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2,544,577

NEEDLE-THREADING MECHANISM FOR SEWING MACHINES

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2 Sheets-Sheet 1

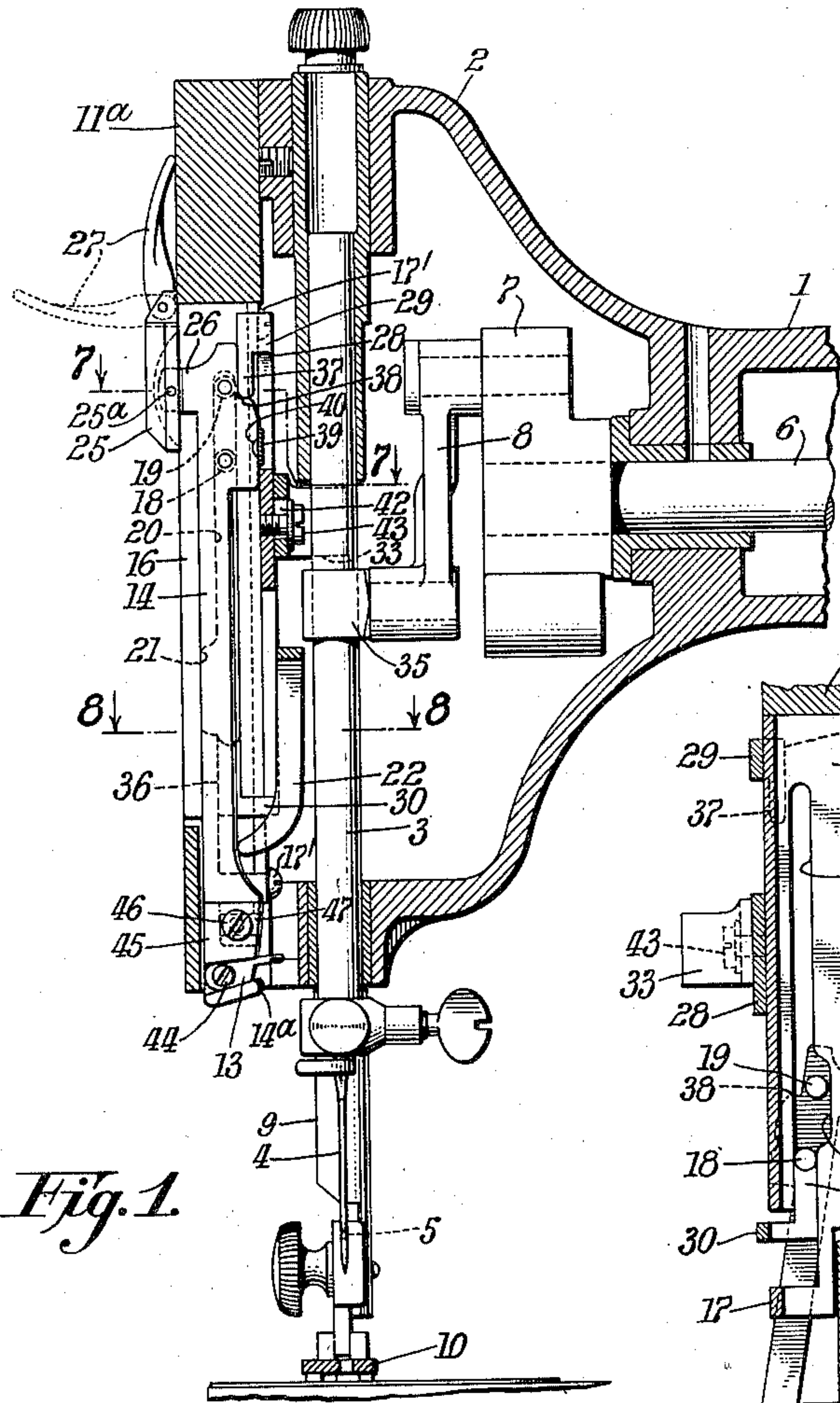


Fig. 1.

