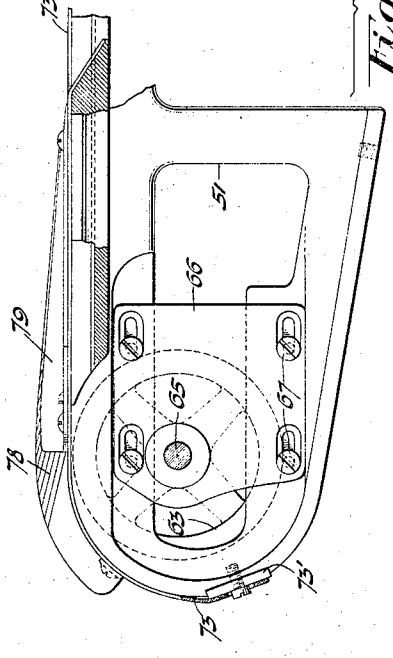


Fig. 15.





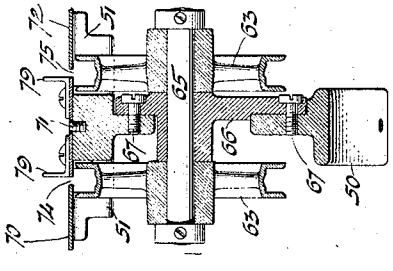


Fig. 12.

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July 3, 1923. 1,460,891

A. H. DE VOE

SEWING MACHINE

Filed June 22, 1918 7 Sheets-Sheet 7

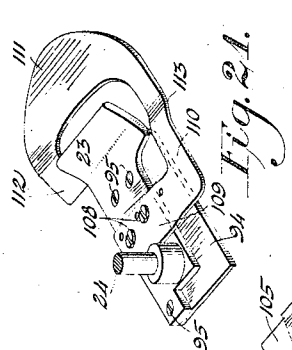


Fig. 21.

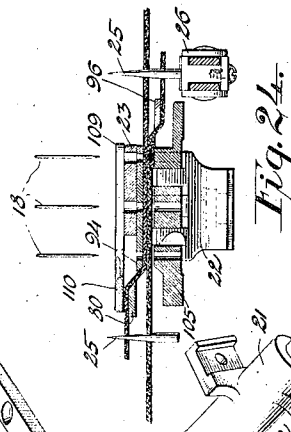


Fig. 24.

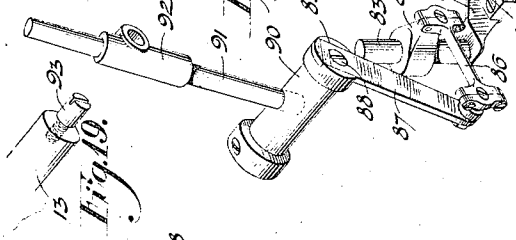


Fig. 19.

Fig. 20.

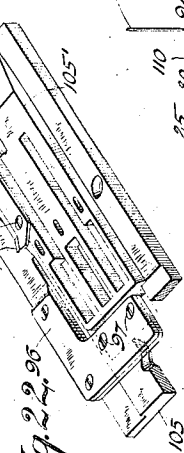


Fig. 22.

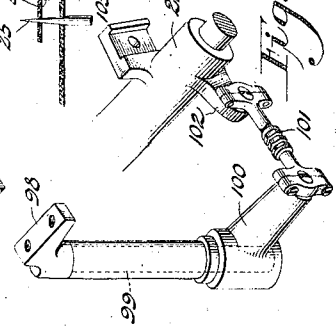


Fig. 23.

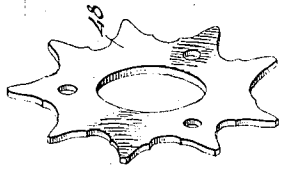


Fig. 18.

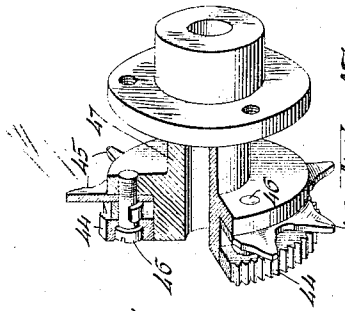


Fig. 17.

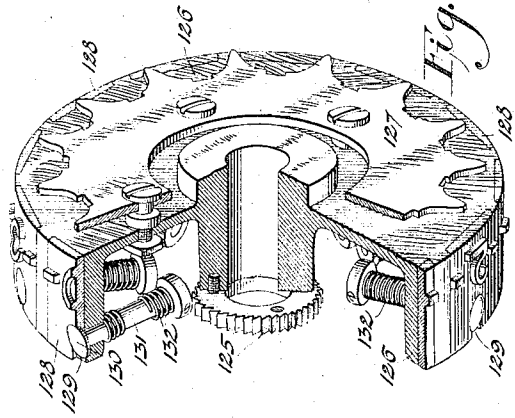


Fig. 25.

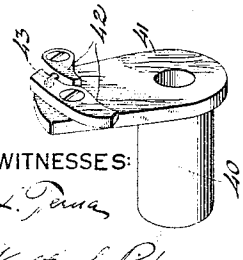


Fig. 16.

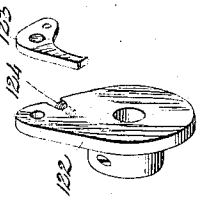


Fig. 26.

WITNESSES:

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Walter E. Sykes

INVENTOR

Albert H. de Voe

BY Henry J. Miller

ATTORNEY

BEST AVAILABLE COPY

Patented July 3, 1923. 1,460,891

UNITED STATES PATENT OFFICE.

ALBERT H. DE VOE, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

SEWING MACHINE.

Application filed June 22, 1918. Serial No. 241,371.

To all whom it may concern:

Be it known that I, ALBERT H. DE VOE, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Sewing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to sewing machines of a special type for use in bleacheries where it is desirable to secure together the ends of long lengths of cloth by a thin lap-seam whose edges are trimmed close to prevent the formation of bulky ridges which are objectionable in subsequent bleaching, singeing and dyeing operations.

