

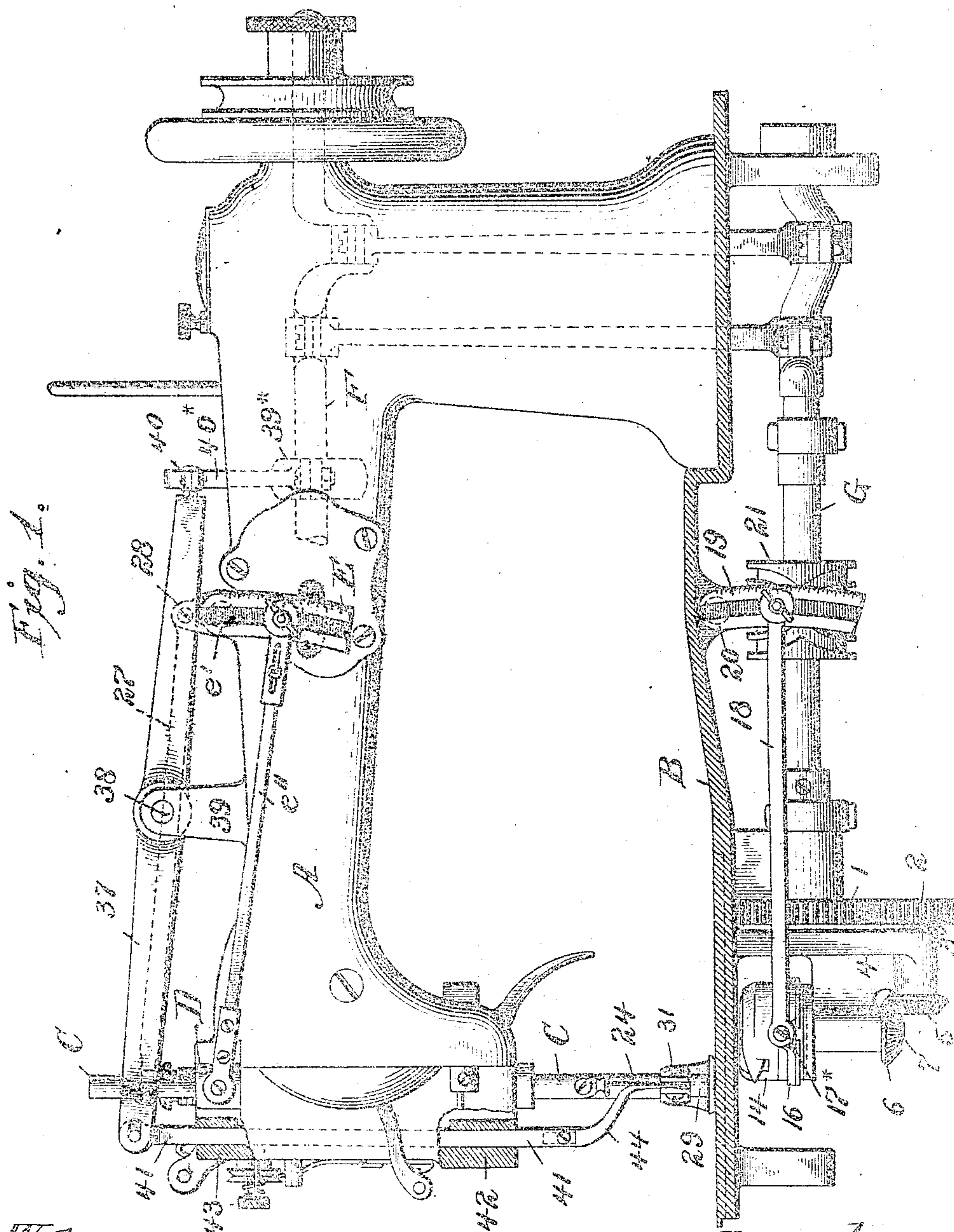
No. 375,600.

PATENTED DEC. 31, 1907.

W. N. PARKES.
HEMSTITCH SEWING MACHINE.

APPLICATION FILED SEPT. 22, 1900.

4 SHEETS—SHEET 1.



A. F. Ross

Handwritten signature: J. M. G.

R. C. Bowell

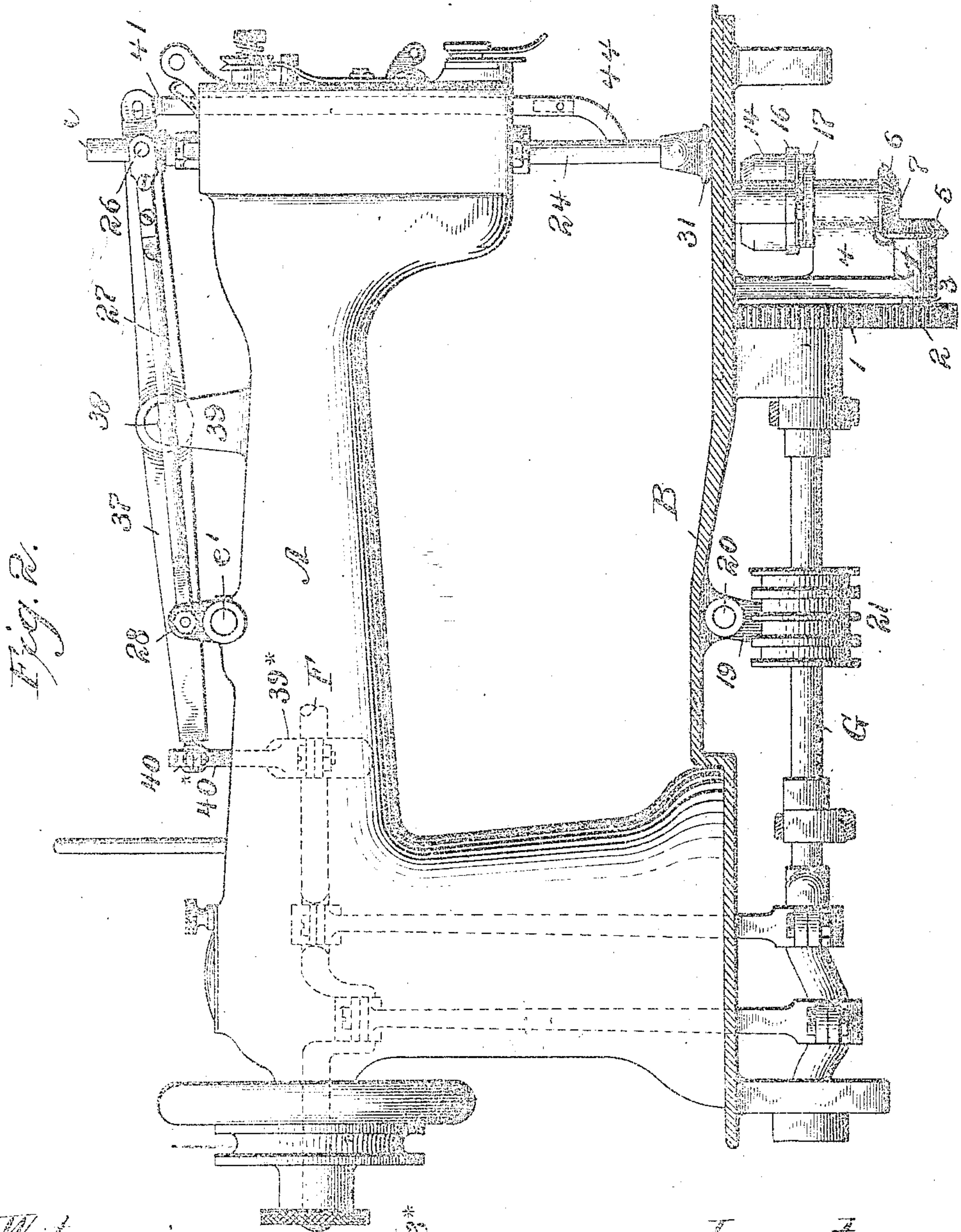
Travertor

William W. Peck

W. N. PARKES.
HEMSTITCH SEWING MACHINE.

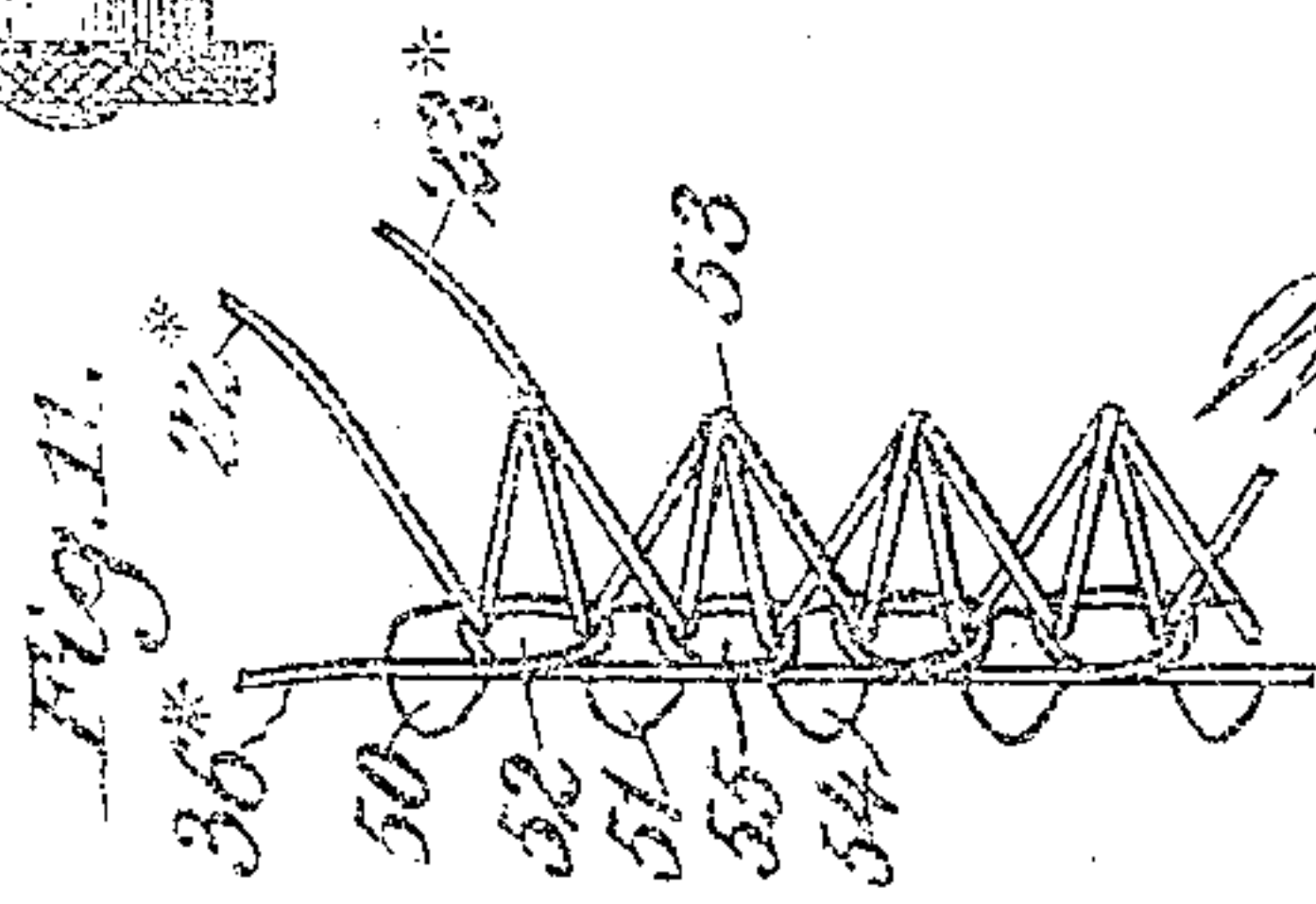
APPLICATION FILED SEPT. 22, 1906.

