1,616,714

Feb. 8, 1927.

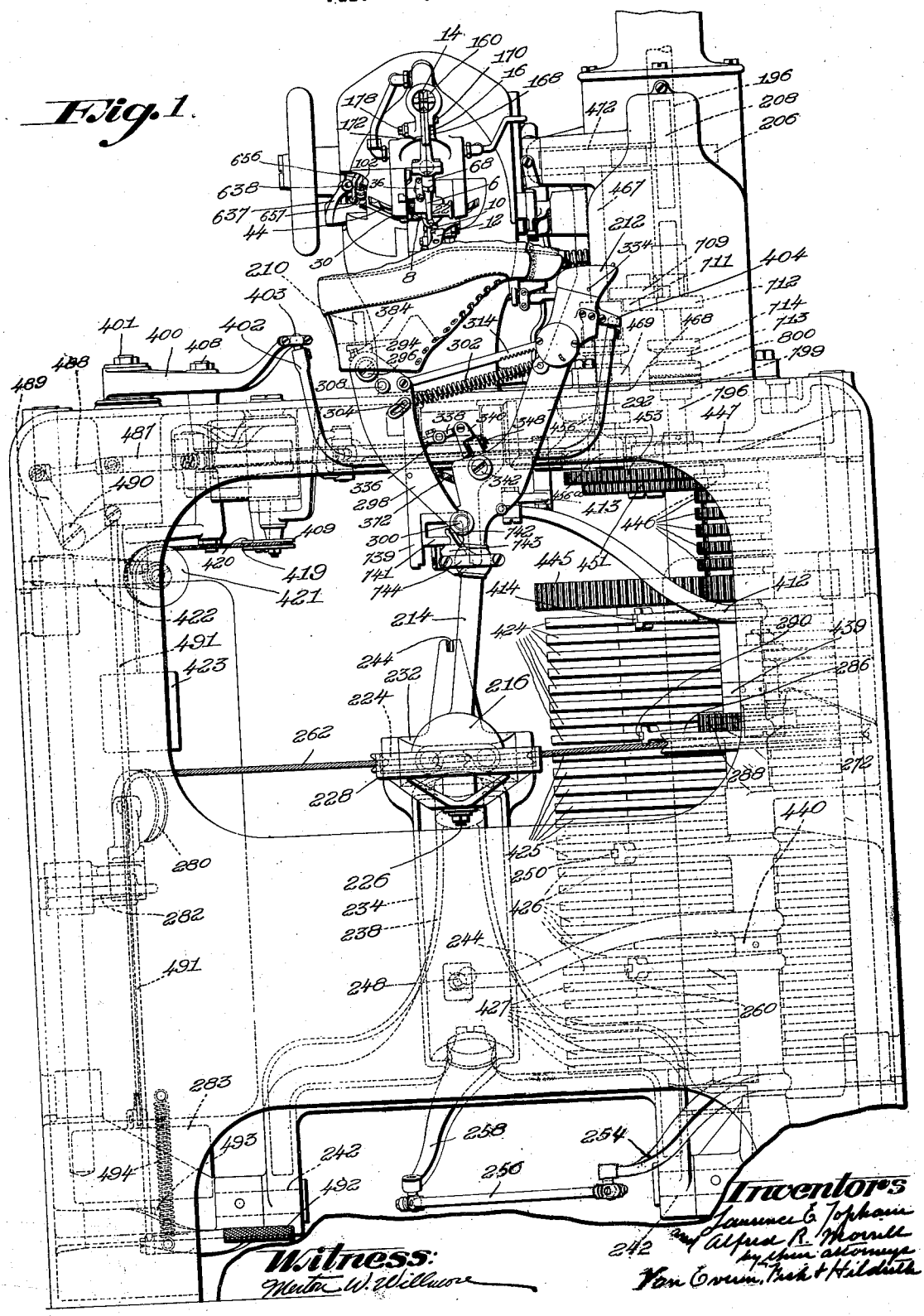
L. E. TOPHAM ET AL

SHOE MACHINE

Filed July 21. 1919

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Fig. 1.



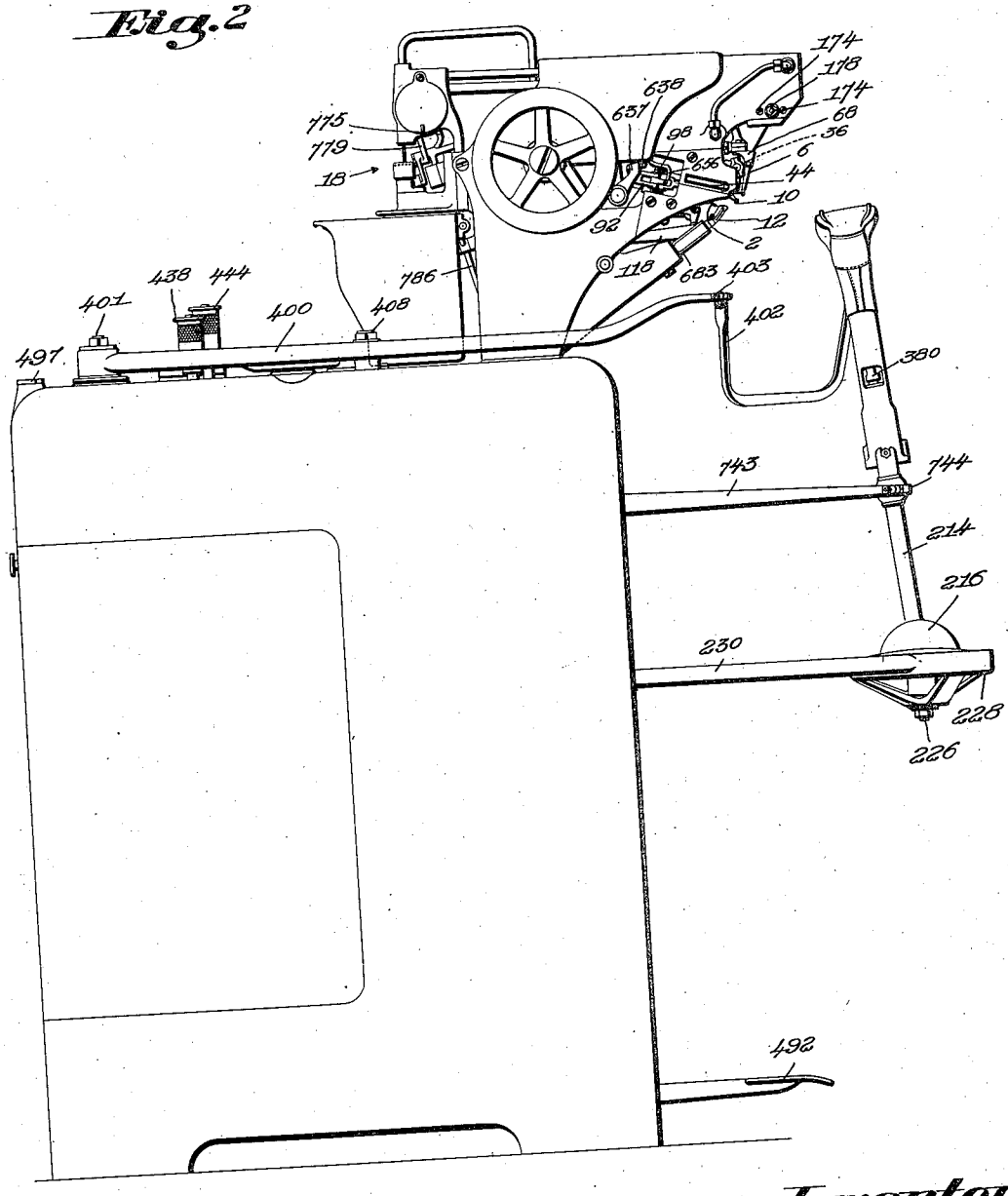
1,616,714

Feb. 8, 1927. L. E. TOPHAM ET AL

SHOE MACHINE

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Fig. 2



Witness

Frederick S. Gruman

Inventors

Laurence E. Topham

and Alfred R. Morrill

by their attorneys

Van Everen Fish & Hildreth

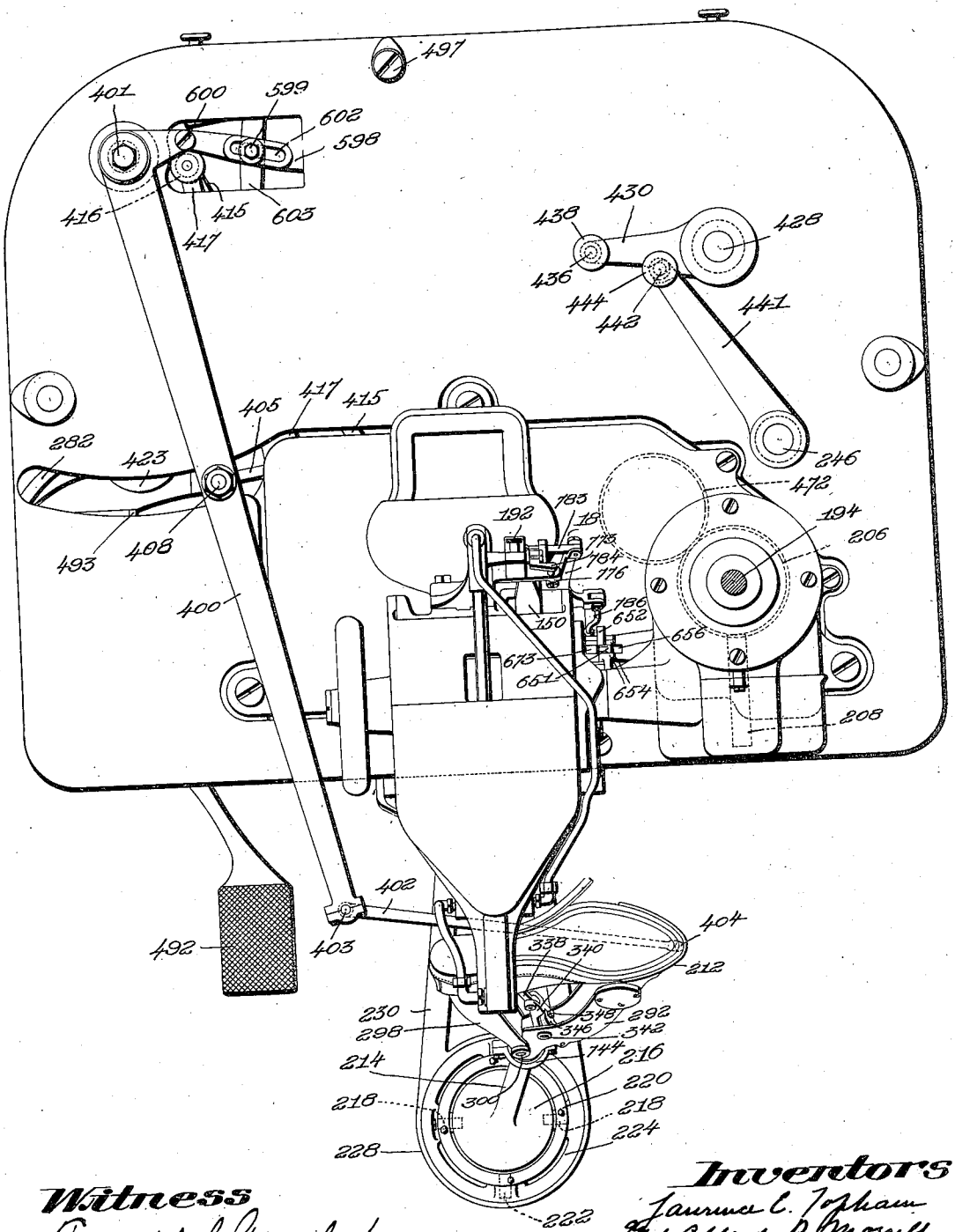
1,616,714

Feb. 8, 1927. L. E. TOPHAM ET AL

SHOE MACHINE

Filed July 21. 1919 34 Sheets-Sheet 3

Fig. 3



Witness

Frederick S. Greenleaf.

Inventors

Laurence E. Topham

Alfred R. Morrill

by their attorneys

Van Everen, Fish & Hildreth

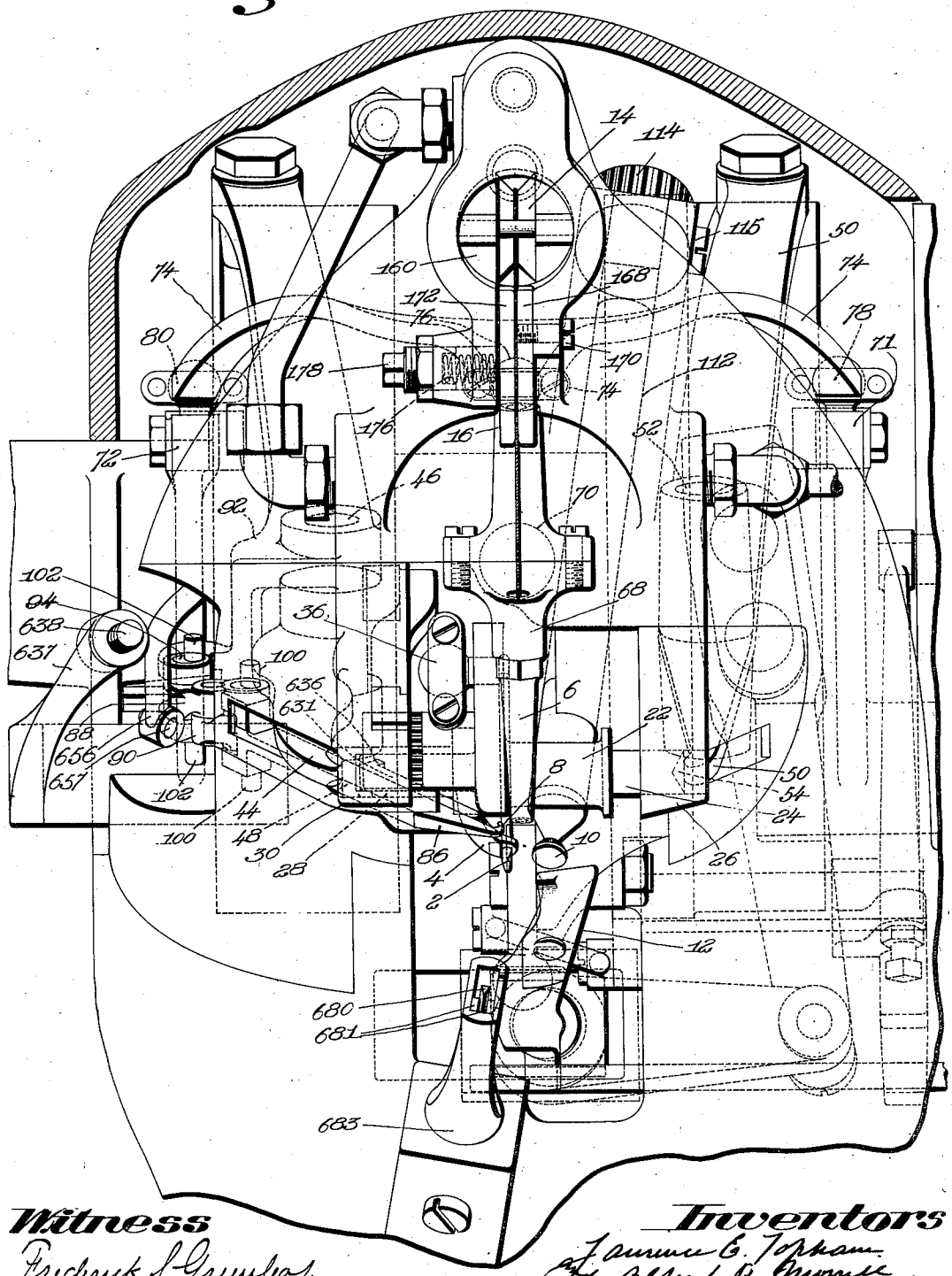
Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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Fig. 4



Witness

Frederick S. Grundy.

Inventors

James E. Topham

& Alfred R. Thomas

by their attorneys

Van Gorden, Park & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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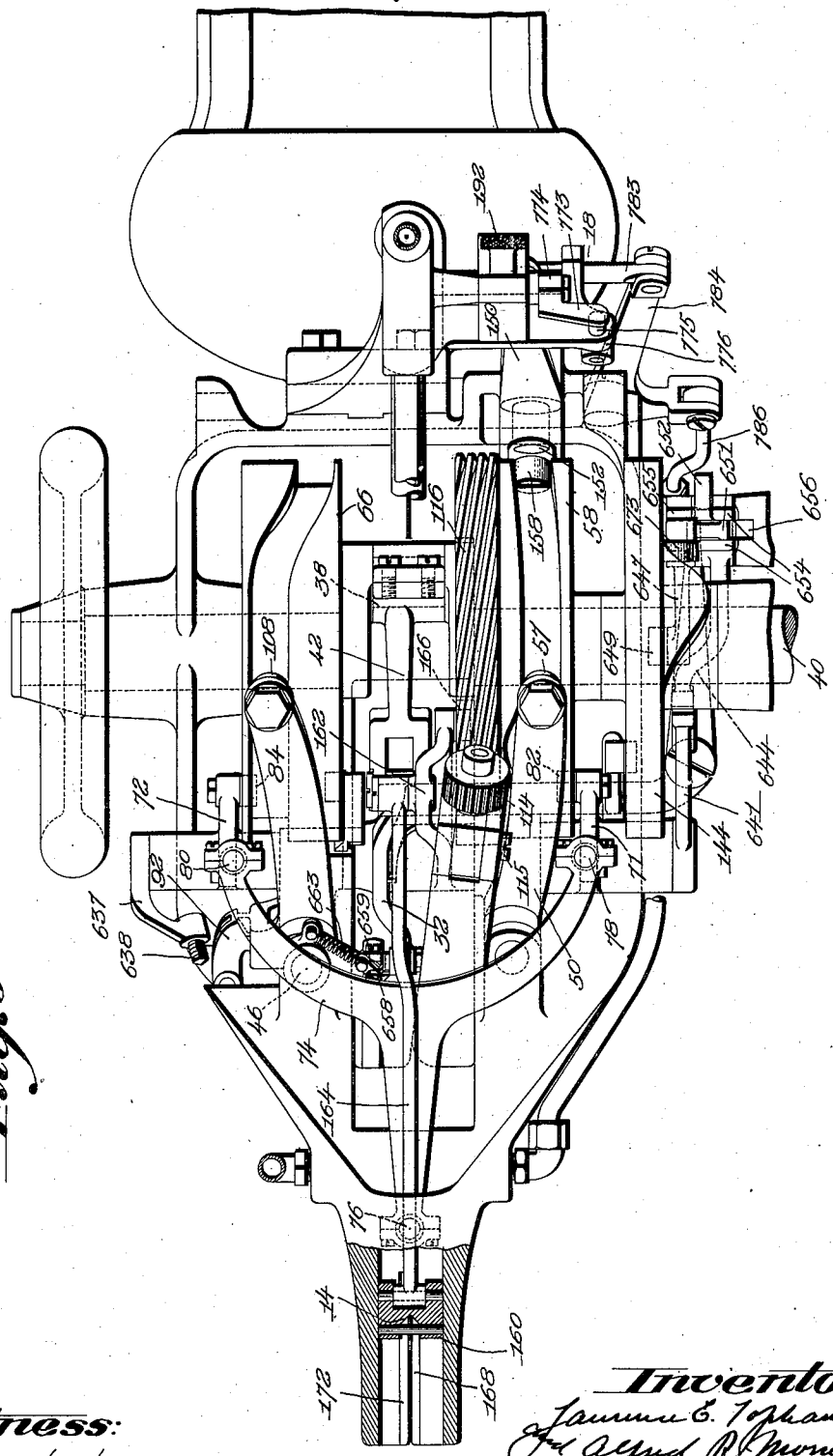


Fig. 5

Witness:
Merton W. Willmore

Inventors
Laurence E. Topham
Fred Alfred R. Morrill
by their attorneys
Van Everen, Fish & Helmuth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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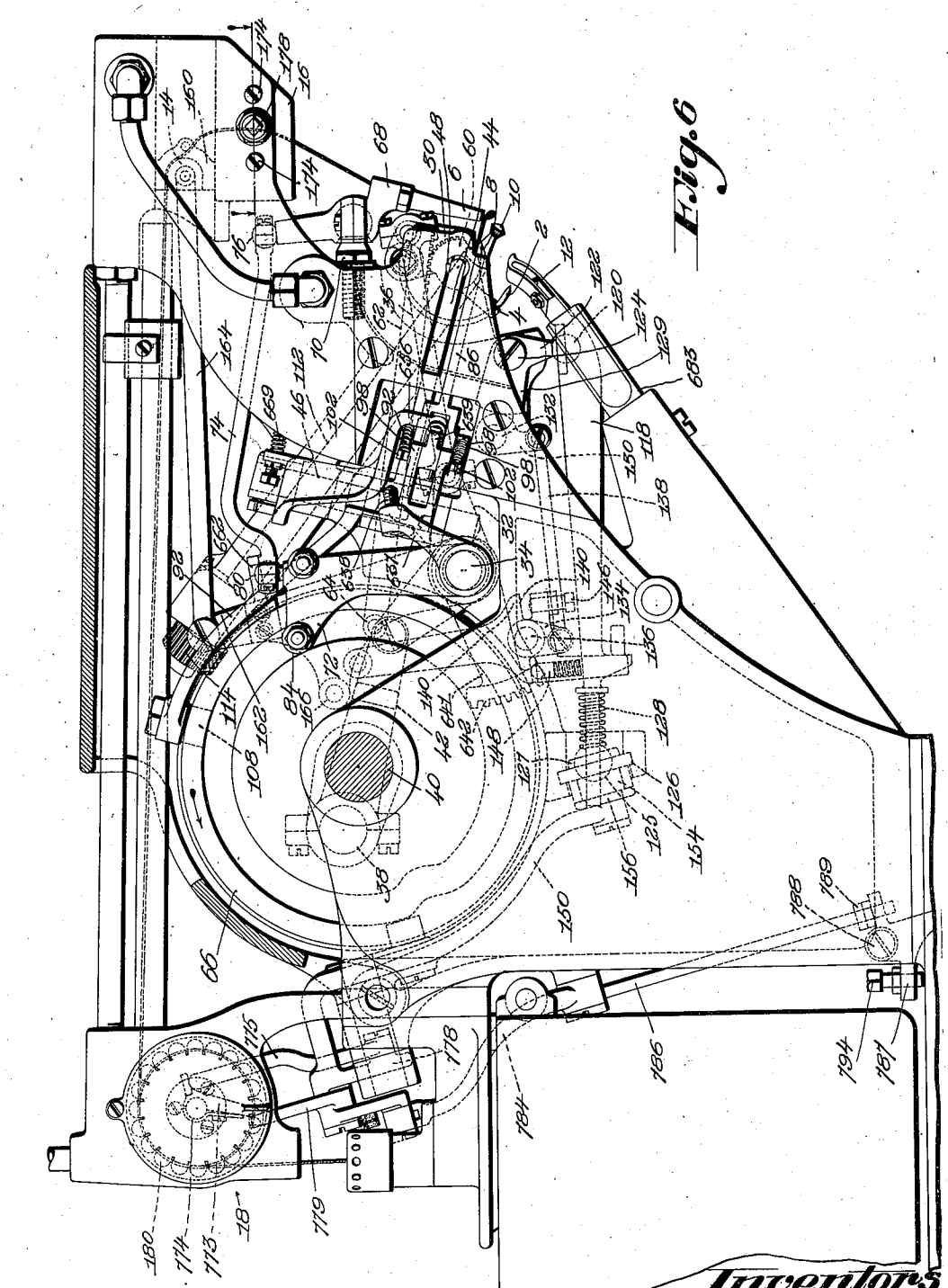


Fig. 6

Witness:
Merton W. Williamson

Inventors
Laurence E. Topham
and Alfred R. Merrill
by their attorneys
Van Everen, Fisk & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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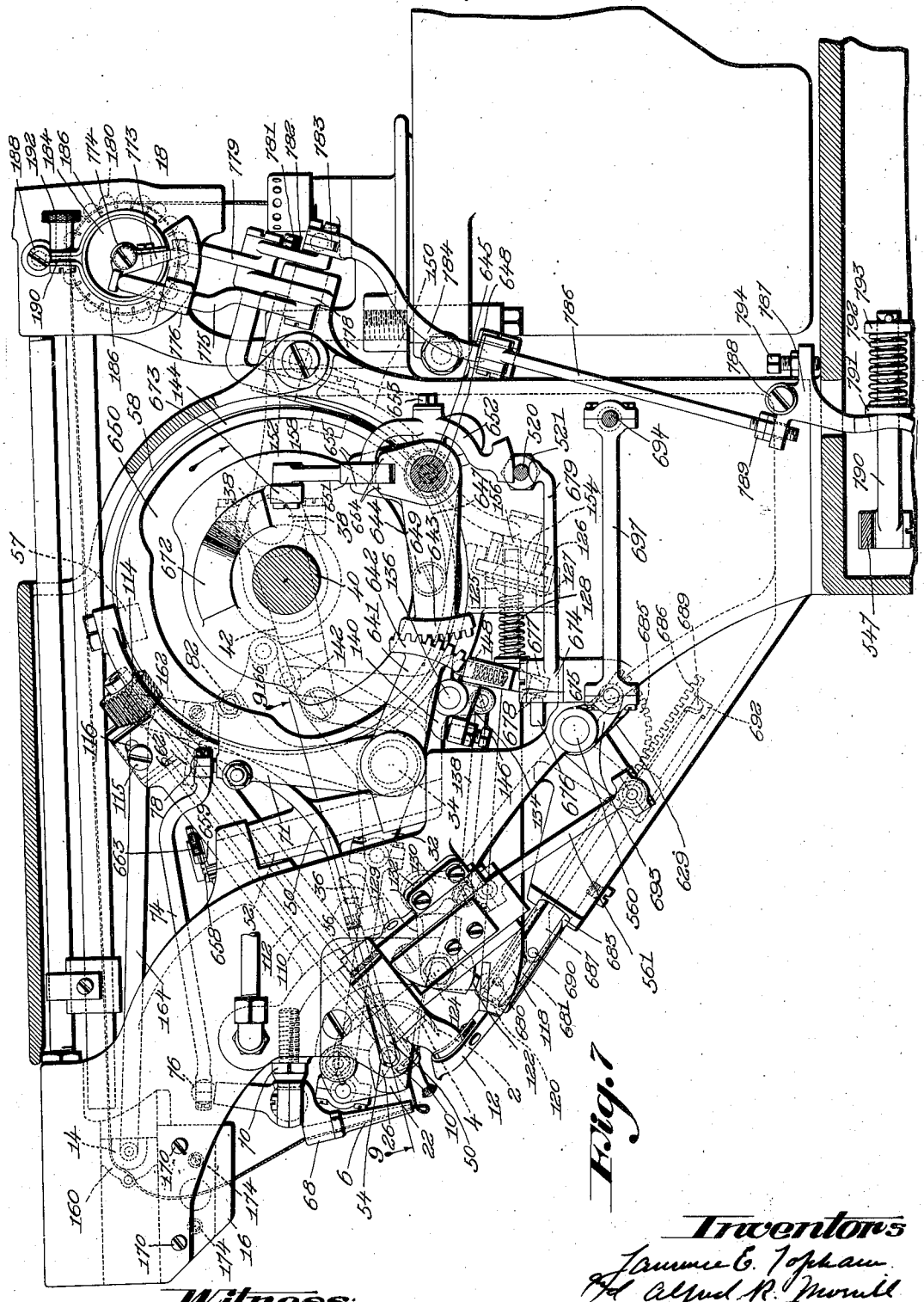


Fig. 7

Witness:
Marian W. Willmore

Inventors
Laurence E. Topham
and Alfred R. Morrill
by their attorneys
Van Everen, Fish & Haldane

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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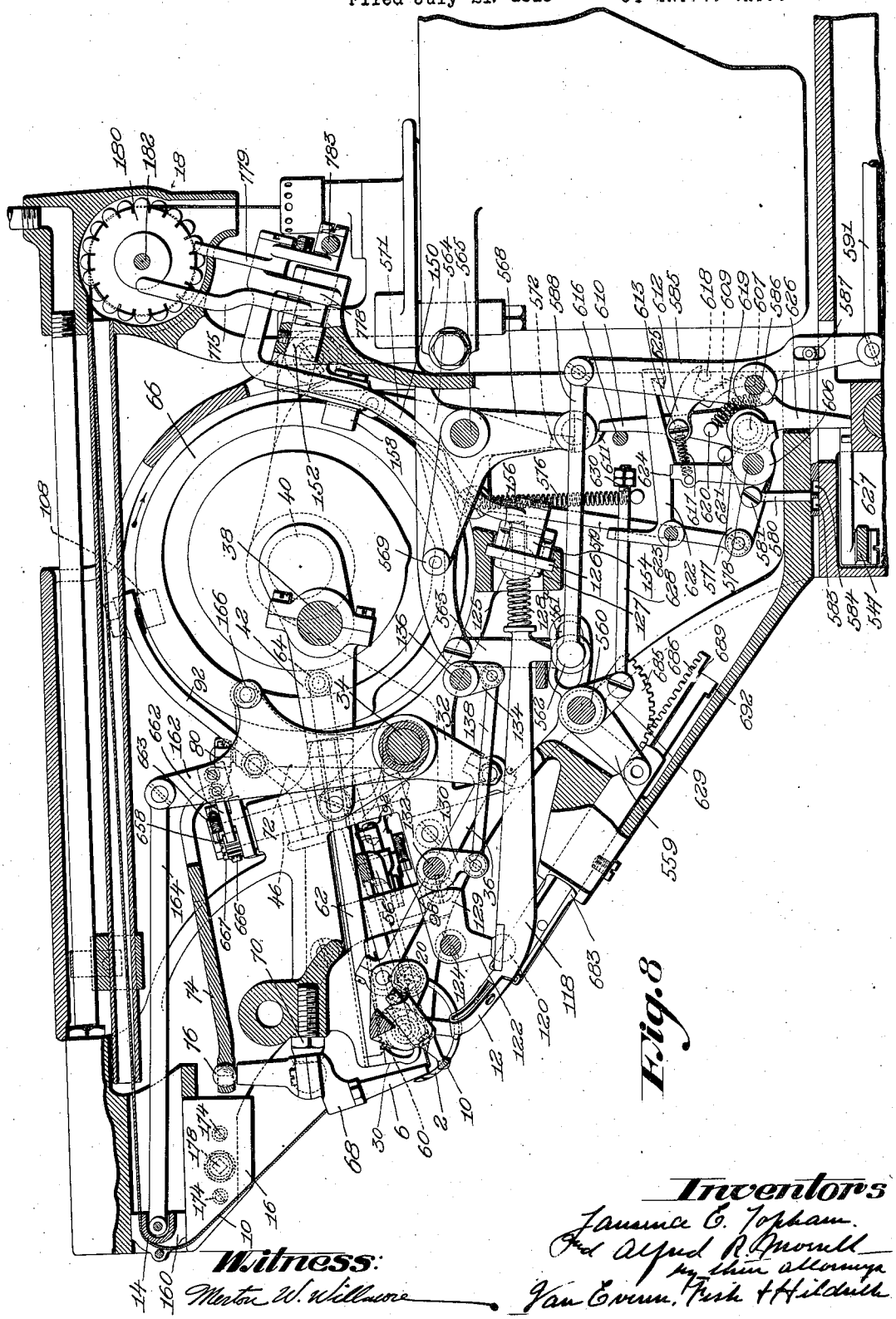


Fig. 8

Witness:
Merton W. Willmore

Inventors
Laurence E. Topham.
and Alfred R. Brownell
by their attorneys
Van Everen, Fish & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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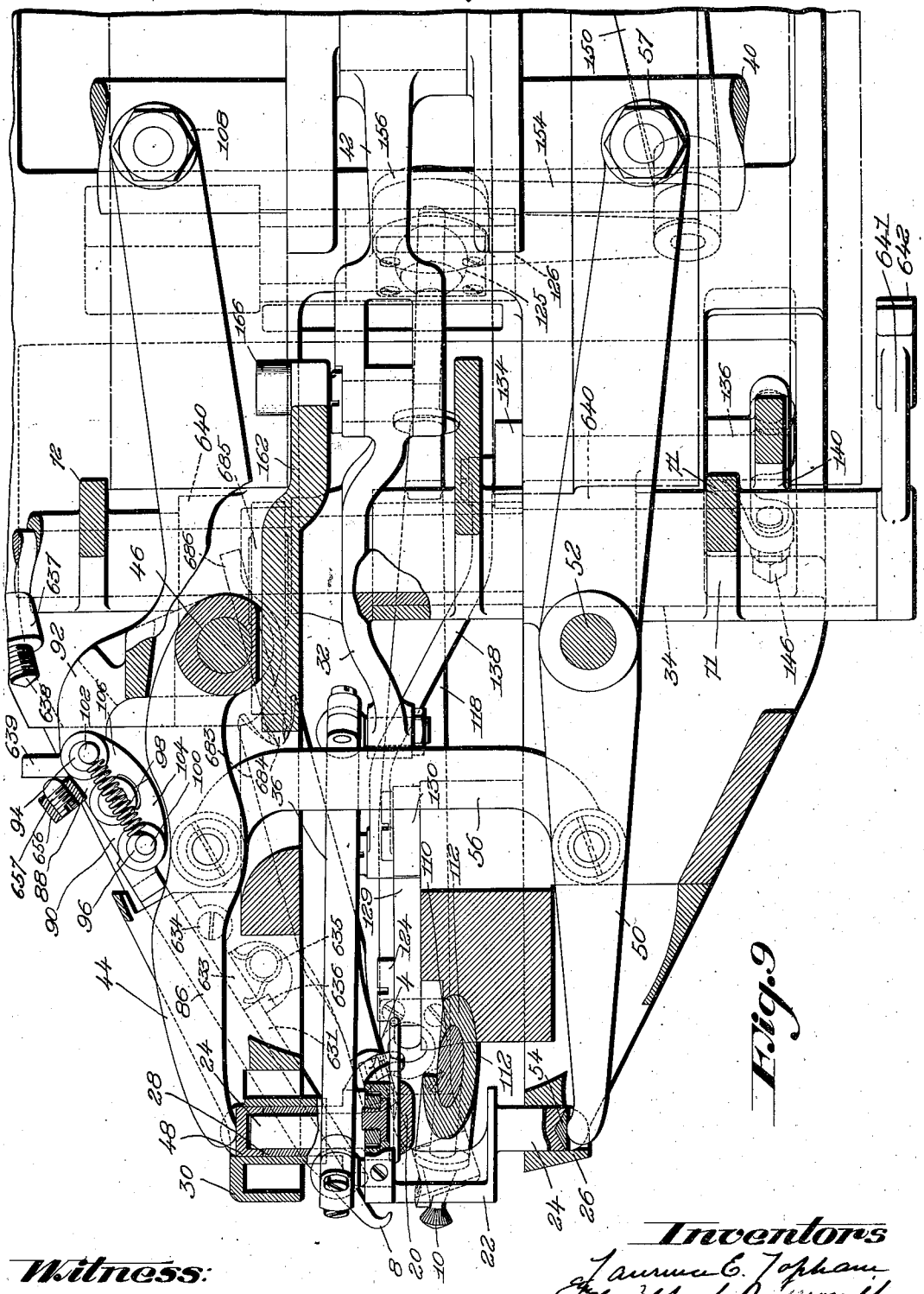


Fig. 9

Witness:
Mertie A. Williams

Inventors
Laurence E. Topham
and Alfred R. Purnell
by their Attorneys
Van Everen, Fish & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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Fig. 10

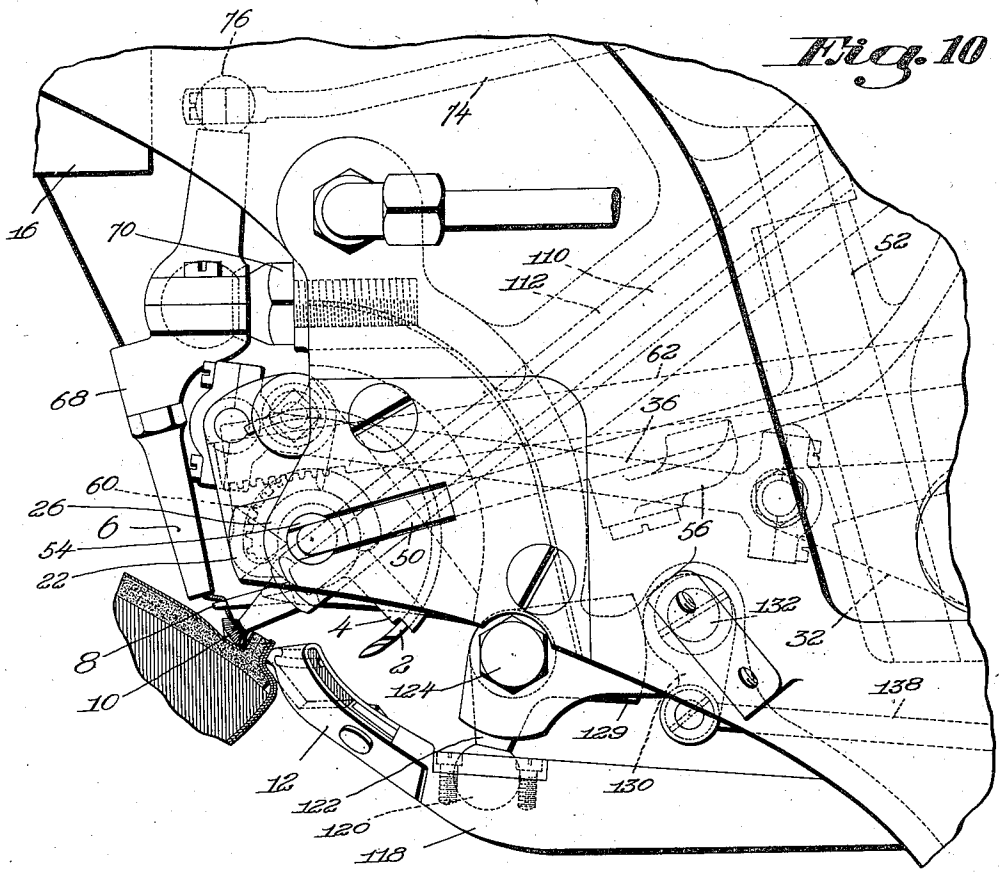
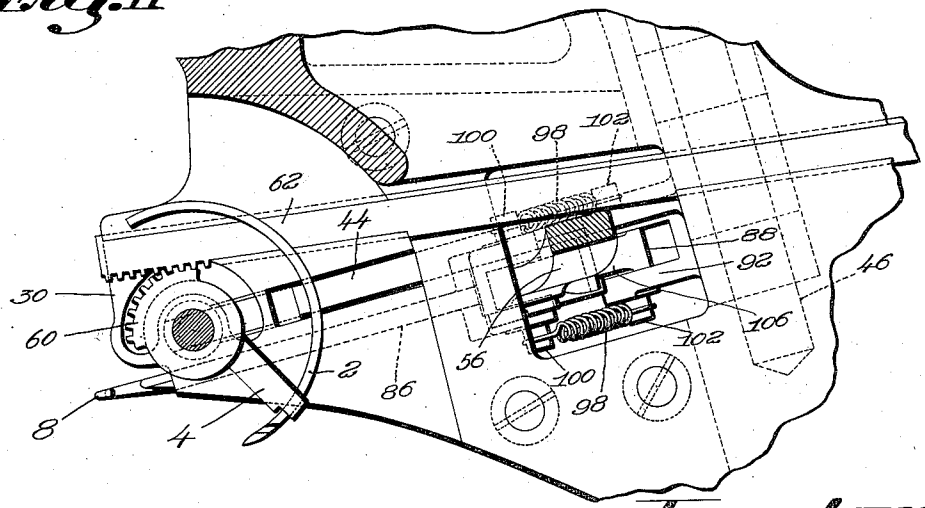


Fig. 11



Witness

Fredrick S. Grunbaum.

