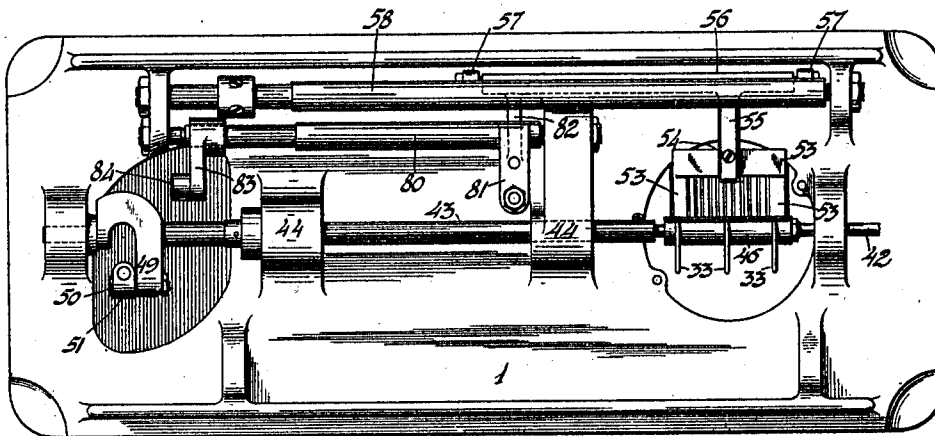
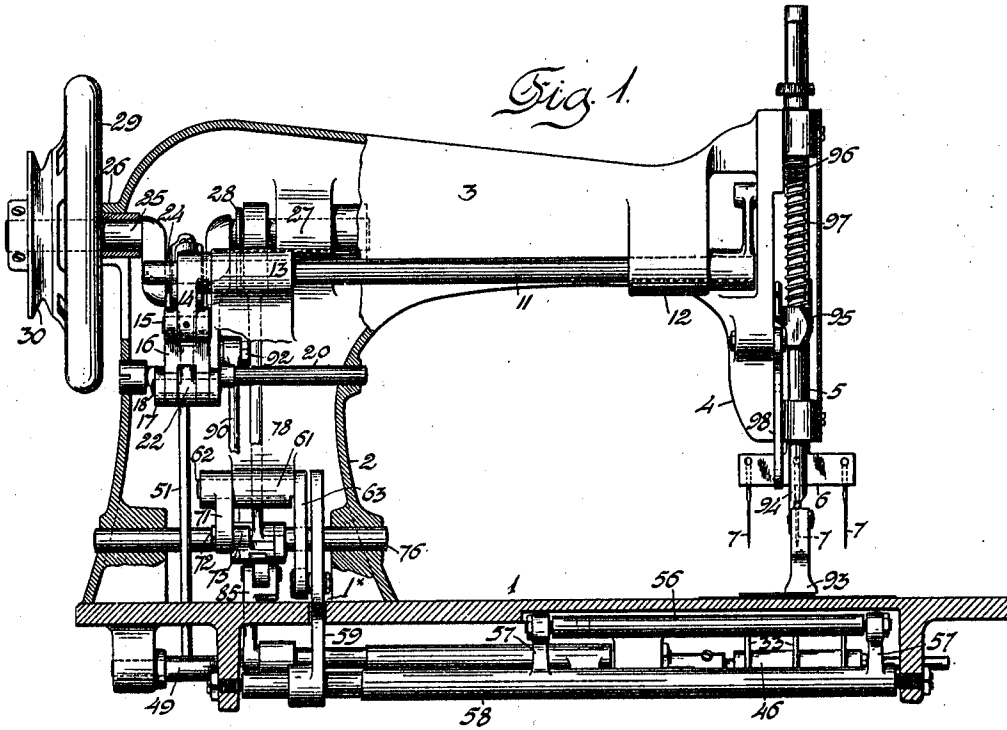


A. H. DE VOE.
CHAIN STITCH SEWING MACHINE.
APPLICATION FILED APR. 22, 1909.

978,140.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.



