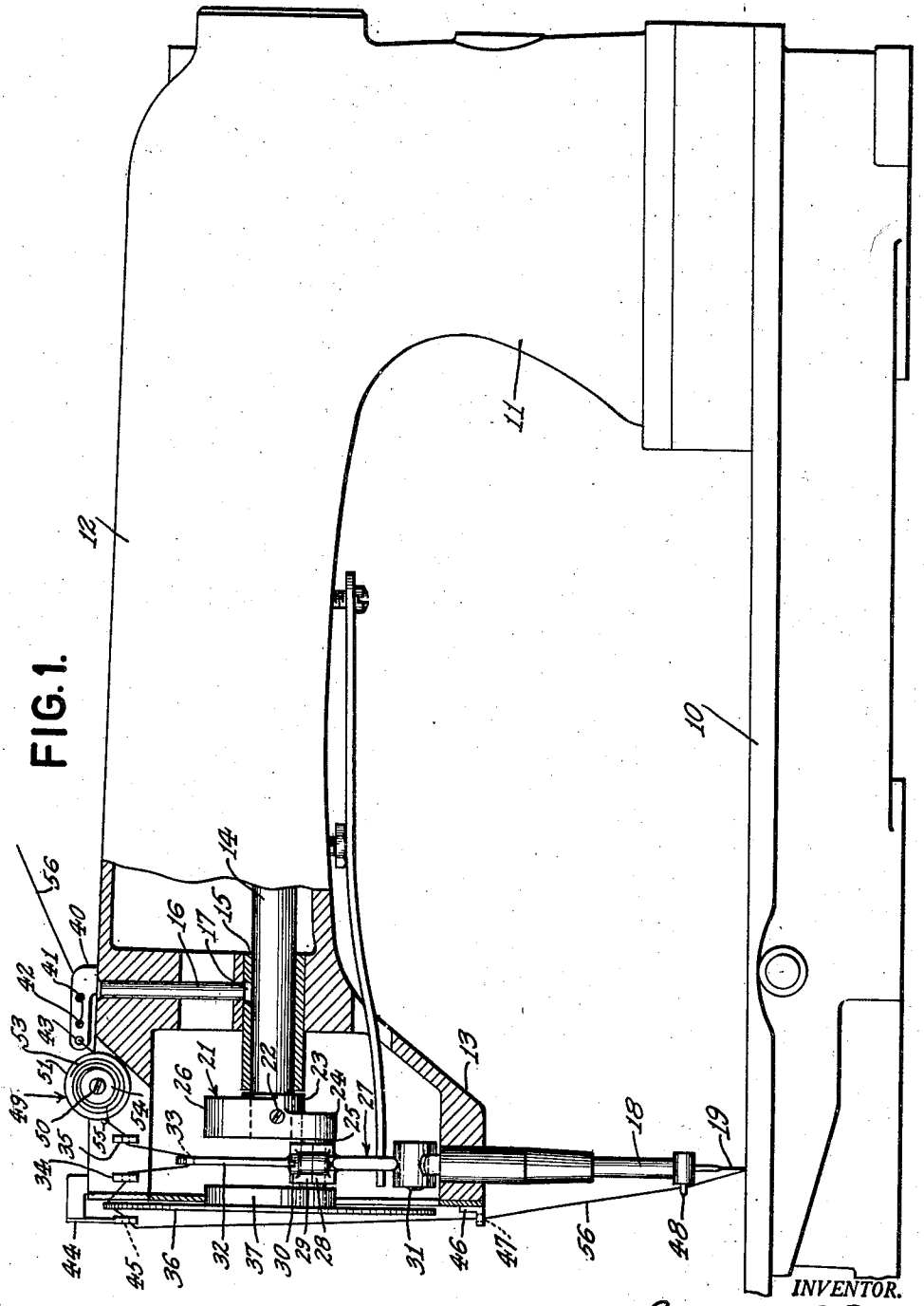
Nov. 4, 1947. C. C. SMITH 2,430,084

TAKE-UP MEANS FOR SEWING MACHINES

Filed Oct. 12, 1944 4 Sheets-Sheet 1

FIG. 1.