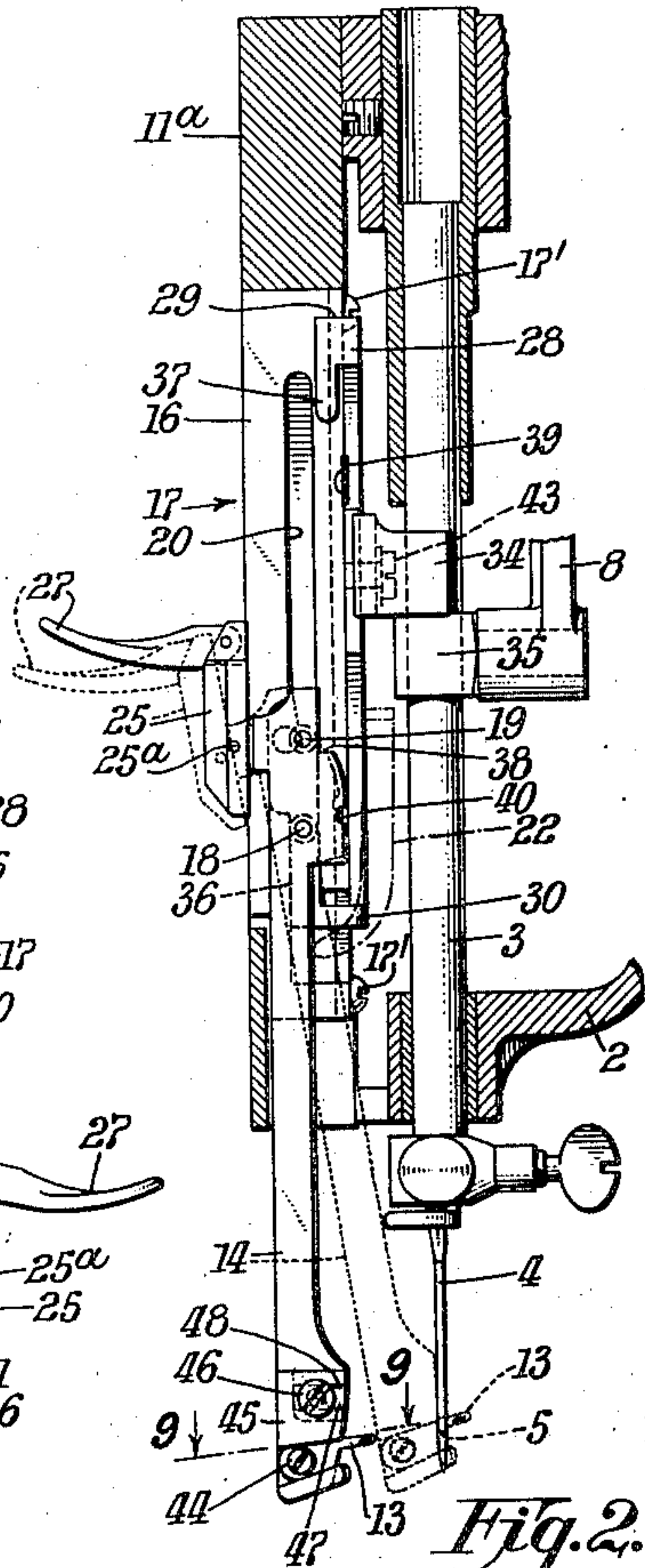


Fig. 2.

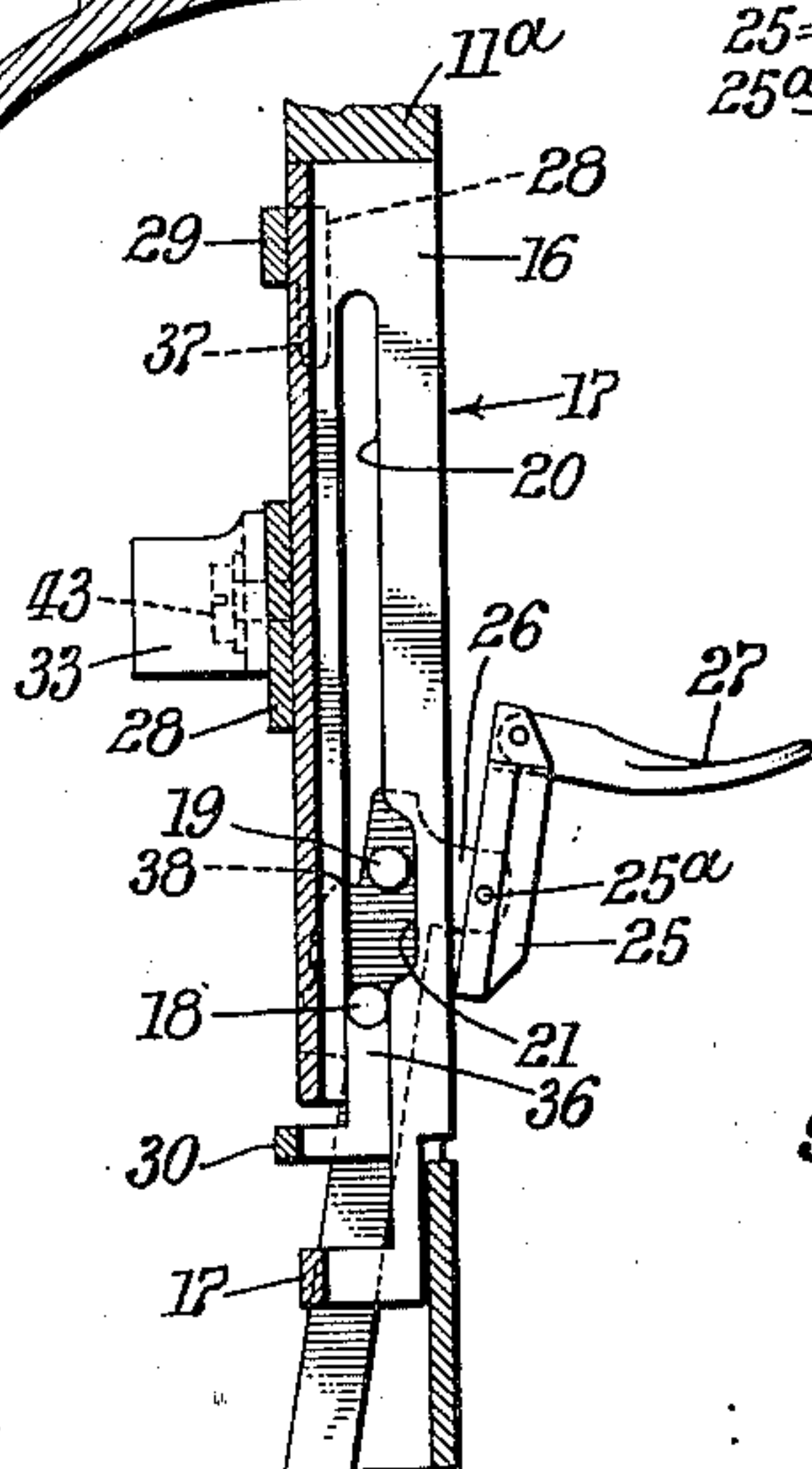


Fig. 5.