WITNESSES

Geza Pinaf
SAKommernann

INVENTOR

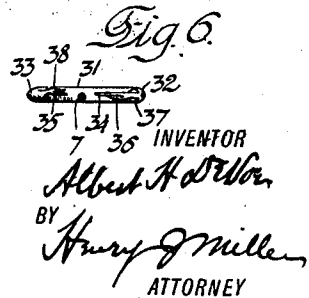
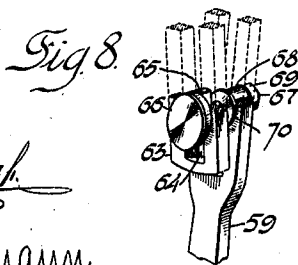
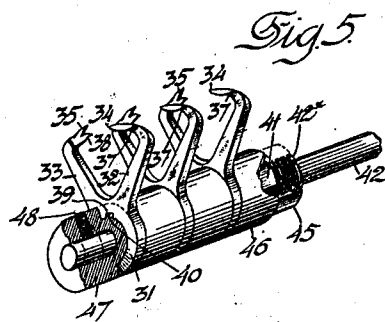
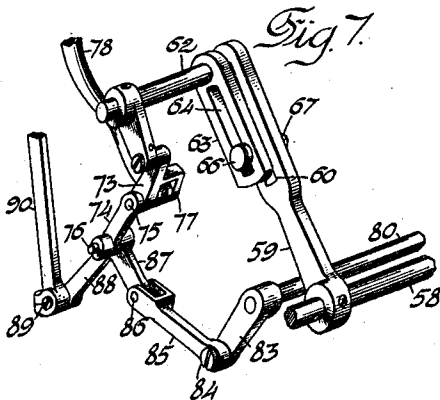
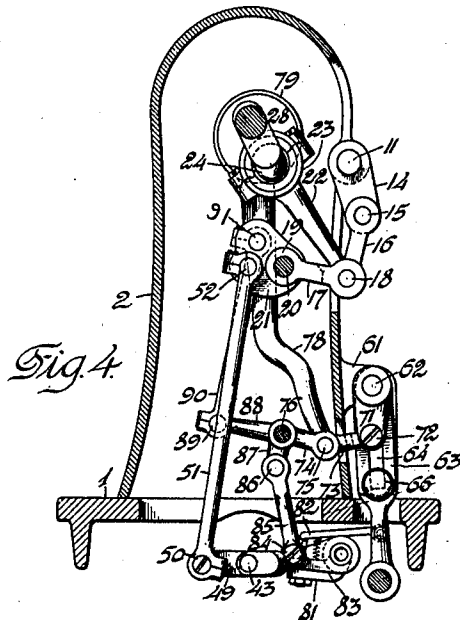
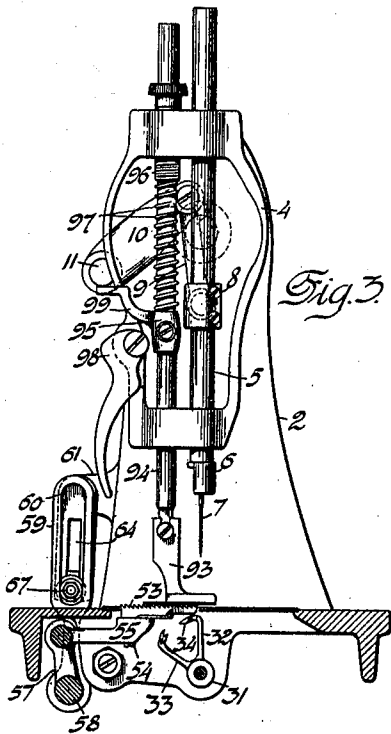
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2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

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

CHAIN-STITCH SEWING-MACHINE.

978,140.

Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed April 22, 1909. Serial No. 491,575.

To all whom it may concern:

Be it known that I, ALBERT H. DE VOE, a citizen of the United States, residing at Elizabeth, in the county of Union and State

5 of New Jersey, have invented certain new and useful Improvements in Chain-Stitch Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention has for its primary object to provide a high speed machine adapted for producing simultaneously a large number of parallel seams; and has for its further object to provide simple and effective stitch-

15 forming and feeding mechanisms capable of meeting the speed requirements of the trade at the present time.

In its preferred form, the present improvement comprises a machine provided

20 with a short main-shaft journaled at the rearward end of the bracket-arm and provided with a crank for actuating the stitch-forming mechanism and imparting lifting movements to the feeding member and with

25 an adjacent eccentric for imparting work-advancing movements to said feeding member. The needle-bar derives its reciprocating movements from a rock-shaft having a crank-arm connected with one end of a toggle member whose opposite end is connected

30 with a second toggle member having its other extremity fulcrumed upon a fixed part of the machine, the pivotal connection between the toggle members being attached to

35 one end of a pitman whose other end embraces the actuating crank of the main-shaft. The toggle and its actuating crank are so proportioned that said pivotal connection is moved between extreme positions

40 substantially equi-distant from alinement with the outer ends of the toggle members for each semi-rotation of the actuating crank, which latter thus imparts two complete reciprocations of the needle for each

45 rotation of the main-shaft. The loop-takers, herein shown with spaced oppositely disposed beaks arranged in the same plane for coöperation alternately with the same needle, are mounted upon a rock-shaft provided

50 with a crank-arm having a pitman connection with an extension of one of said toggle members of the needle-actuating mechanism, whereby the looper rock-shaft receives one rocking movement for each two of said

55 movements imparted to the needle-actuating

rock-shaft. The feeding member is connected with the usual feed rocker beneath the bed-plate provided with an upwardly extending arm adjustably connected with a depending arm of an intermediate rock-shaft carrying a second arm connected with

60 one member of a toggle device whose other member has a fixed fulcrum and whose pivotal connection is attached to the lower end of an eccentric-rod having at its upper end

65 a strap embracing the eccentric upon the main-shaft which serves to impart the work-advancing movements to the feeding member. Upon the fixed fulcrum-pin of the work-advancing toggle mechanism is mounted

70 an elbow-lever having a lateral arm connected with one end of a pitman whose opposite end is connected with the before mentioned extension of the needle-actuating toggle member, while a second depending arm

75 of said elbow-lever forms one member of a toggle whose other member consists of a link pivotally connected thereto at one end and having the other end attached to a lateral arm of the feed-lifting rock-shaft connected in a manner well-known with the

80 feeding member to impart thereto its lifting movements.

It will thus be seen that the mechanism above described imparts to the several members of the stitch-forming and feeding devices easy movements involving pivotal connections throughout, and that the several parts of the mechanism insure the requisite power with the least expenditure of energy.

In factories employing various types of sewing machines, most of which are necessarily driven at moderate speeds, it is quite important that such machines as are driven

85 at the highest speeds may be operated from the same line shafting and the same style of power transmitters as other machines with which they are associated, without employment of pulleys of too large a difference in diameter for practical purposes. By employing a driving shaft adapted to transmit

90 to all of the operating parts the requisite movements for producing a plurality of stitches for each rotation of said main-shaft, the latter is enabled to be rotated at a moderate speed without impairing the high

95 speed capabilities of the machine. By this means, the wear of the main-shaft in its bearings, due to the lateral pull of the belt which usually transmits power to said shaft,

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is prevented from being excessive, by reason of the comparatively slow rotation of the shaft in said bearings, while the durability of said power-transmitting belt is greater
 5 than if it were subjected to the more rapid distortion which it receives in traveling around the pulleys connected thereby.

