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H. BREHMER, Dec'd.

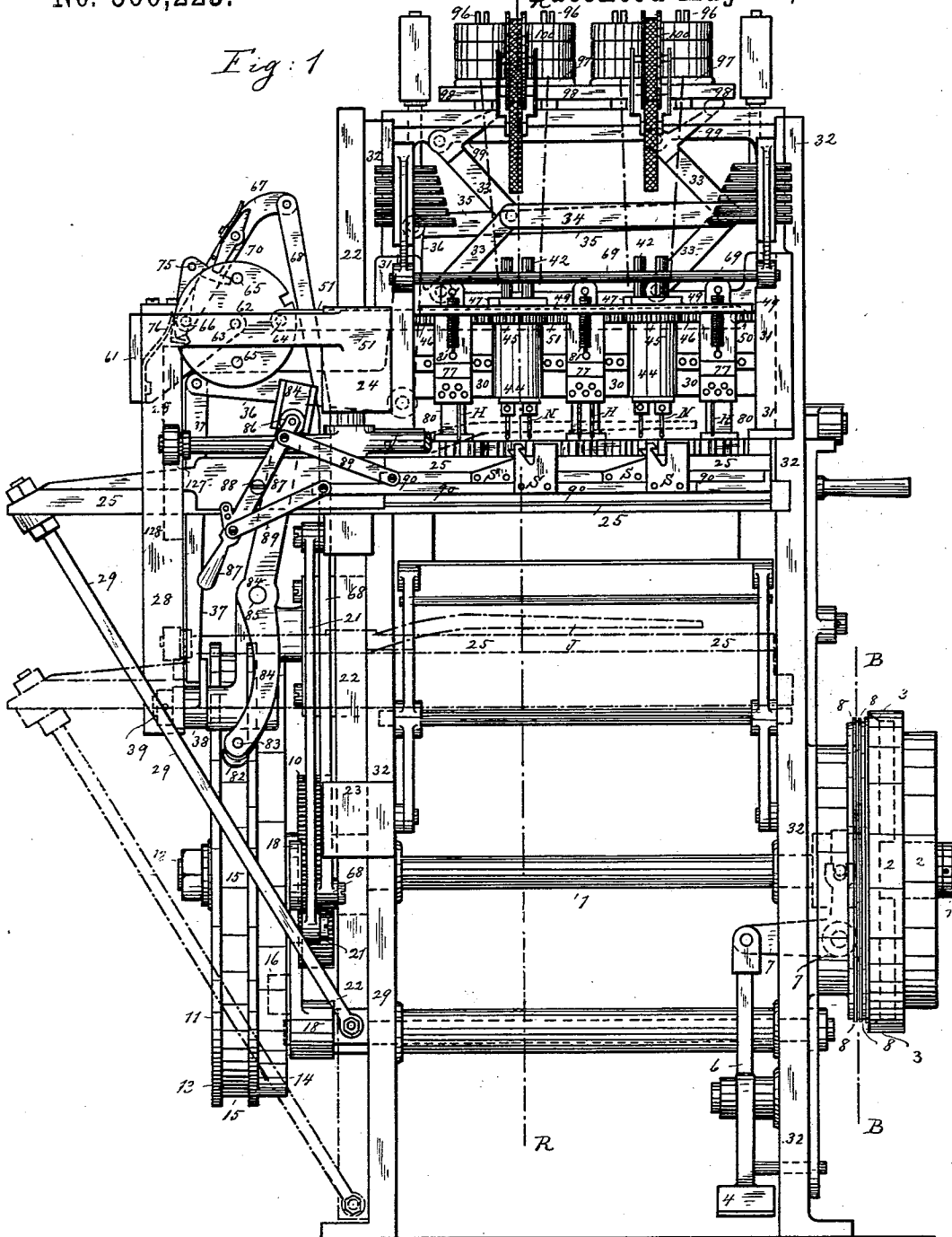
C. F. LINDENBERG, Executor.

BOOK SEWING MACHINE.

No. 560,223.

Patented May 19, 1896.

Fig. 1



Witnesses:
A. J. Longmans.
Wm. Schultz.