Inventors

Laurence E. Topham.

Alfred R. Merrill

by their attorneys

Van Everen, Fish & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

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Fig. 12

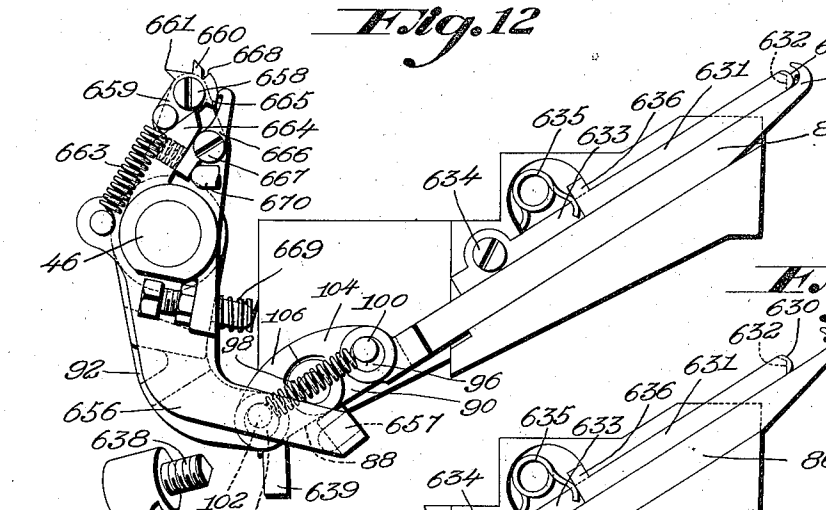


Fig. 13

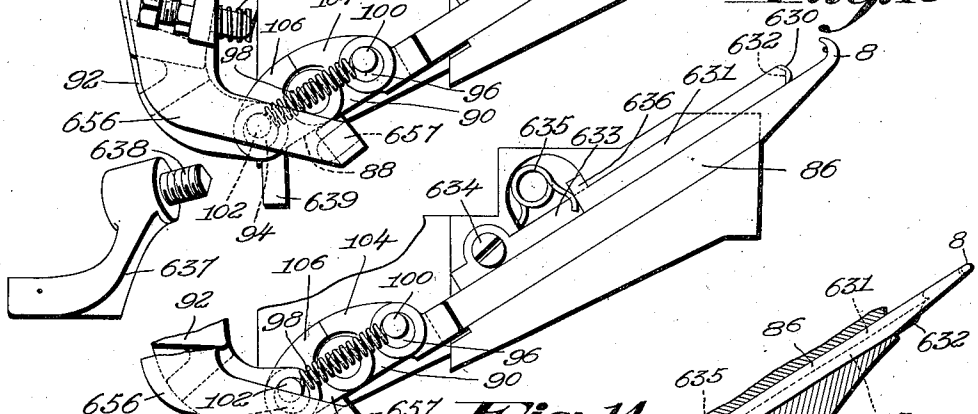


Fig. 14

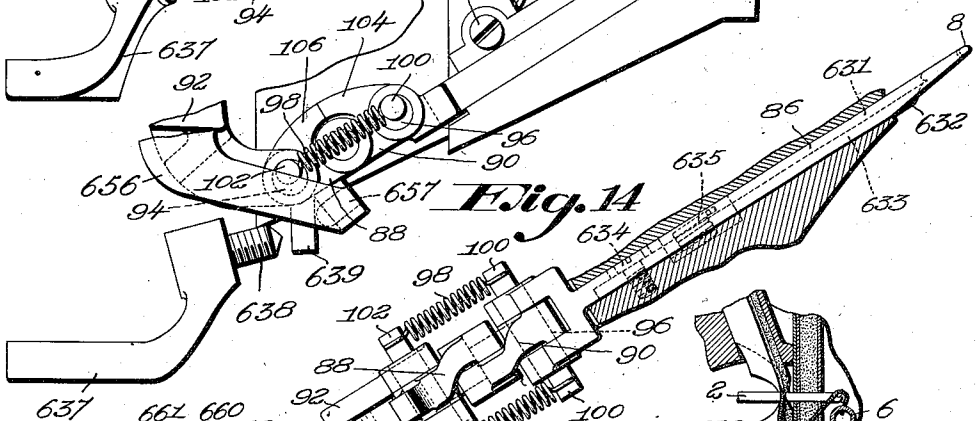


Fig. 15

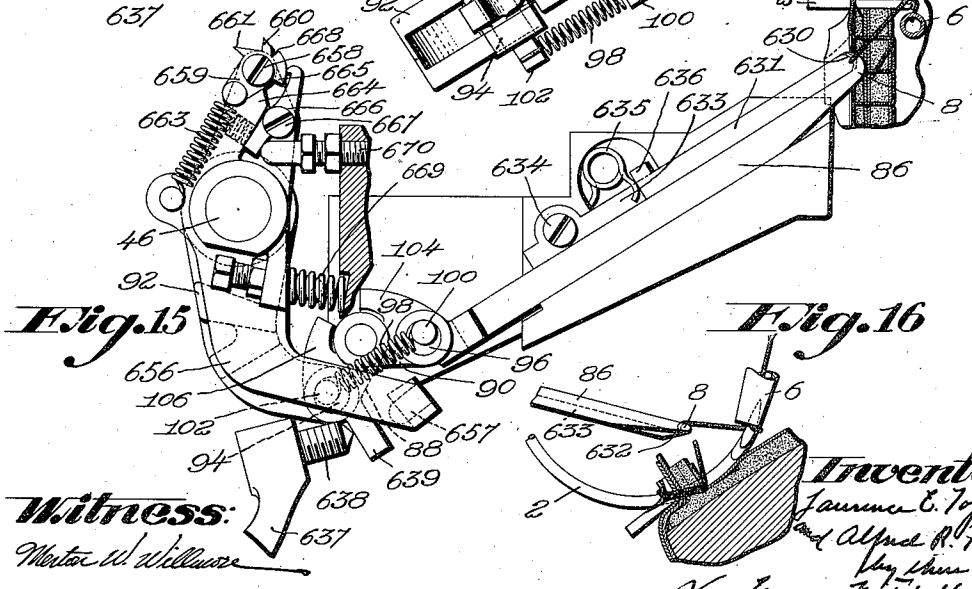


Fig. 16

Witness:
Merton W. Williams

Inventors
James E. Topham
and Alfred R. Morrill
by their attorneys
Van Orman, Fish & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

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Fig. 17

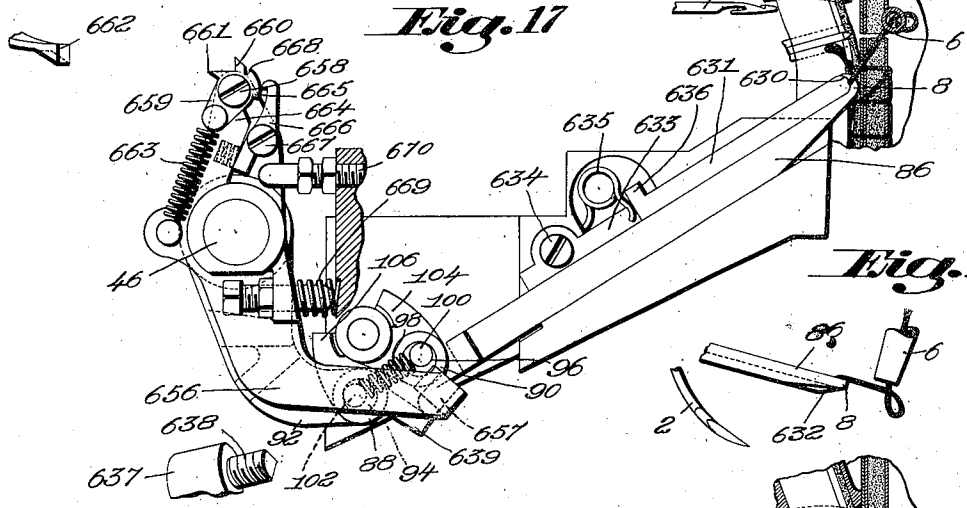


Fig. 18

Fig. 19

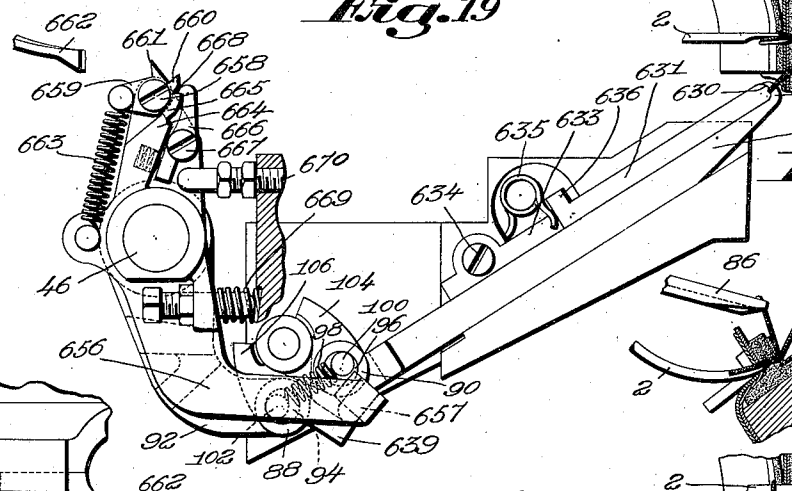


Fig. 20

Fig. 21

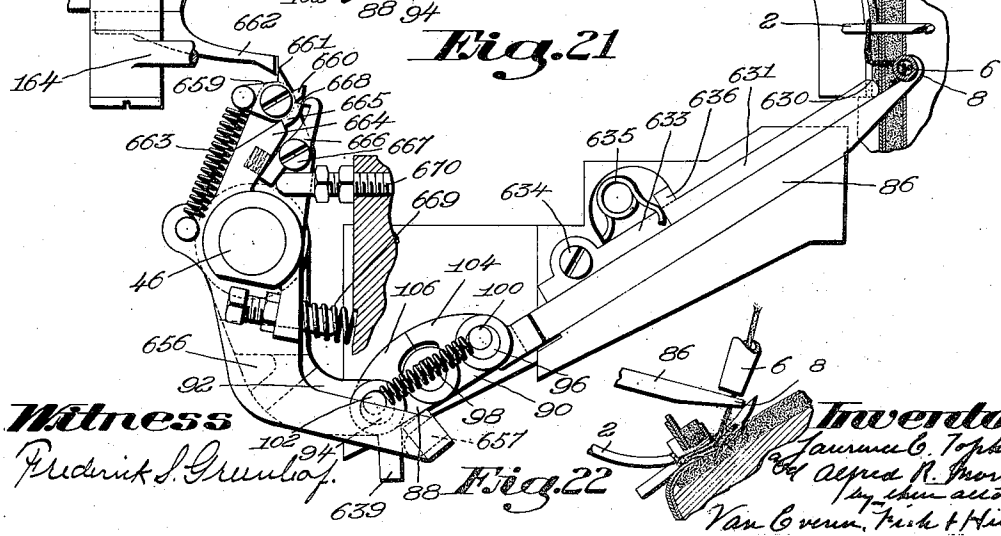


Fig. 22

Witness

Frederick S. Grundy

Inventors

Laurence E. Topham

Alfred R. Morrill

by their attorneys

Van Everen, Frick & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

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Fig. 37

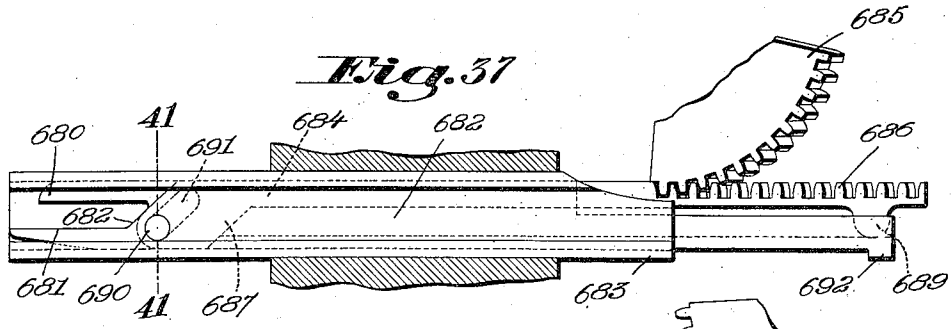


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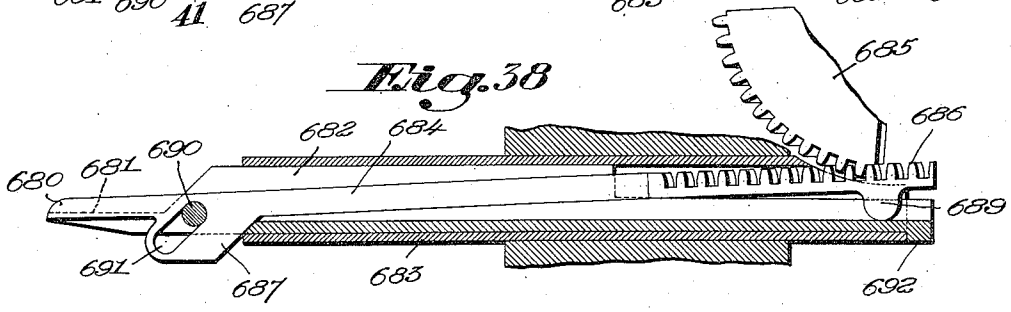


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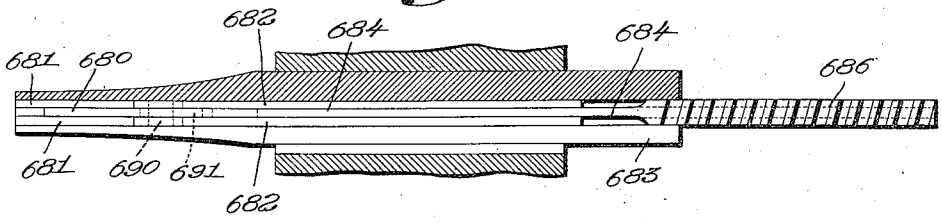


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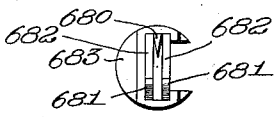


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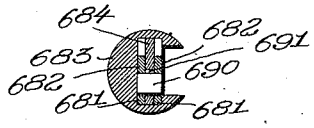


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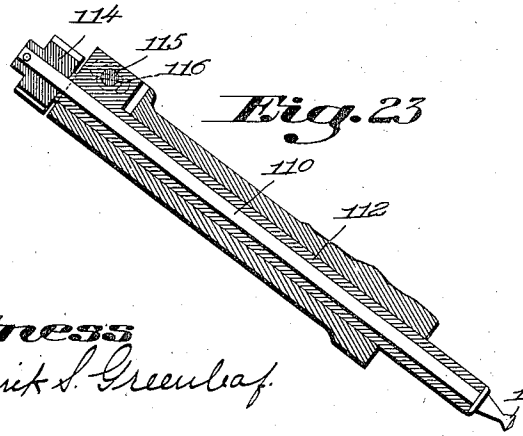
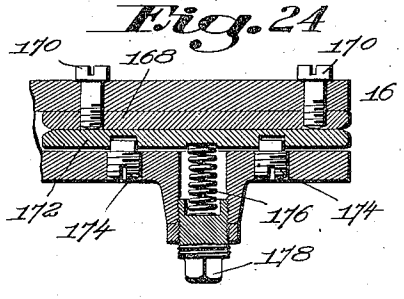


Fig. 24



Witness
Frederick L. Greenleaf.

Inventors
James E. Topham
and Alfred R. Merrill
by their attorneys
Van Emmon, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 26

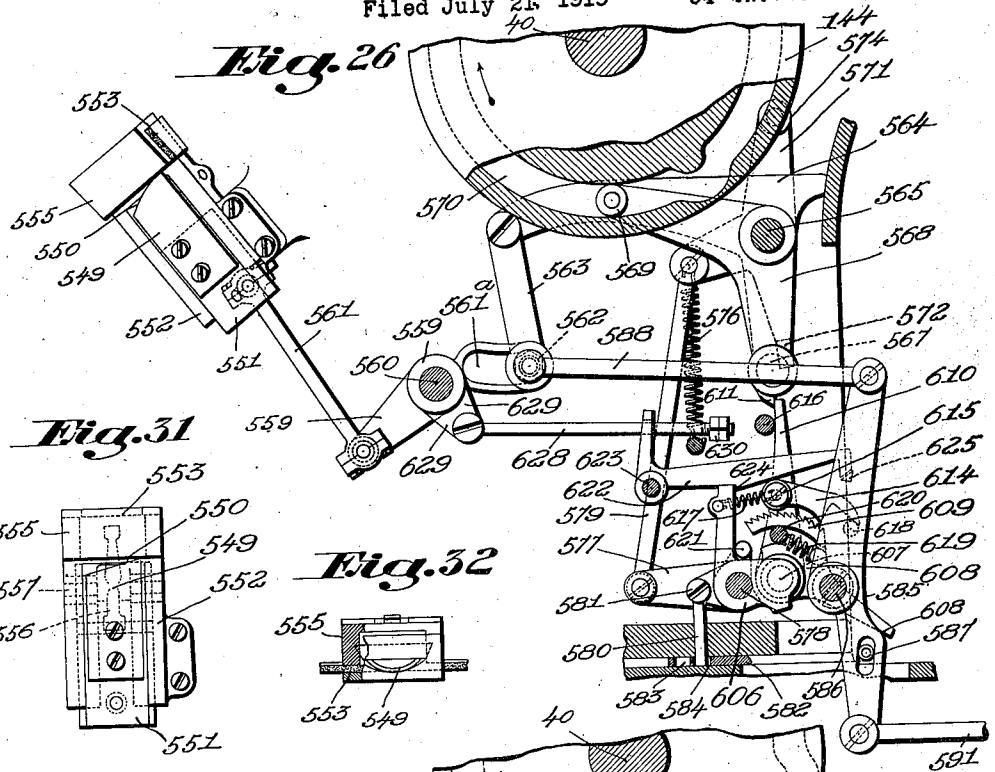


Fig. 31

Fig. 32

Fig. 25

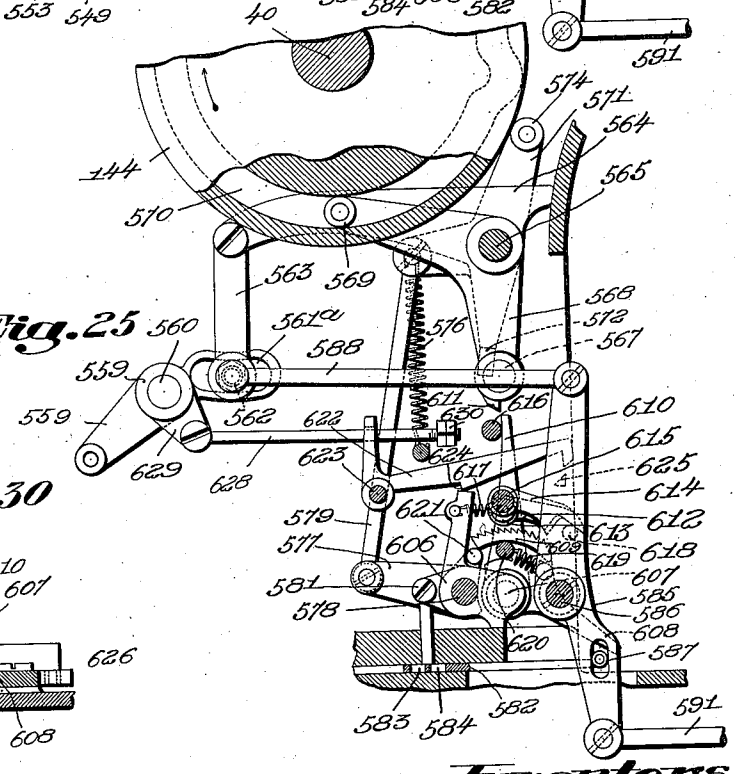
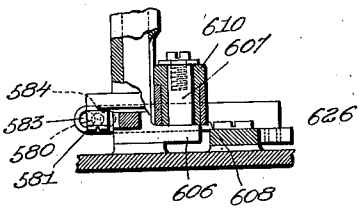


Fig. 30



Witness
Frederick S. Grunsfeld

Inventors
James E. Topham
and Alfred R. Thornhill
by their attorneys
Van Cleve, Pike & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 27

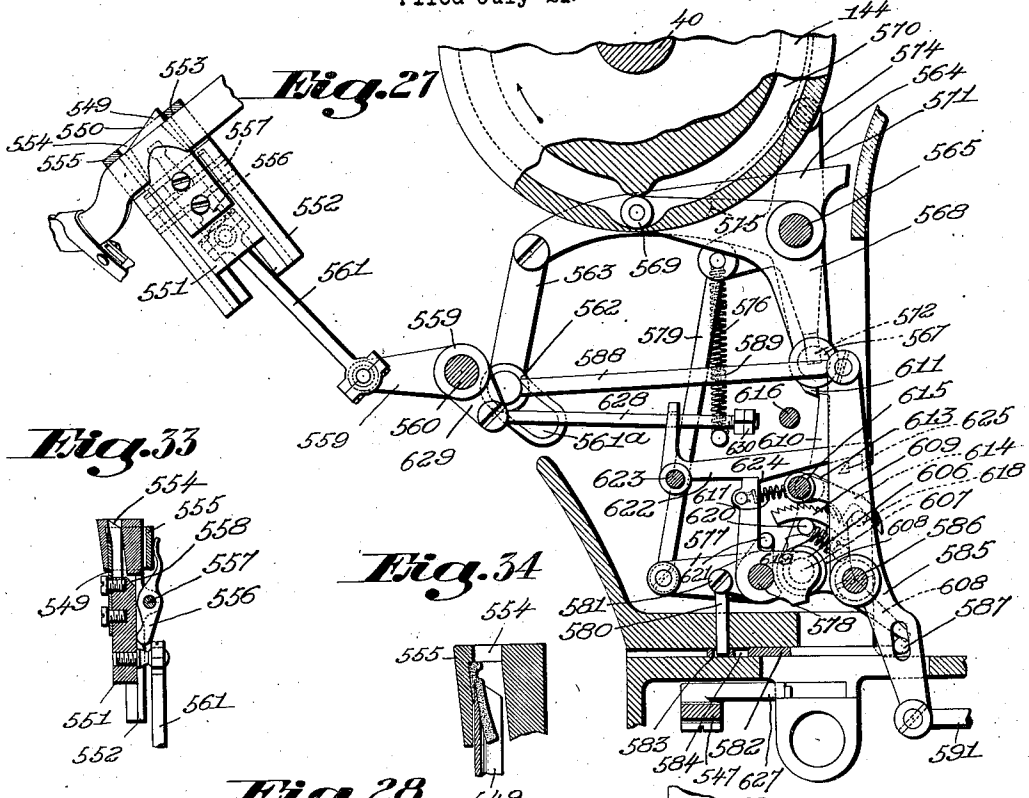


Fig. 33

Fig. 34

Fig. 28

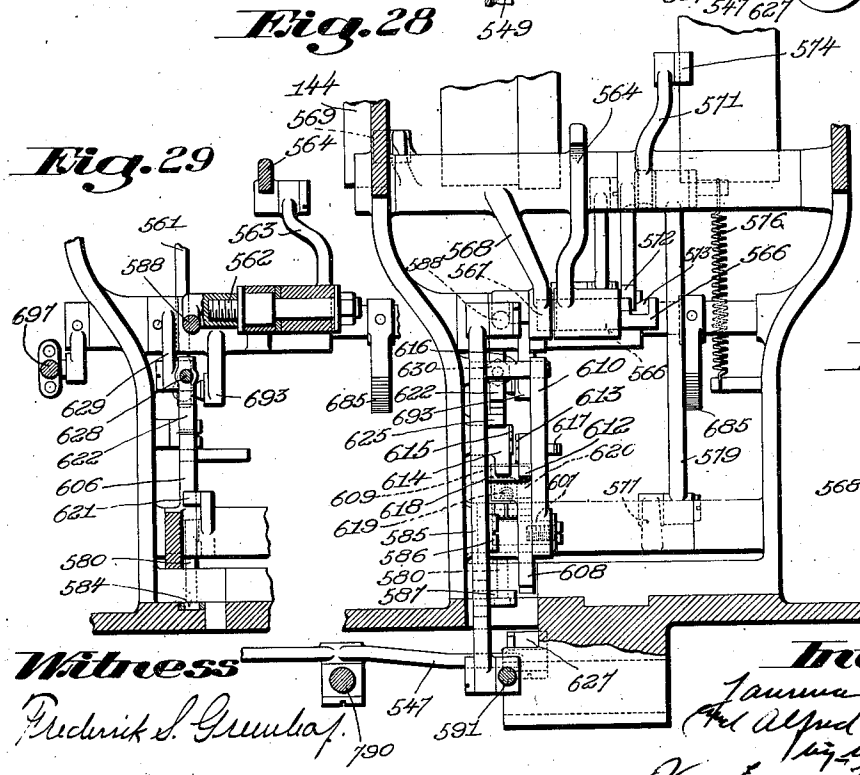
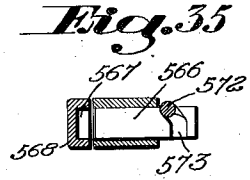


Fig. 29

Fig. 35



Witness

Frederick S. Greenleaf

Inventors

James E. Topham

Alfred R. Burrill

by their attorneys

Van Everen, Fish & Fish

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 65

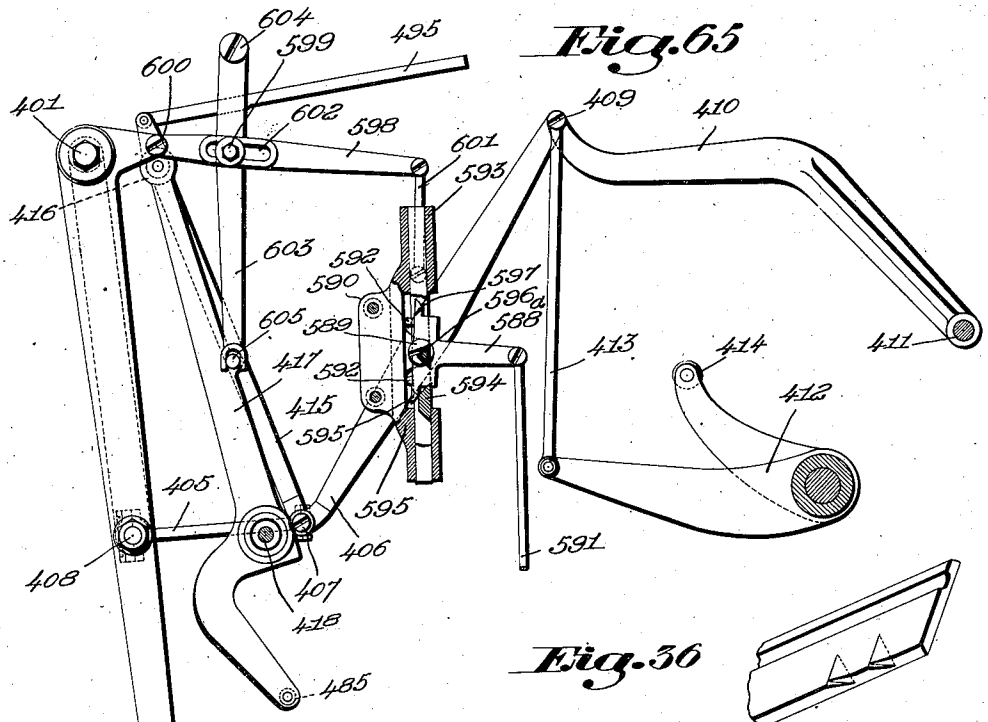


Fig. 36

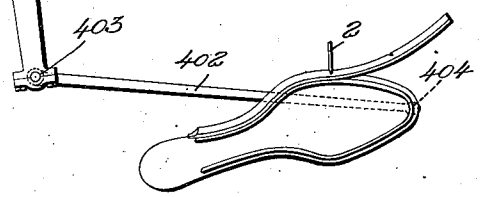


Fig. 68

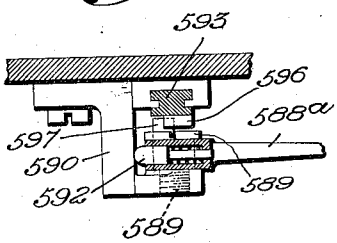
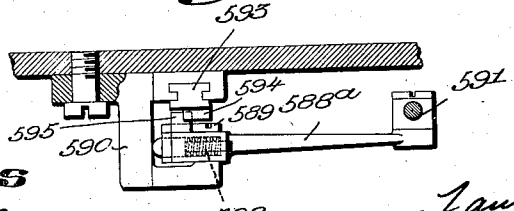


Fig. 67



Witness

Frederick S. Greenleaf

Inventors

James E. Topham

Alfred R. Howell

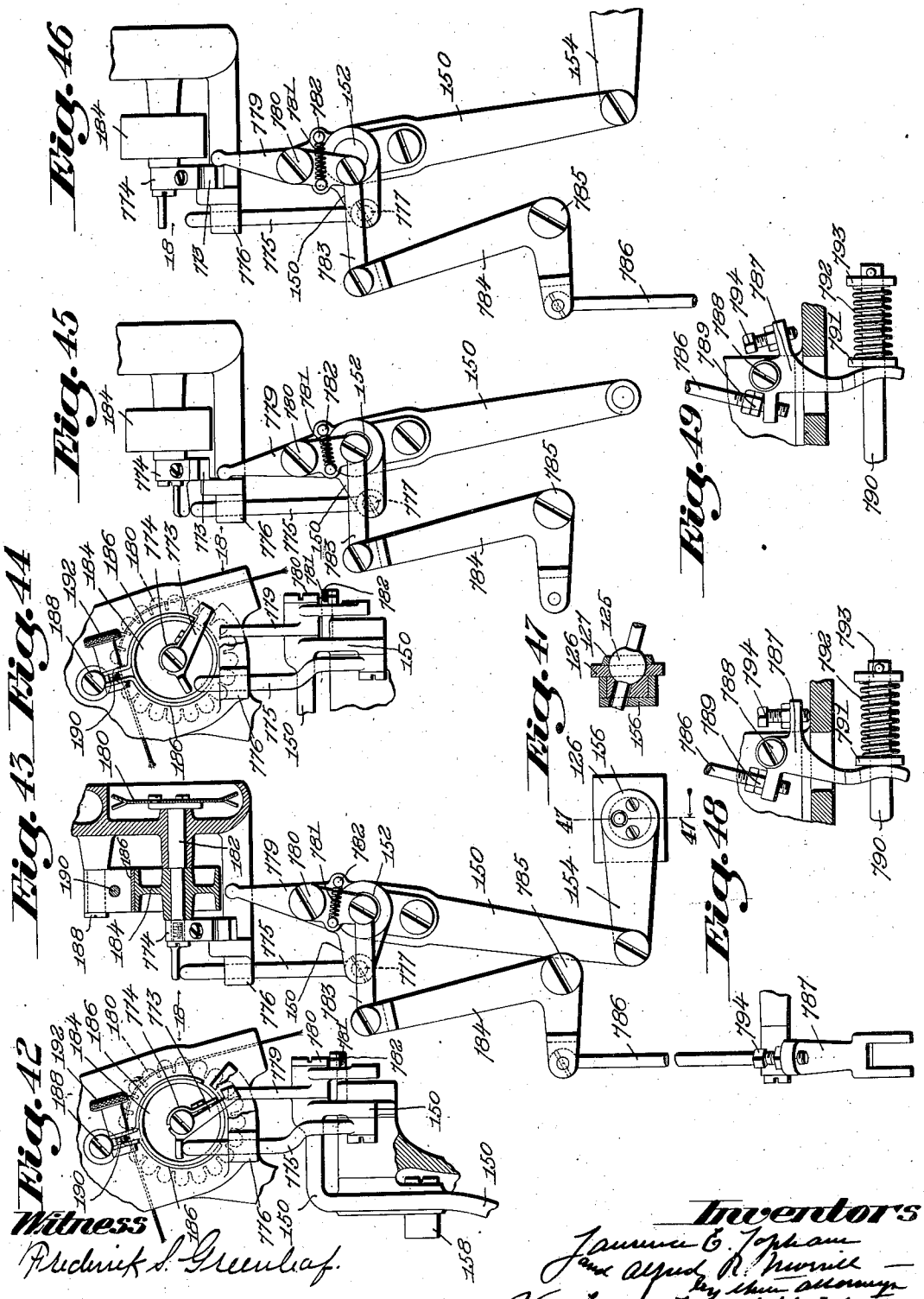
by their attorneys

Van Everen, Fisk & Hilbruch

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Witness
Frederick S. Greenleaf.