4 SHEETS—SHEET 2.



Witnesses:
J. M. Giv. *J. M. Giv.*
R. C. Roswell *R. C. Roswell*

Inventor:
William N. Parkes *William N. Parkes*



No. 875,600.

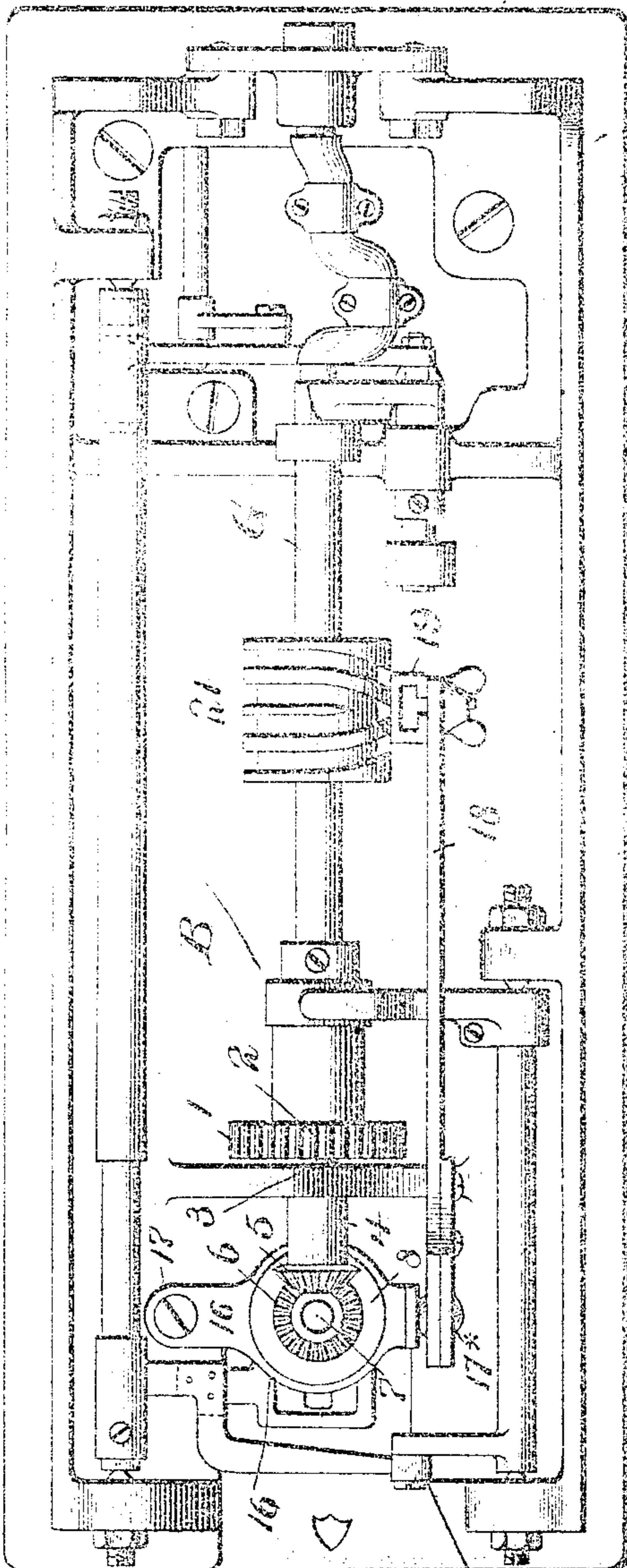
PATENTED DEC. 31, 1907.

W. N. PARKES.
HEMSTITCH SEWING MACHINE.

APPLICATION FILED SEPT. 22, 1900.

4 SHEETS—SHEET 3.

Fig. 13.



Witnesses:

J. B. McGivver.

R. C. Bowell.

Fig. 16.

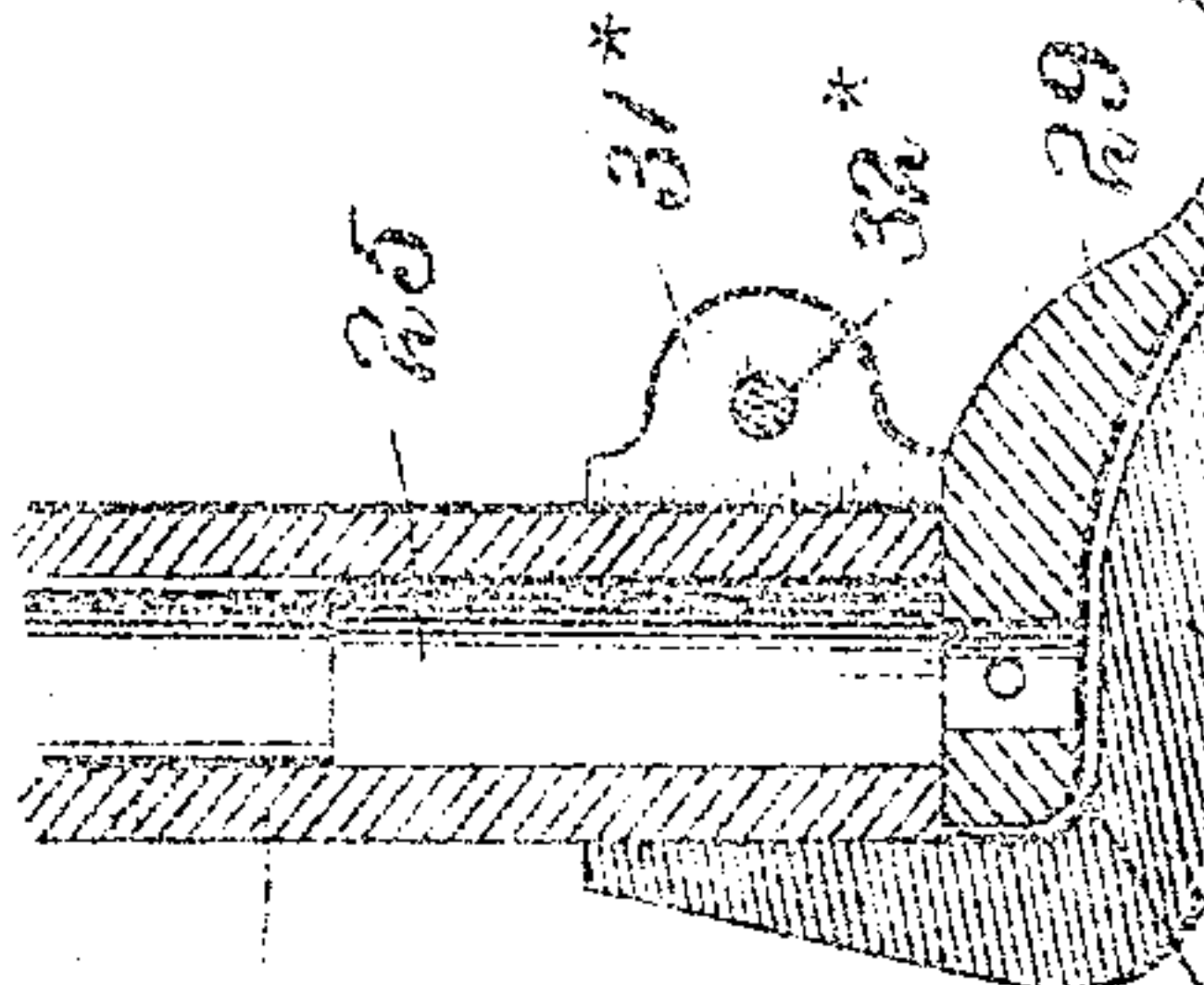
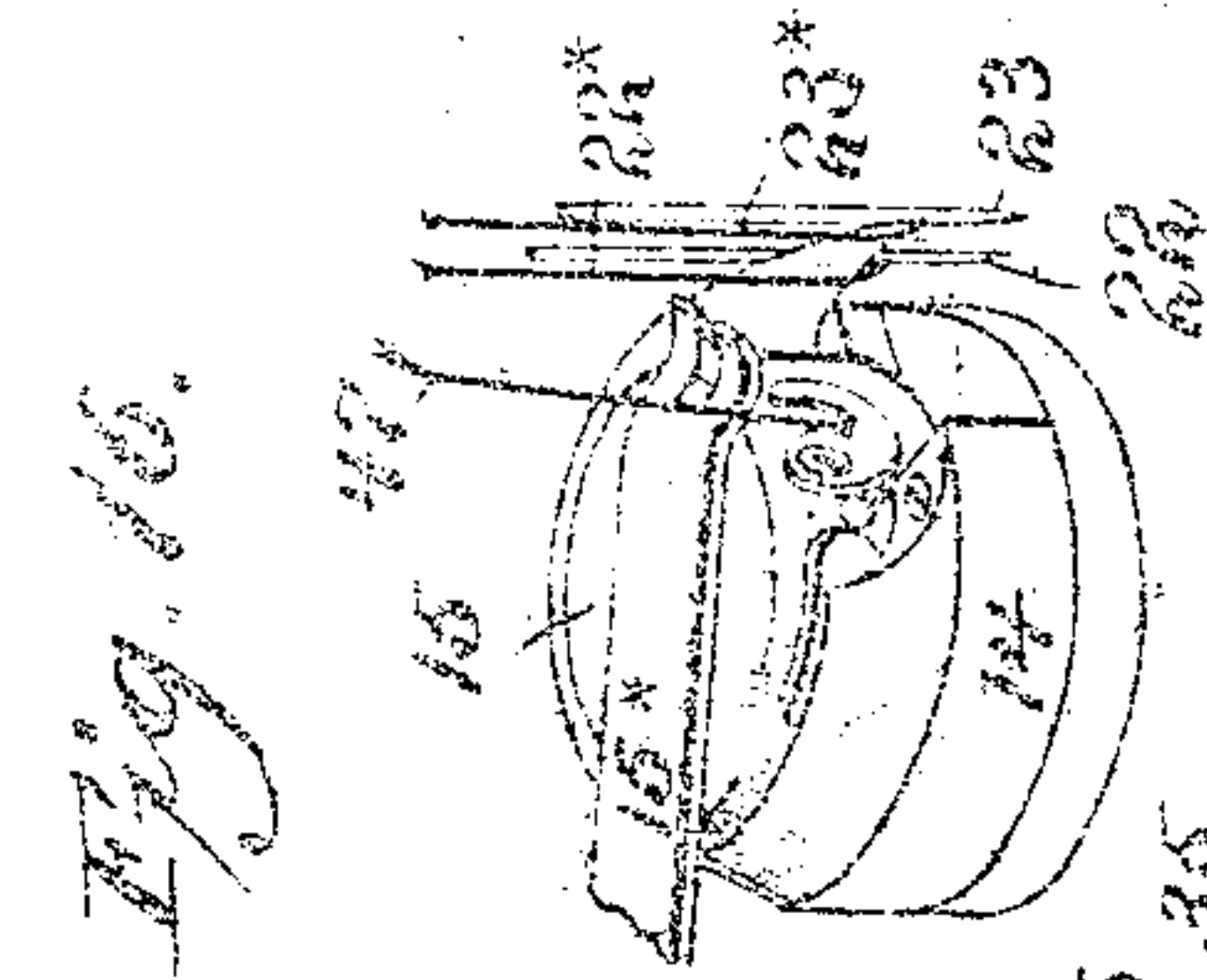