C. F. Lindenberg Ex
by his attorney
Roeder & Bissell

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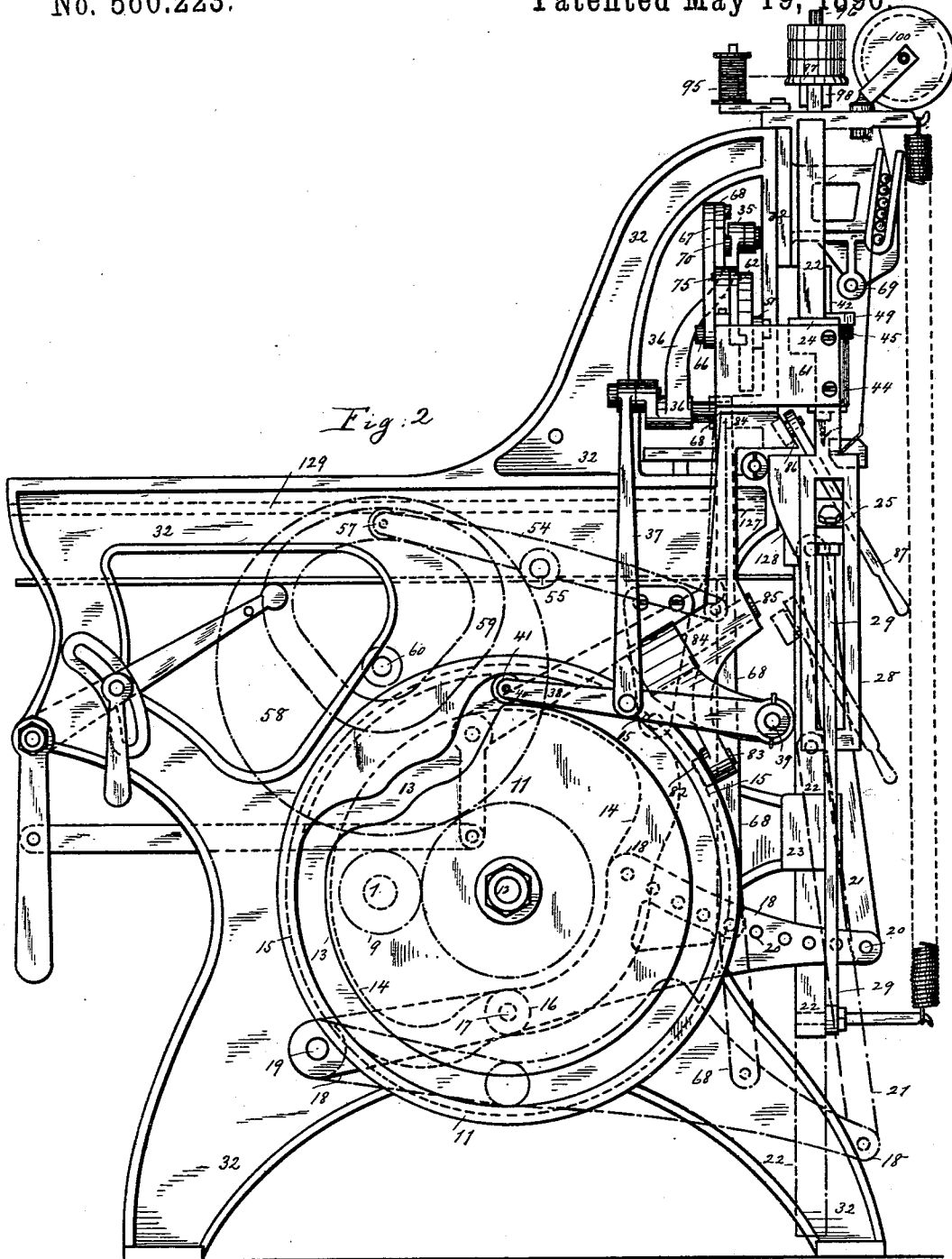
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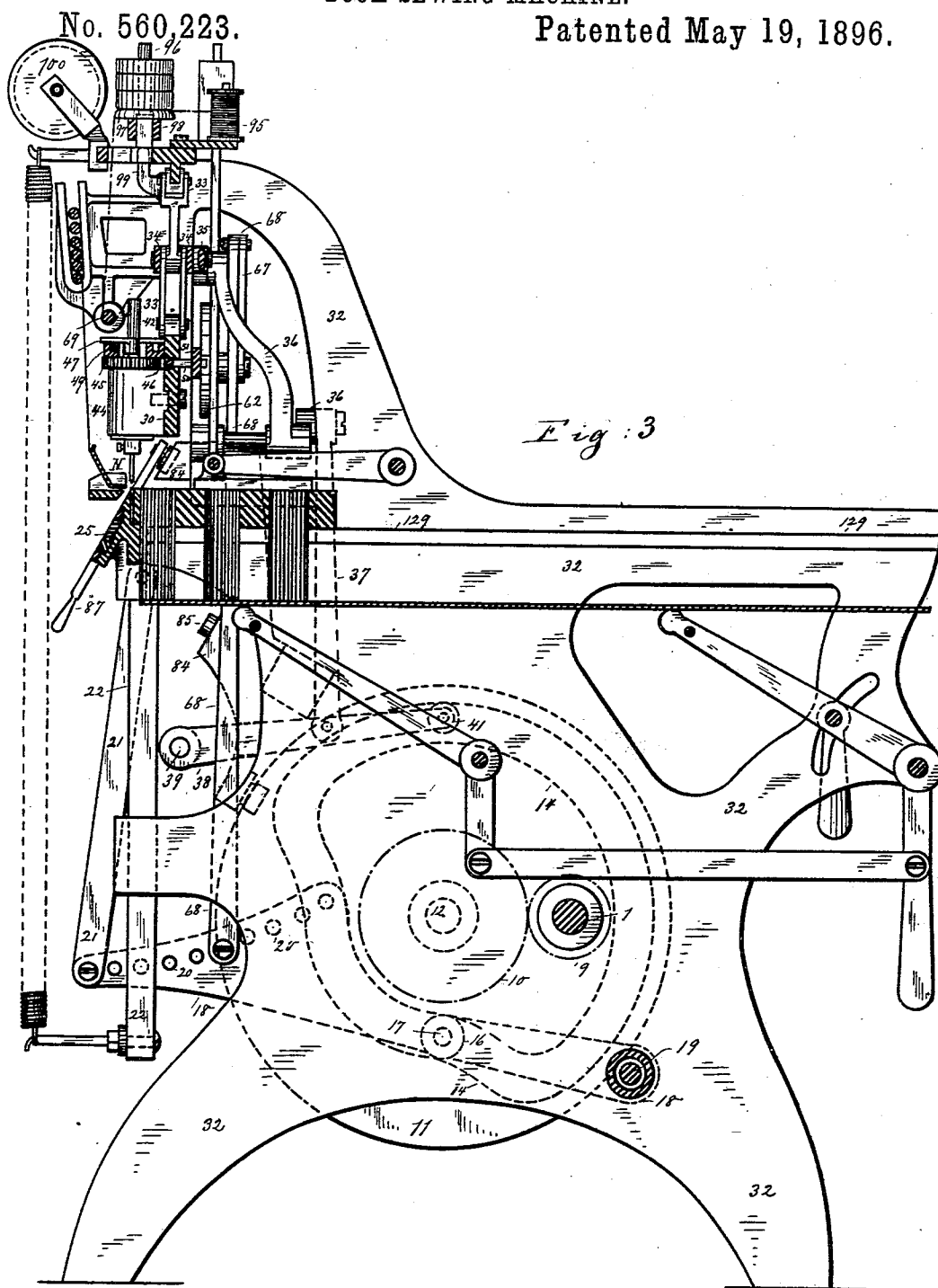
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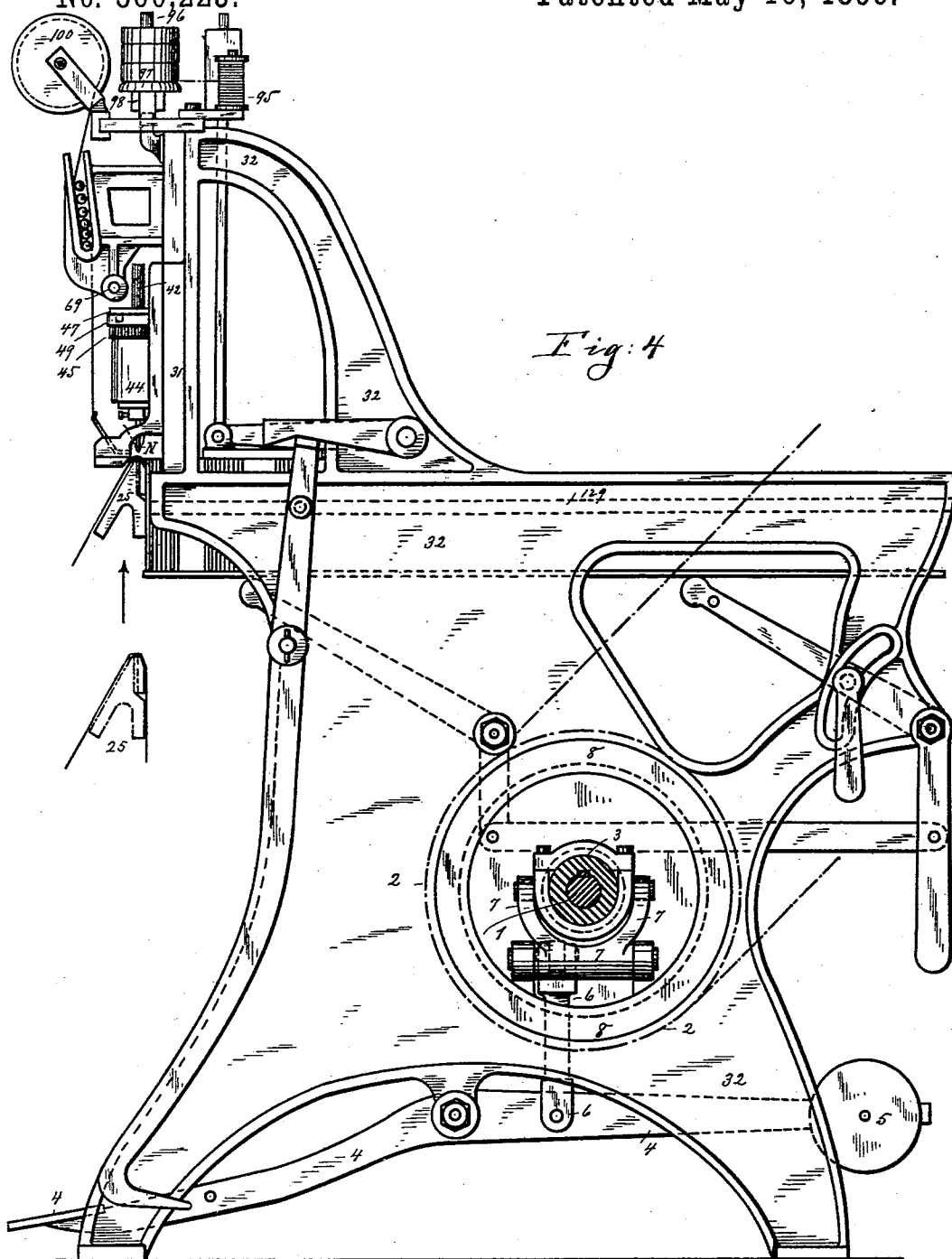
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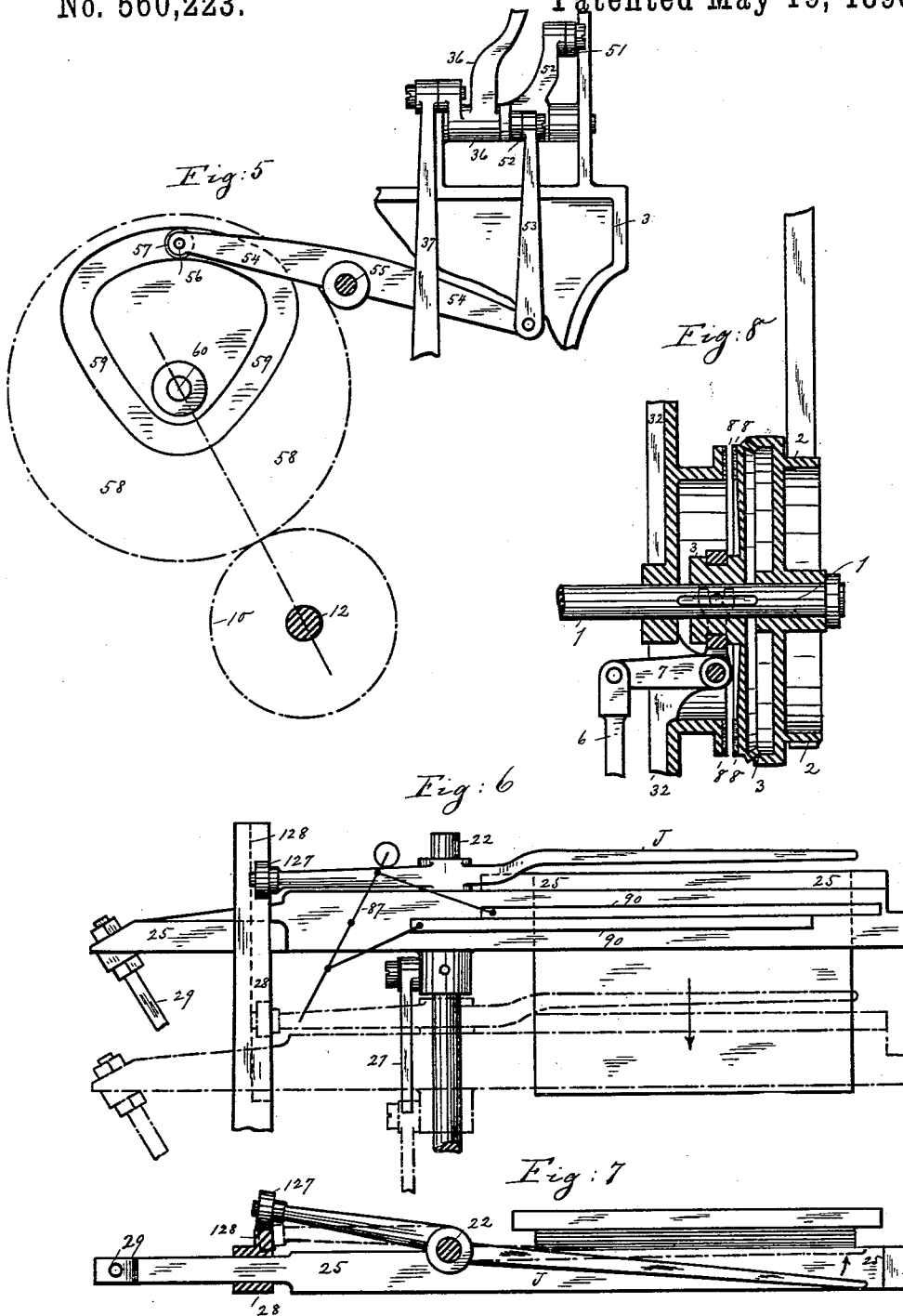