The invention will be more fully understood by reference to the accompanying
 10 drawings, in which—

Figure 1 is a rear side elevation, partly in section, representing a machine provided with the present improvements, and Fig. 2 a bottom plan view of the same. Fig. 3 is a
 15 front end elevation of the machine with the bed-plate in section, and Fig. 4 a transverse section of the machine through the hollow upright portion of the bracket-arm representing the several toggle mechanisms for
 20 actuating the stitch-forming and feeding devices. Fig. 5 is an enlarged perspective view, partly in section, showing a set of loopers upon the looper rock-shaft, and Fig. 6 a plan view, upon a still larger scale, of
 25 one of the loop-taking members in its relation to the needle at the loop-seizing point. Fig. 7 is a perspective view of a portion of the feed-actuating mechanism, and Fig. 8 a perspective view upon a larger scale of a
 30 part of said mechanism.

The machine is constructed with a frame comprising the usual bed-plate 1 and bracket arm consisting of the hollow standard 2 and horizontal portion 3 with head 4 in which
 35 latter is journaled the rectilinearly reciprocating needle-bar 5 carrying the multiple needle-clamp 6 in which are secured the eye-pointed needles 7, of which three are shown in the drawings. The needle-bar is provided with the usual collar 8 connected by
 40 means of the pitman 9 with the outer end of a lateral arm 10 upon the needle rock-shaft 11 journaled in bearings 12 and 13 extended from the rear side of the bracket-arm. The rock-shaft 11 has fixed upon its rearward
 45 end the depending crank-arm 14 pivotally connected by means of the pin 15 with the embracing forked end of a link member 16 whose forked opposite end is embraced by
 50 the forked rearward extremity of a link member 17 connected therewith by means of the pivotal pin 18 and having its forward end terminating in a hub 19 embracing the fixed fulcrum-pin 20 mounted in the standard 2
 55 and formed with the forwardly projecting arm or extension 21. The forked lower end of the link member 16, which with the member 17 affords a toggle device intermediate the fulcrum-pin 20 and the pivotal pin 15 of
 60 the crank-arm 14, embraces one end of a pitman 22, pivotally connected therewith by means of the pin 18, whose opposite end is formed with a strap 23 which embraces an actuating crank 24 formed in the main-shaft
 65 25 journaled in bearings 26 and 27 of the

bracket-arm and provided with an adjacent feed-lifting eccentric 28 intermediate said bearings. The crank 24 is so proportioned in relation to the toggle 16 17 that it serves to bend the same equi-distantly into extreme
 70 positions at opposite sides of its mean position in alinement with the fulcrum members 15 and 19 in each semi-rotation of the main-shaft, whereby the rock-shaft 11 receives two equal oscillatory movements, and the needles
 75 7 two complete reciprocatory movements, for each rotation of the main-shaft, while the rocking member 17, 19, 21 receives only a single oscillatory movement for each rotation of the main-shaft. The shaft 25 has
 80 fixed upon its rearward end the usual balance-wheel 29 with attached belt-wheel 30 to receive the power transmitting belt by means of which the machine is driven.