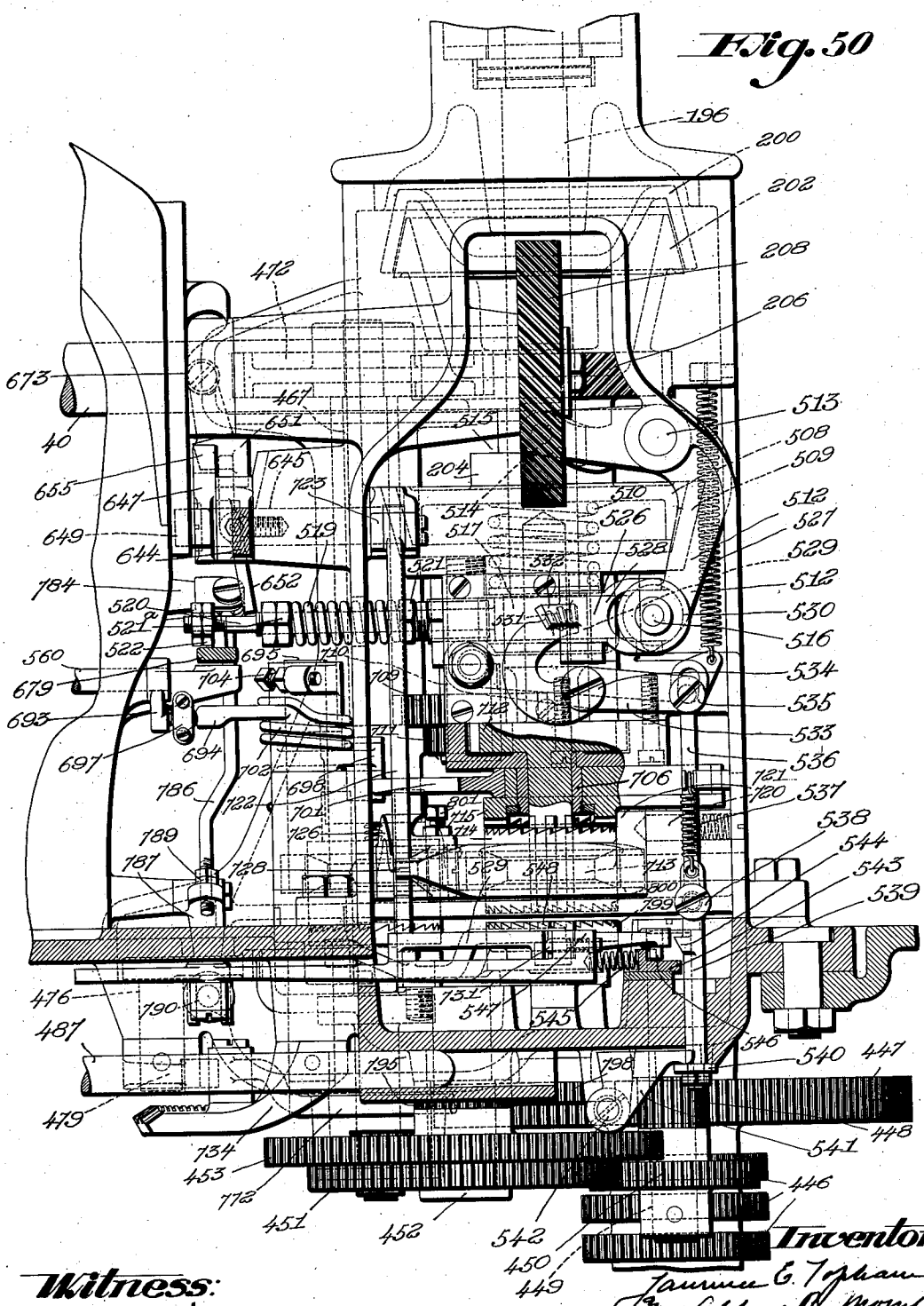
Inventors
James E. Topham
and Alfred R. Merrill
by their attorneys
Van Everen, Fitch & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE.

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Fig. 50



Witness:
Mentor W. Williamson

Inventors
Laurence E. Topham
and Alfred R. Morrill
by their Attorneys
Van Everen, Fish & Holdrich

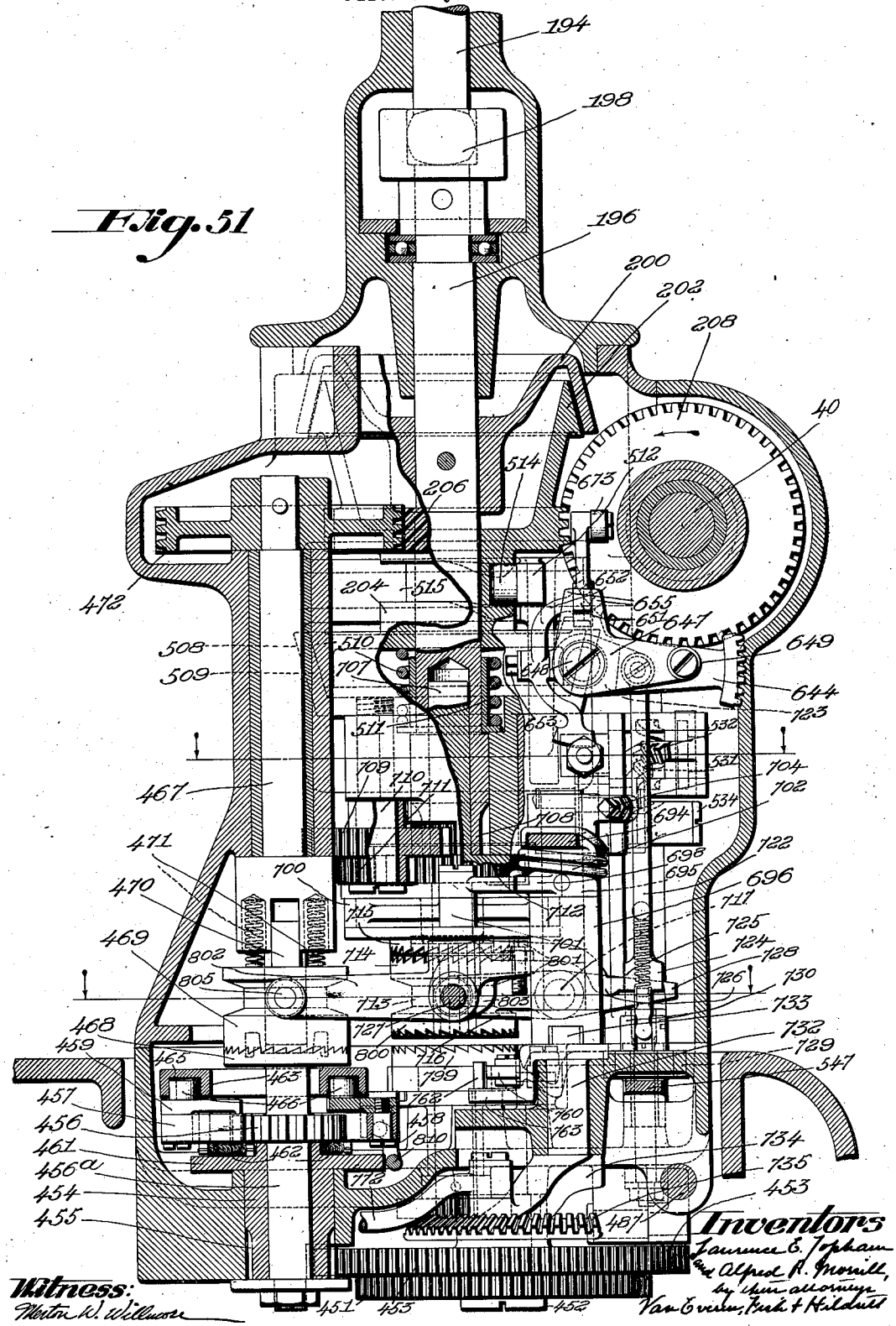
Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE.

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Fig. 51



Witness:
Morton W. Williams

Inventors
Laurence E. Topham
and Alfred R. Mowill,
by their attorneys
Van Everen, Fuch & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 77

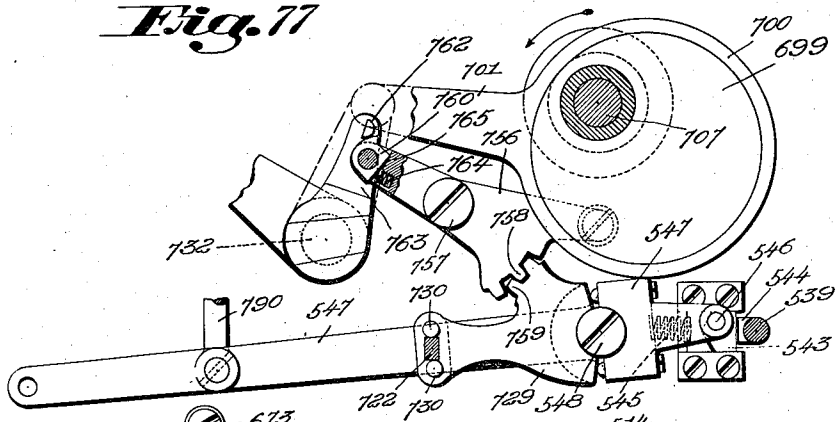


Fig. 52

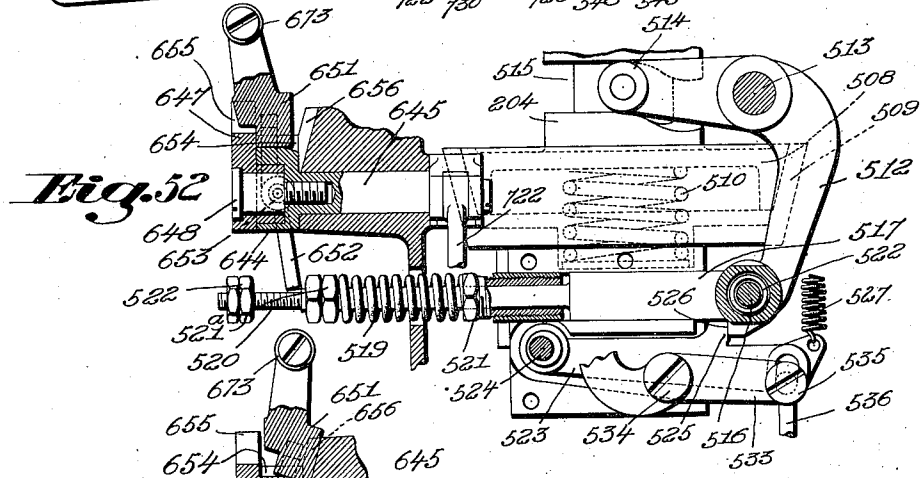


Fig. 53

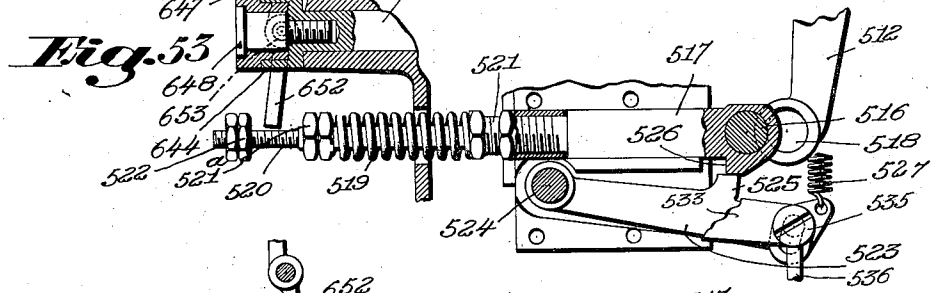
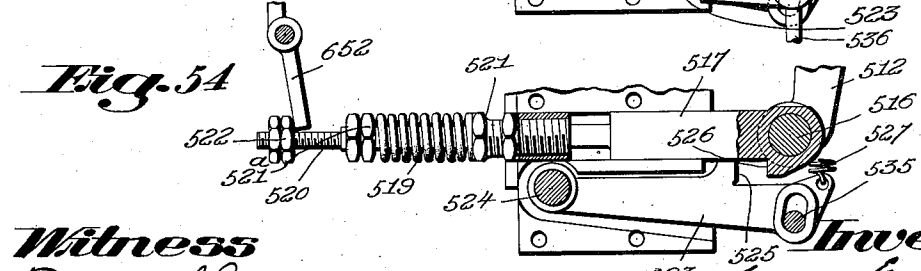


Fig. 54



Witness

Frederick S. Greenleaf

Inventors

James E. Topham

Fred Alfred R. Morrill

by their attorneys

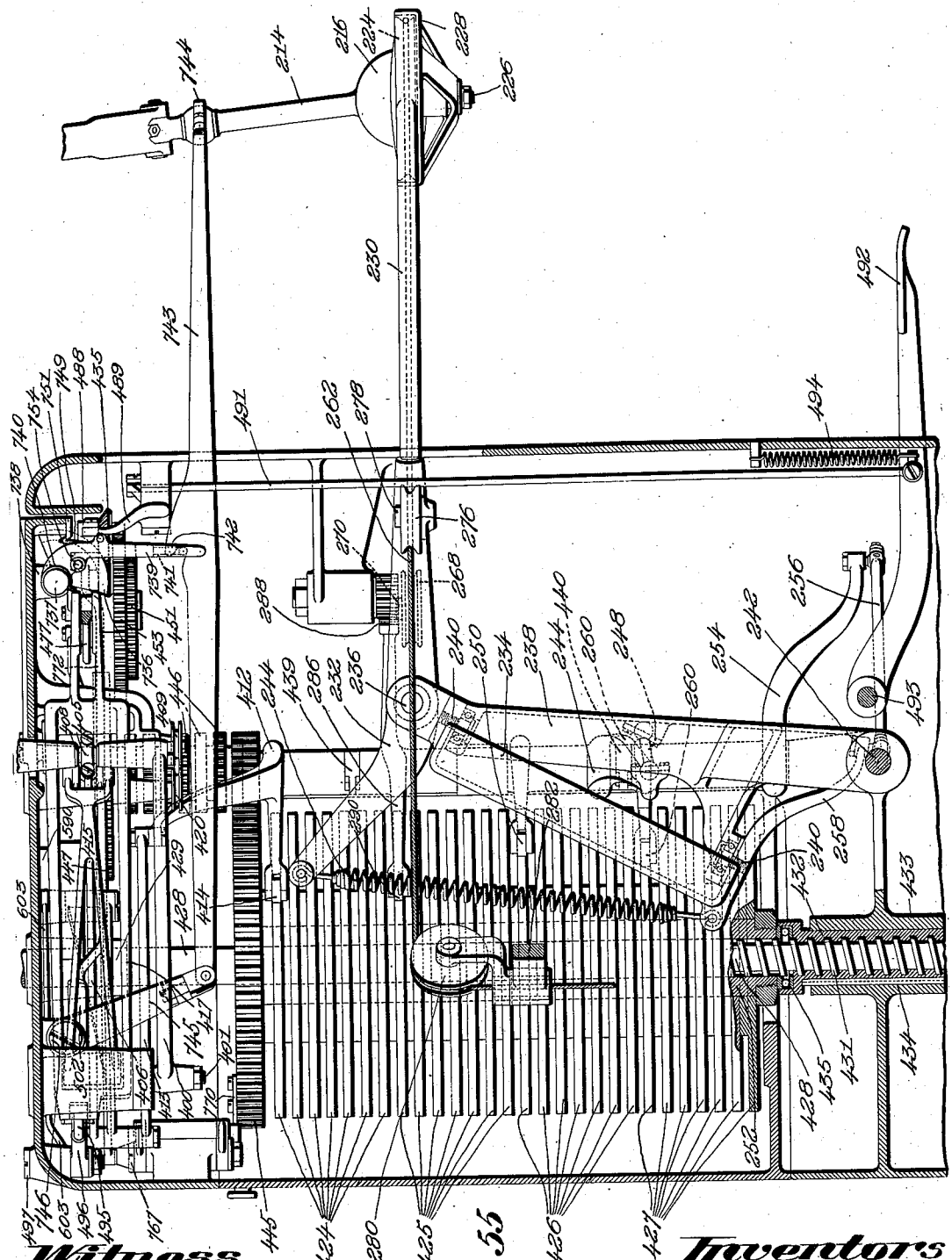
Van Everen, Fisk & Hildreth

Feb. 8, 1927. 1,616,714

L. E. TOPHAM ET AL

SHOE MACHINE

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Witness
Frederick S. Greenleaf.

Fig. 55

Inventors
Laurence E. Topham
and Alfred R. Bromell
by their attorneys
Van Emon, Fish & Holcomb

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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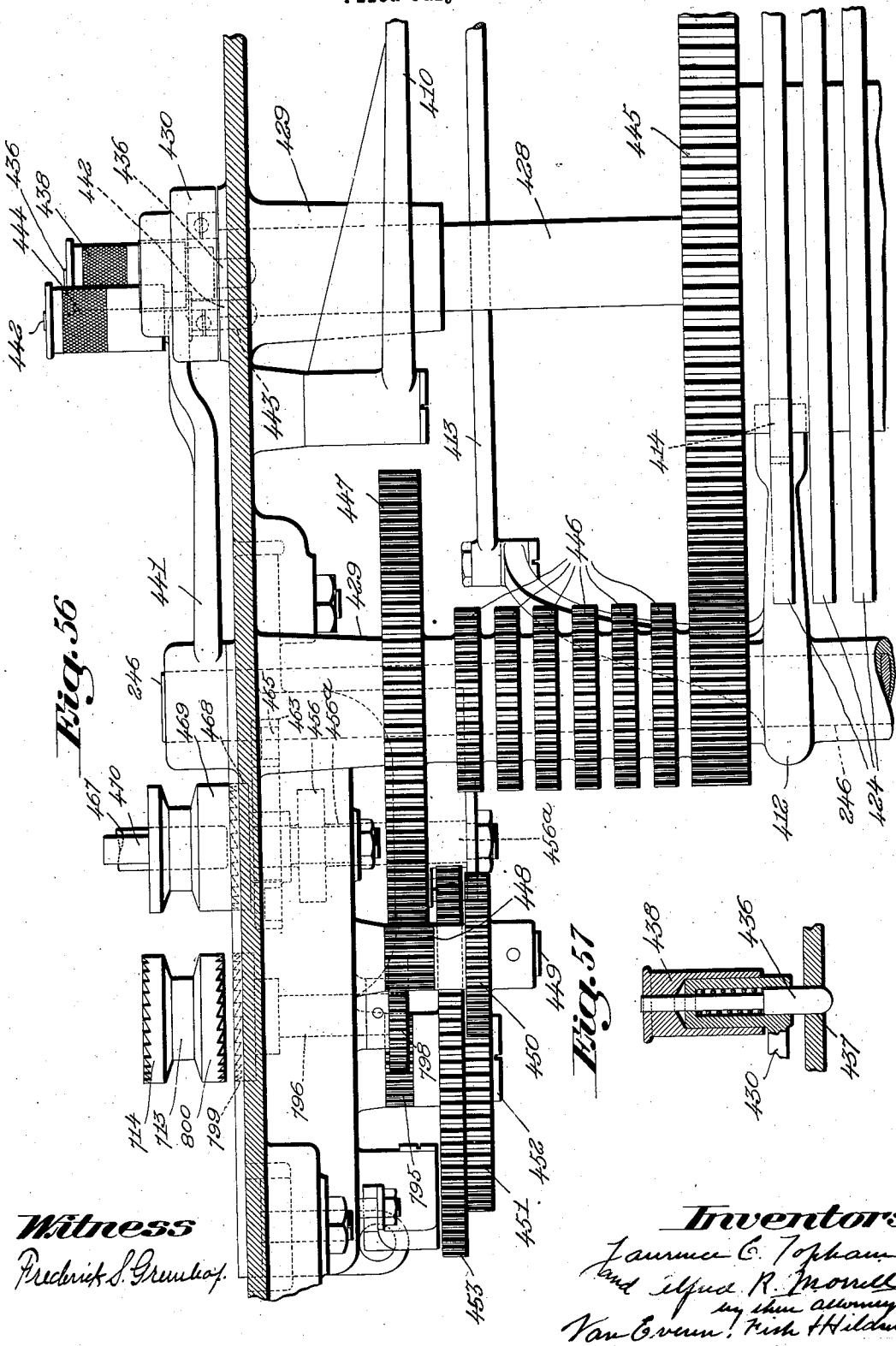


Fig. 56

Fig. 57

Witness
Frederick S. Greenleaf.

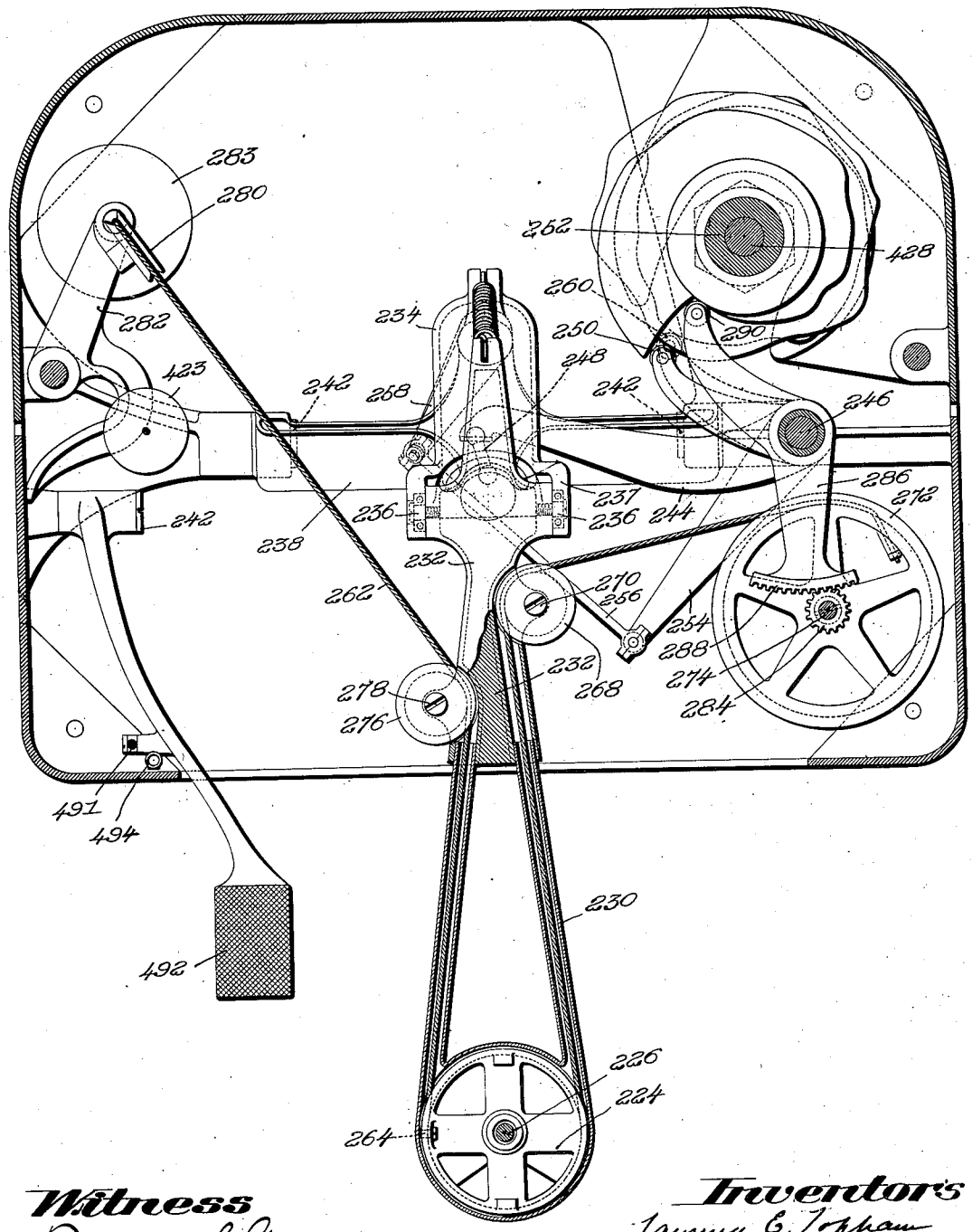
Inventors
Laurence E. Topham
and Alfred R. Morrill
by their attorneys
Van Everen, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 58



Witness
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Inventors
James E. Topham
and Alfred A. Morrell
by their attorneys
Van Orman, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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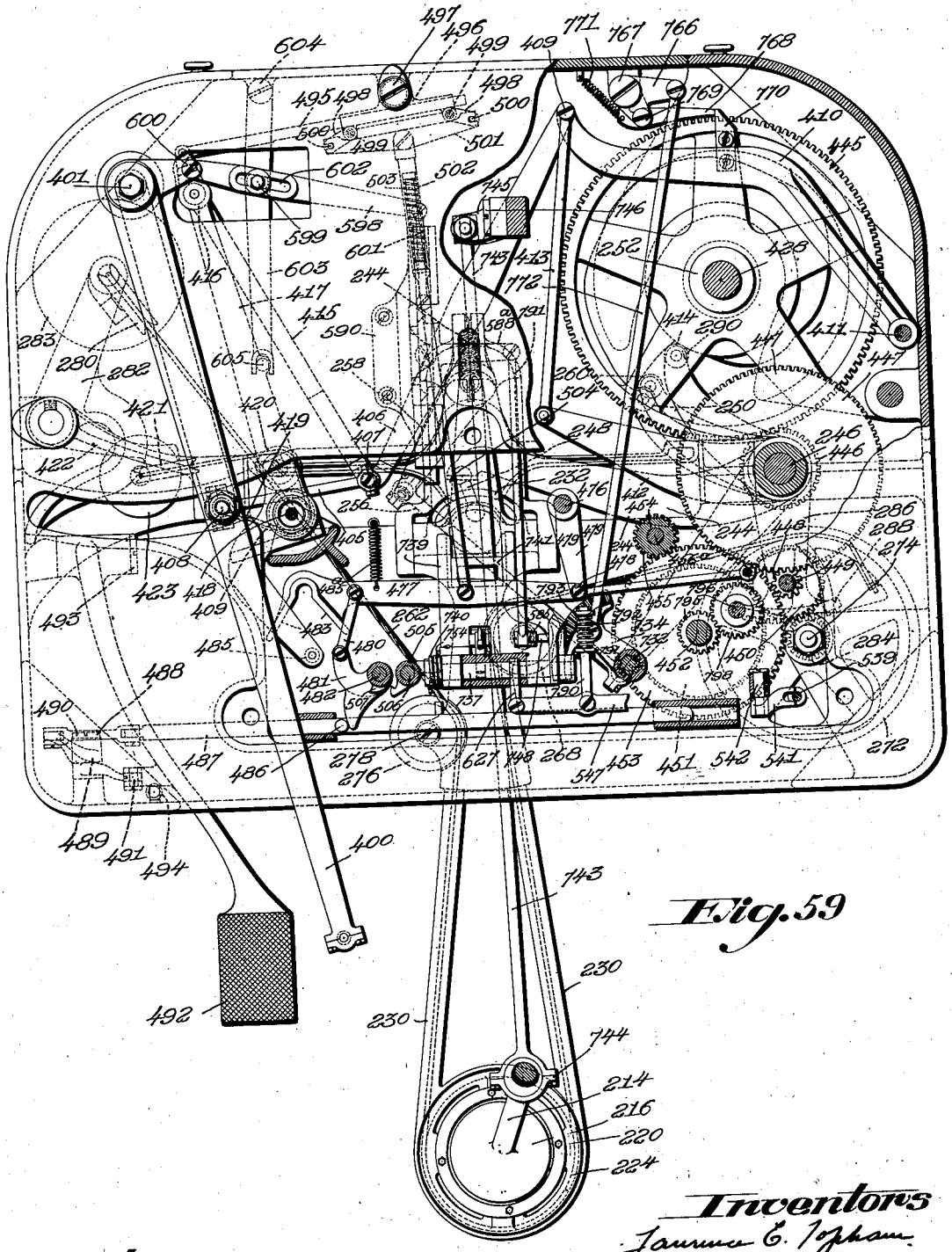


Fig. 59

Witness:
Merton W. Williams

Inventors
James E. Topham
and Alfred R. Morrill
by their attorneys
Van Everen, Fish & Holcomb

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 62

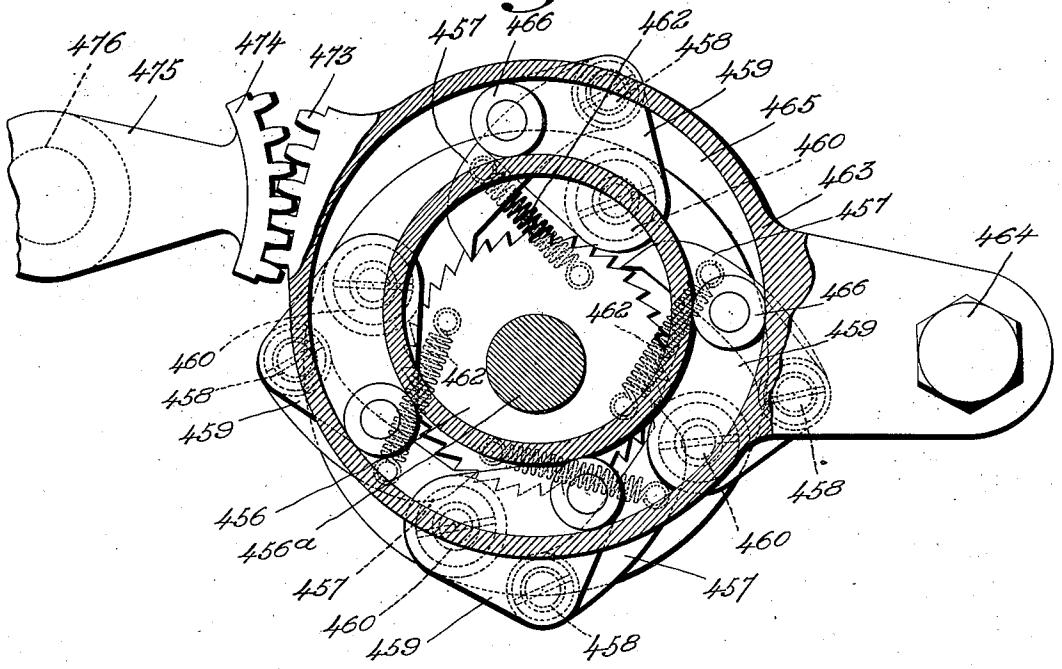
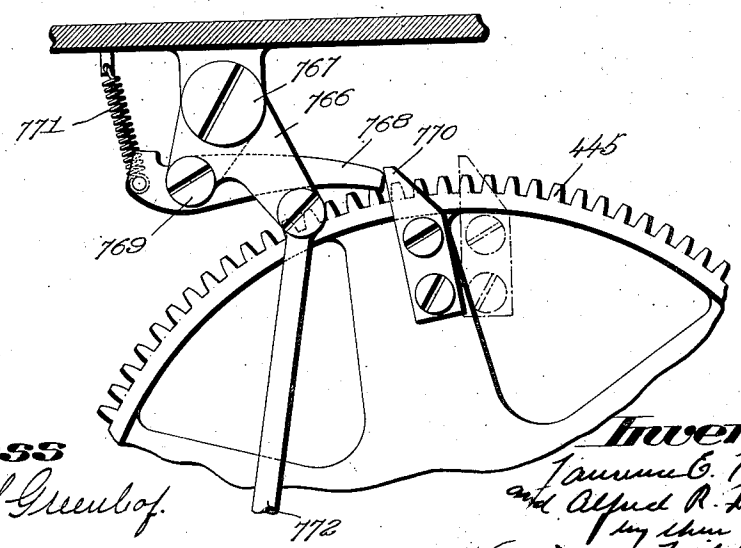


Fig. 60



Witness

Frederick S. Greenhof.

Inventors

James E. Topham

and Alfred R. Thornill

by their attorneys

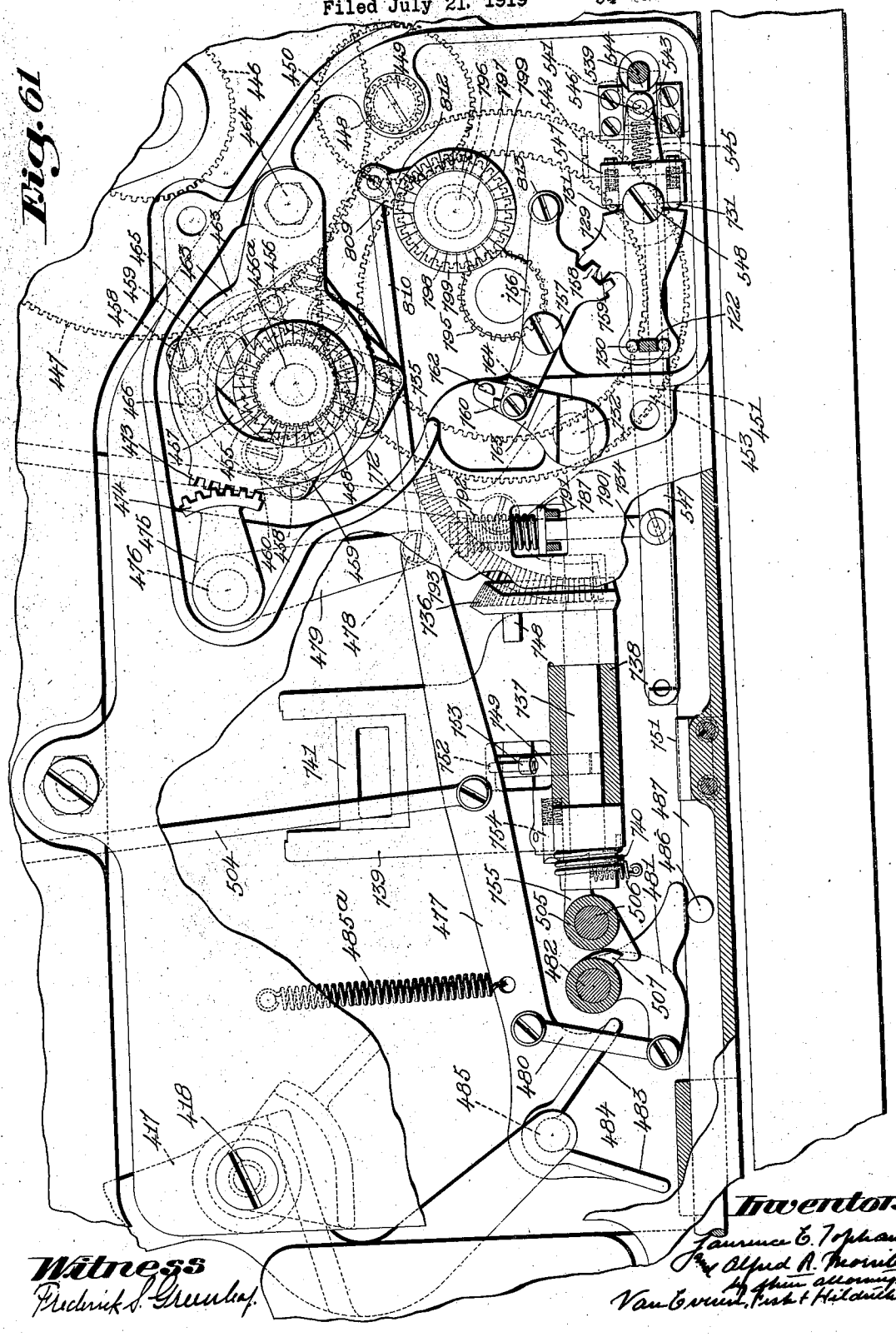
Van Orsdel, Fish & Holdcroft

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 61



Witness
Frederick S. Greenleaf.