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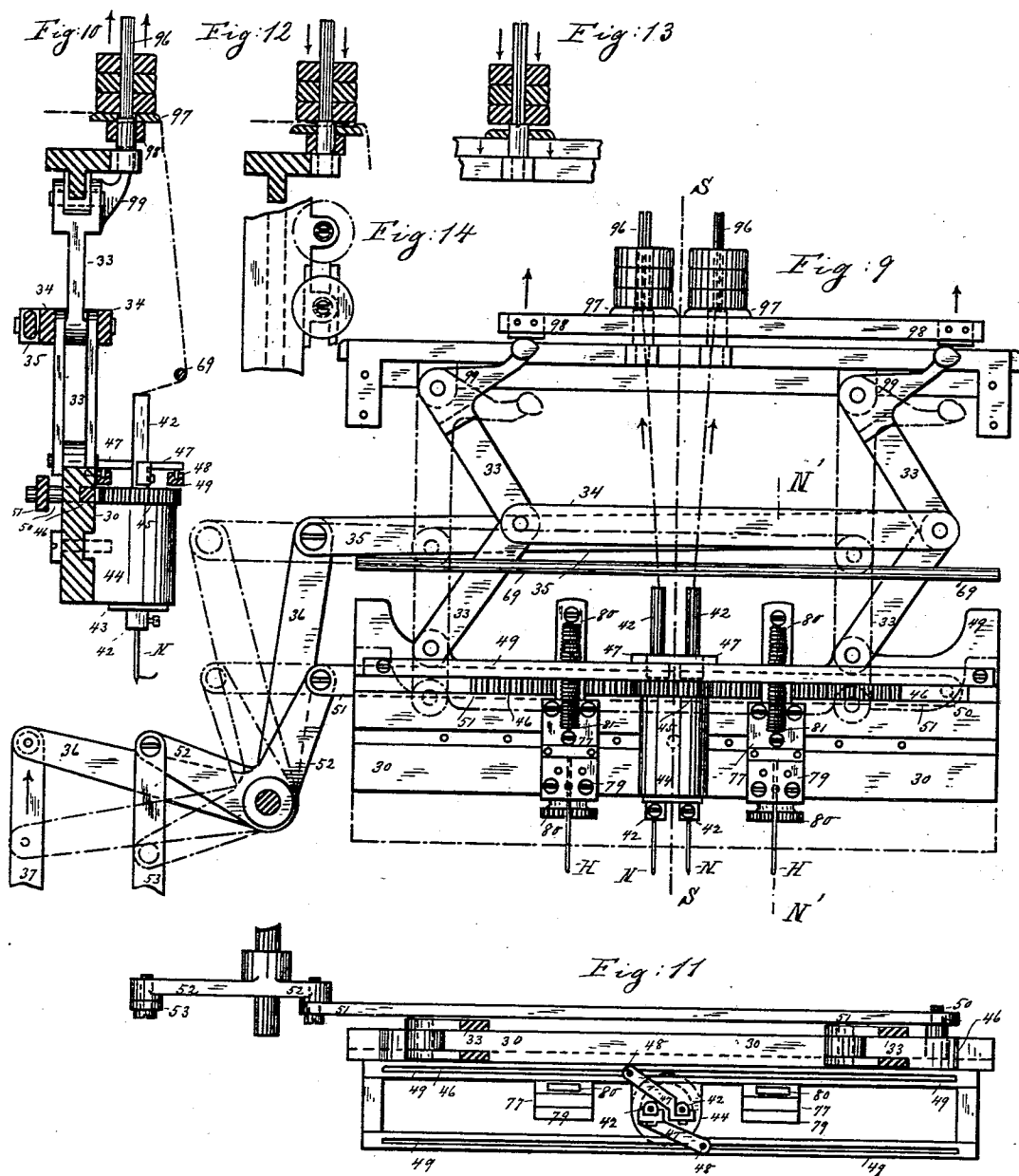
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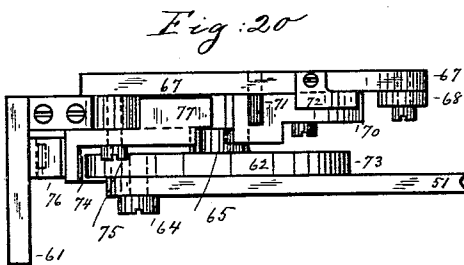
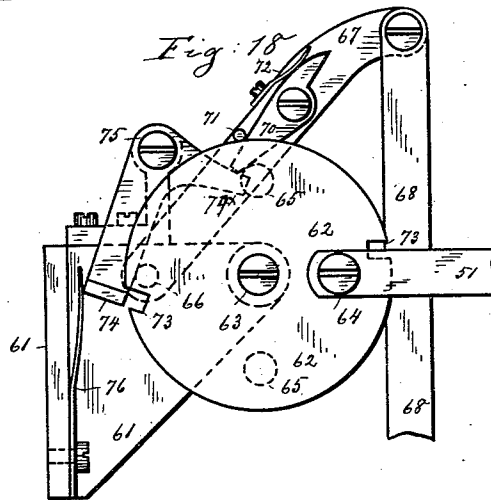
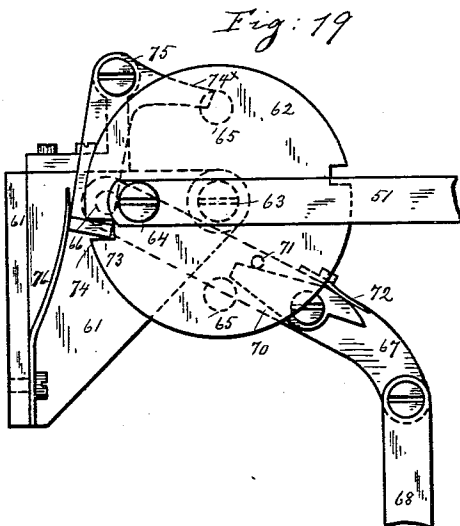
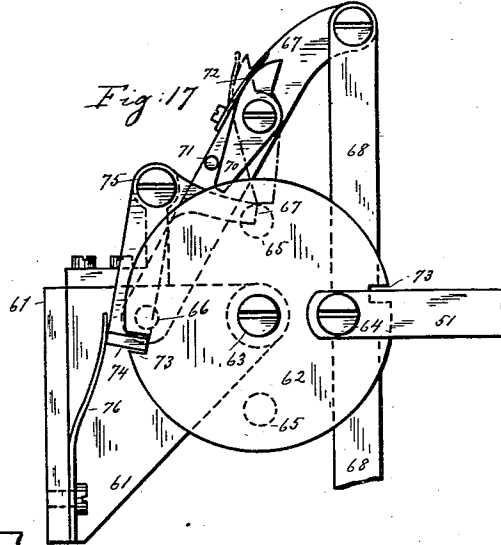
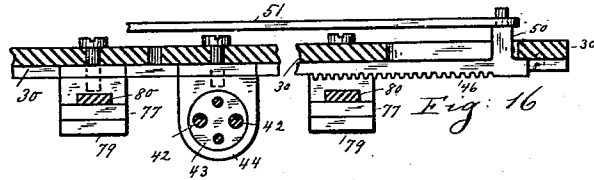
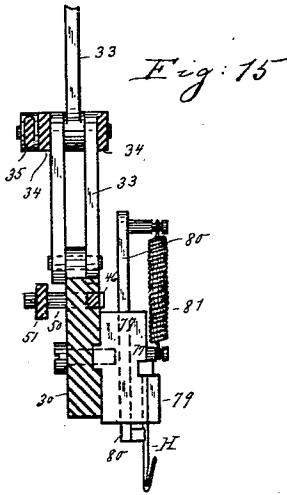