Coöperating with each of the needles 7 is
 85 a loop-taking member comprising, as represented in the drawings, a perforated hub 31 provided with two divergent arms 32 and 33 constituting shanks for the looper beaks or points 34 and 35 respectively. The pri-
 90 mary looper beak is cut away upon one side to form a flat loop-seizing blade 36 bulged upon the lower side to form at its heel an inclined loop-detaining shoulder, and adjacent said flat blade is formed with a lat-
 95 eral loop-distending portion 37 of such form that a loop of needle-thread extending from the loop-detaining shoulder upwardly and rearwardly to the needle-hole is laterally distended by the portion 37 to admit the
 100 needle-point in the succeeding descent of the needle. The secondary loop-seizing beak 35 is wedge-shaped so as to spread the needle-loop seized by the same, and has beneath it a barb 38 to form an intermediate
 105 fork to detain the needle-loop in the advance position of this loop-taking implement and in opposition to the feeding action. The hub of each loop-taking member is formed with a key-way 39 fitted to an external
 110 key or spline 40 extending longitudinally of a carrying sleeve 41 which is fitted upon the reduced forward portion 42 of the loop-taker rock-shaft 43 journaled in bearings 44 upon the bottom of the bed-
 115 plate 1. As herein shown, the shaft section 42 is provided with a threaded portion 42* to which is applied the thrust-nut 45, against which rests one end of the extreme spacing ring 46 of a series interposed be-
 120 tween the hubs 31 of the spaced loop-taking members, the series of loop-taking members and spacing rings being confined between said thrust-nut 45 and a collar 47 upon the opposite end of the sleeve 41 which is fixed
 125 on said shaft by means of the set-screw 48. It is obvious that the arms 32 and 33 of the loop-taking implements 34 and 35, respectively, may be provided with separate hubs, if desired, and that these implements may
 130

be secured upon the loop-taker shaft by any usual or suitable means.

The looper rock-shaft 43 is provided with a lateral crank-arm 49 carrying a pivotal pin 50 embraced by one end of a pitman 51 whose opposite end embraces a pin 52 extending laterally from the toggle link extension 21 adjacent the fulcrum-pin 20 whereby the looper rock-shaft receives a single rocking movement for every two rocking movements of the needle-actuating rock-shaft 11.

The feed-dog 53 is secured by means of a screw 54 upon the end of a lateral arm 55 extending from a rock-bar 56 journaled intermediate the upwardly projecting arms 57 of the feed rock-shaft 58, which has secured upon its rearward end the upwardly projecting arm 59 extending through a slot 1* in the bed-plate and formed in its upper portion with a slot 60. Journaled in a rearwardly projecting lug 61 of the standard 2 is an intermediate rock-shaft 62 having a depending arm 63 adjacent the arm 59 and provided with a slot 64 entered by the transverse tongue 65 upon the inner face of the head 66 of a bolt 67 whose shank passes through the slots of the members 63 and 59, and preferably carries a roller-stud 68 embraced by the slot 60, the said bolt being suitably shouldered to permit the roller-stud to turn when confined thereon by the nut 69. A spacing washer 70 is interposed between the adjacent faces of the arms 59 and 63. The intermediate rock-shaft 62 is provided with a second depending crank-arm 71 connected by means of a screw-stud 72 with a link-member 73 of a toggle device whose other link-member 74 is connected thereto at one end by means of the pivotal pin 75 and has its opposite end fulcrumed upon the fixed pin 76 mounted in the standard 2. The link-member 73 is provided with a fork 77 in which is secured by means of the pin 75 the lower end of the eccentric rod 78 whose upper end is provided with a strap 79 embracing the eccentric 28 upon the main-shaft. The parts are so proportioned that the toggle 73 74 is bent equally in both directions twice for each rotation of the main-shaft, thereby imparting two lateral or work-advancing movements to the feed-dog 53 for each rotation of the main-shaft, the extent of operative movement of the feed-dog being determined by the position of adjustment of the bolt 67 in relation to the oppositely extending crank-arms 59 and 63.

The feed lifting rock-shaft 80 is provided with a lateral arm 81 having a suitable connection with a second lateral arm 82 of the rock-bar 56, which is or may be as shown and described in the United States patent to M. Hemleb, No. 863,533, of August 13, 1907. The feed-lifting rock-shaft 80 has upon its

rearward end a laterally extending crank-arm 83 connected by means of a pin 84 with the lower end of a link 85 whose forked upper end embraces and is pivotally connected by means of the pin 86 with the depending arm 87 of an elbow-lever fulcrumed upon the pin 76 and having a lateral arm 88 carrying a screw-stud 89 embraced by the lower end of a pitman 90 whose upper end is formed with a strap embracing the stud 91 projecting laterally from the forward extension 21 of the link member 17 and provided with a nut 92 by which the same is confined upon said stud. As will be observed, the link 85 and arm 87 constitute the component members of a toggle device whose pivotal pin 86 is carried from one to the other extreme position across a line joining the pivotal pins 74 and 76 twice for each excursion of the rocking member 21, thereby imparting to the feed-dog two lifting movements for each rotation of the main-shaft synchronously with the double stitch-forming cycle performed in the same period.

