Nov. 10, 1959 T. D. TAYLOR 2,911,930

SEWING MACHINE

Filed May 22, 1957 6 Sheets-Sheet 1

FIG. 1

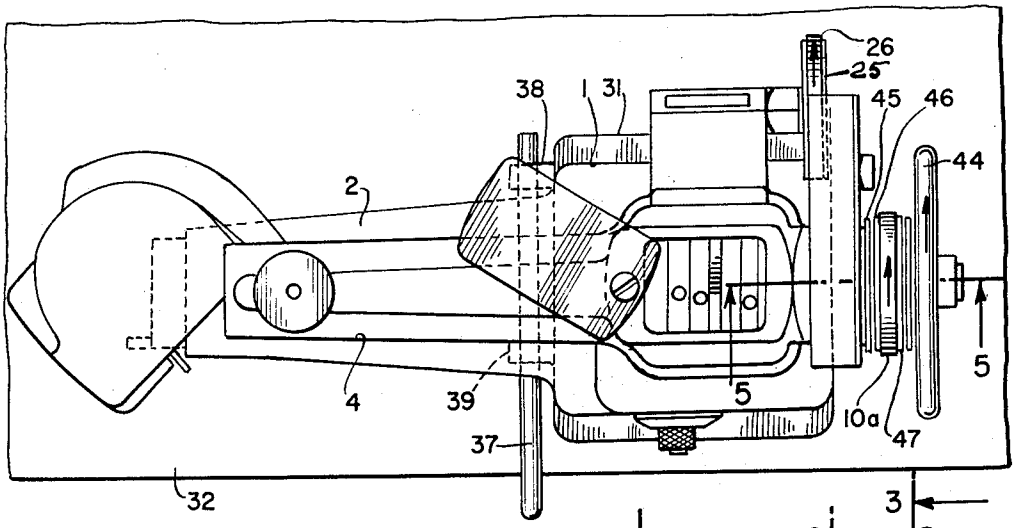
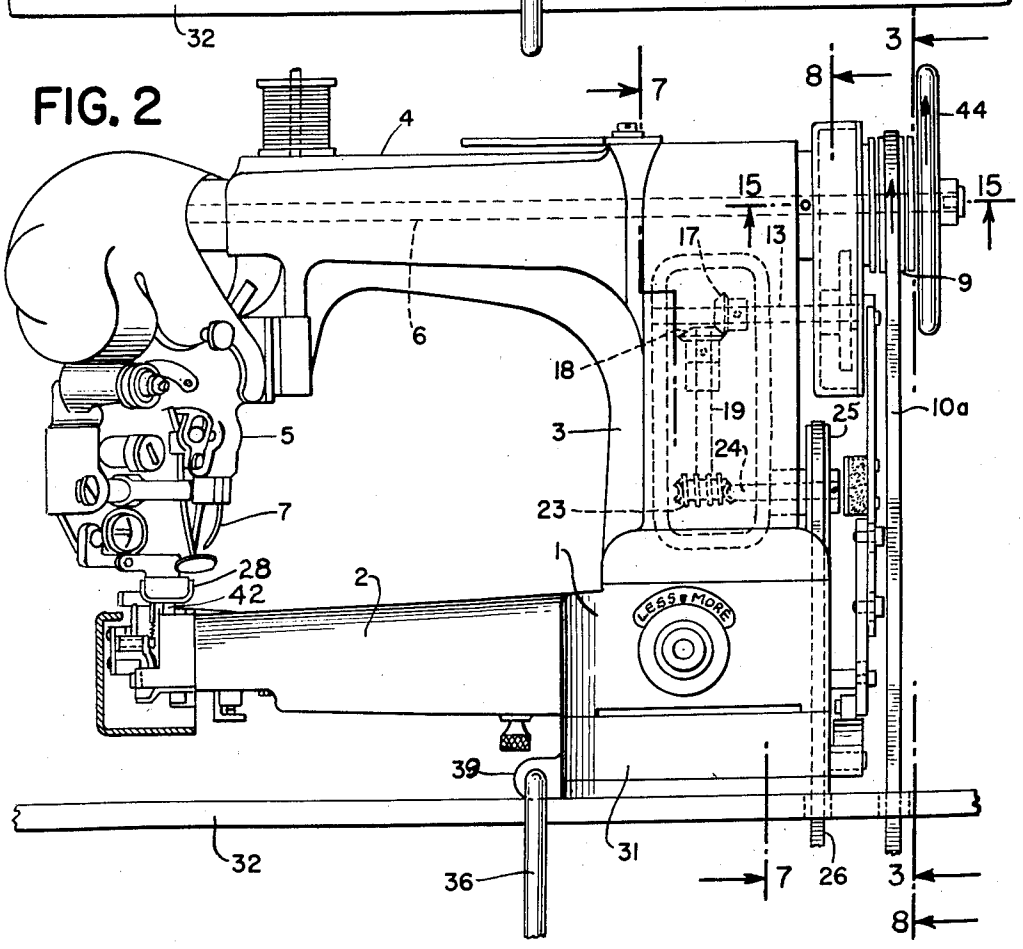