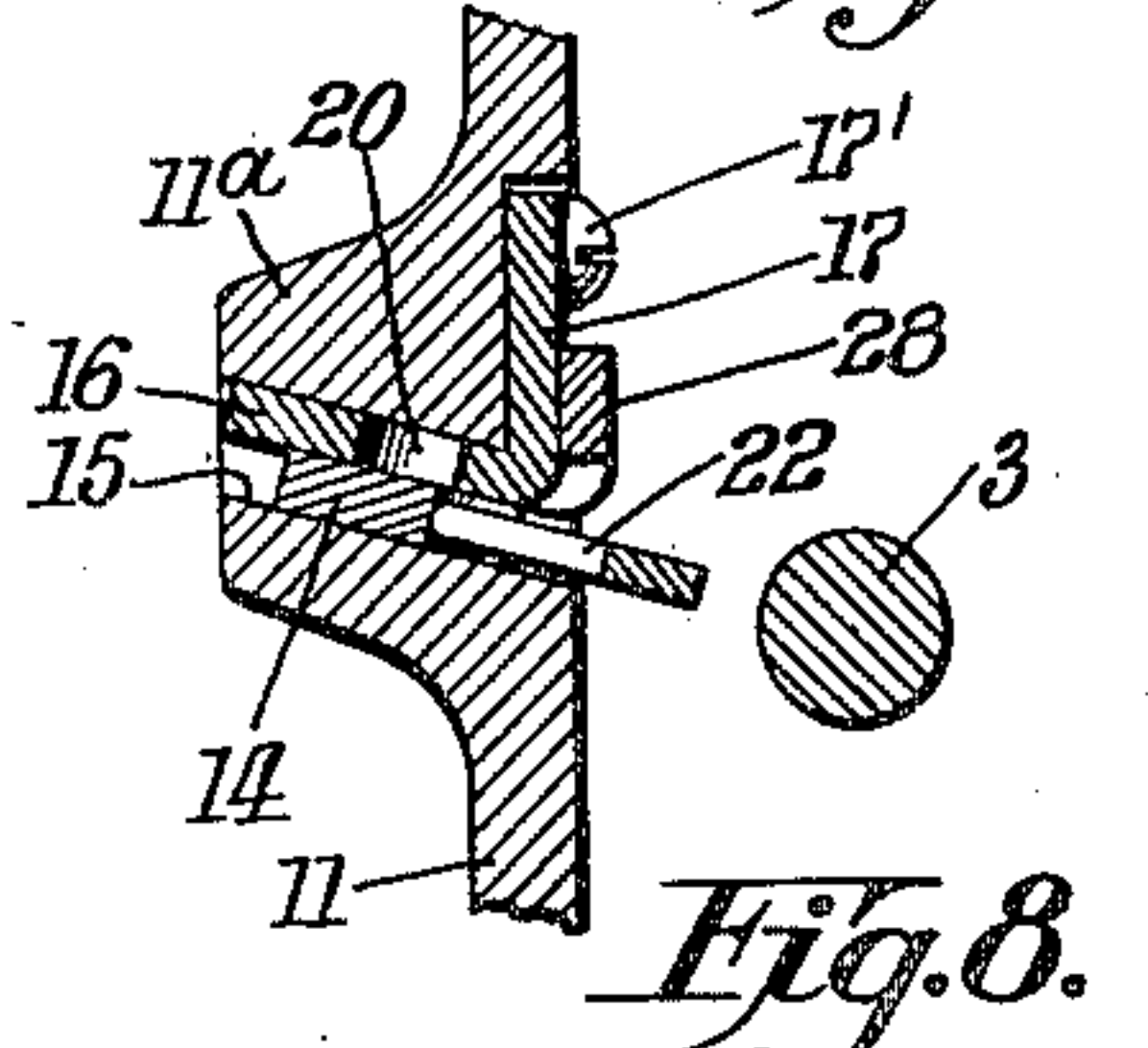


Fig. 8.

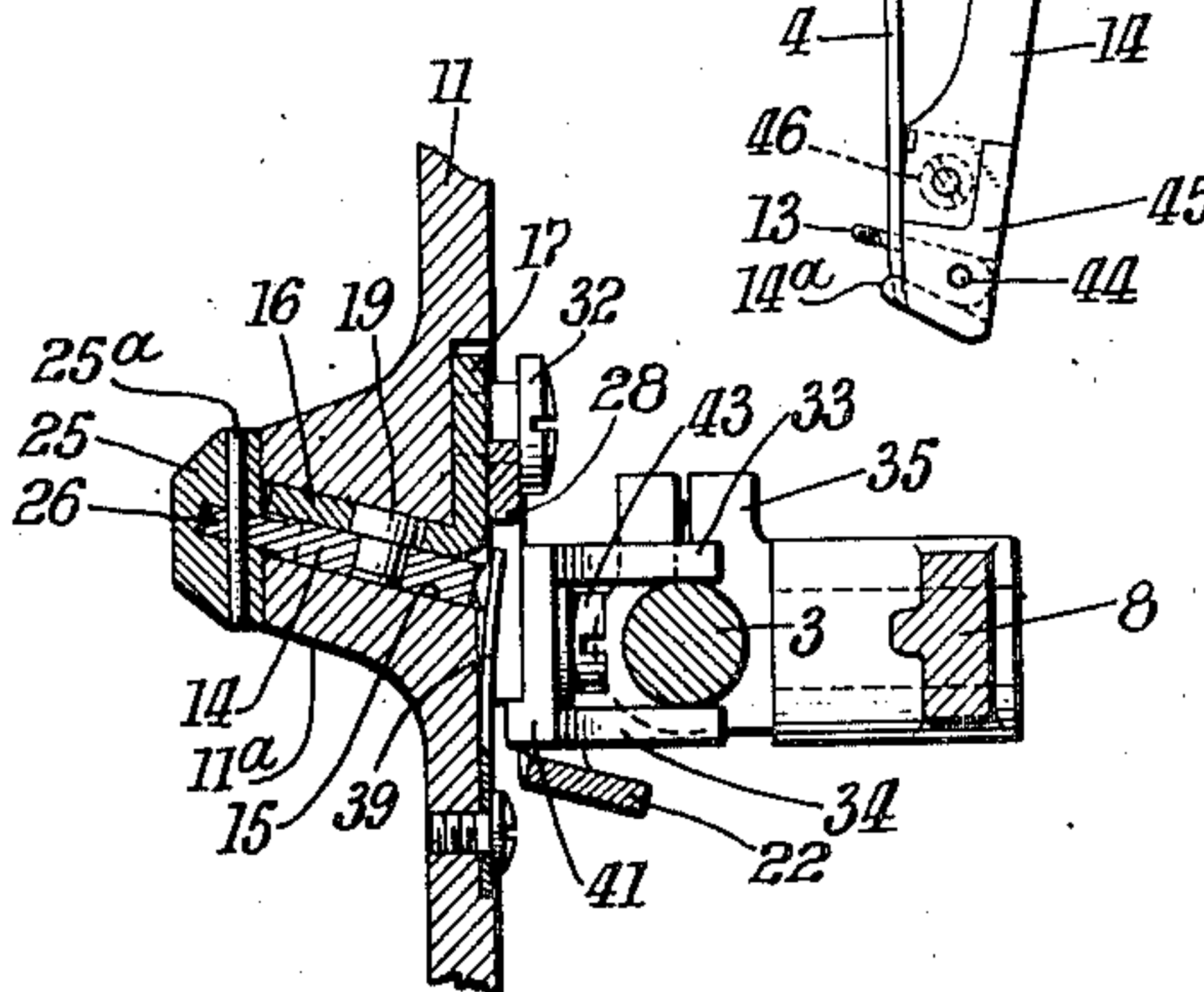


Fig. 7.