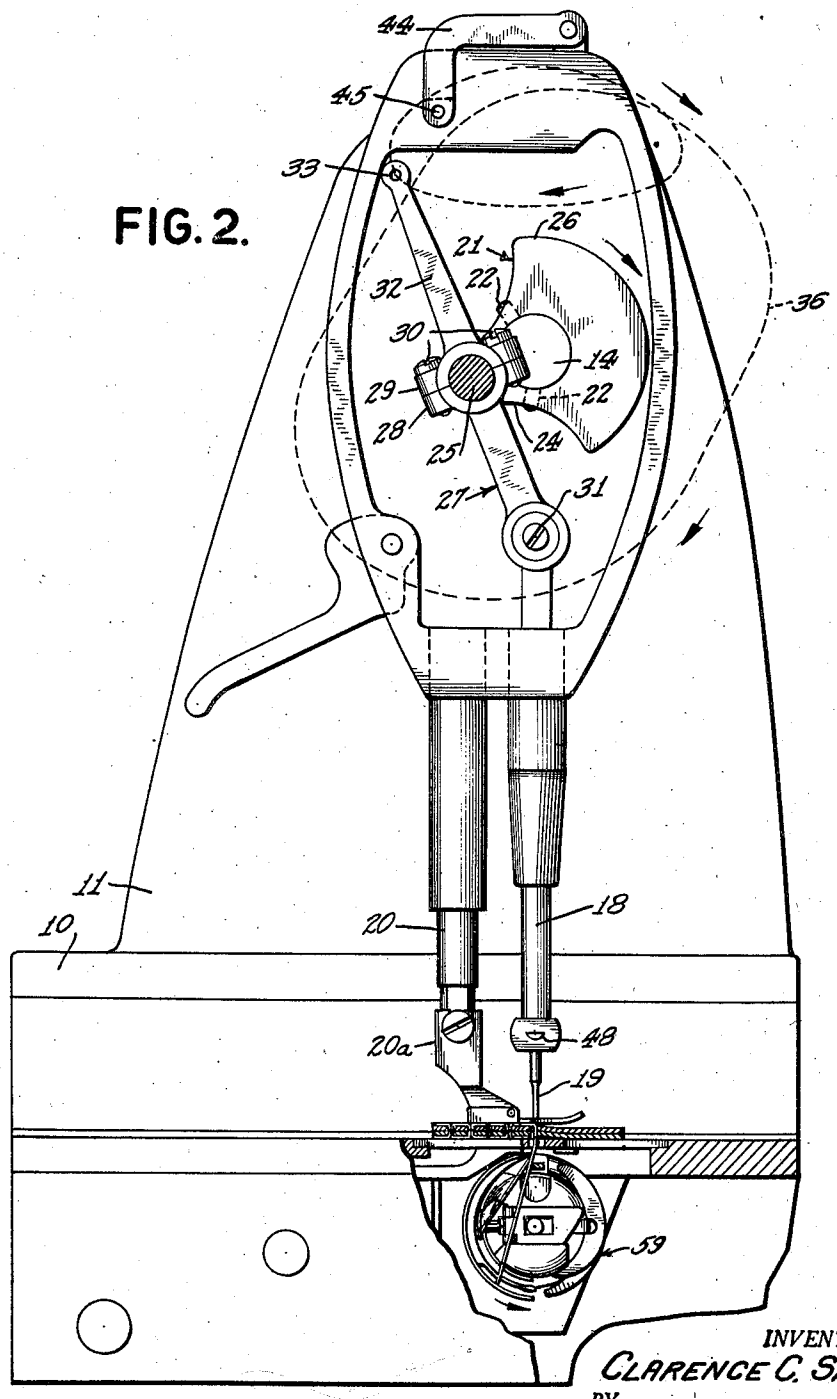
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TAKE-UP MEANS FOR SEWING MACHINES

Filed Oct. 12, 1944 4 Sheets-Sheet 2

FIG. 2.



