

942,090.

W. A. MACK.
SEWING MACHINE.
APPLICATION FILED APR. 18, 1906.

Patented Dec. 7, 1909.
4 SHEETS—SHEET 1.

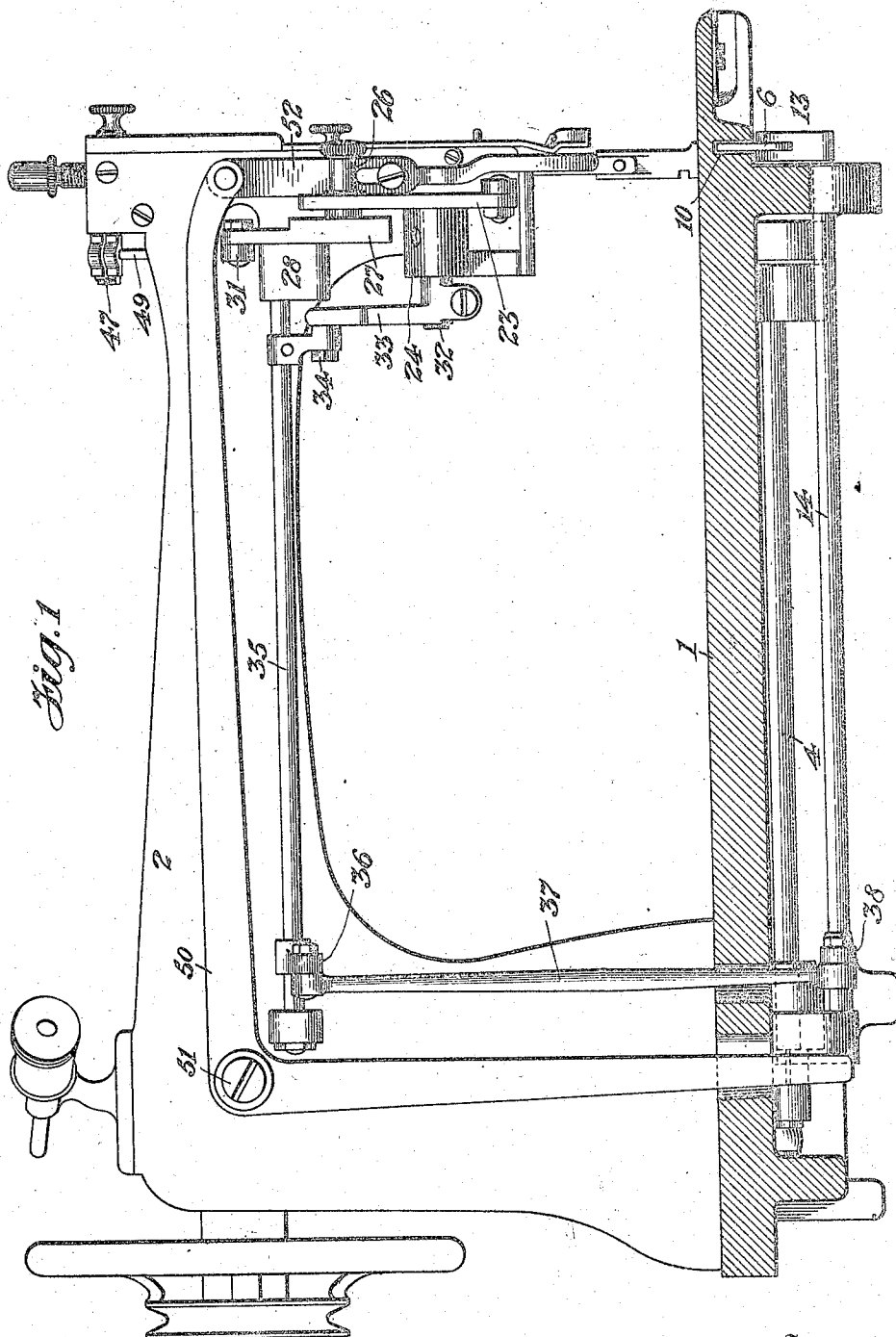


Fig. 1

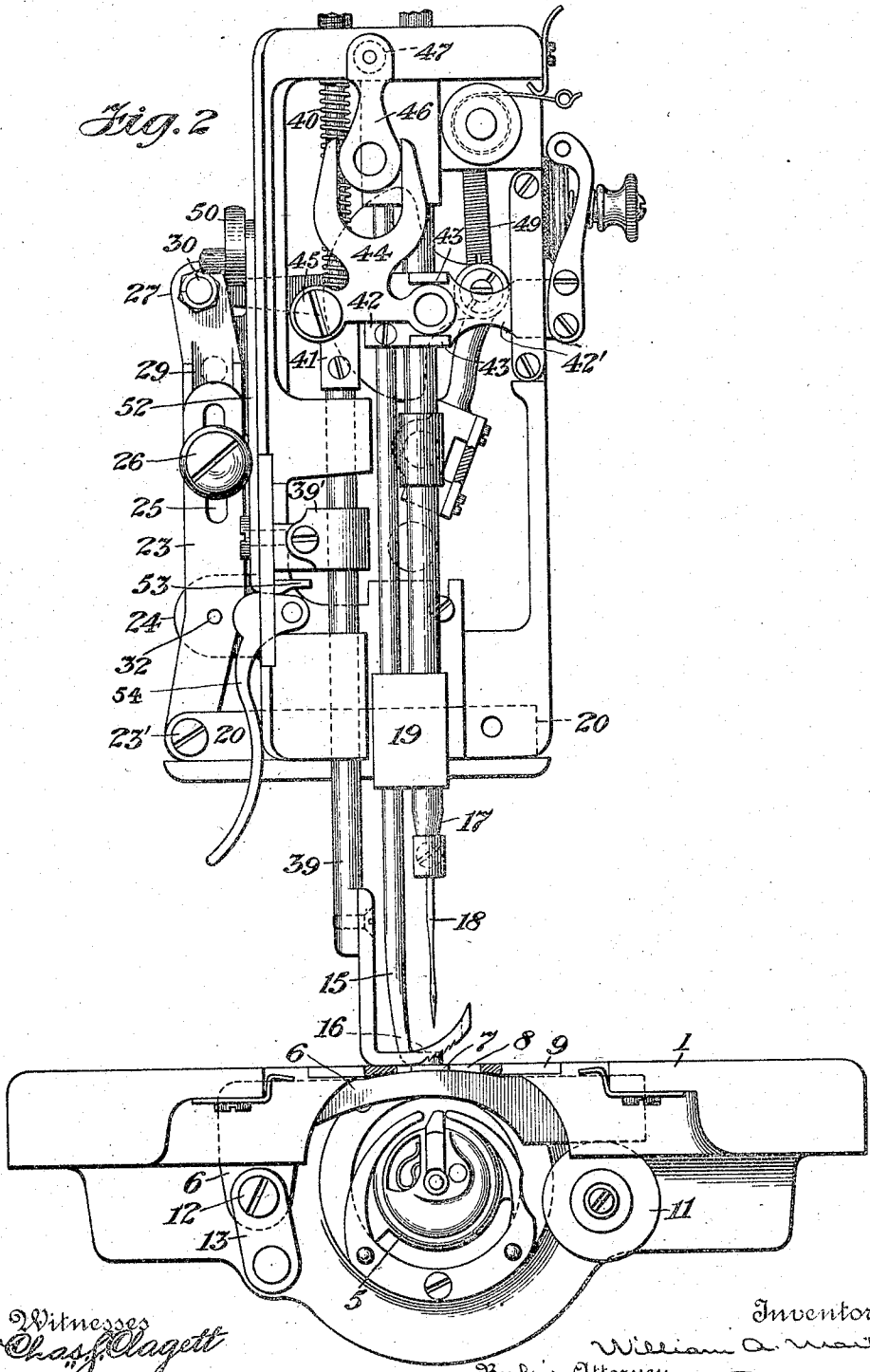
Witnesses
Chas. C. Daggett
May E. Stanton