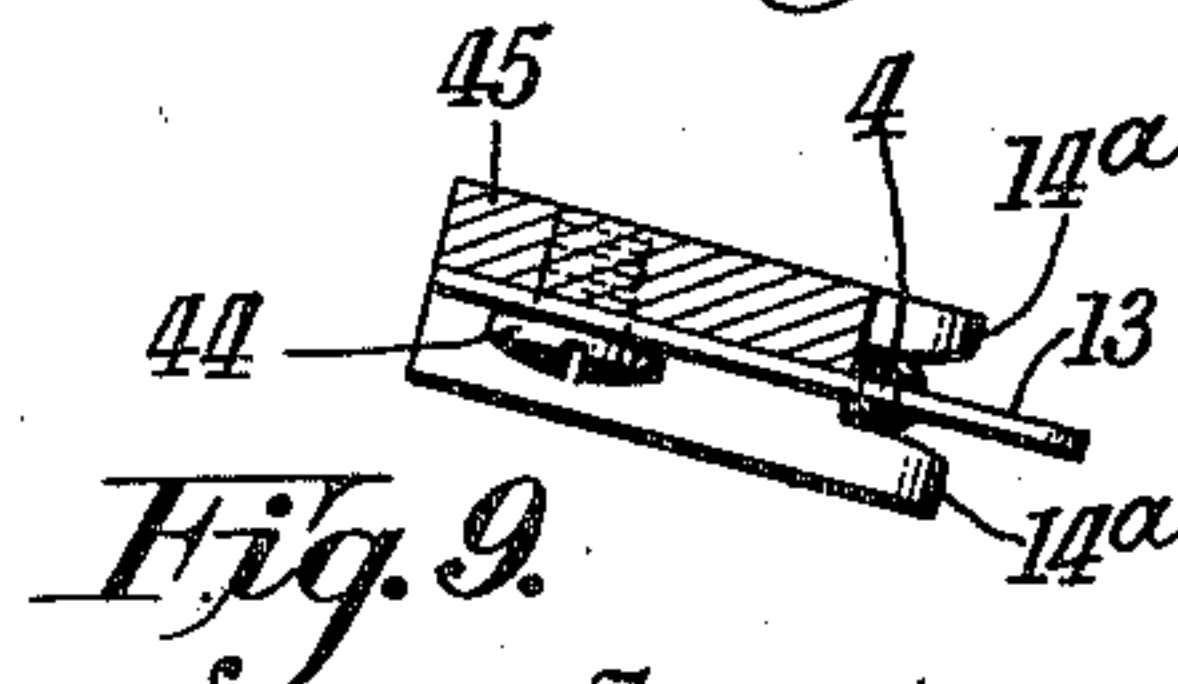


Fig. 9.

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2 Sheets-Sheet 2

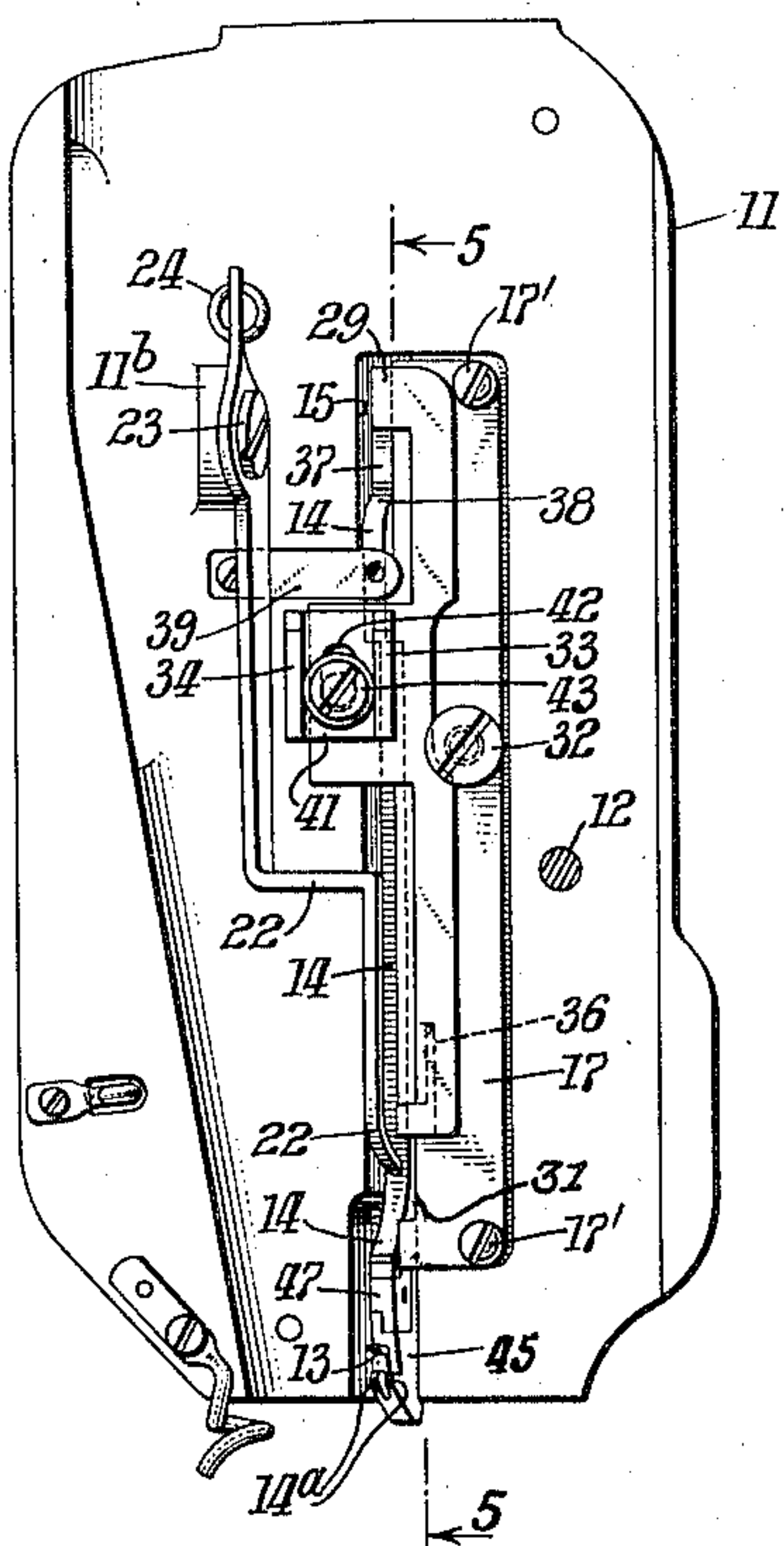


Fig. 4.