Inventors
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by Alfred R. Thornill
his attorneys
Van Everen, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

Filed July 21, 1919 34 Sheets-Sheet 27

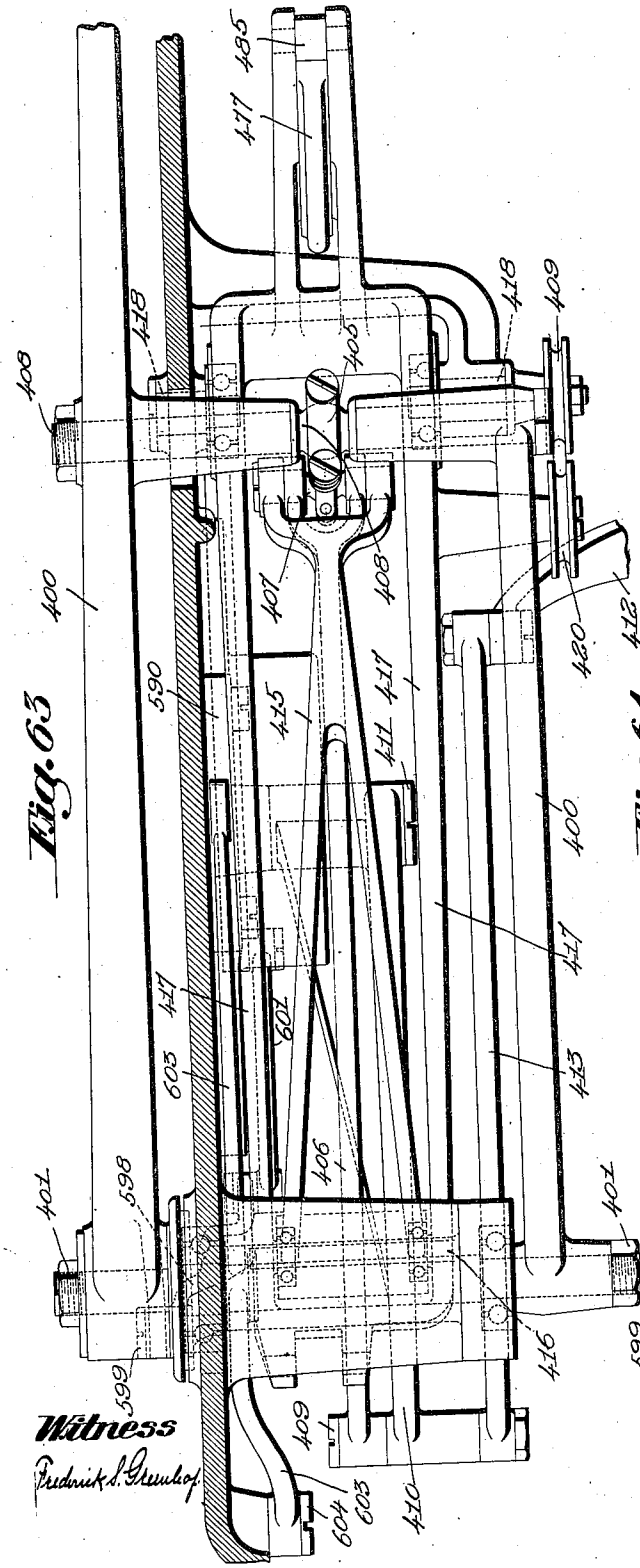


Fig. 63

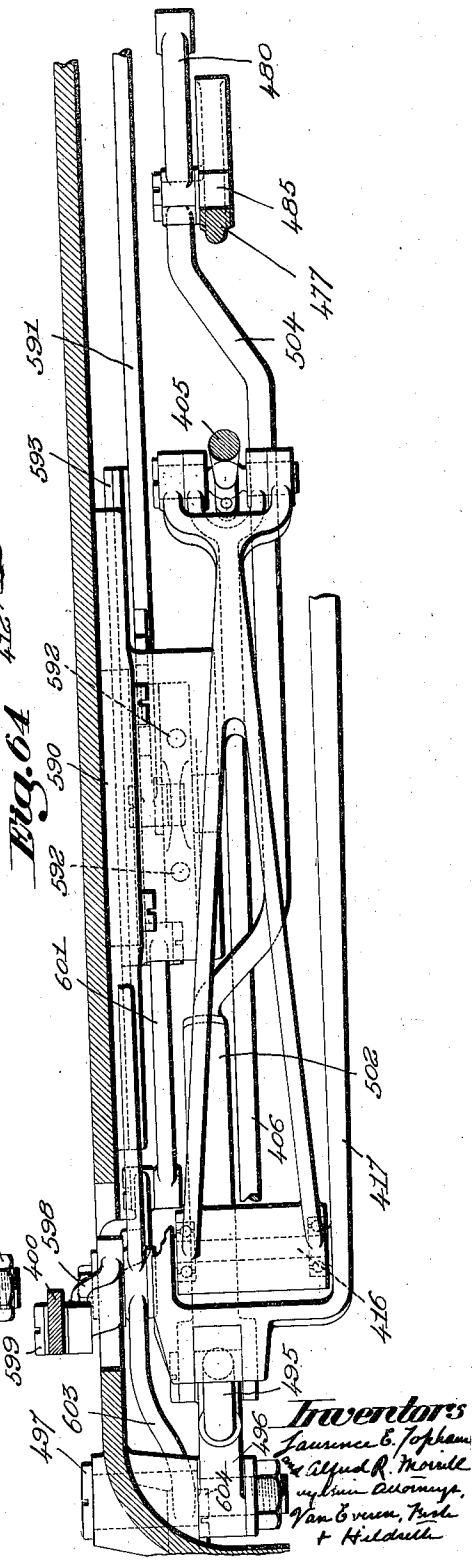


Fig. 64

Witness
Fredrick S. Grunbaum

Inventors
Laurence E. Topham
& Alfred R. Morrill
by their Attorneys,
Van Everen, Fyke
& Hildreth

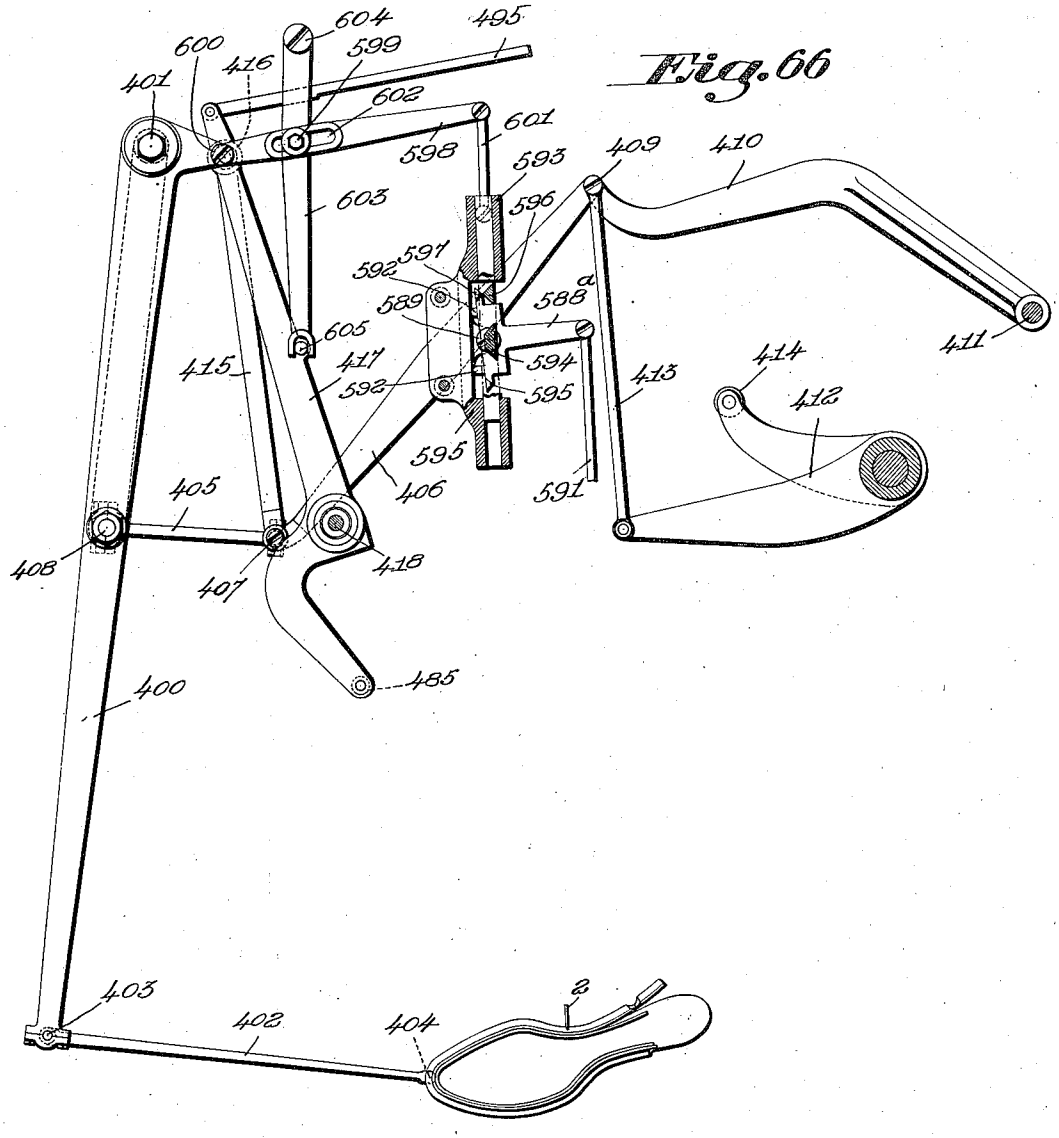
1,616,714

Feb. 8, 1927. L. E. TOPHAM ET AL

SHOE MACHINE

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Fig. 66



Witness
Frederick L. Grumbach

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Van Everen, Fish & Hildreth

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SHOE MACHINE

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Fig. 69

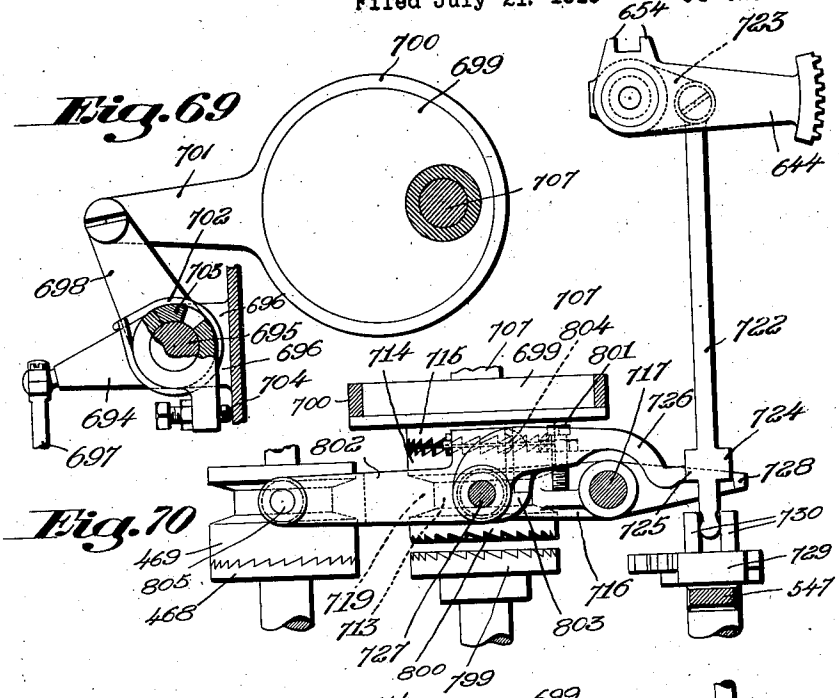


Fig. 70

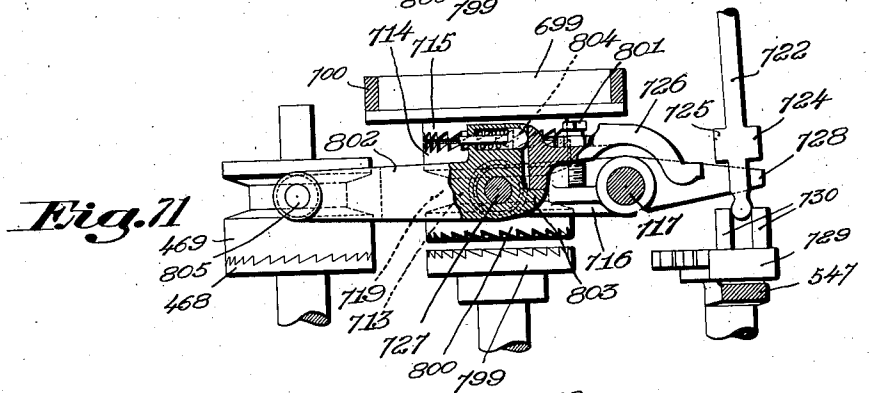


Fig. 71

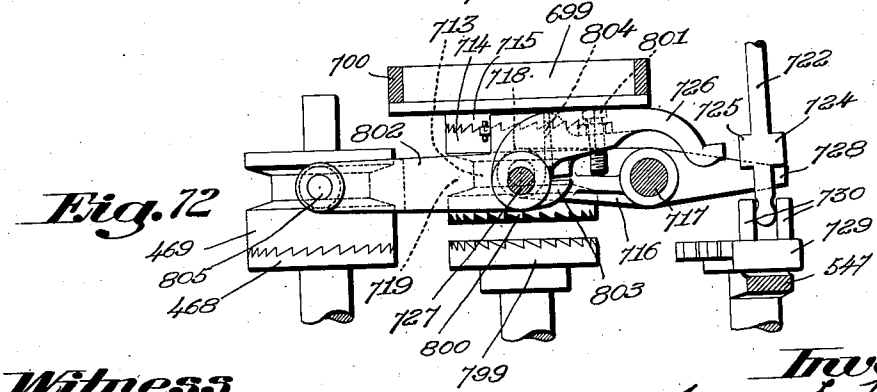


Fig. 72

Witness

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Van Cleve, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 73

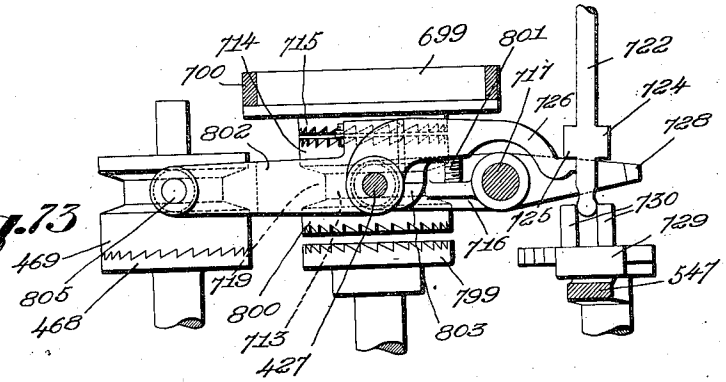


Fig. 74

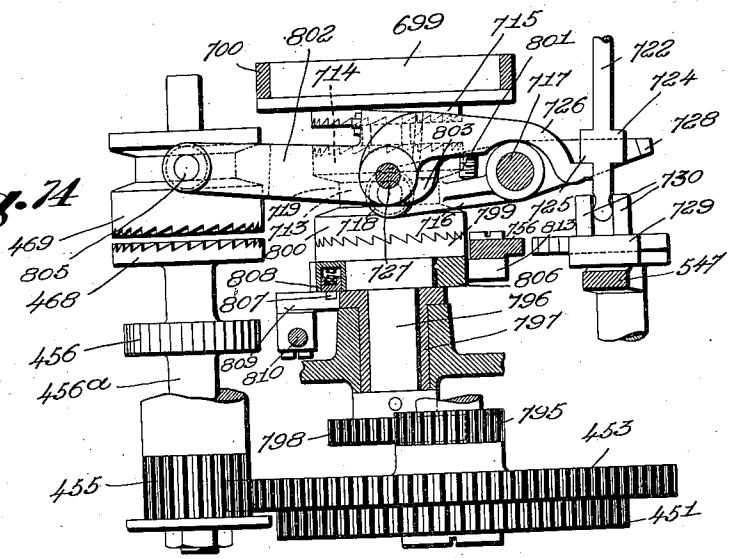
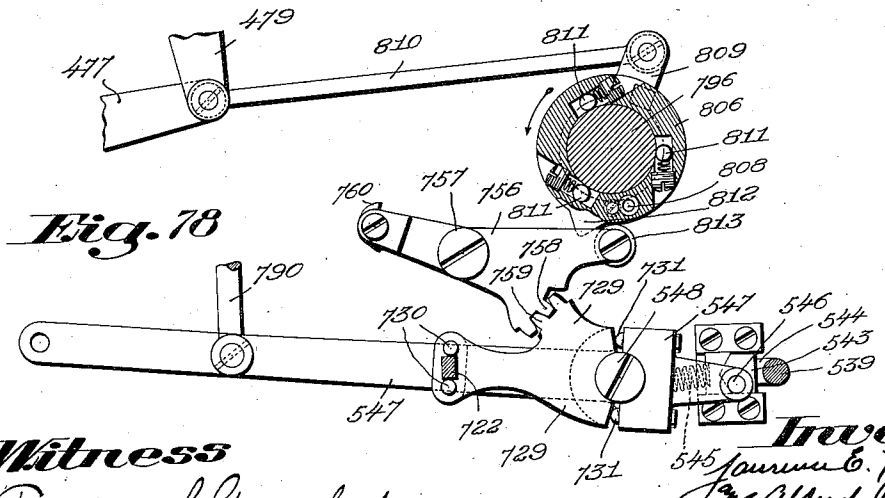


Fig. 78



Witness

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Van Cleve, Frick & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

Filed July 21. 1919 34 Sheets-Sheet 31

Fig. 75

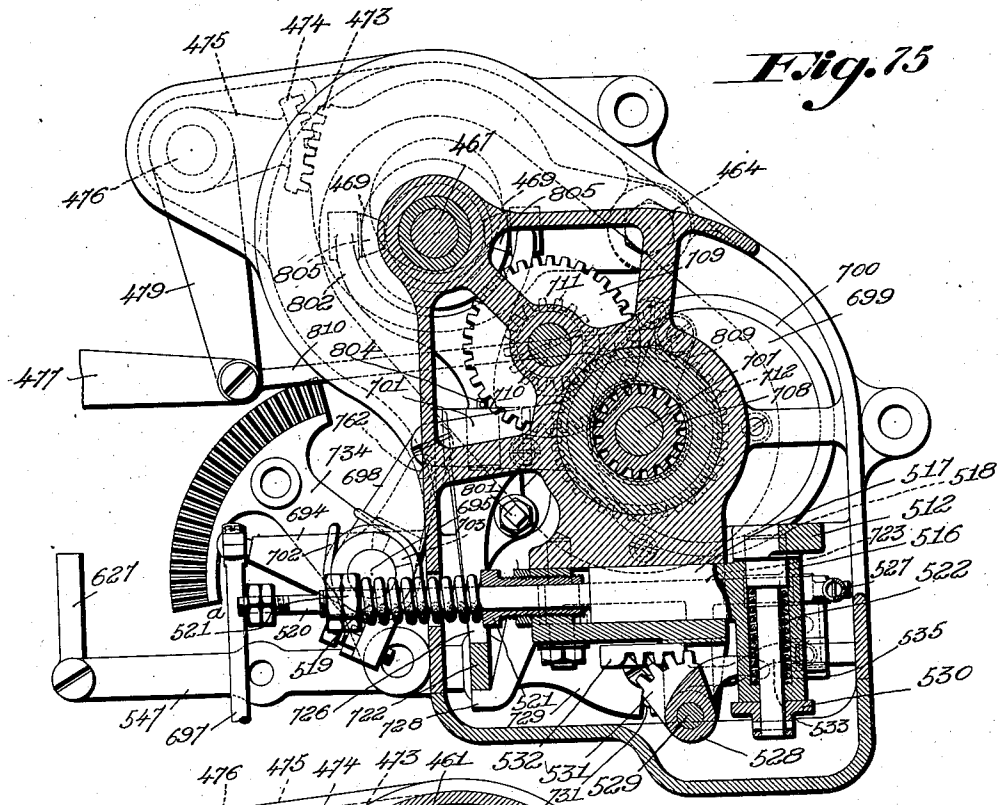
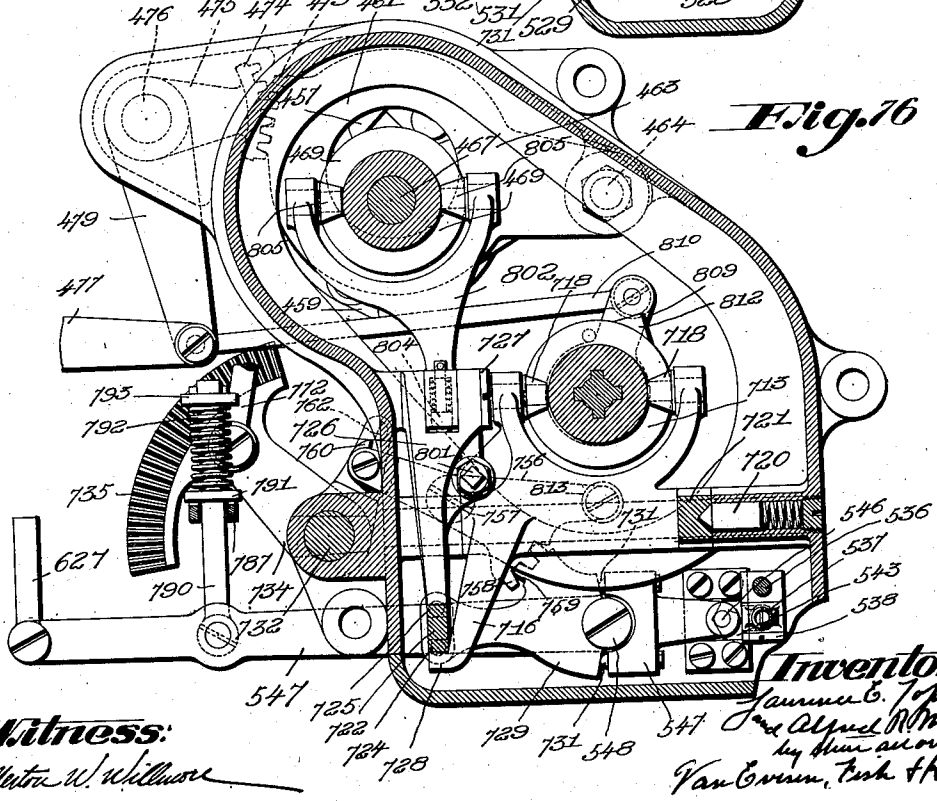


Fig. 76



Witness:
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Van Everen, Fish & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

Filed July 21. 1919 34 Sheets-Sheet 32

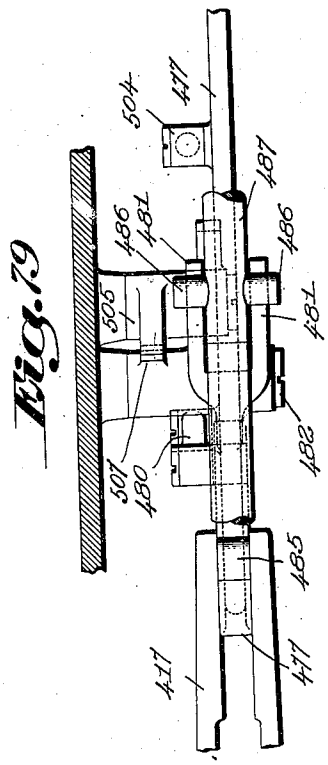


Fig. 79

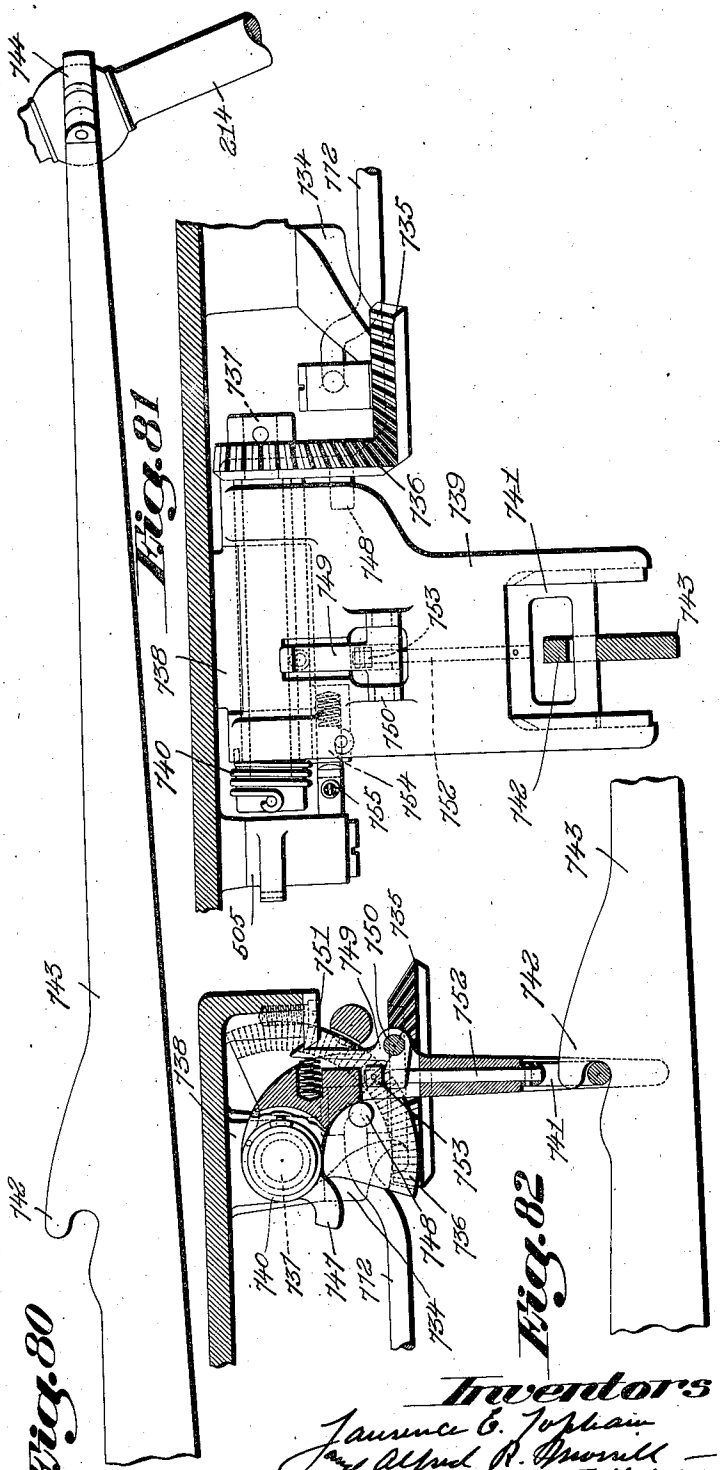
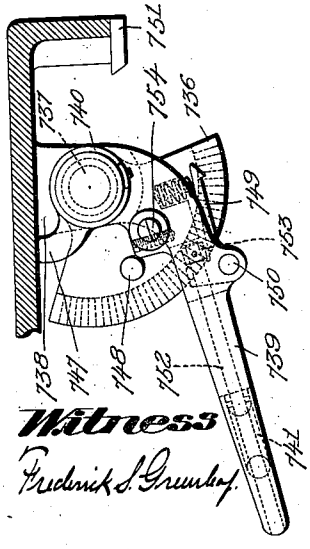


Fig. 81



Witness

Frederick S. Grumbach

Fig. 80

Fig. 82

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Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

Filed July 21. 1919 34 Sheets-Sheet 33

Fig.83

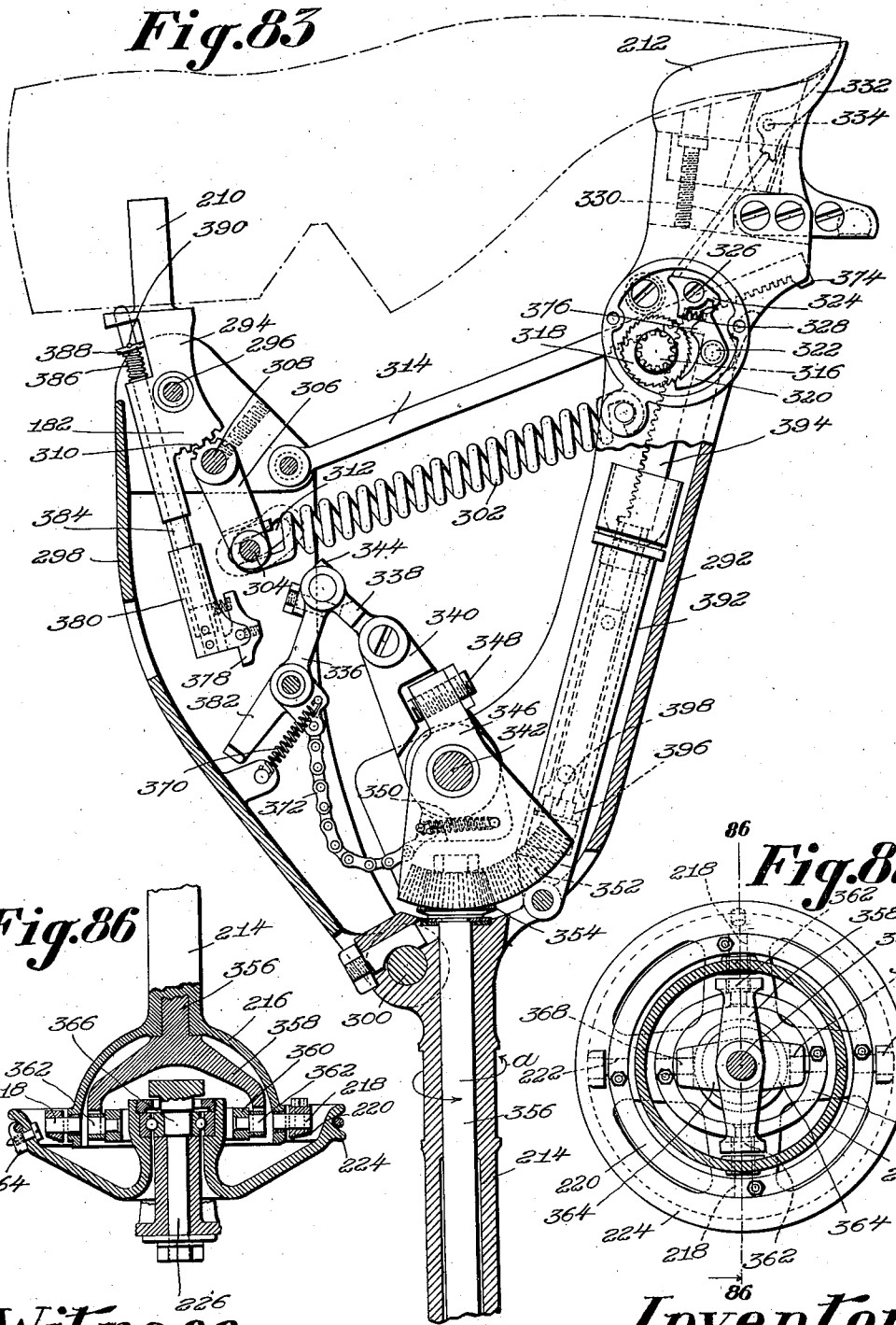


Fig.86

Fig.87

Witness
Robert C. Boone

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Van Everen, Reid & Hildreth

Feb. 8, 1927. L. E. TOPHAM ET AL 1,616,714

SHOE MACHINE

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Fig. 84

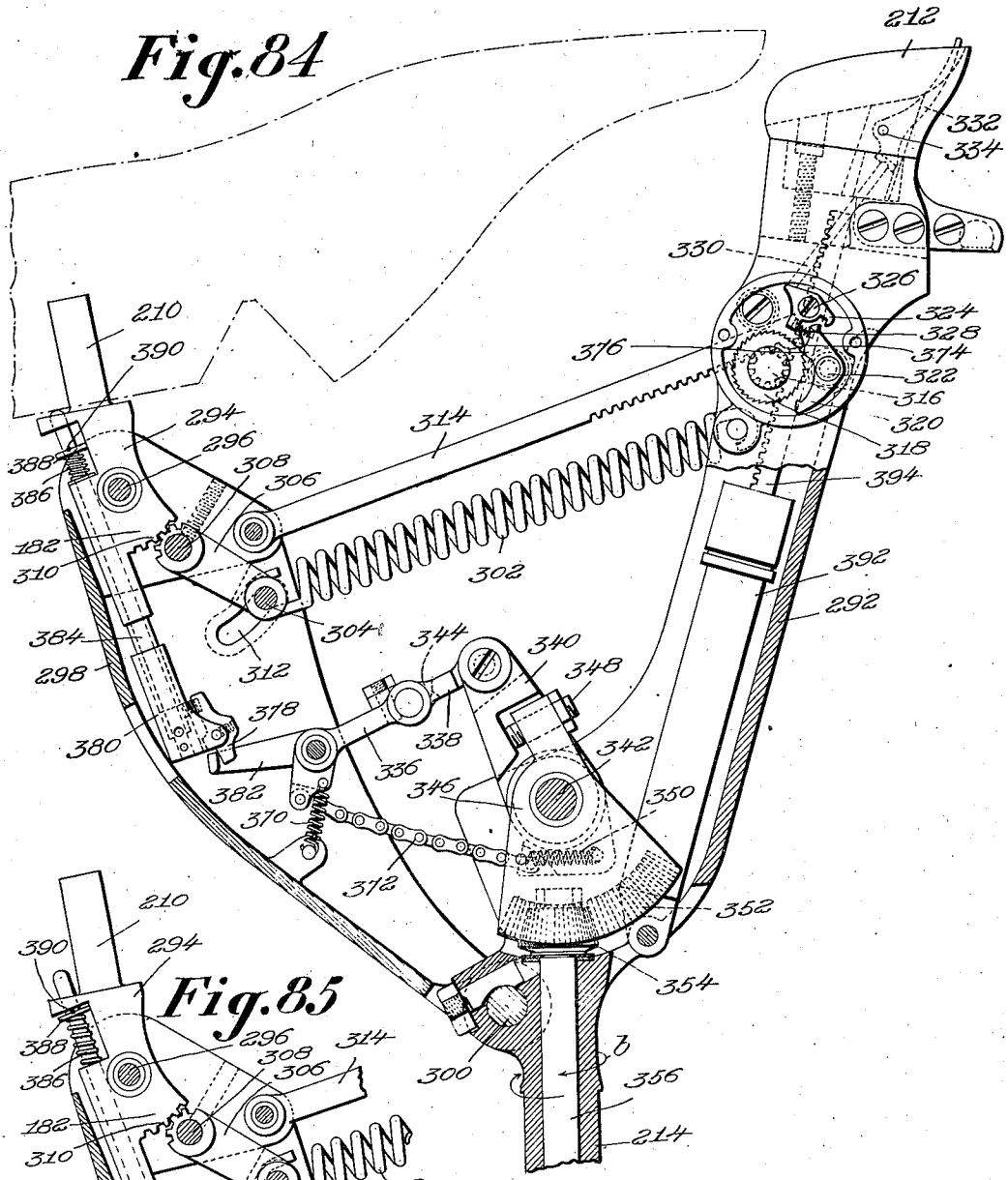


Fig. 85

Witness

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and Alfred A. Monnie

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Van Everen Fish & Fiedler

Patented Feb. 8, 1927. 1,616,714

UNITED STATES PATENT OFFICE.

LAURENCE E. TOPHAM, OF SWAMPSCOTT, AND ALFRED R. MORRILL, OF BEVERLY, MASSACHUSETTS, ASSIGNORS TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHOE MACHINE.

Application filed July 21, 1919. Serial No. 312,366.

This invention relates to shoe machines and, more particularly, to machines for operating on shoes of the type in which the shoe and the means for operating on the shoe are moved relatively to transfer the point of operation about the shoe and to change the relative positions of the shoe and the operating means to present the shoe properly to the operating means as the point of operation is transferred about the shoe, and in which the shoe is supported in operating position in the machine and all of its movements are effected and controlled by automatically acting mechanisms.

The object of the present invention is to improve the construction and mode of operation of machines for operating on shoes, and with this object in view the invention comprises various novel and improved features, constructions and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention is illustrated in the present application as embodied in a machine for sewing welts and uppers to the insoles of welted shoes. Certain features of the invention, however, are not limited to this particular class of automatic shoe sewing machines but are generally applicable to automatic machines for sewing shoes. Certain features of the invention also are not limited to automatic shoe sewing machines but may be embodied with advantage in automatic machines for performing various operations upon shoes. Certain features of the invention also are not limited to automatic machines but may be embodied with advantage in machines in which the shoe is held and manipulated by the operator.

The features of the invention will be clearly understood from the accompanying drawings illustrating the invention in its preferred form, and the following detailed description of the constructions therein shown.

