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(54) **Multi-needle automatic sewing machine.**

(57) A sewing machine has two needles (44, 46) each supported in a needle holder (48, 50) which is horizontally displacable, to present one needle (44 or 46) to an active workstation in a prethreaded manner and simultaneously shift the other needle (44 or 46), which has a different thread therein, into an adjacent inactive position. As the needles (44,46) are being shifted, the needle (44 or 46) moving to inactive status has its thread (160 or 170) clamped against the needle holder (48 or 50) by a wheel (68 or 74), to secure the thread (160 or 170) from being pulled therefrom or straying. A vacuum tube (78) arranged at each respective inactive position or station sucks the tail of the thread (160 or 170) therein. Alternatively, a thread wiping finger (202 or 204) may clink the thread end against an associated plate (222 or 224) and wipe it out of the way. Two thread guides (138), one for each thread (160, 170), are arranged for vertical movement, to pullback on the dangling thread (160 or 170) of the inactive needle to prevent it from whipping during its inactive status.

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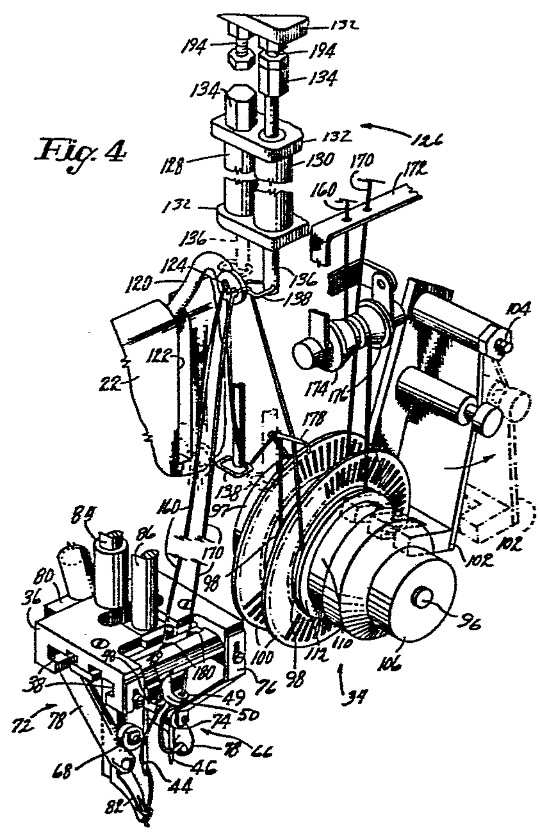
Fig. 4



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Automatic Sewing Machine

This invention is concerned with automatic sewing machines, comprising a plurality of needles each of which is movable into and out of an active (or stitching) position in which it is aligned with a needle drive bar, the or each other needle being held in an inactive position.

Multiple threads and multiple needles on sewing machines are useful mechanisms for improving product output. These mechanisms are typically used for tufting or embroidering, and, by way of example, reference is made to U.S. Patents Nos. 3724405, 3547058 and 3160125.

In the case of machines of this type, however, when a needle is moved to an inactive position, the thread which is supplied thereto usually is no longer under the same control, especially as to its tension, as when it is in the active position, and consequently may interfere with the operation of the active needle or its thread. This may be especially the case when the thread supplied to an inactive needle has been cut, thereby leaving a loose end.

It is the object of the present invention to provide an automatic sewing machine capable of utilizing several needles with their respective threads, which threads may be varied in colour, size or texture from one another, in the operation of which, when a needle is moved to an inactive position, the thread associated therewith will not interfere with the operation of the active needle.

This object is resolved in accordance with the invention, in a machine as set out in the first paragraph hereof, in that thread control means is provided for controlling the thread supplied to the or each inactive needle so as to ensure that such thread does not interfere with the thread supplied to the active needle during the operation of the latter.

More particularly, the thread control means conveniently comprises, associated with each inactive needle position, a thread end removal device for drawing out of the

way the thread end extending beyond the needle in such inactive position. In this way, the end of the thread, which may otherwise have become entangled with the thread supplied to the active needle, with a result that the loose thread end is locked into the stitching being effected by the active needle, is prevented from becoming so entangled.

In one machine in accordance with the invention, each thread end removal device comprises a vacuum tube arranged adjacent its associated inactive needle position. More specifically, the end of each vacuum tube is preferably arranged adjacent the eye of the needle against the direction of feed of the thread through the eye.

In another embodiment of the invention, on the other hand, the thread end removal device comprises a reciprocable thread-wiping finger arranged adjacent its associated inactive needle position and co-operative with a surface to clinch the end of the thread, extending beyond the needle when in its inactive position, against said surface to draw it out of the way. In this case, the surface may conveniently be provided by a plate fixidly disposed parallel to the path of movement of its associated wiping finger, the latter being biassed against its associated plate. Conveniently, a single motor may be provided for effecting reciprocating movement of the wiping fingers, the latter being effective only to draw the thread end of the or each inactive needle out of the way, while avoiding engagement with the thread supplied to the active needle.

Whichever embodiment is used, it will be appreciated that the thread end associated with the or each inactive needle is thus reliably removed from the operating locality of the machine, whereby entanglement with the thread supplied to the active needle, or with the stitches formed by the active needle in the operation thereof, can be avoided.

The thread control means of the machine in accordance of the invention may also comprise, associated with each inactive needle position, a thread-nipping device by which, when a needle is in such inactive position, the thread supplied

thereto is secured against being pulled from the eye thereof. In this way, a more secure control of the thread supplied to the inactive needles can be achieved. More specifically, conveniently each thread-nipping device comprises a clamp element arranged adjacent its associated inactive needleposition and co-operative with a surface of a holder for the needle, the arrangement being such that the thread is clamped between said clamp element and said surface when the needle is moved to the inactive position.

Furthermore, the thread control means may also comprise, associated with each needle, a thread pull-back device including a guide element movable between an advanced position adjacent its associated needle and a retracted position spaced apart from the needle, the arrangement being such that when a needle is in the active position its associated guide element is in its advanced position, and when a needle is in an inactive position its associated guide element is in its retracted position. In this way, by co-operation with said nipping means referred to above, the thread supplied to the or each inactive needle can be maintained taut during the operation of the active needle, thereby ensuring that the threads of the inactive and active needles do not become entangled "upstream" of the stitching mechanism.

There now follows a detailed description, to be read with reference to the accompanying drawings, of one machine in accordance with the invention, together with a modification thereof. It will be appreciated that this machine and its modification have been selected for description merely by way of non-limiting example.

In the accompanying drawings:-

Figure 1 is a side elevational view of an automatic sewing machine in accordance with the invention;

Figure 2 is an exploded view of a part of a needle support and indexing mechanism of the machine shown in Figure 1;

Figure 3 is an elevational view of one end of the machine of Figure 1;

Figure 4 is a partial perspective view, showing details of a thread monitor arrangement in one operational mode;

Figure 5 is a view similar to Figure 4, but in a subsequent operational mode;

Figure 6 is a view taken along the lines VI-VI of Figure 1;

Figure 7 is a partial sectional view of the thread monitor arrangement;

Figure 8 is a partial sectional view, showing details of needle holders and the indexing mechanism in a first operational mode;

Figure 9 is a view similar to Figure 8, but in a subsequent operational mode;

Figure 10 is a partial perspective view of a modification of the machine in accordance with the invention, taken from the front to the left thereof, and showing details of a thread-wiping mechanism;

Figure 11 is a front elevational view of the parts shown in Figure 10; and

Figure 12 is a partial perspective view of the parts shown in Figure 10 and 11, looking forwardly towards the thread-wiping mechanism, at the left hand side thereof.

The machine in accordance with the invention now to be described is an automatic sewing machine 20 capable of sewing two different threads into an item to be stitched. The threads may be of a different colour, texture, or size, depending upon the requirements of the item being sewn. The sewing machine 20 comprises a housing 22 disposed on a work support table 24. A stitching mechanism 26 is disposed at one end of the housing 22 and is connectively associated therethrough by a drive shaft 28 to a drive means 30 at the other end of the housing 22. An indexing mechanism 32 is connected to the stitching mechanism 26 to effectuate shuttling therein. A thread monitor generally designated 34 controls the thread feed and usage and checks for irregularities associated therewith.