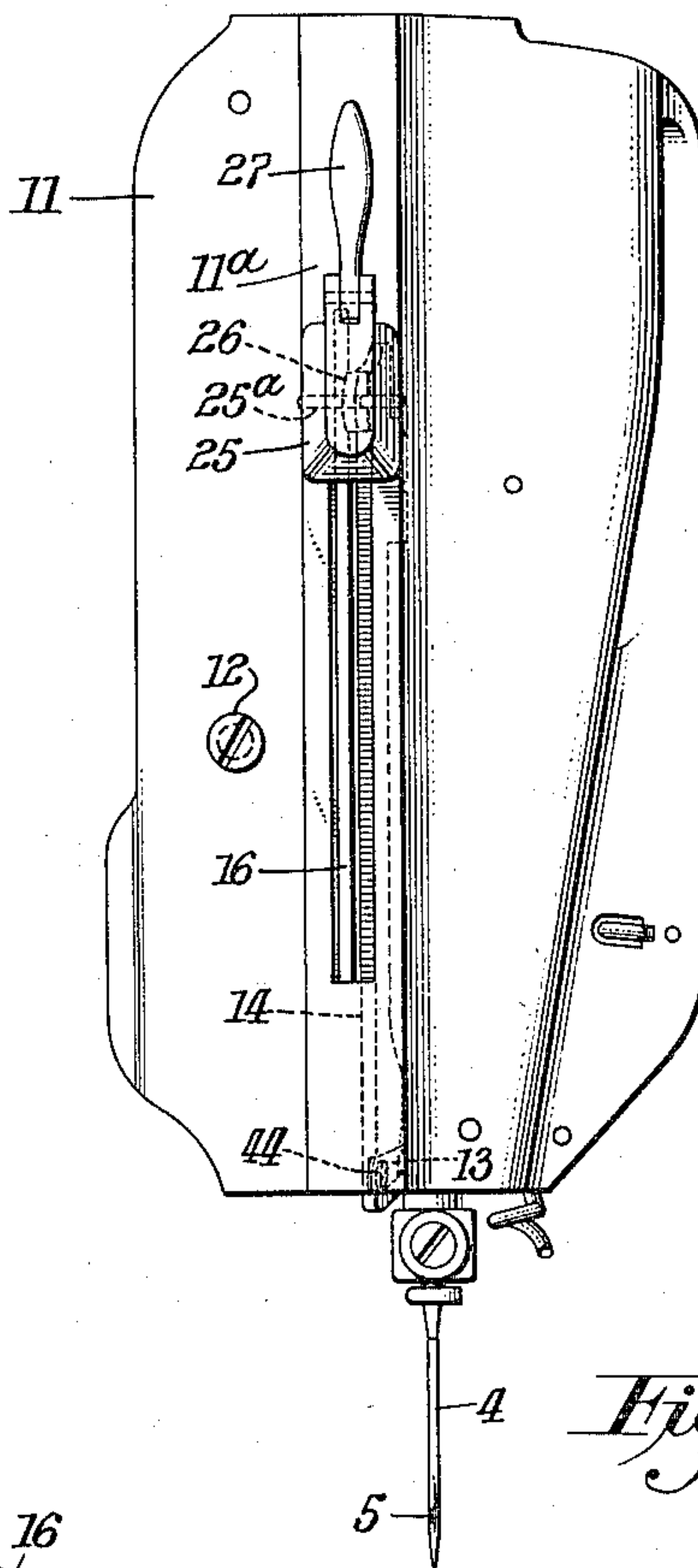


Fig. 3.