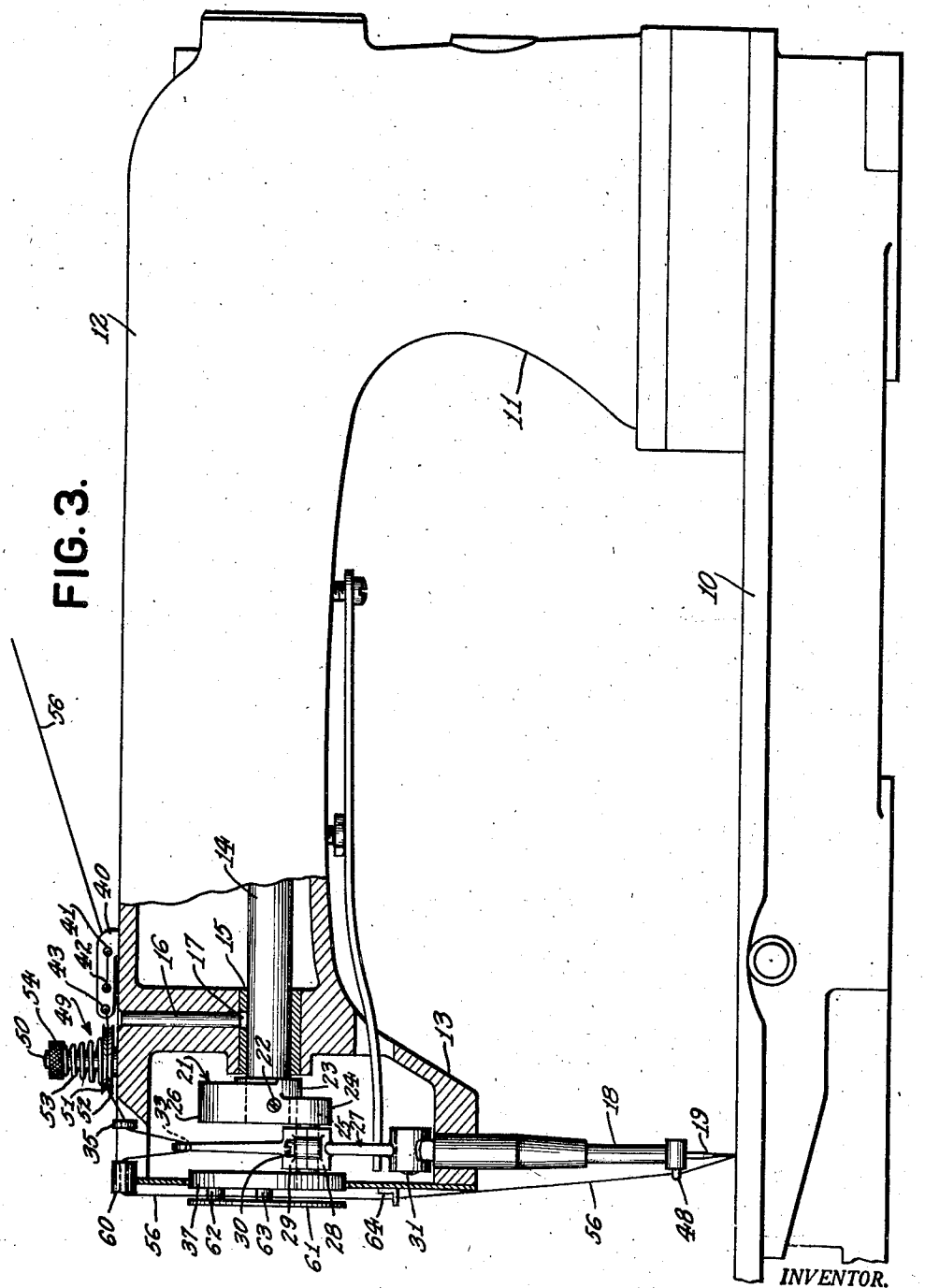
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TAKE-UP MEANS FOR SEWING MACHINES

Filed Oct. 12, 1944 4 Sheets-Sheet 3

FIG. 3.