The stitching mechanism 26 is shown more clearly in Figure 2, which mechanism comprises a needle-holding cage 36 which mounts against the lower side of the housing 22, and which cage 36 has a pair of opposed channels 38 which each slidingly receive a shoulder 40 of a needle holder indexer 42. A first needle 44 and a second needle 46 are each secured in a needle holder 48, 40 respectively, slidably received in an opening 52 within the needle holder indexer 42. The holder indexer 42 has an extension 54 which slides under a bracket 56 one end of which is secured to the needle-holding cage 36. The other end of the bracket 56 pivotally supports an indexing cylinder 58, which comprises a part of the indexing mechanism 32. The indexing cylinder 58 has a piston (not shown) and a piston rod 60 which is pivotally connected to one end of an indexing lever 62. The other end of the indexing lever 62 is swingably connected to the extension 54 of the needle holder indexer 42. An elbow 64 disposed near the midpoint of the indexing lever 62 is pivotally attached to the bracket 56.

A needle bar 86, shown in Figure 2, has an arrangement of flanges 88 on the lower end thereof, which flanges 88 slidingly mate successively with a pair of opposed channels 90 on the upper end of each needle holder 48, 50. Thus, under the action of the indexing mechanism 32 the needle holders 48, 50 can slide relative to the needle bar 86 to bring a selected one of the needles 44, 46 into an active position in alignment with the needle bar 86. The upper end of the needle bar 86 is pivotally connected to the lower end of a connecting rod 92 (Figure 3) which is journalled on a crank shaft 94, on the end of the drive shaft 28, shown also in Figures 1 and 6.

A presser foot 82 is disposed adjacent the active position for the needles 44 and 46, and is reciprocably held by a presser foot bar 84 which extends through a fitting in the needle-holder cage 36.

The thread monitor 34, shown in Figures 4, 5 and 7, comprises an axis 96, journalled into a ferrule 97 supported in the housing 22, the axis 96 having a pair of thread-engaging

wheels 98 rotatively disposed thereon. A disk 100, having perforations arranged on its periphery, is secured to a side of each wheel 98, in a manner similar to the arrangement shown in U.S. Patent 3,843,883, which is now incorporated herein by reference. The peripheral perforations are counted by a photoelectric device 102 adapted with an encoder, not shown, to monitor the thread usage. The photoelectric device 102 is pivotally mounted on a shaft 104 secured to the housing 22, and may be swung out of the way to permit thread to be wound around the thread-engaging wheels 98, which pivoting out of the way is shown in dashed lines in Figures 4 and 5. An adjustment knob 106 is threadably received on the distal end of the shaft 96, which knob 106 may be rotated to compress a spring 108 or biasing member between the knob 106 and an annular non-rotative housing 110 disposed on the axis 96 and against a friction disk 112 adjacent the outer thread-engaging wheel 98. A roller thrust bearing 114 is disposed between the contiguous sides of the inner and outer thread-engaging wheels 98, and a second friction disk 116 is disposed against the inner side of the inner thread-engaging wheel 98 and into abutting contact with a non-rotative portion of the ferrule 97 as shown in Figure 7.

The machine in accordance with the invention also comprises thread control means for controlling a thread 160 (or 170) supplied to the needle 44 (or 46) which is in an inactive position, during the operation of the needle in the active position. To this end, the thread control means comprises thread-nipping means generally designated 66, comprising a first thread-nipper, in the form of a biasing element or resilient wheel 68 mounted on a first bracket 70 and secured to the needle-holder cage 36, and a second thread-nipper in the form of a biasing element or resilient wheel 74 mounted on a second bracket 76 and also secured to the needle-holder cage 36. The first thread-nipper 68 is disposed adjacent inactive position of the first needle 44 and the second thread-nipper 74 is disposed adjacent the inactive position of the second needle 46. In addition, the thread control means comprises thread end removal means generally

designated 72 comprising two vacuum tubes 78 having their distal ends disposed adjacent the inactive position of each needle 44, 46 respectively, as shown in Figures 1 and 2. The tubes 78 are connected to a manifold 80 which is secured to the needle-holder cage 36. The manifold 80 is connected to a vacuum source (not shown).

The thread control means further comprises a take-up lever 120 (Figures 4 and 5) which extends through slot 122 in the housing 22 and has a distal portion 124 with two orifices through which the two threads 160, 170 pass. The take-up lever 120 is shown in both its upper and its lower position in both Figures 4 and 5. Also the thread control means comprises thread pullback means generally designated 126, shown in Figures 1, 3 and 4, which comprises one associated with each needle 44, 46 a first and a second pressurizable cylinder 128, 130, attached to a bracket arrangement 132 secured to the housing 22. Each pressurizable cylinder 128, 130, actuatable by proper means (not shown), is a double-acting pressurizable cylinder, and each has an upper piston rod 134 and a lower piston rod 136 extending from their upper and lower ends respectively. A guide ring 138 is arranged on the distal end of each lower piston rod 136.

The drive shaft 28 (Figures 1 and 6) is turned by the drive means 30, which includes a motor (not shown) and is attached to a drive belt 140, which travels about a pulley 142 on the drive shaft 28. A disk 144 is disposed on the drive shaft 28 adjacent the pulley 142. The disk 144 has a wedge-shaped detent 146 arranged therein, as shown in Figure 6. A pressurizable cylinder 148 is attached to the frame 22 of the sewing machine 20, by a bracket 150 secured generally under the drive shaft 28. The cylinder 148 has a movable piston rod 152 extending therefrom. A wedge-shaped extension 154 is attached to the distal end of the movable piston rod 152, mateable with the wedge-shaped detent 146 in the disk 144 on the drive shaft 28.

In the operation of the machine in accordance with the invention, the two thread filaments 160, 170 (Figures 4 and 5) are unwound from their respective spools (not shown)

and extend through openings in a guide bracket 172 attached to the frame 22 above the thread monitor 34. The threads 160, 170 each pass through a thread retainer 174, 176 beneath the guide bracket 172 and are each wound around one of the thread-engaging wheels 98 while the photoelectric device 102 is pivoted out of the way therefrom (as shown by the phantom lines in Figures 4 and 5). The threads 160, 170 are then drawn around a guide spring 178 and through the guide rings or loops 138 on the distal end of each of the lower piston rods 136 on the thread pullback means 126, thence through their respective orifices on the distal portion 124 of the take-up lever 120, each thence through a channel 180 in the front shoulder 40 of the needle-holder indexer 42. The threads then extend through an opening on a tab 49 on the lower portion of the needle holders 48, 50, and through the eyes of their respective needles 44, 46.

The stitching mechanism 26 may be activated, once the desired needle 44 or 46 is shuttled to the active position, the remaining needle 44 or 46 at the same time being shuttled to the inactive position. The active (or stitching) position is located directly beneath the needle bar 86. The respective inactive positions of the two needles 44,46 are immediately adjacent the active position, one at either side thereof (see Figures 8 and 9). Thus each needle 44 or 46 may be shuttled from its respective inactive position to the active position, while the other needle 44 or 46 is shuttled to its respective inactive position from the active position by actuation of the indexing cylinder 58, upon receipt of a proper signal, causing pivotal movement of the indexing lever 62 about its pivot point in the elbow 64 thereof. The extension 54 of the needle holder indexer 42, being attached to the indexing lever 62, pulls or pushes the needle holders 48 and 50 accordingly, with their respective needles 44, 46 arranged therewith. The channels 90 on each needle holder 48, 50 respectively are pulled or pushed onto the flanges 88 of the needle bar 86 according to the direction of motion of the needle holder indexer 42, which is a function of whether the piston rod 60 of the indexing cylinder 58 is being extended or retracted. As seen in Figures 8 and 9 each of the needle

holders 48, 50 has a channel therethrough and a detent 184 through which its associated needle 44, 46 may pass. A ball 186 is biased by a spring 188 within the centre of the needle bar into the detent 184, to properly locate and help secure the needle holder 48 or 50 precisely in the active position while stitching. Each inactive position has a biased ball 190 arranged between a locator plate 192 and the needle holder cage 36 to mate with the detent 184, to properly locate and hold secure the needle holder 48 or 50 in its inactive position while the other needle holder 48 or 50 is in the active position, as shown between the Figures 8 and 9.