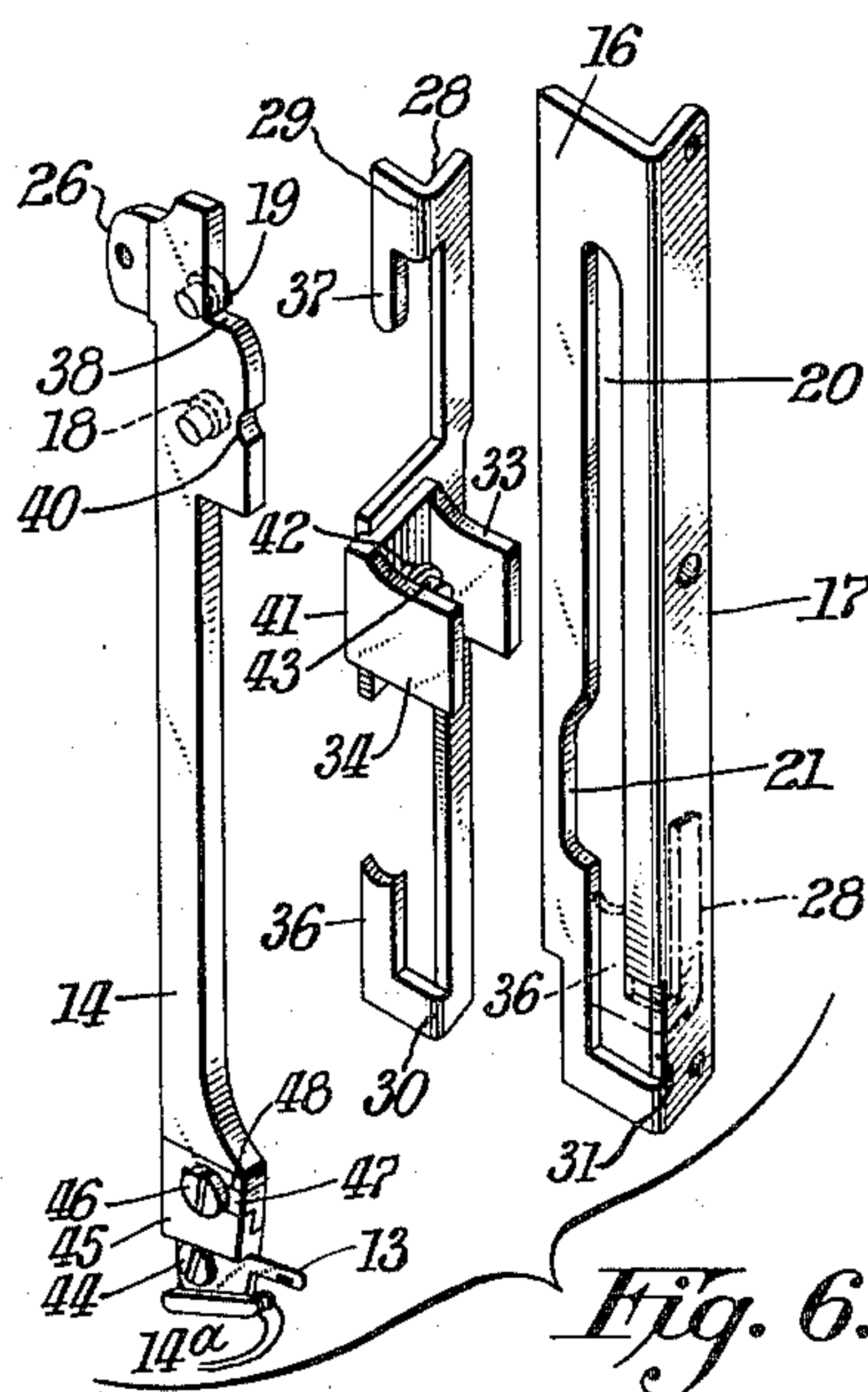


Fig. 6.

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## UNITED STATES PATENT OFFICE

2,544,577

NEEDLE-THREADING MECHANISM FOR  
SEWING MACHINES

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Application October 6, 1948, Serial No. 53,008

10 Claims. (Cl. 112—225)

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This invention relates to needle-threading devices for use with sewing machines, and more specifically to a needle-threading device which may be incorporated in the sewing machine as an integrated component thereof.

It is an object of the invention to provide a means whereby the needle of a sewing machine may be threaded without requiring the operator to manually seek out the needle-eye in the usual manner of threading needles. Accordingly this invention includes a retractable carrier for a needle-threading element which is controlled by simple hand operations and which automatically projects a thread-receiving portion of the threading element through the eye of the needle. Once the threading element is projected through the needle-eye it becomes a relatively simple procedure to thread the needle by engaging the thread therewith and withdrawing the threading element from the needle eye.

Another object of the invention is to provide means whereby the threading device is self-adjusting to accommodate variations in the position of the needle above the throat-plate of the sewing machine. Thus, the needle-eye need not be disposed at any specific or predetermined height in order for the device to be operable, but rather may be positioned anywhere within a given range.

A further object of the invention is to incorporate this self-aligning needle-threading mechanism within the frame of the sewing machine. In the embodiment of the invention selected for illustration, the face-plate has been adapted to house the mechanism, as shown in the accompanying figures in which:

Fig. 1 is a vertical sectional view of the head-end of a sewing machine bracket-arm to which has been affixed a face-plate incorporating the needle-threading device, the needle-threading mechanism being shown in its retracted or inoperative position.

Fig. 2 is a partial duplication of Fig. 1, with the major portion of the needle-threading mechanism shown in elevation and showing, in full and dotted lines, the threading mechanism in two successive stages of operation.

Fig. 3 is a front elevational view of the face-plate carrying the needle-threader, a portion of the needle-bar and needle also being shown.

Fig. 4 is a rear elevational view of the face-plate and the needle-threading mechanism carried thereby.

Fig. 5 is a vertical sectional view taken substantially along the line 5—5 of Fig. 4, but showing the threading device shifted to its operative

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position and the threading element projected through the needle eye.

Fig. 6 is a perspective view of three component elements of the device.

Fig. 7 is an enlarged horizontal sectional view taken substantially on the line 7—7 of Fig. 1.

Fig. 8 is an enlarged horizontal sectional view taken substantially on the line 8—8 of Fig. 1.

Fig. 9 is an enlarged sectional view, taken substantially on the line 9—9 of Fig. 2.

The portion of a sewing machine shown includes part of a bracket-arm 1 having a hollow head 2 disposed at its free end. The head supports a reciprocatory needle-bar 3 carrying a needle 4 at its lower end. The needle is of the conventional sewing machine type, being provided with a thread-eye 5 proximate to its point. The needle-bar is reciprocated by a rotary arm-shaft 6 through a conventional crank 7 and connecting link 8. A presser-bar 9 is slidably mounted in the head 2 rearwardly of the needle-bar and has a presser-foot 10 secured to its lower end.

The hollow head 2 is closed by a face-plate 11 secured to the head by a screw 12. The face-plate carries the present improved needle-threading mechanism, the preferred embodiment of which comprises a threading element, preferably but not necessarily in the form of a hook 13 secured to the lower free end of a carrier-arm 14 having bodily endwise and swinging movements. The hook 13 is designed to have its free end projected through the eye of the needle and to have the needle thread placed therein, after which the hook is withdrawn from the needle-eye pulling the thread with it, thereby threading the needle. Below the hook 13 the carrier arm or a separate head 45 carried thereby is bifurcated, as indicated at 14<sup>a</sup>, to straddle the needle thereby to facilitate passage of the hook 13 through the thread-eye 5. The carrier-arm 14 is mounted for vertical endwise movements in a slideway provided in the face-plate. This slideway is defined by a pair of parallel vertical walls 15 and 16, the former being provided by a thickened portion 11<sup>a</sup> of the face-plate and the latter being provided by a separate angular guide member 17 held to the face-plate by a pair of screws 17' (see Figs. 4 and 8).

The carrier 14 is provided at its upper end with an enlarged portion from which project a pair of vertically spaced guiding pins, or studs, 18 and 19. A vertical guide slot 20 is cut in the wall 16 of the guide member 17 and receives the pins 18 and 19 of the carrier. The pins fit snugly



within the major portion of the slot 20 thereby restricting the carrier to movements in a vertical line. The slot 20, however, is provided with a widened portion 21, which when entered by the guiding pins 18 and 19 permits limited angular movement of the carrier 14 (Fig. 5). This angular movement is yieldingly opposed by a two-armed lever 22 (Fig. 4) which is pivoted to a lug 11<sup>b</sup> on the inner surface of the face-plate by means of a shoulder screw 23. The lower arm of the lever 22 is biased against the carrier 14 by a coil spring 24 interposed between the upper arm of the lever and the inner surface of the face-plate.

