No. 875,608. PATENTED DEC. 31, 1907.

W. N. PARKES.

TAKE-UP AND NEEDLE BAR MECHANISM FOR SEWING MACHINES.

APPLICATION FILED MAR. 6, 1903.

3 SHEETS—SHEET 1.

Fig. 1.

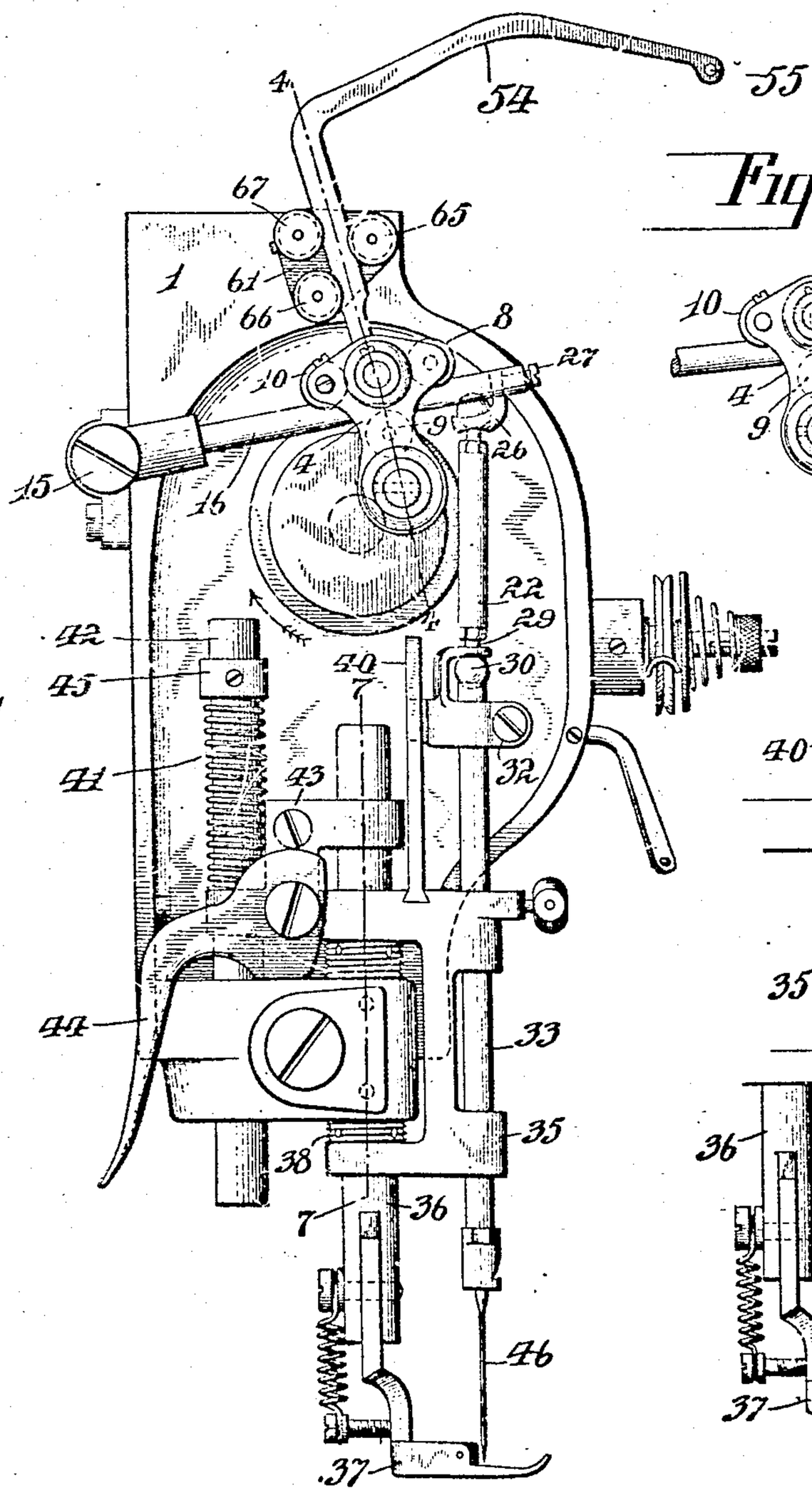
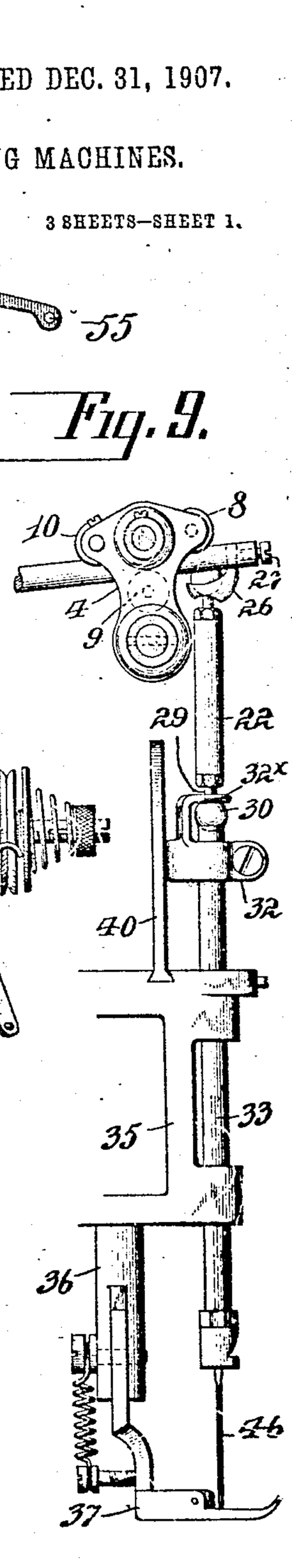
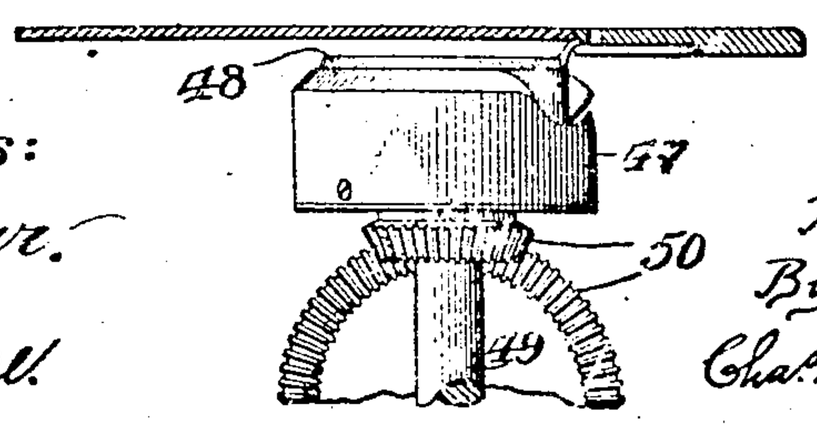