It aims to provide a new and improved machine of the type shown in the patent to W. P. Anthony, No. 1,001,186, dated August 22, 1911, and also in my copending application Serial No. 113,071, filed August 4, 1916, of which this application is a continuation in part. In the prior construction a pair of trimmers is located behind the multiple needle sewing machine, the stitching point of which is embraced by a rectangular and slidable frame having impaling pins flanking the needles and the trimmers. The slidable frame holds the fabric stretched flat during the stitching and trimming operations.

The width of the cloth that may be stitched with the prior construction is limited by the size of the frame, it being impossible to trim and stitch material wider than the frame is long. The slidable frame after each operation must be retracted to a position in front of the needles to make ready for the next operation and this wastes time and energy. The frame must also be made heavy and strong enough to hold the work stretched flat and yet it must be light enough to be dragged along by the feed-dog's advance of the work a stitch length at a time. The opposite free margins of the lap seam joining the lengths of cloth are in the prior construction trimmed after it is stitched and these margins cannot be cut off very close to the lines of stitches owing to the movement of the trimming blades in a plane at right angles to the plane in which the work travels.

The present invention aims to improve the prior constructions by providing a fabric stretching and holding mechanism conveying the work in lapped relation to and from the stitching point which is capable of handling any width of cloth and which is ready to start wherever it may happen to stop at the end of a previous operation thereby increasing the capacity of the machine.

For relieving the operator of the trouble of removing the work from the conveying mechanism, it aims to provide devices stripping the work from the stretching and holding mechanism after the lengths have been joined by a lap seam.

It also aims to provide positive mechanical means for conveying the work in lapped condition to and from the stitching point at a velocity substantially equal to the average velocity of the feed-dog's intermittent advance.

Also it aims to improve the character of the work done by a combination and arrangement of trimmers and separator which effect a stretching of the material immediately before it passes under the presser-foot and is gripped thereagainst by the feed-dog.

Then also it aims to provide a new and improved arrangement of trimmers which sever the cloth before it is secured together close to the outside rows of stitches.

It aims to provide new and improved mechanism for operating the trimmers, the blades of which are conveniently accessible for repair, replacement or resharpening.

It aims still further to provide a new and novel marking device for making distinguishing characters upon the work the device being manually operable independently of the machine.

A further aim of the invention is to provide new and useful controlling devices for conveniently holding the machine coupled to power and for manually shifting the work along when the stitch-forming mechanism is at rest.

And finally it aims to improve the construction and arrangement so that the machine may be operated at a high rate of speed.

In its preferred form the construction comprises a sewing machine of any suitable form making a plurality of parallel rows of stitches, a trimming mechanism including pairs of shear trimmers arranged in advance of the stitching point and operating close and parallel to the plane of the throat-plate

on opposite sides of the needles, and a fabric-stretching and holding mechanism having as its leading feature a series of impaling pins mounted on endless chains on opposite sides of the stitching point and flanking the shear trimmers. Through parallel slots in the table extending in the direction of feed and flanking the trimmers, project series of pins on which the work is lapped and impaled. The table is of relatively great length and is arranged transversely of the sewing machine head between the bed-plate and overhanging arm and is substantially level with the throat-plate. At the rear end of the table adjacent the point where the endless carriers reverse their direction of movement stripping plates are provided to remove the finished work from the pins on which it is impaled. The fabic stretching and holding mechanism is driven from the main-shaft of the sewing machine. A foot-treadle affords convenient means for coupling the machine to a source of power for simultaneously actuating the stitch-forming, trimming and fabric stretching and holding mechanisms. The machine is equipped with a species of latching mechanism for holding the foot-treadle depressed, enabling the operator to freely move about in order to advantageously handle wide material, such as table cloth seventy-two inches in width. A marking device is also provided on the machine and has a series of characters arranged conveniently for impressing distinguishing letters or numbers upon the work when desired.

The invention is illustrated in the accompanying drawings, in which Fig. 1 is a perspective view of the complete machine. Fig. 2 is an end elevation partly in section of the central portion of the machine and its frame. Fig. 3 is a front elevation partly in section approximately in a vertical plane in advance of the stitching point. Fig. 4 is a detail cross-section illustrating part of the mechanism for actuating the lower trimming blade. Fig. 5 is a top plan view of the machine and a portion of the table with the work-plate of the sewing machine removed, taken on a horizontal plane slightly above the work-plate. Fig. 6 is a detail cross section on a vertical plane of the impression roller of the marking device. Figs. 7, 8 and 9 are details in perspective, the latter being partly in section. Fig. 10 is a bottom plan view of the central portion of the table. Fig. 11 is a cross-section on the line A—B, Fig. 10 showing the grooves in one frame section of the table. Fig. 12 is a detail in cross-section showing the adjustable pair of end pulleys about which the endless chains turn. Fig. 13 is a plan view showing fragments of the table-top. Fig. 14 is a sectional detail showing the non-adjustable end pulleys around which the chains travel. Fig. 15 is a fragmentary side elevation of the frame sections showing the relation of the end pulleys and stripping plates. Figs. 16, 17 and 18 are perspective views of the components of a pawl and ratchet mechanism for actuating a pair of sprockets driving the endless chains. Figs. 19, 20, 21, 22 and 23 represent in spaced perspective the upper and lower shear trimming mechanisms, one of which is mounted upon the presser-foot. Fig. 24 is a cross-section through the presser-foot and throat-plate illustrating the condition of the lap seam at the stitching point. Fig. 25 is a perspective, partly in section, of the impression roll of a marking device. Fig. 26 is a detail in perspective of a pawl-carrying arm for driving the impression roll.

As represented in Fig. 1 of the drawings, end standards with legs 1 connected in pairs by cross-members 2 are braced together by the tie-rods 3. On the upper ends of the legs, Fig. 3 bosses 4 are formed with sockets within which are adjustably secured by the screws 5 pins 6 upon which in turn a tray 7 is secured by the screws 8.