Fig. 15.

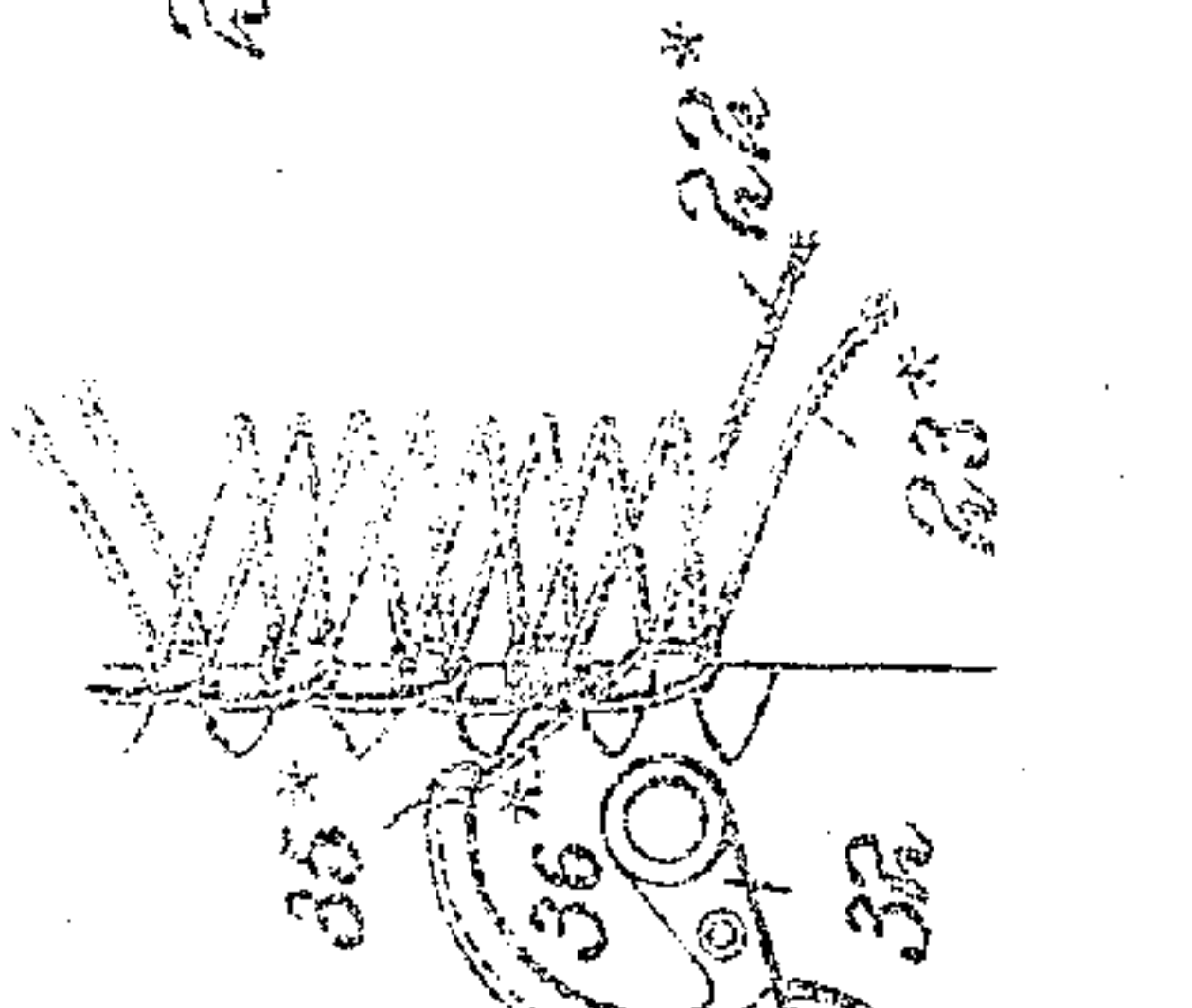


Fig. 14.

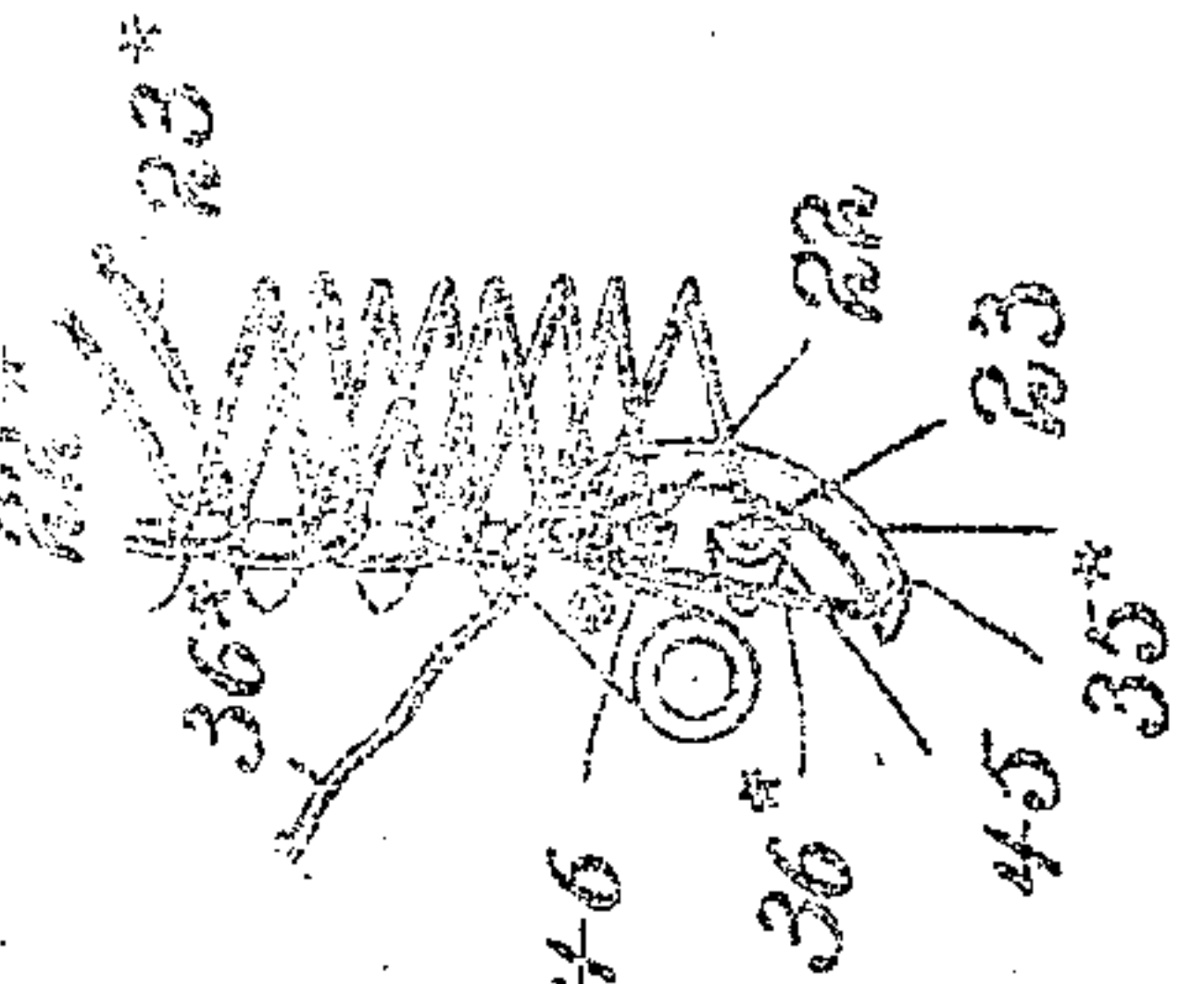


Fig. 13.

Inventor:

William N. Parkes

No. 875,600.

PATENTED DEC. 31, 1907.

