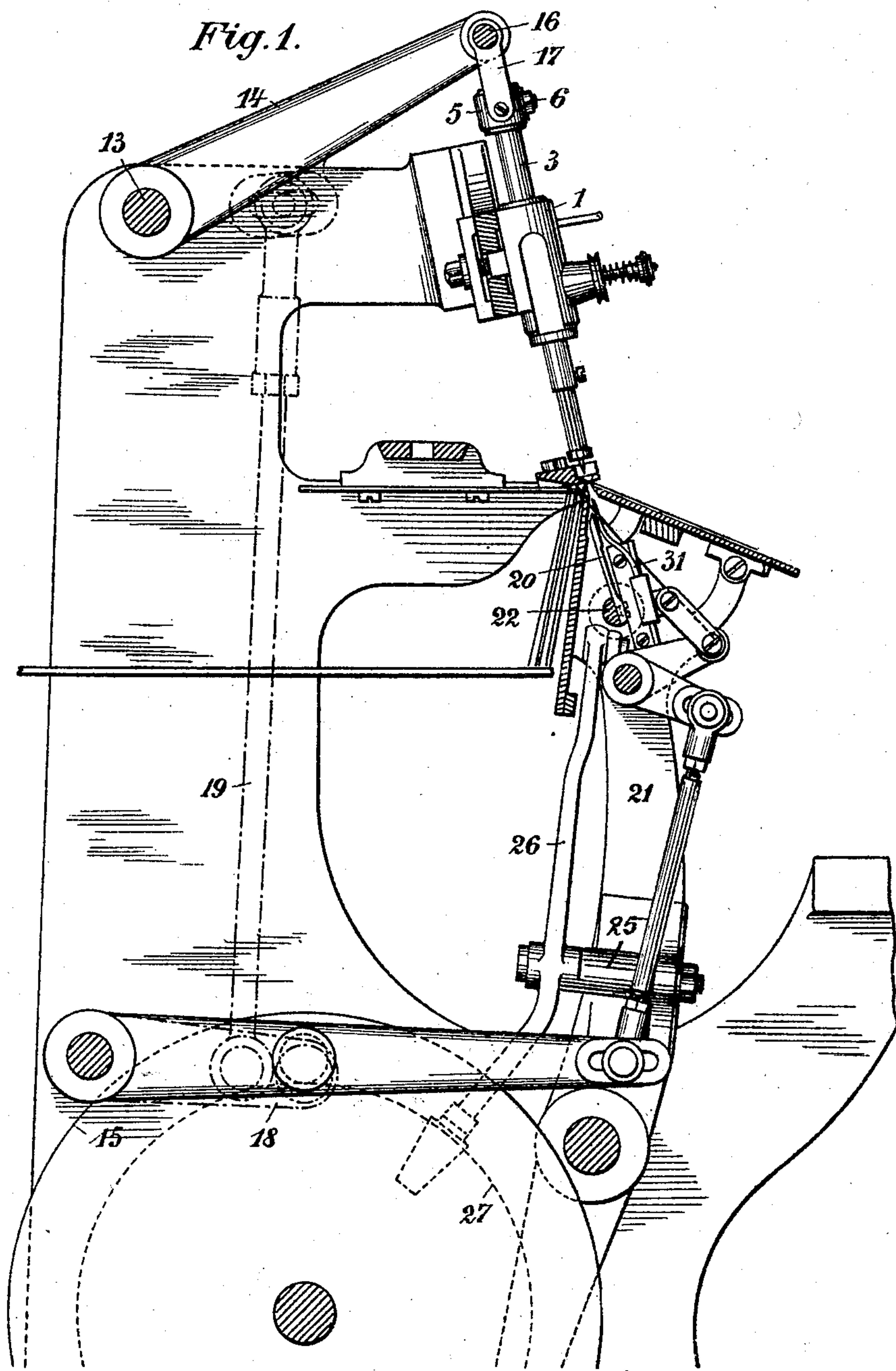


No. 795,623.

PATENTED JULY 25, 1905.