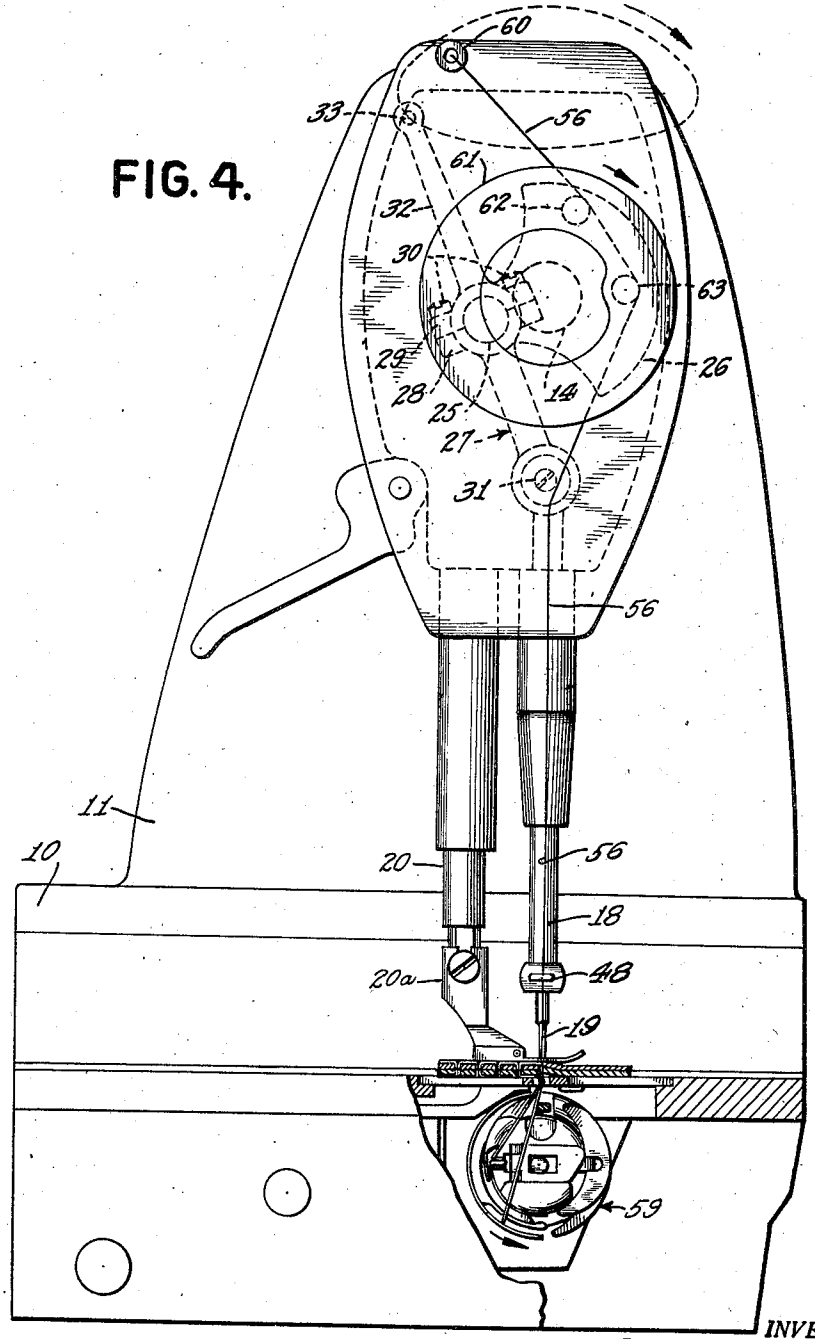
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TAKE-UP MEANS FOR SEWING MACHINES

Filed Oct. 12, 1944 4 Sheets-Sheet 4

FIG. 4.



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Patented Nov. 4, 1947

2,430,084

UNITED STATES PATENT OFFICE

2,430,084

TAKE-UP MEANS FOR SEWING MACHINES

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Application October 12, 1944, Serial No. 558,333

10 Claims. (Cl. 112—248)

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This invention relates to sewing machines and more particularly to improved take-up devices for the needle thread of such machines. It relates especially to lock-stitch sewing machines equipped with 2 to 1 rotary hooks.

The invention has for its primary object the provision of a simple arrangement involving few parts but presenting a plurality of take-up means which cooperate to handle the needle thread of a sewing machine in a positive and effective manner at all times.

One of the important objects of this invention is to provide take-up devices of the character indicated so constructed and arranged that their combined action on the thread of a sewing machine is additive and subtractive at different times, or differential in the course of each complete cycle of operation.

Another object of the invention is the provision of means of the character indicated wherein the moving parts are arranged in substantially balanced relation to thereby materially reduce or completely overcome objectionable vibrations during operation.

It is a further object of this invention to provide take-up means for sewing machines that is simple and compact in design, that is reasonable in first cost, that contains relatively few moving parts all of which have either a rotary or an orbital movement, and that is substantially trouble-free in operation.