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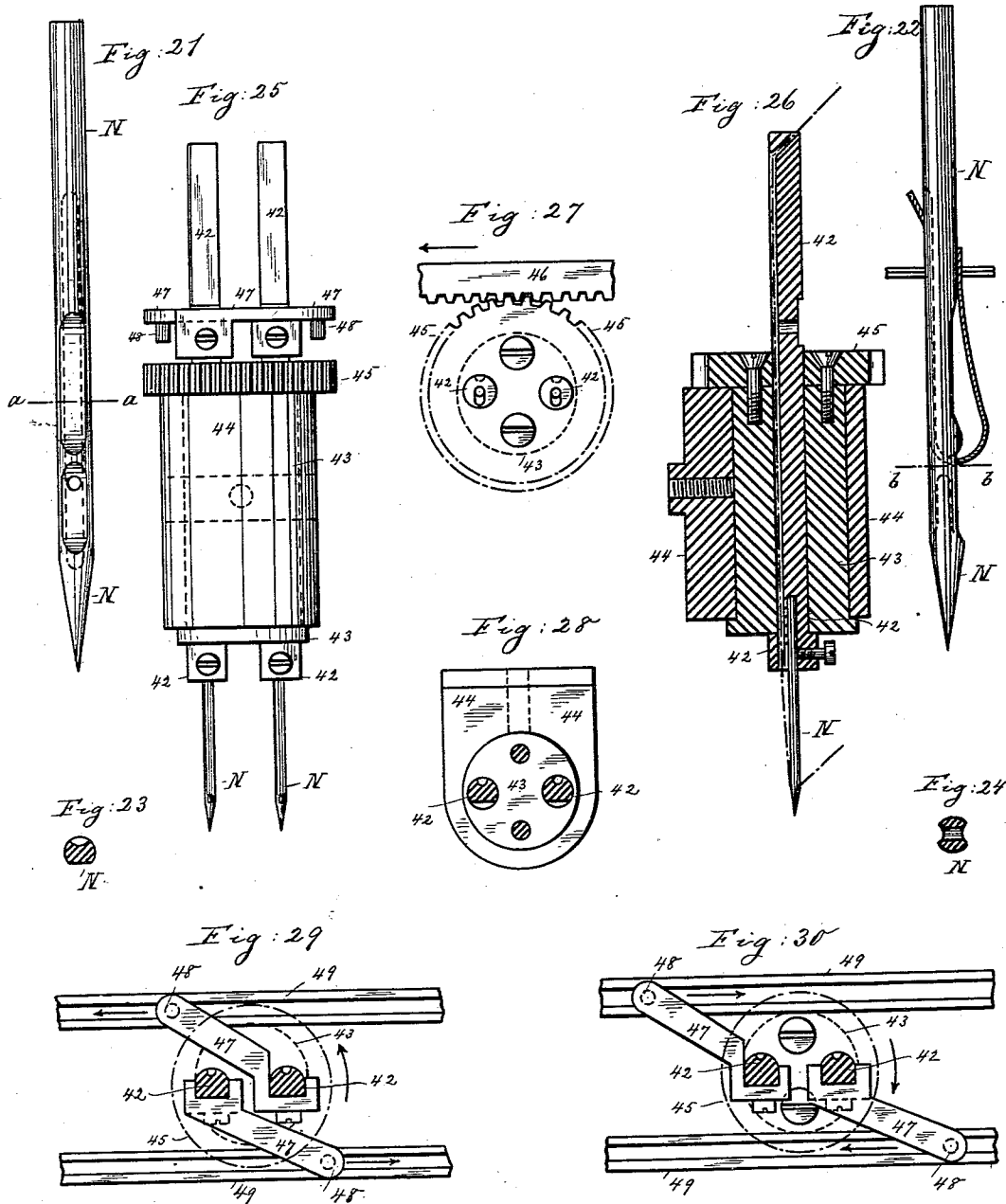
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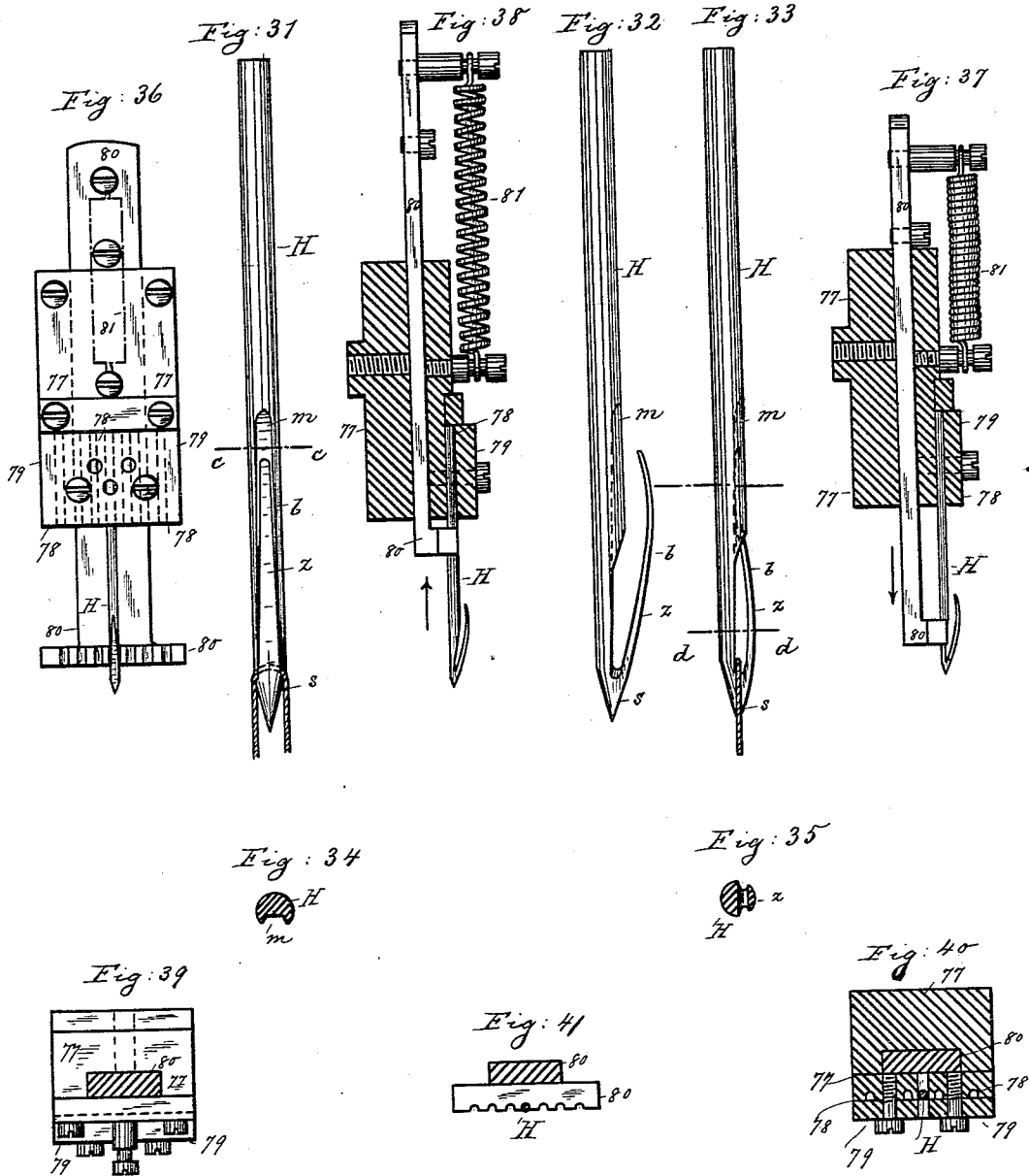
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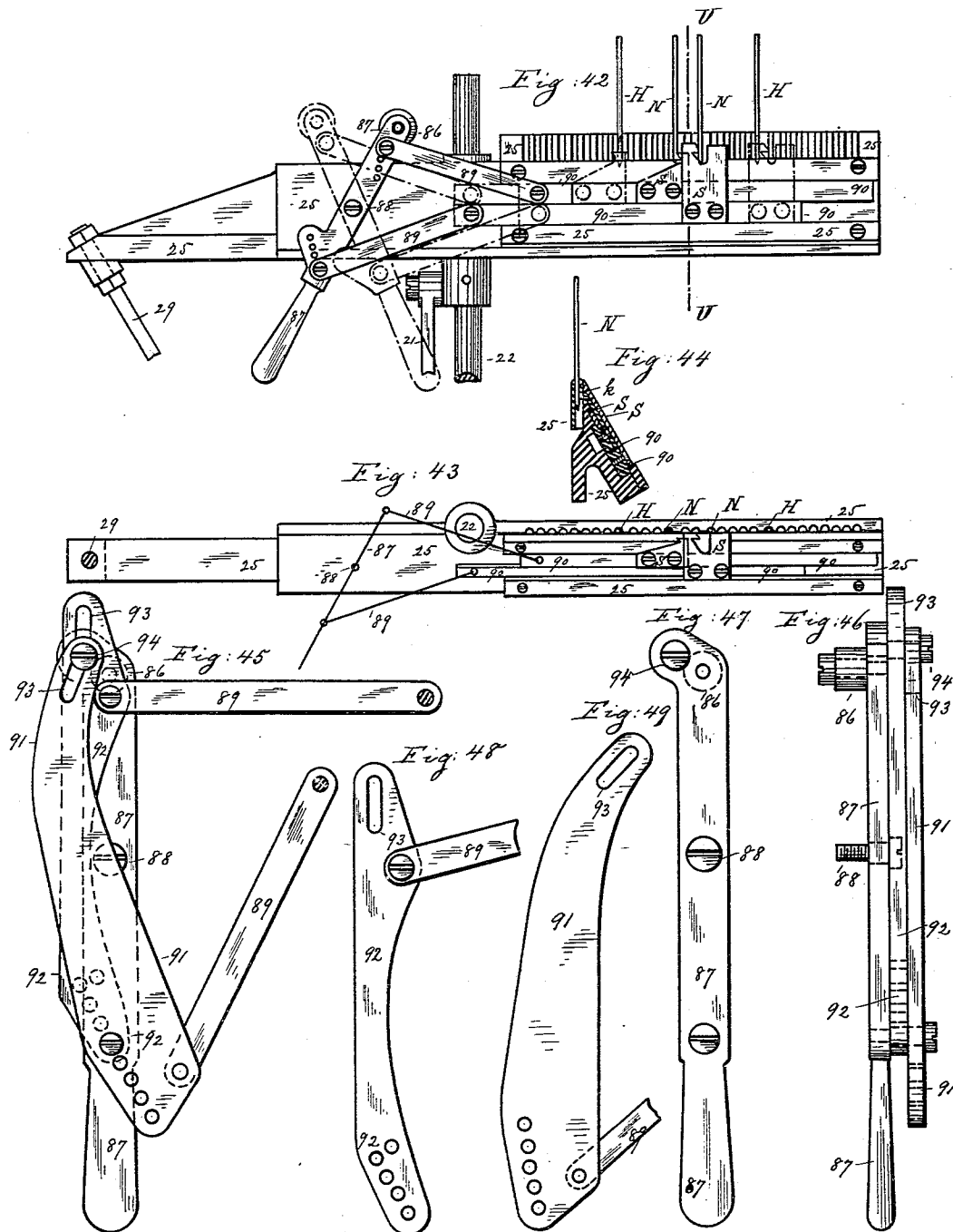
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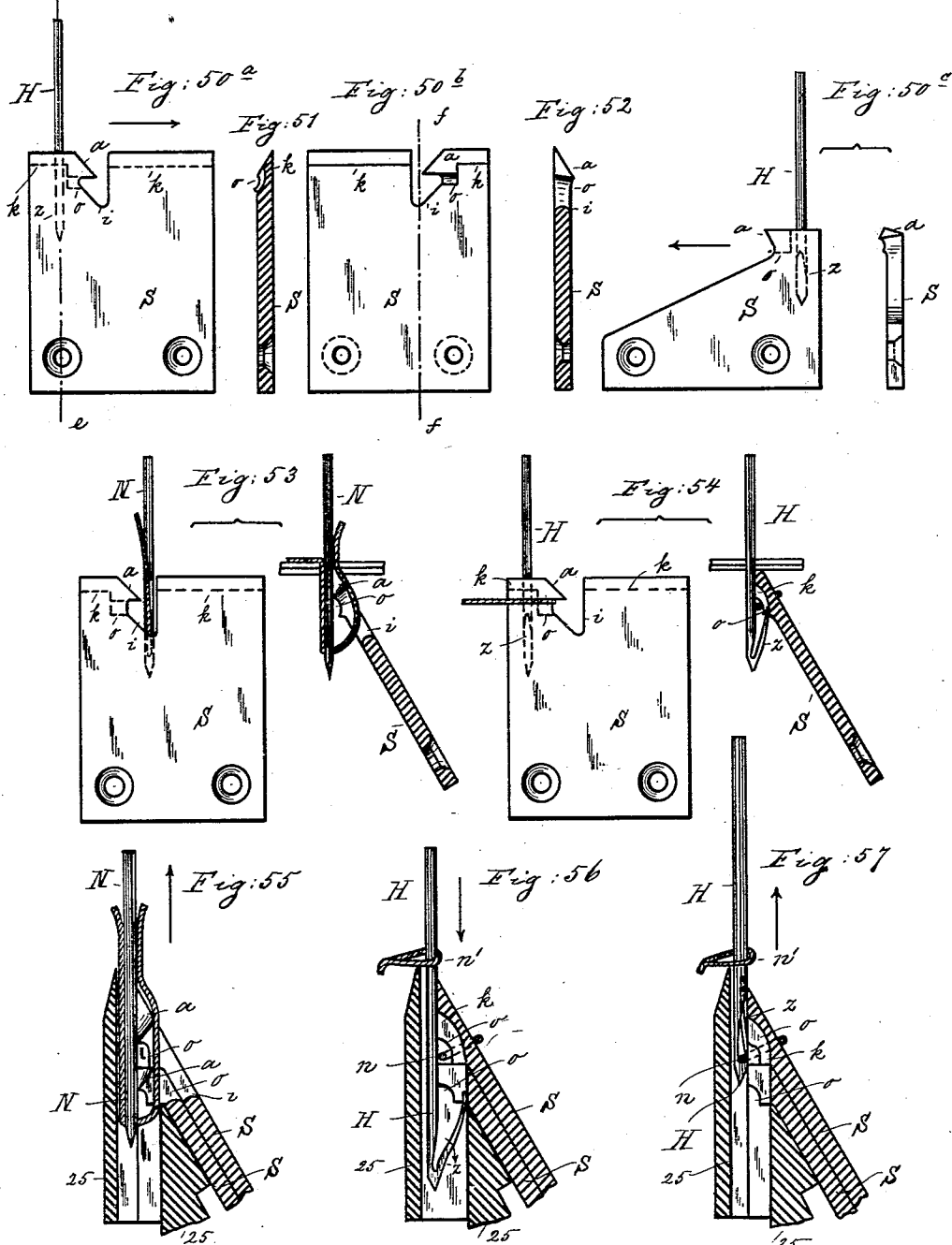
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Witnesses:

A. Goughman.

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Roderick & Riss.

(No Model.)

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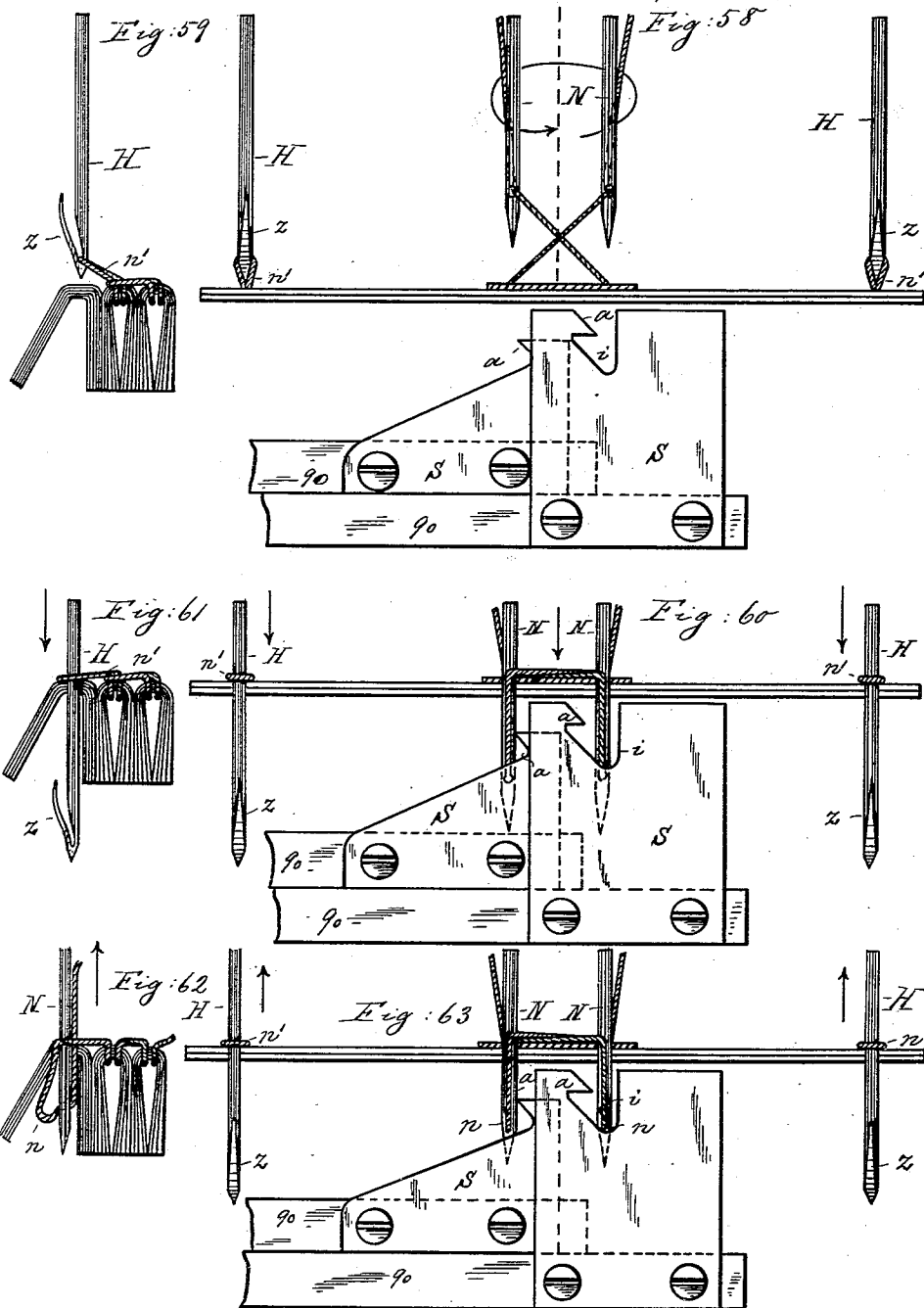
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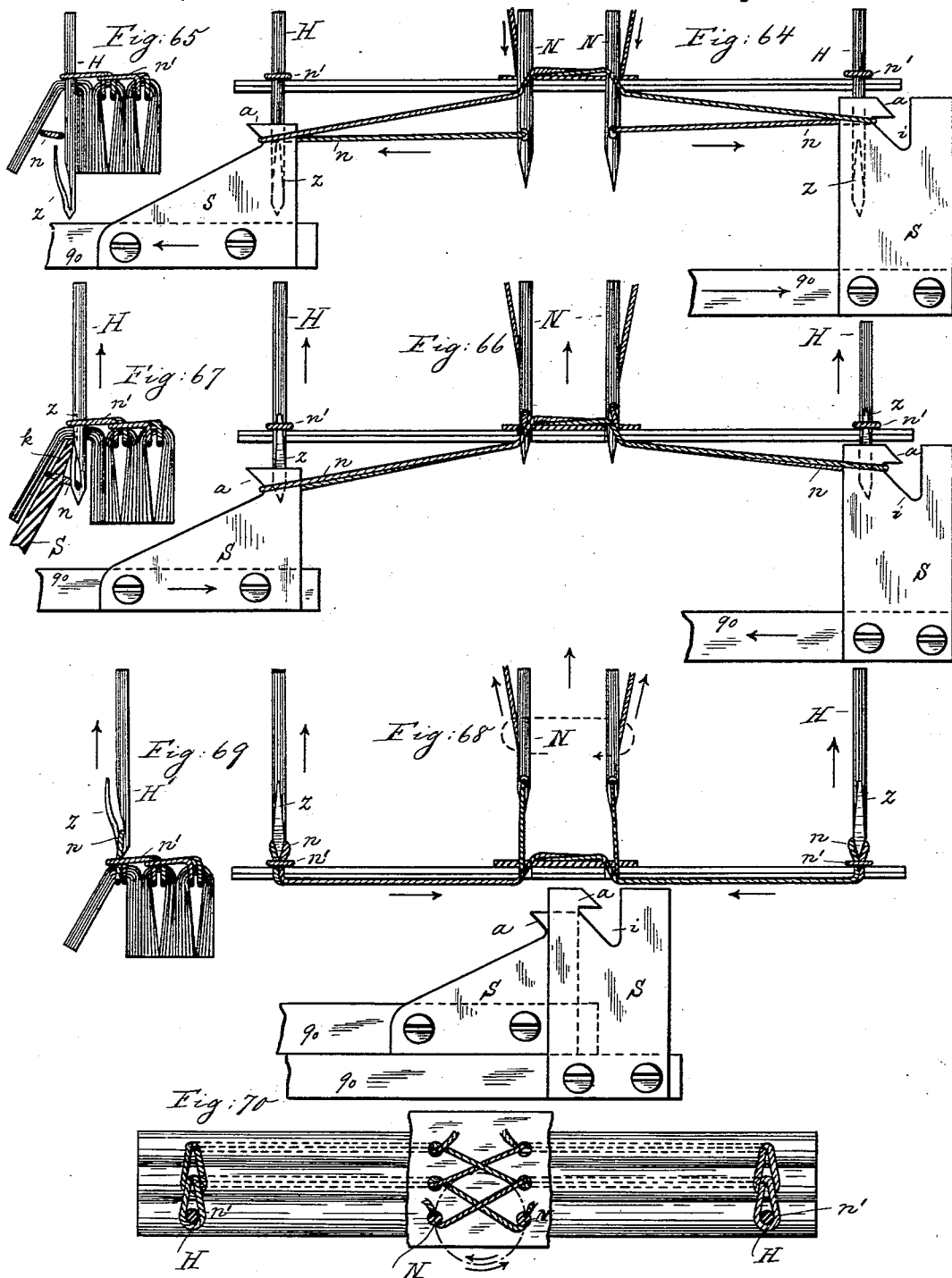
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Witnesses:
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Roeder & Riesen