F. KUGLER.
BOOK STITCHING MACHINE.
APPLICATION FILED OCT. 7, 1902.

4 SHEETS—SHEET 1.



Witnesses:

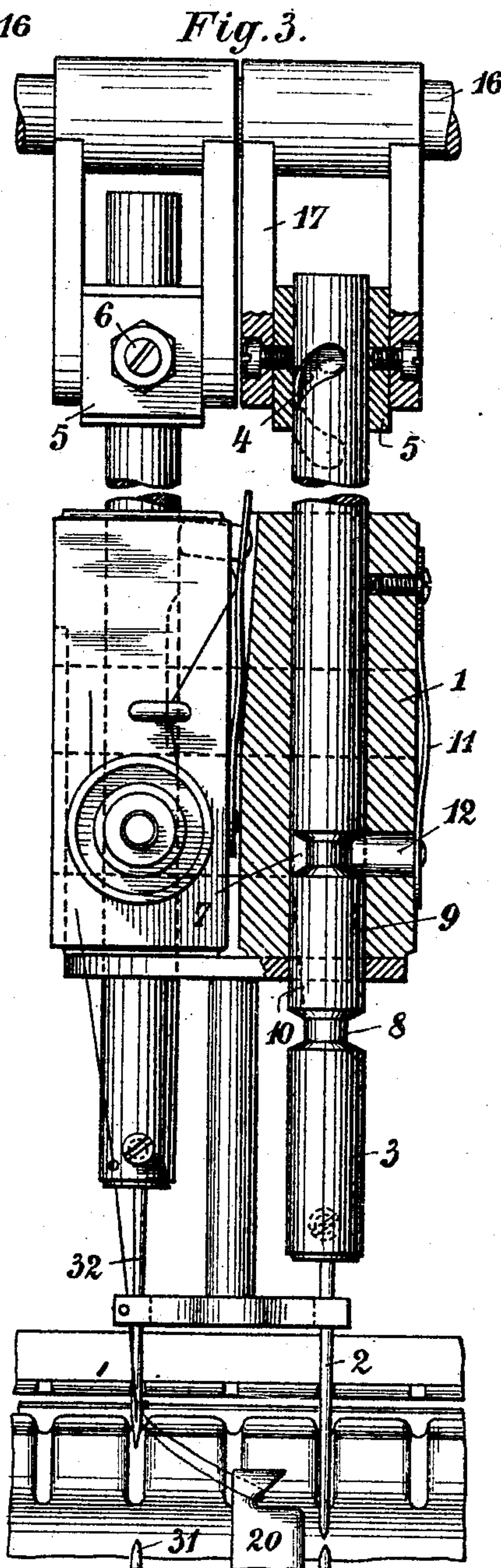
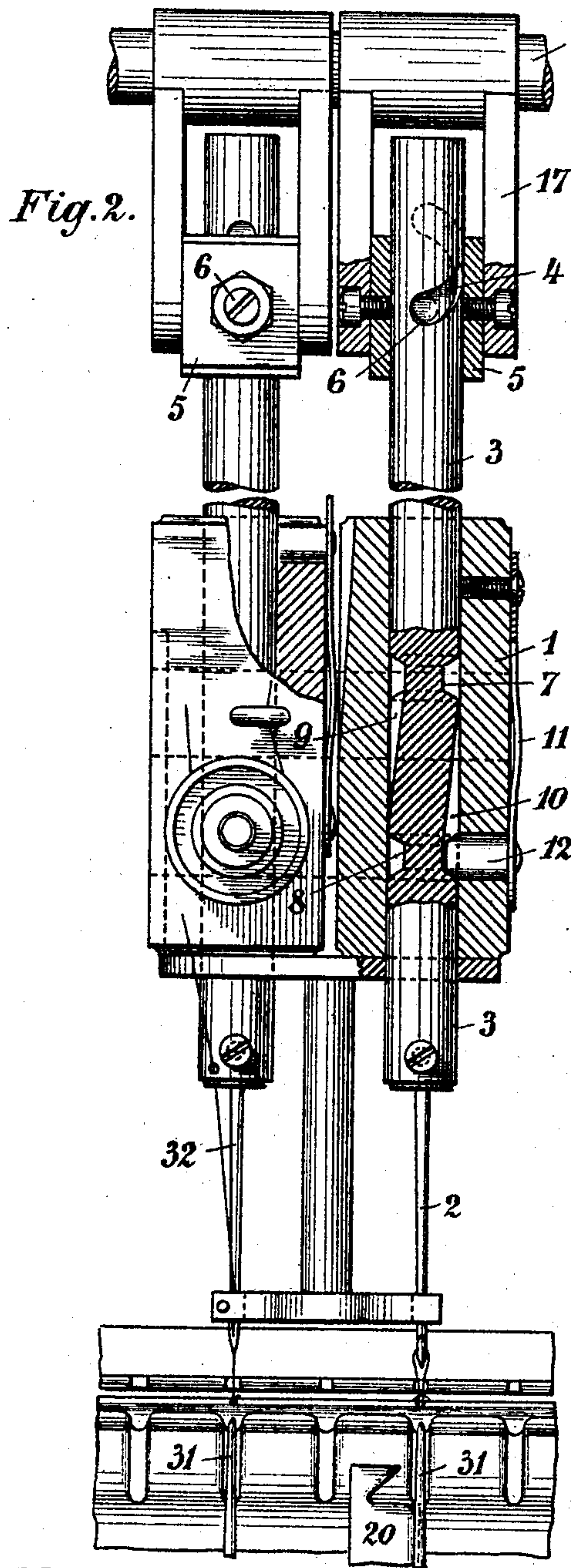
Anton Glatzer.
Susan McLaughlin