Fig. 9.





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3 SHEETS—SHEET 2.

Fig. 2.

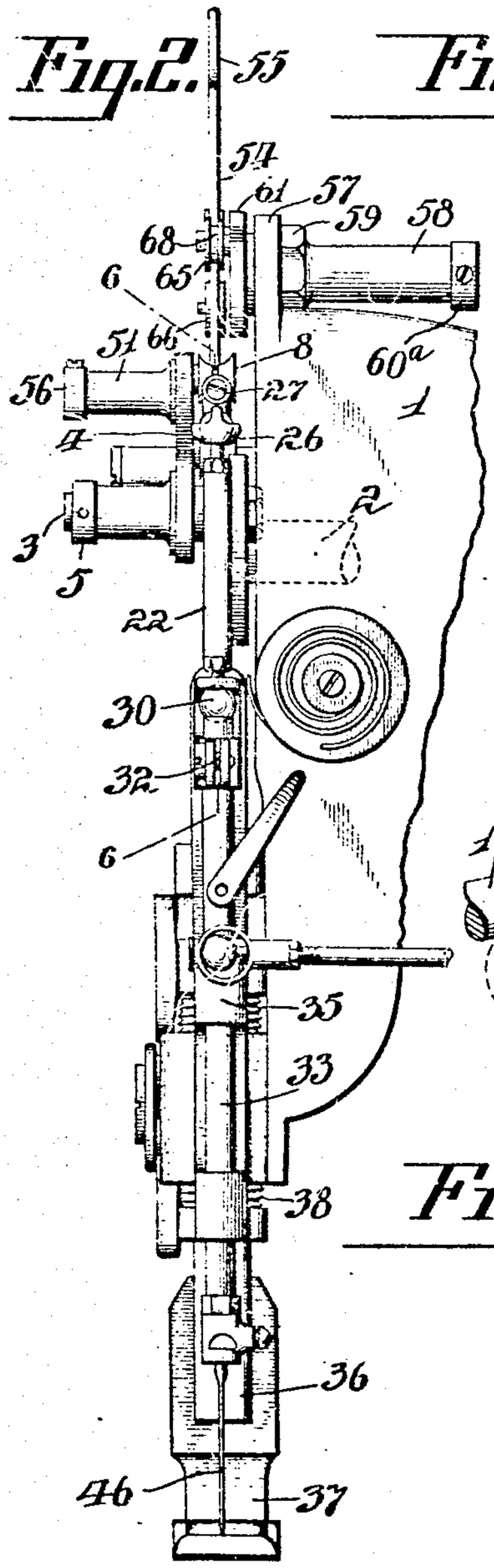


Fig. 3.

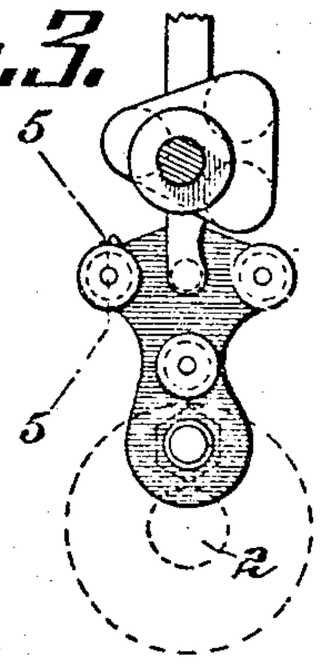


Fig. 4.