W. N. PARKES.
HEMSTITCH SEWING MACHINE
APPLICATION FILED SEPT. 22, 1900.

4 SHEETS—SHEET 4.

Fig. 6

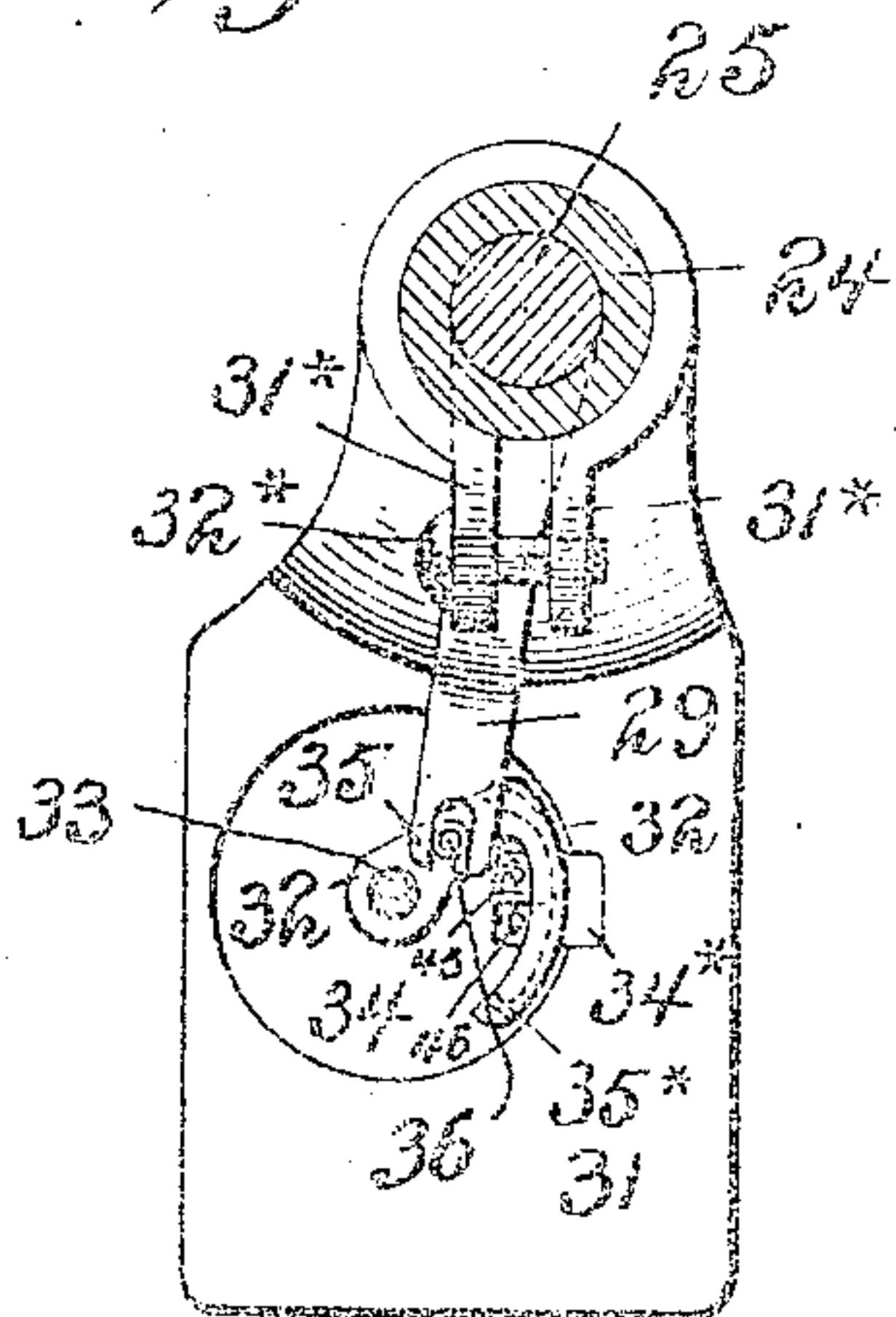


Fig. 11

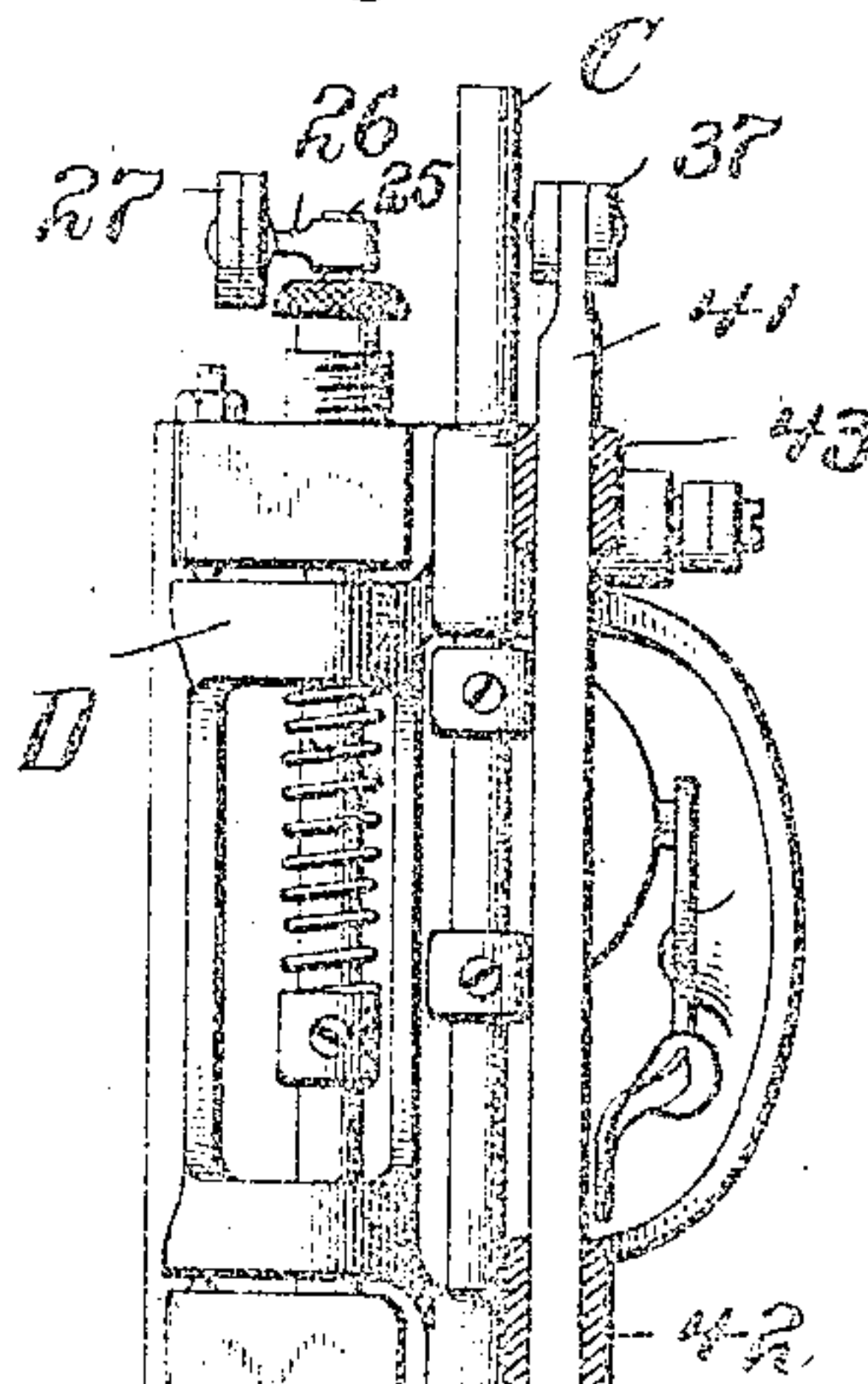


Fig. 7

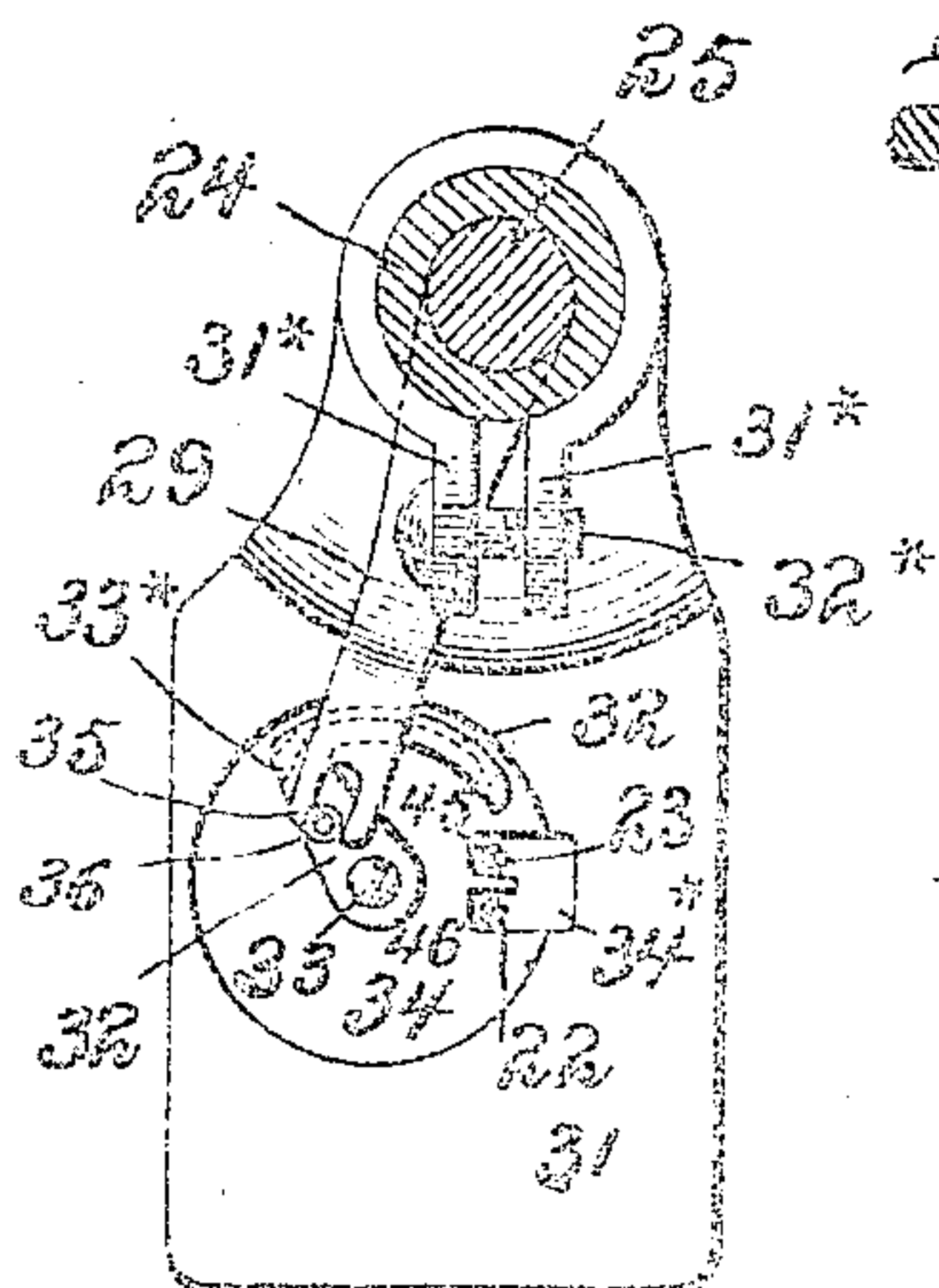


Fig. 12

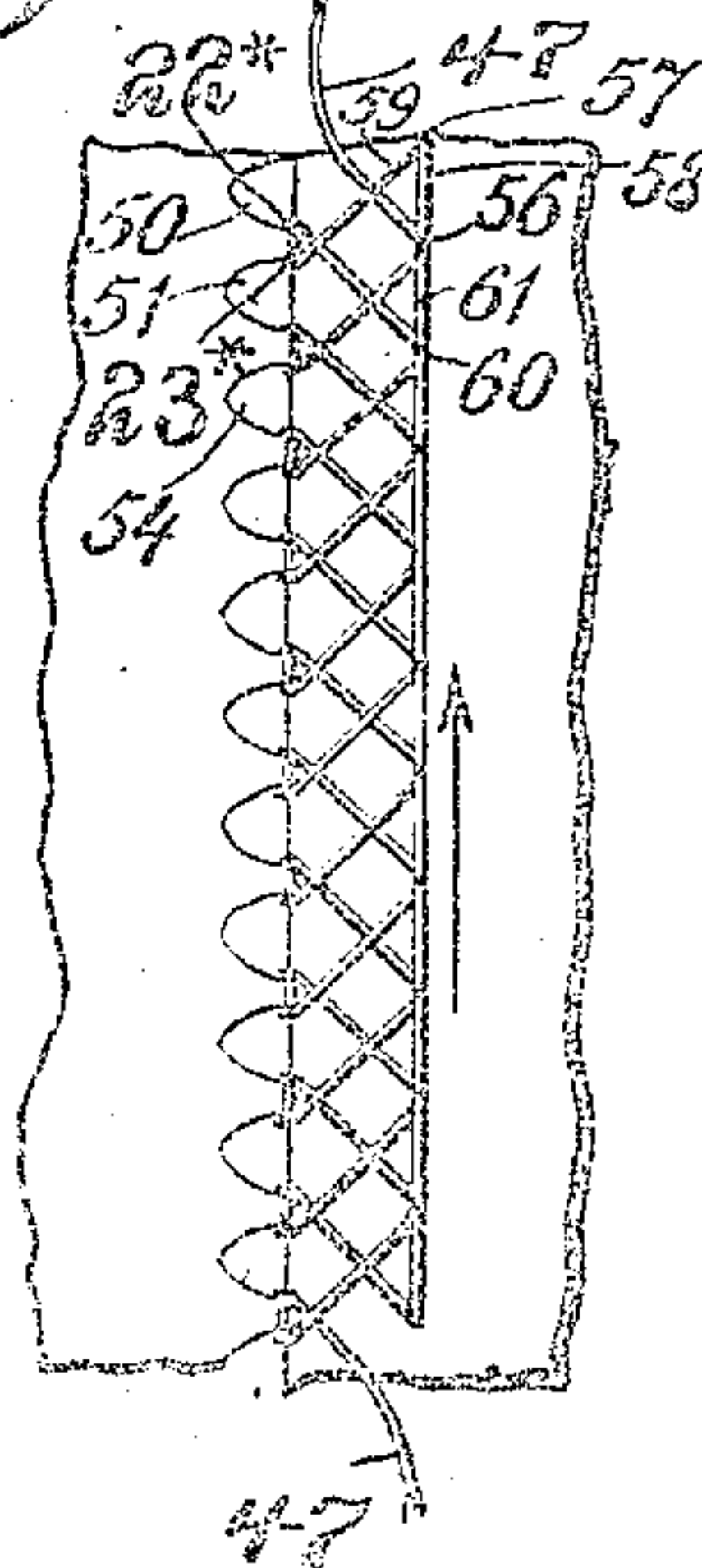