Inventor:

Friedrich Kugler
by *Wm. H. Morgan*
his attorney.

F. KUGLER.
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4 SHEETS—SHEET 2.



Witnesses

Anton Claetner
Susan McLaughlin

Inventor:

Friedrich Kugler,
by "Wap Thurg" his attorney.

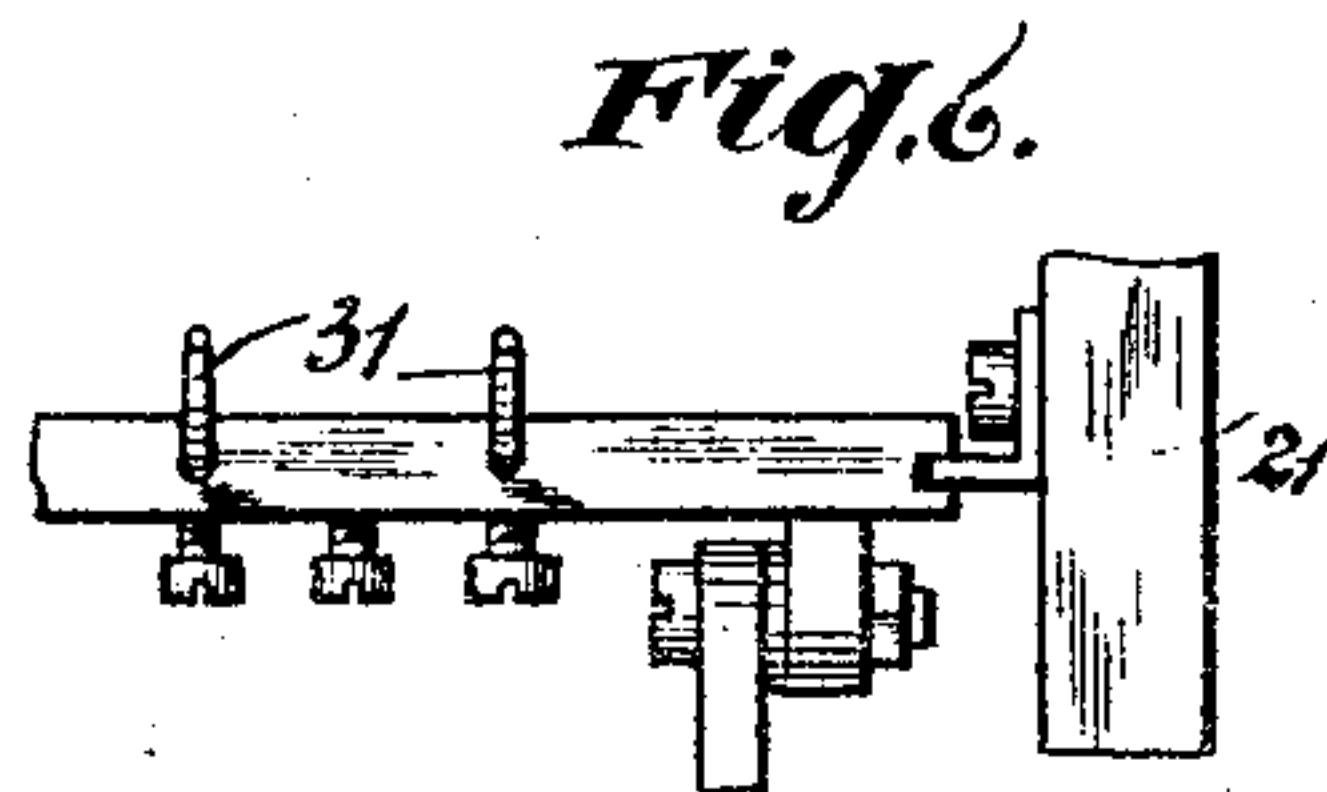