Referring again to Figure 4, the thread pullback means 126 is shown including a pair of adjustable bolts or stops 194 attached to the upper portion of the bracket 132. They are utilized to regulate the amount of upward travel of the upper piston rods 134, which are contiguous with and hence regulate the amount of upward travel of the lower piston rods 136 and their guide rings 138 attached thereto. The guide ring 138 on the lower piston rod 136 on whichever pressurizable cylinder 128 or 130 is holding the thread 160 or 170 for the active needle 44 or 46 is lower than the ring 138 holding up and out of the way the thread 160 or 170 for the needle in the inactive position. In the case shown in Figure 4, the second needle 46 is in the inactive position and the needle holder cage 36 has been shuttled to the right by proper actuation of indexing cylinder 58 by proper means (not shown). The thread 170 for the second needle 46 is caught between the tab extension 49 on the lower portion of the second needle holder 50 and the second resilient elastomeric wheel 74, thus keeping the inactive thread 170 taut and out of the way. The tail of the inactive thread 170 shown in Figure 4 has been sucked into its respective vacuum tube 78, which vacuum is maintained in both tubes 78 by proper vacuum generating means (not shown). The lower piston rod 136 and its guide ring 138 of the first cylinder 128 is shown in phantom in its upper position and is shown in full lines where it would be in its lower position where it guides the thread 160 for the first needle 44 shown here as being in

the active position.

Figure 5 shows the lower piston rods 136 holding the threads 160, 170 wherein the inactive needle in this view is the first needle 44 having the tail of its thread 160 sucked into the vacuum tube 78 and the thread 160 above the eye of the first needle 44 being trapped between the tab extension 49 on the lower portion of the first needle holder 48 and the first resilient elastomeric wheel 68, thus keeping the inactive thread 160 taut and out of the way.

The needle holders 48, 50 are not permitted to be shuttled by activation of the indexing cylinder 58 until the active needle holder 48 or 50 is brought into heightwise alignment with the other inactive needle holder 48 or 50, whereupon the indexing cylinder 58 may be activated by the proper mechanism (not shown) to effectuate the shuttle. The proper alignment occurs when the wedge-shaped extension 154 is caused to be inserted into the wedge-shaped detent 146 on the disk 144 by actuation of its pneumatic cylinder 148. This brings the rotational movement of the drive shaft 28 to a stopped position within $\pm .5^{o}$ of the desired angular position. The drive shaft 28 in turn effectuates the positioning of the needle bar 86, permitting, through proper circuitry, the pressurization of the indexing cylinder 58 to complete the needle shuttle, and thus allows automatic stitching by the successive needle as required of the machine 20.

In a modification of the machine, instead of vacuum tubes 78, the thread control means may comprises a a thread-wiping mechanism generally designated 200. The mechanism 200 is arranged on the side of the machine opposite from the machine operator, and comprises two articulated hook-shaped fingers 202 and 204 (Figures 10 and 12). A drive means for the fingers comprises a pressurizable double-acting cylinder 206, secured to the housing 22, by a bracket 207, arranged adjacent the stitching mechanism 26. Alternatively, the drive means may comprise a solenoid arrangement,in place of the pressurizable cylinder. The first articulated finger 202 is secured to the distal end of a first shaft 208 (Figures 10), and the second articulated finger 204 is secured to the distal end of a second shaft 210

(Figure 12). The drive means also includes a piston, not shown, arranged within the cylinder 206, having a piston rod 212 extending upwardly and outwardly therefrom. A first transverse bracket 214 is secured to the distal end of the rod 212. The upper end of each shaft 208 and 210 is respectively secured in a bore 216 in the bracket 214. The other, lower, end of each shaft 208 and 210 is slidably received in a bore 218 in a second transverse bracket 220 to which the lower end of the cylinder 206 is attached.

A pair of wiper plates 222 and 224 extend downwardly from the second bracket 220 immediately adjacent and generally parallel to each articulated finger 202 and 204. Each wiper plate 222 and 224 has a distal edge 226 which is generally parallel to the needles 44 and 46. The distal ends of the fingers 202 and 204 are biased against their respective wiper plates222 and 224, the finger 202 or 204 holding the end of the thread 160 or 170 of the now inactive needle 44 or 46 thereagainst.

The pressurizable cylinder 206 is serviced by a first and a second pressurizable fluid supply conduit 230 and 232 which channel pressurizable fluid from a proper regulatable pressurizable source, not shown, to the cylinder 206.

In operation of the modification, the thread-wiping mechanism 200 is pressurized by effecting pressurized fluid to be channelled through conduit 230 to cause the piston rod 212 to move downwardly in the cylinder 206, from its position shown in phantom lines in Figure 11 and designated "A" and "B" to the lower position shown in full line drawing therein, prior to the needles 44 and 46 shifting by actuation of the indexing mechanism 32. The fingers 202 and 204 extend to a position, shown in Figure 11, wherein the lowest portion or trough of the fingers 202 and 204 are beneath the needles 44 and 46. The thread from whichever needle is the "to-be-active" needle 44 or 46, is then released from between its respective resilient wheel 68 or 74 and distal portion of its respective needle holder 48 or 50 as the needles and needle holders are caused to shift with respect to the resilient wheels

68 and 74. The thread 160 or 170 from the remaining "to-be-inactive" needle 44 or 46 is secured as it passes between its respective resilient wheel 68 or 74 and its respective needle holder 48 or 50. The wiper fingers 202 and 204 are then retracted by pressurized fluid entering the cylinder 206 through the conduit 232, and the end of the thread, which has been cut by known means, in the now inactive needle is pulled out of the workpiece due to its being caught by its respective returning finger 202 or 204. This return motion of the retracting finger does not pull the thread from the inactive needle because the respective resilient wheel 68 or 74 holds (pinches) the thread against its respective needle holder 48 or 50, and because each wiper finger 202 and 204 passes by its respective needle 44 or 46 on the side opposite from which the thread enters from above, to keep the inactive needle threaded.

The retracted wiped position of finger 202 is shown in Figure 11 by the dashed lines indicated at "B", the thread 160 being shown wiped or pinched against its respective wiper plate 222, in this case.

In a modified form, the fingers 202 and 204, may have slightly different configurations, and they may be actuated independently by independent means such as a pair or pressurizable cylinders or the like.

Claims

1. Automatic sewing machine comprising a plurality of needles each of which is moveable into and out of an active (or stitching) position in which it is aligned with a needle drive bar, the or each other needle being held in an inactive position, characterised in that thread control means (66; 72 (200); 126) is provided for controlling the thread (160 or 170) supplied to the or each inactive needle (44 or 46) so as to ensure that such thread (160 or 170) does not interfere with the thread (160 or 170) supplied to the active needle (44 or 46) during the operation of the latter.

2. Machine according to claim 1 characterised in that the thread control means (66; 72 (200); 126) comprises, associated with each inactive needle position, a thread end removal device (72; 200) for drawing out of the way the thread end (160 or 170) extending beyond the needle (44 or 46) in such inactive position.

3. Machine according to claim 2 characterised in that such thread end removal device (72) comprises a vacuum tube (78) arranged adjacent its associated inactive needle position.

4. Machine according to claim 3 characterised in that the end of each vacuum tube (78) is arranged adjacent the eye of the needle (44 or 46) against the direction of feed of the thread (160 or 170) through the eye.

5. Machine according to claim 2 characterised in that each thread end removal device (200) comprises a reciprocable thread-wiping finger (202; 204) arranged adjacent its associated inactive needle position and co-operative

with a surface (222; 224) to clinch the end of the thread (160 or 170) extending beyond the needle (44 or 46) when in its inactive position against said surface (222 or 224) and to draw it out of the way.

6. Machine according to claim 5 characterised in that the surface (222; 224) is provided by a plate (222; 224) fixedly disposed parallel to the path of movement of its associated wiping finger (202; 204), the latter (202; 204) being biassed against its associated plate (222; 224).

7. Machine according to either one of claims 5 and 6 characterised in that a single motor (206) is provided for effecting reciprocating movement of the wiping fingers (202; 204), the latter (202; 204) being effective only to draw the thread end of the or each inactive needle (44 or 46) out of the way.