FIG. 2



Nov. 10, 1959 T. D. TAYLOR 2,911,930

SEWING MACHINE

Filed May 22, 1957 6 Sheets-Sheet 2

FIG.3

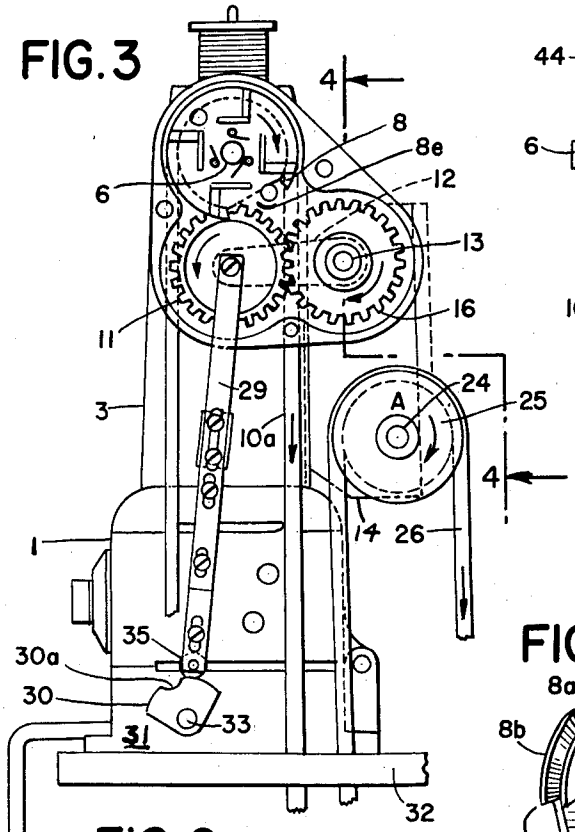


FIG.4

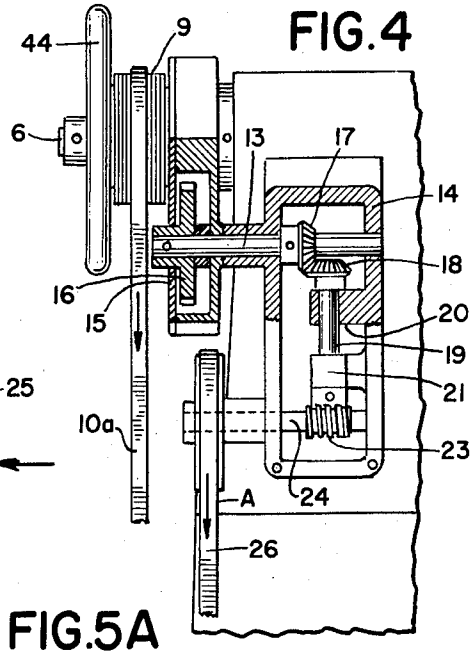


FIG.5A

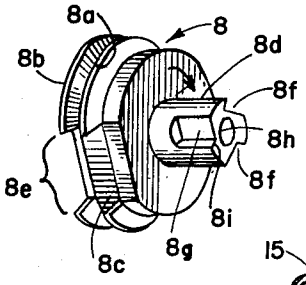


FIG.5

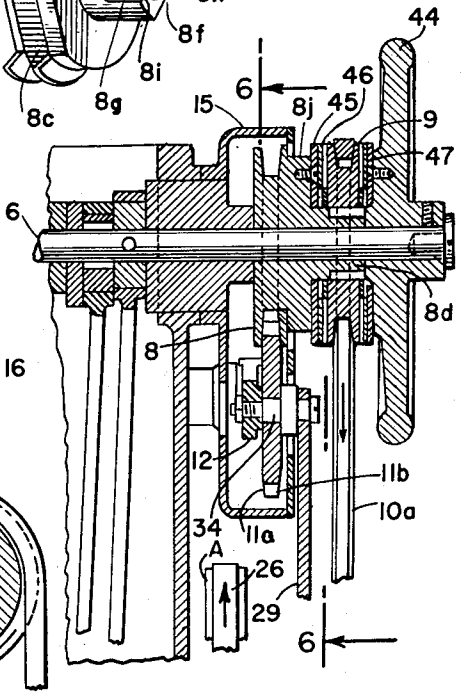
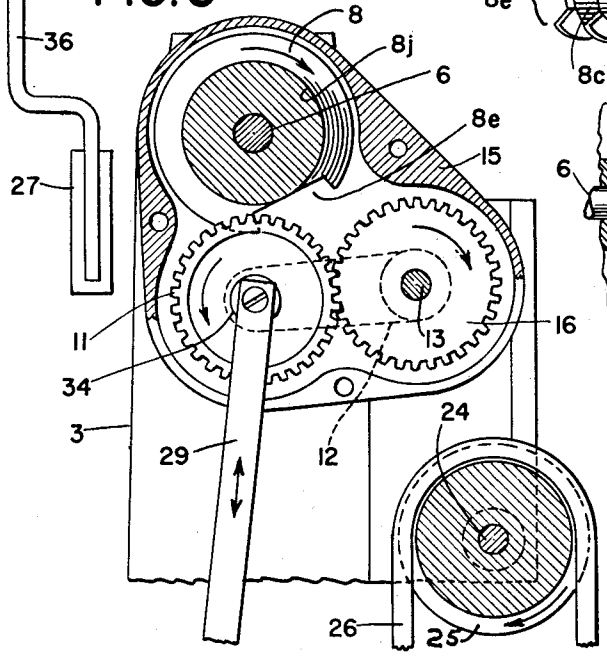