To facilitate endwise and swinging movements of the carrier 14 a manual control device is provided comprising a slide-block 25 secured by a pin 25<sup>a</sup> to an ear 26 on the carrier arm 14, which ear projects through the slideway in the face-plate defined by the walls 15 and 16, and a finger piece 27 pivotally secured to the slide-block. The finger piece 27 may be swung to its inoperative position as shown in full lines in Fig. 1, or to its operative position as shown in dotted lines. By pressing downwardly on the finger piece (it first having been swung to its horizontal or operative position) the carrier 14 is caused to be lowered vertically until the guiding pins 18 and 19 enter the widened portion 21 of the guide slot 20, after which, under continued pressure on the finger piece, the carrier is caused to pivot about the pin 18 an amount governed by the breadth of widened portion 21 of the slot 20. This pivotal movement of the carrier is utilized to project the hooked end portion of the member 13 through the needle-eye preparatory to the needle-threading operation.

In the absence of a suitable control means it would be necessary to manually align the needle-eye and the threading hook each time the device were used. This invention, however, overcomes that necessity by providing means for automatically aligning the threading hook with the needle-eye in any one of a plurality of positions within a considerable range of movement of the needle-bar. This means comprises an element 28 slidably mounted on the guide member 17 and adapted to connect the needle-bar 3 and the carrier 14, using the needle-bar as a gauge from which to position the threading hook relative to the needle-eye. In other words the position of the needle-bar is utilized to determine the operative position of the carrier by means of the interposed sliding element 28.

The sliding element 28 is formed at its upper and lower ends with angle-portions 29 and 30 having downturned and upturned fingers 37 and 36, respectively, hereinafter mentioned. A notch 31 is cut in the lower part of the vertical edge of the stationary guide member 17 to accommodate the angle-portion 30 of the sliding element 28 and to define the limits of the sliding movement of that element. A screw 32 is threaded into the stationary element 17 and has an enlarged head portion which overhangs an edge of the sliding element 28 to hold the latter in contact with the guide member 17. Secured to the element 28, intermediate its ends, is a U-shaped bracket 41 affording a pair of spaced parallel arms 33 and 34 which extend outwardly from the sliding element. The arms straddle the needle-bar 3 above a collar 35 on the needle-bar to which the driving link 8 is operatively connected.

An upturned finger 36 on the lower end of the

element 28 slides in the lower portion of the slot 20 in stationary element 17 (see dotted lines, Fig. 6). The tip of this finger 36 forms a bearing or pivot point against which the pin 18 of the carrier arm 14 bears when the device is in use (Fig. 5).

The tip of the downturned finger 37 on the upper end of the sliding element 28 is engaged by a horizontal shoulder 38 on the carrier arm 14 (Fig. 1) as the device is moved to its upper or inoperative position. In this inoperative position, the sliding element 28 is held in its uppermost position by the shoulder 38 and consequently the pair of arms 33 and 34 of the element 28, are maintained above and beyond the stroke or path of travel of the collar 35 on the reciprocatory needle-bar 3. The carrier arm 14 is frictionally maintained in this inoperative position by a spring detent 39 secured to the inside face of the face-plate 11 and which has a rounded portion releasably entering a notch 40 in the carrier arm 14.

To operate the present needle-threader the carrier 14 is slid downwardly, to about the position illustrated in Figs. 2 and 5, by means of its finger piece 27. In moving downwardly, the shoulder 38 of the carrier 14 moves away from the lower end of the finger 37 of the sliding element 28 until the pin 18 of the carrier engages the upstanding finger 36. Thereafter the element 28 moves downwardly with the carrier 14 until the arms 33 and 34 engage the collar 35 on the needle-bar (Fig. 2).

With arms 33 and 34 bearing upon the collar 35 of the needle-bar 3, the sliding element 28 is established in a fixed position relative to the needle-bar. Furthermore, the pin 18 of the carrier 14 in bearing upon the finger 36 of the sliding element 28, causes the carrier to assume a fixed vertical position relative to the needle-bar and to the needle carried thereby. Within a fixed range of positions of the needle-bar these elements are able to assume the same relative positions. The threading hook 13 thus being established at the proper height with respect to the needle-eye 5, it remains only to swing the carrier inwardly to pass the threading hook into and through the eye of the needle. This is accomplished by continuing to press downwardly on the finger piece 27 of the carrier which sets up a turning moment about the pivot pin 18. The pin 19 at this point is disposed within the enlarged portion 21 of the guiding slot 20 and thus there is permitted limited angular movement of the carrier 14 (Fig. 5) sufficient to allow the threading hook to be swung into the eye of the needle against the action of the spring-biased lever 22.

Once the thread has been ensnared on the hook 13 the finger piece 27 may be released, permitting the spring-biased lever 22 to return the carrier to its vertical position carrying with it the threading hook which draws a bight of the thread through the eye of the needle. The thread may then be lifted from the hook and the carrier raised to its inoperative position.

It may thus be seen that the operation of this mechanism is independent of the relative position of the needle with respect to the sewing machine frame within pre-established limits of substantial amplitude. The needle-bar may be disposed in any position between the top of its stroke and a point well beneath the top which is governed in the illustrated mechanism by the engagement of the angle portion 30 of the element



28 with the lower edge of the notch 31 in the member 17.

It is possible to make adjustments in the mechanism for accommodating, for example, needles of different lengths or in which the eye of the needle is disposed a different distance from the fixed collar 35 on the needle-bar. To accomplish this purpose the unitary U-shaped bracket 41 (Figs. 6 and 7) is provided with an elongated slot 42 (Figs. 1 and 4) entered by a clamp screw 43 which secures the bracket to the sliding element 28. By shifting the bracket, within the limits defined by the slot 42, the ultimate position assumed by the threading-hook 13 relative to the needle-eye may be varied.

To facilitate removal and replacement of the threading hook 13, should that element become broken, the hook is preferably secured, by a screw 44, in a head 45 removably secured by a clamp screw 46 to the lower end of the carrier-arm 14. The arm 14 is provided with a transverse rib 47 adapted to fit within a slideway 48 formed in the head 45. Thus by loosening the screw 26 the head 45, and the hook 13 carried thereby, may be entirely removed from the carrier-arm for ready removal and replacement of the hook 13.

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

1. In a sewing machine provided with a reciprocating needle having a thread-eye; a needle threader carried by the sewing machine and comprising a carrier-arm, a threading element carried by said carrier-arm, means to shift said carrier-arm and threading element lengthwise of said needle to align said threading element with said thread-eye in any one of a plurality of vertical positions of said needle, means to swing said carrier-arm and threading element to a position in which a portion of the threading element is projected through said thread-eye to receive therein a thread, and means to retract said carrier-arm and threading element to draw a portion of said thread through said thread-eye.