The sewing machine.—Upon the tray 7 sets the bed-plate 9 of a sewing machine from whose vertical standard 10, Fig. 1, extends laterally the usual overhanging arm 11. The main-shaft 12, Figs. 2 and 5, of the machine on which is mounted the grooved hand-wheel 12′ is located in suitable bearings rising from the bed-plate and is operatively connected in any suitable manner through the vertical standard with a rock-shaft 13, Fig. 2, sustained in the overhanging arm and having a crank-arm 14 linked at 15 to the needle-bar 16 whose clamp 17 carries one or more needles 18, preferably three in number. Beneath the bed-plate loopers 19, of the non-thread carrying type and as many as there are needles, are supported on a carrier 20 secured to a sleeve 21 and operated from the main-shaft of the machine by any of the great variety of known mechanisms suited for the purpose.

The work-feeding mechanism for intermittently advancing the work a stitch-length at a time comprises a feed-dog 22, to which four motions may be imparted by suitable mechanism, and a cooperating presser-foot 23 on a presser-bar 24 that is supported in the head of the overhanging arm in rear of the needle-bar as usual.

The construction above briefly described relates to the stitch-forming and work-feeding mechanisms of a sewing machine which has been employed in an embodiment of the invention but obviously the stitch-forming and work-feeding mechanisms may be of any suitable form and type. Their specific construction forms no part of the present invention.

The fabric stretching and holding mechanism.—The work is led to and from the stitching point, where the needle or needles

penetrate the work, with the fabric plies overlapped as shown in Fig. 24 in which condition the plies are held flat and tensioned by being impaled upon two separate and distinct series of pins 25 secured to endless carriers 26 of any suitable form and construction. Preferably, as shown, the endless carriers are in the form of chains.

The means for driving and supporting the endless carriers or chains 26 will now be described.

Beneath the tray 7 as shown in Figs. 2 and 3 is mounted a rectangular plate 27, being clamped by screws 28 to the pins 29 in the bosses 30, four in number on the upper side of the tray. To the bottom of the plate 27 is secured by screws 31 a driving head 32 of the form shown, by which head a countershaft 33 is sustained parallel with the main-shaft 12. The counter-shaft 33 is operated, see Figs. 2, 3 and 5 from a worm 34 on a reduced extension of the main-shaft 12 through a worm-wheel 35 on a vertical shaft 36 supported in a bearing 37, which is secured by the screws 37′ to the bed-plate 9 of the sewing machine and which carries a small bearing 37″ for the portion of the main-shaft 12 which extends beyond the worm 34. At the lower end of the vertical shaft 36 is a beveled gear 38 meshing with a similar gear 39 on one end of the countershaft 33. On the other end of the countershaft 33, Figs. 3 and 10, is fixed a sleeve or bushing 40 with an integral arm 41 carrying a pair of pawls 42, see Fig. 16, yieldingly held by a coil-spring 43 against a ratchet wheel 44, Fig. 17, which together with a sprocket-wheel 45 is fastened by bolts 46 to a double flanged sleeve 47 loosely supported on the countershaft 33, a second sprocket-wheel 48 being bolted to the sleeve 47 in spaced relation with the first-mentioned sprocket-wheel. In a plane and parallel with the countershaft 33 and on opposite sides thereof stud-shafts 49 are supported by the driving head 32 and loosely supported on the stud-shafts are idlers 50 whose peripheral grooves 50′ are in line with the sprocket-wheels 45 and 48, see also Fig. 10.

Frames 51—52 are arranged in back and front respectively of the sewing machine in line with each other in the direction of feed. The frames are of skeletonized construction and are supported above the tray 7 on the before mentioned pins 29 which are embraced by the frame bosses 53—54, while below the tray, in bosses 55—56 is clamped a rod or strut 57 having thrust collars 59—60 mutually supporting the frames 51—52, one by the other in alinement. A U-shaped lug 61 depending from the plate 27 straddles the strut 57 and collars 62 upon the rod and on opposite sides of the lug afford means for bringing the respective frames 51—52 into alinement. On opposite free ends of the frames 51—52 are mounted in pairs peripherally grooved idlers 63—64, Figs. 15 and 12, the former of which may be adjusted bodily laterally in the direction of feed to properly tension the chains 26, their stud-shaft 65 being supported in a plate 66 adjustably secured by the screw-and-slot connections 67 to a finished surface on the side of the frame.

The conveying mechanism, whose construction has thus been described is thus operated preferably at a uniform velocity equal to the average advance of the fabric by the feed-dog and cooperating presser from the main-shaft of the sewing machine through a ratchet mechanism, the series of impaling pins on the chains being positively advanced in the direction of feed. By reason of the spring-pawl construction 42—43 movement of the pins in the direction of feed is permitted independently of the main-shaft 12, such independent movement being effected manually in a manner made apparent later. The independent movement facilitates the introduction under the presser-foot of plies of fabric in overlapping relationship before the machine is thrown into stitching operation.

The table.—The tops of the frames 51—52 are planed smooth and drilled and tapped at suitable intervals to receive screws clamping in position sections 70—71 and 72 of a work-supporting table indicated generally by the numeral 73, the outside ends of the table being bent down and secured to cross-bars 73′ at the opposite ends of the frames 51—52 and at a point slightly beyond the grooved pulleys 63—64. The sections of the table 73 are spaced apart and define channels 74—75 on opposite sides of the stitching point and extending parallel to the line of seam-formation. These channels communicate with grooves 76—77, Fig. 11, provided in the top of the frames 51—52 which grooves receive the endless chains 26 carrying the impaling pins 25 which pins project up through the channels above the surface of the table 73 and upon them the overlapped plies of fabric are adapted to be impaled. On the rear ends of the table 73 stripping plates 78—79 are mounted with their fin-like ribs flanking the channels 74—75 to a point where the impaling pins descend beneath the curved end of the table. These stripping plates as will be readily understood lift and clear the overlapped and stitched work from the impaling pins and allow it to drop from the rear end of the table without manipulation by the operator of the machine.

The trimming mechanism.—Between the work-feeding mechanism i. e., the feed-dog 22 and presser-foot 23, and the outlying series of work-holding pins pairs of shear trimmers are arranged to sever respective

plies of fabric before it is stitched and of course these shear trimmers are supported and actuated from opposite sides of the work.