Fig. 5

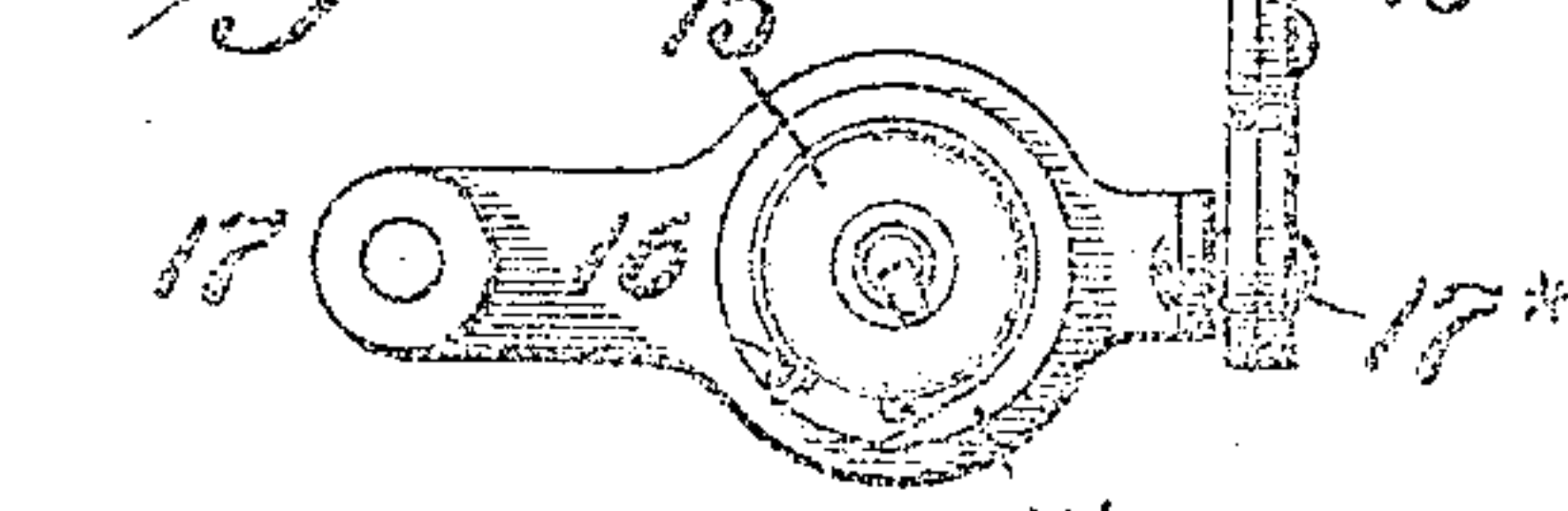


Fig. 8

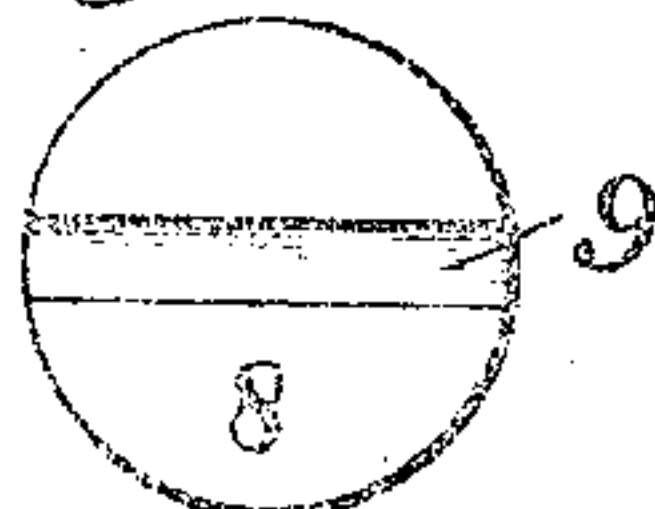


Fig. 9

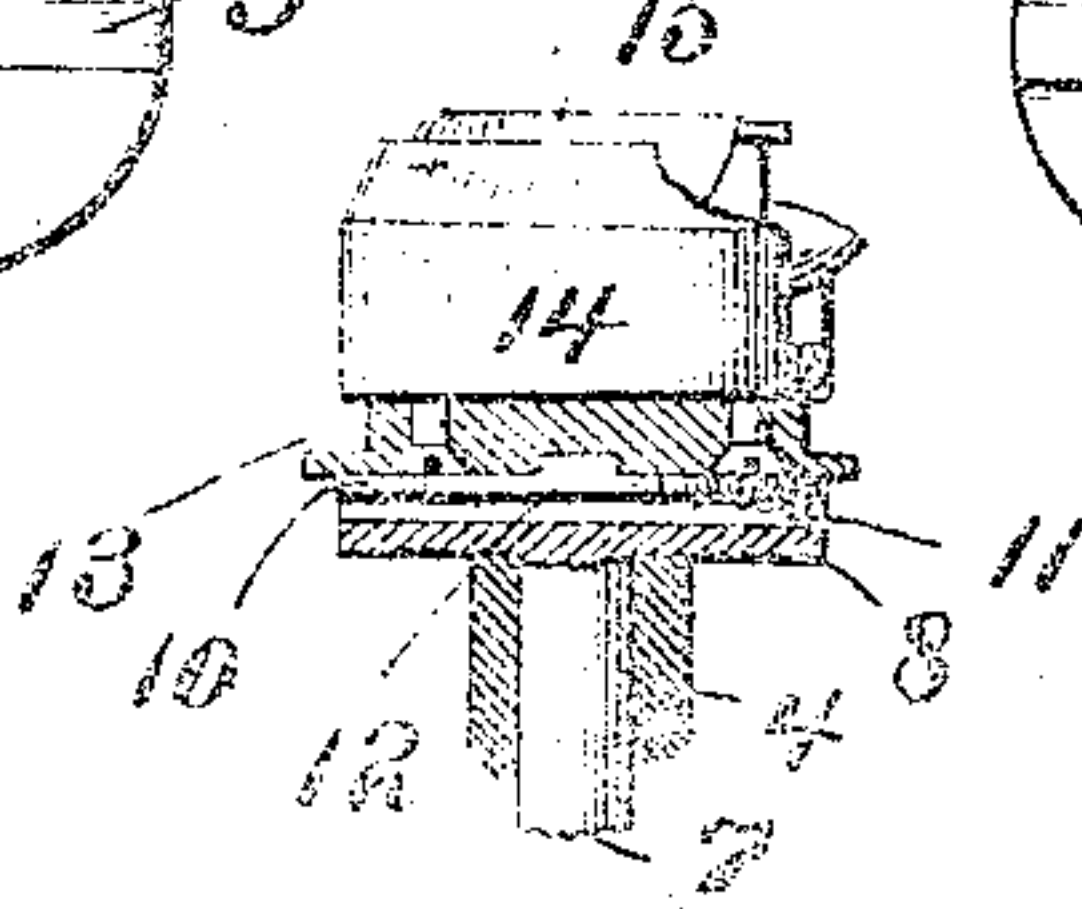
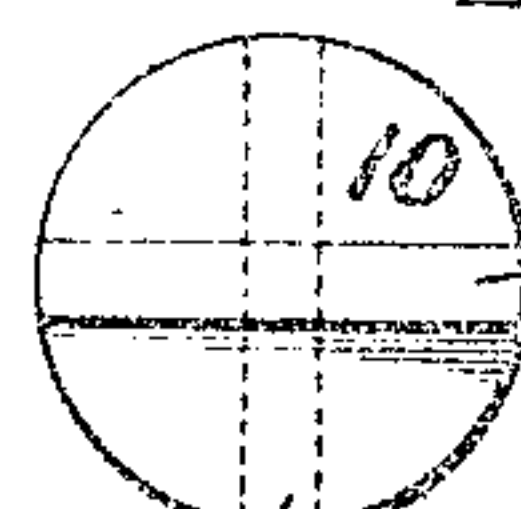


Fig. 10



Witnesses:
J. B. Miller
R. E. Bowell

Inventor:
W. N. Parkes

UNITED STATES PATENT OFFICE.