In the operation of the machine as thus described, the needles descend and begin to rise slowly, each presenting its thread-loop to its respective primary looper whose blade 36 enters the same in its advance in the direction of feed, the needle rising to its highest position during which rising movement the feed-dog also rises and subsequently performs its work-advancing or feeding movement while the point of the needle is still above the work, thus advancing the end of the previously seized needle-loop. As the needle is about to penetrate the work in a succeeding descent, the looper commences its retrograde movement, carrying with it the free end of the previously seized needle-loop spread upon its distending portion 37 in which position of the loop the point of the needle enters the same, while the continued retrograde movement of the looper effects the escape of the same upon the needle-blade. During the return movement of the primary looper to initial position the secondary looper advances, and as the needle begins to rise, seizes a second loop of needle-thread, and holds the same during the rise and feeding movement of the feed-dog, maintaining the loop distended until the point of the needle in the succeeding descent enters the same, when the secondary looper recedes to leave the loop around the needle-blade, the advance of the primary looper being effected, as before described, to seize the new loop of thread presented by the needle in the initial portion of its rising movement, and the alternate coöperation of the primary and secondary loopers with the needle continuing as before described.

It will be observed that the loopers enter the needle loops in opposite directions in the

line of feed, but that each holds the lower end of its respective needle-loop at the front side of the needle-path for the succeeding descent of the needle through the same subsequent to a feeding operation. To insure the proper positioning of the distended thread-loop for passage of the needle, the looper rock-shaft actuating mechanism is so arranged that the secondary looper is given a dwell at the end of its loop-seizing movement slightly beyond the needle path in relation to its retracted position, for holding the distended needle loop for passage of the needle in its subsequent descent, while the primary looper, after advancing in its loop-seizing movement to extreme loop-holding position, immediately begins its retrograde movement to draw the loop backwardly in front of the needle path in opposition to the work-feeding movement, this movement being so timed that the point of the needle enters the distended loop upon the backwardly moving looper before it is cast off the rounded lower edge of the blade 36. The described movement of the rock-shaft 43 is insured by disposing the pivotal pin 52 upon the member 21 laterally of the fulcrum-pin 20 when the link-member 17 is in its lower position, the crank-arm 49 of the looper-actuating rock-shaft being at this time at the corresponding side of the rock-shaft, as represented in Fig. 4. As the link-member 17 is rocked by the pitman 22, the pin 52 moves downwardly in an arc concentric with the fulcrum-pin 20, while the crank-pin 50 moves in a similar arc about the shaft 43 as a center. As in the opposite extreme position of the link member 17 the pin 52 crosses a line connecting the pivotal members 20 and 50, it will be observed that the members 21 and 51 constitute a toggle device which is straightened in only one extreme position of the actuating part 17, whereby the looper rock-shaft 43 receives a dwell in only one of its extreme positions, which corresponds with the advance or loop-holding position of the secondary looper 35.

By the term "dwell" as used herein, is meant a period of substantial rest exceeding the time normally required for the reversal of the circular movements in opposite directions imparted to the loop-taker shaft 43.

The machine is provided with the usual presser-foot 93 secured to the lower end of the presser-bar 94 suitably mounted in the head 4 of the bracket-arm and provided with a collar 95 between which and the bushing 96 surrounding the upper end of the presser-bar is interposed the spring 97, the usual cam-lever 98 being provided for engagement with the arm 99 extending from the collar 95 for lifting the presser-bar.