In the drawings Figure 1 is a view in front elevation of a machine embodying the invention; Fig. 2 is a view in side elevation of the machine looking from the left; Fig. 3 is a plan view of the machine; Fig. 4 is a view in front elevation of a portion of the sewing head of the machine; Fig. 5 is a plan view of the sewing head; Fig. 6 is a view in side elevation of the sewing head looking from the left; Fig. 7 is a view in side elevation of the sewing head looking from the right; Fig. 8 is a view in vertical section of the sewing head; Fig. 9 is a view of the sewing head partly in plan and partly in section taken substantially on the line 9—9 of Fig. 7; Fig. 10 is a view in side elevation illustrating a portion of the mechanism shown in Fig. 7; Fig. 11 is a view in vertical section illustrating the needle guide and thread gripping and severing mechanisms; Fig. 12 is a plan view of the thread gripping and severing mechanisms illustrating the parts in the positions which they assume during the normal operation of the machine; Fig. 13 is a view similar to Fig. 12 illustrating the parts in the positions which they assume upon stopping the machine just before the thread is gripped and severed; Fig. 14 is a side view of the thread gripping and severing mechanisms as shown in Fig. 13; Fig. 15 is a plan view of the thread gripping and severing mechanisms, needle and looper illustrating the positions of the parts as the thread is being gripped and severed; Fig. 16 is a view in side elevation of the needle, looper and thread gripping and severing devices illustrating these parts in the same positions as shown in Fig. 15; Fig. 17 is a view similar to Fig. 15 illustrating the positions of the parts when the machine is finally stopped; Fig. 18 is a view in side elevation of the needle, looper and thread gripping and severing devices illustrating these parts in the same positions as shown in Fig. 17; Fig. 19 is a plan view of the thread gripping and severing devices, needle and looper illustrating the parts in the positions which they assume after the first loop drawing stroke of the take-up upon starting the machine; Fig. 20 is a view in side elevation illustrating the needle, looper and thread gripping and severing devices in the same positions as shown in Fig. 19; Fig. 21 is a view similar to Fig. 19 illustrating the parts in the positions which they assume after the second loop drawing stroke of the take-up; Fig. 22 is a view in side elevation illustrating the needle, looper and thread gripping and

severing devices in the same positions as shown in Fig. 21; Fig. 23 is a detail view in vertical section illustrating the construction for adjustably supporting the channel guide roll; Fig. 24 is a detail sectional view of the retaining device for controlling the slack in the thread; Fig. 25 is a view in side elevation, partly in section, illustrating the mechanism for slashing the welt; Fig. 26 is a view of the mechanism shown in Fig. 25 and certain associated parts illustrating certain of the parts in different positions; Fig. 27 is a view similar to Figs. 25 and 26 illustrating certain of the parts in still different positions; Fig. 28 is a view in rear elevation of the mechanism shown in Fig. 25; Fig. 29 is a view in vertical section of a portion of the mechanism illustrated in Fig. 28; Fig. 30 is a view partly in plan and partly in section of a portion of the mechanism illustrated in Fig. 25; Fig. 31 is a detail view illustrating the welt slashing knife and certain associated parts; Fig. 32 is an upper end view partly broken away and partly in section of the parts shown in Fig. 31; Fig. 33 is a view in longitudinal section of the parts shown in Fig. 31; Fig. 34 is a detail sectional view illustrating the manner in which the slashing knife acts on the welt; Fig. 35 is a detail view partly in plan and partly in horizontal section illustrating certain parts of the mechanism shown in Fig. 28; Fig. 36 is a perspective view illustrating a portion of the welt after it is slashed by the slashing knife; Fig. 37 is a side view of the welt severing devices illustrating said devices in retracted or inoperative positions; Fig. 38 is a view in longitudinal section of the welt severing devices illustrating said devices in their advanced or operative positions; Fig. 39 is a view of the welt severing devices taken from above, Fig. 37, with certain parts shown in section; Fig. 40 is an end view of the welt severing devices taken from the left, Fig. 37; Fig. 41 is a sectional view taken substantially on the line 41—41 of Fig. 37; Fig. 42 is a detail view in side elevation illustrating the tension mechanism and certain devices controlled from the tension wheel; Fig. 43 is a view in rear elevation partly in section of the mechanism illustrated in Fig. 42 and certain cooperating parts with the parts in the same positions; Fig. 44 is a view similar to Fig. 42 illustrating certain of the parts in different positions; Fig. 45 is a view in rear elevation of the mechanism illustrated in Fig. 44 and certain cooperating parts with the parts in the same positions; Fig. 46 is a view similar to Fig. 45 illustrating the parts in different positions; Fig. 47 is a detail sectional view taken substantially on the line 47—47 of Fig. 43; Fig 48 is a view in side elevation of a portion of the mechanism illustrated in Fig. 43 and certain associated parts; Fig. 49 is a view similar to Fig. 48 illustrating the parts in different positions; Fig. 50 is a view in front elevation partly in section illustrating particularly the driving connections for the machine; Fig. 51 is a view partly in side elevation and partly in vertical section of substantially the mechanism shown in Fig. 50; Fig. 52 is a view partly in front elevation and partly in section of a portion of the mechanism illustrated in Figs. 50 and 51; Fig. 53 is a view partly in front elevation and partly in section of a portion of the mechanism illustrated in Fig. 52 with certain of the parts in different positions; Fig. 54 is a view partly in front elevation and partly in section of a portion of the mechanism illustrated in Figs. 52 and 53 with certain of the parts in still different positions; Fig. 55 is a view in side elevation partly in section of the portion of the machine below the sewing head and illustrating particularly the mechanism for supporting and actuating the jack; Fig. 56 is a view in side elevation illustrating particularly the driving connections for the pattern cam shaft; Fig. 57 is a detail sectional view of certain of the parts shown in Fig. 56; Fig. 58 is a plan view partly in section illustrating particularly the mechanism for supporting and actuating the jack; Fig. 59 is a plan view with certain parts broken away and certain parts shown in section of the portion of the machine below the sewing head; Fig. 60 is a detail plan view illustrating certain parts of the mechanism for completing the rotation of the pattern cam shaft; Fig. 61 is a plan view partly in section illustrating a portion of the mechanism shown in Fig. 59 and certain additional parts; Fig. 62 is a detail plan view partly in section illustrating certain parts of the driving mechanism for the pattern cam shaft; Fig. 63 is a detail view in side elevation illustrating particularly the mechanism for actuating the jack to impart feeding movements to the shoe; Fig. 64 is a view in side elevation of a portion of the mechanism shown in Fig. 63 and certain additional parts; Fig. 65 is a plan view partly in section illustrating the mechanism for actuating the jack to feed the shoe and certain associated parts; Fig. 66 is a view similar to Fig. 65 illustrating the parts in different positions; Fig. 67 is a detail view in front elevation illustrating certain parts of the mechanism shown in Figs. 65 and 66; Fig. 68 is a view of the mechanism illustrated in Fig. 67 showing certain parts in section; Fig. 69 is a detail plan view partly in section illustrating certain parts of the mechanism for actuating the welt severing devices and for moving the jack out of operating position; Fig. 70 is a view in side elevation illustrating a portion of the mechanism shown in Figs. 50 and 51; Figs. 71, 72 and 73 are

views similar to Fig. 70 illustrating respectively the parts in different positions; Fig. 74 is a view in front elevation partly in section illustrating the parts shown in Figs. 70 to 73, inclusive, in still different positions and also illustrating certain additional parts of the mechanism shown in Figs. 50 and 51; Fig. 75 is a view partly in plan and partly in horizontal section illustrating certain of the parts shown in Figs. 50 and 51; Fig. 76 is a view partly in plan and partly in horizontal section illustrating a portion of the mechanism shown in Fig. 75 and certain associated parts; Fig. 77 is a detail plan view partly in section illustrating certain parts of the mechanisms shown in Figs. 75 and 76; Fig. 78 is a detail plan view partly in section illustrating certain parts of the mechanism shown in Fig. 76; Fig. 79 is a detail view in front elevation illustrating certain parts of the mechanism for adjusting the speed of the pattern cam shaft; Fig. 80 is a detail view in side elevation illustrating certain parts of the mechanism for moving the jack out of operating position; Fig 81 is a view in front elevation of the mechanism shown in Fig. 80 and certain associated parts illustrating the parts in different positions; Fig. 82 is a view in side elevation partly in section of the mechanism shown in Fig. 81 with the parts in the same positions; Fig. 83 is a view partly in front elevation and partly in vertical section of the jack; Fig. 84 is a view similar to Fig. 83 illustrating certain of the parts in different positions; Fig. 85 is a detail view in vertical section illustrating a portion of the jack with certain of the parts in different positions from those in which they are shown in Figs. 83 and 84; Fig 86 is a detail sectional view illustrating the devices at the lower end of the jack spindle taken substantially on the line 86—86 of Fig. 87; and Fig. 87 is a view partly in plan and partly in section illustrating the devices at the lower end of the jack spindle.

The machine illustrated in the drawings is so constructed and arranged that all that is required of the operator in performing an operation on a shoe is to place the shoe on the jack, to insert the shoe in the machine and to start the machine, and to remove the shoe from the jack after the operation is completed. Upon the placing of a shoe on the jack the shoe is automatically adjusted in a predetermined position with relation to the jack and is clamped in adjusted position. After the shoe is thus secured in adjusted position on the jack, the operator inserts the shoe in the machine in proper position for the starting of the operation, and starts the machine. After the completion of the operation on the shoe the jack is automatically moved out of operating position to disengage the shoe from the machine, and then is restored to starting position. As the jack is restored to starting position the parts of the jack are automatically actuated to unclamp the shoe and to restore the parts of the jack to their initial conditions so that after the jack comes to rest the shoe may be lifted from the jack. After the completion of the operation on the shoe the operating mechanism is stopped automatically with the parts in their initial or shoe receiving position, this position of the parts enabling the shoe to be disengaged from the operating mechanism by the movement of the jack out of operating position. Thus when the machine is finally stopped, after the completion of an operation and the shoe is removed from the jack, the parts are all in position for the reception of another shoe and for the starting of another operation.

As above stated in the illustrated embodiment of the invention, the mechanism for operating on the shoe consists of a sewing mechanism and the machine is provided with automatically acting means for stopping this mechanism at the predetermined point in the operation of the machine chosen for the completion of the seam and for causing the needle to come to rest in retracted position and free of thread, with means for placing other parts of the machine in condition for the removal of the shoe, and with means for severing the connections between the shoe and the machine and for finally stopping the machine. The stopping of the sewing mechanism with the parts in these positions and with the needle free of thread, and the severing of the connections between the shoe and the machine enables the shoe to be entirely disengaged and disconnected from the sewing mechanism by the movement of the jack out of operating position. In connection with the particular type of sewing machine illustrated in the drawing, mechanisms are provided for causing the needle to misloop during the last cycle of operations, for stopping the sewing mechanism with the needle in retracted position, for retracting the welt guide, for severing the welt and the thread between the shoe and the machine, and for gripping the end of the thread leading from the supply.

The machine illustrated in the drawings of the present application is a machine of the same general type as that illustrated and described in the pending application of Laurence E. Topham, Ser. No. 269,076, filed December 31, 1918. In the present machine as in the machine of the above Topham application, the sewing mechanism as a whole is fixed in position and the shoe supporting jack is movably mounted in the machine to enable the shoe to be moved laterally in the direction of feed to transfer the point of operation about the shoe, and to be moved transversely to the direction of feed

to maintain the edge of the shoe bottom in the proper position with relation to the sewing mechanism transversely of the direction of feed, and to be tipped and laterally turned to position the shoe properly with relation to the sewing mechanism. The lateral movement of the shoe to transfer the point of operation about the shoe is imparted thereto by devices acting on the jack to impart movements to the jack to feed the shoe, and by the feeding devices of the sewing mechanism which directly engage the shoe and cooperate with the jack moving feeding devices. The sewing mechanism and the positioning mechanism are driven in unison during the sewing of a seam. At the completion of the seam the sewing mechanism is stopped automatically by the action of suitable stopping devices, while the positioning mechanism continues its operation to turn the jack to starting position.

The sewing mechanism of the machine illustrated in the drawing is especially constructed for sewing the inseams of welted shoes, although with certain relatively slight changes this mechanism might be fitted for sewing the inseams of turned shoes. The work engaging parts of the sewing mechanism are constructed and operated to feed the shoe continuously through the machine, these parts having substantially the same work feeding movements as the corresponding parts of the machine illustrated in the pending application of Alfred R. Morrill, one of the present applicants, Ser. No. 267,378, filed December 18, 1918. The sewing mechanism illustrated in the drawing comprises an oscillating curved hook needle 2, a needle guide 4, a looper 6, a thread finger 8, a channel guide roll 10, a welt guide 12, a take-up 14, a thread retaining device 16, and a tension device 18. The thread handling devices of the present machine have the same general mode of operation in the handling of the thread to form a chain stitch seam as is usual in machines of this type. The channel guide roll is mounted in fixed position and is continuously rotated to feed the shoe, and the welt guide and needle are both reciprocated in the direction of feed and cooperate with the channel guide to feed the shoe continuously.

The needle is secured by means of a clamping device 20, Fig. 9, to a needle carrier 22 formed with laterally extending bearing studs or trunnions 24, one of which is journaled in a bearing in a forwardly projecting arm 26 on the frame and the other of which is journaled in a sleeve 28 mounted to turn in a bearing in a forwardly projecting arm 30 on the frame. The mechanism for oscillating the needle comprises a bell crank lever 32 pivoted upon a shaft 34 extending across the machine, a link 36 connected at its respective ends by universal joints with the needle carrier and with the lower arm of the bell crank lever, a crank 38 carried by the main driving cam shaft 40 which, for the sake of convenience, will be hereinafter termed the sewing cam shaft of the machine, and a pitman 42 connecting the upper arm of the bell crank lever with the crank.

The needle carrier is reciprocated axially to impart lateral feeding and return movement to the needle by means of a lever 44, see Fig. 9, pivoted on a stud 46 the forward end of which engages in a slot in a button 48 engaging the outer end of the sleeve 28, and a cam lever 50 pivoted on a stud 52 the forward end of which engages in a slot in a button 54 engaging the outer end of the right hand trunnion of the needle carrier. The levers 44 and 50 are connected by a link 56 so that the levers are actuated in unison to reciprocate the needle carrier, and the cam lever 50 carries a cam roll 57 at its rear end engaging in a cam groove in a cam disk 58 mounted on the sewing cam shaft 40 of the machine.

The needle guide 4 projects outwardly from a flange formed at the inner end of the sleeve 28 and is oscillated in the usual manner in timed relation to the movements of the needle. The mechanism for oscillating the needle guide comprises a gear segment 60 secured to the flange on the sleeve 28, the teeth of which mesh with rack teeth formed on the forward end of a longitudinally reciprocating slide 62 mounted in guides in the frame. Reciprocatory movements are imparted to the slide by means of a cam roll 64 mounted on the rear end of the slide and engaging in a cam groove formed in cam disk 66 mounted on the sewing cam shaft 40.

The looper mechanism of the present machine is similar to the looper mechanism illustrated and described in applicant's application, Ser. No. 249,088, filed August 9, 1918, renewed December 9, 1919, Serial No. 343,646. In the construction illustrated the looper 6 consists of a tube secured in the lower arm of a lever 68 mounted on the forward end of a stud 70 secured in the frame of the machine, the thread extending downwardly from the thread retaining device through an opening in the lever 68 and through the looper 6, as shown in Fig. 7. The looper lever 68 is connected with the stud 70 by means of a ball and socket joint so that the lever is capable of universal swinging movement about its connection with the stud, and the lever is actuated to carry the looper about the needle by swinging the upper arm of the lever 68 forwardly, rearwardly and laterally. The mechanism for thus actuating the looper lever comprises two cam levers 71 and 72, both pivoted on

the shaft 34, and a three armed lever or link 74, the forwardly extending arm of which is connected by a ball and socket joint 76 with the upper arm of the looper lever 68, and the rearwardly extending arms of which are respectively connected by ball and socket joints 78 and 80 with the cam levers 71 and 72. The movements of the cam levers 71 and 72 are such that the link 74 is moved forwardly and rearwardly and is swung about its connections with the respective levers, the forward and rearward movements of the link occurring in timed relation to the swinging movements thereof so as to actuate the looper lever 68 to carry the looper in a circular path about the needle. The lever 71 carries a cam roll 82 engaging in a cam groove in the cam disk 58, and the lever 72 carries a cam roll 84 engaging in a cam groove in the cam disk 66.

The thread finger 8 is operated to measure off thread in the usual manner during each cycle of operations of the machine. The thread finger is secured to the forward end of a slide 86 mounted to reciprocate longitudinally in guides in the frame of the machine. The rear end of the slide 86 is connected by means of pivotally connected links 88 and 90 with a cam lever 92 pivoted on the stud 46. The links 88 and 90 form a toggle, which is normally maintained in a straightened condition as shown in Figs. 12, 13 and 14, so that reciprocating movements are imparted to the slide 86 from the cam lever 92 through the toggle. The links 88 and 90 are respectively secured to studs 94 and 96 which serve to connect said links respectively with the slide 86 and with the cam lever 92, and the toggle formed by the links is normally maintained in a straightened condition by means of tension springs 98 connected at their opposite ends with pins 100 and 102 projecting eccentrically from the ends of the respective studs 94 and 96. The relative movement of the links under the action of the springs 98 is limited by the engagement of stops 104 and 106 formed on the respective links. The cam lever 92 is provided with an arm extending rearwardly over the cam disk 66 which carries a cam roll 108, engaging in a cam groove in said cam disk.

The channel guide roll 10 is secured to the lower end of a shaft 110 mounted to turn in a bearing in a bushing 112 secured in the frame of the machine. To the upper end of the shaft 110 is pinned a spiral gear 114 the teeth of which mesh with spiral gear teeth 116 formed on the periphery of the cam disk 58. Through the connections described the channel guide roll is rotated in definite timed relation to the movements of the needle and welt guide in the direction of feed so as to cooperate with these parts to feed the shoe continuously through the machine.

To enable the channel guide roll to be adjusted radially of the needle, the bushing 112 is mounted for longitudinal adjustment in the frame of the machine, and is arranged to be held in adjusted position by means of a screw 115 passing through a slot 117 in the frame and threaded into a projection on the bushing.

The welt guide 12 is mounted for forward and rearward movement, yieldingly pressed forward against the work during a portion of each cycle of operations so that it will accommodate itself to different thicknesses of work between the welt guide and the channel guide roll, and is then locked in position. The welt guide is also mounted for movement in the direction of feed to enable the same to cooperate with the channel guide roll and needle in feeding the work. The welt guide is yieldingly pressed forward into engagement with the work during the back feeding movement of the guide, and after the completion of its back feeding movement is locked in position during the remainder of each cycle of operations. The welt guide is secured to the forward end of a carrier 118 supported by a ball and socket joint 120 on a swinging support 122 pivoted at 124 on the frame of the machine. The rear end of the carrier 118 is slidingly engaged in a diametrical bore in a ball 125 mounted in a socket formed in a laterally movable slide 126 and in a plate 127 secured to the slide. This manner of mounting the welt guide enables the guide to move forwardly and rearwardly, and the parts are so constructed and arranged that the guide during its forward and rearward movements moves in a path substantially concentric with the needle. This inner edge of the welt is thus maintained in substantially the same position with relation to the path of the needle regardless of the thickness of the work. The welt guide is yieldingly pressed forward into engagement with the work by means of a coiled spring 128 mounted on the rear end of the carrier 118 and interposed between a flange on the carrier and the ball 125. The mechanism for locking the welt guide in position comprises a segment 129 formed on the swinging support 122 and a locking lever 130 pivoted at 132 on the frame of the machine, and formed with an eccentric face arranged to engage the rear face of the segment to lock the support 122 in position. The mechanism for actuating the locking lever 130 to lock and unlock the welt guide comprises a lever 134 pivoted on a stud 136, and a link 138 connecting one arm of said lever with the locking lever. A cam lever 140 is also pivoted on the stud 136 and carries a cam roll 142 engaging in a cam groove in a cam disk 144 mounted on the sewing cam shaft 40. The lever 134 is actuated from the cam lever 140 by means of

an abutment screw 146 mounted in an arm on the lever 134 and engaging a lateral projection on the forward side of the cam lever and a spring pressed plunger 148 mounted in another arm on the lever 134 and arranged to engage a projection on the rear side of the cam lever. The lever 134 is normally held by the action of the plunger 148 in the angular position shown in Figure 7 with relation to the cam lever with the abutment screw 146 in engagement with the projection on the forward side of the cam lever. With the above construction the lever 134 is swung forwardly and rearwardly by the cam lever, and the locking lever 130 is swung forwardly and rearwardly with the lever 134 to lock and unlock the welt guide. The cam lever is arranged to have a certain amount of overthrow or excess movement in a direction to lock the welt guide, the plunger 148 yielding during the locking movement of the cam lever after the locking face on the locking lever has engaged the segment 129. The provision of the yielding connection between the cam lever 140 and the lever 134 eliminates the necessity of frequent adjustment of the parts to take up wear, and insures the locking of the welt guide in a reliable manner even when the parts become considerably worn by long continued use.

The welt guide is moved in the direction of feed to assist in feeding the work by swinging the carrier 118 in a horizontal plane about its connection with the swinging support 122. The carrier 118 is swung horizontally about its connection with the support 122 by the reciprocating movements imparted to the slide 126 by means of a cam lever 150 pivoted on a stud 152 through a link 154 connecting the cam lever with the slide. As shown in Figs. 43 and 47 the connection between the slide 126 and the link 154 consists of a boss formed on the slide, which engages in an opening in the end of the link, the link being held in place by means of a circular plate 156 secured to the boss. Oscillating movements are imparted to the cam lever 150 to reciprocate the slide 126 through the engagement of a cam roll 158 mounted on the lever with a cam groove formed in the cam disk 58.

The take-up 14 operates in the usual manner during each cycle of operations to draw the thread taut about the shank of the needle when the needle is in the work, and to pull thread from the supply for the formation of the succeeding stitch. The take-up is carried by a reciprocatory slide block 160 mounted in guides in the frame of the machine and is reciprocated by means of a cam lever 162 pivoted on the shaft 34 through a link 164 connecting the slide block with the upper end of the cam lever. The cam lever 162 carries a cam roll 166 engaging in a cam groove in the cam disk 58.

The thread retaining device 16 is arranged to engage frictionally the thread between the take-up and the looper, and operates to maintain the thread taut between the retaining device and the work during the retracting or inactive stroke of the take-up, and allows the thread to pay out under the pull exerted thereon by the looper, thread finger and needle as required by these thread handling devices, thereby insuring the proper looping of the needle and formation of each stitch. The thread retaining device comprises a thread engaging plate 168 secured by screws 170 to the frame of the machine, and a co-operating thread-engaging plate 172 mounted on the inner ends of guide screws 174, see Fig. 24, secured in the frame so that it is movable toward and from the plate 168. The plate 172 is yieldingly pressed toward the plate 168 by means of a coiled spring 176 interposed between the plate 172 and the inner end of an adjusting screw 178 threaded into the frame. The thread extends from the take-up downwardly between the plates 168 and 172 and thence through the opening in the looper lever 68, through the looper, and back of the thread finger to the work. With the above construction, after the completion of the loop-drawing stroke of the take-up, the thread is slackened between the take-up and the retaining device by the retracting movement of the take-up, and is then drawn downwardly between the retaining plates 168 and 172 by the pull exerted by the thread handling devices on the thread. The retaining plates 168 and 172 at this time maintain a yielding pressure on the thread tending to retard its movement and thus keep the thread taut between the retaining device and the work. The retaining device thus takes the place of an auxiliary take-up, insuring the proper looping of the needle and furnishing the resistance against which the needle pulls at the end of its retracting stroke to tighten the preceding loop. The pressure with which the retaining plates 168 and 172 engage the thread may be adjusted to regulate the action of said device by turning the adjusting screw 178.

The tension device comprises a tension wheel 180 about which the thread passes on its way from the supply to the work, and a brake device for retarding the rotation of the tension wheel to apply tension to the thread. The tension wheel is secured to one end of a shaft 182 journaled in a bearing in the frame of the machine, to the other end of which is secured a brake wheel 184. A pair of brake shoes 186 are arranged to engage the periphery of the brake wheel. The brake shoes 186 are formed on the arms of a spring plate bent in a loop and held in

place on the frame of the machine by means of a screw 188 passing through the eye of the loop. To enable the pressure exerted by the brake shoes on the brake wheel to be adjusted, an adjusting screw 190 is passed through the arms of the spring plate intermediate the screw 188 and the brake shoes, and is threaded into a hand nut 192. By the frictional engagement of the brake shoes 186 with the brake wheel 184 the rotation of the tension wheel is retarded so as to maintain a constant tension on the thread.

The driving mechanism for the sewing cam shaft, see Figs. 50 and 51, comprises a driving shaft 194 adapted to be connected at its upper end with a suitable power shaft and a vertical counter-shaft 196 connected with the driving shaft 194 by a universal joint 198. The counter-shaft 196 carries the driving member 200 of a friction clutch the driven member of which, indicated at 202, is carried by a flange formed on a sleeve 204 loosely mounted on the counter-shaft. The sleeve also carries a spiral gear 206 formed on the flange on said sleeve which meshes with a spiral gear 208 fixed to the sewing cam shaft. During the sewing operation the members 200 and 202 of the main friction driving clutch are engaged, and the sewing cam shaft is driven through the spiral gears 206 and 208 at a speed dependent upon the speed of the driving shaft 194.

The jack for supporting the lasted shoe during the operation of the machine, see Fig. 1, comprises a heel support 210 and a toe rest 212 mounted upon a spindle 214. The jack is supported in the machine in substantially the same manner as the jack of the Topham machine covered by the above application so that the various movements may be imparted to the jack required to locate a shoe supported on the jack in the proper position with relation to the sewing mechanism as the point of operation is transferred about the shoe. In the construction shown the lower end of the jack spindle is secured to a hemispherical shell or casing 216 pivoted to swing upon bearing pins 218, see Figs. 86 and 87, secured in a gimbal ring 220 having their inner ends engaging in bearings in the shell. The gimbal ring 220 in turn is pivoted to swing upon bearing pins 222 mounted in the ring and having their inner ends engaging in bearings in a wheel 224. The common axis of the bearing pins 218 is preferably located substantially at right angles to the common axis of the bearing pins 222 so that the shell 216 and the jack spindle can swing in any direction about its connections with the wheel 224. The wheel 224 is mounted to rotate on a vertical stud 226 which is secured in a casing 228 carried at the forward end of hollow supporting arms 230, see Figs. 55 and 58. This manner of mounting the jack enables the jack to be rotated freely. The rear ends of the supporting arms 230 are secured in a carrier 232 engaging between spaced projections or arms formed at the upper end of a support 234 and are pivotally mounted on said support to swing in a vertical plane by means of bearing pins 236. The support 234 embraces a second support 238 and is pivotally mounted on the latter support to swing in a plane somewhat inclined to the vertical by means of bearing pins 240. The support 238 is provided at its lower end with spaced arms and is pivotally mounted in the machine to swing forwardy and rearwardly in a vertical plane by means of bearing pins 242. With this construction the jack is movable vertically and the lower end of the jack spindle is freely movable in any direction in a horizontal plane. Furthermore, the connection between the lower end of the spindle and the devices for supporting the same will permit the upper end of the jack and the shoe to be moved horizontally in any direction independently of the lower end of the jack spindle. In order to support the jack spindle and at the same time to permit it to move vertically to accommodate itself to the necessary variations in the vertical position of the shoe, a coiled spring 245 is connected at one end with the rear end of the carrier 232 and at its other end with the support 234.

During the sewing operation the shoe is held positively to the machine at all times during each cycle of operations by the needle, welt guide and channel guide roll. Relatively slight vertical movements to compensate for the transverse curvature of the shoe bottom are imparted to the jack and the shoe by the action of the spring 245 on the jack and by the engagement of the channel guide roll and welt guide with the shoe, these parts acting as guides for the shoe. The required tipping movements are imparted to the jack and thereby to the shoe by devices acting on the jack spindle to move the lower end of the spindle in horizontal directions forwardly, rearwardly and laterally of the machine, and the lateral turning movements are imparted to the shoe by devices acting on the jack spindle to rotate the spindle. Because of the fact that the shoe is held at all times at the point of operation by the needle, channel guide roll and welt guide, the tipping and turning movements are caused to take place about the point of operation. In the present construction the lateral tipping movements of the shoe are produced by swinging the support 238 forwardly and rearwardly, thereby imparting forward and rearward movements to the lower end of the jack spindle. The mechanism for thus swinging the support comprises a cam lever 244 pivoted on a shaft 246 and a ball ended link 248 connecting one

arm of the lever with the support 238. The other arm of the cam lever 244 carries a cam roll 250 arranged to engage the periphery of a cam disk mounted on the shaft 252 which for the sake of convenience will be hereinafter termed the pattern cam shaft. This shaft is rotated through less than a complete revolution during the sewing of a shoe by mechanism hereinafter described.

Longitudinal tipping movements are imparted to the jack and thereby to the shoe by swinging the support 234 about the bearing pins 240, thereby imparting movements to the lower end of the jack spindle laterally of the machine. The required swinging movements are imparted to the support 234 by means of a cam lever 254 pivoted on the shaft 246 and a link 256 connecting one arm of the cam lever with an arm 258 on the support. The other arm of the cam lever carries a cam roll 260 arranged to engage the periphery of a cam disk mounted on the cam shaft 252. The lateral turning movements of the jack and the shoe are produced by imparting turning movements to the wheel 224 about the stud 226. The required turning movements are imparted to the wheel by means of a cable 262 passing about the wheel within a groove in the periphery thereof and secured from slipping about the wheel by means of a clamping plate 264. The part of the cable leading rearwardly from the right side of the wheel 224 extends about a pulley 268 mounted upon a stud 270 secured in the carrier 232, thence extends to the right about a pulley 272 mounted to rotate on a stud 274, and is secured at its end to said pulley. The part of the cable 262 leading rearwardly from the left side of the wheel 224 extends about a pulley 276 mounted on a stud 278 secured in the support 232, thence extends toward the rear of the machine and passes over a pulley 280 mounted on an arm of a stationary carrier 282. To the end of this part of the cable is secured a weight 283 which operates to keep the cable taut at all times. The required rotative movements of the wheel 224 are produced and controlled by rotative movements imparted to the pulley 272. The mechanism for rotating the pulley comprises a gear 284 secured to the pulley and a cam lever 286 pivoted on the shaft 246, one arm of which carries a gear segment 288 meshing with the gear 284. The other arm of the cam lever carries a cam roll 290 arranged to engage the periphery of a cam disk mounted on the cam shaft 252.

It will be noted from an inspection of Fig. 58 that the pulley 268 is arranged to the rear of the pulley 276 or intermediate the latter pulley and the axis upon which the carrier 232 is arranged to swing laterally of the machine. With the parts arranged as above described, the weight 283 tends to rotate the pulley 272 in a counterclockwise direction and tends to swing the carrier 232 to the left and to move the carrier rearwardly. The weight thus acts to maintain the cam rolls carried by the cam levers 244, 254 and 286 constantly in engagement with their respective cam disks and to eliminate back lash in the connections between said levers and the jack.

The jack of the present invention has the same construction, arrangement and mode of operation of parts as the jack illustrated and described in the Topham patent referred to above. The jack illustrated in the drawing (see Figs. 83 to 87, inclusive) is constructed and arranged so that upon the placing of the shoe on the jack the shoe is automatically located in a predetermined and unvarying position lengthwise of the jack regardless of the size of the shoe placed on the jack and is then securely clamped in adjusted position, and that at the completion of the sewing operation the shoe is unclamped and the parts of the jack are restored to their initial positions ready for the application of another shoe to the jack. The shoe is gaged with relation to the jack from the forward point in the bulge in the toe portion of the upper of the shoe. The toe rest 212 is concave in cross section so that it will center the toe of the shoe relative to the jack and is mounted on the upper end of an arm 292 on the jack frame. The heel support 210 consists of a last pin for insertion in the last pin hole in the last and is mounted upon a lever 294 pivoted on a stud 296 carried at the upper end of a swinging arm 298. The heel support carrying arm 298 is pivoted at its lower end to the central portion of the jack frame by means of a stud 300 so that the arm may be swung toward and from the toe rest supporting arm 292 to carry the last pin toward and from the toe rest. Before a shoe is placed on the jack the arm 298 is located in a position relatively remote from the arm 292 and upon the placing of the shoe on the last pin 210 is swung toward the arm 292 to adjust the shoe in a predetermined position longitudinally of the jack. The arm 298 is acted upon by a comparatively heavy coiled spring 302 secured at one end to the arm 292 and at its other end to a pin 304 mounted in the outer end of a lever 306 pivoted upon a stud 308 secured in the arm 298. Upon the hub of the lever 306 is formed a series of gear teeth meshing with the teeth of a gear segment 310 formed on the last pin lever 294. The opposite ends of the pin 304 are engaged in slots 312 in the arm 298 which limit the movement of the lever 306. When a shoe is applied to the jack the arm 298 is held substantially in the position shown in Fig. 84 relative to the arm 292 with the last pin located so that

when the shoe is applied thereto the toe of the shoe will be out of engagement with the toe rest as shown in said figure, the coiled spring 302 then being distended and the pin 304 held in engagement with the inner ends of the slots 312. Upon the placing of the shoe on the last pin the arm 298 is released so that it is free to move under the action of the coiled spring 302. By the action of said coiled spring the arm 298 is swung toward the arm 292 thereby carrying the toe of the shoe into engagement with the surface of the toe rest and sliding the same along the toe rest toward the forward end thereof. The surface of the toe rest with which the toe of the shoe is thus brought into contact is inclined upwardly with relation to the arc about which the toe of the shoe is swung, so that as the toe of the shoe slides along this surface it is lifted thereby swinging the last pin lever 294 about the stud 296 and also swinging the lever 306 about the stud 308 in a direction to carry the pin 304 away from the inner ends of the slots 312. Thus when the shoe is adjusted in the proper position on the jack and the swinging movement of the arm 298 ceases, the parts described will have assumed substantially the positions shown in Figure 83, the coiled spring 302 not only acting on the arm 298 to maintain the shoe in its adjusted position longitudinally of the jack but also through its action on the lever 306 tending to tilt the lever 294 in a direction to depress the toe of the shoe and thereby clamp the shoe firmly on the jack.

In order that the shoe may be located accurately in a predetermined and definite position longitudinally of the jack, mechanism is provided for arresting the swinging movement of the heel support carrying arm 298 toward the arm 292 when the forward point of the bulge in the toe portion of the upper reaches a definite predetermined position longitudinally of the jack. The mechanism for thus arresting the movement of the arm 298 comprises a bar 314 pivotally connected at one end with the arm 298 and having its other end arranged to pass through an opening in the toe rest supporting arm 292. The bar 314 is formed on its lower side with a series of rack teeth meshing with the teeth of a pinion 316 rotatably mounted in the arm 292. To the pinion 316 is secured a ratchet wheel 318, and a pawl 320 pivoted at 322 on the arm 292 is arranged to engage the teeth of the ratchet wheel. When the arm 298 is swung toward the arm 292 to adjust the shoe longitudinally of the jack the ratchet wheel 318 is rotated in a clockwise direction, Fig. 84, by the longitudinal movement of the rack bar 314. The pawl 320 is normally held out of engagement with the ratchet wheel during the movement of the arm 298 toward the arm 292 by means of a latch 324 pivoted at 326 on the arm 292 and formed with a projection arranged to engage the tail of the pawl. The latch and the pawl are both acted upon by a coiled spring 328 which tends to move the latch into position to engage the pawl and also to move the pawl into engagement with the ratchet wheel 318. The latch is actuated to release the pawl by means of a rod 330 mounted for longitudinal movement in guides in the arm 292 with its lower end engaging an arm on the latch. The upper end of the rod 330 is engaged by a lateral projection formed on the lower end of a feeler lever 332 pivoted at 334 in a central slot in the toe rest. The upper end of the feeler lever 332 is located in position to be engaged by the bulge in the toe portion of the upper of a shoe applied to the jack. As the shoe is moved forwardly on the jack by the swinging movement of the heel support carrying arm 298 under the influence of the coiled spring 302 the bulge at the toe portion of the upper of the shoe engages the upper end of the feeler lever 332 thereby swinging the feeler lever on its axis and actuating the rod 330 and the latch 324 to disengage the latch from the pawl 320. Upon its release by the latch the pawl is engaged with the ratchet wheel 318 thereby arresting the rotation of the ratchet wheel and the swinging movement of the arm 298. The swinging movement of the arm 298 to adjust the shoe longitudinally on the jack is thus positively arrested when the forward point in the bulge in the toe portion of the upper of the shoe reaches a predetermined position longitudinally of the jack. The shoe after its adjustment in the proper predetermined position is held securely clamped on the jack by the action of the coiled spring 302 on the lever 306 as above explained.

The mechanism for controlling the swinging movements of the heel support carrying arm 298 comprises a toggle lever consisting of two pivotally connected links 336 and 338, of which the link 336 is pivotally connected with the arm 298 and the link 338 is pivotally connected with a lever 340 pivoted on a stud 342 carried by the central portion of the jack frame. The relative angular movement of the members of the toggle lever in a direction to straighten the toggle is limited by means of a projection 344 formed on the member 336 of the toggle lever arranged to engage an abutment or contact face on the member 338. A toggle actuating and controlling lever 346 is pivoted on the stud 342 by the side of the lever 340 and carries an abutment screw 348 for engagement with a shoulder formed on the lever 340. The levers 340 and 346 are connected by means of a coiled spring 350 which normally maintains the lever 340 in position relative to the lever 346 with the

shoulder formed thereon in contact with the abutment screw 348. The lever 346 carries a bevel gear segment 352 meshing with a bevel gear 354 secured to the upper end of a shaft 356 mounted in bearings in the jack spindle 214. Upon the lower end of the shaft 356 is formed a yoke 358, see Figs. 86 and 87. which embraces a gimbal ring 360 and is pivotally connected with the ring by means of bearing pins 362 secured in the ring and engaging in bearings in the arms of the yoke. The ring 360 embraces a yoke 364 mounted on the upper end of a stud 366 mounted within and secured to the stud 226 and is pivotally connected with the latter yoke by means of bearings pins 368 secured in the ring and engaging in bearings in the arms of the yoke. The shaft 356 through its connection with the stud 366 is held from rotary movement with the jack spindle but is free to swing in any direction relative to the stud in accordance with the swinging movements of the spindle. When the shoe is placed on the jack the toggle lever 336—338 is straightened and the toggle actuating and controlling lever 346 and the intermediate lever 340 are held in position through the engagement of the gear segment 352 with the bevel gear 354 to maintain the heel support carrying arm 298 in a position remote from the toe rest supporting arm 292 as shown in Fig. 84 against the tension of the spring 302. Upon the placing of a shoe on the jack the toggle lever is broken allowing the spring 302 to actuate the arm 298 to adjust the shoe in a predetermined position longitudinally of the jack and to clamp the same in position as shown in Fig. 83. The jack is turned through substantially half a revolution in the direction of the arrow *a*, Fig. 83, during the sewing of a seam. During this turning movement of the jack the toggle actuating and controlling lever 346 is swung on the stud 342 in the direction of the arrow applied thereto in said figure and the intermediate lever 340 is swung therewith until at the completion of the sewing of the seam the toggle lever is straightened. The jack is turned in the opposite direction or in the direction of the arrow *b*, Fig. 84, through substantially half a revolution by the rotation of the pattern cam shaft independently of the sewing cam shaft to bring the jack to its initial or starting position, and the lever 346 is swung on the stud 342 in the direction of the arrow applied thereto in Fig. 84. The toggle lever 336—338 is then in a straightened condition and is moved longitudinally from the lever 346 through the lever 340 to swing the arm 298 away from the arm 292 into the position shown in Fig. 84. The shoe is thus unclamped from the jack and may be removed from the jack merely by lifting the shoe from the last pin 210.