WILLIAM N. PARKES, OF BROOKLYN, NEW YORK.

HEMSTITCH SEWING-MACHINE.

No. 875,600.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed September 22, 1900. Serial No. 30,793.

To all whom it may concern:

Be it known that I, WILLIAM N. PARKES, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Hemstitch Sewing-Machines, of which the following is a specification.

My invention relates to hem stitch or ornamental stitch sewing machines. Its main object is to provide a mechanism which will do hemstitching in combination with a consecutively forward movement of the feed.

In the usual hem-stitch machine, as is well known, the feed of the work takes place once to each third reciprocation of the needle. In one type there is no feed of the work during a depth and edge stitch, after which the work moves forward one stitch. In another type the work moves forward two stitches and backward one stitch, which gives an advancing stitch to each third reciprocation of the needle. In all the varieties of hemstitch sewing machines known to me the feed of the work advances only one stitch to each third reciprocation of the needle. In the present form of my hem-stitch sewing machine the work moves forward after each reciprocation of the needle thereby gaining enormously in the product of these machines.

Referring to the drawings, Figure 1 represents a front elevation of a machine embodying my invention partly in section, Fig. 2 a rear view partly in section and Fig. 3 a bottom plan view of the same. Fig. 4 is a face view partly in section. Fig. 5 is a top plan view of the hook, bobbin-case and carrier. Fig. 6 is a top plan view on line $x-x$ Fig. 4 showing the thread carrying looper and presser foot with the looper in its forward position, and Fig. 7 is a view of the same in its initial position. Figs. 8, 9 and 10 are details of the hook operating mechanism. Fig. 11 is a diagrammatic upper view of a hemstitch made on my machine, and Fig. 12 is a bottom view of the same. Fig. 13 is a diagrammatic view showing the looper in engagement with the needle threads, and Fig. 14 a view of the same after the looper has disengaged from the needle threads. Fig. 15 is a vertical sectional view showing the relative positions of the looper mechanism and the presser foot. Fig. 16 is a diagrammatic view in perspective showing the point of the hook entering the loops of the needle threads.

In the drawings A represents an overhanging arm, B the bed plate, C the needle bar which is mounted in a gate D, the same being pivoted in a usual manner in the face of the machine as shown in Fig. 4. The needle bar is reciprocated in the usual manner from the end of the upper shaft F.

E is a segment lever attached at e' to a shaft mounted in a bearing on the arm of the machine and running transversely to said arm.

e'' is a link one end of which is attached to the gate D and the other end adjustably connected to the segment lever E. The segment lever E is vibrated in a usual manner by a switch cam, (not shown) which is mounted on the upper shaft F of the machine. The movement given by the switch cam and through it to the segment lever E and from it to needle bar gate D is the same which is given to the needle bar in the usual zig-zag or overseaming machine.

G is the under shaft of the machine which is operated in the usual manner from the upper shaft F. To the forward end of the shaft G is attached a gear wheel 1 meshing with a gear wheel 2 attached to a shaft 3 mounted on a bearing 4. To the forward end of the shaft 3 is attached a beveled gear 5 which meshes with the beveled gear 6, which, in turn, is attached to a vertical shaft 7 also mounted in the bearing 4. To the upper end of the shaft 7 is attached a disk 8 having a way 9 formed therein. An idle disk 10 having ribs or feathers 11 and 12 running at right angles to each other formed thereon is mounted on top of the disk 8. The feather 11 extends into the way 9 and is adapted to slide therein. On top of the idle disk 10 is mounted a disk 13 having a way formed across its under side in which the rib or feather 12 extends. A hook 14 is attached to the upper side of the disk 13 as shown in Fig. 9. It will thus be seen, from this construction, that, if the shaft 7 is rotated the hook 14 will be rotated and that, at the same time, the said hook will be free to move in any direction in a horizontal plane.

The hook 14 is of the usual construction and carries the usual bobbin case or holder 15, which case is prevented from turning by the usual fork 15*, which engages the stop lug which extends from the bobbin case and thereby prevents the same from turning. A

lever 16 is pivoted at 17, said pivot being in vertical alinement with the pivots of the gate D. The said lever is formed and constructed to encircle the disk 13, as shown in Figs. 3, 4, 5 and 9. To the outer end of the lever 16 is attached at 17* one end of a link 18, which link at its other end is adjustably connected to a segment lever 19 mounted on a shaft 20 which is adapted to turn in a bearing on the under side of the bed plate B, the segment lever 19 being in engagement in the usual manner with the switch cam 21, mounted on the lower shaft G. The segment levers E and 19 are duplicates, and the switch cam 21 is the same as the switch cam which operates the segment lever E, the latter cam (not shown) as before mentioned. The levers E and 19 are both oscillated in unison and to the same extent. The lower end of the needle bar C is adapted to carry two needles 22 and 23, which needles are in line in the direction in which the work moves and are adapted to present two threads to the hook 14, which hook loops the said two needle threads 22* and 23* around the bobbin which is in the bobbin case 15. The gears 1 and 2 are proportioned relative to each other two to one. Through the action of these gears the hook 14 is revolved twice while the needle bar is reciprocated once. One of the objects of this increased speed in the hook relative to the movement of the needle is to expedite the engagement between the hook and the needle threads.

24 is a cylindrical presser bar through which passes a rod 25 to the upper end of which is attached an arm 26. To the outer end of the arm 26 is attached one end of a link 27, the other end of the said link being attached to an arm 28, which, in turn, is attached to the shaft e'. To the lower end of the rod 25 is attached an arm 29 which extends forward through an opening 30 in the shank of a presser foot 31. The shank of the presser foot 31 encircles the cylindrical presser bar 24 and, at its upper end is split, terminating at its forward side in ears or lugs 31* through which a screw 32* passes. This construction, as will be seen, serves as a means for securely fastening the foot to the presser bar 24, and permits the lower end of the rod 25 to extend into the opening 30, thereby allowing the arm 29 to be readily attached to the rod 25. An auxiliary thread carrying looper 32 is mounted to turn on a stud 33, and oscillate in a receptacle 34 formed in the top of the presser foot 31. An eye 33* is formed in the heel of the looper 32 and serves as a means for leading the thread 36* to a channel which runs along the outer periphery of the looper and terminates in an eye 35* which passes through the nose of the looper. An opening 34* is formed through the presser foot 31 to admit of the operation of the needles and the piercers. The arm 29

is at its end 35 forked and adapted to engage the anti-friction roller 36 mounted on a stud extending upwardly from the shank of the looper 32. A lever 37 is pivoted at 38 to a bearing 39, which bearing, in turn, is attached to the arm A of the machine. The rear end of the lever 37 is in engagement with an eccentric cam 39* mounted on the upper shaft of the machine (shown in dotted outline Figs. 1 and 2) by means of a strap 40* which at one end encircles the said cam and extends upwardly through an opening (not shown) in the arm A of the machine and connects as at 40 with the said lever 37. To the forward end of the lever 37 is connected the upper end of a rod 41 which is adapted to reciprocate in bearings 42 and 43 formed on the face plate of the machine as shown in Figs. 1 and 4. To the lower end of the rod 41 is attached a piercer 44 which has downwardly extending prongs 45 and 46. Prongs 45 and 46 are made concavo-convex (as shown in Figs. 6 and 7) and tapering to points substantially as shown in Fig. 4. The piercer 44 is reciprocated once to each reciprocation of the needle by means of the cam 39* and the intermediate connections. As shown in Figs. 4 and 7, the two prongs of the piercer are arranged close beside the needles, one behind the other in parallelism with the line of the needles, and said prongs cooperate, respectively, with said needles, as hereafter described.

The shaft e' being oscillated from the movement of the usual switch cam which oscillates the segment lever E, oscillates once to two reciprocations of the needles and, the looper 32 being moved by the same switch cam, also oscillates once to two reciprocations of the needles. The arm 28 and the arm 26 are constructed sufficiently long to transmit sufficient movement from the shaft e' to oscillate the looper 32 so as to engage and disengage from the needle threads, substantially as shown in Figs. 13 and 14.

As will be seen from Fig. 16, I have shown a diagrammatic view of the hook 14 engaging the loops of the needle threads 22* and 23* and the bobbin thread 47 extending from the delivery eye of the bobbin case. The connections between the link e'', the gate D, the link 18 and the lever 16 are in the same vertical plane, and thus it will be seen that if the links 18 and e'' are equally reciprocated the needle bar and the hook 14 will be equally oscillated.

Graduated scales are formed on the face of the levers E and 19 and are placed in the same position relative to the pivots of the levers, as shown in Fig. 1. The object of this scale is to facilitate the adjustment of the links e'' and 18 to a like position on each lever relative to the pivots of the same, so as to move the needles and the hook laterally to the same extent, it being understood, of

course, that the cams which operate these levers are so adjusted that they operate these levers in unison with each other.

In the present form of my invention I use the usual feed mechanism which is used in Wheeler & Wilson overseaming sewing machines, the movement being transmitted from the upper shaft F to the lower shaft G and to the feed mechanism, the same being as in the above mentioned machine. As is well known this feed mechanism moves the work forward consecutively step by step.