The upper trimmer, Figs. 2, 19, 20 and 21 has a movable blade 80 secured by screws 81 to an arm 82 on a vertically arranged pin 83 hinged in the spaced ears 84 fixedly connected to the presser-bar 24. An arm 85 fastened permanently to the pin 83 and arranged between the ears 84, is provided with a ball end embraced by one of the two socket ends of a link 86 which is actuated by a ball-ended arm 87 secured by a screw 88 within a groove 89 arranged transversely in the end of a rock-shaft 90 which is supported horizontally at the rear of the head of the sewing machine in a bracket-plate 90′ shown in detail in Figs. 7 and 9. The rock-shaft 90 intermediate its ends is provided with a socket receiving a pin 91, which is set-screwed to the shaft as indicated in Fig. 9, and through a sliding sleeve 92 is actuated from a crank-pin 93 on the end of the needle-bar rock-shaft 13 in the overhanging arm.

The ledger or stationary blade of the upper trimmer in the present embodiment of the invention is formed by an edge of a hardened sole piece 94 fastened by screws 95 to the presser-foot 23 which latter is cut away as shown best in Fig. 21 to provide clearance for the movable or cutting blade 80 passing above it during the normal operation of the machine.

The lower shear trimmer Figs. 3, 4, 22 and 23, has a movable blade 96 secured by screws 97 to an arm 98 on the upper end of a vertical rock-shaft 99 whose lower end is connected by an arm 100 to an adjustable link 101 actuated from a crank-arm 102 formed on the looper-carrying sleeve 21 before mentioned, the link 101 having ball-and-socket connections at its opposite ends. Cooperating with the movable blade 96 is a ledger or stationary blade 103 secured by screws 104 to the throat-plate 105 of the machine.

The cutting action of the shear trimmers is completed in advance of the penetration of the work by the needles, i. e., it is completed in advance of the stitching point, which is insured by the provision of a lip 106 on the movable blade of the upper trimmer and of a similar lip 107 on the ledger-blade of the lower trimmer, both lips being located as shown forward of the needles.

It will be noticed that the movable blades of both shear trimmers operate in planes parallel to the throat-plate 105 and consequently parallel to the plane in which the work traverses. The movable blades are operated through connections with the upper and lower stitch-forming instrumentalities, which connections are simple and light and do not hamper or limit the speed of the machine in operation. And all the blades are accessible for replacement, repair or resharpening.

The separator.—On the presser-foot secured by screws 108 is a plate or finger 109 which has a forwardly extending portion 110, a laterally extending portion 111 across and in front of the presser-foot, and a rearwardly extending portion 112, the latter being bent down and terminating slightly in advance of the end of the movable blade of the lower shear trimmer. A similar bend 113 connects the portions 110 and 111 of the finger just in advance of the end of the movable blade of the upper shear trimmer. These bent portions 112 and 113 insure the entrance of the horizontal portions of the overlapping plies into their respective shear trimmers and also guard against snagging the overlapping plies on the free ends of the movable blades. The laterally extending portion 111 of the finger 109 enters between the lapping plies of the fabric parting them slightly before they reach the bent portions 112—113. The bent portions 112—113 in conjunction with the raised portion 105′ of the throat-plate and with the presser-foot cause the material to kink or fold, as shown in Fig. 24, thereby making it taut between the flanking series of pins outside of the trimmers and stitch-forming mechanism before the work gets well under the presser-foot and before the margins of the work are cut off. Thus there is obtained a smoothing or ironing action immediately before the stitching operation insuring a smooth flat lap-seam in the product.

The marker.—Rearward of the stitching point and supported by a lug 114, Figs. 2 and 6, depending from the frame section 51 is the character carrying part of the marker. It comprises a bushing 115 provided with a shoulder 116 and threaded end 117 taking a clamp-nut 118 for adjustably securing the bushing in place in the slot 119 provided in the depending lug. A shaft 120 having a hand-crank 121 at one end is journaled within the bushing 115 and at its opposite end carries an arm 122, Figs. 25 and 26 on which is mounted a pawl 123 with an actuating spring 124 for holding the pawl in engagement with a ratchet-wheel 125 fastened permanently to an impression roller 126 loosely supported externally upon the bushing 115. To the web of the impression roller 126 is fastened permanently a sprocket-wheel 127 meshing with one of the endless chains 26 and within seats in the periphery of the impression roller are removably mounted plates 128 on which characters of a suitable kind are fashioned and in which open-ended key-hole slots 129 are provided to receive the tapered heads 130

of plungers 131 pressed by the springs 132 radially inward to hold the plates 128 in position.

Directly beneath the impression roller 126, Fig. 2, means are provided for conveniently inking the characters on the plates 128. A casting 133, provided with a boss 134 fitting over the end of the strut or rod 57 and also with a seat 135, is detachably secured by screws to the frame-section 51. On a stud 136 sustained by the casting is an inking roller 137 to which ink is supplied by a second roller 138 carried by a lever 139 pivoted to the casting as shown at 139′ and arranged for emersion in a trough 140 permanently secured to the casting. Ink or other suitable fluid in the trough is carried by the supply-roller 138 to the padded surface roller 137 which wets the surfaces of the characters on the several plates 128.

Directly above the impression roller 126 is a pressing roller 141, surfaced with rubber or other suitable material, for deflecting the work downward when it is desired to mark the fabric. Normally the plates 128 on which the characters are formed are just cleared by the under surface of the work and by depressing the roller 141 the fabric is deflected into contact with the characters on the plates. For convenient manipulation, the pressing roller 141 is carried on the end of an arm 142 having a laterally extending hub 143, Fig. 8 hinged on a pin 144, Fig. 7 fast in the bracket-plate 90′ before mentioned, secured to the rear of the head of the sewing machine, with an integral projection 146 of the bracket plate arranged to engage a catch 147 integral with the hub 143, when elevation of the pressing roller carries the catch clear of the projection and allows a coiled thrust spring 149, Fig. 3, whose opposite ends are sunk in a collar 150 fixed on the pin 144 and in the hub 143, to displace the arm 142 bodily sidewise. The spring 149 also tends to swing the arm 142 down and hold the projection 146 and catch 147 in close engagement. By the combined thrust and tortional forces of the coiled spring 149 the pressing roller in an elevated position is secured against accidental displacement and vibration.