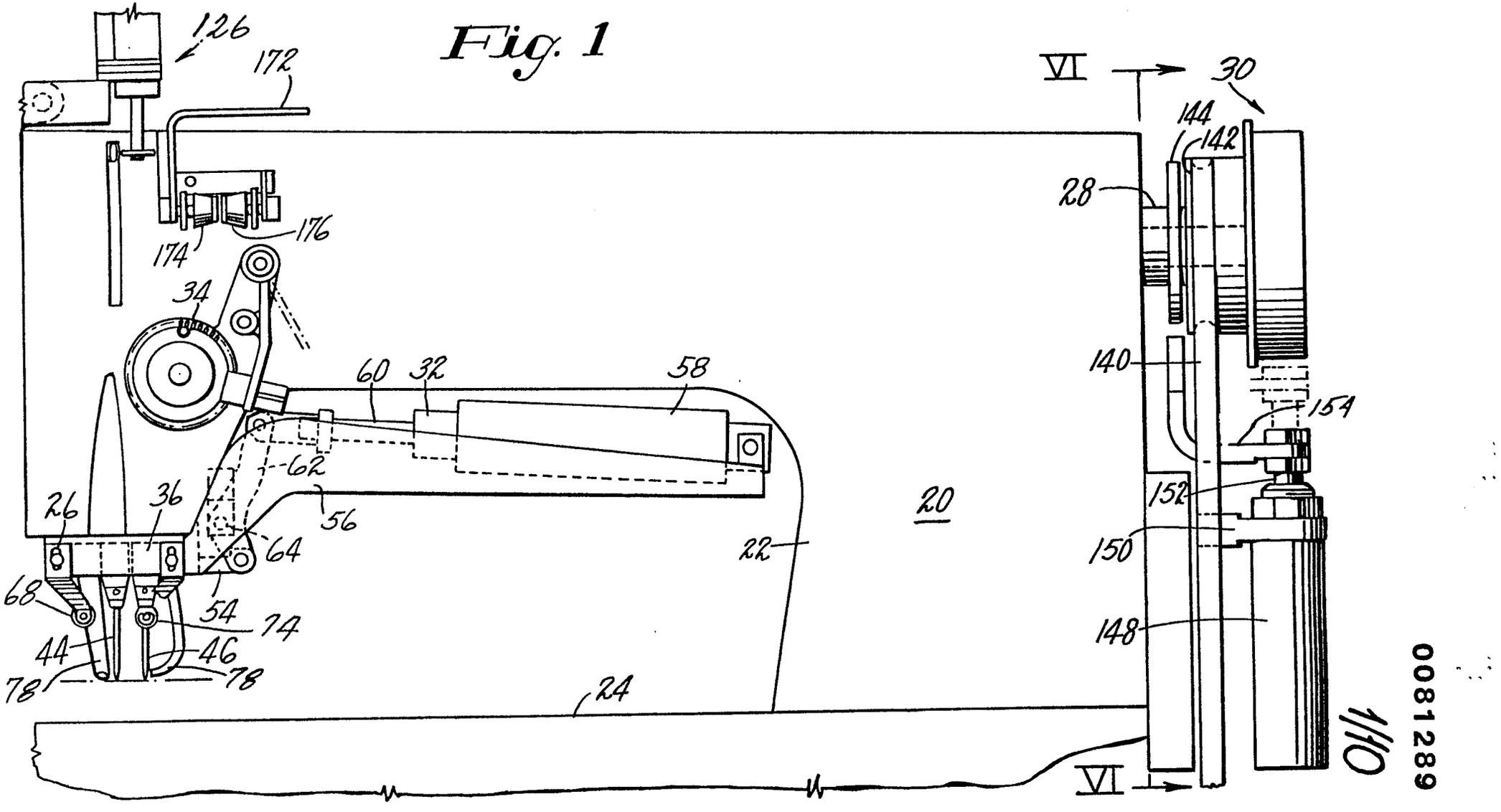
8. Machine according to any one of claims 2 to 7 characterised in that the thread control means (66; 72 (200); 126) comprises, associated with each inactive needle position, a thread-nipping device (66) by which, when a needle (44 or 46) is in such inactive position, the thread (160 or 170) supplied thereto is secured against being pulled from the eye thereof.

9. Machine according to claim 8 characterised in that each thread-nipping device (66) comprises a clamp element (68; 74) arranged adjacent its associated inactive needle position and co-operative with a surface (49) of a holder (48; 50) for the needle (44; 46), the arrangement being such that the thread (160; 170) is clamped between said clamp element (68 or 74) and said surface (49) when the needle (44 or 46) is moved to the inactive position.

10. Machine according to either one of claims

8 and 9 characterised in that the thread control means (66; 72 (200); 126) comprises, associated one with each needle (44; 46) a thread pullback device (126) including a guide element (138) movable between an advanced position adjacent its associated needle (44; 46) and a retracted position spaced apart from the needle (44; 46), the arrangement being such that when a needle (44 or 46) is in the active position its associated guide element (138) is in its advanced position, and when a needle (44 or 46) is in the inactive position its associated guide element (138) is in its retracted position.

Fig. 1



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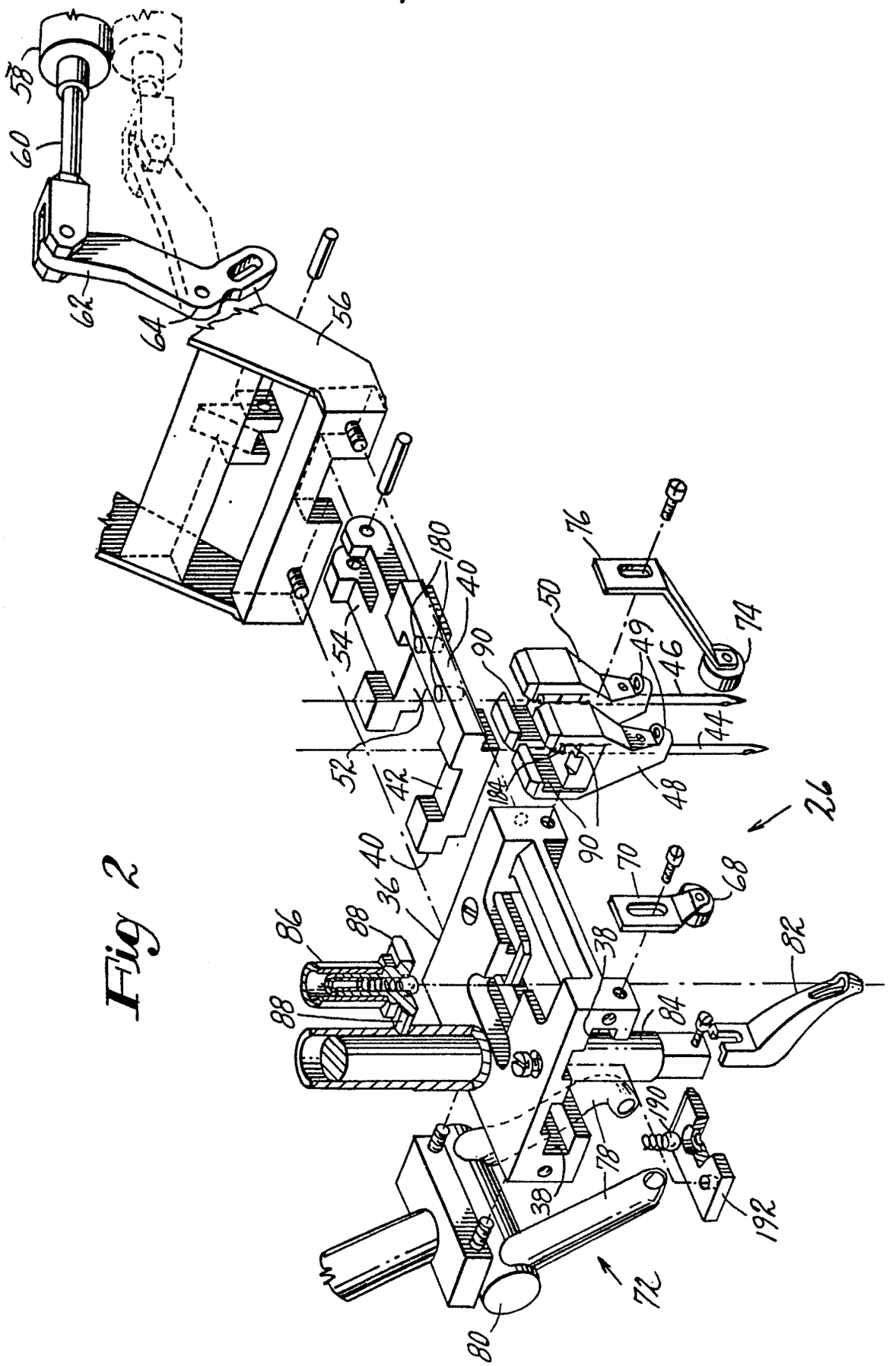
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Fig 2