Inventor
William A. Mack
By his Attorney
Chas. F. Dand

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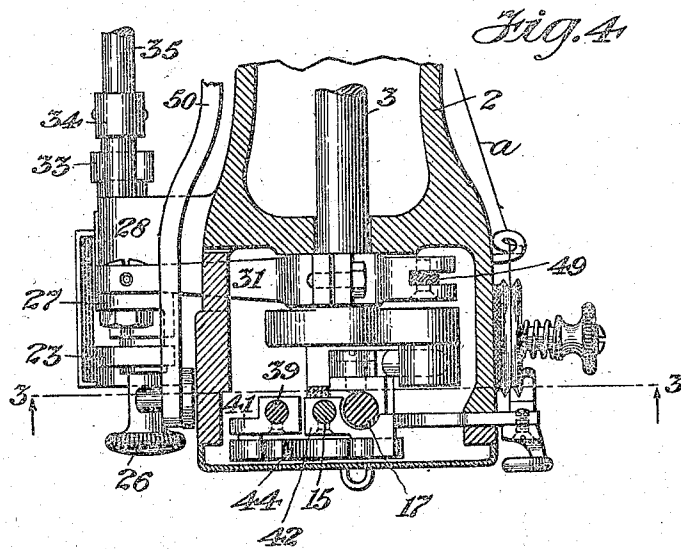
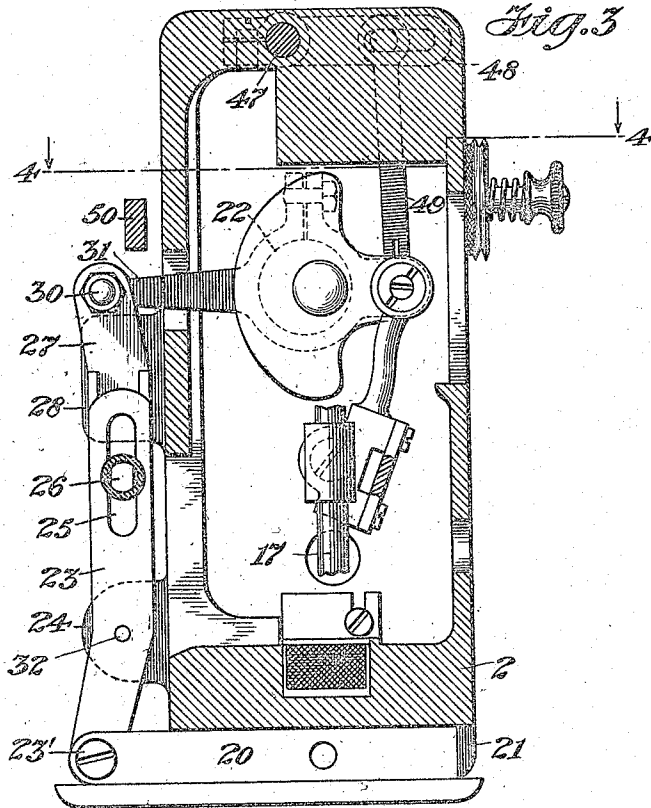
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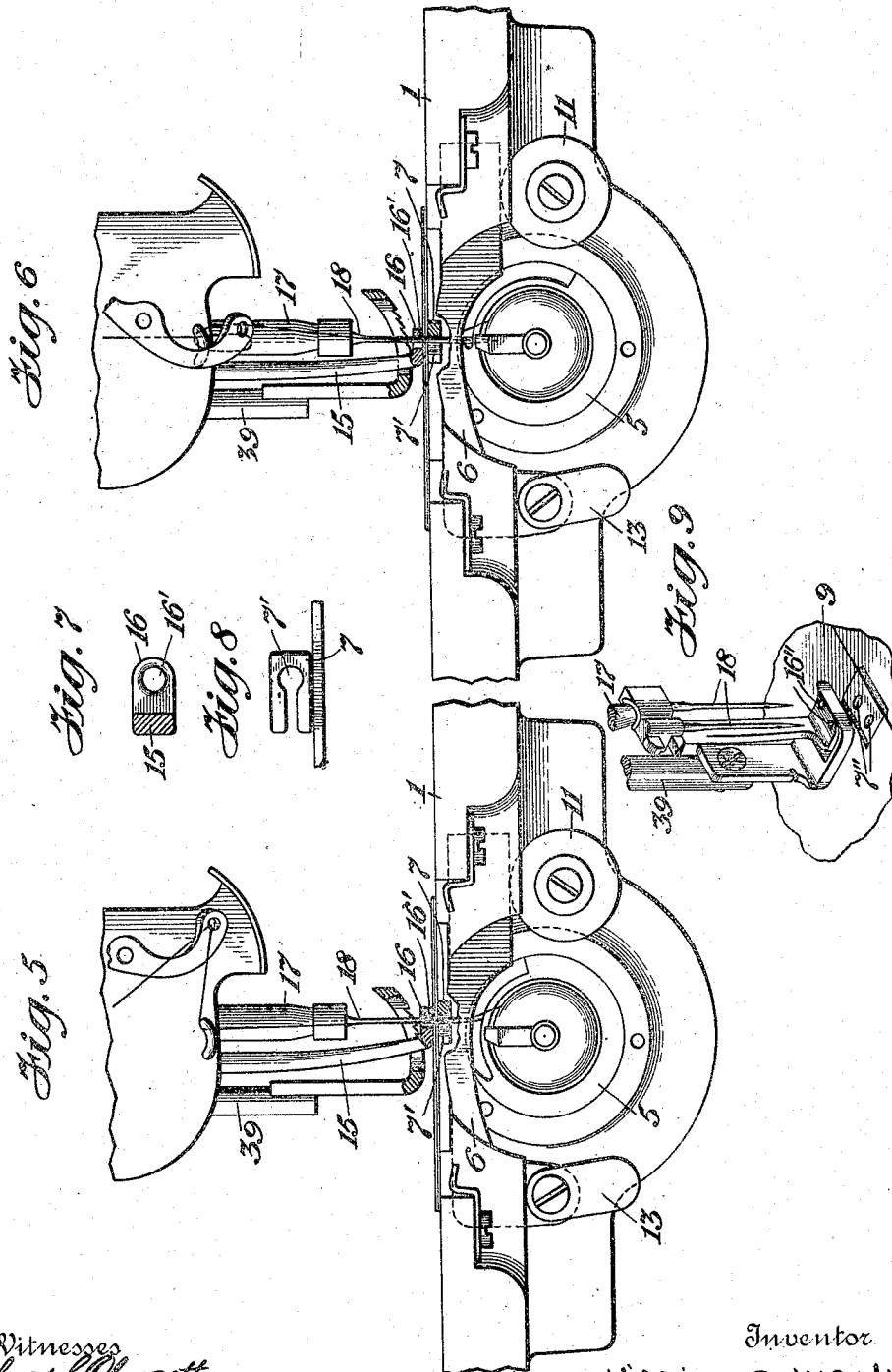
Witnesses
Chas. Clagett
Mary C. Stanton