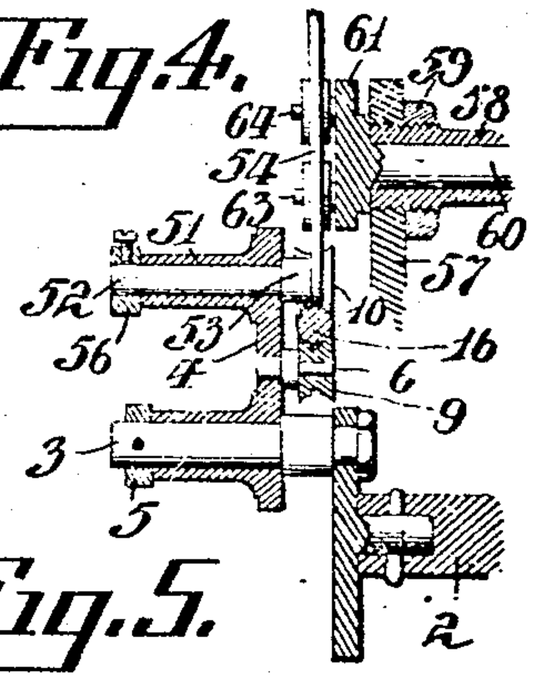
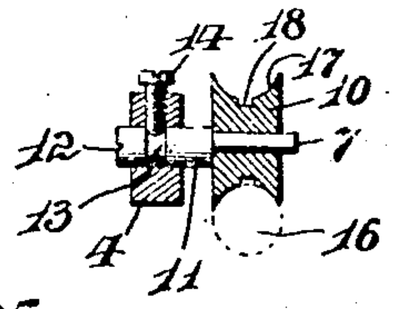


Fig. 5.



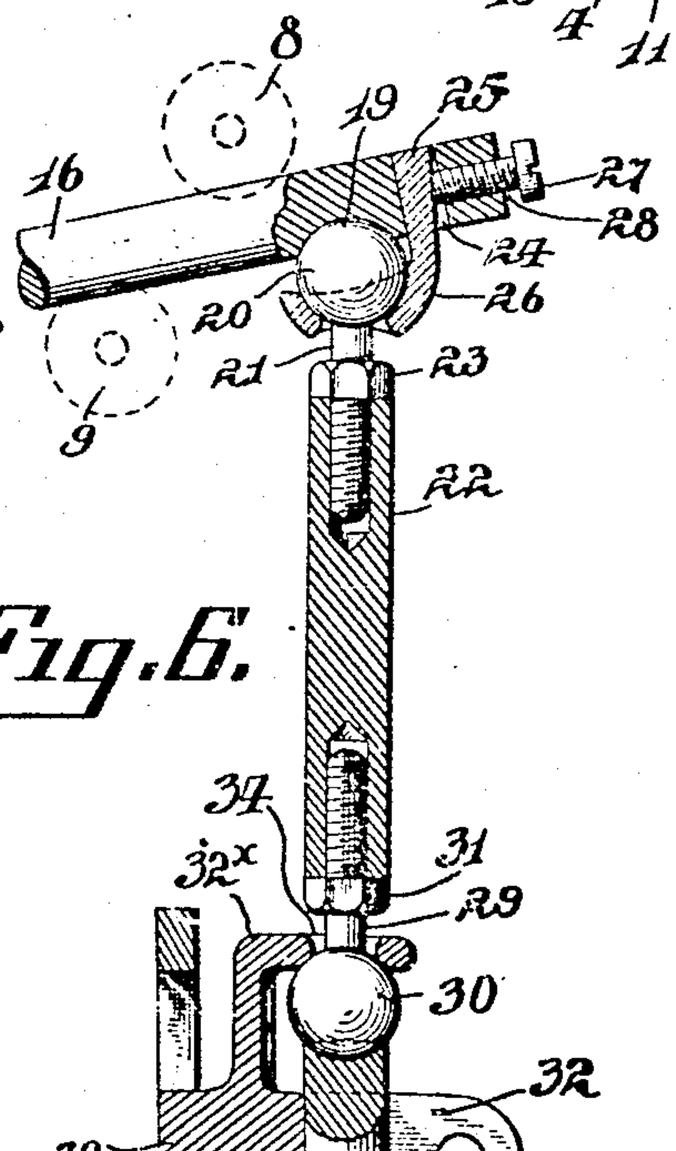


Fig. 6.

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3 SHEETS—SHEET 3.

Fig. 7.