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Fig. 3

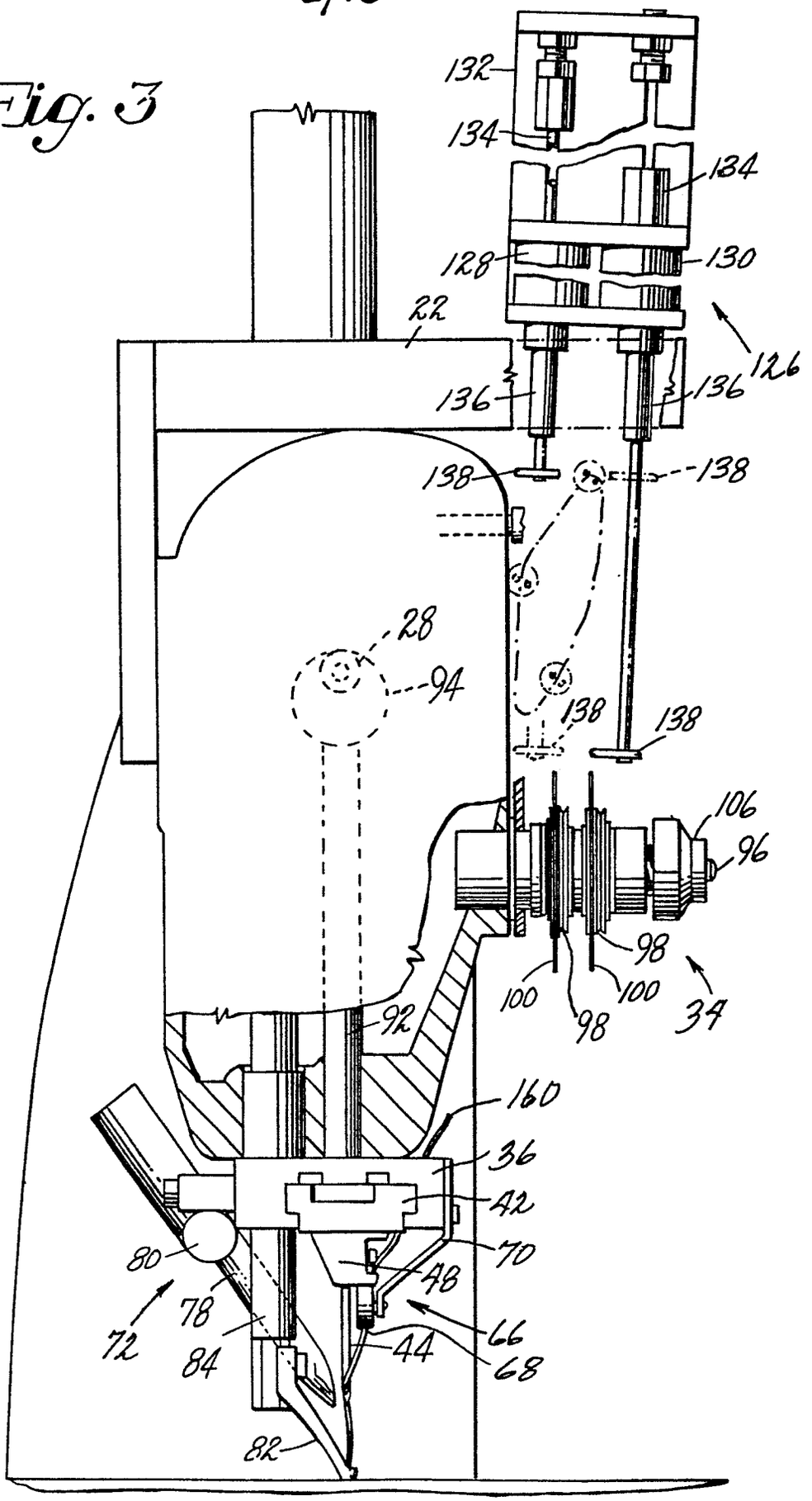
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Fig. 4

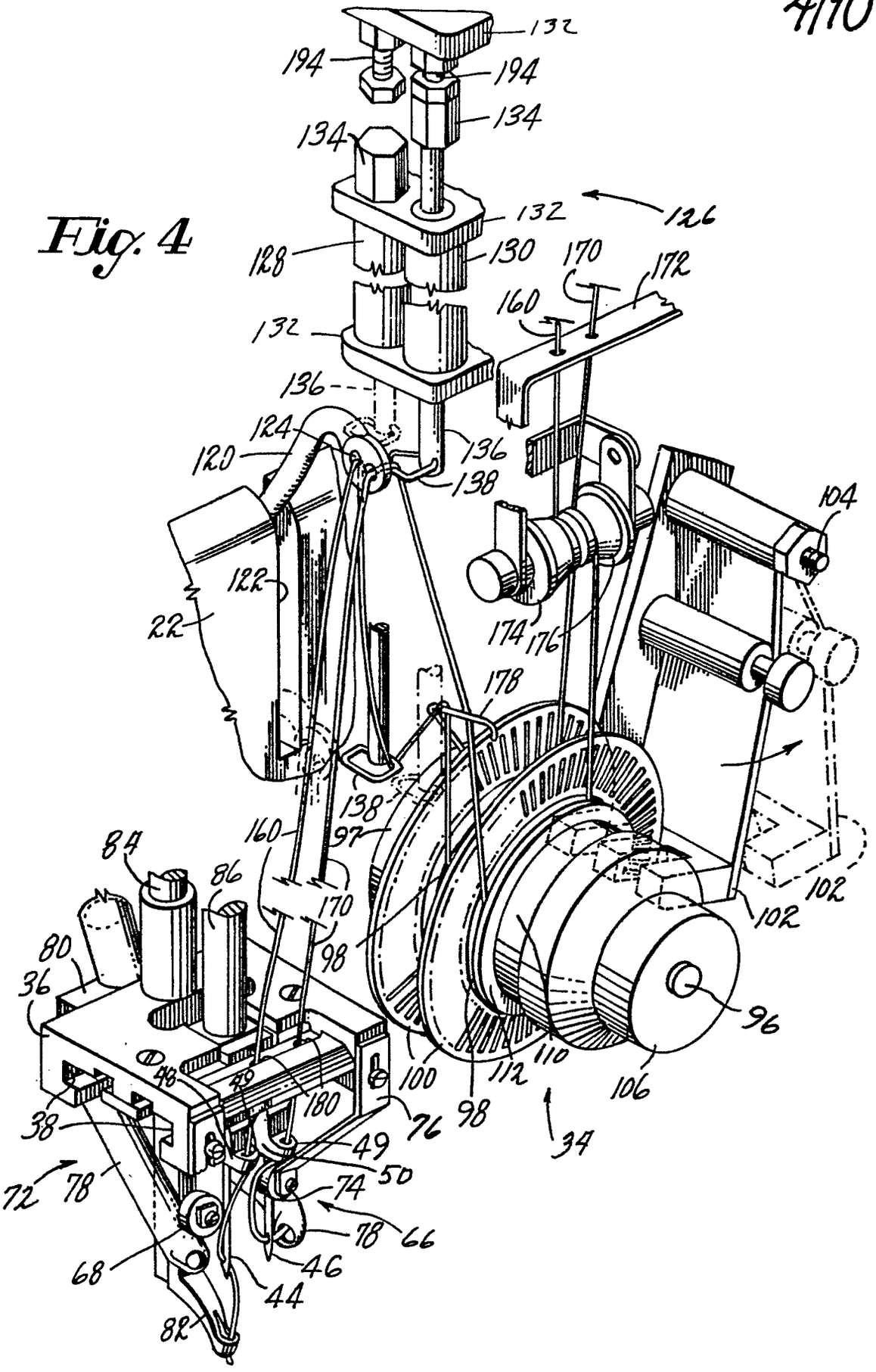
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Fig. 5