While certain of the parts of the machine are herein minutely described in their construction and arrangement, it is to be under-

stood that the present improvement is susceptible of material modification of these several features without departure from the scope of the invention.

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

1. In a sewing machine, the combination with the main-shaft provided with a plurality of actuating members, stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, and feeding mechanism including a work-engaging member and actuating and lifting rock-shafts having independent operative connections therewith, of means including a toggle device having one of its component members mounted upon a fixed fulcrum and connected with one of the actuating members of the main-shaft for imparting to each of the component members of the stitch-forming mechanism a plurality of stitch-forming movements for each rotation of said shaft, a crank-arm upon the feed-actuating rock-shaft, an operative connection between another of the actuating members of the main-shaft and said crank-arm for imparting to the actuating rock-shaft rocking movements corresponding in number with the operative movements of said stitch-forming mechanism, a crank-arm upon the lifting rock-shaft, and an operative connection between the toggle member having the fixed fulcrum and the crank-arm of said lifting rock-shaft for imparting operative movements to the latter corresponding in frequency with those of said actuating rock-shaft.

2. In a sewing machine, the combination with the main-shaft provided with a plurality of actuating members, stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, and feeding mechanism including a work-engaging member and actuating and lifting rock-shafts having independent operative connections therewith, of means including a toggle device having one of its component members mounted upon a fixed fulcrum and connected with one of the actuating members of the main-shaft for imparting to each of the component members of the stitch-forming mechanism a plurality of stitch-forming movements for each rotation of said shaft, means connected with another of the actuating members of the main-shaft for imparting to the actuating rock-shaft rocking movements corresponding in number with the operative movements of the stitch-forming mechanism, and a link connection between the toggle member having the fixed fulcrum and said lifting rock-shaft for imparting to the latter rocking movements corresponding in frequency with those of the actuating rock-shaft.

3. In a sewing machine, the combination with the main-shaft provided with a plu-

ality of actuating members, stitch-forming mechanism comprising a reciprocating needle and a cooperating loop-taker, and feeding mechanism including a work-engaging member, of means connected with one of the actuating members of said main-shaft and including a common rocking member for imparting to the component elements of the stitch-forming mechanism a plurality of stitch-forming movements for each rotation of the main-shaft, an operative connection intermediate said common rocking member and the work-engaging member for imparting to the latter rising and falling movements, and an operative connection intermediate another of the actuating members of the main-shaft and said work-engaging member for imparting to the latter work-advancing movements.

4. In a sewing machine, the combination with the frame comprising a bed-plate and an overhanging bracket-arm, the main-shaft, stitch-forming mechanism including a reciprocating needle, and a cooperating loop-taker, and feeding mechanism including a work-engaging member, of needle-actuating means comprising a rock-shaft journaled upon and disposed longitudinally of the bracket-arm and operatively connected with the needle and provided with a crank-arm, a toggle device connected with said crank-arm and comprising two pivotally connected members one of which is provided with a fixed fulcrum, and a connection intermediate the main-shaft and said toggle whereby the latter is alternately bent in opposite directions, means for imparting operative movements to said loop-taker, and means for actuating said feeding mechanism.

5. In a sewing machine, the combination with the main-shaft, stitch-forming mechanism including a reciprocating needle and a cooperating loop-taker, and feeding mechanism including a work-engaging member, of needle actuating means comprising a rock-shaft extending longitudinally of the bracket-arm and operatively connected with the needle and provided with a crank-arm, a toggle device connected with said crank-arm and comprising two pivotally connected members one of which is provided with a fixed fulcrum, and a connection intermediate the main-shaft and said toggle whereby the latter is alternately bent in opposite directions, a loop-taker operating rock-shaft parallel with the needle-actuating rock-shaft, an operative connection intermediate one of said toggle members and the loop-taker rock-shaft for imparting thereto oscillatory movements, and means for actuating said feeding mechanism.