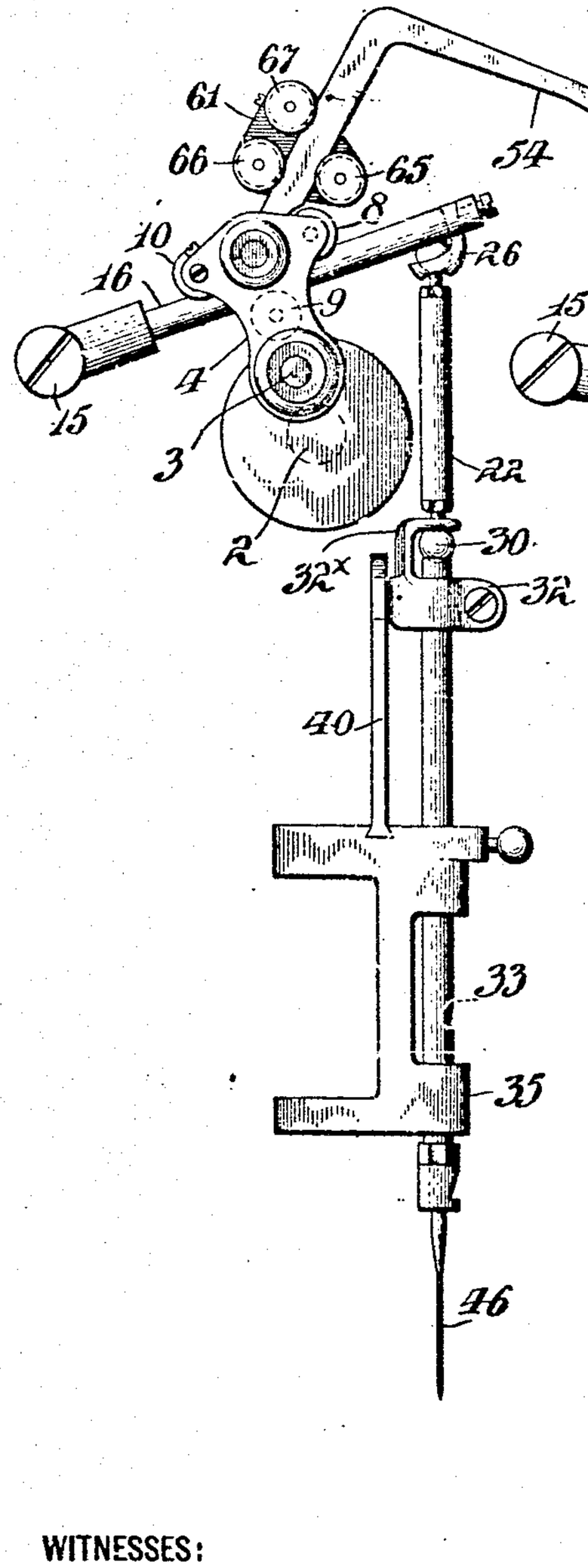
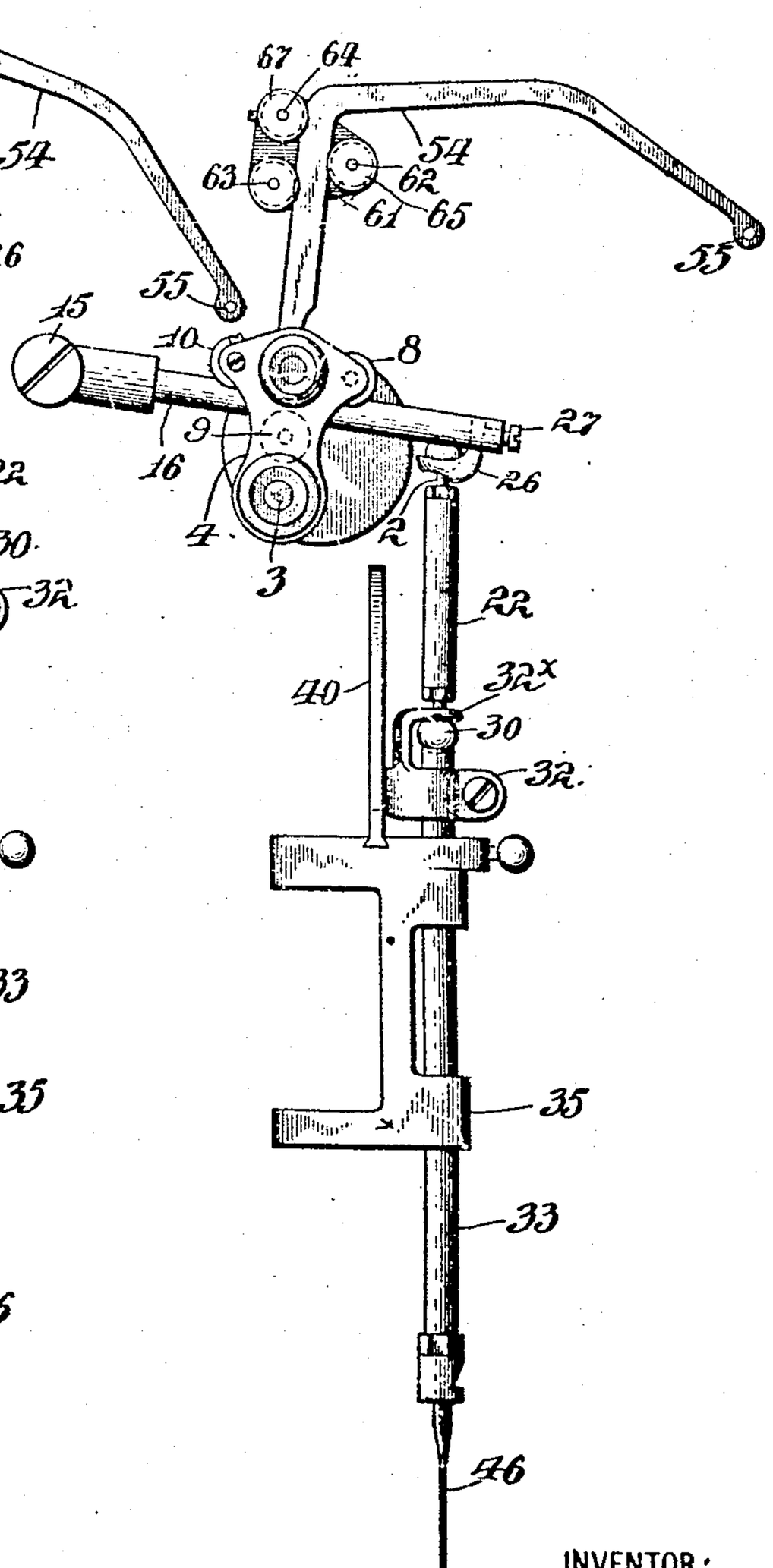


Fig. 8.