UNITED STATES PATENT OFFICE.

CARL FRIEDRICH LINDENBERG, OF LÜBECK, GERMANY, EXECUTOR OF
HUGO BREHMER, DECEASED.

BOOK-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,223, dated May 19, 1896.

Application filed January 4, 1893. Serial No. 457,283. (No model.) Patented in Germany March 8, 1892, No. 71,947, and in England July 30, 1892, No. 13,917.

To all whom it may concern:

Be it known that I, CARL FRIEDRICH LINDENBERG, of Lübeck, Germany, executor of the last will and testament of HUGO BREHMER, deceased, late of Leipsic-Plagwitz, Saxony, Germany, hereby give a full, clear, and exact description of an Improved Book-Sewing Machine, the invention of said HUGO BREHMER, and for which he obtained a German patent, No. 71,947, dated March 8, 1892, and in England, No. 13,917, dated July 30, 1892.

This invention relates to certain improvements in book-sewing machines whereby the tape or backing is secured to the back of the book by the same stitches which connect together the collection of sheets known as the "signatures" instead of employing a special set of needles for the purpose, as heretofore. According to this invention the thread-carrying needles are arranged in pairs, the holder of each pair receiving motion of rotation after each stitch has been made, so as to reverse the positions of the needles and cause the thread carried by the said needles to cross each other on the back of the book. Crochet-hooks or needles with open eyes and also loop-carriers are employed in combination with the thread-carrying needles, the said crochet-hooks or open-eyed needles and loop-carriers being arranged to so operate with the thread-carrying needles as to produce a series of chain-stitches on opposite sides of the crossed stitches formed by the rotation of the thread-carrying needle-holders. The sets of sheets or signatures to be sewed are placed one at a time on a reciprocating frame known as a "saddle," which saddle may be caused to slide vertically in guides, as shown, or be mounted on a fulcrum or in any other convenient way, so as to be capable of being moved into position to receive a signature, and then to carry the signature into position beneath the sewing-needles to be stitched. In this saddle are grooves in which the needles enter, and in the interior or on the under side of this saddle the loop-carriers are caused to reciprocate, so that when by a slight upward movement of the needles loops are formed in the needle-threads the said loops are engaged by the loop catchers or hooks on

loop-carriers and drawn into position to be engaged by the open eyes or hooks of the crochet-hooks or open-eyed needles. The eyes of the said crochet-hooks or open-eyed needles have each a spring or hinged tongue, which normally remains open in position to receive a loop, but which, when the said needles rise, is by an inclined or curved surface on the loop-carriers closed against the stems of the needles, thereby permitting the needles to rise through the same holes in the signature that they formed when descending, and through the preceding loops to form the chain-stitch.

The accompanying drawings illustrate a book-sewing machine to which the invention is applied, but the invention is not limited to the precise construction and arrangement of the parts of the machine which do not in themselves form part of the present invention, but which serve to illustrate a manner of carrying out the said invention.

Figure 1 is a front elevation of a book-sewing machine having this invention applied thereto. Fig. 2 is a side elevation; Fig. 3, a section on line R R, Fig. 1; Fig. 4, a section on line B B, Fig. 1. Fig. 5 is a face view of the cam and parts connected therewith which may be employed for imparting reciprocating movement to a rack by which the thread-carrying needle holder or holders is or are rotated. Fig. 6 is a side elevation, and Fig. 7 a plan, of the arrangement of a pivoted bar, termed a "fly," for laying the signature previously stitched in position to permit the rising of the saddle. Fig. 8 is a vertical section through the driving-pulley and the friction-clutch arrangement connected therewith. Fig. 9 is an elevation of the bar which carries the needle-holders. Fig. 10 is a transverse section on line S S, Fig. 9; and Fig. 11 is a plan. Figs. 12 and 13 are vertical sections at right angles to each other of the tension device for the needle-threads, and Fig. 14 a plan corresponding to Fig. 12. Fig. 15 is a section on line N' N', Fig. 9; Fig. 16, a horizontal section of a portion of the right-hand end of Fig. 9. Figs. 17, 18, and 19 are elevations of the stop-disk in connection with the mechanism for operating the needle-holders. Fig. 20 is a plan

corresponding to Fig. 19. Figs. 21 and 22 are elevations at right angles to each other of one of the thread-carrying needles. Fig. 23 is a section on line *a a*, Fig. 21; and Fig. 24 is a section on line *b b*, Fig. 22. Fig. 25 is a front elevation of one of the boxes containing the rotatable socket or needle-holders and the box in which it rotates. Fig. 26 is a vertical section, Fig. 27 a plan, and Fig. 28 a sectional plan, of the same. Figs. 29 and 30 are plans of the arrangement for retaining the eyes of the needles always in the same position although the position of the needles is reversed. Figs. 31 and 32 are elevations at right angles to each other of one of the crochet-hooks or open-eyed needles drawn to an enlarged scale; and Fig. 33 is a view similar to Fig. 32, showing the eye closed. Figs. 34 and 35 are transverse sections taken along the line *c c*, Fig. 31, and *d d*, Fig. 33, respectively. Fig. 36 is a front elevation, and Figs. 37 and 38 are vertical sections, of one of the boxes or holders which carry the crochet-hooks or open-eyed needles. Fig. 39 is a plan, and Fig. 40 is a horizontal section, of the same. Fig. 41 is a sectional plan of the slide which works up and down in the box or holder and provided with notches in which the crochet-hook or open-eyed needle slides. Fig. 42 is a front elevation of the saddle, showing the loop-carriers. Fig. 43 is a plan corresponding to Fig. 42; and Fig. 44 is a transverse section on line *U U*, Fig. 42. Figs. 45 and 46 are elevations at right angles to each other of the mechanism for operating the loop-carriers, and Figs. 47, 48, and 49 are parts thereof detached. Figs. 50^a, 50^b, and 50^c are elevations of the sliding loop-carriers drawn full size, and Figs. 51 and 52 are vertical sections thereof. Fig. 53 shows the relative positions of the thread-carrying needle and the loop-carrier when the loop of thread is about to be engaged by the loop-catcher. Fig. 54 shows the position of the open-eyed needle when about to receive the loop of the thread from the loop-carrier. Figs. 55, 56, and 57 are transverse sections of the saddle and the loop-carriers, Fig. 55 showing the loop of needle-thread about to be engaged by the loop-carrier, Fig. 56 the crochet-hook or open-eyed needle about to engage the loop of thread engaged by the loop-carrier, and Fig. 57 showing the loop in the eye of the crochet-hook or open-eyed needle, the needle being raised into the position in which the spring-tongue is pressed by a curved projection on the loop-carrier against the stem of the needle. Figs. 58 to 69 show also, drawn to an enlarged scale, the different stages or positions of the needles and loop-carriers for producing the crossed stitches on the back of the book; and Fig. 70 is a plan of the stitching.