To take up lost motion and assist in straightening the toggle lever at the completion of the turning movement of the jack produced during the sewing of the seam a coiled spring 370 is attached at one end to the arm 298 and at its other end to a projection formed on the member 336 of the toggle lever. The yielding connection between the intermediate lever 340 and the toggle actuating and controlling lever 346 will take care of any additional movement or overthrow of the lever 346 at the completion of the seam after the toggle lever is straightened.

During the sewing of the seam along the shank of the shoe on the side of the shoe first sewn the jack is turned to a certain degree in the direction of the arrow *b*, Fig. 84. If the operator should start the machine while the toggle lever is straightened the movement of the lever 346 in the direction of the arrow, Fig. 84, which would be produced by this rotary movement of the jack would be liable to result in breakage of certain of the parts. In order to break the toggle lever when this rotary movement of the jack occurs in case the machine is started with the toggle lever straightened, a chain 372 is attached at one end to the projection on the member 336 of the toggle lever and at its other end to the lever 340.

In order to disengage the pawl 320 from the ratchet wheel 318 and to reset the pawl in position to be engaged and held by the latch 324, the rack bar 314 is formed with a projection 374 at its outer end arranged to engage a laterally projecting arm 376 formed on the pawl. As the heel support carrying arm 298 is swung from the position shown in Fig. 83 to the position shown in Fig. 84, and the bar 314 is thus moved longitudinally to the left to the position shown in the latter figure, the projection 374 on the bar engages the arm 376 on the pawl and moves the pawl to disengage the same from the ratchet wheel 318 and to carry the tail thereof within the cooperating projection on the latch 324 as shown in Fig. 84. The pawl is held in the position shown in Fig. 84 until the arm 298 is released and starts to swing toward the toe rest supporting arm 292 under the influence of the coiled spring 302 when the projection 374 on the bar 314 is disengaged from the arm 376 on the pawl by the longitudinal movement of the bar to the right. The pawl is then caught by the latch and held until the latch is disengaged from the pawl by the movement of the feeler lever 332 produced by the engagement of the shoe therewith.

The devices for breaking the toggle lever 336—338 upon the placing of the shoe on the jack comprise a spring pressed dog 378 pivoted upon a vertically movable block

380 and arranged to engage the laterally bent end of an arm 382 formed on the member 336 of the toggle lever. The block 380 is secured to the lower end of a rod 384 mounted for longitudinal movement in guides in the lever 294. The rod 384 is acted upon by a coiled spring 386 surrounding the rod within a recess in the lever 294 and interposed between a washer resting on the lower face of the recess and a collar 388 mounted on the rod and held from longitudinal movement thereon by a pin 390. This pin through its engagement with the upper face of the recess in the lever 294 limits the upward movement of the rod. The parts are constructed and arranged so that when the rod 384 is in elevated position the upper end of the rod projects some distance above the body of the lever 294 alongside the last pin 210 and the dog 378 is located above the laterally bent end of the arm 382 in position to engage the same as shown in Fig. 85. Fig. 85 shows the condition of the parts before a shoe is applied to the jack. Upon the application of a shoe to the last pin and the seating of the last pin in the last pin hole in the last, the last engages the upper end of the rod 384 and depresses the same. During the downward movement of the rod the dog 378 engages the end of the arm 382 and swings the same downwardly, thereby breaking the toggle lever 336—338 and allowing the arm 298 to be actuated by the spring 302 to adjust the shoe longitudinally of the jack and to clamp the same to the jack. As the toggle lever is straightened by the turning movement imparted to the jack during the sewing of a seam, the laterally bent end of the arm 382 is swung upwardly to a position outside of the lower end of the dog 378. As the arm 298 is swung away from the arm 292 by the turning movement imparted to the jack to bring the same to its initial or starting position, the end of the arm 382 engages the lower end of the dog 378 and swings the same slightly inwardly. Upon the removal of the shoe from the last pin the rod 384 is elevated by the action of the spring 386 and the lower end of the dog 378 is swung outwardly by the action of its spring over the end of the arm 382 as shown in Fig. 85. The parts of the jack are thus restored to their initial position ready for the reception of another shoe.

The movement of the heel support carrying arm 298 under the influence of the coiled spring 302 upon the release of the arm by the toggle lever 336—338 if unrestrained is liable to result in breakage of certain of the parts. A dash pot mechanism is therefore provided for retarding the movement of the arm. This dash pot mechanism is adapted to be fluid controlled and briefly described comprises a cylinder 392 secured at its lower end to the jack frame, a longitudinally movable bar 394 having rack teeth formed at its upper end which are held in mesh with the pinion 316, a piston 396 secured to the bar 394, and a valve 398 mounted in the piston. This valve is constructed to allow the controlling fluid to pass freely from above the piston to the space below the same as the piston moves upwardly in the cylinder and to retard the passage of the fluid from below the piston as the piston is moved downwardly in the cylinder. The manner in which this dash pot mechanism operates to retard the movement of the arm 298 will be obvious without further description.

The mechanism for actuating the jack to impart feeding movements to the shoe, see Figs. 3, 63, 64, 65 and 66, comprises a lever 400, which may for convenience be termed the feeding lever, pivoted by means of a stud 401 upon the frame of the machine, and a bar connecting said lever with the forward or toe end of the jack. The lever 400 is made up of the stud 401 and upper and lower arms secured respectively at their rear ends to the upper and lower ends of the stud, as shown in Fig. 63. A bar 402 is connected at one end by a universal joint 403 with the forward end of the upper arm of the lever 400, and at its other end by a universal joint 404 with the forward end of the jack. During the sewing operation the feeding lever 400 is swung toward the left to actuate the jack to advance the marginal portion of the shoe at a substantially uniform rate past the stitch forming devices, or to feed the shoe in conformity with the feeding movements normally imparted to the shoe by the shoe engaging feeding devices of the sewing mechanism. The mechanism for actuating the lever 400 in this manner comprises links 405 and 406 pivotally connected by a stud 407 of which the link 405 is pivotally connected with the lever 400 by a stud 408, and the link 406 is pivotally connected at 409 with the end of an arm 410 pivoted on a stud 411. The arm 410 is swung about the stud 411 during the sewing operation by means of a cam lever 412, one arm of which is connected with said arm by means of a link 413. The other arm of the cam lever carries a cam roll 414 arranged to engage the periphery of a cam disk mounted on the pattern cam shaft 252. The path of connection between the links 405 and 406 during the swinging movements of the arm 410 is controlled by a controlling arm 415 pivotally connected at its forward end by the stud 407 with said links. The controlling arm is pivoted at its rear end upon a stud 416 carried by a lever 417 which, for convenience, may be hereinafter termed the fulcrum carrying lever. As clearly shown in Figures 63 and 64, the body

of the lever 417 is made in the form of a rectangular frame, the arm 415 engaging between the upper and lower sides of said frame. The lever 417 is pivoted by means of bearing pins 418 upon the frame of the machine. During the sewing operation the fulcrum carrying lever 417 is locked in position and the links 405 and 406 are actuated through the connection described from the cam lever 412 to actuate the feeding lever 400, the controlling arm 415 and the connection between the links swinging about the stud 416 during the movement of the links.

The center of the pivotal connection between the controlling arm 415 and the links 405 and 406 is located the same distance from the fulcrum 416 as the axis of the fulcrum-carrying lever 417 so that the center of said pivotal connection is brought into alignment with the axis of said lever as the controlling arm is swung about its fulcrum during the sewing of a seam. The parts are constructed and arranged so that at the beginning of the sewing operation the controlling arm 415 is located at the right of the fulcrum carrying lever 417, that the swinging movement of the controlling arm carries the center of the pivotal connection between the links 405 and 406 and said arm into alignment with the axis of the fulcrum carrying lever 417 when the toe of the shoe is reached, and that at the completion of the seam the controlling arm 415 is swung into a position at the left of the fulcrum carrying lever, the positions of said controlling arm at the beginning and at the end of the sewing operation having a symmetrical relation to the position of said lever.

A cable 419, see Figs. 1 and 59, is fastened at one end to the stud 408 and extends therefrom about a pulley 409 mounted to turn upon the end of the lower bearing pin 418, thence about a pulley 420 mounted on the fulcrum carrying lever 417, and over a pulley 421 mounted on an arm on a stationary bracket 422 and a weight 423 is suspended at the other end of the cable. The weight 423 through its action on the cable 419 tends to swing the feeding lever 400 to the right and the rear end of the fulcrum carrying lever 417 to the left and thus tends to swing the cam lever 412 rearwardly. The weight will thus act on the cam lever to maintain the cam roll constantly in contact with the periphery of the corresponding cam disk, and will eliminate lost motion or back lash between the parts of the mechanism through which the feeding lever is actuated and also between the connections intermediate the fulcrum carrying lever 417 and the feeding lever.

In the present machine as above stated the feeding lever 400 is actuated to feed the shoe to impart a continuous feeding movement to the shoe corresponding with the feeding movement which is normally imparted to the shoe by the shoe engaging feeding devices. With a jack actuating feeding mechanism of the above construction the imparting of the proper movement to the jack to feed a shoe of one size requires that a movement of greater amplitude or extent be imparted to the feeding lever 400 than is required in feeding a shoe of smaller size. To enable this mechanism for actuating the jack to feed the shoe to impart the proper feeding movements to the jack to feed shoes of different sizes, the movement imparted from the arm 410 through the links 405 and 406 to the feeding lever is adjusted in accordance with the size of the shoe placed in the machine. The mounting of the fulcrum of the controlling arm 415 upon the lever 417 enables this fulcrum to be shifted to vary the path of connection between the links 405 and 406. In changing from one size of shoe to a smaller size, the fulcrum carrying lever is swung to the left about its axis to adjust the fulcrum of the controlling arm 415, while in changing from one size to a larger size, the fulcrum carrying lever is swung to the right to adjust the fulcrum of the controlling arm. The shifting of the fulcrum of the controlling arm to the left will increase the amount of the movement of the arm 410 absorbed in the relative movement of the links 405 and 406 and will cause a reduction in the amplitude of movement of the feeding lever 400, while in a corresponding manner the shifting of the fulcrum of the controlling arm 415 to the right will reduce the amount of the movement of the arm 410 absorbed in the relative movement of the links 405 and 406 and will cause an increase in the amplitude of movement of the feeding lever.

The fulcrum of the controlling arm 415 is located in the proper position for the size of the shoe to be sewn by the placing of the shoe in the machine in correct position for the starting of the seam. At the time when the shoe is placed in the machine, the fulcrum carrying lever 417 is unlocked so that it may be adjusted about its axis. When a shoe is placed in the machine in correct position for the starting of the seam, the feeding lever 400 will be adjusted through the connection between said lever and the jack in a position depending upon the size of the shoe. The adjustment of the feeding lever thus produced will effect the proper adjustment of the fulcrum of the controlling arm 415. Thus in changing from one size of shoe to a smaller size the feeding lever 400 will be swung to the left upon the placing of the shoe in the machine in position to be sewn, the connection between the links 405 and 406 will be swung rearwardly about the pivotal connection be-

tween the link 406 and arm 410, and the fulcrum carrying lever will be swung to the left by the action of the controlling arm 415. In a corresponding manner in changing from one size of shoe to a larger size, the feeding lever 400 will be swung to the right upon the placing of the shoe in the machine, the connection between the links 405 and 406 will be swung forwardly about the pivotal connection between the link 406 and the arm 410, and the fulcrum carrying lever 417 will be swung to the right by the action of the controlling arm 415.

To enable different styles of shoes to be sewn upon the machine, a series of sets of cam disks for actuating the cam levers 412, 286, 244 and 254 are mounted on the pattern cam shaft 252 and are arranged so that they may be interchangeably located in position to be engaged by the cam rolls carried by the respective cam levers. In the construction illustrated, see Fig. 55, the pattern cam shaft carries seven sets of cam disks. The cam disks for actuating the several cam levers, 412, 286, 244 and 254 are indicated in the drawing respectively at 424, 425, 426 and 427 and each set referred to is of course made up of four disks, one from each of these groups. To enable the cam disks of any one of the sets to be located in operative positions with relation to the several cam levers, the pattern cam shaft 252 is mounted so that it may be shifted axially, and manually operable means is provided for shifting the same. In the construction illustrated the pattern cam shaft is centrally bored and rotates on a vertical supporting shaft 428. The upper end of the shaft 428 is mounted to turn in a bearing 429 in the frame, and has an arm 430, see Figs. 3 and 56, secured thereto and engaging the upper end of said bearing to support the shaft. The shaft 428 is formed at its lower end with screw threads 431 of relatively steep pitch and is threaded into a sleeve 432 mounted to slide vertically in a bearing 433 in the frame and held from turning movement by a key 434. The pattern cam shaft is supported by the sleeve 432 through a ball bearing 435 interposed between the lower end of the shaft and the upper end of the sleeve. With this construction the pattern cam shaft may be adjusted axially to locate any one of the sets of cam disks in operative position with relation to the cam levers by a suitable rotary adjustment of the shaft 428, which is adapted to be rotated manually by swinging the arm 430. In order to hold the shaft 428 in position a spring pressed plunger 436 is mounted in the outer end of the arm 430 and is arranged to engage in an opening 437 in the frame of the machine. To the upper end of the plunger is secured a sleeve 438, see Fig. 57, by which the plunger may be manually retracted from the opening before adjusting the shaft 428. The threads on the shaft are so constructed that the pattern cam shaft is shifted axially to carry one set of cam disks out of operating position and to locate the next succeeding set in operative position with relation to the cam levers by a single complete rotation of the shaft 428.

In order that the cam levers 412, 286, 244 and 254 and the cam rolls carried thereby may not interfere with the shifting of the cam disks carried by the pattern cam shaft, mechanism is provided for swinging said cam levers in a direction to carry the cam roll supporting arms thereof away from the cam disks prior to the shifting of the cam disks. In the construction shown, see Figs. 1 and 55, a collar 439 is secured to the shaft 246 intermediate the hub of the cam lever 412 and the hub of the cam lever 286, and a similar collar 440 is secured to the shaft 246 intermediate the hub of the cam lever 244 and the hub of the cam lever 254. Each of these collars is provided with shoulders arranged to engage opposed shoulders formed on the hubs of the respective cam levers. The shoulders on the collars and on the hubs of the cam levers are arranged so that when the shaft 246 is in its normal position, the cam levers can swing freely about the shaft as required in imparting the various movements to the jack during the sewing operation. Before the pattern cam shaft is moved axially to shift the cam disks, the shaft 246 is swung in a counter-clockwise direction, Fig. 3, from its normal position. During this turning movement of the shaft the shoulders on the collars 439 and 440 engage the opposed shoulders on the hubs of the cam levers, and the cam levers are swung with the shaft, thereby carrying the cam roll supporting arms of the cam levers away from the cam disks. An operating arm 441 is secured to the upper end of the shaft 246 and a spring pressed plunger 442 is mounted in the end of said arm and is arranged to engage in an opening 443 in the frame of the machine to hold the arm and the shaft 246 in normal position. A sleeve 444 similar to the sleeve 438 is secured to the upper end of the plunger 442. In changing from one style of shoe to another, the operator before shifting the cam disks grasps the sleeve 444, disengages the plunger 442 from the opening 443 in the frame, and swings the arm 441 in a counter-clockwise direction, thereby turning the shaft 246 to carry the cam roll supporting arms of the cam levers away from the cam disks. He then grasps the sleeve 438, disengages the plunger 436 from the opening 437 in the frame and swings the arm 430 in one direction or the other through one or more complete revolutions to bring the desired set of cam disks into operating

position. He then swings the arm 441 back to its normal position to restore the cam levers to operative positions with relation to the cam disks of this set. The arm 430 is formed with a slot in which the plunger 442 engages when the arms 430 and 441 are in their normal positions as shown in Fig. 3. The arm 430 is thus locked in position until the arm 441 is swung in a counter-clockwise direction to disengage the plunger 442 from the slot in the arm 430. This construction makes it practically certain that the operator will not attempt to shift the cam disks while the cam levers are in operative positions.

The adjustment of the fulcrum of the controlling arm 415 will adjust or time the action of the jack actuating feeding mechanism with relation to the action of mechanism for tipping and turning the jack to present the shoe properly to the sewing devices. In order that the jack actuating feeding mechanism may operate to feed the shoe always at the same rate that the shoe is normally fed by the shoe engaging feeding devices regardless of the size of the shoe, mechanism is provided for adjusting the speed of the pattern cam shaft in accordance with the size of the shoe to be sewn. The speed of the pattern cam shaft is adjusted in accordance with the size of the shoe upon the depression of the treadle to start the machine by the action of mechanism controlled from the fulcrum carrying lever 417.

The mechanism for driving the pattern cam shaft, see Figs. 50, 51, 56 and 59, comprises a gear 445 secured to the upper end of said shaft and a series of substantially duplicate gears 446 journaled on the shaft 246 and arranged to mesh with the gear 445 to drive the same. The gears 446 are all secured together and the gear 445 is shifted from engagement with one of said gears into engagement with another of the same as the pattern cam shaft is moved axially to shift the pattern cam disks. To the gears 446 is secured a gear 447 meshing with and driven by a gear 448 secured to a shaft 449 journaled in a bearing in the frame of the machine. To the gear 448 is secured a gear 450 and the gears 448 and 450 are driven by a gear 451 secured to a shaft 452 journaled in the frame of the machine, said gear meshing with the gear 450. To the gear 451 is secured a gear 453 and the gears 451 and 453 are driven from a sleeve 454 journaled in a bearing in the frame by a gear 455 formed on the lower end of the sleeve and meshing with the gear 453. The sleeve 454 is driven from a ratchet wheel 456 mounted on a shaft 456[a] journaled at its lower end in the sleeve 454 through a series of pawls 457, see Fig. 62, carried by the sleeve 454 and engaging the teeth of the ratchet wheel. The pawls 457 are respectively pivoted at 458 upon oscillatory levers 459 pivoted on studs 460 carried by a flange 461 formed at the upper end of the sleeve 454, and the pawls are acted upon by coiled springs 462 which yieldingly hold the pawls in engagement with the ratchet wheel. The angular positions of the pawl carrying levers 459 on their respective pivot studs are controlled by a non-rotating adjustable ring 463 pivoted on a stud 464 and having a circular groove 465 in which engage rolls 466 mounted on the respective levers. The shaft 456[a] is driven from a shaft 467 located in alignment therewith through the engagement of a clutch member 468 formed on the upper end of the shaft 456[a] with a clutch member 469 mounted on the shaft 467 to rotate therewith and movable longitudinally of said shaft into and out of engagement with the clutch member 468. In the illustrated construction, the clutch member 469 is formed with a diametrical key 470 engaging in a slot in an enlargement formed on the lower end of the shaft 467, and said clutch member is normally held in engagement with the clutch member 468 by the action of coiled springs 471. The shaft 467 is driven in timed relation to the sewing cam shaft 40 through a spiral gear 472 secured to the upper end of the shaft 467 and meshing with the spiral gear 206. As clearly shown in the drawings the gears 455, 453, 451, 450, 448, 447, 446 and 445 are so proportioned as to produce a considerable reduction in speed so that the pattern cam shaft is driven at a relatively slow speed as compared with that of the sleeve 454.

The speed at which the sleeve 454 is driven from the ratchet wheel 456 is controlled by the position of the ring 463. The angular positions of the levers 459 on their respective pivot studs during their rotation with the sleeve 454 is controlled by the ring which is adjustable about the stud 464 in a plane substantially parallel with the plane of rotation of the sleeve. The parts are constructed and arranged, however, so that in one angular position of the ring the center of the groove 465 lies in the axis of the sleeve, or that the groove is concentric with the sleeve and with the path of rotation of the axes of the levers 459. Obviously, with the ring in other angular positions the groove will be eccentric to the sleeve. With the ring located so that the groove is concentric with the sleeve 454 the levers will have no angular movement on their respective pivot studs during their rotary movement with the sleeve, and the sleeve will be driven by the ratchet wheel 456 through the pawls 457 at the same speed as the ratchet wheel. When the ring, however, is adjusted so that the groove 465 is eccentric to the sleeve 454, as shown in Fig. 62, the levers will be oscillated about their pivot studs during their rotative move-

ment with the sleeve, each lever swinging in one direction about its pivot stud during half of each revolution of the sleeve, and in the opposite direction during the remaining half of each revolution. During the swinging movement of each of the pawl carrying levers inwardly toward the axis of the sleeve the pawl carried thereby is first engaged with one of the teeth on the ratchet wheel 456, and the pawl and the lever then have a toggle action and operate to advance the pivot stud of the lever and the sleeve at a greater speed than the speed of rotation of the ratchet wheel, while during the swinging movement of the lever outwardly away from the axis of the sleeve, the pawl is advanced about the periphery of the ratchet wheel. The sleeve will always be driven from the ratchet wheel through the pawl mounted on the lever which has the most rapid inward movement, the other pawls then resting idly upon the ratchet wheel. With the ring 463 adjusted, in a position eccentric to the sleeve 454, the speed of rotation of the sleeve will be equal to the speed of rotation of the ratchet wheel 456 plus the increment in speed due to the angular movement of each of the pawl carrying levers about its pivot stud during its rotation. The amount of this increment will depend upon the extent of the adjustment of the ring from a position concentric with the sleeve. It will thus be seen that with the ring 463 located so that the groove 465 is concentric with the sleeve 454, the sleeve will be driven from the ratchet wheel 456 through the pawls at a minimum speed, and that the speed at which the sleeve is driven will be increased by an adjustment of the ring so that the groove is eccentric to the sleeve, the extent of the increase in the speed of rotation of the sleeve depending upon the extent of the adjustment of the ring.

During the sewing operation the pattern cam shaft is driven from the shaft 467 through the ratchet wheel 456, and the pawls 457 at a speed depending upon the adjustment of the ring 463. The ring 463 is adjusted to adjust the speed at which the pattern cam shaft is driven in accordance with the size of the shoe placed in the machine. The adjustment of the ring is effected through mechanism controlled by the position of the fulcrum carrying lever 417 which, as described above, is adjusted in accordance with the size of the shoe to be sewn by the placing of the shoe in position in the machine for the starting of the seam. In the present construction, this mechanism is adjusted to adjust the ring 463 upon the depression of the treadle to start the machine. As illustrated in the drawing, the ring 463 is formed with a series of gear teeth 473 meshing with the teeth of a gear segment 474 carried by an arm 475 secured to the upper end of a rock shaft 476. A longitudinally movable controller bar 477 is pivoted at one end at 478 to another arm 479 secured to the lower end of the rock shaft and is movably supported adjacent its other end by a link 480 connecting the controller bar with one arm of a lever 481 pivoted on a stud 482. The latter end of the controller bar 477 engages between spaced arms formed on the fulcrum carrying lever 417 and the controller bar is formed with oppositely inclined surfaces 483 leading to a recess 484 adapted to receive a roll 485 mounted on the lever 417. When the machine is at rest after a shoe has been placed on the jack the controller bar 477 is held in its rearward position by the action of a spring 485[a] as shown in Figure 59, the roll 485 then being disengaged from the recess 484. Upon the depression of the starting treadle to start the machine, the controller bar 477 is swung forwardly about its pivotal connection with the arm 479 to engage the roll 485 in the recess 484 by means of pins 486 mounted on a longitudinally movable bar 487, and arranged to engage spaced arms on the lever, see Fig. 79.

The bar 487 is mounted to slide in guides in the frame of the machine and is arranged to be actuated from the starting treadle in starting the machine, and to this end the left hand end of the rod is connected by the link 488 with one arm of a bell crank lever 489 pivoted on a stud 490. The other arm of the bell crank lever is connected by a treadle rod 491 with the starting treadle 492 which is pivoted on a stud 493 at the base of the machine and is normally held in elevated position by means of a coiled spring 494. Through the connections described upon the depression of the treadle 492, the bar 487 is moved longitudinally to the right, this movement of the bar operating to cause the engagement of the members 200 and 202 of the main driving clutch to start the machine in the manner hereinafter described. After the machine is started the treadle is released and is moved upwardly by the action of the spring 494 and the bar 487 is moved back to the left to its normal position. During the movement of the bar to the right produced by the depression of the treadle, the pin 486 engages the lever 481 and actuates said lever to swing the controller bar 477 forwardly.

Before the depression of the treadle to start the machine, the shoe is placed in the machine in the correct position for starting of the seam, thereby adjusting the fulcrum carrying lever 417 in accordance with the size of the shoe. When the controller bar 477 is swung forwardly to engage the roll 485 in the recess 484, if the recess is not in position to receive the roll the roll engages one of the inclined surfaces 483 on the controller bar, and the controller bar

is thereby shifted longitudinally in one direction or the other until the recess registers with the roll. The controller bar is thus located in a longitudinal position corresponding with the position of the fulcrum carrying lever 417, and through the connections described between the controller bar and the ring 463 the ring is adjusted to adjust the speed of the pattern cam shaft in accordance with the size of the shoe to be sewn.

The mechanism for locking the fulcrum carrying lever 417 in position during the sewing operation, see Fig. 59, comprises a rod 495 pivotally connected at one end with the rear end of the fulcrum carrying lever 417, and engaging in a sleeve 496 pivoted on a stud 497, and a pair of locking levers 498 pivoted to the sleeve on studs 499 and formed with cam shaped inner ends arranged to engage the rod 495. The locking levers 498 at their outer ends carry pins 500 engaging in slots formed in the opposite ends of a cross bar 501, to the central part of which is pivotally connected a sleeve 502 having a yielding connection through a coiled spring 503 with the rear end of a rod 504 engaging in the sleeve. The rod 504 is pivotally connected at its forward end with the controller bar 477. As the controller bar is swung forwardly upon the depression of the treadle, the rod 504 is moved forwardly therewith, thereby actuating the locking levers 498 to lock the rod 495 in the sleeve 496.

The controller bar is held in forward position during the sewing operation by means of a spring actuated latch 505 pivoted upon a stud 506 and arranged to engage a projection 507 on the hub of the lever 481. As the bar 487 is moved longitudinally to the right upon the depression of the treadle, thereby swinging the lever 481 into the position shown in Figure 61, the latch is swung by its actuating spring into position to engage the projection 507 on said lever and holds said lever in position as the bar 487 returns to its initial position upon the release of the treadle. The latch 505 remains in engagement with the projection 507 during the sewing of the seam about a shoe and also after the completion of the sewing operation until another shoe is placed on the shoe supporting jack. As another shoe is placed on the jack the latch is thrown out allowing the controlling bar 477 to swing back to its rearward position under the action of the spring 485a.

After a shoe has been placed by the operator on the jack and has been adjusted in a predetermined position with relation to the jack and clamped in adjusted position automatically by the action of the jack mechanism, the operator places the shoe in the machine with the channel guide roll 10 in engagement in the channel of the insole at the proper point for the starting of a seam, and then depresses the starting treadle to engage the main driving clutch to start the machine. During the sewing operation the members 200 and 202 of the main driving clutch are held in engagement and the machine is driven at a speed depending upon the speed of the driving shaft 196. When the sewing operation is completed the members of the main driving clutch are disengaged and the sewing mechanism is stopped through the action of automatically acting devices. The mechanism for disengaging the clutch and stopping the sewing mechanism is arranged to be thrown into operation automatically at a predetermined point in the operation of the sewing mechanism, and the machine is stopped with the sewing cam shaft 40 in a predetermined angular position. In the illustrated construction, see Figs. 50 to 54, inclusive, and 75, the sleeve 204 which carries the driven member of the main driving clutch also carries a brake member 508 arranged to engage a brake shoe 509 formed on the frame of the machine. The sleeve 204 is arranged to slide longitudinally of the counter-shaft 196 to carry the driven clutch member 202 into and out of engagement with the driving clutch member 200, and to carry the brake member 508 into and out of engagement with the brake shoe 509. The sleeve is acted upon by a coiled spring 510 interposed between the lower end of the sleeve and a flange on a bushing 511 surrounding the counter-shaft 196 and resting on a shoulder on the frame which normally maintains the sleeve in its upper position with the driven clutch member in engagement with the driving clutch member and with the brake member 508 disengaged from the brake shoe 509.

The mechanism for moving the sleeve 204 longitudinally to disengage the clutch and engage the brake comprises an oscillatory bell crank lever 512 pivoted on a stud 513 and carrying a cam roll 514 at the end of the laterally extending arm thereof which engages in a cam groove 515 in the sleeve 204. Said mechanism also comprises a locking pin 516 mounted to slide longitudinally in a carrier 517 and arranged to engage in a recess 518 in the downwardly extending arm of the bell crank lever 512. The carrier 517, see Figs. 52, 53 and 54, is mounted to slide longitudinally in suitable guides in the frame of the machine and is acted upon by a coiled spring 519 surrounding a rod 520 forming part of the carrier 517 and interposed between the outer end of an adjustable screw threaded sleeve 521 through which the rod slides and a nut 521a threaded on the outer end of the rod. The spring 519 normally holds the carrier 517 in position with a shoulder on the carrier in

engagement with the inner end of the sleeve 521. The locking pin 516 is acted upon by a coiled spring 522 which tends to move the same rearwardly into engagement with the bell crank lever 512. During the normal operation of the machine, however, the locking pin is held in forward position out of engagement with the arm of the bell crank lever so that the lever is oscillated idly by the action of the cam groove 515. In stopping the machine the locking pin is released and forced rearwardly by the action of the spring 522 against the forward side of the downwardly extending arm of the bell crank lever 512, and when the recess in the lever registers with the locking pin the locking pin is engaged in the recess thus locking the lever to the carrier 517. Obviously the lever 512 is actuated by the cam groove 515 to bring the recess 518 into registration with the locking pin 516 and the carrier 517 is locked to the lever at a definite predetermined point in the rotation of the sewing cam shaft 40. This occurs preferably when the roll 514 is in the upper idle portion of the cam groove. After the carrier 517 is locked to the bell crank lever 512 by the locking pin 516 as the cam roll 514 reaches a downward throw in the cam groove 515, the bell crank lever 512 is swung in a direction to move the carrier 517 longitudinally to the right, Fig. 52, against the tension of the spring 519. The cam roll 514 then passes into the lower idle portion of the cam groove 515, and when the sewing cam shaft 40 arrives in stopping position the cam roll engages in an upward throw in the cam groove. During the passage of the cam roll through this upward throw in the cam groove the sleeve 204 is moved downwardly by the cooperative action of the cam groove and the cam roll to disengage the driven clutch member 202 from the driving clutch member 200 and to engage the brake member 508 with the brake shoe 509. In order to render this upward throw in the cam groove effective to move the sleeve 204 downwardly, a latch lever 523 is provided to prevent the return of the carrier 517 to its normal limiting position after it is moved longitudinally to the right by the action of the lever 512 during the passage of the cam roll 514 through the downward throw in the cam groove. The latch lever 523 is pivoted on a stud 524 and is formed with a projection 525 for engagement with a projection 526 on the carrier 517. The latch lever 523 is normally held in lowered position with the projection 525 on the lever beneath the projection 526 on the carrier, as shown in Fig. 53, and is acted upon by a coiled spring 527 which tends to swing the same upwardly into acting position. As the carrier 517 is moved to the right during the passage of the cam roll 514 through the downward throw in the cam groove 515, the lever 523 is swung upwardly by the action of the coiled spring 527 into the position shown in Fig. 54 with the projection 525 at the left of the projection 526. As the carrier 517 moves back to the left during the passage of the cam roll 514 through the upward throw in the cam groove 515, the projection 525 on the latch lever engages the projection 526 on the carrier thereby arresting the return movement of the carrier before the carrier reaches its normal limiting position, as shown in Fig. 52. The stopping of the return movement of the carrier by the latch lever renders the cam throw effective to move the sleeve 204 and the sleeve is moved downwardly to disengage the clutch and engage the brake by the cooperative action of the cam groove and the cam roll.

The mechanism for holding the locking pin in forward position out of engagement with the lower arm of the bell crank lever 512 comprises a lever 528 pivoted on a stud 529, one arm of which is provided with spaced projections embracing the portion of the carrier 517 in which the locking pin slides and arranged to engage a collar 530 secured to the forward end of the locking pin. The other arm of the lever 528 carries a gear segment 531 which meshes with a gear segment 532 formed on one arm of a lever 533 pivoted on a stud 534. The other arm of the lever 533 is pivotally connected by means of a pin 535 with the upper end of a vertically movable rod 536. The rod 536 also controls the position of the latch lever 523 through the engagement of the rear end of the pin 535 in a slot in the latch lever. In starting the machine the rod 536 is depressed by the operator and in stopping the machine said rod is released and is then moved upwardly by the action of a coiled spring 537. When the rod 536 is depressed the lever 528 is actuated from the lever 533 to move the locking pin 516 forwardly out of locking engagement with the bell crank lever 512, allowing the sleeve 204 to be moved upwardly by the action of the coiled spring 510 to engage the clutch and disengage the brake and the latch lever 523 is moved downwardly out of acting position allowing the carrier 517 to be moved to the left into its normal position by the action of the coiled spring 519. As the rod 536 upon its release is moved upwardly under the action of the coiled spring 537 the locking pin 516 is forced rearwardly against the arm of the bell crank lever 512, and when the recess in the arm of said lever registers with the pin, the pin snaps into the recess, thus connecting the lever with the carrier 517. The upward movement of the rod 536 also releases the latch lever 523 allowing said lever to move upwardly

into acting position under the action of the coiled spring 527 as the carrier 517 is moved to the right.

The rod 536 is arranged to be depressed by the longitudinal movement to the right imparted to the bar 487 by the depression of the treadle. The rod 536 is pivotally connected at 538 with a second rod 539 which is mounted to slide vertically in guides in the frame and carries at its lower end a collar 540. The collar 540 is engaged by spaced projections formed on a lever 541 pivoted at 542 on the frame in the line of movement of the longitudinally movable bar 487.

The lever 541 is engaged by the right hand end of the bar 487 as said bar is moved to the right by the depression of the treadle, and the lever is thereby actuated to depress the rod 539 and the rod 536 therewith.

The rods 539 and 536 are held in depressed position during the sewing operation by means of a latch 543, see Figs. 50 and 61, arranged to engage a projection 544 on the rod 539. The latch 543 is mounted to slide in guides on the frame toward and from the rod 539 and is acted upon by a coiled spring 545 which tends to advance the same into acting position. The lower side of the projection 544 on the rod 539 is inclined so that as the rod is depressed, the latch is retracted by the engagement of the projection therewith, and the latch snaps forward into acting position as the projection is carried below the latch. The stopping devices are thus held out of operation by the latch after the starting of the machine, allowing the treadle to be released and the bar 487 to be moved back to the left to its normal position.

When the sewing mechanism arrives at a predetermined point in the margin of the shoe chosen for the completion of the seam, the latch 543 is automatically disengaged from the projection 544 on the rod 539 allowing the stopping devices to be thrown into operation. To enable the latch to be disengaged from the projection on said rod, the latch is provided with a V-shaped notch in which is engaged a pin 546 mounted on a lever 547 pivoted on a stud 548. With this construction the latch may be retracted by the swinging movement of the lever 547 in either direction through the engagement of the pin 546 with either of the inclined faces of the latch. In stopping the machine at the completion of the seam the left hand end of the lever 547 is swung forwardly by automatically acting devices.

In attaching a welt about the marginal portion of a shoe bottom it is desirable that a series of transverse slashes be cut in that portion of the welt to be attached about the toe before its attachment to the shoe bottom to enable the outer and inner margins of the welt to conform to the toe curve. It is desirable in the manufacture of a Goodyear or welted shoe that these slashes extend partially through the welt and partially across the welt from its outer toward its inner edge, so the outer portion of the welt may stretch during its attachment to the shoe and during the welt beating operation.

In the ordinary process of shoe manufacture after the sewing of the seam, the ends of the welt are scarfed or bevelled off at an angle to the plane thereof so that the welt will make a smooth joint with the outsole at the heel. This operation is known as welt butting and is ordinarily performed by means of a hand knife although machines have been devised for this purpose. The operation requires considerable skill and care and takes some time and it is obviously desirable to relieve the operator of this operation. In the present machine automatically acting mechanism is provided for cutting a predetermined number of transverse slashes partially through the welt and partially across the welt from its outer edge in the portion of the welt to be attached about the toe of the shoe, this mechanism being arranged to be thrown into operation at a predetermined point in the sewing operation. Mechanism is also provided for cutting a slash completely across the welt to form a bevel surface at the end of the welt being attached to the shoe and an oppositely inclined bevel surface on the end of the portion of the welt projecting from the welt guide after the welt is severed at the completion of the sewing operation. This mechanism is also arranged to be thrown into operation at a predetermined point in the sewing of a seam. In the present construction a single knife is provided for cutting the slashes partially across the portion of the welt to be attached about the toe of the shoe and for cutting completely across the welt to form the oppositely inclined bevel surfaces on the welt. In the drawings, see Figs. 7, 26, 27 and 31 to 34, inclusive, the welt cutting knife is indicated at 549. As clearly shown in Fig. 32, the knife is arcuate in cross section and is formed with an inclined cutting edge indicated at 550. The knife is secured to a reciprocatory slide 551 mounted in guides in a block 552 secured to the frame of the machine at a point somewhat to the right or in advance of the welt guide. The block 552 is formed with a transverse guide way 553 intersecting the path of the knife through which the welt passes on its way from the supply to the welt guide and with an opening 554 at its outer end through which the end of the knife may be projected. The knife is thus arranged to move widthwise of the welt during its cutting stroke. In order to hold the welt from buckling during the opera-

tion of the knife, a welt holding or gripping member 555 is movably mounted on the block 552 with its arms arranged to engage the welt upon opposite sides of the knife. The arms of the gripping device 555 engage in guides in the block 552 so that the gripping device may be moved transversely of the welt guiding passage 553 to grip and release the welt. When the knife is inactive the gripping device 555 is free to move outwardly with relation to the block so that the welt may pass freely through the guide way 553. As the knife is advanced to slash the welt, the gripping device 555 is moved inwardly to grip, the welt before the welt is engaged by the knife. The inward movement is imparted to the gripping device at this time by the movement of the slide 551. To this end a lever 556 is pivoted at 557 on the block 552 and is formed with an outer yielding or spring arm arranged to engage the central portion of the gripping device. The lever 556 is actuated to move the gripping device inwardly as the knife is advanced to slash the welt by means of a cam face 558 formed on the slide 551 and arranged to engage the inner arm of the lever, and said lever is thereafter held in position during the continued movement of the knife by the engagement of the inner arm of the lever with the slide.