With the view of attaining the aforementioned objects, there is provided a rotary needle operating shaft which simultaneously actuates a rotary take-up, that may either be in the nature of a cam or an orbitally movable element, and a take-up that is coupled to the needle bar of the sewing machine and that has a thread controlling portion which is movable about an orbital path. The preferred and recommended construction contemplates the rotary shaft extending into and terminating within a hollow needle head of a sewing machine. A crank having a crank pin and carrying a counter-weight is disposed within the needle head and attached to the end of the shaft so as to rotate therewith. The rotary take-up is mounted at the end of the crank pin. A pitman, or other suitable linkage, is rotatably coupled to the crank pin intermediate the rotary take-up and the end of the shaft and is pivotally connected to the upper end of the needle bar. A second take-up includes an arm formed integral with the pitman and which carries a thread engaging element movable about an orbital path upon rotation of

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the shaft. As will be apparent to persons skilled in the art from the detailed description that follows, taken together with the accompanying drawings, the combined effect of the rotary take-up and the second mentioned take-up on the needle thread is additive at certain times and subtractive or differential at other times during each complete revolution of the shaft.

The foregoing objects, as well as other objects, together with the advantages inherent in the practice of my instant invention, will be readily understood upon reference to the following description and annexed drawings which respectively describe and illustrate preferred apparatus embodying the invention, and wherein

Figure 1 is a view partly in front elevation and partly in vertical section through a sewing machine embodying the invention;

Figure 2 is an end view of the machine, as seen from the left in Figure 1, with certain parts removed;

Figures 3 and 4 are views corresponding to Figures 1 and 2, respectively, and illustrate a modified form of apparatus embodying the invention.

Referring now to the drawings, wherein like numerals designate corresponding parts throughout the several views, and more particularly to Figures 1 and 2, I have, for the purpose of illustration, shown the invention as applied to a sewing machine of the type disclosed in the Christensen et al. Patent No. 2,113,572, granted on April 12, 1938. This machine has a main frame comprising a supporting bed 10, the top of which serves as the cloth plate of the machine, a standard 11, an overhanging arm 12, and a hollow needle head 13. Disposed within overhanging arm 12 is a shaft 14 that is rotatably supported in a bearing sleeve 15 and that terminates in the hollow portion of needle head 13. Oil for lubricating the bearing 15 is supplied thereto by way of a vertical tube 16 in overhanging arm 12, accessible at the top thereof, and a port 17 in the bearing sleeve, with which the tube communicates. A reciprocatory needle bar 18 extends through and beyond the bottom of needle head 13 and carries a needle 19 at its lower end. Adjacent needle bar 18 is a vertically reciprocable presser bar 20 that may be of any desired construction and that is adapted to carry a presser foot 20a at its lower extremity.

A crank generally indicated by reference numeral 21 is preferably secured to the end of shaft 14 by a plurality of set screws 22 so as to rotate with the shaft. Crank 21 consists of a hub 23, an

arm 24 extending radially of the hub and formed either integral therewith or affixed thereto in any desired manner known to the art, a crank pin 25 projecting laterally of the arm and having its axis substantially parallel to the axis of shaft 14, and a counter-weight 26. A link, such as a pitman 27, includes a split yoke which embraces pin 25 and which consists of portions 28 and 29 that are united by means of screws 30. Suitable means, such as a screw 31, may be provided to obtain a pivotal connection between the lower end of pitman 27 and the upper end of needle bar 18, to thereby permit necessary angling between these elements during operation. An arm 32 is formed integral with or is otherwise secured to the pitman and is provided at its free end with a thread controlling eye 33. A pair of spaced eyelets 34 and 35, carried by the needle head, serves as thread guides. It will be observed that thread controlling eye 33 of arm 32 passes between eyelets 34 and 35 during each complete revolution of shaft 14. It will be further observed that said thread controlling eye 33 describes a substantially elliptical, orbital path during each complete revolution of shaft 14, as indicated in dotted lines (Figure 2).

A rotary take-up member 36, in the form of a cam, is secured to a disc 37 affixed to the end of crank pin 25 with the result that both the disc and the rotary take-up member 36 are rotatable about the axis of, and upon rotation of shaft 14. Rotary take-up 36 is indicated in dotted lines in Figure 2.