FIG.6

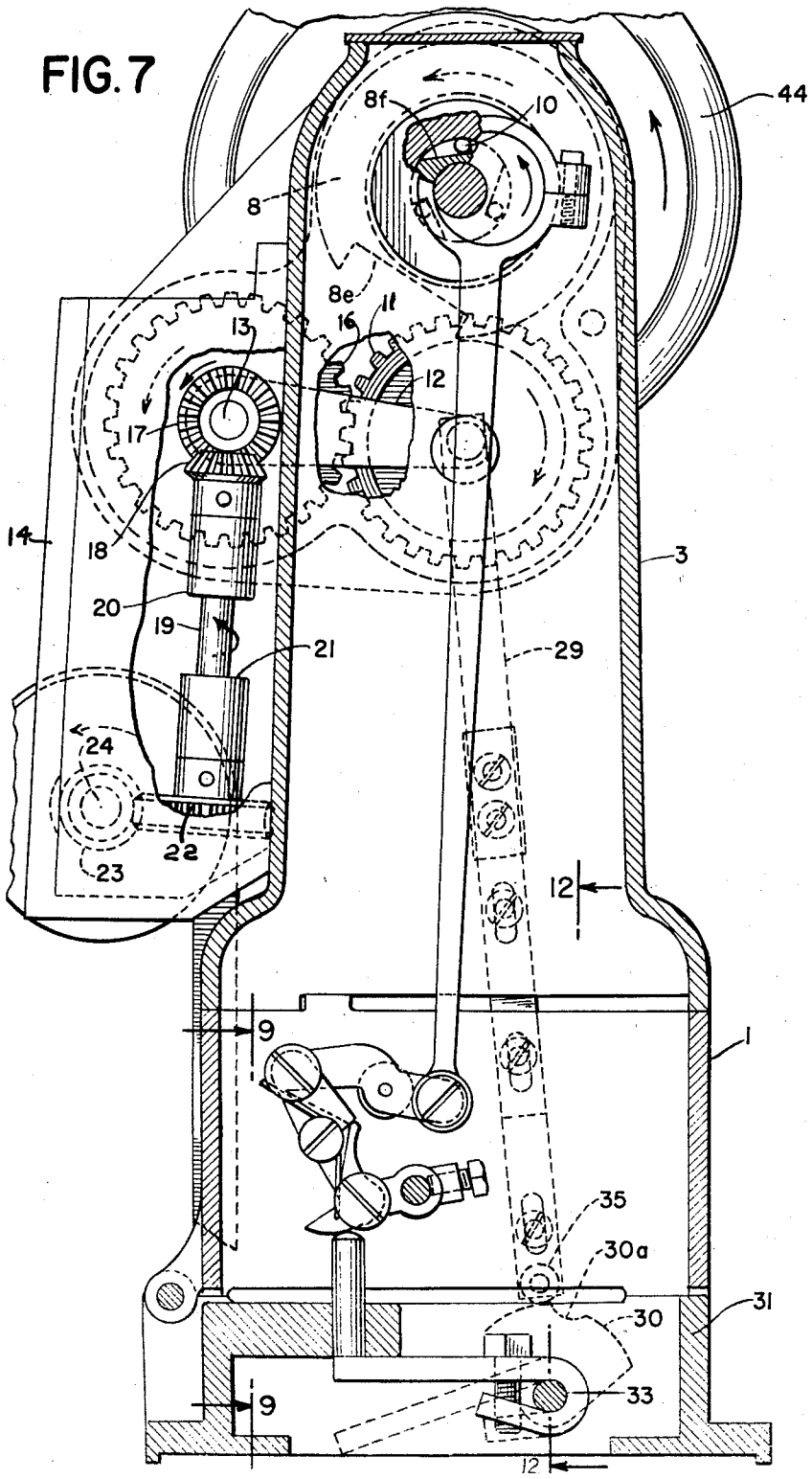


Nov. 10, 1959 T. D. TAYLOR 2,911,930

SEWING MACHINE

Filed May 22, 1957 6 Sheets-Sheet 3

FIG. 7



Nov. 10, 1959 T. D. TAYLOR 2,911,930

SEWING MACHINE

Filed May 22, 1957 6 Sheets-Sheet 4

FIG. 8

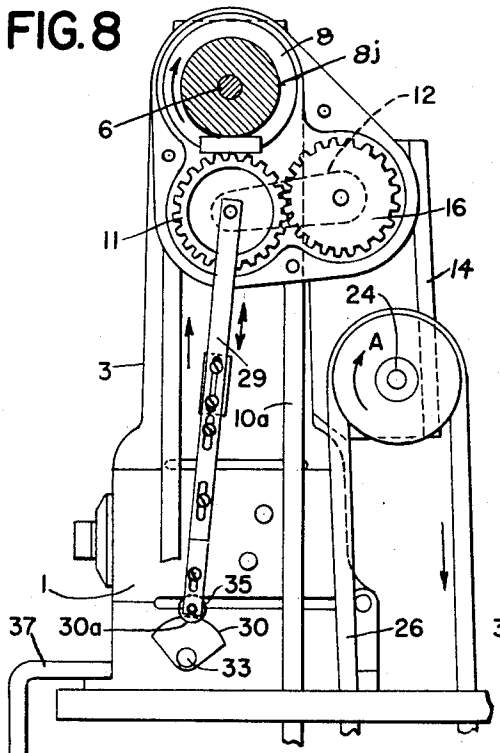


FIG. 9

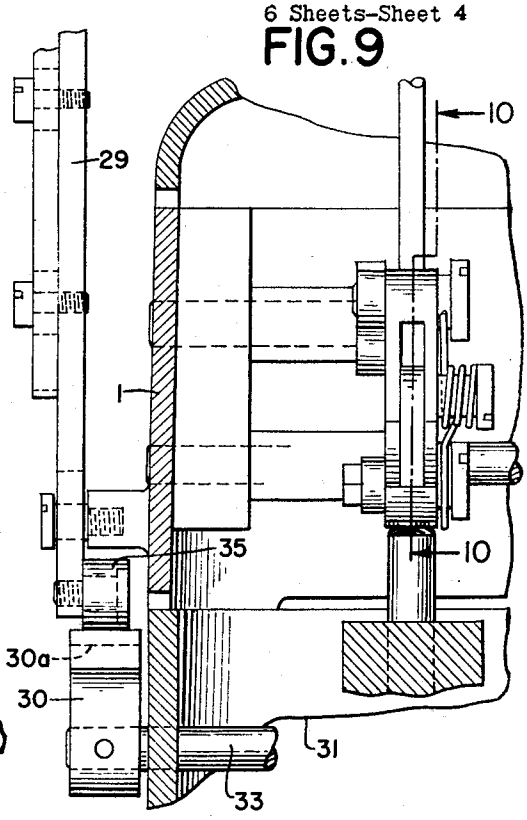


FIG. 10

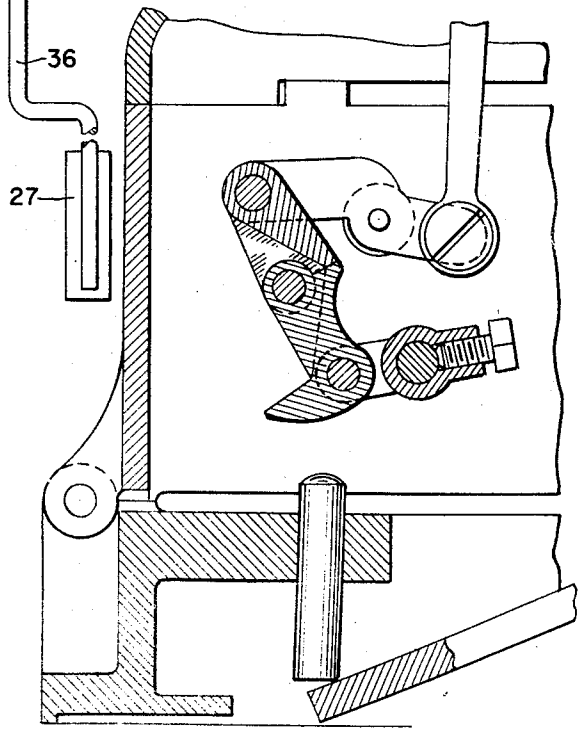


FIG. 11

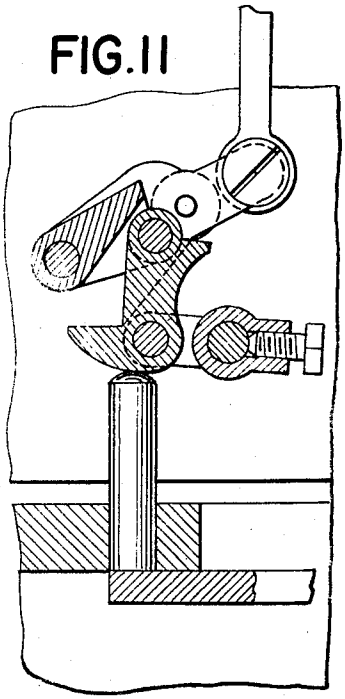


FIG. 12

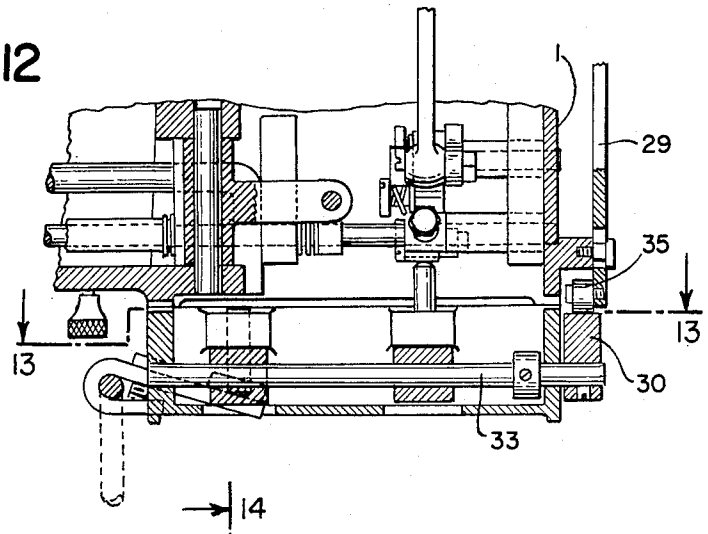


FIG. 13

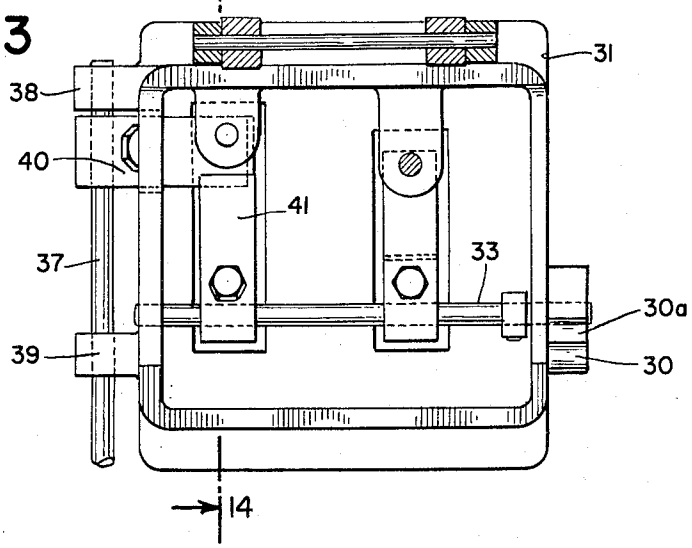
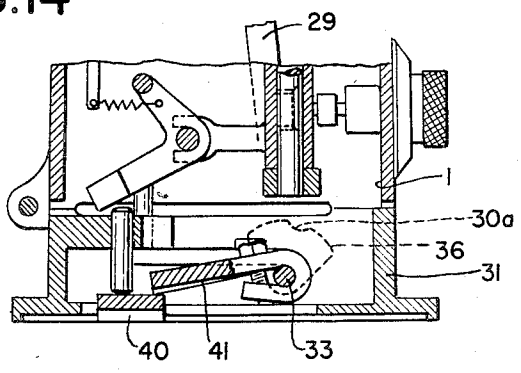


FIG. 14

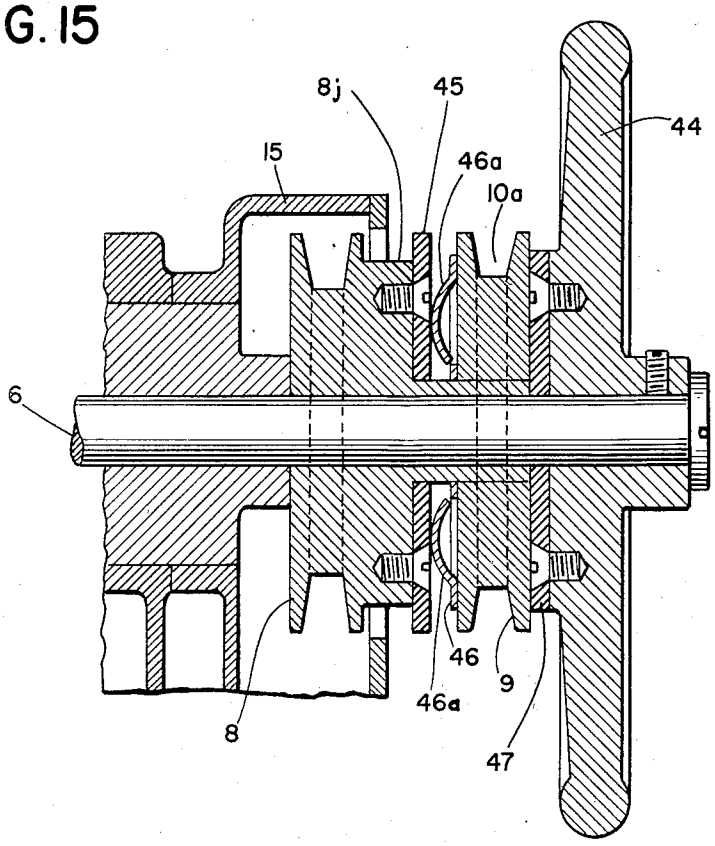


Nov. 10, 1959 T. D. TAYLOR 2,911,930

SEWING MACHINE

Filed May 22, 1957 6 Sheets-Sheet 6

FIG. 15



United States Patent Office 2,911,930 Patented Nov. 10, 1959

2,911,930

SEWING MACHINE

Thomas D. Taylor, University City, Mo., assignor, by mesne assignments, to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application May 22, 1957, Serial No. 660,781

4 Claims. (Cl. 112—219)

The invention herein disclosed relates to a mechanism for automatically positioning the needle of a sewing machine to a predetermined position. More particularly, the invention relates to a needle-positioning mechanism that brings the needle to a predetermined position at which it is held for manipulation of the material.

When a sewing machine is stopped, as, for example, by disconnecting the power drives, the needle may be left in various positions, two of which are important, namely, the penetrating, i.e. the position in which the needle point is past the work support, and the retracted or withdrawn position. For the removal and insertion of work, the needle must be retracted. If this be not the position of the needle, the operator must carefully manipulate the hand wheel to bring the needle to the retracted position before releasing the work-clamping means and removing or inserting material. Such manual manipulation of the hand wheel becomes important in commercial operations. Also, in certain sewing operations, where the material is turned repeatedly, it may be desirable to have the needle in penetrating position so that the material is turned about the needle.

While various arrangements have heretofore been suggested for positioning the needle of a sewing machine, it appears that none has, for one reason or another been entirely satisfactory. They are either complicated, expensive or require considerable maintenance.