In the operation of the machine the end of the link e'' , and the end of the link 18 are adjusted away from the pivots of the lever E, and 19 respectively, a sufficient extent to give the lateral movements to the needles and hook that may be desired. If it is desired to have the needles and hook move laterally in unison with each other, then the cams that operate said levers are adjusted in a usual way to bring about this movement.

The working position of the needles is such that they vibrate to and from the piercer 44, which as is understood has no lateral movement, the piercer reciprocating once to each reciprocation of the needles through the action of the cam 39*. The cam 39* is so constructed and placed on the shaft F that it reciprocates the piercer just in advance of the reciprocations of the needles, that is to say, the prongs of the said piercer enter the work just previous to the needles entering the same. This operation of the piercer is not essential as it can be timed to enter the work at any time relative to the entering of the needles.

The piercer reciprocates once to each reciprocation of the needles and, having two prongs which perforate the material, will always punch one hole in advance of the needle 23. For example, when the needles descend to make the edge stitch, the piercer descends also making two depth perforations in the material. The work moves forward one stitch after the piercer and needles have risen from engagement with the work while the needles move to the left into the concave portions of the piercer and both descend together into the perforations previously made by the piercer; the needle and piercer ascending again, the work moves forward and the needles descend and make an edge stitch, while the piercer descends the prong 45 entering the perforation previously made by the prong 46 the latter, at this point, making a new perforation in advance of the stitching.

The auxiliary looper is timed to cooperate with the needles and piercer so that, as the latter descends the looper will have reached the forward position shown in Fig. 13, thus forming a loop of its thread extending from the last concatenation to and through the eye in the end of the looper and back along the body of the latter. As the needles and piercer ascend, the looper assumes the reverse

extreme position shown in Fig. 14, carrying its thread about the strands of needle threads, and drawing the same together with the requisite degree of tension. It will thus be seen that the looper thread 36* is wound around the needle threads 22* and 23* as illustrated in Fig. 11, 13 and 14. In these figures I have shown the stitches somewhat separated and the looper thread somewhat to the left of its normal position, in order that the formation of the stitches may be clearly seen.

The hook in the present form of my machine is disposed to turn in a horizontal plane from right to left, and the beak of the hook enters the loops of needle threads as indicated in diagrammatic Fig. 16. In this figure it is of course seen that the loop engaging position of the hook or looper is shifted around relative to the position it is shown in the other figures, so that the beak of the same may be seen entering the loops of needle thread.

It is of course clear that the hem stitch made on this machine may be varied or modified in various ways. In diagrammatic Fig. 11, is indicated the way the needle threads will run on the top of the material when the length of each movement of the feed of the work is an extent equal to one half the distance between the needles, and in Fig. 12, the way the bobbin thread will run in making such a stitch is also indicated. To illustrate let it be assumed that the needles have anchored the threads 22* and 23* in the work at the point indicated in Fig. 11, after this has been done the work is moved one half the distance the needles are separated, and the needles are moved laterally so they descend in about the center of the holes 50 and 51 that have been previously made by the piercers, the looper 32 having previously been brought to the position shown in Fig. 13. Now when the needles are withdrawn and the threads are drawn taut the auxiliary thread 36* will draw the threads 22* and 23* towards the point indicated by 52 in said Fig. 11, which point is the center of the material between the holes 50 and 51. The next movement of the work, and lateral movement of the needles will bring the needle that entered at 22* to the point where the thread 23* is anchored in the work, and the needle that entered at 23* before when the depth stitches were being made will now enter at the point indicated by 53. After the needle threads have been anchored at the points 23* and 53 the work and needles will again be moved, and said needles this time will enter holes 51 and 54, thereby straddling the part 55 of the material, the looper having again been moved to the position shown in Fig. 13, in which position the looper thread 36* is looped around the needle threads. It is thus seen how the needle threads, and aux-

iliary threads run on the top of the work when the extent of the movement of the feed dog is as stated.

In Fig. 12 is illustrated how the bobbin thread runs on the under side of the work when the movements of the feed, and the needles are as above stated. In said figure, 47 indicates the bobbin thread as before noted. Assuming now that the work moves in the direction indicated by the arrow in said figure, the bobbin thread will pass through the loop of the needle thread carried by needle 23 at 56, and then through the loop of the needle thread carried by the needle 22 at 57. Thus from the points 56 to 57 runs a link 58 of bobbin thread. The next movements of the parts bring the needles through holes 50 and 51, and the bobbin thread through the needle loops from hole 51 to hole 50, and thus it is seen that a link 59 of bobbin thread runs from point 57 to the hole 51 and from there said thread runs to hole 50. The next movement of the parts bring the needle 22 through the material at the point 56 and the needle 23 at a point that is indicated by 60 when the bobbin thread is carried through the loops of needle threads as before, and a link 61 of the bobbin thread runs from the point 60 to the point 56. It is thus seen that the bobbin thread runs as shown in said Fig. 12 on the underside of the work when the stitches on the surface of the work are as indicated in Fig. 11. And it is also seen that the needle threads are drawn towards the center of the material that is between the holes made by the prongs of the piercers, and that the bobbin thread draws on the said material in the same direction so that the tendency of the draw of the threads is to enlarge the openings or holes or keep said openings open. This function is accomplished in an ordinary hem stitch machine by moving the work forward two stitches, and then back one stitch, so that the work only progresses once to each third reciprocation of the needle as before noted. While in my machine the work moves forward once to each reciprocation of the needle, and at the same time the functions of a hem stitch machine are accomplished.

It will be understood in the working of this machine that the extent of the feed is regulated so as to feed the work forward at each stitch the requisite distance, this depending upon the character of work and effect desired.

In the description reference has been made to the disposition of the needles as being in line in the direction in which the work moves, and by this description I mean to be understood that the needles are arranged one behind the other in a line substantially parallel with the line of feed, whatever that may be, or may be caused to be, in any given machine, the idea being to have the line of the

needles and the line of feed of the work always in substantial parallelism in hemstitching in my machine. I do not wish to be confined to this arrangement, however, and some of my claims will not be limited thereto, as many of the features are novel irrespective of the arrangement of the needles. Moreover, I do not wish to be limited to the precise details of construction which I have described, as many variations thereof, may be made within the terms of my broad claims by any one skilled in the art. Furthermore, I have referred, in this description, to a consecutive forward movement of the feed, and by this expression I mean to be understood as referring to a feed having progressive, consecutive movements to feed the work continually in the same direction, in contradistinction to the feeds ordinarily employed in hem-stitch machines.

What I claim as new is:—

1. The combination with a sewing machine having a feed mechanism and a stitch forming mechanism comprising a plurality of reciprocating thread carrying needles in line in the direction of the feed of the work; of means for producing a relative jogging or lateral movement between the said needles and the feed; a thread carrying looper suitably mounted to be operated; and means for operating the said looper so as to loop the looper thread around the needle threads on the side of the work into which the needles enter.

2. A sewing machine comprising a plurality of needles arranged substantially in line in the direction of the feed-movement; complementary stitch-forming mechanism; a consecutive feed; and means for producing a relative jogging movement between the needles and feed; a thread-carrying looper; and means for causing the looper to cooperate with the needles on the side of the work into which the needles enter.

3. A sewing machine comprising a plurality of needles; complementary stitch-forming mechanism; a consecutive feed; a piercer; and means for producing a relative jogging movement between the needles and feed; a thread-carrying looper; and means for causing the looper to cooperate with the needles on the side of the work into which the needles enter.

4. A hemstitch sewing-machine comprising a plurality of needles arranged substantially in the line of the feed-movement; a piercer cooperating with the needles; and a looper cooperating with the needles disposed so that its hook when engaging the needle loops will move substantially in the line of the feed.

5. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles arranged substantially in the line of the feed-movement; means for vibrating said needles simultaneously in the same direction; a looper

mechanism adapted to cooperate with said needles; and a piercer cooperating with the needles to periodically penetrate the work at the same point therewith.

5 6. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles; complementary stitch-forming mechanism; a piercer cooperating with the needles; and an auxiliary looper cooperating with the needles.

10 7. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles; complementary stitch-forming mechanism; a piercer cooperating with the needles; and an auxiliary looper cooperating with the needles
15 above the work-plate.

8. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles; complementary stitch-forming mechanism; and a piercer having a plurality of prongs co-
20 operating with the needles; and an auxiliary looper cooperating with the needles.

9. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles arranged substantially in the line of the feed-
25 movement; means for vibrating said needles simultaneously in the same direction; a looper mechanism adapted to cooperate with said needles; and a piercer having a plurality of prongs cooperating respectively with the
30 needles to periodically penetrate the work at the same point therewith.

10. A hemstitch sewing machine comprising a consecutive feed; a plurality of reciprocating and vibrating needles; means for vi-
35 brating said needles simultaneously in the same direction; a looper mechanism adapted to cooperate with said needles; and a piercer having a plurality of prongs cooperating respectively with the needles to periodically
40 penetrate the work at the same point therewith.

11. A hemstitch sewing machine comprising a consecutive feed; a plurality of vertically reciprocating and laterally vibrating
45 needles arranged substantially in the line of the feed-movement; means for vibrating said needles simultaneously in the same direction; a looper mechanism adapted to cooperate with said needles; and a piercer coöperat-
50 ing with the needles to periodically penetrate the work at the same point therewith.

12. A hemstitch sewing machine comprising a consecutive feed; a plurality of reciprocating and vibrating needles arranged sub-
55 stantially in the line of the feed-movement; complementary stitch-forming mechanism; a piercer cooperating with the needles; and an auxiliary looper cooperating with the needles.

13. A hemstitch sewing machine compris-
60 ing a consecutive feed; a plurality of reciprocating and vibrating needles arranged substantially in the line of the feed-movement; means for vibrating said needles simultane-
65 ously in the same direction; a looper mechanism adapted to cooperate with said

needles, and a piercer confined to vertical reciprocation cooperating with the needles to periodically penetrate the work at the same point therewith.

14. A hemstitch sewing machine com- 70
prising a plurality of reciprocating and vibrating needles arranged substantially in the line of the feed-movement; means for vibrating said needles simultaneously in the same direction; a piercer cooperating with 75
the needles; and complementary stitch-forming mechanism including a continuously rotating and bodily vibrating looper.

15. A hemstitch sewing machine comprising a plurality of reciprocating and vi- 80
brating needles; a piercer cooperating with the needles; complementary stitch-forming mechanism including a rotating and vibrating looper; and an auxiliary looper co-
operating with the needles. 85

16. In combination with a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying needles in line in the direction of the feed of the work, and complementary stitch-forming 90
mechanism for engaging the needle threads below the work; of a thread-carrying looper adapted to operate above the work; and means for operating the said looper so as to loop the looper thread around the needle 95
threads.