Attached in any suitable way to the top of needle head 13 is a first bracket 40 having a plurality of thread receiving openings 41, 42 and 43 and a second bracket 44 overhanging the end of the needle head and having a thread eyelet 45. It will be noted in Figure 1 that rotary take-up 36 passes between eyelets 34 and 45 in operation. An L-bracket 46 is attached to the lower end of the needle head and is provided with a thread guide opening 47. A conventional type of thread guide 48 is carried at the lower end of the needle bar. Intermediate bracket 40 and eyelet 35 is a thread tensioning device 49 including a horizontal post 50, a pair of tensioning discs, one of which is indicated at 51, a compression spring 53 concentric with post 50, an element 54 threadedly connected to the end of the post for adjustably varying the force exerted by the compression spring upon tensioning disc 51, and a check wire 55. This may, for example, be of the construction disclosed in the application of Christensen et al. S. N. 369,248, filed December 9, 1940, and which has matured into Patent 2,394,365, February 5, 1946. Thread 56 from an appropriate source of supply is passed through openings 41, 42 and 43 of bracket 40 in the order named, is then passed between the discs of the tensioning device 49, then through eyelet 35, thread control eye 33, and eyelet 34, thence over the peripheral edge of rotary take-up 36, and is then successively passed through eyelet 45, guide opening 47, guide 48 and lastly through the needle eye (not shown).

By virtue of the construction herein illustrated and described, it will be clear that for each revolution of shaft 14, complete reciprocatory movement will be imparted to needle bar 18 and needle 19, and that simultaneously therewith complete rotation is imparted to rotary take-up 36 and an orbital movement is given to thread controlling eyelet 33 about the path indicated by the broken line in Figure 2, the direction of movement

of rotary take-up 36 and thread controlling eyelet 33 being clockwise, as indicated by the respective arrows in Figure 2. It will be apparent to persons skilled in the art from an examination of Figures 1 and 2 that the combined effect of the rotary take-up 36 and the take-up means including thread controlling opening 33 is additive at times and subtractive or differential at other times during each revolution of shaft 14. By appropriately forming the cam 36, the combined take-up action on the needle thread may be so regulated as to impart to this thread a desired slack at certain points in the cycle and a desired tension at other points. In the use of the invention in connection with lock-stitch mechanism involving a 2 to 1 rotary hook, such as that generally indicated by reference numeral 59, the combined action of the cam 36 and the thread controlling eye 33 may be such as to quickly yield the thread required to carry the loop around the rotary hook on one of its revolutions and to quickly take up this loop after it has passed across the vertical diameter of the rotary hook. The arrangement is such, moreover, that no excessive amount of slack will be provided at any point in the cycle of the machine so that danger of entanglement of the needle thread with rapidly moving parts is eliminated.

The modification of the invention illustrated in Figures 3 and 4 is generally similar to Figures 1 and 2. In Figures 3 and 4, I disclose an elongated eyelet 60 which takes the place and serves the function of eyelets 34 and 45 of Figure 1. Also, the thread tensioning device 49 has its post 50 disposed substantially vertically instead of substantially horizontally as shown in Figure 1. Moreover, in Figure 3 there are illustrated both of the thread tensioning discs, namely, discs 51 and 52. It will be understood that two such discs are provided in the Figure 1 construction also.

In Figures 3 and 4 the rotary take-up comprises parallel discs 37 and 61 that are spaced apart and joined together by take-up elements or pins 62 and 63, each of which moves in an orbital path upon rotation of shaft 14, the disc 37 being rigidly connected with the crank 25 and the two discs being co-axial with shaft 14. An arm 32 having a thread engaging eyelet 33, similar in construction and operation to the corresponding parts of Figures 1 and 2, is also provided for giving to the needle thread take-up and yielding actions which combine sometimes additively and sometimes subtractively with the action of pins 62 and 63. After passing through the eyelet 33, the thread is passed through guide 60 and then through guide 64 down to the needle. The portion of the thread between guides 60 and 64 is carried across the path of the pins 62 and 63 and is subjected to the take-up action thereof. It will hence be observed that the principal difference between the structures of Figures 1 and 2 and Figures 3 and 4 resides in the different types of rotary take-ups illustrated in the respective pairs of figures. In Figures 1 and 2 the rotary take-up comprises a cam, while in Figures 3 and 4 the rotary take-up comprises one or more pins 62 and 63 that move about an orbital path upon rotation of shaft 14.

From the foregoing it is believed that the construction, operation and advantages of the instant invention will be readily comprehended by persons skilled in the art. It is to be understood, however, that various changes in the construction as herein illustrated and described may be

resorted to without departing from the spirit of this invention or the scope of the appended claims.