By the invention herein disclosed, there is provided a needle-positioning mechanism that is applicable to any type or kind of sewing machine, that is comparatively inexpensive; that is of rugged construction; and that is effective and dependable in operation. In accordance with one particular embodiment of the invention, there is provided a needle-positioning mechanism which includes releasably engageable driving and driven elements. The driven element is operatively connected to effect movement of the needle of the sewing machine with which the mechanism is associated. One of these elements is such that the driving relation is interrupted when the needle is properly positioned even though the elements are in engageable relation.

From the following, wherein there is described one particular embodiment of the invention which embodiment is illustrated in the accompanying drawings, a clearer understanding of the invention may be had.

The drawings include:

Fig. 1, which is a top plan view of a blind-stitch, lockstitch sewing machine, with a cover plate in the open position, the machine having the needle-positioning mechanism of this invention associated therewith;

Fig. 2, which is a side, front elevation of the same showing certain parts of the needle-positioning mechanism in broken lines;

Fig. 3, which is an end elevation of the same with the hand wheel removed, the view being taken on line 3—3 of Fig. 2,

Fig. 4, which is a fragmentary view, partly in section

and partly in rear elevation of the right portion of the machine, taken on the line 4—4 of Fig. 3,

Fig. 5, which is a fragmentary, sectional elevation taken on the line 5—5 of Fig. 1,

Fig. 5a, which is an isometric view of the driven element of the needle positioning mechanism;

Fig. 6, which is a fragmentary sectional view taken on the line 6—6 of Fig. 5;

Fig. 7, which is a sectional view taken on the irregular line 7—7 of Fig. 2;

Fig. 8, which is a sectional view taken on the irregular line 8—8 of Fig. 2;

Fig. 9, which is an enlarged, fragmentary section taken on the line 9—9 of Fig. 7,

Fig. 10, which is a fragmentary section taken on the line 10—10 of Fig. 9;

Fig. 11, which is a fragmentary section, similar to Fig. 10, showing a toggle connection broken;

Fig. 12, which is a section taken on the line 12—12 of Fig. 7;

Fig. 13, which is a plan of the base of the machine, partly in section, taken on the line 13—13 of Fig. 12;

Fig. 14, which is a vertical section through the base taken on the line 14—14 of Fig. 13; and

Fig. 15, which is a fragmentary section taken on the line 15—15 of Fig. 2.

In general a sewing machine includes a main shaft which is connected through manually controllable means to a source of power, such, for example, as an electric motor, drive shaft, etc. Normally, the needle, loop taking mechanism and feed are actuated from the main shaft. When the machine is disconnected from the source of power, or the source be interrupted to stop the machine, the needle may be in various positions from extreme penetration to complete withdrawal. The mechanism illustrated and described below, brings the needle to the withdrawn or retracted position through actuation of the main shaft to a definite position.

While a blind-stitch, lockstitch sewing machine is illustrated in the drawing, it will be apparent, as the description below indicates, that the needle-positioning mechanism of this invention is applicable to any type or kind of machine. Furthermore, it will be apparent, that the needle-positioning mechanism may be made as an attachment that may be applied to existing machines. The primary objective is to provide a needle-positioning mechanism which effects actuation of the needle actuating means to present the needle in a predetermined position.

The sewing machine illustrated in the drawing comprises a frame that includes a base 1, a horizontally extending work supporting arm 2, an upstanding column 3, an arm 4 extending horizontally from the upper end of the column 3, and a head 5 depending from the free end of the arm 4, towards the work supporting arm. Extending through and journaled in the arm 4, there is a main shaft 6 of the sewing machine. At the free end of the arm 4 and in the head 5, the shaft 6 is connected through needle-actuating mechanism (not shown) to the needle 7. In a manner, well known in the art, the main shaft 6 is connected through positive linkage to effect, upon rotation of the main shaft 6, reciprocation of the needle 7. Consequently for any given position of the shaft 6, the needle 7 assumes a definite position.

At the opposite end of the frame, the shaft 6 extends through the column 3. On the extended end of the shaft, adjacent the column, there is secured on the shaft, a driven element designated generally by the numeral 8. This element includes a circumferentially grooved section 8a having an engageable portion consisting of sloping or diverging side walls 8b and 8c, comparable to the

commonly known V-shape pulley, and an extending hub 8*d*. The engageable portion of the section 8*a* is interrupted over a part thereof as indicated at 8*e*, i.e. the side walls 8*b* and 8*c* are cut away, as clearly shown in Figs. 5A and 7.

The hub 8*d* of the element 8 has three longitudinal grooves 8*f* (Fig. 5A) therein shaped as illustrated, each groove having a tangential surface 8*g*, tangential to a cylinder slightly greater than the bore 8*h*, terminating in a radial shoulder 8*i*. So formed, the hub 8*d* forms one part of a one way clutch.

On the hub 8*d* of the element 8, there is mounted a driving pulley 9. The pulley 9 forms the other part of the one way clutch. Inserted between the hub 8*d* and the pulley 9 and within the grooves 8*f*, there are rollers 10 (Fig. 7). When the pulley 9 is driven in one direction, i.e. the normal direction for operation of the sewing machine, the rollers become wedged in the grooves and the shaft 6 is driven through the element 8. When, the pulley is stopped, the element 8 may be rotated, in the same direction, independently of the pulley. The pulley 9 is driven through a belt 10*a* (Fig. 2) that is connected, through a manually controlled clutch (not shown), to a power source, such, for example, as an electric motor or a power driven shaft.