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TAKE-UP AND NEEDLE-BAR MECHANISM FOR SEWING-MACHINES.

No. 875,608. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed March 6, 1903. Serial No. 146,463.

To all whom it may concern:

Be it known that I, WILLIAM N. PARKES, a citizen of the United States, residing in Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Take-Up and Needle-Bar Mechanism for Sewing-Machines, of which the following is a description.

This invention relates to sewing machines in general, but more particularly to those in which a needle-bar or holder is reciprocated from the movement of a rotating or oscillating shaft.

The main objects are to provide a more efficient driving mechanism intermediate the shaft and the needle-bar; to adapt a member of the driving mechanism to operate a thread take-up; to provide a take-up adapted to be operated by the said member; and to so construct the parts, and locate them, that they may be run at a very high rate of speed.

In sewing machines wherein the needle-bar is driven from the forward end of a rotating shaft, it is usual to provide the shaft with a crank-pin and make a pitman connection between said pin and needle-bar. As the upper end of the pitman is connected to the crank-pin,—the latter being considerably off the center shaft,—it is clear that there is a considerable side thrust of the bar in driving it down and a considerable side pull in raising it, and this, even though the crank-pin is located directly over the end of the bar, as in some of the latest machines in the art. This side thrust and pull on the needle-bar, cause the latter, under very high speed, to heat in its bearings, wear the bar and bearings, and thus limit the speed and life of the bar and its actuating parts.

It is a further object of my invention to avoid practically all side thrust or pull on the needle-bar, and especially when the needle is entering the work.

Another object is to provide a driving mechanism for the needle and take-up adapting them to coöperate with the under or complemental stitch-forming mechanism which is the subject-matter of my U. S. Patent No. 730,692, issued to me June 9, 1903, in which a bobbin carrying a very large quantity of thread is used.

Another object is to provide a mechanism which will cause the needle-bar and take-up, and especially the latter, to coöperate with a looper which rotates, or moves, a plurality of times to each reciprocation of the needle so as to cause the loop to be quickly drawn up or in and avoid engagement of the looper with the preceding stitch-loop.

In the form of my invention as herein described and ilustrated in the drawings, the needle-bar is adapted to be moved laterally, as well as reciprocated vertically; but, it is to be understood that the feature of the needle-bar being mounted and connected so as to swing laterally forms no part of the subject-matter of this application, except that the same means which reciprocate the said bar permit it to be moved laterally. That is to say, I do not purpose claiming in this case the details of the connection between the vibrating driving lever and the needle-bar; for, such connection is specially adapted to coöperate with the mechanism which gives to said needle-bar its lateral vibration, and is not at all essential to the operation of a straight-stitch machine. Such connection is shown herein to illustrate the principle of my invention and not as an essential thereof.

With the above objects in view, and others which will appear during the course of this description, the invention consists in the parts, elements and combinations hereinafter described and claimed.

Referring to the drawings: Figure 1 is an end elevation of the head of a sewing machine embodying my invention, the take-up being shown in approximately the stitch-setting position; Fig. 2 is a front elevation of the same; Fig. 3 is a rear elevation of a detail showing the arrangement of the rolls on the back of the actuator and the connection of the take-up with the latter; Fig. 4 is a section of the needle-bar and take-up actuating mechanism on the line 4—4 of Fig. 1; Fig. 5 is a vertical section of one of the adjustable guide rolls, on the line 5—5 of Fig. 3; Fig. 6 is an enlarged vertical section of a portion of the needle-bar actuating mechanism on the line 6—6 of Fig. 2; Fig. 7 is a front elevation of the take-up and needle-bar actuating mechanism, the relative position of the take-up and needle-bar being shown at approximately the moment the take-up has begun to rise; Fig. 8 is a view similar to Fig. 7, the relative position of the take-up and needle-bar being at approximately the moment the looper engages the needle-thread loop; and Fig. 9 is a similar view showing the position

of the needle-bar and its connection with the driving lever when the needle is about entering the work.

In the drawings: 1, represents the overhanging arm of the machine,—a part only of which is shown,—in which is suitably mounted a rotating shaft 2, the forward end being provided with a crank-pin 3. On the said crank-pin is mounted a triangular shaped actuator 4, which, in combination with other elements presently to be described, operates the take-up and needle-bar or holder; a collar 5, serving as a means for retaining the actuator in the proper position on the said crank pin. On pins 6, Fig. 3, and on eccentric pin 7, Fig. 5, which are suitably attached to the actuator 4, are mounted respectively rollers 8, 9 and 10. The eccentric pin 7 has an enlarged portion 11, located in a bore formed in the actuator 4, a slot 12 serving as a means for turning the eccentric with a screw driver; and a channel 13, and screw 14 being provided for locking the cecentric pin from turning after it has been adjusted.