Manual actuation of the endless carriers.—The handle or crank 121 provided on the end of the rod 120 extending through the impression roller affords convenient means for manually moving the endless chains 26 in the direction of feed before the machine is started and while the stitch-forming, work-feeding and trimming mechanisms are at rest, facilitating the location of the plies of work on opposite sides of the separator 109 before starting up.

Treadle mechanism for power operation of the machine.—The sewing machine and the fabric-stretching and holding mechanism are simultaneously operable from a power-transmitter 150′ suitably secured to the lower side of the tray 7 under the vertical standard 10 of the sewing machine frame. Any suitable form of transmitter may be employed, the one illustrated in Fig. 3 having driving and driven members which are relatively movable into clutching relation through a bar 151, Figs. 1 and 3, hinged to an arm 152 constituting part of a foot-lever or treadle 153 which is suitably fulcrumed between the legs 1 and which is normally held raised by a coiled spring 154. The transmitter has the usual belt pulleys 150^2 from which power is transmitted to the main driving shaft 12 of the sewing machine by a belt 150^3 passing over the groove of the band-wheel 12′. On the casing of the transmitter are spaced lugs 150^4 on which is fulcrumed by means of rod 150^5 the transmitter controlling lever 150^6. The rod 151 is connected to the lever 150^6 by suitable means such as the screw-bolt 151′. Swinging of the lever 150^6 connects and disconnects the clutch members as is ordinary in such devices. Power is supplied to the transmitter from an external source by any suitable means such as the belt pulley 150^8. By depressing the foot-treadle the machine is thrown into operation.

To enable the operator to move about the machine freely while it is in operation, devices are provided to hold the foot-treadle down with the operator's foot thereupon. A rod 155 links the bar 151 with a bell crank 156 fulcrumed at 157 upon the tray 7. To the bellcrank is linked a second rod 158 having a sleeve 159 fixed thereto and slidably supported in a lug 160 depending from the table 73. A transverse groove 161 in the sleeve is adapted to receive the short end of a latch-lever 162 fulcrumed at 163 to a block 164 depending from the table. The fulcrum of the lever 162 is located so as to allow gravity to urge the short end of the lever up alongside of the lug 160 into the groove 161 in the sleeve. When the foot-treadle is depressed to couple the machine to power the groove 161 in the sleeve 159 is moved to the left (in Fig. 3) into register with the short end of the latch-lever 162 which rises thereinto, thus holding the foot-treadle raised against the tortion of spring 154 and thereby permitting the operator to remove his foot from the treadle and move about the machine. This is obviously desirable in handling material which varies in width and especially when it is very wide.

Toggle-roller-support for table.—For convenience in shifting the machine about in the factory, rollers 163 (Fig. 1 only) are mounted on the opposite ends of rock-bars 164 pivotally connected by the fixed pairs of legs 1. Between ears 165 on the rock-

bars 164 pairs of toggle links 166 are arranged with a lateral arm 167 on one link of a pair extending outward for convenient access to the operator's foot by which the toggle-links may be broken as shown in Fig. 1 to lower the ends of the legs 1 into direct contact with the floor or by which they may be straightened to support the machine upon the rollers 163 for ease in shifting it about on the floor.

Operation of the machine.—The ends of the lengths of cloth are impaled each upon both series of pins in lapping relation as shown in cross-section in Fig. 24. With the plies of work introduced under the presser-foot and upon opposite sides of the separator the operator may readily stretch the material flat and smooth over the receiving end of the table. When the machine is operated the pins penetrate the material one after another before it reaches the stitching point slightly in advance of which the trimmers sever the irregular margins close to where the lines of stitches are subsequently laid. As the fabric passes off of the delivery ends of the table it is raised and stripped from the pins and piles up loosely upon the floor until the machine operator has finished a number of bolts. Another truck load of bolts of cloth is then drawn up to the machine and the ends thereof united to the loose ends of the previously united truck loads of bolts. These operations are continued until the desired aggregate length of material is attained.

During the stitching of contiguous lengths of the work or after the machine has been brought to rest, the operator may bring down the presser roller upon the impression roll and mark the work with an identifying character as is frequently desirable. The machine is started by depressing the foot-treadle and left in operation by reason of the detaining action of the latch-lever 162 while the operator moves about in manipulating the cloth.

The endless carriers or chains 26 in the combination disclosed contribute materially to the value of the machine over prior constructions enabling any width of work being united with less exertion and with far greater rapidity than in machines of the prior art. The capacity of the machine for different widths of material and for handling more pieces of work per day is thus increased.

If the work becomes displaced or disarranged, and while the sewing machine is at rest, the operator may find it convenient to turn the hand-crank 121 and shift the endless carriers with their impaling pins 25 in the direction of feed in order to straighten out the work as well as introduce its plies upon opposite sides of the separator 109.

Owing to the length of the table in front of the stitching point and to the endless character of the work-holding and stretching mechanism, the operator may conveniently prepare the next lengths of cloth to be united during the last portion of the stitching operation on the previous lengths of cloth.

The separator and trimming blades bend the work as shown in Fig. 24 and tension it transversely of the line of feed between the flanking rows of impaling pins thereby insuring a flat condition in the lapped plies at the critical stage when they are being stitched.

Because the trimmers operate immediately in advance of the stitching point and operate in horizontal planes the stitches may be laid as close to the cut edges of the work as the texture of the cloth renders safe thus reducing to a minimum waste of material and the liability of the cut edges creasing or folding in their passage through the rolls during subsequent bleaching, singeing and dyeing operations.

While the invention has been described in its preferred form, it is susceptible of alteration and modification in a variety of ways.

It is therefore to be distinctly understood that the invention is not limited to the specific construction shown and described, as the same is only illustrative of the principles of operation which are capable of extended application in various forms, and that the invention comprehends all construction within the scope of the accompanying claims.

Having thus set forth the nature of the invention, what I claim herein is—

1. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step work feeding mechanism, endless fabric stretching and holding mechanism, means acting independently of the work for advancing said fabric stretching and holding mechanism, and shear trimming mechanism for cutting the free edges of lapping pieces of work.

2. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step work feeding mechanism, endless fabric stretching and holding mechanism, means acting independently of the work for advancing said fabric stretching and holding mechanism, and shear trimming mechanism on opposite sides of the stitching point for cutting the opposite free edges of the lapping pieces of work.

3. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step feeding mechanism, endless fabric stretching and holding mechanism, and shear trimming mechanism adjacent the stitching point and including a movable

blade arranged to operate in a plane parallel with the plane in which the work travels for cutting the free edges of lapping pieces of work.

4. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism and work-feeding mechanism, of stretching and holding means for advancing the work to the stitch-forming mechanism in stretched condition, means for simultaneously driving said work-feeding mechanism and said stretching and holding means, and means permitting the advance of said stretching and holding means independently of said work-feeding mechanism.

5. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism and work-feeding mechanism, of a fabric-stretching and holding mechanism functioning independently of the work-feeding mechanism, and means for simultaneously driving said mechanisms including devices permitting movement of the fabric-stretching and holding mechanism independently of said work-feeding mechanism.

6. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step work feeding mechanism, endless fabric stretching and holding mechanism, means acting independently of the work for advancing said latter mechanism, and of shear trimming mechanism arranged between the fabric stretching and holding mechanism and the stitch-forming mechanism for cutting a free edge only of lapping pieces of work.

7. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step work feeding mechanism, endless fabric stretching and holding mechanism, means acting independently of the work for advancing said latter mechanism, and of shear trimming mechanism including a pair of trimming devices arranged between the fabric stretching and holding mechanism and the stitch-forming mechanism and arranged also on opposite sides of the stitch-forming mechanism for cutting the opposite free edges of lapping pieces of work.

8. In a machine of the class described, in combination, stitch-forming mechanism, step-by-step feeding mechanism, endless fabric stretching and holding mechanism, and of shear trimming mechanism having pairs of movable and stationary blades, each pair of cooperating blades being supported and actuated from opposite sides of the work, and means for actuating the movable blades including rock-shafts extending transversely of the plane in which the work advances.

9. In a device of the class described, a sewing machine having a presser-foot, trimming mechanism including stationary and movable blades supported by the presser-foot on one side thereof in cooperative relation, and a second pair of stationary and movable blades supported independently of the presser-foot and at the opposite sides thereof, in combination with endless work holding mechanism.

10. In the device of the class described, stitch-forming mechanism including upper and lower stitch-forming instrumentalities, two pairs of cooperating trimmers, and means connected respectively with said upper and lower stitch-forming instrumentalities for actuating said two pairs of trimmers.

11. In the device of the class described, stitch-forming mechanism, means for feeding the work a stitch length at a time, and trimming mechanism including two pairs of trimmers operable in planes parallel with the plane in which the work is advanced for cutting the opposite free edges of lapping pieces of work.

12. In the device of the class described, stitch-forming mechanism, means for feeding the work a stitch length at a time, and trimming mechanism including two pairs of trimmers, a rock-shaft for one of said pairs of trimmers and arranged transverse the plane in which the work travels, connections between the rock-shaft and the stitch-forming mechanism, and means for actuating the other of the pairs of trimmers.

13. In the device of the class described, a presser-foot, a throat-plate, stitch-forming mechanism, means coacting with said presser-foot for feeding the work a stitch length at a time, and trimming mechanism including a pair of cutting devices including stationary blades carried by the throat-plate and presser-foot respectively and arranged on opposite sides of the stitch-forming mechanism and movable blades cooperating with the stationary blades.

14. In a device of the class described, a work-support, a throat-plate, a presser-foot, stitch-forming mechanism, means coacting with the presser-foot for feeding the work a stitch length at a time, and trimming mechanism including a plural-blade shear trimmer carried by the presser-foot and a plural-blade shear trimmer sustained by the work-support and each arranged to operate upon the work from opposite sides thereof for cutting the opposite free edges of lapping pieces of work.

15. In a lap trimming mechanism for sewing machines having a presser-foot and a throat-plate and stitch-forming mechanism, a pair of ledger-blades on said foot and throat-plate respectively on opposite sides of the stitch-forming mechanism, movable cutting blades cooperating with said ledger-blades, and means for operating said blades

including links having universal connections at their ends.

16. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, fabric holding mechanism, trimming mechanism including two pairs of trimmers arranged to cut the fabric in advance of the stitching point, and a single implement for separating superimposed plies of lapped fabric and directing their margins into the trimmers.

17. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, a presser-foot, fabric holding mechanism, trimming mechanism including two pairs of trimmers arranged to cut the fabric in advance of the stitching point, and means supported by the presser-foot and extending in front of the trimmers for separating superimposed plies of lapped fabric and directing their margins into the trimmers.

18. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, a presser-foot, fabric holding mechanism, trimming mechanism including two pairs of trimmers arranged to cut the fabric in advance of the stitching point, and a tongue supported by the presser-foot and extending forwardly and then laterally across the front of the presser-foot and then rearwardly towards the presser-foot for separating superimposed plies of lapped fabric and directing their margins into the trimmers.

19. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, fabric holding mechanism, trimming mechanism including two pairs of trimmers arranged to cut the fabric in advance of the stitching point, and a member having upwardly and downwardly bent portions immediately in advance of the trimmers for directing the margins of lapped fabric into the same and for deflecting the other portions of the fabric margins from entrance into the trimmers.

20. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, a presser-foot, fabric holding mechanism, trimming mechanism including two pairs of trimmers arranged to cut the fabric in advance of the stitching point, and a member supported wholly from one side of the work and having a portion extending forwardly at one side of the line of seam-formation to a point in advance of the trimmers and another portion extending in front of the presser-foot for separating superimposed plies of lapped fabric and directing their margins into the trimmers.

21. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism and step-by-step feeding mechanism for advancing the work a stitch length at a time, of a fabric stretching and holding mechanism, positive means independent of the work for moving the same, and trimming mechanism for cutting the free edges of lapping pieces of work.

22. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism and step-by-step feeding mechanism for advancing the work a stitch length at a time, of a movable fabric stretching and holding mechanism, means acting independently of the work for advancing said latter mechanism, and trimming mechanism having a plurality of trimming members for severing the work at spaced intervals.

23. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism, work feeding mechanism, a frame by which the stitch-forming and work-feeding mechanisms are sustained, and a main-shaft supported by said frame, of an endless fabric stretching and holding mechanism, trimming mechanism, and means operated by said main-shaft for driving each of said mechanisms.

24. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism, work-feeding mechanism, a frame by which the stitch-forming and work-feeding mechanisms are sustained, and a main-shaft supported by said frame, of a fabric stretching and holding mechanism, and of a plurality of trimming mechanisms, and means operated by said main-shaft for driving each of said mechanisms, said trimming mechanisms being arranged to operate upon opposite sides of the work for cutting the opposite free edges of lapping pieces of work.

25. In a device of the class described, the combination with a sewing machine having stitch-forming and work-feeding mechanisms, of a movable endless pair of fabric stretching and holding carriers having fabric penetration devices arranged in series on opposite sides of the stitching point, and of trimming mechanism arranged to operate upon the work between the stitching point and the endless conveying devices for cutting the opposite free edges of lapping pieces of work.

26. In a device of the class described, the combination with a sewing machine having stitch-forming mechanism and work-feed-

ing mechanism, of a fabric stretching and holding mechanism, a trimming mechanism for cutting the opposite free edges of lapping pieces of work, and positive means for operating said mechanisms including devices permitting advance of the fabric stretching and holding mechanism in the direction of feed and independently of said work-feeding mechanism.

27. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism and work-feeding mechanism, a work-supporting table provided with an elongated opening parallel with the line of feed, an endless carrier having a plurality of impaling pins projecting through the opening in said table, and means for trimming the work between the stitch-forming mechanism and the impaling pins.

28. In a device of the class described, in combination, a sewing machine having stitch-forming mechanism and work-feeding mechanism, a work-supporting table extending in the direction of the feed transversely of the machine, and provided with elongated parallel openings on opposite sides of the stitching point, an endless fabric holding and stretching mechanism having series of impaling pins projecting through the openings, and trimming mechanism.

29. In a machine of the class described, in combination, stitch-forming mechanism, and work-feeding mechanism, trimming mechanism for cutting the opposite free edges of lapping pieces of work, fabric stretching and holding mechanism including a plurality of pins, and means independent of the work for moving the same.

30. In a machine of the class described, in combination, stitch-forming mechanism, trimming mechanism for cutting the opposite free edges of lapping pieces of work, fabric stretching and holding mechanism including a plurality of pins and an articulated carrier therefor that is endless.

31. In a machine of the class described in combination, a table, stitch-forming mechanism, trimming mechanism for cutting the opposite free edges of lapping pieces of work, fabric stretching and holding mechanism including an endless carrier supported beneath the table, impaling pins on said carrier projecting through the table during a part of the endless carriers cyclic movement.

32. In a machine of the class described, in combination, stitch-forming mechanism, work-feeding mechanism, pairs of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism and work-holding mechanism including a plurality of pins, and means independent of the work for moving the same, said trimming devices being adapted to cut the opposite free edges of lapping pieces of work.

33. In a machine of the class described, in combination, stitch-forming mechanism, a pair of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism, and work-holding mechanism including a plurality of pins and an articulated carrier therefor that is endless, said trimming devices being adapted to cut the opposite free edges of lapping pieces of work.

34. In a machine of the class described, in combination, stitch-forming mechanism, a pair of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism, a table and work-holding mechanism including an endless carrier supported beneath the table, impaling pins on said carrier projecting through the table during a part of the endless carriers cyclic movement, said trimming devices being adapted to cut the opposite free edges of lapping pieces of work.

35. In a machine of the class described, in combination, stitch-forming mechanism, pairs of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism, and work-holding mechanism including independent series of impaling pins, carriers therefor, and positive means for operating the carriers to move the pins in the direction of feed, said positive means including a connection permitting movement of the carriers independently of the stitch-forming mechanism.

36. In a machine of the class described, in combination, stitch-forming mechanism, a pair of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism, work-holding mechanism including independent series of impaling pins, carriers therefor, and positive means for operating the carriers to move the pins in the direction of feed, said positive means including a connection permitting movement of the carriers independently of the machine, and means for manually moving the carriers in the direction of feed.

37. In a machine of the class described, in combination, a table, stitch-forming mechanism, a pair of trimming devices sustained on opposite sides of the work and on opposite sides of the stitch-forming mechanism, work-holding mechanism, and means for stripping the fabric from the work-holding mechanism after it has passed the stitching point the said last named means including a stripping plate supported on the table.

38. In a device of the class described, in combination, a sewing machine having

stitch-forming mechanism and a main-shaft for driving the same, a worm and worm wheel driven therefrom, a fabric stretching and holding mechanism including an endless series of pins on which fabric is adapted to be impaled, and means for driving said fabric stretching and holding mechanism from said worm and worm wheel for conveying the fabric to the stitch-forming mechanism.

39. In a machine of the class described, in combination, a sewing machine having a main-shaft, stitch-forming mechanism, trimming mechanism, a fabric stretching and holding mechanism including separated endless series of impaling pins, an articulated carrier for said pins, sprocket-wheels for driving said carrier, supports for said sprocket-wheels arranged transversely of the sewing machine and front and back of the stitching point, and means for turning the sprocket-wheels from the main-shaft of the machine at an angular velocity that is fixed relative to that of the main-shaft.

40. In a machine of the class described, in combination, a sewing machine having stitch-forming mechanism and a main-shaft, trimming mechanism, a fabric stretching and holding mechanism including separated endless series of impaling pins, an articlated carrier for said pins, sprocket-wheels for driving said carrier, supports for said sprocket-wheels arranged transversely of the sewing machine and front and back of the stitching point, and means for positively driving the sprocket-wheels from the main-shaft of the machine including a one way driving mechanism permitting counter rotation of the sprocket-wheels independently of the main-shaft.

41. In a machine of the class described, in combination with a sewing machine having a feed-dog and a bed-plate, a work-suping table, common means for supporting a sewing machine and a work-supporting table, said table being arranged transversely of the machine so as to extend in the line of feed, and of endless fabric stretching and holding mechanism cooperating with said feed-dog on opposite sides thereof, and means beneath the table for supporting and actuating said endless fabric stretching and holding mechanism.