For positioning the needle 7, when the pulley 9 is stopped, there is provided needle positioning mechanism which includes the element 8 and a driving element 11 releasably engageable with the engageable portion of the element 8. In the particular embodiment illustrated in the drawings, the driving element 11 consists of a spur gear having complementary, sloping, converging, side walls 11*a* and 11*b* receivable between and engageable with the diverging side walls 8*b* and 8*c* of the element 8. The driving element 11 is rotatably mounted on the end of a lever 12 (Fig. 7) that is pivoted on a shaft 13 journaled in a housing 14 (Fig. 4) mounted on the side of the column 3.

Secured on the extended end of the shaft 13, and within a casing 15, into which the shaft 13 extends, there is a gear 16 which meshes with the gear teeth of element 11. Within the housing 14, a bevel gear 17 is secured to the shaft 13 and meshes with a bevel gear 18 secured on the end of a vertical shaft 19 journaled in spaced, bearing brackets 20 and 21 extending from the inner surface of a wall of the housing 14. On the lower end of the shaft 19, there is secured a worm gear 22 which meshes with a worm 23 secured on a shaft 24 journaled in and extending through the housing 14. A pulley 25 is secured on the extended end of the shaft 24. Through a belt 26, the shaft 24 is continuously driven, independently of the belt 10*a*, either from the same power source that drives the sewing machine or from an independent power source. Thus, through the mechanism described above, the driving element 11 is continuously rotated.

The lever 12 is actuated to bring the driving element 11 into engageable, driving relation with the driven element 8, in the illustrated embodiment of the invention, upon the actuation of a knee press 27 (Figs. 3 and 8) which, upon being pressed, releases or retracts the work support, which work support is designated generally by the numeral 28. This actuation of the lever 12 is effected through a link 29 and a cam 30 that is moved upon actuation of the knee press 27.

The sewing machine is mounted on a hollow, rectangular casting 31, which is secured on a table 32. Extending through and journaled in the casting 31, there is a shaft 33. On the extended end of the shaft 33, the cam 30 is mounted on and secured to the shaft. The surface of the cam 30, which is in the shape of a sector, has a depression 30*a* therein intermediate the ends thereof.

At one end, the upper end, the link 29 is pivotally connected to the lever 12, on the pivot 34 which is secured to the lever 12 and on which pivot the driving element 11 is rotatably mounted. At the opposite or lower end, there is attached to the lever 29, a cam follower 35 that engages the cam 30. During operation of the sewing machine, the cam follower 35 rests in the depression 30*a* of the cam 30, and the driving element 11 is disengaged from the driven element 8. Upon movement of the shaft 33 and, in consequence the cam 30, the link 29 is actuated to move the lever 12 so that the element 11 is moved into driving engagement with the element 8.

As previously indicated, movement of the shaft 33 is effected by the knee press 27. To this end, the knee press 27 is secured on a rod 36 which is a part of and extends perpendicular to a shaft 37 (Fig. 8). The shaft 37 is journaled in bearing lugs 38 and 39 (Fig. 1) extending from the exterior of one side of the casting 31. On the shaft 37, between the bearing lugs 38 and 39, there is secured a lever 40 (Fig. 13). The end of a lever 41, secured to the shaft 33, rests upon the lever 40. Thus, when the knee press 27 is moved, shaft 37 is moved and through the levers 40 and 41, shaft 33 and cam 30, secured thereon, are moved.

The knee press 27 is primarily for the purpose of retracting the work support and node former designated generally by the numeral 42. Such is common and well known in the art. This is to say that in commercial machines, a knee-press is used to release the presser foot, plattens or work support. In a blind-stitch, lock-stitch machine, such as that illustrated, the work support and node-former are actuated by the knee press. As work-support retracting mechanism is well known in the art, and as the particular mechanism disclosed, while novel, does not constitute a part of the invention herein disclosed, it seems unnecessary to further describe the particular mechanism.

As it is common in the art to actuate a knee press to release and insert material, the needle-positioning mechanism, in the embodiment of the invention illustrated in the accompanying drawings is associated therewith. At the end of a sewing operation, the operator disconnects the sewing machine from the power. Then, the operator actuates the knee press 27 to retract the work support so that material may be released or inserted. On actuation of the knee press, the cam 30 is actuated, the link 29 raised and the driving element 11 is engaged, in driving relation with the driven element 8. The main shaft is rotated until the interrupted section 8*e* of the driven element comes into position. So positioned, even when the driving element 11 is in engageable position, no further movement of the shaft 6 can be effected. The interrupted section 8*e* of the driven element 8 is, in the illustrated embodiment of the invention, such that, as related to the main shaft 6, the needle 7 is in the retracted (Fig. 2) poistion.

By poistioning the driven element 8 about the shaft 6 through an angle of one hundred and eighty degrees from that shown, the needle may be positioned in the penetrating position when the knee press is actuated. In certain operations this is important, particularly with sewing machines of the common type having a vertically reciprocating needle. On such machines, in certain operations, it is desirable to turn the cloth being sewn about the needle as a pivot. To do this, the work support is retracted and upon retraction, the needle should be in penetrating position.