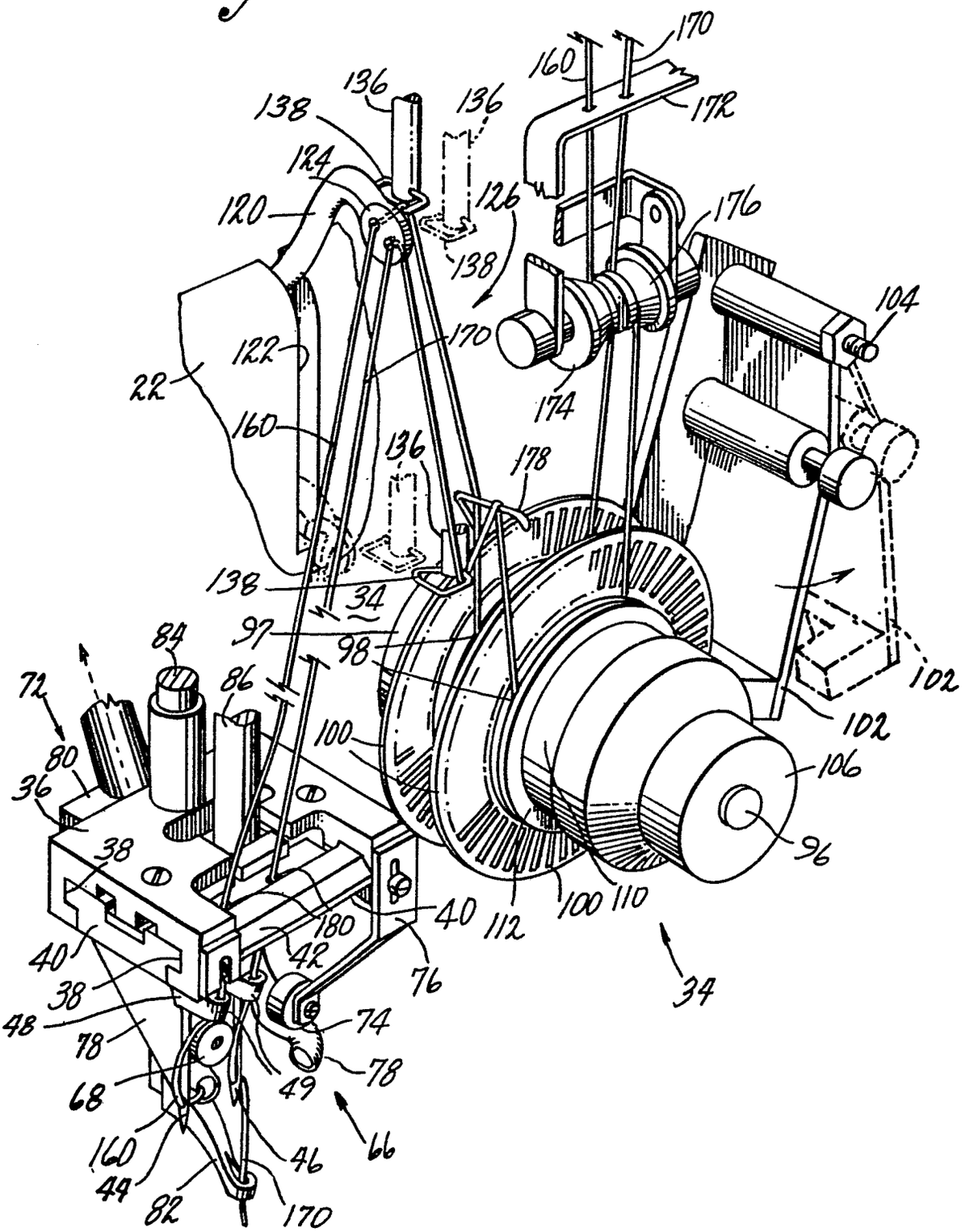
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Fig. 6

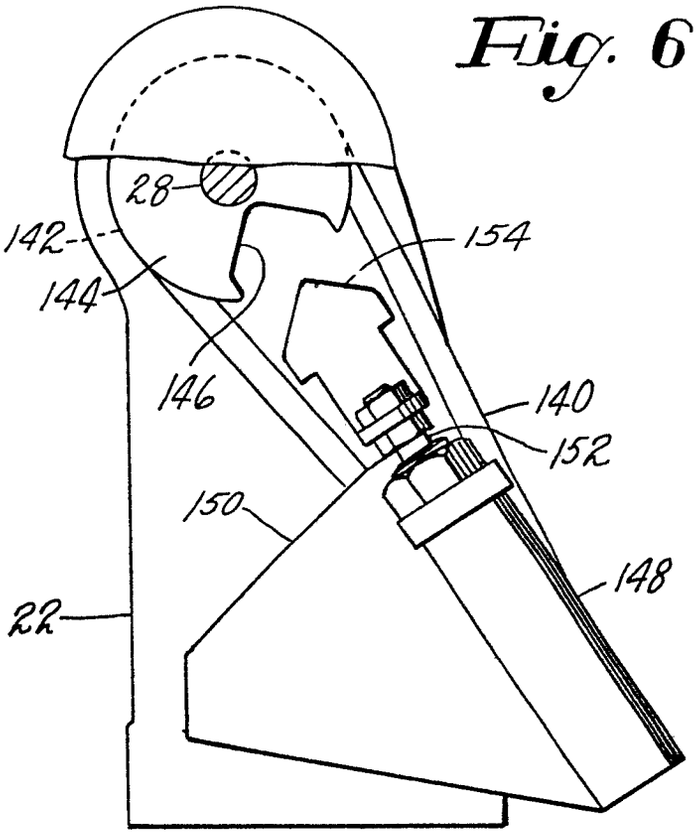
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Fig. 7

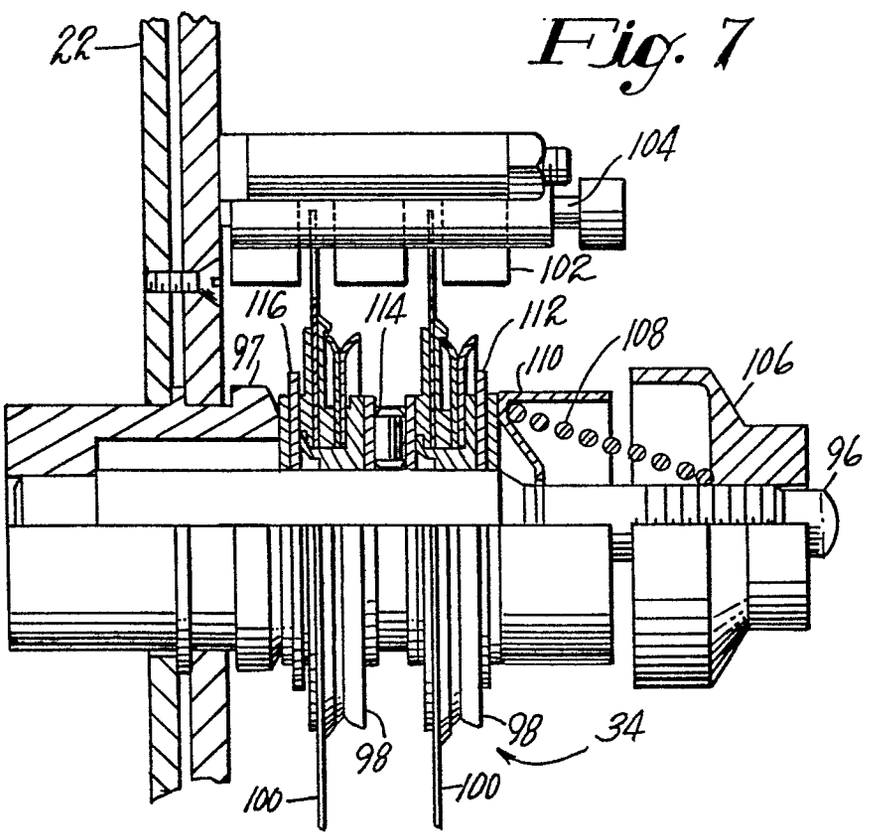
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Fig. 8