At 15, on a suitable bearing carried by the arm 1, is pivoted an enlarged end of a round needle-bar driving lever 16, which is engaged on its upper side by the rollers 8 and 10, and on its under side by roller 9, the periphery of the rollers being concaved, as at 17, to conform to the periphery of the lever 16, and having channels 18, formed in them, to receive refuse and other matter, as shown in Figs. 3 and 4. No means are provided between the pins and rollers to retain the latter on the former, and the rollers are free to slide on their pins. But the lever 16, and the rollers are formed so as to conform to each other, thus enabling the lever to retain the rollers on their pins.

In a socket 19, formed in the underside of the lever 16, is seated the upper portion of a ball 20, provided with a threaded stem 21, screwed into the upper end of a link 22, a nut 23, serving to hold the stem in adjusted position. In a smooth bore 24, running transversely through the lever 16, is located the stem 25, of a cup-shaped part 26, which engages the under portion of the ball 20, thus retaining the ball in the socket 19. The stem 25, is tapered and a screw 27, extending through a threaded hole 28, in the end of the lever 16, engages said tapered portion and retains the same securely in adjusted position,—see Fig. 6. To the lower end of link 22, is connected the screw-threaded stem 29, of a ball 30, held in adjusted position by a nut 31. A clamp-piece 32, is secured to the needle-bar 33, in such manner as to hold the upper, socketed end of the same in contact with the ball 30, said clamp-piece 32, being provided with a bearing 32^{x} concaved to receive the upper portion of the ball 30, and with a hole 34, to permit free movement of the stem 29, see Fig. 5.

As shown in the drawings, the needle-bar is mounted to reciprocate in a gate or carrier 35, which is journaled upon a bar 36, shown as the presser-bar, carrying a foot 37, at its lower end,—and supported and adjustable by bushings 38, entering the head of the machine. The needle-bar is prevented from axial motion by a lug 39, projecting from the clamp-piece 32 into a slot in a vertical bar 40, carried by the gate 35. The presser-bar 36, is normally depressed by a spring 41, surrounding a bar 42,—suitably secured in the machine-head,—and acting upon an angular piece 43, carried by the bar 36. A cam-lever 44, secured to the piece 43, and acting on the head, is provided for lifting the presser-bar, and the pressure of its foot is regulated by the adjustable collar 45.

The needle is indicated at 46, and a looper 47, carrying a bobbin-case 48, coöperates therewith. The looper is carried in a horizontal plane on the upper end of a vertical shaft 49, actuated by gearing 50, driven from the main or a countershaft of the machine, the proportion of the gearing being such as to impart to the looper a plurality of rotations to a single reciprocation of the needle.

In a suitable bearing 51, on the actuator 4, is mounted to turn a small shaft 52, to the inner enlarged end 53, of which is attached the lower end of a take-up lever 54, shaped substantially as shown in Figs. 1 and 2, and which has a thread-eye 55, in its outer end. A collar 56, attached to the outer end of the shaft 52, serves in combination with the enlarged portion 53, as a means for keeping the shaft in its proper position.

In a threaded seat formed in a flange 57, which extends upwardly from the arm 1, is secured a bushing 58, a portion of which is threaded for the said seat, a lock-nut 59, serving to lock the bushing in its seat. In the bushing is mounted a short shaft 60, held in place by a collar 60^{a}, and to the outer end of which is attached a fulcrum-plate 61, carrying pins 62, and 63, and eccentric pin 64, on which are mounted rollers 65, 66, and 67, respectively, and in the periphery of which are formed grooves 68, see Fig. 2. These grooves and the take-up are constructed so that the edge of the latter fits and moves freely in the grooves. The take-up passes between the rollers 65, 66 and 67, in the grooves 68, of the same. The take-up rollers 65, 66 and 67, are retained in their proper position on their bearing pins by the edge of the take-up in the grooves 68.

The bearing pins for the several rollers are of such length, and the rollers are so located, that they are free to move laterally on the pins. This is advantageous by reason of the fact that it prevents any binding

between the rollers and their respective coöperating levers, even though the latter is out of perfect alinement with the said rollers.

Mounting the levers to run between three rollers, is advantageous by reason of the fact that, by a simple adjustment of one of the said rollers, any lost motion between them can be taken up; and also fine fitting in assembling is avoided. To adjust the rollers on the actuator 4, for example, so there will be no lost motion between them and the needle-bar driving lever, the screw 14, is loosened, and the eccentric pin 7, turned until all lost motion is taken up, when the eccentric pin is secured again by the screw 14. The adjustment between the take-up lever, and its roller bearings, is the same as described in connection with the needle-bar driving lever and rollers. It will be seen that provision is made for taking up lost motion between the needle-bar driving lever and its bearing on the fulcrum-plate.