The numeral 1 refers to the main driving-shaft of the machine, on which is loosely mounted a strap-pulley 2, around which passes a strap from any suitable motor. Fitted to slide on a spline or feather on shaft 1 and in

proximity to the pulley 2 is a friction-disk 3, (see Fig. 8,) the periphery of which disk is coned to fit in a corresponding recess formed in or attached to one side of the pulley 2. One side of the said disk 3 carries a ring 8 of friction-producing material—such, for example, as wood or india-rubber—a similar ring being carried on a rim formed on the frame 32 of the machine. Centered to the frame within the said rim is a bell-crank lever, one arm of which is forked so as to engage a collar formed on the boss of the disk 3, while the other arm 7 of the said bell-crank is connected by a rod 6 to a treadle 4, provided with a counterweight 5, which tends to maintain the ring 8 on the disk 3 in contact with the corresponding ring 8 on the frame, and so retain the machine out of action. The operator by depressing the treadle with the foot can cause the disk to slide along the shaft and force the conical periphery thereof into frictional engagement with the pulley 2, and thus by coupling the pulley to the shaft 1 set the machine in action.

On the shaft 1 is fast a toothed wheel 9, gearing with a corresponding wheel 10, mounted loosely on a stud 12, projecting from one side of the frame 32 of the machine. Formed in one with or detached to the wheel 10 is a disk 11, having on each of its two sides a cam-groove 13 and 14 and on its periphery another cam-surface 15. In the cam-groove 14 is a roller or antifriction-bowl 16, carried on a pin 17 on a lever 18, mounted on a rod 19, passing through a sleeve extending between the two opposite sides of the frame 32. The free end of the lever 18 is provided with a number of perforations 20 for the attachment of the lower end of a rod 21, the upper end of which rod is connected to the saddle 25, so that when the machine is started a vertically-reciprocating motion is imparted to the said saddle by the cam-groove acting through the lever 18 and connecting-rod 21. The extent of vertical movement of the saddle can be adjusted to suit various sizes of signatures by connecting the lower end of the rod 21 with the hole 20 suitable therefor. The saddle 25 is guided in its vertical movement by a projection thereon sliding in a slot in a piece 28, and is connected rigidly to a rod 22 by means of a stay-rod 29. The rod 22 is fitted to slide vertically with the motion of the saddle in bearings or guides 23 and 24, and to the lower end of the rod 22 is attached one end of a helical spring, the opposite end of which spring is connected to a projection from the upper part of the frame 32, the said spring serving to partially counterbalance the weight of saddle and moving parts connected therewith, so as to reduce the friction of the roller or bowl 16 in the cam-groove 14. For the sewing of the books eye-pointed thread-carrying needles *N*, Figs. 21 to 24, and hook-shaped or open-eyed needles *H*, Figs. 31 to 35, with spring or hinged tongues are employed. The needles *H* are of cylindrical

form, with the lower end terminating in a point *s*. The conical portion, consisting of the point, is very short, and directly above it is the spring-hook *Z*, (which may be a hinged tongue,) which can be forced by pressure into a groove *m* in the needle-shank, as shown at *b*, Fig. 33, so that the needle can pass upward through the hole which it had made in the work in its descent.

10 The bar 30, which carries the needles, is fitted to reciprocate in guides 31 in the frame 32, and is connected by two pair of toggle-levers 33 to the upper part of the said frame. The two pair of toggle-levers are connected together by a bar 34, and to the joint of one of the pair of levers is connected by a rod 35 one arm of a bell-crank lever 36, pivoted to the frame 32, the other arm of the said bell-crank being connected by a rod 37 to an arm 38, pivoted at one end by a pin 39, Fig. 2, to a bracket on the frame 32 and carrying at its opposite end on a pivot 40 a roller or friction-bowl 41, working in the cam-groove 13 in the disk 11, so that by the rotation of the cam-disk 11 a vertically-reciprocating motion is imparted to the needle-bar 30 through the connections described. The cam-grooves 13 and 14 are suitably timed with reference one to the other, so as to cause the saddle with a signature thereon to be first brought into position beneath the needles and then the needles to descend and afterward the needle-bar and needles to rise and then the saddle to descend into position to receive another signature.

35 The boxes or holders 44 and 77, in which the needles *N* and *H* are respectively carried, are adjustably secured to the bar 30, so that they can be fixed nearer together or farther apart, as required to suit signatures of different lengths. The needles *N* are fixed by means of screws in rods 42, which are free to turn in socket-pieces or needle-holders 43, rotatable in the boxes 44, there being rods for two needles in each holder.

45 The socket-pieces 43 are each provided with a toothed wheel 45, engaging with the teeth of a rack 46, fitted to slide in guides in the bar 30. A reciprocating motion may be given to the rack 46 by means of a disk 62, pivoted at 63 in an arm or bracket 61, secured to the frame 32. This disk carries a pin 64, to which the rack is connected by a rod 51, (see Figs. 17 to 20,) the eccentricity of the pin 64 being equal to one-half the traverse of the rack, so that if the pin be in the position shown in Fig. 17 and a half-revolution be given to the disk into the position shown in Fig. 19 the rack will be moved to its full extent in one direction, and at the next half-revolution of the said disk the rack will be caused to move to its full extent in the reverse direction. These reciprocations of the rack impart to the socket-pieces 43, through the toothed wheels 45, connected thereto, a movement of rotation to the extent of half a revolution, first in one direction and then in the reverse direction, thereby causing the

two needles carried in each socket to reverse their relative positions at each reciprocating movement of the rack.

To impart to the disk 62 the semirotations hereinbefore described, there is provided on the back of the said disk two pins 65, arranged diametrically opposite each other and at an angle of forty-five degrees to the pin 64, and on a stud 66 on the arm or bracket 61 is a lever-arm 67, to which an oscillating motion is imparted by means of a rod 68, connected at its upper end to the said lever and at its lower end to the lever 18 by one of the holes 20 on the said lever, (see Fig. 3,) which lever, as hereinbefore described, operates the saddle 25. The lever 67 carries a pawl 70, normally maintained by a spring 72 in contact with a stop 71. During the upward movement of the rod 68 and lever 67 the pawl 70 comes into contact with the one of the pins 65 which is uppermost, but cannot move the disk around the stud 63 by reason of a spring-detent 74, centered at 75 to the arm or bracket 61, being engaged with a notch 73 in the periphery of the said disk. Consequently the pawl 70 glides over the pin 65, the spring 72 yielding to allow of its passage thereover. As soon as the pawl has passed over the pin 65 it is returned to its normal position by the spring 72 against the stop 71, the end of the pawl then resting on an arm or projection 74^x on the detent 74, which detent is normally pressed toward the periphery of the disk by the spring 76. At the commencement of the downward movement of the rod 68 and lever 67 the pawl 70 by its pressure on the arm or projection 74^x forces the detent 74 out of the notch 73 in the disk, as shown in Fig. 18, and then by the continued descent of the said lever 67 the pawl 70 by engaging with the upper pin 65 imparts a motion of partial rotation to the said disk to the extent of half a revolution, whereby the other notch 73 in the disk is brought into position for the detent 74 to enter, as shown in Fig. 19. Although the arrangement of the disk 62 and the parts in connection therewith as hereinbefore described is preferred, the arrangement shown in Figs. 2 and 5 may be employed instead thereof, if desired. This arrangement consists of a cam-disk 58, mounted on a stud 60 and driven from the shaft 12 by the wheel 10, gearing with teeth on the periphery of the cam-disk 58, the diameters of the disk 58 and the wheel 10 being such that the wheel 10 will make two revolutions to one revolution of the said disk. In the face of this disk is a cam-groove 59, in which works a roller or friction-bowl 51, carried on a pin 56 in one end of a lever 54, centered at 55 to the frame of the machine, the opposite end of the said lever being connected by a rod 53 to one arm of a bell-crank lever 52, (see Fig. 9,) the other arm of which bell-crank lever is connected by a rod 51 to the rack 46, so that at each complete revolution of the cam-disk 58 the rack will be caused to complete a to-and-fro traverse,

and through the wheels 45 twice reverse the positions of the needles N.

As it is necessary that the needle-eyes should always retain their relative position with reference to the loop-carriers, there is provided on each needle bar or rod 42, Figs. 25, 29, and 30, an arm 47, carrying at its outer end a pin or stud 48, engaging in a groove in a rail 49, connected to the bar 30, (see Figs. 9, 10, and 11,) there being two grooved rails 49 parallel to each other, the pin or stud 48 on one needle-bar 42 of each pair entering the groove on one of the said bars and the pin or stud on the other needle-bar of each pair entering the slot on the other rail 49, so that when the socket-piece 43 receives a motion of partial rotation, as hereinbefore described, the needle-bars 42 are prevented from turning axially in the said socket while their position is being reversed. The arms 47 during the reversing motion of the needle-bar 42 turn on the pins 48 in the grooved rails, the said pins at the same time sliding in the grooves from the position shown in Fig. 29 to that shown in Fig. 30, and vice versa. The crochet-hooks or open-eyed needles are carried by blocks 77, Figs. 36 to 40, each having a face-plate provided with a number of grooves 78 for the reception of the stem of the needle, which is held in position by means of a clamping-plate 79. In the block 77 is a groove or recess, in which is fitted to slide vertically a plate 80, having at its lower end a projection provided with grooves corresponding to the grooves in the face-plate of the block 77 and serving to support the needle against lateral strain when drawing a loop of thread from the needles N, and also as a presser acted on by the spring 81 to press on the signatures, so as to hold them down when the needle is drawing the loop of thread through the said signatures.