Inventor
William A. Mack
By *his Attorney*
Chas. F. Dams

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Witnesses
Chas. J. Claggett
May C. Stanton

Inventor
William A. Mack
By his Attorney
Chas. H. Davis

UNITED STATES PATENT OFFICE.

WILLIAM A. MACK, OF CLEVELAND, OHIO, ASSIGNOR TO THE STANDARD SEWING MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SEWING-MACHINE.

942,090.

Specification of Letters Patent.

Patented Dec. 7, 1909.

Application filed April 18, 1906. Serial No. 312,305.

To all whom it may concern:

Be it known that I, WILLIAM A. MACK, a citizen of the United States, and a resident of Cleveland, Cuyahoga county, State of Ohio, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

The invention forming the subject-matter of my present application relates to sewing machine feeding mechanism of the type disclosed in my pending application, Ser. No. 35,395, filed Nov. 3, 1900, in which the feed of the work is effected by a feeding mechanism comprising cooperating work-engaging members, one of which is the needle. This type of feeding mechanism is desirable in that it assures a uniform, or substantially uniform, feeding movement of a plurality of plies of material.

The feeding mechanism of my said pending application comprises the needle, which is operative to have a combined reciprocating and vibrating movement, and two cooperating work-engaging feed-members operative at the upper and under sides of the work to engage or grip the work therebetween. As fully disclosed in said pending application, the upper feed-member is provided with a needle-hole for the passage of the needle in its descent through the work having one wall thereof arranged for engagement with the needle during the work-feeding operation to prevent undue bending or springing of the needle under any undue drag or strain produced by the engaged work.