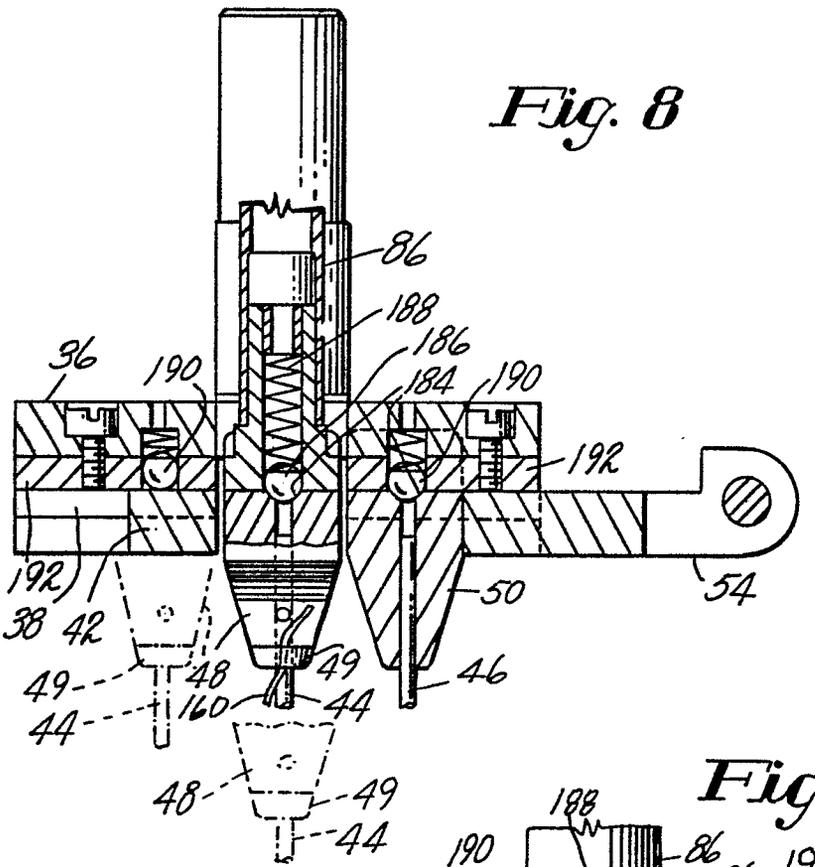
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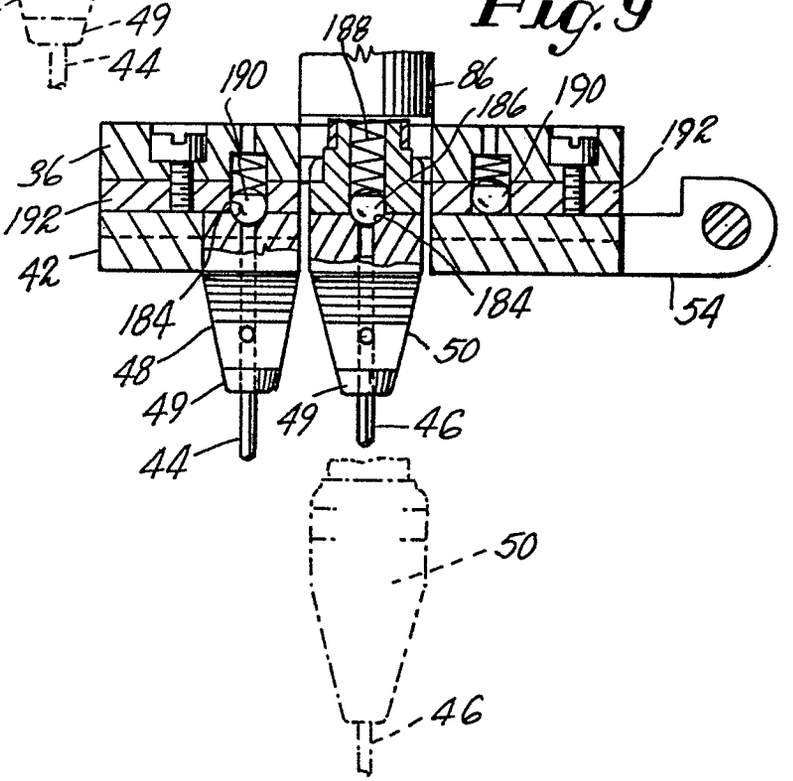
Fig. 9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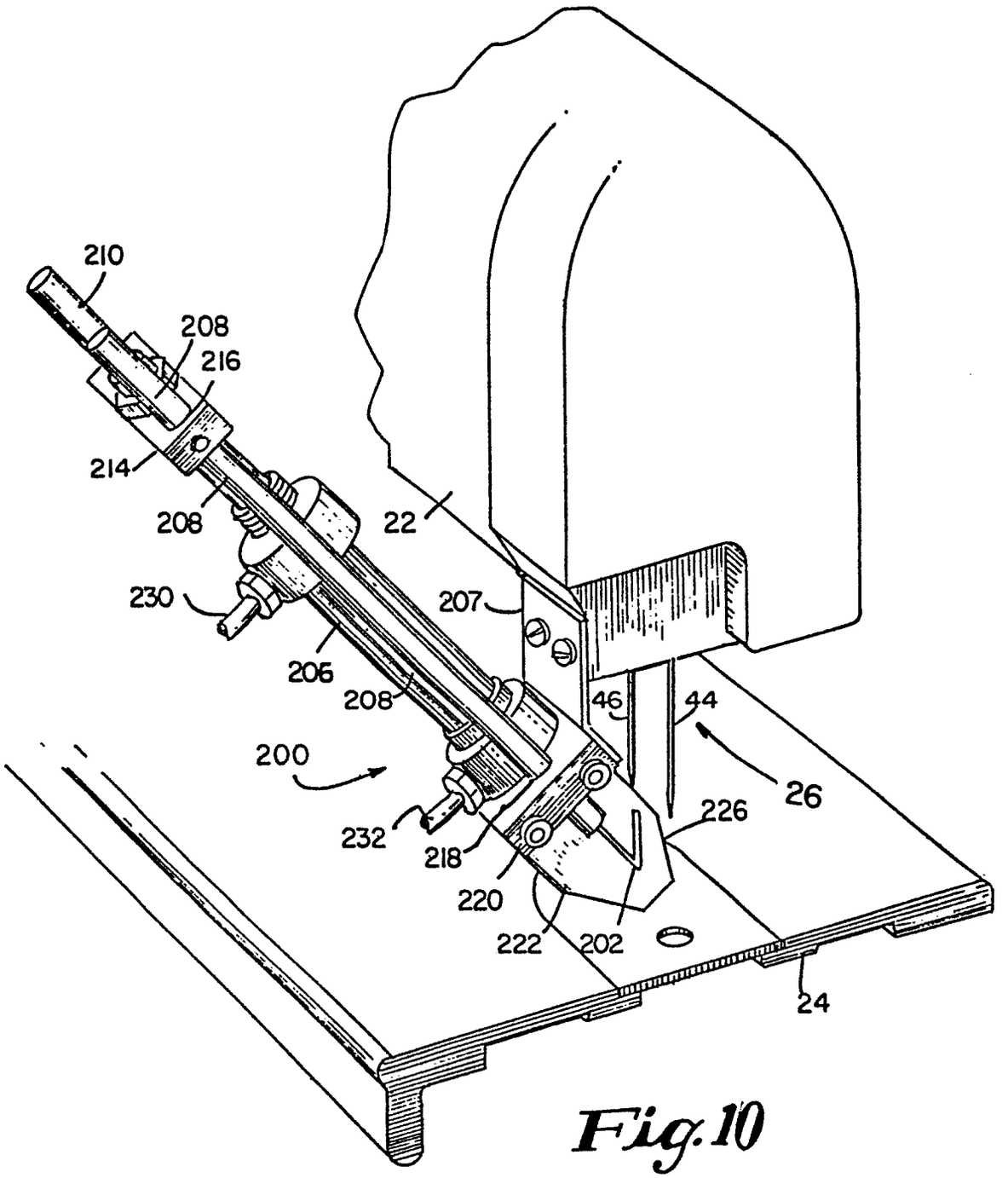
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Fig. 10