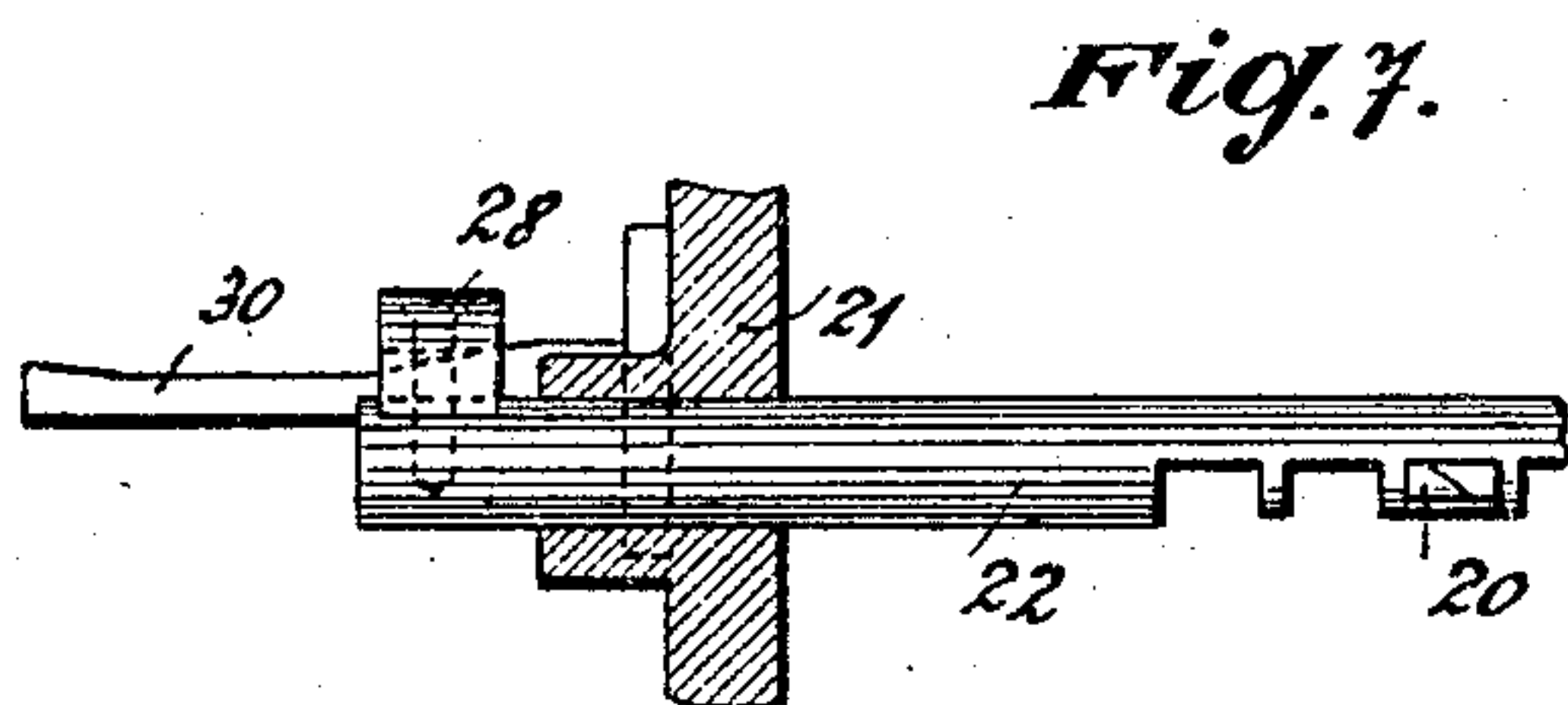
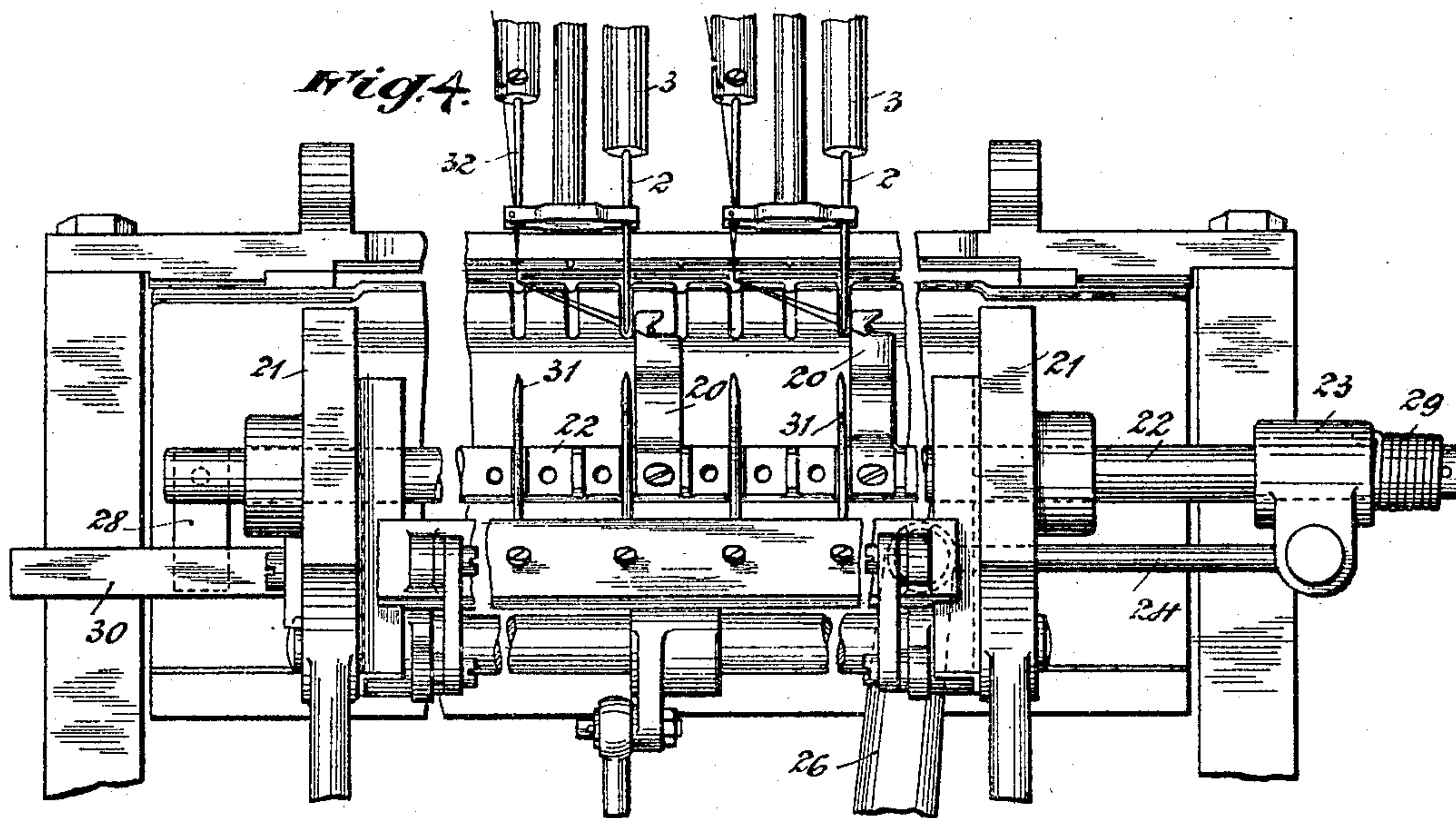
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4 SHEETS—SHEET 3.