In order to avoid over-riding of the main shaft when the desired needle position is reached, a drag mechanism is mounted on the main shaft 6 between the hand wheel 44 and the end surface of the reduced axially extending section 8*j* of the driven element 8. On the end surface of the extending section 8*j*, there is secured a disk 45 (Figs. 5 and 15), preferably of brass, and on the adjacent side of the pulley 9 there is secured an

element 46 which consists of a spring steel disk cut and shaped to provide resilient tangs 46*a*, four in number, that bulge axially and engage the disk 45 secured to the driven element 8. A brass thrust bearing disk 47 is secured to the hand wheel 44 and bears against the pulley 9. In assembly, the hand wheel 44 is pressed, axially of the shaft and secured thereto so that the resilient tangs 46*a* of the element 46 are flexed and bear against the disk 45 with the pressure due to the flexing thereof.

When the machine is disconnected, by the operator, from the power source, the pulley 9 is held stationary in the ordinary manner. On actuation of the needle positioning mechanism, the tangs 46*a*, being held stationary with the pulley 9, drag on the disk 45 rotating with the driven element 8 and shaft 6. Sufficient friction is applied to prevent over-riding of the shaft 6 to the extent of definitely preventing the driven element 8 from passing this disengaging portion 8*e* and again engaging the driving element.

From the foregoing description of the particular embodiment of the invention illustrated in the drawings it will be apparent to those skilled in the art that by this invention there is provided an inexpensive, dependable, needle-positioning mechanism that may be incorporated in sewing machines, and that may be provided as an attachment to existing sewing machines.

It will be obvious that various changes and modifications may be made to and in the mechanism illustrated in the accompanying drawings and described in detail above within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. A needle-positioning mechanism for a sewing machine having a main shaft, needle-actuating means operatively connected to the main shaft, means for driving the main shaft, and manually operable means for effecting a driving connection with and disconnecting the main shaft from said means for driving the main shaft, which needle-positioning mechanism includes releasably engaging driving and driven elements, means for driving the needle-poistioning mechanism, one of said releasably engaging elements being operatively connected to the main shaft of the sewing machine to effect rotation of the shaft and the other of said elements being operatively connected to the driving means for the needle-positioning mechanism, and one of said engageable driving and driven elements having the engaging portion interrupted to effect a discontinuance of the driving connection while the elements are in engageable position, such interrupted portion being so positioned in relation to the main shaft of the sewing machine that disconnection is effected when the needle-actuating means is in a definite, predetermined position, and means for effecting a driving relation between the driving and driven elements of the needle-positioning mechanism upon actuation of said manually operable means to disconnect the main shaft of the sewing machine from said means for driving the main shaft.

2. A needle-positioning mechanism for a sewing machine having a main shaft, needle-actuating means operatively connected to the main shaft, means for driving the main shaft, and manually operable means for effecting a driving connection with and disconnecting the main shaft from said means for driving the main shaft, which needle-positioning mechanism includes releasably engaging driving and driven elements, the driven element being operatively connected to the main shaft of the sewing machine, means for driving the said driving element, one of said releasably engaging driving and driven elements having the engaging portion interrupted to effect a discontinuance of the driving connection while the elements are in engageable position, such interrupted portion being so positioned in relation to the main shaft of the sewing machine that disconnection is effected when the needle-actuating means is in a definite, predetermined position, and means for effecting a driving relation between the driving and driven elements of the needle-positioning mechanism upon actuation of said manually operable means to disconnect the main shaft of the sewing machine from said means for driving the main shaft.

3. A needle-positioning mechanism for a sewing machine having a main shaft, needle-actuating means operatively connected to the main shaft for actuation in accordance with the movement of the main shaft, means for driving the main shaft and manually operable means for effecting a driving connection with and disconnecting the main shaft from said means for driving the main shaft, which needle-positioning mechanism includes power operated driving means, releasably engageable driving and driven elements, the driven element being operatively connected to the main shaft of the sewing machine for effecting rotation thereof and the driving element being operatively connected to said power operated driving means, one of said driving and driven elements having the engaging portion interrupted to effect a discontinuance of the driving connection while the elements are in engageable position, such interrupted portion being so positioned in relation to the main shaft of the sewing machine that disconnection is effected when the needle-actuating means is in a definite, predetermined position, and means for effecting a driving relation between the driving and driven elements of the needle-positioning mechanism upon actuation of said manually operable means to disconnect the main shaft of the sewing machine from said means for driving the main shaft.

4. A needle-positioning mechanism for a sewing machine having a main shaft, needle-actuating means operatively connected to the main shaft, means for driving the main shaft and manually operable means for effecting a driving connection with and disconnecting the main shaft from said means for driving the main shaft which needle-positioning mechanism includes a power operated driving means, releasably engageable driving and driven elements, the driven element being operatively connected to the main shaft of the sewing machine for effecting rotation thereof and the driving element being operatively connected to said power operated driving means, one of said driving and driven elements having the engaging portion interrupted to effect a discontinuance of the driving connection while the elements are in engageable position, such interrupted portion being so positioned in relation to the main shaft of the sewing machine that disconnection is effected when the needle-actuating means is in a definite, predetermined position, a drag mechanism operative upon engagement of said driving and driven elements to effect the stopping of the mechanism upon discontinuance of the driving connection between the driving and driven elements, and means for effecting a driving relation between the driving and driven elements of the needle-positioning mechanism upon actuation of said manually operable means to disconnect the main shaft of the sewing machine from said means for driving the main shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

2,332,649	Knott	Oct. 26, 1943
2,554,981	Goff	May 29, 1951