The undue feed-member is preferably formed with a work-engaging surface of an area at least equal to that of the cooperating upper feed-member and is accordingly provided with an opening for the passage of the needle, which opening, in accordance with the invention forming the subject-matter of the present application, is also formed with a wall arranged for engagement with the needle at its rear side during the feeding operation to prevent undue bending or springing of the same.

Referring now to the accompanying drawings forming part of this specification, and in which like parts are designated by like reference characters,—Figure 1 is a side elevation of a sewing machine embodying my invention, with the bed-plate in section, Fig. 2 is an enlarged front end elevation of the

same with the face-plate removed. Fig. 3 is a vertical section through the front end of the machine arm, taken on line 3—3 of Fig. 4, also showing a portion of the needle-bar. Fig. 4 is a horizontal section through the front end of the machine arm, taken on line 4—4 of Fig. 3. Figs. 5 and 6 are detail views of the work-engaging portions of the feeding mechanism, partly in section, showing respectively the position of the parts at or about the beginning and ending of the feeding movement. Figs. 7 and 8 are enlarged plan views of the work-engaging portions of the upper and lower feed members respectively. Fig. 9 is a detail perspective view illustrating the application of my invention to a two-needle machine.

The sewing machine head or frame comprising the bed-plate 1 and the overhanging arm 2, the upper or main driving shaft 3 supported in bearings in said arm, the lower shuttle driving shaft 4 supported in bearings on the under side of the bed-plate and driven from the upper shaft through the medium of operative connections, and the rotary shuttle 5 driven from said lower shaft 4 through the medium of an intermediate shuttle-driver, are all substantially as found in the "Standard" sewing machine upon which, in the present instance, I have applied my improvements.

The lower member of my improved feeding mechanism consists of a horizontally reciprocating feed-bar 6 having a projection or dog 7 attached thereto which projects through an elongated slot 8 in the throat-plate 9 so as to engage with the under side of the work. This feed-bar 6 adjacent to its opposite ends is supported and guided within a groove 10 in the under side of the bed-plate as clearly shown in Fig. 1, the same resting at one end upon a roll 11 attached to the front end of the bed-plate, and at its opposite end being pivotally connected at 12 with a short crank-arm 13 on the front end of a rock-shaft 14 from which it receives its longitudinal movement. The two upper members of the feeding mechanism, consisting of the helper-bar 15 having a foot 16 cooperating with the dog 7 of the lower feed-member in gripping the work or material interposed between the same, and the needle-bar 17 carrying the needle 18 for entering the work, are both loosely supported in bearings in the upper end of the

machine arm and adjacent to their lower end passed through a block or gate 19, which latter is pivotally connected with a horizontally reciprocating bar 20 from which the helper and needle bars receive their lateral or feeding movement.

The bar 20 is supported to slide within a seat 21 in the lower end of the machine arm, as clearly shown in Fig. 3, and is operated from a cam or eccentric 22 on the upper driving shaft 3 in a manner as follows: A lever 23, mounted on a short shaft 32 journaled in a lug 24 on one side of the machine arm, is pivotally connected at its lower end with the outer projecting end of the bar 20 at 23', and adjacent to its upper end is provided with an elongated slot 25 in which a stud 26 is adjustably supported. A second lever 27, pivotally supported in a lug 28 on the machine arm in a position above the said lower lever 23, is provided with a face-groove 29 on its lower arm having a sliding block therein which connects with the inner end of said stud 26 on the lever 23, and at its upper end is pivotally connected at 30 with the outer end of a reciprocating pitman rod 31 which is connected with and driven by the said cam or eccentric 22 on the driving shaft. By such arrangement of parts, reciprocating movement is communicated to the bar 20 from the driving shaft 3, and by adjusting the pivot connection or stud 26 back and forth in the slot 25 the length of movement of said bar 20 and thereby the lateral throw of the helper and needle bars may be regulated.