6. In a sewing machine, the combination with the main-shaft, stitch-forming mechanism including a reciprocating needle and a cooperating loop-taker, and feeding mechanism

including a work-engaging member, of needle-actuating means comprising a rock-shaft operatively connected with the needle and provided with a crank-arm, a toggle device connected with said crank-arm and comprising two pivotally connected members one of which is provided with a fixed fulcrum and with a loop-taker actuating crank-pin, a loop-taker rock-shaft provided with a crank-arm, an operative connection intermediate the main-shaft and said toggle whereby the latter is alternately bent in opposite directions and said crank-pin is caused to thereby move alternately into and out of alinement with said fixed fulcrum and the outer end of the crank-arm of said loop-taker shaft, a pitman connection intermediate the last named crank-arm and the crank-pin of said toggle member, and means for actuating said feeding mechanism.

7. In a sewing machine, the combination with stitch-forming mechanism comprising a reciprocating needle and a loop-taking member movable in a plane substantially in the line of feed and formed with two oppositely directed beaks, and feeding mechanism, of means for actuating said needle, and means for imparting oscillatory movements to said loop-taking member of less frequency than the needle reciprocations and including a dwell in the extreme position of said loop-taking member at the end of a movement opposite the direction of feed and in excess of that incidental to the reversal of direction of movement in the other extreme position.

8. In a sewing machine, the combination with stitch-forming mechanism comprising a reciprocating needle and a loop-taking member movable in a plane substantially in the line of feed and formed with two loop-seizing beaks disposed respectively in and opposite to the direction of feed, the former having a loop-detaining shoulder at its heel, and feeding mechanism, of means for actuating said needle, and means for imparting oscillatory movements to said loop-taking member of less frequency than the needle reciprocations and including a dwell in the extreme position of said loop-taking member at the end of a movement opposite the direction of feed.

9. In a sewing machine, the combination with the main-shaft, stitch-forming mechanism including a reciprocating needle and a cooperating loop-taker, and feeding mechanism including a work-engaging member, of needle-actuating means comprising a toggle device and a connection with the main-shaft for bending said toggle equi-distantly in opposite directions from its straightened position, means for actuating said loop-taker for cooperation with said needle in each reciprocatory movement thereof, means for imparting work-advancing movements to

said work-engaging member of the feeding mechanism and comprising a toggle device and a connection between the main-shaft and said toggle device whereby the latter is bent 5
equally in opposite directions from straight-
ened position, and means independent of the
means for imparting work-advancing move-
ments for communicating rising and falling
movements to said work-engaging member
10 of the feeding mechanism of the same fre-
quency as said work-advancing movements.
10. In a sewing machine, the combination
with the main-shaft, stitch-forming mecha-
nism including a reciprocating needle and a
15 coöperating loop-taker, and feeding mecha-
nism including a work-engaging member, of
needle-actuating means comprising a toggle
device and a connection with the main-shaft
for bending said toggle equi-distantly in op-
20 posite directions from its straightened po-
sition, means for actuating said loop-taker for
coöperation with said needle in each recip-
rocatory movement thereof, means for impart-

ing work-advancing movements to said
work-engaging member of the feeding 25
mechanism and comprising a toggle device
and a connection between the main-shaft and
said toggle device whereby the latter is bent
equally in opposite directions from straight- 30
ened position, and means for imparting ris-
ing and falling movements to said work-en-
gaging member of the feeding mechanism
and including a toggle device and a connec-
tion between the same and one of the mem-
bers of the needle actuating toggle device 35
whereby said toggle device is bent equally
in opposite directions from straightened po-
sition.

In testimony whereof, I have signed my
name to this specification, in the presence of 40
two subscribing witnesses.

ALBERT H. DE VOE.

Witnesses:

H. A. KORNEMANN, Jr.,
JOSEPH F. JAQUITH.