The knife 549 is arranged so that when a relatively short stroke is imparted thereto the knife will cut an inclined slash partially through the welt and partially across the same from its outer toward its inner edge substantially as illustrated in Figure 36, the welt then being cut merely by the point of the knife. The arrangement of the knife is such, however, that when the knife is projected completely across the welt it will cut a piece from the welt thereby forming an indentation in the welt having in effect two oppositely inclined faces, one to form a bevel surface at the end of the portion of the welt being attached to the shoe, and the other to form an oppositely inclined bevel surface on the end of the welt projecting from the welt guide after the welt is severed at substantially the central point of the indentation. The knife moves during its cutting stroke in a direction slightly inclined to the plane of the portion of the welt engaging in the guide way in the block 552 so that the welt is cut partially through transversely, as shown in Figure 27.

The mechanism for reciprocating the knife, see Figs. 25 to 28, inclusive, and 35, comprises a lever 559 pivoted on the stud 560 and a link 561 connecting one arm of the lever with the slide 551. The other arm of the lever 559 is formed with a slot 561ª in which engages a pin 562 mounted on the lower end of a link 563 pivoted at its upper end on the forwardly extending arm of a lever 564 pivoted on the shaft 565. A locking pin 566 is slidably mounted in the downwardly extending arm of the lever 564 and is arranged to engage in a recess 567 in the downwardly extending arm of a cam lever 568 to lock the lever 564 to the cam lever. The cam lever 568 is also pivoted on the shaft 565 and the forwardly extending arm thereof carries a cam roll 569 arranged to engage in a cam groove 570 in the cam disk 144. The locking pin 566 is normally held in retracted position out of engagement with the recess 567 in the cam lever 568 so that the cam lever oscillates idly. To throw the welt slashing knife into operation the locking pin is projected into engagement with the recess in the cam lever to lock the lever 564 to the cam lever, thereby causing the latter lever to oscillate with the cam lever. By the oscillating movement imparted to the lever 564 through the connections described, the slide 551 is reciprocated to actuate the welt slashing knife. The locking pin 566 is advanced and retracted by means of a lever 571 also pivoted upon the shaft 565, the end of the downwardly extending arm of which carries a stud 572 engaging in a cam slot 573 in the locking pin. The lever 571 is actuated to retract the locking pin through the engagement of a cam roll 574 mounted on the upwardly extending arm of the lever with a peripheral cam 575 formed on the cam disk 144. A coiled spring 576 is connected with a forwardly extending arm on the lever 571, which tends to swing the downwardly extending arm of the lever rearwardly to advance the locking pin into locking position. The lever 571, however, is normally held from movement under the action of the spring with the downwardly extending arm of the lever in forward position, thereby maintaining the locking pin in retracted position as shown in Figures 25 and 35, the cam roll 574 lying out of the path of the cam 575 when the lever is in this position.

The mechanism for controlling the position of the lever 571 comprises a lever 577 pivoted on a stud 578 secured in the frame, and a link 579 connecting the forward end of the lever 577 with the forwardly extending arm of the lever 571. The forward end of the lever 577 is normally held in elevated position to maintain the lever 571 substantially in the position shown in Figure 25 by means of a rod 580 pivotally supported at 581 on the lever 577 and movable vertically in suitable guides in the frame and a plate 582 arranged to be engaged by the lower end of the rod. The plate 582 is mounted to reciprocate in guides in the frame and is formed with openings 583 and 584 either of which may be brought into registration with the rod 580. When one of these openings is brought into registration with the rod 580,

the rod and the forward end of the lever 577 are allowed to descend under the action of the spring 576, and the lever 571 is actuated to advance the locking pin 566 into locking position. When the lever 577 is thus released by the plate 582 the lever 564 is locked to the cam lever 568 during the acting stroke of the cam lever and is actuated by the cam lever to advance and retract the knife. It is to be noted that under this condition the lever 571 is actuated by the cam 575 at one point during each cycle of operations to retract the locking pin from locking position. Before the acting stroke is imparted to the cam lever 568, however, the lever 571 is swung back by the spring 576 to restore the locking pin to locking position. It is to be noted also that the movement imparted to the lever 571 by the cam 575 while the lever 577 is released by the plate 582, lifts the forward end of the lever 577 and the rod 580 during each cycle.

The lower end of the rod 580 normally rests on the portion of the slide 582 between the openings 583 and 584 so that the openings are adapted to be brought respectively into registration with the lower end of the rod by the movement of the slide in opposite directions from its normal position. The movement of the slide is controlled by a lever 585 pivoted on a stud 586 secured in the frame through the engagement of a roll 587 mounted on the rear end of the slide in a slot in the lever. The lever 585 also controls the extent of the advancing movement of the knife, the swinging of the lever in one direction causing a relatively short stroke to be imparted to the knife, and the swinging of the lever in the other direction causing a long stroke to be imparted to the knife. The connection for controlling the stroke of the knife from the lever 585 consists of a link 588 pivotally connected at its rear end to the upper end of the lever and having the stud 562 threaded into its forward end as shown in Figure 29. The stud 562 normally occupies the central portion of the slot 561[a] as shown in Figure 25. As the lower end of the lever 585 is swung to the left, Figure 25, the slide 582 is moved forwardly bringing the opening 584 into registration with the lower end of the rod 580 to throw the knife actuating mechanism into operation, and the stud 562 is located in the outer end of the slot 561[a] as shown in Figure 26 so that a relatively short stroke will be imparted to the knife from the cam lever 568. As the lower end of the lever 585 is swung to the right, the opening 583 in the slide is brought into registration with the lower end of the rod 580 to throw the knife actuating means into operation, and the stud 562 is located in the inner end of the slot 561[a] so that a relatively long stroke will be imparted to the knife from the cam lever 568.

The movements of the lever 585 are produced by mechanism controlled by the feeding movement of the shoe so that the lever is actuated to throw the knife into operation at predetermined points in the feeding movement of the shoe past the sewing mechanism and to cause the knife to execute strokes of the desired lengths at these points.

The mechanism for moving the lever 585, see Figs. 65 to 68, inclusive, comprises a lever 588[a] pivoted on a stud 589 mounted on a bracket 590 secured to the frame and a link 591 connecting a laterally extending arm on said lever with the lower end of the lever 585. The lever 588[a] is normally maintained in central position to hold the lever 585 substantially in the position shown in Figure 25 by means of spring pressed plungers 592 mounted in the lever 588[a] and arranged to engage the bracket 590. A slide 593 is mounted to reciprocate in guides in the bracket 590 above the lever 588[a], and the lever 588[a] is actuated to swing the laterally extending arm thereof forwardly by the engagement of a trapezoidal projection 594 formed on the slide with a triangular projection 595 formed on the lever. The movement of the lever thus produced will swing the lever 585 substantially into the position shown in Figure 26. The lever 588[a] is actuated to swing the laterally extending arm thereof rearwardly by the engagement of a triangular projection 596 formed on the slide 593 with a triangular projection 597 formed on the lever. The movement of the lever 588[a] thus produced will swing the lever 585 substantially into the position shown in Figure 27. At the beginning of the sewing operation the slide 593 is normally located in forward position with the trapezoidal projection 594 on the slide in advance of the projection 595 on the lever and with the triangular projection 596 on the slide intermediate the projections 595 and 597 on the lever, and is moved rearwardly through connections from the feeding lever 400 during the movement of the shoe past the sewing mechanism. Said connections comprise a lever 598 pivoted on a stud 599 and pivotally connected at 600 with a laterally extending arm on the feeding lever 400 and a link 601 connecting the lever 598 with the slide 593. With this construction, as the feeding lever is swung to the left to actuate the jack to feed the shoe, the lever 598 is actuated to move the slide 593 rearwardly in definite timed relation to the feeding movement imparted to the shoe.

In order that the movement of the slide 593 may be adjusted so that it will operate in the proper timed relation to the feeding movement of the shoe regardless of the

size of the shoe being sewn, the fulcrum stud 599 for the lever is engaged in a slot 602 in said lever and is adjusted longitudinally of the lever in accordance with the size of the shoe placed in the machine. The fulcrum stud 599 is mounted on an arm 603 pivoted at 604 on the frame of the machine, and having a recess at its forward end in which engages a pin 605 mounted on the fulcrum carrying lever 417. With this construction as the fulcrum carrying lever 417 is adjusted in accordance with the size of the shoe to be sewn upon the placing of the shoe in operating position in the machine, the arm 603 will be adjusted from the fulcrum carrying lever to adjust the stud 599 longitudinally of the lever 598 for the size of the shoe.

The projection 594 on the slide 593 is engaged with the projection 595 on the lever 588[a] to actuate said lever to throw the welt slashing knife into operation and to cause said knife to execute a relatively short slashing stroke at a predetermined point in the sewing of the seam just before the sewing mechanism reaches the toe portion of the shoe. The width of the projection 594 is such that it continues in engagement with the projection 595 during several cycles of operation of the sewing mechanism so that the slashing knife cuts several slashes in the welt before it is thrown out of operation. The projection 596 on the slide 593 is engaged with the projection 597 on the lever 588[a] to throw the welt slashing knife into operation and to cause the knife to execute a relatively long slashing stroke at a predetermined point in the formation of the seam, and after the welt is slashed by the knife the sewing mechanism executes a predetermined uniform number of cycles of operations or forms a predetermined uniform number of stitches, and is then stopped automatically. The feeding movement of the shoe during the predetermined number of cycles of operation following the long slashing stroke of the knife before the sewing mechanism is stopped brings the recess cut in the welt in position relative to the welt severing devices so that said devices will sever the welt at substantially the central point of the recess. The projection 596 is relatively narrow and engages with the projection 597 only during a single cycle of operations of the sewing mechanism so that the knife is thrown out of operation after having executed a single long slashing stroke.

The means for stopping the sewing mechanism after said mechanism has described a predetermined number of cycles of operations following the long slashing stroke of the welt slashing knife comprises what may be aptly termed a counting mechanism. This counting mechanism is normally inactive, and is thrown into operation as the lever 585 is swung into the position shown in Figure 27, and then acts to count the cycles of operations following the long slashing stroke of the knife. This counting mechanism comprises a lever 606 pivoted on the stud 578 by the side of the lever 577 and carrying at its rear end a stud 607, a lever 608 pivoted on the stud 607 and formed with a ratchet segment 609, a lever 610 also pivoted on the stud 607 the upper end of which is arranged to be engaged by a projection 611 on the downwardly extending arm of the cam lever 568, a pawl 612 pivoted at 613 on the lever 610 and arranged to engage the teeth of the ratchet segment, and a pawl 614 pivoted at 615 on the frame of the machine and also arranged to engage the teeth of said ratchet segment. When the lever 577 is in normal position, as shown in Figure 25, the rear end of said lever rests on the frame of the machine and the upper end of the lever 610 lies below the projection 611 on the cam lever 568, said lever then being held in stationary position in engagement with a pin 616 fixed in the frame by means of a coiled spring 617 connecting the lever with an upwardly extending arm on the lever 606. With the lever 577 in this position the pawls 612 and 614 are held out of engagement with the ratchet segment 609 by the engagement of the pawls with a pin 618 mounted on the lever 585. The lever 608 is acted upon by a coiled spring 619 which tends to swing the lever in a counter-clockwise direction, Fig. 25, about the stud 607 and maintains the same normally in engagement with a pin 620 mounted on the lever 610. When the lever 585 is swung from its normal position, shown in Fig. 25 into that shown in Fig. 26 or into that shown in Fig. 27, and the forward end of the lever 577 is depressed by the action of the spring 576, the lever 606 is swung with the lever 577 about the stud 578 by the engagement of a lateral projection 621 on the lever 577 with the upwardly extending arm of the lever 606. This movement of the lever 606 carries the upper end of the lever 610 into position to be engaged by the projection 611 on the cam lever 568 and the lever is then oscillated by the cooperative action of the cam lever, and the spring 617. When the lever 585 is swung into the position shown in Fig. 26, the pawls 612 and 614 are still held out of engagement with the ratchet segment by the engagement of the pawls with the pin 618 and the lever 610 then swings idly, the counting mechanism remaining inactive. When the lever 585 is swung into the position shown in Fig. 27, however, the pin 618 allows the pawls to engage the teeth of the ratchet segment 609, as shown in said figure, and a step by step movement will be imparted to the lever 608

by the action of the pawl 612 while the levers 608 and 610 are held in elevated position, the pawl 614 operating to hold the lever 608 from return movement. The levers 606 and 610 are held in elevated position to maintain the counting mechanism in action after lever 585 is swung into the position shown in Fig. 27 until the machine is stopped by means of a latch lever 622 pivoted on a stud 623 the rearwardly extending arm of which is provided with a projection or shoulder 624 arranged to engage the rear side of the upwardly extending arm of the lever 606. The lever 606 is caught by the latch lever when the lever 606 is actuated by the lever 577 to elevate the levers 608 and 610. This occurs both when the lever 585 is swung into the position in Fig. 26 and when said lever is swung into the position shown in Fig. 27. When the lever 585 is swung from the position shown in Fig. 26 to normal position, however, the rearwardly extending arm of the latch lever is lifted to release the lever 606 by the engagement of a lateral projection 625 on the lever 585 with an inclined face formed on a down turned projection on the rear end of said arm of the latch lever. When the lever 585 is swung into the position shown in Fig. 27, however, the projection 625 on said lever is located within the projection on the rearwardly extending arm of the latch lever, as shown in said figure, so that the arm of the latch lever remains in acting position when the lever 585 is swung back to normal position. The latch lever 622 thus holds the lever 606 in the position shown in Fig. 27 after the lever 585 is swung into the position shown in this figure or after the slashing knife mechanism is thrown into operation and adjusted to cut a recess in the welt until the machine is stopped, and during this period a step by step movement is imparted to the lever 608 by the cooperative action of the pawls 612 and 614. When the machine has executed a predetermined number of cycles of operations following the movement of the lever 585 into the position shown in Fig. 27, the machine is stopped through the engagement of a rearwardly extending arm on the lever 608 with the rear end of a bar 627 secured at its forward end to the lever 547. By the engagement of this arm of the lever 608 with the rear end of the bar 627, the left hand end of the lever 547 is swung forwardly to disengage the latch 543 from the projection 544 on the rod 539.

Thus after the recess is cut in the welt by the welt slashing knife the machine executes a predetermined definite number of cycles of operation and is then stopped automatically. The work is thus fed a predetermined uniform distance after the indentation or recess is cut in the welt by the welt slashing knife. By this uniform feed movement of the work following the cutting of the indentation in the welt, the indentation is located with relation to the welt severing devices in position for the severing of the welt.

After the stopping mechanism is thrown into operation the latch lever 622 is actuated to release the lever 606 before the machine finally comes to rest. The latch lever is actuated to release the lever 606 by means of a rod 628 pivoted at its forward end to an arm 629 secured to the rock shaft 560 and extending through an opening in an upwardly extending arm on the latch lever 622, the rod having a nut 630 mounted thereon at the rear of said arm. After the stopping mechanism is thrown into operation the rock shaft is actuated in a manner hereinafter described to swing the arm 629 forwardly, thereby engaging the nut 630 with the upwardly extending arm of the latch lever and actuating the latch lever to release the lever 606. Upon the release of the lever 606 by the latch lever, the lever 606 is swung back into the position shown in Fig. 25 by the action of the spring 617, thereby throwing the parts of the counting mechanism out of operating positions.

The mechanism for severing the thread upon stopping the machine operates to sever the thread between the looper and the shoe, and thread gripping means is associated therewith and operates to grip and hold the end of the thread leading from the supply after the thread is severed. The thread severing and gripping mechanism is arranged to operate before the looper encircles the needle in the last cycle of movement of the machine. After the thread is severed and gripped, the looper encircles the needle and the needle retracts from the work before the machine is brought to rest. In order that the needle may be free of thread during its last retracting movement, mechanism is provided for causing the needle to misloop during the last cycle of movement of the parts. In the present construction this mechanism is constructed and arranged to reduce the advancing movement of the needle during the last cycle so that the looper as it encircles the needle lays the thread about the needle between the needle barb and the point and the needle readily frees itself from the thread as it retracts from the work. The mechansm for severing and gripping the thread and the mechanism for reducing the advancing movement of the needle during the last cycle are all controlled from the locking pin carrier 517. The thread severing and gripping mechanism, see Figs. 4, 6 to 9, inclusive, 12 to 22, inclusive, and 50 to 54, inclusive, comprises the thread finger 8 whch forms a thread gripping jaw, a cooperating thread

gripping jaw 630 formed at the forward end of a longitudinally movable slide 631, and a thread cutting knife 632 formed at the forward end of a bar 633 located below the slide 631 and secured by a screw 634 to the frame. The slide 631 is acted upon by a spring 635 which tends to advance the slide, and the forward movement of the slide under the influence of the spring is limited by the engagement of a projection 636 on the slide with a suitable abutment face on the frame of the machine. During the normal operation of the machine, the slide 86 is retracted in each cycle of operations substantially from the position shown in Fig. 13 to that shown in Fig. 12 to actuate the thread finger to form a bight or loop in the thread, the thread being out of contact with the gripping jaw 630 when the thread finger is in its limiting retracted position. Upon stopping the machine, however, the slide 86 is retracted substantially into the position shown in Fig. 17, and during this retracting movement of the slide the thread finger carries the thread into engagement with the gripping jaw 630 thereby gripping the thread between the thread finger and said jaw, and the gripping jaws then retract together thereby carrying the thread across the knife 632 and severing the same This retracting movement is imparted to the slide 86 to actuate the thread finger 8 to grip and sever the thread by the cooperative action of the cam lever 92 and mechanism acting to break the toggle 88—90.

The mechanism for breaking the toggle comprises an arm 637 secured to the left hand end of the shaft 34 and carrying an abutment screw 638 arranged to engage a lug or projection 639 formed on the toggle link 88.

The shaft 34 is mounted to turn in bearings 640 formed on the frame, and to the right hand end of said shaft is secured an arm 641 carrying at its rear end a gear segment 642 meshing with a gear segment 643 carried at the forward end of a pivoted arm 644. The arm 644 is secured to and preferably formed integral with the outer end of a rock shaft 645 mounted to turn in a bearing in the frame. A cam lever 647 is pivoted on a stud 648 threaded into the outer end of the shaft 645 and carries a cam roll 649 engaging in a cam groove 650 in the cam disk 58. The cam lever 647 is normally oscillated idly by the action of the cam groove 650 thereon. Upon stopping the machine, however, the cam lever is connected with the arm 644 so that the arm is then actuated from the cam lever. The mechanism for connecting the cam lever with the arm 644 comprises a block 651 secured to the upper arm of a lever 652 pivoted on a stud 653 mounted on the hub of the arm 644, said block engaging between projections 654 formed on the hub of the arm. The block 651 is also arranged to engage between projections 655 formed on the cam lever 647 to lock the cam lever to the arm 644. The lever 652 is normally held in position with the block 651 disengaged from between the projections 655 on the cam lever 647 and engaged in a recess 656[a] in the frame to hold the arm 644 from swinging movement, as shown in Fig. 53. Upon stopping the machine the lever 652 is actuated from the movement of the locking pin carrier 517 to swing the block 651 outwardly thereby engaging the block between the projections 655 on the cam lever 647 to lock the arm 644 to the cam lever. The arm 644 is locked to the cam lever when the cam roll 649 is in the outer portion of the cam groove 650, and as the cam roll passes into the inner portion of the groove the arm is swung upwardly by the cam lever thereby turning the shaft 34 in a direction to swing the arm 637 downwardly. The movement of the arm 637 thus produced carries the abutment screw 638 from a position above the projection 639 on the toggle link 88 into a position back of said projection, as shown in Fig. 13, this movement of the arm 637 occurring prior to the thread finger retracting stroke of the cam lever 92. With the abutment screw 638 in the latter position during the thread finger retracting stroke of the cam lever 92, the projection 639 on the toggle link 88 engages the abutment screw 638 thereby swinging the toggle link 88 about its pivotal connection with the cam lever and breaking the toggle, as shown in Fig. 15. As the toggle is broken the retracting movement imparted to the slide 86 actuates the thread finger first to grip the thread against the thread gripping jaw 630, and then to draw the thread across the knife 632 to sever the same.

The advancing stroke of the needle is reduced so as to cause the needle to misloop during the last cycle of movement of the machine by the turning movement imparted to the shaft 34 upon stopping the machine. As clearly shown in Fig. 9 that part of the shaft 34 upon which the bell crank lever 32 is mounted is eccentric to the parts of said shaft engaging in the bearings 640. The eccentric portion of the shaft 34 is arranged so that as said shaft is turned in a counter clockwise direction, Fig. 7, by the cam lever 647 to throw the thread gripping and severing devices into operation, the bell crank lever 32 is moved rearwardly to a relatively slight degree. Because of this adjustment of the bell crank lever, the needle during its last work piercing stroke advances to a limiting position somewhat back of its normal advanced position, as shown in Fig. 16, and the looper, as it encircles the needle, lays the thread about the needle be-

tween the barb and the point thereof. As the needle retracts from the work it readily disengages itself from the loop of thread formed about the same by the looper. Figs. 17 and 18 illustrate the condition of the parts of the thread gripping and severing mechanism when the rotation of the sewing cam shaft 40 is finally arrested.

Before the machine is stopped the shaft 34 is turned in a clockwise direction to its normal position, thereby restoring the arm 637 and the bell crank 32 to their normal positions. The needle, therefore, executes its normal advancing stroke during the first cycle of operations upon starting the machine. The toggle 88—90, however, is maintained in a broken condition by the action of the springs 98 and the end of the thread leading from the supply is securely held between the thread finger and the gripping jaw 630 during the first part of a seam formation until after the take-up has executed its second active or loop-drawing stroke.

The first stroke of the take-up upon starting the machine occurs while the needle is advancing through the work in its first work-piercing stroke or before the first stitch is even partially formed, this action of the take-up merely drawing the thread taut between the thread gripping devices and the tension wheel and imparting a slight rotary movement to the tension wheel. The holding of the thread by the gripping devices during the first cycle of operations insures the proper looping of the needle in the first stitch formation and the tightening of the stitch in a reliable manner.

After the completion of the second loop-drawing stroke of the take-up the toggle 88—90 is straightened, the thread finger is advanced to release the thread and the thread finger thereafter resumes its normal operation. The mechanism for thus controlling the action of the thread gripping devices comprises a lever 656, pivoted loosely on the stud 46, and carrying an abutment stud 657 at the end of its forwardly extending arm arranged to engage the projection 639 on the toggle link 88. Pivoted at 658 on the lever 656 is a ratchet lever 659, provided with teeth or projections 660 and 661, arranged to be engaged by an arm 662 formed on the take-up actuating cam lever 162. The ratchet lever 659 is acted upon by a coiled spring 663 which normally holds the same in the position shown in Fig. 12 in engagement with the rear side of a stop 664 on the lever 656. In order to limit the turning movement of the ratchet lever in a clockwise direction, said lever is formed with an abutment or shoulder 665 arranged to engage the upper end of the stop 664. To hold the ratchet lever in position with the abutment 665 in engagement with the stop 664, a spring pressed pawl 666 is pivoted at 667 on the lever 656 and is arranged to engage a shoulder 668 on the ratchet lever. The lever 656 is acted upon by a coiled spring 669 which maintains the same normally in the limiting position shown in Fig. 12 with an arm on the pawl 666 in engagement with an abutment screw 670 threaded into the frame and with said arm also in engagement with the forward face of the stop 664.

Fig. 17 illustrates the condition of the parts just described at the beginning of the sewing of a seam. As the take-up actuating cam lever 162 acts to impart the first loop-drawing stroke to the take-up, the arm 662 on said lever engages the projection 660 on the ratchet lever 659 and the ratchet lever is swung into the limiting position shown in Fig. 19, with the shoulder 665 in engagement with the stop 664, and is held in such position by the pawl 666. As the take-up actuating cam lever acts to impart the second loop-drawing stroke to the take-up, the arm 662 engages the projection 661 on the ratchet lever and the lever 656 is thereby swung in a clockwise direction, Fig. 12, about the stud 46. During this movement of the lever 656 the abutment stud 657 engages the projection 639 on the toggle link 88 thereby straightening the toggle 88—90 and advancing the thread finger to release the end of the thread, as shown in Fig. 21. The thread finger during its forward movement passes by the thread between the looper and the work and lies in front of this portion of the thread in position to resume its normal operation when its forward movement ceases, the thread being deflected laterally by the thread finger as it moves forwardly. During the toggle straightening movement of the lever 656, the abutment screw 670 engages the lower arm of the pawl 666 thereby disengaging the pawl from the shoulder 668 on the ratchet lever so as to allow the ratchet lever to swing back to its normal position under the action of the spring 663 as the arm 662 is disengaged from the projection 660 on the ratchet lever.

The lever 652 is actuated to swing the block 651 into locking position between the projections 655 on the cam lever 647 by the movement of the locking pin carrier to the right upon stopping the machine. To this end the lever is provided with an arm projecting downwardly from its pivotal point into position to be engaged by the nut 522 mounted in the locking pin carrier 517. As the locking pin carrier is moved to the right in the manner described above upon stopping the machine, the nut 522 engages the lever 652 and swings the lever in a direction to carry the block 651 between the projections 655 on the cam lever 647, said projections being then in position to receive the block between them. The block 651 remains

in locking position with relation to the cam lever during the stoppage of the machine and during a portion of the first revolution of the sewing cam shaft 40 upon starting the machine. The block is disengaged from between the projections on the cam lever and is engaged in the recess 656ª during the first revolution of the sewing cam shaft by means of a cam 672 carried by the cam disk 58 and arranged to engage a cam roll 673 mounted on an upwardly projecting arm formed on said block.

The stopping devices are arranged to stop the machine at a point in a cycle of operations when the needle is substantially at the limit of its retracting stroke. At this point in a cycle of operations the welt guide is normally locked in engagement with the shoe. To enable the shoe to be readily removed from the machine, mechanism is provided which will act automatically upon stopping the machine to unlock the welt guide and draw the same back away from the shoe. In the illustrated construction a bell crank lever 674 is pivoted on a stud 675 and is arranged with the arm 676 thereof extending laterally of the machine below the welt guide carrier and in front of projections 677 and 678 formed respectively on the lever 140 and on the welt guide carrier 118. The rearwardly extending arm 679 of the bell crank lever is formed at its end with a projection arranged to be engaged by the nut 522 on the locking pin carrier 517. As the locking pin carrier is moved to the right upon stopping the machine, the bell crank lever 674 is actuated by the engagement of the nut 522 with the rearwardly extending arm thereof to swing the laterally extending arm of said lever rearwardly. During this movement of the bell crank lever the laterally extending arm of the lever first engages the projection 677 which is arranged somewhat in advance of the projection 678, and the lever 140 and the locking lever 130 are actuated to unlock the welt guide after which said arm engages the projection 678 and the welt guide carrier is retracted to carry the welt guide away from the shoe.

The mechanism for severing the welt upon stopping the machine comprises severing devices which are normally held in retracted or inoperative positions and upon stopping the machine are advanced into operative positions and are actuated to sever the welt at substantially the central point in the recess formed in the welt by the welt slashing knife.

The welt severing devices comprise a welt cutting knife 680, see Figs. 37 to 39, inclusive, and spaced welt supports or jaws 681 for supporting the welt during the action of the knife. The knife and the welt supporting jaws are held in retracted position during the formation of a seam so as not to interfere with the movement of the shoe. Upon stopping the machine the knife and the welt supporting jaws are advanced into positions upon opposite sides of the welt, and are then relatively actuated to sever the welt. The welt supporting jaws 681 are formed on the forward end of a slide 682 mounted to slide longitudinally in a guide-way in a sleeve 683 secured in the frame of the machine. The welt cutting knife 680 is formed on the forward end of a slide 684 mounted to slide longitudinally through the sleeve 683. In the illustrated construction, the slide 682 is U-shaped in cross section, and forms a guide-way for the slide 684 which engages between the side plates of the slide 682 and is held in place between said plates by its engagement with the sleeve 683. Mechanism is provided for advancing and retracting the knife carrying slide 684 and the jaw carrying slide 682 is advanced and retracted by the movement of the knife carrying slide. The knife carrying slide is actuated by the movement of a gear segment 685 secured to one end of the rock shaft 560 and meshing with rack teeth 686 formed on the rear end of the knife carrying slide. The jaw carrying slide 682 is advanced with the knife carrying slide during the greater part of the forward movement of the knife carrying slide. During the last part of the forward movement of the knife carrying slide the jaw carrying slide is held stationary and the connections between the slides then act to impart a lateral movement to the forward end of the knife carrying slide so that the knife is moved obliquely toward the welt supporting jaws 681 and severs the welt against said jaws with a drawing cut. The slide 684 is provided adjacent its forward end with an inclined projection 687 fitting within the sleeve 683 when the slide is in retracted position to guide the forward end of the slide, and said slide is provided adjacent its rear end with a rounded projection 689 arranged to engage the web connecting the side plates of the slide 682, as shown in Fig. 38 to guide the rear end of said slide. The jaw carrying slide 682 is connected with the knife carrying slide 684 by means of a pin 690 mounted in the jaw carrying slide and engaging in an inclined slot 691 formed in the knife carrying slide. Fig. 37 shows the positions of the parts when the slides are in retracted positions. Starting with the parts in the positions shown in this figure, as the knife carrying slide 684 is advanced by the movement of the gear segment 685, said slide is held from lateral movement by the engagement of the projection 687 with the sleeve 683, and the jaw carrying slide 682 is moved forwardly with the knife carrying slide by the engagement of the pin 690 in the slot 691. When the slides have been advanced

to place the knife 680 and the welt supporting jaws 681 upon opposite sides of the welt, the forward movement of the jaw carrying slide is limited by the engagement of a stop 692 formed on the rear end of the slide with the rear end of the sleeve 683. The parts are constructed and arranged so that just before the stop 692 engages the rear end of the sleeve 683, the lower end of the projection 687 on the knife carrying slide is projected beyond the forward end of the sleeve. As the knife carrying slide continues its forward movement the forward end of said slide is moved downwardly by the cooperative action of the pin 690, and the slot 691 and the knife is moved obliquely toward the jaws 681 to sever the welt, the slide 684 pivoting about the rounded end of the projection 689 as its forward end is moved laterally. As clearly shown in Figs. 37 and 38, the rear side of the projection 687 is inclined in a direction parallel with the slot 691. As the forward end of the slide 684 is moved downwardly to impart the cutting movement to the knife the projection 687 is projected below the sleeve 683 as shown in Fig. 38 so that the inclined rear side of said projection is located in position to be engaged with the forward end of the sleeve upon the retraction of the slide. As the slide 684 is retracted the forward end of the slide is moved upwardly by the engagement of the rear side of the projection 687 with the forward end of the sleeve until the projection clears the forward end of the sleeve, and the jaw carrying slide 682 is held stationary during this movement of the knife carrying slide by the engagement of the pin 690 in the slot 691. As the projection 687 clears the forward end of the sleeve, the slides are retracted together within the sleeve to their initial positions.

The mechanism for actuating the gear segment 685 to advance and retract the knife carrying slide comprises an arm 693 secured to the other end of the rock shaft 560, an arm 694 pivoted to turn loosely on a second rock shaft 695 mounted in a bearing 696, and a link 697 connected at its opposite ends by universal joints with the arm 693 and with the arm 694. An arm 698 is secured to the rock shaft 695 and is arranged to be actuated from an intermittently operating eccentric 699 through an eccentric strap 700 and pitman 701. The arm 694 is arranged to be moved in a direction to advance the slide 684 through a spring 702 connecting said arm with the arm 698, and the arm 694 is arranged to be actuated in a direction to retract the slide 684 by the engagement of a projection 703 formed on the hub of the arm 698 and engaging in a recess in the hub of the arm 694 with the forward or right hand face of said recess. The movement of the arm 694 in a direction to advance the slides is limited by the engagement of an abutment screw 704 mounted in a projection formed on the hub of said arm with the frame of the machine, and the recess in which the projection 703 engages is considerably wider than said projection so as to allow a certain amount of lost motion between the arm 698 and the arm 694. With this construction the arm 694 is actuated to advance the slide 684 during the first part of the movement of the arm 698 imparted thereto by the eccentric, and the slide advancing movement of the arm 694 is limited by the engagement of the abutment screw 704 with the frame, the arm 698 continuing its movement after the arm 694 reaches its limiting position.

The eccentric 699 is journalled on a boss 706 on the frame of the machine. The driving mechanism for the eccentric comprises a shaft 707 the upper end of which engages in a bearing formed in the lower end of the counter-shaft 196, and the lower end of which engages in a bearing in the boss 706. The shaft 707 is driven from the shaft 196 at a relatively slow speed by means of a gear 708 formed on the lower end of the shaft 196, a gear 709 journalled on a stud 710 secured in the frame, a gear 711 secured to the gear 709, and a gear 712 secured to the shaft 707 and meshing with the gear 711. Upon the lower end of the shaft 707 is mounted a sleeve 713, said sleeve being splined to the shaft so that it rotates therewith and is movable longitudinally of the shaft. Mounted upon the upper end of the sleeve 713 and preferably formed integral therewith is a toothed clutch member 714 arranged to engage a toothed clutch member 715 secured to the eccentric 699. The position of the sleeve 713 on the shaft 707 is controlled by means of a lever 716 pivoted on a shaft 717 and provided with tapered rolls 718 mounted on studs secured in spaced arms on said lever embracing the sleeve, said rolls engaging in a tapered groove 719 in the sleeve. The lever 716 is normally located in the positions shown in Figs. 70 and 71 so as to hold the sleeve 713 in position on the shaft 707 with the clutch members 714 and 715 disengaged. The lever is held in the position shown in these figures by means of a spring pressed detent pin 720, having a tapered forward end arranged to engage a corresponding recess in an upstanding projection 721 on said lever. Upon stopping the sewing mechanism the lever 716 is actuated to move the sleeve 713 upwardly to engage the clutch members 714 and 715.

The mechanism for actuating the lever 716 to engage said clutch members comprises a rod 722 pivotally connected at its upper end with an arm 723 formed on the hub of the arm 644, and provided adjacent its lower

end with lateral projections 724 and 725. The projections 724 and 725 on the rod are normally located between the forward end of a lever 726 pivoted on a stud 727 and a lateral projection 728 formed on the forward end of the lever 716, as shown in Fig. 70. The position of the rod 722 upon stopping the sewing mechanism is controlled by a lever 729 pivoted on the stud 548 above the lever 547 and provided with pins 730 between which the lower end of the rod 722 engages. The lever 729 is normally held in central position with relation to the lever 547 by means of spring pressed plungers 731 mounted in the lever 547 on opposite sides of the stud 548 and arranged to engage the lever 729. In stopping the sewing mechanism at the completion of a seam the left hand end of the lever 547 is swung forwardly to disengage the latch 543 from the projection 544 on the rod 539. During this movement of the lever 547 the lever 729 is held stationary by the engagement of the lower end of the rod 722 between the pins 730, the rod being held at this time from forward or rearward movement, as shown in Fig. 70. As the arm 644 is swung upwardly by the action of the cam lever 647, the projection 724 on the rod is carried above the lateral projection 728 on the lever 716 and the lever 729 is then swung forwardly by the action of one of the spring pressed plungers 731, thereby actuating the rod to locate the projection 724 thereon above said lateral projection on the lever 716 as shown in Fig. 71. With the parts in this condition, as the arm 644 is swung downwardly, thereby depressing the rod 722, the projection 724 on the rod engages the lateral projection 728 on the lever 716 and the lever is actuated to move the sleeve 713 upwardly on the shaft 707, thereby engaging the clutch member 714 with the clutch member 715. Through the engagement of the clutch members 714 and 715 the eccentric 699 is driven through substantially a complete revolution before the machine finally comes to rest.