17. The combination with a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying vertically reciprocating and laterally vi- 100
brating needles in line in the direction of the feed of the work, a thread carrying looper, located above the work-plate and means for operating the said looper so as to loop the looper thread around the needle threads. 105

18. The combination with a sewing machine having a stitch-forming mechanism comprising a plurality of vertically reciprocating thread-carrying needles adapted to move laterally, a thread carrying looper 110
adapted to operate above the work, and means for operating the said looper and for moving the aforesaid needles laterally so as to alternately loop the looper thread around the needle threads above the work. 115

19. The combination with a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying vertically reciprocating and laterally vi- 120
brating needles in line in the direction of the feed of the work, a thread carrying looper adapted to operate above the work, and means for operating the said looper so as to loop the looper thread around the needle threads. 125

20. In a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying needles; a thread carrying looper located to operate above the work; means for actuating the aforesaid needles 130

and the looper so that the needle threads are periodically caused to cross the looper and descend in the loop of the looper thread.

21. In a sewing machine having a stitch-forming mechanism comprising a plurality of vertically reciprocating thread carrying needles, the said needles adapted to be moved laterally; a thread carrying looper; means for oscillating the said looper in a horizontal plane, means for vibrating the aforesaid needles across the said looper so that the needles alternately descend in the loop of the looper thread.

22. In a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying needles in line in the direction of the movement of the work; a piercer having a plurality of prongs in line in the direction of the movement of the work; means for operating the said piercer; a thread carrying looper; and means for operating the looper so as to loop the looper-thread around the needle threads.

23. In a sewing machine having a plurality of reciprocating thread carrying needles adapted to be moved laterally, a complementary stitch-forming mechanism comprising a looper adapted to be moved laterally; means for operating the said looper; means for moving the needles and the looper laterally in unison; an auxiliary looper adapted to operate above the work; and means for operating the said auxiliary looper.

24. The combination with a sewing machine having a stitch-forming mechanism comprising a plurality of needles mounted in line in the direction of the feed of the work; means for reciprocating and for moving the said needles laterally simultaneously in the same direction; a device for piercing holes in the work; means for operating the said device so that it co-acts with the needles to periodically penetrate the work at the same point therewith; a device for engaging the needle-threads below the work to produce a single line of stitching; and means for operating the said device.

25. A hemstitch sewing machine comprising a plurality of reciprocating and vibrating needles; a piercer cooperating with the needles; and complementary stitch-forming mechanism including a fixed shaft, a single looper cooperating with both needles, means between the shaft and looper for actuating the latter, and means for vibrating the looper relatively to the said shaft and in unison with the vibrations of the needle.

26. A hemstitch sewing machine comprising a plurality of needles arranged substantially in the line of the feed-movement; a piercer cooperating with the needles; and complementary stitch-forming mechanism including a fixed shaft, a looper cooperating with both needles, means between the shaft and looper for actuating the latter, and means

for vibrating the looper relatively to the shaft and in unison with the vibrations of the needle.

27. A hemstitch sewing machine comprising a plurality of reciprocating and vibrating needles; a piercer cooperating with the needles; complementary stitch-forming mechanism including a fixed shaft, a looper cooperating with the needles, means between the shaft and looper for actuating the latter, and means for vibrating the looper relatively to the shaft and in unison with the vibrations of the needles; and an auxiliary looper cooperating with the needles.

28. A sewing machine comprising a reciprocating and vibrating needle; and complementary stitch-forming mechanism including a fixed shaft, a looper supported by said shaft, means for actuating the looper, and means for loosely engaging the looper for vibrating the latter relatively to the shaft and in unison with the vibrations of the needle.

29. A sewing machine comprising a plurality of reciprocating and vibrating needles arranged substantially in the line of the feed-movement; and complementary stitch-forming mechanism including a fixed shaft, a looper, means between the shaft and looper for actuating the latter, and means for loosely engaging the looper for vibrating the same transversely of its axis and in unison with the vibrations of the needles.

30. A sewing machine comprising a reciprocating and vibrating needle; and complementary stitch-forming mechanism including a fixed shaft, a looper, means between the shaft and looper for actuating the latter, a lever having a portion which loosely surrounds the looper, and means for actuating the lever to vibrate the looper bodily relatively to its axis and in unison with the vibrations of the needle.

31. A sewing machine comprising a reciprocating and vibrating needle; and complementary stitch-forming mechanism including a fixed shaft, a looper supported thereby and having a loose sliding connection therewith, and means for vibrating the looper relatively to the shaft and in unison with the vibrations of the needle.

32. A sewing machine comprising reciprocating and vibrating needles; and complementary stitch-forming mechanism including a fixed shaft, a disk sliding thereon, a looper sliding on the disk, and means for engaging the looper and vibrating the same relatively to the shaft and in unison with the vibrations of the needle.

33. A hemstitch sewing machine comprising a plurality of reciprocating and vibrating needles; means for vibrating said needles simultaneously in the same direction; complementary stitch-forming mechanism cooperating with said needles; a piercer cooperating with the needles to periodically

penetrate the work at the same point therewith; and means for actuating said piercer including a rotating cam, a vertically reciprocating rod, and means between the cam and rod for actuating the latter.

34. A hemstitch sewing machine comprising a plurality of reciprocating and vibrating needles; means for vibrating said needles simultaneously in the same direction; complementary stitch-forming mechanism cooperating with said needles; a piercer comprising a plurality of prongs cooperating respectively with the needles to periodically penetrate the work at the same point therewith; and means for actuating said piercer including a cam, a reciprocating rod, and means between the cam and rod for actuating the latter.

35. The combination with a sewing machine having a stitch forming mechanism comprising a plurality of vertically reciprocating and laterally vibrating needles in line in the direction of the movement of the work; of means for vibrating said needles simultaneously in the same direction; a rod mounted to reciprocate vertically; a piercer actuated thereby and cooperating with the needles to periodically penetrate the work at the same point therewith; a lever; a connection between the lever and the rod; and means for oscillating the lever.

36. A hemstitch sewing machine comprising a plurality of needles arranged in line in the direction of feed-movement; means for vibrating said needles simultaneously in the same direction; complementary stitch-forming mechanism cooperating with said needles; a piercer cooperating with the needles to periodically penetrate the work at the same point therewith; a rod connected thereto; a cam; and a lever connected to the cam and to the rod for reciprocating the latter.

37. The combination with a sewing machine having a stitch-forming mechanism comprising a plurality of vertically reciprocating and laterally vibrating needles in line in the direction of the movement of the feed; means for vibrating said needles simultaneously in the same direction; a rod mounted in suitable bearings to reciprocate vertically; a piercer cooperating with the needles to periodically penetrate the work at the same point therewith, said piercer being attached to the lower end of the said rod; a lever; a connection between the forward end of the lever and the rod; a cam mounted on the upper shaft of the machine; and a connection between the said cam and the lever.

38. A hemstitch sewing machine comprising a consecutive feed; a plurality of needles arranged substantially in the line of feed-movement; a piercer cooperating with the needles; and a looper cooperating with the needles disposed so that its hook when en-

gaging the needle-loops will move substantially in the line of the feed.

39. A hemstitch sewing machine comprising a plurality of needles arranged substantially in the line of the feed-movement; a looper cooperating with the needles and disposed so that its hook when engaging the needle-loops will move substantially in the line of the feed; and an auxiliary looper cooperating with the needles.

40. A hemstitch sewing machine comprising a plurality of needles arranged substantially in the line of the feed-movement; a looper cooperating with the needles and disposed so that its hook when engaging the needle loops will move substantially in the line of the feed; and an auxiliary looper cooperating with the needles above the work-plate.

41. A hemstitch sewing machine comprising a plurality of needles arranged substantially in the line of the feed-movement; a piercer cooperating with the needles; a looper cooperating with the needles and disposed so that its hook when engaging the needle-loops will move substantially in the line of the feed; and an auxiliary looper cooperating with the needles.

42. A sewing machine comprising a reciprocating and vibrating needle-bar carrying a plurality of needles arranged substantially in the line of the feed-movement; an auxiliary looper cooperating with the needles; an actuator; and means connecting the needle-bar and the auxiliary looper with the actuator for imparting vibratory movements thereto.

43. A sewing machine comprising a reciprocating and vibrating needle-bar carrying a plurality of needles arranged substantially in the line of the feed-movement; complementary stitch-forming mechanism; an auxiliary looper cooperating with the needles; a common actuator for the needle-bar and auxiliary looper; connections between the actuator and the needle-bar and auxiliary looper; and means for varying the vibratory movements of the needle-bar.

44. A sewing machine comprising a plurality of vibrating and reciprocating needles arranged substantially in line in the direction of the feed-movement; means for vibrating said needles including a rock-shaft; a looper cooperating with said needles above the work-plate; and means between the rock-shaft and looper for oscillating the latter.

45. In a sewing machine having a stitch-forming mechanism comprising a plurality of thread carrying needles; a complementary stitch-forming mechanism adapted to engage the needle threads below the work; a presser-bar suitably mounted; a way formed longitudinally through the said presser-bar; a rod located in the said way and adapted to

oscillate therein; a presser-foot mounted on the presser-bar; a looper mounted to oscillate on the presser-foot, a connection between the looper and the aforesaid rod; and
5 means for oscillating the rod.

46. A stitch-forming mechanism comprising a reciprocating needle and cooperating looper; and means for actuating said looper including a shaft, a disk supporting the
10 looper and a connection between the disk and shaft whereby the latter may actuate the looper bodily.

47. A stitch-forming mechanism comprising a reciprocating and vibrating needles and
15 a cooperating looper; means for actuating said looper comprising a fixed rotating shaft, a disk supporting the looper, and a sliding connection between the shaft and disk whereby the looper may be actuated bodily.

20 48. A stitch-forming mechanism compris-

ing a looper, an actuating shaft, a disk mounted to slide on the shaft, and a disk connected to the looper and mounted to slide on the first disk.

49. A hemstitch sewing machine comprising 25
a reciprocating needle; a reciprocating piercer; a rotating looper; an auxiliary oscillating looper; and mechanism for actuating the parts including means for giving two
rotations to the looper to a single reciproca- 30
tion of the needle-bar and a single oscillation of the auxiliary looper.

Signed at New York, in the county of New York and State of New York, this twenty-first day of September, A. D. 1900.

WILLIAM N. PARKES.

Witnesses:

R. C. BOSWELL,
J. B. MCGIRR.