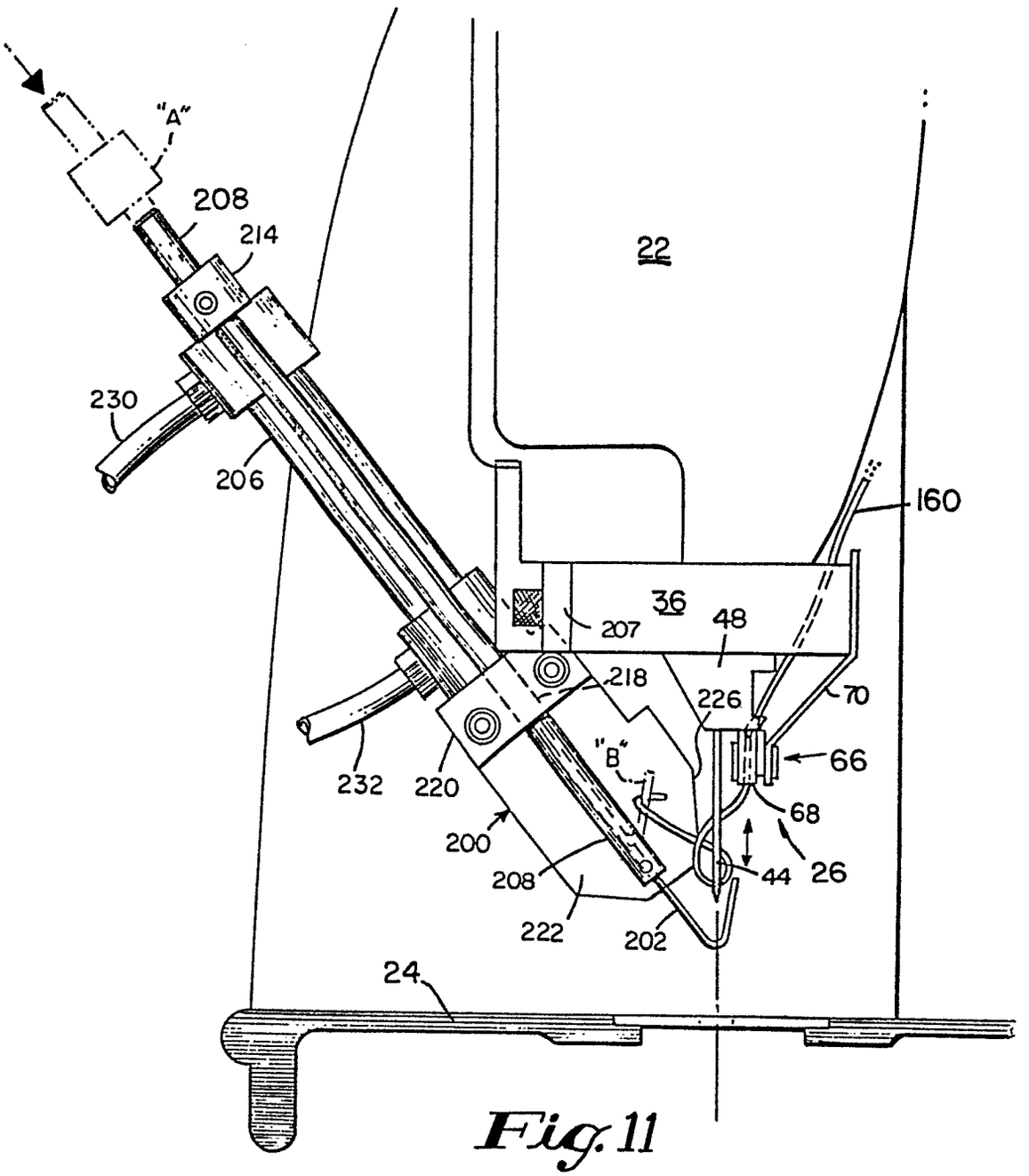
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Fig. 11

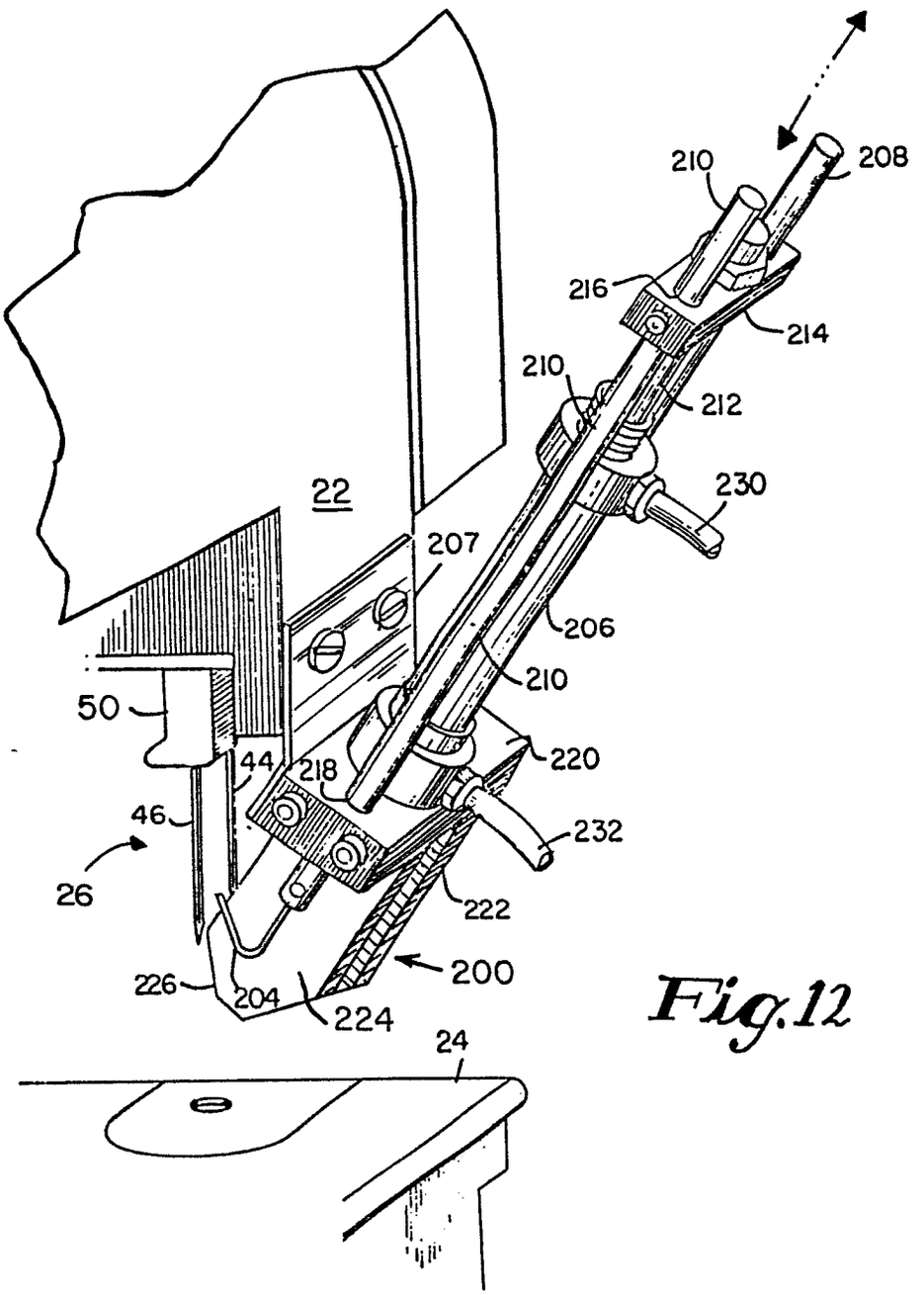
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Fig. 12

0081289

European Patent Office

Application number

EP 82 30 5575

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	DE-A-2 938 894 (PFAFF) * the whole document *	1,2,3, 8	D 05 B 65/06
Y	US-A-3 494 316 (ROSS) * the whole document *	1,2,5, 6,7	
Y	US-A-3 848 555 (BOSER) * figures 3 to 6 *	1,2,5, 6,7	
Y	US-A-3 901 171 (ROSA) * abstract *	1,2,5, 6,7	
Y	US-A-3 922 983 (SCHIPS) * figure 7; column 2, lines 45-50 and 56-57; column 3, lines 11-16 *	1,2,3	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) D 05 B
Y	DE-A-2 949 625 (VEB) * the whole document *	1,2,5, 6,7	
A	FR-A-1 445 554 (GAM) * page 3, column 2, paragraphs 5 and 6 *	10	

-/-

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-01-1983	VUILLEMIN L.F.

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0081289
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	US-A-3 601 074 (VON HAGEN) ----	1,2,5, 6,7,10	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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