2. In a sewing machine provided with a face-plate and a reciprocating needle having a thread-eye; a needle threader carried by said face-plate and comprising a carrier-arm mounted in said face-plate for bodily endwise and swinging movements, a threading element carried by said carrier-arm, means to shift said carrier-arm and threading element lengthwise of said needle to align said threading element with said thread-eye, means to swing said carrier-arm and threading element to a position in which a portion of the threading element is projected through said thread-eye to receive therein a thread, and spring means to retract said carrier-arm and threading element to draw a portion of said thread through said thread-eye.

3. In a sewing machine provided with a face-plate and a reciprocating needle having a thread-eye; a needle threader carried by said face-plate and comprising a carrier-arm, a threading element carried by said carrier-arm, a guide member carried by said face-plate and provided with a vertically disposed guide slot, means on said carrier-arm tracking said guide slot, means to shift said carrier-arm and threading element lengthwise of said needle to align said threading element with said thread-eye, means to swing said carrier-arm and threading element to a position in which a portion of the threading element is projected through said thread-eye to receive therein a thread, and spring means to retract said carrier-arm and threading element to

draw a bight of said thread through said thread-eye.

4. In a sewing machine provided with a face-plate and a reciprocating needle having a thread-eye; a needle threader carried by said face-plate and comprising a carrier-arm, a threading element carried by said carrier-arm, a guide member carried by said face-plate and provided with a vertically disposed guide slot having a widened portion, a pair of spaced studs on said carrier-arm tracking said guide slot, means to shift said carrier-arm and threading element lengthwise of said needle to align said threading element with said thread-eye in any one of a plurality of vertical positions of said needle, means operable when one of said studs is in the widened portion of said guide slot to swing said carrier-arm and threading element to a position in which a portion of the threading element is projected through said thread-eye to receive therein a thread, and spring means to retract said carrier-arm and threading element to draw a bight of said thread through said thread-eye.

5. In a sewing machine provided with a face-plate and a reciprocating needle having a thread-eye; a needle threader carried by said face-plate and comprising a carrier-arm, a spring detent acting on said carrier-arm to yieldingly retain it in inoperative position, a threading element carried by said carrier-arm, a guide member carried by said face-plate and provided with a vertically disposed guide slot having a widened portion, a pair of spaced studs on said carrier-arm tracking said guide slot, a finger piece attached to the carrier-arm to shift the carrier-arm and threading element lengthwise of said needle to align said threading element with said thread-eye in any one of a plurality of vertical positions of said needle and when one of said studs is in the widened portion of said guide slot to swing said carrier-arm and threading element to a position in which a portion of the threading element is projected through said thread-eye to receive therein a thread, and spring means to retract said carrier-arm and threading element to draw a bight of said thread through said thread-eye.

6. In a sewing machine provided with a face-plate, a reciprocating needle-bar, a needle carried by the needle-bar and having a thread-eye; a needle threader carried by the face-plate and comprising a carrier-arm, a threading member carried by said carrier-arm, means to shift said carrier-arm and threading member lengthwise of said needle-bar, an element slidably mounted on said face-plate and movable vertically with said needle-bar throughout a portion of its stroke and having a definite position relative to the eye of the needle, cooperating stop means provided by said carrier-arm and said element to cause the arm and the element to be moved together during that portion of the stroke of the needle-bar when the element moves therewith and to position said threading member in alignment with said thread-eye, means to swing said carrier-arm and threading member to a position in which a portion of the threading member is projected through said thread-eye to receive therein a thread, and spring means to retract said carrier-arm and threading member to draw a portion of said thread through said thread-eye.

7. In a sewing machine provided with a face-plate, a reciprocating needle-bar, and a needle carried by the needle-bar and having a thread-eye; a needle threader carried by said face-plate



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and normally disconnected from said needle-bar and needle, said needle threader comprising a carrier-arm, a threading element carried by said carrier-arm, detent means to hold said carrier-arm and threading element in an inoperative position, means to shift said carrier-arm and threading element lengthwise of said needle-bar to align said threading element with said thread-eye in any one of a plurality of vertical positions of said needle, means to swing said carrier-arm and threading element to project a portion of the threading element through said thread-eye to receive therein a thread, and means acting on said carrier-arm to retract the carrier-arm and threading element to draw the thread through said thread-eye.

8. In a sewing machine provided with a face-plate, a reciprocating needle-bar, a needle carried thereby and having a thread-eye, and means for reciprocating said needle-bar; a needle threader carried by said face-plate and comprising a carrier-arm mounted on said face-plate for bodily endwise and swinging movements, a threading member carried by said carrier-arm, means to shift said carrier-arm and threading member lengthwise of said needle-bar, an element slidably mounted on said face-plate, an arm carried by said element and engaging a portion of the needle-bar reciprocating means for causing said element to be moved vertically with said needle-bar during a portion of its stroke and to have a predetermined position relative to the eye of the needle, cooperating stop means provided by said carrier-arm and said element to cause the arm and the element to be moved together during that portion of the stroke of the needle-bar when the element is moved therewith and to position said threading member in alignment with said thread-eye, means to swing said carrier-arm and threading member to project a portion of the member through the thread-eye to receive therein a thread, and means to retract the carrier-arm and threading member to draw

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a portion of said thread through said thread-eye.

9. A needle threader for sewing machines as set forth in claim 8, in which the arm, which is carried by the element slidably mounted on the face-plate and which engages a portion of the needle-bar reciprocating means, is vertically adjustable to adapt the needle threader for needles of different lengths.

10. In a sewing machine provided with a face-plate, a reciprocating needle-bar, and a needle carried by said needle-bar and having a thread-eye; a needle threader carried by said face-plate and comprising a carrier-arm mounted in said face-plate for bodily moving in a straight line and for swinging movements about an axis transverse to said straight line, a threading element carried by said carrier-arm, means for guiding said carrier-arm endwise of itself and in said straight line throughout one end portion of its amplitude of straight line travel, means providing a transverse axis pivot about which said carrier-arm may be swung whenever said carrier-arm is shifted to the other end portion of its amplitude of straight line travel so that said threading element may be projected through said thread-eye, and means for connecting said pivot means with said needle-bar thereby accurately to position said threading element relative to the needle-eye preparatory to the swinging of said carrier-arm about said pivot means.

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