As a means for operating the lower feed-bar 6 in unison with the upper feed members, the shaft 32 which carries the said lower lever 23 is extended through the supporting lug 24 and provided on its rear end with an arm 33 rigidly connected therewith, as shown in Fig. 1. The end of this arm 33 is bifurcated and engages with a roll or block carried by an arm 34 of a rock-shaft 35, which latter is mounted in bearings adjacent to the opposite ends of the machine and provided at its rear end with a second arm 36 which connects, through the medium of a pitman 37, with an arm 38 located on the said lower rock-shaft 14, which latter is mounted in bearings on the under side of the bed-plate and provided with the arm 13 at its front end connecting with the feed-bar 6, as before described. When the lever 23 is operated from the driving-shaft to receive a vibrating movement, its rigidly connected arm 33 is likewise operated and communicates a rocking movement to the lower shaft 14 through the medium of the connections described and so causes the arm 13 at the front end of said shaft to vibrate and give the feed-bar 6 its horizontal reciprocating movement. The upper and lower members of the feed being thus operated

from the driving shaft through the medium of the said lever 23, it will be understood that the one adjustment of the latter caused by the shifting of the stud 26 will regulate the horizontal throw of both said upper and lower feed members and cause them to always move in unison whatever their length of throw may be.

The presser-bar 39 is held, in the usual manner, with a normal downward pressure by means of a coiled spring 40 which has a bearing at one end against a wall of the machine arm and at its opposite end against a block 41 secured on said presser-bar, as clearly shown in Fig. 2. A block 42 is secured in rigid connection with the helper-bar 15 in position opposite the said block 41 on the presser and is provided with two forwardly projecting lugs 43, 43, on its face side located one above the other. A three-armed lever 44 is arranged with one arm having a pivotal connection with the presser-bar block 41 by means of a pivot-screw 45, another arm extending loosely between the said lugs on the helper-bar block 42, and its third arm being bifurcated and embracing the lower end of an arm 46 which is secured on the end of a short shaft 47 journaled in bearings in the upper front end of the machine arm 2. This shaft 47, as most clearly shown in Figs. 1 and 3, extends through the arm 2 and is provided at its rear end with a second rigidly connected arm 48, which latter connects with the inner end of the eccentric rod 31 through the medium of a pitman 49.

In the operation of the machine, the inner end of the eccentric rod 31 receives a vertical or up and down movement which communicates a rocking movement to the shaft 47 through the medium of the connections referred to, and so causes a laterally swinging or vibrating movement to the lower end of the arm 46 at the front end of said rock-shaft which operates the lever 44 in a manner as will hereinafter be described. The presser-bar 39 and helper-bar 15 being operatively connected through the medium of the lever 44 in the manner described, it will be understood that the presser-bar spring 40 serves to exert a yielding downward pressure upon the helper-bar as well as the presser-bar, vertical movement of either one or both of said bars being permitted by the sliding connection of the upper bifurcated end of the lever 44 with the said vibrating arm 46 as shown. In order to raise the helper and presser bars for the purpose of releasing the work, the block 41 on the presser-bar is adapted to be engaged by a suitable lifting-device in the usual manner, and, by reason of the lever 44 connecting with the blocks on both of said bars and being guided by the arm 46 which is rendered stationary by the stopping of the machine,

the helper-bar is caused to be raised and lowered in unison with the presser-bar. Any suitable means might be employed for raising the presser and helper bars, one means, as herein shown, consisting of an elbow-lever 50 which is pivotally supported upon the side of the machine at 51 with one end having connection with a vertically movable plate 52 which is arranged to slide upon the outer wall of the machine arm and provided with a lower inwardly turned end 53 projecting through an opening in the arm into a position beneath the presser-bar block 39' so as to engage therewith, as clearly shown in Fig. 2, and the opposite end of said elbow lever extending downward through an opening in the bed-plate into a position beneath the latter to be operated by any suitable actuating means. The ordinary hand-operated lifting lever, indicated at 54, is also provided, the same as herein shown being adapted to engage with the inwardly turned end 53 of the plate 52 in raising the presser-bar.