Having thus described the details of my invention and shown a practical form of mechanism for performing the several operations and securing the several results desired, I wish to dwell with some stress upon certain features and principles involved. First, it will be noted that the needle-bar, take-up and driving parts contacting therewith are located and operate in a single vertical plane parallel with the face of the machine-head and at a right angle to the longitudinal axis of the driving-shaft 2, and cutting the latter transversely. This disposition of the parts avoids sagging or binding; provides a compact structure capable of being housed in small space; avoids the necessity for the usual numerous lugs, bearings, and recesses to accommodate parts in the frame thus simplifying and cheapening the manufacture of the latter; enables all the parts in the head to be placed close to the bearing for the driving shaft and the latter to be shortened, thus avoiding vibration and increasing steadiness; and produces a mechanism having easy, noiseless movements and capable of high-speed. Again, it will be noted that lateral or side drag or thrust on the needle-bar is practically impossible; for, the driving lever 16, operates in substantially a vertical plane upon the link 22, and the latter likewise upon the needle-bar 33. Hence, the driving power of the lever is exerted and transmitted in substantially a straight line coincident with the longitudinal axis of the needle-bar. Therefore, friction heating and binding of parts are avoided; and all the benefits, such as power, steadiness and certainty of action, of the direct thrust of the driving lever are obtained. And, even though the mechanism be incorporated in a machine having a laterally vibrating needle-bar, the good results, advantages and benefits are still derived therefrom; for, the lateral vibrations of the needle-bar, even though extensive, cannot materially modify the action of the parts. Again, it will be noted that the actuator 4, is positive in its action upon both the take-up and needle-bar, the revolving and oscillating motion thereof together with its loose, sliding connection with the driving lever 16, producing the necessary variations in speed of the needle-bar and take-up relatively. Moreover, the actuator 4, in exerting its downward stress upon the driving lever 16, gradually approaches the plane of the needle-bar, thus relieving said lever of strain, and applying its driving force more directly upon the link 22, and the needle-bar. And the motion of the actuator, its direct, pivotal connection with the take-up, and the fulcrum-plate 61, give the take-up positiveness of action and combined reciprocating and oscillating motion. Again, the manner in which the several rolls are related to their axes and their respective coöperating levers, is an important feature of my invention, together with the means provided for taking up lost motion between said rolls and levers.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In combination, an actuating crank-pin, an actuator pivoted on the said crank-pin, a pivoted lever, said lever being in engagement with the said actuator, a take-up pivoted on the said actuator, and a fulcrum for the said take-up.

2. In combination a rotating part, an actuator operated by the said rotating part, a take-up pivoted on the said actuator, and a fulcrum for the said take-up on which it is adapted to slide.

3. In combination a rotating shaft, a crank-pin operated by the shaft, a pivoted lever, an actuator pivoted on the crank-pin and adapted slidingly to engage and operate the said lever, a needle-bar, and a connection between the lever and the needle-bar.

4. A needle-bar operating mechanism comprising a rotating shaft, a lever adapted to operate in a plane at substantially right angles to the longitudinal axis of the said shaft, an actuator pivoted to the shaft, by which the said lever is operated, a needle-bar operating in the plane of operation of the said lever, and a connection between the needle-bar and the said lever whereby the needle-bar is operated by a direct thrust from the movement of the lever.

5. A needle-bar operating mechanism comprising a needle-bar, a rotating shaft, a lever pivoted to oscillate in a vertical plane at a right angle to said shaft, and the needle-bar operating in the vertical plane of operation of said lever, a pivoted actuator connecting the said lever and the rotating shaft, and a

connection between the said lever and the end of the needle-bar.

6. A needle operating mechanism comprising a needle-bar, a pivoted needle-bar driving-lever having a round portion, a plurality of rolls engaging and affording a sliding bearing for the said lever, the faces of the said rolls being concaved to conform to the round portion of the said lever, means for bodily oscillating the rolls and thereby operating the lever, and a connection between the lever and the needle-bar.

7. A needle operating mechanism comprising a needle-bar and a rotating shaft, said shaft provided with a crank-pin, an actuator pivoted on the said crank-pin, a pivoted lever in sliding connection with the said actuator, and a connection between the aforesaid needle-bar and the said lever.

8. A needle-bar operating mechanism comprising a rotating shaft, a needle-bar disposed at an angle to and located at one side of the axis of the said shaft, a driver for the said needle-bar mounted independently of the shaft and operating in the same plane with the needle-bar, an actuator pivoted to the shaft and connected to the driver and connections between the driver and the needle-bar.

9. In combination, a take-up, needle-bar, and a driving shaft, the take-up and needle-bar operating in the same vertical plane at substantially a right-angle to the shaft; and means connecting the forward end of the shaft with the needle-bar and take-up, including a pivoted actuator and a vibrating lever.

10. In combination, a take-up, a needle-bar, and a driving shaft, the take-up and needle-bar operating in the same vertical plane at substantially a right-angle to the shaft; and means connecting the forward end of the shaft with the needle-bar and take-up, including a revolving pivotally supported actuator.

11. In combination, a driving shaft, a take-up, a fulcrum-plate upon which the take-up slides and with which it oscillates, an actuator for the take-up, and means for operating the actuator.

12. In combination, a driving shaft, a driving lever, an actuator, a pivotal connection between the driving shaft and actuator, a sliding connection between the latter and the lever, a needle-bar, and means connecting the latter and the lever.

13. In combination, a needle-bar and actuating mechanism therefor, the latter including an actuator and lever connected to have relative sliding movement one upon the other and anti-friction rolls forming said sliding connection.