I claim:

1. In a sewing machine, a reciprocatory needle bar having a thread carrying needle, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary takeup for the needle thread connected to the crank and rotatable with the shaft, means coupled to the crank and the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that engages the needle thread at all times in the course of normal operation, that is connected to said first mentioned means and that is movable about an orbital path upon rotation of the shaft.

2. In a sewing machine, a reciprocatory needle bar having a thread carrying needle, a rotary shaft, a rotary take-up for the needle thread carried by the shaft and rotatable therewith, means including a link pivotally connected to the needle bar and eccentrically coupled to the shaft for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that is connected to said first mentioned means and that is movable about an orbital path upon rotation of the shaft, a portion of said member engaging the needle thread at all times and in a region to the side of the axis of the shaft opposite the pivotal connection of the link with the needle bar.

3. In a sewing machine, a reciprocatory needle bar having a thread carrying needle, a rotary shaft, means coupled to the needle bar and the shaft for imparting reciprocatory movement to the needle bar upon rotation of the shaft, a rotary take-up for the needle thread connected to said means and spaced from and rotatable with the shaft, and thread take-up means including a thread-controlling member that is disposed between the shaft and the rotary take-up, that is connected to said first mentioned means, and that is movable about an orbital path upon rotation of the shaft, said member engaging the needle thread at all times in the course of normal operation.

4. In a sewing machine, a reciprocatory needle bar having a thread carrying needle, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread connected to the crank and spaced from and rotatable with the shaft, means comprising a link pivotally coupled to the crank and to the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that is disposed between the shaft and the rotary take-up, that is rigidly connected to said first mentioned means, and that is movable about an orbital path upon rotation of the shaft, said member engaging the needle thread at all times in the course of normal operation.

5. In a sewing machine, a reciprocatory needle bar having a thread carrying needle at its lower end, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread connected to the crank and spaced from and rotatable with the shaft, link means coupled to the crank intermediate the shaft and the rotary take-up and pivotally connected to the upper end of the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that is rigidly connected to the link means and that is movable about an orbital path upon rotation of the shaft, said member engaging the needle thread at all times in the course of normal operation.

6. In a sewing machine, a reciprocatory needle bar having a thread carrying needle at its lower end, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread connected to the crank and spaced from and rotatable with the shaft, a pitman coupled to the crank intermediate the shaft and the rotary take-up and pivotally connected to the upper end of the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member, constituting an extension of the pitman, that is disposed between the rotary take-up and the shaft, and that is movable about an orbital path upon rotation of the shaft.

7. In a sewing machine, a reciprocatory needle bar having a thread carrying needle at its lower end, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread comprising a cam connected to the crank and spaced from and rotatable with the shaft, a pitman coupled to the crank intermediate the shaft and the rotary take-up and pivotally connected to the upper end of the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that is rigidly connected to the pitman, that is disposed between the rotary take-up and the shaft, and that is movable about an orbital path upon rotation of the shaft.

8. In a sewing machine, a reciprocatory needle bar having a thread carrying needle at its lower end, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread comprising at least one orbitally movable element connected to the crank and spaced from and rotatable with the shaft, a pitman coupled to the crank intermediate the shaft and the rotary take-up and pivotally connected to the upper end of the needle bar for imparting reciprocatory movement to the needle bar upon rotation of the shaft, and thread take-up means including a thread-controlling member that is rigidly connected to the pitman, that is disposed between the rotary take-up and the shaft, and that is movable about an orbital path upon rotation of the shaft.

9. In a lock-stitch sewing machine having a reciprocatory needle bar carrying a needle at its lower end and having a cooperating 2 to 1 rotary hook and a needle operating shaft, needle thread take-up means comprising a rotary member driven by said shaft and a complementary take-up member driven by said shaft through an elliptical path, said complementary take-up member engaging the needle thread at all times under normal operating conditions.

10. In a sewing machine, a reciprocatory needle bar having a thread carrying needle, a rotary shaft, a crank connected to the shaft and rotatable therewith, a rotary take-up for the needle thread connected to the crank and spaced from and rotatable with the shaft, means coupled to the crank and to the needle bar for imparting reciprocatory movement to the needle bar upon

rotation of the shaft, and thread take-up means including a thread-controlling member that is disposed between the shaft and the rotary take-up, that is connected to said first mentioned means, and that is movable about an orbital path upon rotation of the shaft, said member engaging the needle thread at all times in the course of normal operation.

CLARENCE C. SMITH.

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