Witnesses:
Anton Clafall
Susan McLaughlin

Inventor:
Friedrich Kugler,
by Mark Morgan
his attorney.

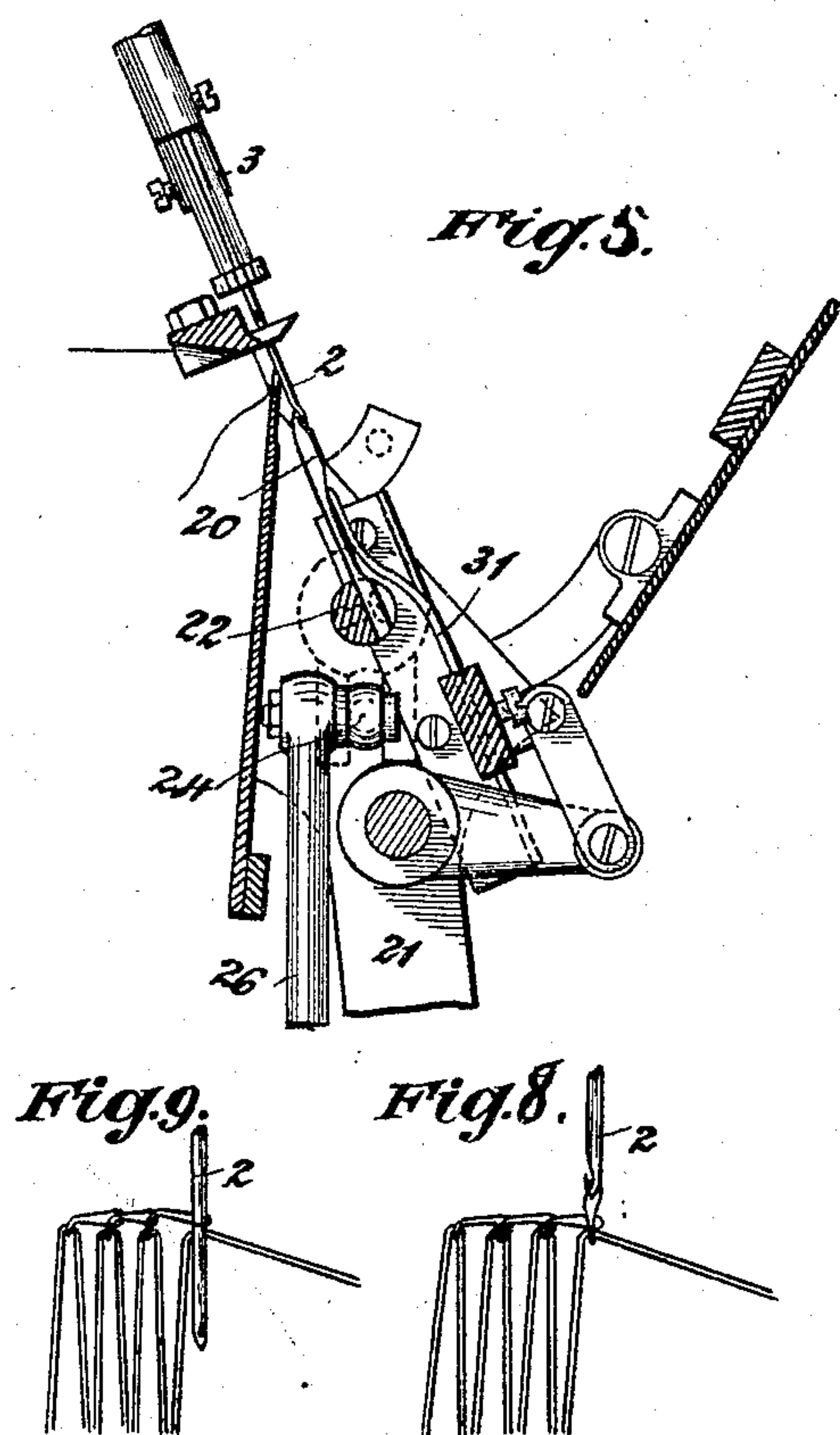
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4 SHEETS—SHEET 4.