In the operation of the machine as described, after the work has been placed under the regular presser-foot in the usual manner and the machine set in motion, the presser-foot will be raised from engagement with the work while the upper feed member or helper-bar will be caused to cooperate with the lower feed member and grip the interposed work therebetween preliminary to the feeding movement, as shown in Fig. 5. Such action of the presser and helper bars in respectively releasing and engaging the work is secured in a manner as follows: The lever 44 being rocked by the vibrating arm 46, when the helper-bar is lowered into gripping engagement with the work and becomes stationary, the said lever is caused to pivot or fulcrum between the lugs on the helper-bar block and so raise its opposite end and the connected presser-bar. Upon the return swing of said lever, when the presser reaches a position in engagement with the work, the lever will of course fulcrum upon the pivot screw 45 in the presser-bar block and so raise the helper-bar. In this manner, one bar is caused to be brought into holding or gripping engagement with the work before the other raises therefrom, both of the same being in engagement with the work only as the lever 44 and its actuating arm 46 move past a central vertical line. To now continue with the feeding operation of the parts, after the work has been gripped between the upper and lower gripping members of the feed as described but before any forward movement of the same, the needle first descends through the work as shown in Fig. 5, passing through the needle openings 16' and 7' of the said upper and lower feed members respectively, and, while in the work and during its movement

to throw out the loop, is moved laterally with the said gripping members of the feeding mechanism and as a part of the latter to feed or carry the work forward. After the several members of the feeding mechanism have reached the limit of their feeding movement, as shown in Fig. 6, the needle first raises from the work and the presser moves downward into engagement with the latter, while immediately following such engagement, the helper-bar, as before described, raises from its engagement with the work and is swung backward into position to be again lowered into gripping engagement with the work at the starting point of the feeding movement.

During the described feeding operation of the several cooperating work-engaging parts of the feeding mechanism, the wall of the needle-opening in both the upper and under feed members is so formed as to provide a means for engagement with the needle at that side thereof which forms the rear side with respect to its direction of feeding movement, as shown in Fig. 6 to prevent the needle being unduly bent or sprung under any drag or strain produced by the engaged work. It will of course be understood, however, that the said needle-opening of both the upper and under feed members is made sufficiently large to permit of vertical passage therein of the needle in normal condition without frictional engagement with its walls, as shown in Fig. 5; the opening 7' in the lower feed member being shown in the present case as open at that end opposite its needle engaging end to permit of the ready withdrawal of the thread there-through.

As illustrated in Figs. 1 to 8 inclusive, my invention as shown is applied to a sewing machine employing but one needle. In some instances, however, the invention is applied to a machine employing a plurality of needles, as shown in Fig. 9, in which event it is only necessary to provide the cooperating work-engaging feed members with a corresponding number of needle openings, as indicated by 7'' and 16'' in Fig. 9, having walls arranged to cooperate with the needles during the feeding operation in the manner hereinbefore described.

What I claim is:

1. In a sewing machine, a combined reciprocating and vibrating needle, two feed members having work-gripping surfaces operative to engage the work at opposite sides thereof and clamp it therebetween and cooperating with the said needle to effect the feed of the work while the needle is in the work, said two feed members each being provided with means for engagement with the needle at its rear side during the feeding operation, and means for operating said needle and feed members.

2. In a sewing machine, a combined recip-
rocating and vibrating needle, two feed mem-
bers having work-gripping surfaces operative
to engage the work at opposite sides thereof
5 and clamp it therebetween and coöperating
with the said needle to effect the feed of the
work while the needle is in the work, said
two feed members each being provided with
a complemental needle-opening, and means
10 for operating said needle and feed members.

3. In a sewing machine, a combined recip-
rocating and vibrating needle, two feed
members having work-gripping surfaces op-
erative to engage the work at opposite sides
15 thereof and clamp it therebetween and co-

operating with the said needle to effect the
feed of the work while the needle is in the
work, said two feed members each being
provided with a complemental needle-open-
ing, means for operating said needle and 20
feed members, and adjusting means common
to both the said needle and feed members
for effecting a like adjustment of feed
movement to the same.

In testimony whereof I have hereunto set 25
my hand this 13th day of April, 1906.

WILLIAM A. MACK.

Witnesses:

CHAS. C. EMMONS,
H. W. CORNING.