42. In a machine of the class described, in combination, a sewing machine having stitch-forming and work-feeding mechanism, work-holding and stretching mechanism having endless carriers, means for actuating the carriers during the operation of the sewing machine, and means for coupling the sewing machine and the work-holding and stretching mechanism to a source of power, said last named means including a controlling lever, and means for detaining the controlling lever in position after the machine is started for maintaining operation thereof.

43. In a machine of the class described, in combination, a sewing machine having stitch-forming and work-feeding mechanism, work-holding and stretching mechanism having endless carriers, means for actuating the carriers during the operation of the sewing machine, and means for coupling the sewing machine and the work-holding and stretching mechanism to a source of power, said last named means including a controlling lever, and a latching mechanism for holding the controlling lever in position after the machine is started for maintaining operation thereof.

44. In a machine of the class described, in combination, a sewing machine having stitch-forming and work-feeding mechanism, work-holding and stretching mechanism having endless carriers, means for actuating the carriers during the operation of the sewing machine, and means for coupling the sewing machine and the work-holding and stretching mechanism to a source of power, said last named means including a controlling lever, and automatically acting means for holding the controlling lever in position after the machine is started for maintaining operation thereof.

45. In combination with a sewing machine having stitch-forming mechanism and a main driving shaft for operating the same, an endless fabric conveyor having a series of work-holding devices thereon, means for operating said conveyor to convey fabric to the stitch-forming mechanism comprising a counter-shaft parallel with the main-shaft, a driving member on said counter-shaft operatively engaging said endless conveyor, and a speed reduction gear between the main and counter-shafts.

46. In combination with a sewing machine having stitch-forming mechanism and a main driving shaft for operating the same, an endless fabric conveyor having a series of work-holding devices thereon, means for operating said conveyor to convey fabric to the stitch-forming mechanism comprising a counter-shaft parallel with the main-shaft, a driving member on said counter-shaft operatively engaging said endless conveyor, a speed reduction mechanism between the main and counter-shafts, and idler wheels on opposite sides of the counter-shaft for increasing the surface of contact between the conveyor and the driving member.

47. In combination, a sewing machine having stitch-forming mechanism and a main-shaft for actuating the same, an endless fabric conveyor having a series of impaling pins thereon, means for operating the conveyor to convey fabric to the stitch-forming mechanism including a rotary driving

element arranged beneath the main-shaft, members for guiding the conveyor in an endless path arranged on opposite sides of the driving element, and a worm on the main-shaft beyond the stitch-forming mechanism geared to drive the rotary element at an angular velocity less than that of the main-shaft.

48. A sewing machine having upper and lower stitch-forming devices and step-by-step feeding mechanism, upper and lower shafts for actuating the stitch-forming devices, a pair of trimmers arranged to operate on the work from opposite sides thereof, and means for operating said trimmers, respectively, from said upper and lower shafts, said trimmers being adapted to cut the opposite free edges of lapping pieces of work.

49. In a sewing machine having stitch-forming and step-by-step feeding mechanism, a pair of trimmers arranged to operate upon the work from opposite sides thereof, each of said trimmers having a ledger-blade and a movable blade, and means for operating the movable blades from parts of the stitch-forming mechanism including rock-shafts arranged at a substantial angle to the plane in which the work travels.

50. In a sewing machine having stitch-forming and step-by-step feeding mechanism, a presser-foot, a pair of trimmers arranged to operate upon the work from opposite sides thereof, each of said trimmers having a ledger-blade and a movable blade, and means for operating the movable blades from parts of the stitch-forming mechanism including rock-shafts arranged at a substantial angle to the plane in which the work travels, one of the ledger-blades being fixed to the presser-foot.

51. In a sewing machine having stitch-forming and step-by-step feeding mechanism, a throat-plate, a pair of trimmers arranged to operate upon the work from opposite sides thereof, each of said trimmers having a ledger-blade and a movable blade, and means for operating said trimmers from parts of the stitch-forming mechanism including rock-shafts arranged at a substantial angle to the plane in which the work travels, one of the ledger-blades being fixed to the throat-plate.

52. In combination, a sewing machine having stitch-forming mechanism including a needle and work-feeding mechanism including a feed-dog, ledger-blades supported from opposite sides of the plane of the work and on opposite sides of the needle, cutting blades likewise supported and movable in planes further removed from the work than their respective cooperating ledger-blades, and means for insuring the entrance of lapped plies of material into each pair of cooperating blades.

53. In combination, a sewing machine having stitch-forming mechanism including a needle, work-feeding mechanism including a feed-dog, stationary and movable blades in pairs operatively supported from opposite sides of the work and separated laterally, each of said movable blades being operable in a plane parallel with the plane in which the work is advanced by the feed-dog, whereby in one operation a lap seam may be trimmed and stitched uniform distances from the cut edges.

54. In a machine of the class described, in combination, stitch-forming mechanism, pairs of trimming devices sustained from opposite sides of the work and on opposite sides of the stitch-forming mechanism, and work-holding mechanism including independent series of impaling pins, carriers therefor flanking the pairs of trimming devices, and positive means for moving the carriers in the direction of feed, said positive means including a one-way driving connection for permitting manual movement of the carriers in the direction of feed while the stitch-forming mechanism is at rest.

55. In a device of the class described, in combination, stitch-forming mechanism including a needle, work-feeding mechanism, and trimming mechanism, the latter including spaced pairs of cooperating shear blades operating in substantially horizontal planes, said blades being adapted to cut the opposite free edges of lapping pieces of work.

56. In combination, a sewing machine having stitch-forming mechanism and step-by-step work feeding mechanism, an endless series of impaling pins movable in a plane transverse the plane of feed, means acting independently of the work for advancing said pins, and means for simultaneously severing the margins of lapped plies of material whereby in one operation any lengths of fabric may be cut and lap-seamed together with their margins a uniform distance from the securing stitches.

In testimony whereof, I have signed my name to this specification.

ALBERT H. DE VOE.