Fitted to slide at the front of the saddle 25 are plates S, corresponding in number to the number of crochet-hooks or open-eyed needles H employed. Each plate has in its upper edge a notch *i*, on one side of which is formed at the back of the plate a projection or point *a*, constituting the nose of a hook, beneath which is a slot or recess *o*, and at the back of the said plate extending from one side to the other side is a curved projection *k*, which effects the closing of the spring-tongue *z* of the crochet-hooks against their shanks, as hereinafter described. The plates S are screwed to bars 90, fitting corresponding grooves formed in the saddle to receive them, and these bars are connected by links 89 to a lever 87, pivoted at 88 to the saddle. The said lever 87 carries at one end a friction roll or bowl 86, fitting so as to roll in a groove in one end of a lever 84, Fig. 1, carrying on a pin 83 a roll or friction-bowl 82, which enters the cam-groove 15 in the periphery of the cam-disk 11, the groove 15 being such as to impart to the plates S, through the levers 84 and 87 and links 89, the requisite movements

to carry loops of thread from the needles N into position to be engaged by the crochet-hooks or open-eyed needles H. In order to vary the travel of plates S to said variations of distance to which the hooks H, from the needles N, may be adjusted, the lever 87 is provided with a series of holes, with any one of which the links 89 may be connected and so alter the travel of the plates. The lever 87 terminates at its lower end on a handle for convenience of moving the slides S by hand when the sewing of a book has been completed, so as to draw from the needles sufficient thread to glue or otherwise fasten to the back of the book.

To permit of a more rapid adjustment of the travel of the plates S to correspond to the length of stitches to be produced, the lever 87 may be provided with two plates 91 and 92, Figs. 45 to 49, one above the other. These plates are connected to the links 89, the plate 91 being connected at its lower end to one of the said links 89 and the plate 92 being connected at its upper end to the other of the said links. The plates 91 92 are each provided at their upper ends with a slot 93, through which passes a guide-pin 94, screwing into the upper end of the lever 87. At their lower ends these plates have each a series of perforations, so that by passing a screw through two coinciding perforations in the plates and into a screwed hole in the lever 87 at this part a rigid lever is formed similar to that shown in Fig. 42, the extent of travel of the plates S being altered, as required, by sliding the plates over one another and inserting the screw which connects the plates to the lever 87 in their two coinciding perforations in the said plates. The needles N receive thread from bobbins 95 or the like, mounted on bobbin-holders secured to the frame of the machine, the thread passing from each bobbin through a tension device 97, thence beneath a rod 69 (see Fig. 10) into a perforation in the upper end of the needle-rod 42, and along a groove in the said rod to the eye of the needle. The tension devices 97 are arranged so that the tension on the thread takes place only when the stitches are to be drawn taut—that is, when the needles ascend. For this purpose the thread passes through a slotted or split rod 96, in the lower enlarged part of which a steel disk 97 is supported by rods or bars 98, connected together at both ends. These rods at each upward movement of the bar 30, carrying the needle-holders, are raised by arms 99, projecting from the toggle-levers 33. Threaded upon the upper reduced end of the slotted or split rod 96 are weights, which are normally supported on the shoulder formed by the difference in the diameters of the upper and lower parts of the rod, as shown in Figs. 12 and 13, and the thread is clamped only by the raising of the disk 97, as shown in Fig. 10. Tapes or backing of any suitable material can be connected or secured to the signatures by the same

stitches that secure the signatures together, either by the stitches passing through the tape or backing or by the stitches being caused to cross over the said tapes or backing. The backing or tapes are wound on bobbins 100, Figs. 1, 2, and 3, from which they are passed through a suitable tension device to the back of the book being sewed. The signatures as they are sewed are fed forward by each successive signature brought into position to be sewed, the sewed signatures passing onto a platform which is adjustable in height to suit books of different size. Pivoted to the saddle 25 is a lever J, termed a "fly," which, as the saddle rises to bring a signature into position to be sewed, is by a stationary cam-surface 128 on the guide-bar 28, acting on a friction-bowl 127 on the lever J, caused to press on the previously-sewed signature to admit of the signature on the saddle rising into position to be sewed. In machines having a saddle which oscillates on a center this fly is not required, as the saddle itself when rising will force the previously-sewed signatures forward.

The needle N having been threaded as hereinbefore described and the saddle 25 being in its lowest position, the backing or tapes are led from the bobbins 100 and are laid in position to be connected to the books. The driving-strap being on the pulley 2, the operator depresses the treadle 4, thereby forcing the conical disk 8 into frictional contact with the internally-coned ring 3 on the pulley 2, and so start the machine. The first stitch or combination of stitches is preferably made without a signature being placed on the saddle, so as to secure the backing or tapes to the sewing-threads, after which, the saddle having descended, the operator places a signature in position thereon. The saddle is then raised by the action of the cam-groove 14 into its highest position, with the fold in the signature directly beneath the points of the needles N and H. In this position the saddle remains at rest while the needles descend, the needles N carrying thread with them through the fold of the signature into slits in the back or under side of the saddle. The needle then rises a short distance, so as to form a loop *u* on each of the needle-threads, as shown in Figs. 53 and 62, and while the needles remain in this position the plates S, which are at this time in the position shown in Fig. 63, move outward in opposite directions, the points of the hooks *a* of the plates entering the loops *n* in the needle-threads and extend the said loops, as shown in Fig. 64, so that when the needles commence to further rise the spring or hinged tongues Z on the crochet-hooks or open-eyed needles H will enter the loops *n*, as shown in Figs. 66 and 67. As the needles continue to rise the tongues Z come into contact with curved portions *k* on the back of the plates S and close the tongues against the stems of the said needles, so as to enable the points to

pass up through the signature and through the previously-formed loops *n'*. (See Figs. 66 and 67.) When the needles are in this position, they again remain at rest, while the plates S return to their former position, (shown in Fig. 68,) the loops of thread being released from the hooks *a*, but just before the plates reach this position the needles further rise and draw the threads taut, as shown in Fig. 68, in which figure the needles are shown in their highest position. A motion of partial rotation is now given by the rack 46 and pinions 45 to sockets 43, thereby reversing the positions of the needles N of each pair and crossing the needle-threads, as shown in Fig. 58, but without rotating the rod 42, in which the needles are secured. While this transposition of the needles is taking place the saddle 25 descends into position to receive another signature, the stitched signature being retained by the connecting-threads. The saddle with the next signature to be stitched then rises, and the needles then again descend as before and the operations hereinbefore described are repeated, and when this signature is sewed the needles N are again reversed and the threads crossed as before, and so any desired number of signatures to form a book may be connected together by stitching. When a book of sufficient thickness has been thus sewed, the said book is pressed forward by hand by means of a block of the desired thickness, the said block forming a bearing-surface for the first signature of the next book to be sewed and should be of a width about equal the length of the two projecting ends of the tapes or backing-strips required for the binding of the book. The tapes or backing-strips may be secured to the signatures by the stitches passing through the tapes, as shown in Figs. 60 and 70, or the stitches may be simply crossed over the said tapes, the needle entering the signature in close proximity to the edges of the said tapes. In this way any desired number of books of the same size may be sewed without interruption, and as the books are stitched they can be removed from the back of the machine and separated one from the other by means of a knife passed along slits in the center of the blocks which divide the several books, whereby the backing or tapes are divided, leaving ends projecting on each side of each of the books for attachment to the covers when being bound.

What is claimed is—

1. In double-thread book-sewing machines the combination of thread-carrying needles with a rotary holder for each pair of needles, means for rotating the holders, rods within the holders to which the needles are secured, arms engaging said rods, and grooved rails engaged by the arms and adapted to retain the eyes of the needles in the same direction, substantially as specified.

2. In double-thread book-sewing machines, the combination with thread-carrying needles

arranged in pairs, a rotary holder for each pair of needles, means for rotating the said holders so as to reverse the relative position of the needles, crochet-hooks or open-eyed needles and sliding plates or loop-catchers and means for operating them so as to draw loops of thread from the thread-carrying needles and present the said loops in position to be engaged by the crochet-hooks or open-eyed needles, substantially as hereinbefore described.

3. In double-thread book-sewing machines, the combination with the thread-carrying needles arranged in pairs and sliding plates or loop-catchers for drawing loops of thread from the said needles and presenting the loops so as to be engaged by crochet-hooks or open-eyed needles, of projections or rims on the

sliding plates or loop-catchers against which tongues constituting the hooks or one side of the open-eyed needles are caused to come in contact so as to close the eyes of the needles after they have engaged the loops of thread, substantially as and for the purpose hereinbefore described.

In testimony whereof I have signed the above specification in the presence of two subscribing witnesses.

CARL FRIEDRICH LINDENBERG,
Executor of the last will and testament of Hugo Brehmer, deceased, late a citizen of the Kingdom of Saxony, residing at Leipsic-Plagwitz, in the Kingdom of Saxony.

In presence of—

F. REHWOLDS,

JEAN HEINRICH DIEDRICH ACHENBACH.