The welt slashing devices are arranged relatively to the welt severing devices so that the feeding movement of the work during the predetermined number of cycles of operations executed by the sewing mechanism following the long cutting stroke of the slashing knife advances the welt to a position with the central point in the recess cut in the welt by the slashing knife substantially in front of the welt severing devices. The welt severing devices will therefore, sever the welt at substantially the central point of the recess.

As the rock shaft 560 is actuated to advance the welt severing devices to sever the welt, the arm 629 is swung forwardly and the rod 628 is advanced to actuate the latch lever 622 to release the lever 606.

After the thread is severed and gripped by the thread severing and gripping devices, and the welt is severed by the welt severing devices enabling the shoe to be freed from the machine, the jack is swung forwardly out of operating position and is held in forward position during the turning movement imparted thereto to restore the same to its initial position. The mechanism for swinging the jack forwardly out of operating position is also actuated from the eccentric 699. In the construction shown, see Figs. 50, 51, 55, 61 and 79 to 82 inclusive, a rock shaft 732 is mounted to turn in a bearing in the frame in alignment with the shaft 695 and is connected with the latter shaft by means of a diametrical key 733 engaging in a corresponding slot formed in an enlargement on the lower end of the shaft 695. To the lower end of the shaft 732 is secured an arm 734 carrying a gear segment 735 meshing with a gear segment 736 secured to a rock shaft 737 mounted to turn in a bearing in a bracket 738 on the frame. A lever 739 is pivoted on the shaft 737 and is connected with the shaft by means of a coiled spring 740. A slide 741 having a central opening therethrough is mounted to slide in guides in the outer portion of the lever 739 and the outer cross bar of said slide is arranged to engage a projection 742 formed on a bar 743 connected with the jack. The forward end of the bar 743 is connected by a universal joint 744 with the jack, and the rear end of said bar is supported by an arm 745 pivoted at 746 on the frame of the machine. During the normal operation of the machine the gear segment 736 and the shaft 737 are held in the positions shown in Figures 61 and 80 through the connections between said gear segment and the eccentric 699, and the lever 739 is held by the action of the spring 740 in rearward position, as shown in Figure 80 with a stop projection 747 on the lever engaged with the frame of the machine. As the eccentric 699 is thrown into operation upon stopping the machine, the gear segment 736 is swung forwardly into the position shown in Figures 55, 81 and 82 and then back to its normal position. During the forward movement of the gear segment the lever 739 is swung forwardly therewith into the position shown in said figures by the engagement of a pin 748 mounted on the gear segment with the rear side of the lever. As the lever 739 is swung forwardly the outer cross bar of the slide 741 engages the projection 742 on the bar 743 and the bar is moved forward by the lever, thereby swinging the jack forwardly about its connections with the wheel 224 to disengage the shoe from the sewing mechanism. The lever 739 after being swung forwardly into the position shown in Figures 55, 81 and 82

is held from return movement as the gear segment 736 swings back to its initial position, the returning movement of the gear segment independently of the lever winding up the spring 740. The lever, therefore, after having operated to swing the jack forwardly out of operating position holds the jack in forward position. The lever is held from return movement by means of a spring pressed latch 749 pivoted at 750 on the lever and arranged to engage a catch plate 751 on the frame as the lever is swung into forward position. The jack is held in forward position during the turning movement imparted to the jack to restore the jack to starting position, and during the removal of the shoe from the jack. Means is provided, however, which is arranged to be operated as the shoe is placed on the jack to, release the latch 749 from the catch plate 751. As the shoe is placed on the jack a sharp downward push or blow is delivered to the shoe to seat the last pin in the last pin hole in the last, and to insure the depression of the rod 384 to trip the jack. This forces the shoe and the jack downwardly and the downward movement thus imparted to the jack through the movement of the bar 743 depresses the slide 741. During the downward movement of the slide the latch is thrown out by means of a rod 752 mounted to slide longitudinally in the lever 739 and connected at its lower end with the slide. The rod passes through an opening in a rearwardly projecting arm on the latch 749 and carries a collar 753 at its upper end which, as the rod is moved downwardly by the slide, engages this arm of the latch, and swings the latch to disengage the same from the catch plate 751. As the latch is thrown out the lever 739 is swung back to its initial position by the action of the spring 740.

The latch 505 is disengaged from the projection 507 on the lever 481 by the swinging movement of the lever 739 from its forward to its rearward position by means of a spring pressed plunger 754 mounted in the lever and arranged to engage an arm 755 on said latch. As the lever 739 is swung forwardly the plunger 754 is pushed back by the engagement of an inclined face on the plunger with a correspondingly inclined face on the laterally extending arm 755 of the latch so that the plunger readily passes by said arm.

As the latch 505 is released from the projection 507, the controller bar 477 is swung back to its rearward position shown in Fig. 59 and the locking devices for the fulcrum carrying lever 417 are actuated to unlock said lever.

As the eccentric 699 completes a single revolution the clutch carrying sleeve 713 is actuated to disengage the driving clutch member 714 carried thereby from the driven clutch member 715 carried by the eccentric. To this end a lever 756, see Figs. 77 and 61, is pivoted on a stud 757 and is provided with gear teeth 758 meshing with gear teeth 759 formed on the lever 729. The left hand arm of the lever carries a pivoted dog 760 having a rearwardly extending projection arranged to engage a semi-cylindrical stud 762 mounted on an arm 763 secured to the upper end of the rock shaft 732. The dog 760 has a limited pivotal movement with relation to the lever 756, and normally is held by a spring 764 in engagement with a stop 765 formed on the lever, as shown in Fig. 77. When the lever 729 is swung forwardly to cause the engagement of the clutch member 714 with the clutch member 715, the movement of the lever 756 carries the projection on the dog rearwardly into position to be engaged by the stud 762. As the arm 763 is swung to the left, Figs. 61 and 77, during the first part of the revolution of the eccentric, the stud 762 engages the projection on the dog 760 and swings the dog on its axis until the stud passes the projection. As the arm 763 is swung back to the right during the last half of the revolution of the eccentric, the stud 762 engages the projection on the dog 760 just before the eccentric completes a revolution. The dog is then held by the spring 764 in engagement with the stop 765 which prevents the same from swinging under the action of the stud 762 and the lever 756 is actuated by the engagement of the stud with the dog to swing the lever 729 rearwardly to its normal position. This movement of the lever 729 swings the rod 722 rearwardly, thereby disengaging the projection 724 on the rod from above the projection 728 on the forward end of the lever 716, and the latter lever is then swung back to normal position by the engagement of the tapered end of the plunger 720 with the tapered face of the recess in the projection 721 on said lever, thereby disengaging the clutch member 714 from the clutch member 715.

During the sewing operation the pattern cam shaft is driven through a portion of a revolution, and after the sewing mechanism is stopped at the predetermined point in the operation chosen for the completion of the seam, the pattern cam shaft is driven in the same direction as during the sewing operation through the remaining part of a revolution to bring the same to its initial position. During this movement of the pattern cam shaft, after the sewing mechanism is stopped, the jack is turned through half a revolution in a direction opposite to the direction in which it is turned during the sewing operation to bring the jack to its initial or starting position. The mecha-

nism for imparting the rotary movement to the pattern cam shaft after the sewing mechanism is stopped, see Figs. 59 and 60, comprises a bell crank lever 766 pivoted at 767 on the frame of the machine, a pawl 768 pivoted at 769 on one arm of the bell crank lever, and a contact plate 770 secured to the gear 445 and arranged to be engaged by the pawl. The pawl is acted upon by a coiled spring 771 which tends to swing the same about its pivotal connection with the bell crank lever 766 in one direction, and the movement of the pawl in this direction is limited by the engagement of a projection on the rear end of the pawl with the central portion or hub of the bell crank lever. The bell crank lever is actuated through a rod or link 772 from the arm 734. During the sewing operation the lever 766 and the pawl 768 occupy the positions shown in Fig. 60. In the present machine the pattern cam shaft is rotated through substantially 350° during the sewing operation, and when the sewing mechanism is stopped the contact plate 770 is located substantially 10° from the point at which it started at the beginning of the sewing operation, as shown in full lines in Fig. 60. As the arm 734 is swung forwardly during the first half of a revolution of the eccentric 699, the pawl 768 is carried to the left by the movement of the bell crank lever 766, and as the arm 734 is swung back rearwardly during the last half of a revolution of the eccentric the pawl is carried to the right by the movement of the bell crank. By the engagement of the pawl with the contact plate 770 during this movement of the pawl, the gear 445 and the pattern cam shaft are turned through the remaining 10° of a revolution to bring the same to starting position.

In sewing a seam about the marginal portion of a shoe bottom on machines in which the shoe is held and manipulated by the operator, upon the breakage of the thread the operator stops the machine at once and before starting the machine to complete the seam he moves the shoe backwardly in the direction of the line of feed to a position such that the last part of the seam will overlap the part of the seam formed before the breakage of the thread. The shoe is usually positioned for the starting of the last part of the seam so that the needle in the first cycle of operations will penetrate one of the needle holes previously formed in the shoe. Upon the failure of the looper to loop the needle the machine is stopped, the thread is severed, and the shoe is positioned in the same manner as is done when the thread is broken. To enable the shoe to be positioned in this manner for the starting of the last part of the seam, upon the breakage of the thread or the failure of the looper to loop the needle, in the operation of the present machine, the machine is provided with mechanism acting automatically upon the occurrence of a misstitch to stop the machine and then to turn the pattern cam shaft in a direction reverse to its normal direction of rotation a predetermined angular distance. This reverse movement of the pattern cam shaft positions the lower end of the jack properly so that when the shoe is adjusted in the line of feed for the starting of the last part of the seam, the shoe will be in the proper position of presentation to the sewing mechanism and also enables the feeding lever to be swung in a direction reverse to its normal direction of movement in adjusting the shoe. In the particular construction illustrated in the drawing the pattern cam shaft is driven in a reverse direction an angular distance substantially equal to that which the cam shaft rotates during the formation of three stitches, thereby allowing the shoe to be adjusted to start the last part of the seam three stitches back from the point where the misstitch occurred.

The mechanism for stopping the machine and for driving the pattern cam shaft in a direction reverse to its normal direction of rotation upon the occurrence of a misstitch comprises a controlling member 773 secured by means of a clamping plate 774 to the outer end of the tension wheel shaft 182. Through the frictional engagement of the member 773 and the clamping plate 774 with the tension wheel shaft, the controlling member is adapted to be turned with said shaft during the rotation of the tension wheel. Said member, however, may be turned independently of said shaft. During the normal operation of the machine the controlling member 773 is turned substantially into the position shown in Fig. 44 by the rotary movement imparted to the tension wheel during the latter part of the loop drawing stroke of the take-up in each cycle of operations. The controlling member is turned back in the opposite direction independently of the tension wheel into substantially the position shown in Fig. 42 during each cycle. The mechanism for turning the controlling member from the position shown in Fig. 44 into the position shown in Fig. 42 comprises a rod 775 mounted for vertical movement in a guide-way in a projection 776 on the frame of the machine and having its lower end pivotally connected at 777 with an arm on the cam lever 150. The rod 775 is arranged to engage at its upper end a projection on the controlling member 773. The left hand end of the lever 547 is swung rearwardly to disengage the latch 543 from the projection 544 on the rod 539 to stop the machine through certain connections from the cam lever 150, these connections being con-

trolled by the controlling member 773. Said connections comprise a lever 779 pivotally mounted at 780 on the cam lever 150 and normally held in the position shown in Figs. 43 and 45 with relation to the cam lever by the action of a spring 781, the movement of the lever 779 under the action of the spring being limited by the engagement of the lever with a pin 782 mounted on the lever 150. The lower end of the lever 779 is connected by a link 783 with one arm of a bell crank lever 784 pivoted on a stud 785, the other arm of which is pivotally connected with the upper end of a rod 786. The rod 786 at its lower end extends loosely through an opening in a laterally extending arm of a lever 787 pivoted on a stud 788, and is arranged to actuate the latter lever through the engagement of a nut 789 mounted on the rod with the arm of said lever. Another arm of said lever extending downwardly from the body of the lever embraces a rod 790 pivotally connected at its forward end with the lever 547, and engages a collar 791 loosely mounted on the rod. The arm of the lever 787 is arranged to actuate the rod 790 through a coiled spring 792 interposed between the collar 791 and a second collar 793 held in place by a pin mounted in the rod. The normal position of the lever 787 is determined by an abutment screw 794 threaded into another laterally extending arm of the lever and arranged to engage the frame of the machine.

During the normal operation of the machine, the lever 779 is held in the position shown in Figs. 43 and 45 with relation to the cam lever 150, with the center of the pivotal connection between the link 783 and the lever 779 located in alignment with the axis of the cam lever. While the lever 779 is held in this position, said lever oscillates as one with the cam lever about the axis thereof, and the link 783 and the bell crank lever 784 remain stationary during the movements of the cam lever. When the controlling member 773 is located in the position shown in Fig. 42, the outer end thereof lies in the path of the upper end of the lever 779, as shown in said figure. When located in the position shown in Fig. 44, however, the outer end of the controlling member 773 is located out of the path of the upper end of the lever 779. In the normal operation of the machine the controlling member is turned from the position shown in Fig. 42 into that shown in Fig. 44, and from the position shown in Fig. 44 back to the position shown in Fig. 42 during each cycle of operations in timed relation to the movements of the lever 779, so that said member is not engaged by said lever. When the machine is operating normally the controlling member 773 is turned from the position shown in Fig. 44 to the position shown in Fig. 42 by the action of the rod 775 as the lever 779 is swung to the right from the position shown in Fig. 45 to that shown in Fig. 43. Before the lever 779 executes its return stroke, the controlling member 773 is turned from the position shown in Fig. 42 into that shown in Fig. 44 by the rotation imparted to the tension wheel during the loop taking stroke of the take-up so that the controlling member lies out of the path of the upper end of the lever 779 as said lever is swung back to the left into the position shown in Fig. 45.

Upon the breakage of the thread or the failure of the looper to loop the needle, no movement is imparted to the tension wheel during the next succeeding loop drawing stroke of the take-up. Under these circumstances, the controlling member 773, after having been moved into the position shown in Fig. 42, lies in this position during the next succeeding movement of the lever 779 to the left from the position shown in Fig. 43 into that shown in Fig. 45. During this movement of the lever the upper end thereof engages the controlling member and said lever is swung about its pivotal connection with the cam lever 150 substantially into the position shown in Fig. 46. By this movement of the lever 779 the link 783 and the bell crank lever 784 are actuated to depress the rod 786, and the lever 787 is actuated to move the rod 790 rearwardly. This movement of the latter rod swings the left hand end of the lever 547 rearwardly to disengage the latch 543 from the projection on the rod 539, and thereby throws the stopping devices into operation, these devices acting in the same manner as when thrown into operation at the completion of the sewing of a seam.

The mechanism for driving the pattern cam shaft in a direction reverse to its normal direction of rotation comprises a gear 795 secured to the gears 451 and 453, and a shaft 796 journaled in a bearing in a bushing or sleeve 797, and a gear 798 secured to the lower end of the shaft 796 and meshing with the gear 795. The shaft 796 is adapted to be driven from the continuously rotating shaft 196, and to this end a clutch member 799 is secured to the upper end of the shaft and is arranged to be engaged by and driven from a clutch member 800 formed on the clutch carrying sleeve 713. When the clutch member 800 is engaged with the clutch member 799, the pattern cam shaft is then driven through the connections described in a direction reverse to its normal direction of rotation. The lever 716 is actuated to move the clutch carrying sleeve 713 to engage the clutch member 800 with the clutch member 799 by means of the lever 726 which carries an abutment screw 801 arranged to engage the lever 716 at a

point to the rear of the axis thereof. As the clutch member 800 is engaged with the clutch member 799, the clutch member 469 is disengaged from the clutch member 468 so that no reverse movement will be imparted to the sewing cam shaft. To this end a lever 802 is also pivoted on the stud 727 within a slot in the lever 726 and is adapted to be actuated from the lever 726 by means of a projection 803 formed on its hub and arranged to engage the lever 726 as shown in Fig. 71. A spring pressed plunger 804 is mounted in the lever 802 and is arranged to engage the lever 726 as shown in this figure. The plunger 804 normally maintains the levers 726 and 802 in the relative positions shown in Fig. 71 with the projection 803 engaged with the lever 726, but allows said levers to swing relatively to a slight degree as shown in Fig. 72. The lever 802 is provided with rearwardly extending spaced arms embracing the clutch member 469 and carrying tapered rolls 805 engaging in a groove in said clutch member. The clutch members 799 and 800 are engaged and the clutch members 468 and 469 are disengaged by depressing the forward end of the lever 726, this movement of the lever actuating the lever 716 to depress the clutch carying sleeve 713 as shown in Fig. 74. The forward end of the lever 726 is depressed to actuate the clutch member 469 and the clutch carrying sleeve 713 by the engagement of the projection 725 on the rod 722 with the forward end of the lever. As the left hand end of the lever 547 is swung rearwardly to throw the stopping devices into operation the lever 729 is held stationary by the rod 722 which is then located in the position shown in Fig. 70. As the arm 644 is lifted following the coupling of said arm to the cam lever 647, the projection 725 is carried above the forward end of the lever 726 and the lever 729 is then swung rearwardly by one of the plungers 731, thereby locating the projection 725 over the forward end of the lever 726 as shown in Fig. 73. Then as the arm 644 is depressed by the action of the cam lever 647, the forward end of the lever 726 is depressed by the engagement of the projection 725 with said lever as shown in Fig. 74.

When a reverse movement through a predetermined angular distance has been imparted to the pattern cam shaft the lever 756 is actuated to swing the lever 729 and the rod 722 forwardly to release the projection 725 from the forward end of the lever 726. Upon the release of said lever by the projection 725 the lever 716 is swung back to its normal or central position by the action of the tapered end of the plunger 720 on the tapered recess in said lever, thereby disengaging the clutch member 800 from the clutch member 799 and the clutch member 469 is moved back into engagement with the clutch member 468 by the act on of the coiled springs 471.

The lever 756 is actuated to swing the lever 729 forwardly during the reverse rotation of the correcting cam shaft by means of a ring 806 loosely mounted on an enlarged portion of the shaft 796 between the clutch member 799 and a flange on the upper end of the sleeve 797. During the normal operation of the machine, the shaft 796 rotates in a clockwise direction, Fig. 78, and the frictional engagement of the shaft 796 and the clutch member 799 with the ring 806 tends to turn the ring in the same direction. The ring then is located substantially in the position shown in Fig. 61, its movement in a clockwise direction being limited by the engagement of a pin or stud 807 projecting downwardly from a spring pressed cylindrical block 808 mounted in a bore in the ring with an arm 809 secured to the upper end of the sleeve 797. The arm 809 is held stationary during the operation of the machine by means of a link 810 connecting said arm with the right hand end of the controller bar 477. When the clutch members 799 and 800 are engaged upon the occurrence of a misstitch to drive the pattern cam shaft in a direction reverse to its normal direction of rotation, the shaft 796 is driven in the direction of the arrow, Fig. 78, and the ring 806 is then clutched to the shaft and is driven thereby through a series of spring pressed clutch rolls 811. When the pattern cam shaft has executed a predetermined angular movement in this reverse direction the lever 756 is actuated to swing the lever 729 forwardly by the engagement of a projection 812 formed on the ring 806 with a roll 813 carried by the lever.

The extent of the rotary movement in a forward direction of the pattern cam shaft during the formation of any given number of stitches varies with the size of the shoe being sewn, the larger the size of the shoe the less extent of the rotary movement of the shaft. In order that the extent of the reverse movement imparted to the shaft upon the occurrence of a misstitch may be equal to the extent of the forward movement of said shaft during the formation of a predetermined number of stitches regardless of the size of the shoe being sewn, the reverse movement imparted to the shaft is varied in accordance with the size of the shoe. This is accomplished through the adjustment of the normal position of the ring 806. The position of the arm 809 is determined by the longitudinal position of the controller bar 477 through the link 810. The arm 809 is thus adjusted in accordance with the size of the shoe being sewn. The normal position of the ring or the position from which the ring starts its rotary move-

ment in the direction of the arrow, Fig. 78, upon the reversal of the direction of rotation of the pattern cam shaft, which is controlled by the position of the arm 809, is thus adjusted in accordance with the size of the shoe being sewn. Thus the extent of the rotary movement of the ring before the projection 812 engages the roll 813 to throw the reverse driving mechanism out of operation is varied in accordance with the size of the shoe, and the reverse movement imparted to the pattern cam shaft is correspondingly varied.

The lever 547, after having been swung in either direction from its normal position, is swung back to normal position, upon its release, by the action of the latch 543 through the engagement of one of the inclined surfaces of the notch in the latch with the pin 546.

To prevent the starting of the machine before a shoe is applied to the jack, a pin 814 is mounted on the bar 487 in position to engage the lever 739 while said lever is in forward position. The engagement of the pin with the lever 739 will prevent the movement of the bar 487 to the right to start the machine.

Certain features of the machine herein disclosed but not claimed relating particularly to the mechanism for actuating the jack, form the subject matter of a divisonal application filed December 1, 1923, Serial No. 677,961.

Having explained the nature and object of the invention and having specifically described a machine embodying the various features of the invention in their preferred forms, what is claimed is:

1. A machine for sewing shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the thread between the shoe and the machine upon the completion of the seam, and for moving the jack out of operating position.

2. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the welt and the thread between the shoe and the machine upon the completion of the seam and for moving the jack out of operating position.

3. A machine for sewing shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism acting upon the completion of the seam to sever the thread between the shoe and the machine, to move the jack out of operating position and to unclamp the shoe with relation to the jack.

4. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism acting upon the completion of the seam to sever the thread and the welt, to move the jack out of operating position and to unclamp the shoe with relation to the jack.

5. A machine for sewing shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, mechanism acting upon the completion of the seam to sever the thread, to move the jack out of operating position, to unclamp the shoe with relation to the jack, and to turn the jack to starting position.

6. A machine for sewing shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, mechanism acting upon the completion of the seam to stop the stitch forming devices, to sever the thread and to grip the end of the thread leading to the supply, to move the jack out of operating position, to unclamp the shoe with relation to the jack and to turn the jack to starting position.

7. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism acting upon the completion of the seam to stop the stitch forming devices, to sever the thread between the shoe and the machine and to grip the end of the thread leading to the supply, to sever the welt between the shoe and the machine, to move the shoe out of operating position, to unclamp the shoe with relation to the jack and to turn the jack to starting position.

8. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for butting the welt.

9. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the

point of operation about the shoe, and mechanism for making an inclined transverse cut in the welt at a predetermined point in the sewing operation to form a bevel surface at one end of a length of welt attached to a shoe.

10. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for making an inclined transverse cut in the welt at a predetermined point in the relative movement of the shoe and the sewing mechanism to form a bevel surface at one end of the welt after its attachment to the shoe.

11. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the welt arranged to be thrown into operation at a predetermined point in the relative movement of the shoe and the stitch forming devices.

12. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and automatically actuated and controlled means for severing the welt.

13. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the welt upon the completion of the seam

14. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for cutting one or more slashes partially through the welt and partially across the same from its outer toward its inner edge arranged to be thrown into and out of operation at predetermined points in the relative movement of the stitch forming devices and the shoe.

15. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, normally inactive mechanism for cutting slashes partially through the welt and partially across the same from its outer toward its inner edge, and automatically acting means for throwing the welt slashing mechanism into and out of operation.

16. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism operating at a predetermined point in the sewing operation to sever the thread between the shoe and the machine.

17. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the thread between the shoe and the machine upon the completion of the seam.

18. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and automatically actuated and controlled means for severing the thread between the shoe and the machine and for gripping the free end of the thread leading to the supply.

19. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and automatically actuated and controlled mechanism for stopping the stitch forming devices at a predetermined point in the sewing operation and for severing the welt and the thread between the shoe and the machine.

20. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism acting at a predetermined point in the sewing operation to cut an inclined slash partially through the welt to form a bevel at the end of a length of welt attached to a shoe, and mechanism operating at the completion of the sewing operation to sever the welt at a predetermined point in said slash.

21. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, mechanism for cutting a recess in the welt during the sewing operation to form a bevel at the end of the length of welt attached to the

shoe and an oppositely inclined bevel at the end of the welt leading from the supply after the welt is severed, and mechanism for severing the welt at substantially the central point of the recess after the completion of the seam.

22. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, a welt slashing knife, and automatically actuated and controlled means for actuating the knife to cut one or more relatively short slashes extending partially through the welt and partially across the same from its outer toward its inner edge at predetermined points in the relative movement of the shoe and the stitch forming devices, and to cut an inclined slash to form a bevel at one end of a length of welt attached to a shoe at another predetermined point in the relative movement of the shoe and the stitch forming devices.

23. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fastenings to attach the welt to the shoe bottom, a shoe supporting jack, mechanism for relatively moving the jack and the fastener inserting means to transfer the point of operation about the shoe, and mechanism for making a transverse cut in the welt at a predetermined point in the operation of the machine.

24. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fastenings to attach the welt to the shoe bottom, a shoe supporting jack, mechanism for relatively moving the jack and the fastener inserting means to transfer the point of operation about the shoe, normally inactive means for making a transverse cut in the welt, and automatically acting mechanism for throwing said means into operation.

25. A machine for operating on a welted shoe having, in combination, means for operating on a shoe, a shoe supporting jack, mechanism for relatively moving the jack and the operating means to transfer the point of operation about the shoe, and mechanism operating at a predetermined point in the operation of the machine to make a transverse cut in the welt.

26. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, mechanism for cutting an inclined slash in the welt at a predetermined point in the sewing operation to form a bevel surface at one end of a portion of the welt attached to a shoe, and means acting to stop the machine after the formation of said slash when the welt intermediate the sewing mechanism and said slash has been attached to the shoe bottom.

27. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for changing the relative positions of the jack and the stitch forming devices to present the shoe properly to the stitch forming devices as the point of operation is transferred about the shoe comprising a cam shaft rotating in one direction during the normal operation of the machine, and mechanism for stopping the stitch forming devices and imparting a predetermined rotary movement to the cam shaft in the reverse direction upon the occurrence of a misstitch.

28. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for changing the relative positions of the jack and the stitch forming devices to present the shoe properly to the stitch forming devices as the point of operation is transferred about the shoe comprising a cam shaft rotating in one direction during the normal operation of the machine, mechanism for stopping the stitch forming devices and imparting a predetermined rotary movement in the reverse direction to the correcting cam shaft upon the occurrence of a misstitch, and means for adjusting the reverse movement imparted to the cam shaft in accordance with the size of the shoe being sewn.

29. A shoe sewing machine having in combination, stitch forming devices, a shoe supporting jack, mechanism for changing the relative positions of the jack and the stitch forming devices to present the shoe properly to the stitch forming devices as the point of operation is transferred about the shoe comprising a cam shaft rotating in one direction during the normal operation of the machine, mechanism for imparting a predetermined rotary movement in the reverse direction to the cam shaft upon the occurrence of a misstitch, and means controlled from the shoe for adjusting the reverse movement imparted to the cam shaft in accordance with the size of the shoe being sewn.

30. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means for butting the welt.

31. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt and means for cutting a recess in the welt to form a bevel surface at the end of the portion of the welt attached to the shoe

and an oppositely inclined bevel surface at the end of the welt left in the machine after the welt is severed.

32. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means for abutting and severing the welt.

33. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means for butting and severing the welt so as to form a bevel surface at the end of the portion of the welt attached to the shoe and an oppositely inclined bevel surface at the end of the welt left in the machine.

34. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means for cutting during the sewing operation an inclined slash in the welt to form a bevel surface at the end of a length of welt to be attached to the shoe.

35. A machine for attaching a welt to a shoe bottom having, in combination, welt attaching mechanism, work feeding means, devices for guiding the welt, normally inactive mechanism for making a transverse cut in the welt, means for throwing the welt cutting mechanism into operation when a predetermined point on the shoe is reached.

36. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the thread and the welt upon the completion of the seam.

37. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, and mechanism for severing the thread and the welt and for gripping the end of the thread leading to the supply upon the completion of the seam.

38. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means acting upon stopping the machine to sever the thread and the welt.

39. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, devices for guiding the welt, and means acting upon stopping the machine to sever the thread and the welt and to grip the free end of the thread leading to the supply.

40. A sewing machine having, in combination, stitch forming devices, an actuating slide bar, a second slide bar, connections for moving the second slide bar with the actuating slide bar forwardly to a predetermined position, and for then imparting a relative lateral movement to the slide bars from the movement of the actuating slide bar, and devices for operating on the work carried by the slide bars, arranged to be moved into operating position by the forward movement of the slide bars together and to be relatively actuated to perform their operation by the relative lateral movement of the slide bars.

41. A sewing machine having, in combination, stitch forming devices, an actuating slide bar, a second slide bar, stops for holding the second slide bar from longitudinal movement during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, a pin and inclined slot connections between the slide bars cooperating with said stops to move the second slide bar with the actuating slide bar during the first part of the forward movement of the actuating slide bar, and during the last part of the rearward movement thereof, and to move one of the slide bars laterally with relation to the other slide bar during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, and devices for operating on the work carried by the slide bars and arranged to be moved into and out of operating position respectively by the forward and rearward movement of the slide bars together, and to be relatively actuated to perform their operation by the relative lateral movement of the slide bars.

42. A sewing machine having, in combination, stitch forming devices, an actuating slide bar, a second slide bar, means for holding the second slide bar from longitudinal movement during the last part of the forward movement of the actuating slide bar, a connection between the slide bars for moving the second slide bar with the actuating slide bar during the first part of the forward movement of the actuating slide bar and during the last part of the rearward movement thereof, and for moving one of the slide bars laterally relatively to the other slide bar during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, a stop for preventing the rearward movement of the second slide bar during the first part of the retracting movement of the actuating slide bar carried by the laterally movable slide bar and arranged to be moved into and out of operative position by the lateral movement of said bar, and devices for operating on the work carried by the slide bars and arranged to be moved into and out of operating position respec-

tively by the forward and rearward movement of the slide bars together, and to be relatively actuated to perform their operation by the relative lateral movement of the slide bars.

43. A sewing machine having, in combination, stitch forming devices, an actuating slide bar, a second slide bar, guides for the slide bars, means for holding the second slide bar stationary during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, a connection between the slide bars for moving the second slide bar with the actuating slide bar during the first part of the forward movement of the actuating slide bar and during the last part of the rearward movement thereof, and for moving one of the slide bars laterally relatively to the other slide bar during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, a stop carried by the laterally movable slide bar for engagement with one of the guides to prevent lateral movement of said slide bar, arranged to be located beyond the guide when the slide bars reach the limit of their forward movement together, and to be retracted into operative position with relation to the guide when the slide bars are retracted together, and devices for operating on the work carried by the slide bars and arranged to be moved into and out of operating position respectively by the forward and rearward movement of the slide bars together, and to be relatively actuated to perform their operation by the relative lateral movement of the slide bars.

44. A sewing machine having, in combination, stitch forming devices, an actuating slide bar, a second slide bar, guides for the slide bars, a stop carried by the second slide bar for holding the second slide bar stationary during the last part of the forward movement of the actuating slide bar, a pin and inclined slot connection between the slide bars for moving the second slide bar with the actuating slide bar during the first part of the forward movement of the actuating slide bar and during the last part of the rearward movement thereof, and for moving one of the slide bars laterally relatively to the other slide bar during the last part of the forward movement of the actuating slide bar and during the first part of the rearward movement thereof, a stop formed on the laterally movable slide bar for engagement with one of the guides to prevent lateral movement of said slide bar, arranged to be located beyond the guide when the slide bars reach the limit of their forward movement together, and to be retracted into operative position with relation to the guide as the slide bars are retracted together, a second stop carried by the laterally movable slide bar for preventing rearward movement of the second slide bar during the first part of the retracting movement of the actuating slide bar, arranged to be moved into and out of operative position by the lateral movement of the laterally movable slide bar, and devices for operating on the work carried by the slide bars and arranged to be moved into and out of operating position respectively by the forward and rearward movement of the slide bars together, and to be relatively actuated to perform their operation by the relative lateral movement of the slide bars.

45. A sewing machine having, in combination, stitch forming devices, a thread tension wheel and mechanism controlled from the tension wheel for stopping the machine upon the occurrence of a misstitch.

46. A sewing machine having, in combination, stitch forming devices, a thread tension wheel, a device connected with the tension wheel and arranged to be moved into one position by the movement imparted to the tension wheel during each normal cycle of operations, means for moving said devices into another position during each cycle of operations, stopping devices, and mechanism for throwing the same into operation rendered inoperative when said device is moved into the first position during each cycle of operations, and rendered operative when the tension wheel fails to be actuated during a cycle, allowing said device to remain in the second position.

47. A sewing machine having, in combination, stitch forming devices, a thread tension wheel, stopping devices, and mechanism for throwing the stopping device into operation controlled from the tension wheel and rendered inoperative by the rotary movement imparted to the tension wheel during each cycle of operations, and rendered operative when the tension wheel fails to be actuated during a cycle.

48. A welt shoe sewing machine having, in combination, stitch forming devices, a welt guide adjacent the stitch forming devices, and means comprising an auxiliary guide for the welt located at a distance in advance of said welt guide, and a welt slashing knife to act on the welt as it passes through said auxiliary guide.

49. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fasteners to attach the welt to the shoe bottom, a welt slashing knife, and means for actuating the knife to cut one or more relatively short slashes partially across the welt and to cut a slash completely across the welt.

50. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fasteners to attach the welt to the shoe bottom, a welt slashing knife, and

means for actuating the knife to cut slashes extending different distances across the welt.

51. A shoe sewing machine having, in combination, stitch forming devices, a shoe supporting jack, mechanism for changing the relative positions of the shoe and the stitch forming devices to present the shoe properly to the stitch forming devices as the point of operation is transferred about the shoe, and means for stopping the stitch forming devices and for imparting a reverse movement to the said mechanism upon the occurrence of a misstitch.

52. A machine for operating on shoes having, in combination, means for operating on a shoe, a shoe supporting jack, mechanism for changing the relative positions of the shoe and the operating means to present the shoe properly to the operating means as the point of operation is transferred about the shoe, means for stopping the operating means at the completion of the operation on the shoe, and means for stopping the operating means before the operation is completed and for imparting a reverse movement to said mechanism.

53. A machine for operating on shoes having, in combination, means for operating on a shoe, a shoe supporting jack, mechanism for changing the relative positions of the shoe and the operating means to present the shoe properly to the operating means as the point of operation is transferred about the shoe, means for stopping the operating means at the completion of the operation on the shoe and for continuing said mechanism in operation until it is in position to act on the next shoe, and means for stopping the operating means before the operation is completed and for imparting a reverse movement to said mechanism.

54. A machine for sewing inseams of welted shoes having, in combination, stitch forming devices, a shoe supporting jack, mechanism for relatively actuating the stitch forming devices and the jack to transfer the point of operation about the shoe, welt severing mechanism, means for throwing said welt severing mechanism into operation upon stopping the stitch forming devices at the completion of the seam, and means for stopping the stitch forming devices upon the occurrence of a mis-stitch without throwing said welt severing mechanism into operation.

55. A machine for operating on shoes having, in combination, means for operating on a shoe, a shoe supporting jack, mechanism for changing the relative positions of the shoe and operating means to present the shoe properly to the operating means as the point of operation is transferred about the shoe, means for stopping the operating means at the completion of the operation on the shoe and for continuing said mechanism in operation until it is in a position to act on the next shoe, and means for stopping the operating means and said mechanism before the operation is completed.

56. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fasteners to attach the welt to the shoe bottom, a knife, and automatically actuated and controlled means for actuating the knife during the welt attaching operation to make transverse cuts in the welt to leave the succeeding portion of the welt uncut during the insertion of a plurality of fasteners and to again make a transverse cut in the welt.

57. A machine for attaching a welt to a shoe bottom having, in combination, means for inserting fasteners to attach the welt to the shoe bottom, a knife, mechanism for actuating the knife to make a transverse cut in the welt, and means acting automatically to throw said mechanism into and out of operation a plurality of times during the welt attaching operation to cut the welt at points separated by a plurality of fasteners.

58. A machine for operating on shoes having, in combination, means for operating on a shoe and a shoe supporting jack, relatively movable to transfer the point of operation about the shoe, mechanism for controlling said relative movement, and means, operating upon a failure of said operating means, to impart a reverse movement to said mechanism.

59. A machine for operating on shoes having, in combination, means for operating on a shoe and a shoe supporting jack, relatively movable to transfer the point of operation about the shoe, mechanism connected with the jack for determining the longitudinal position of the shoe, and means, operating upon a failure of said operating means, for imparting a reverse movement to said mechanism to permit restarting the operation at a point previously operated upon.

60. A machine for attaching a welt to a shoe bottom having, in combination, welt attaching means, welt slashing mechanism, and means acting automatically to throw said mechanism into and out of operation during the continued operation of the welt attaching means.

61. A machine for attaching a welt to a shoe bottom having, in combination, welt attaching means, means acting automatically for relatively moving and guiding the shoe and attaching means to transfer the point of operation about the shoe and means acting automatically to sever the welt.

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