14. In combination, a take-up and actuating means therefor, the latter including a revolving actuator, and a fulcrum plate for the take-up on which the latter slides and with which it oscillates.

15. In combination, a take-up, a fulcrum-plate therefor, anti-friction roll connection between the plate and take-up, and means for actuating the latter.

16. In combination, a take-up, a fulcrum-plate therefor and on which it slides, an adjustable connection between the two, and means for actuating the take-up.

17. In combination, a needle-bar, a lever connected to the bar for actuating the same, an actuator, and an adjustable sliding connection between the lever and actuator.

18. In combination, a needle-bar, a take-up, an actuator, a lever, means for operating the actuator, a fulcrum plate for the take-up, connections between the lever and actuator and between the actuator and take-up, whereby oscillating and reciprocating motions are imparted to the take-up and reciprocating motion to the needle-bar.

19. In combination, a needle-bar and actuating mechanism therefor, the latter including an actuator and lever, a plurality of anti-friction rolls connecting said actuator and lever, and means for adjusting one of said rolls.

20. In combination, a needle-bar and actuating mechanism therefor, the latter including an actuator and lever, a plurality of rolls connecting said actuator and lever, said rolls having a triangular arrangement about said lever.

21. In combination, a needle-bar and actuating mechanism therefor, the latter including an actuator and lever, a plurality of rolls carried by said actuator and arranged about said lever so as to embrace the same.

22. In combination, a take-up and actuating mechanism therefor, a fulcrum-plate for said take-up carrying a plurality of anti-friction rolls in contact with said take-up.

23. In combination, a take-up and actuating mechanism therefor, a fulcrum-plate for said take-up carrying a plurality of rolls in contact with said take-up, and means for adjusting one of said rolls.

24. In combination, a take-up and actuating mechanism therefor, a fulcrum-plate, a plurality of rolls connecting said plate and take-up having a triangular arrangement about said take-up.

25. In combination, a take-up and actuating mechanism therefor, a fulcrum-plate, a plurality of rolls connecting said plate and take-up and arranged about said take-up so as to embrace the same.

26. In combination, a needle-bar and mechanism for actuating the same, including an anti-friction roll, a support carrying an eccentric journal for said roll, and means for adjusting said support.

27. In combination, a needle-bar and mechanism for actuating the same, including

an anti-friction roll, loose on its bearing, and a coöperating lever, said roll and lever being correspondingly shaped so that said lever prevents said roll from sliding off its bearing.

28. In combination a rotating shaft, an actuator operated by the said rotating shaft, a take-up pivoted on the said actuator, and a fulcrum for the said take-up, independent of all the said parts, on which it is adapted to slide.

29. In combination a rotating part, an actuator operated by the said rotating part, a take-up pivoted on the said actuator, and a fulcrum for the said take-up, fixed relatively to the other elements, on which it is adapted to slide.

30. A sewing-machine having a needle-bar operating mechanism comprising a rotary driving member; a lever pivoted to the machine frame and disposed so as to operate in a plane at substantially a right-angle to the axis of said member; an actuator pivoted to said member; means connecting said actuator and lever; a needle-bar; and a connection between the lever and the needle-bar operating substantially in the path of reciprocation of the latter.

31. A sewing machine comprising a needle-bar operating mechanism including a rotary member; a lever pivoted to the machine frame; an actuator pivoted to said member; means connecting the lever and the actuator, permitting the same to slide freely relatively; and a link connecting the end of the lever and the end of the needle-bar for actuating the latter, said link transmitting the drive of the lever to the needle-bar directly in the line of the axis of the latter.

32. In combination a driving shaft, a needle bar, a take-up and actuating mechanism therefor including a lever, means connecting the driving shaft and lever between the ends of the latter, the driving parts of said mechanism which contact with the said take-up and needle bar being in the same vertical plane with the latter and at substantially a right angle with the main driving elements of said actuating mechanism.

33. In combination a driving shaft, a needle bar, a take-up and actuating mechanism therefor including a vibrating lever located in the same vertical plane with the needle bar and at substantially a right angle with the main driving elements of the actuating mechanism, and means connecting the driving shaft and said lever between the ends of the latter.

34. A sewing machine comprising a needle bar and take-up; means for actuating the same including a rotating disk, a lever and an actuator directly connected to the disk and take-up and indirectly connected to the needle bar by the lever.

35. A sewing machine comprising a needle bar and take-up; means for actuating the same including a rotating disk, and an actuator pivoted to the disk, and means connecting the take-up and needle bar with the actuator including a lever between the latter and the bar.

36. A sewing machine comprising a needle bar and take-up; means for actuating the same including a rotating disk; an actuator connected to the disk; means pivotally connecting the actuator with the take-up; and means connecting the actuator and needle bar including a lever.

37. A sewing machine comprising a needle bar and take-up; means for actuating the same including a rotating disk; an actuator connected to the disk and take-up; and a connection between the actuator and the needle bar having sliding movement relatively to one of said elements.

38. A needle bar actuating mechanism comprising a rotary disk; a needle bar; a lever connected to said bar; and an actuator between said disk and lever having a sliding connection with the latter and pivoted to the disk.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM N. PARKES.

Witnesses:
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M. B. HOARE.