Witnesses:

Anton Clapen,
Susan McLaughlin

Inventor:

Friedrich Kugler,
by Max H. Ingli
his attorney.

UNITED STATES PATENT OFFICE.

FRIEDRICH KUGLER, OF FRAUENFELD, SWITZERLAND, ASSIGNOR TO THE FIRM OF ACTIENGESELLSCHAFT, VORMALS F. MARTINI & CO., OF FRAUENFELD, SWITZERLAND.

BOOK-STITCHING MACHINE.

No. 795,623.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed October 7, 1902. Serial No. 126,368.

To all whom it may concern:

Be it known that I, FRIEDRICH KUGLER, a subject of the Emperor of Germany, residing at Frauenfeld, Switzerland, have invented new and useful Improvements in Book-Stitching Machines, of which the following is a specification.

This invention relates to book-stitching machines of the kind that are provided with one or more pairs of reciprocating needles, each such pair comprising an eyed needle and a hooked needle and with a thread-laying device for each pair of needles, which moves to and fro between the eyed and the hooked needle of its pair in such a way that after the thread has been carried through a sheet by the downward movement of the eyed needle it is by means of the thread-laying device brought to the hooked needle, which upon its ascent takes a thread-loop with it and draws it through a thread-loop which surrounds the hooked needle and which was formed while stitching the preceding sheet. In machines of the type referred to each hooked needle makes a half-revolution at the commencement of each downward or upward movement, upon the downward movement for the purpose of avoiding the unhooking of the thread-loop held by the hooked needle and upon the upward movement for the purpose of facilitating the drawing of the thread-loop just carried upward through that formed while stitching the preceding sheet.

According to this invention the turning of a hooked needle through a half-revolution is effected as follows: Upon the periphery of the needle-bar which carries the hooked needle is formed a spiral groove that reaches half-way round the circumference of the bar and is engaged by a stud. Upon the bar are also formed two circumferential grooves which are connected by two diametrically opposite longitudinal grooves which form a pair of parallel inclines, each extending from the bottom of one circumferential groove to the edge of the other. A spring-catch engages alternately in the upper and the lower circumferential groove, and thus prevents the movement of the bar in the direction of its length, except when after half a revolution the deep end of the longitudinal groove leading out from the bottom of the circumferential groove lies opposite to the spring-catch.

As the bar moves to and fro its rotation is effected by the spiral groove in conjunction with the spring-catch engaging therein.

The accompanying drawings illustrate an example of the apparatus in accordance with this invention.

Figure 1 is a vertical section through a machine embodying my invention. Figs. 2 and 3 are elevations, partly in section, of the cross-heads and needle bars or shafts and their guides. Fig. 4 is an elevation of the thread-carrying mechanism and adjacent parts. Fig. 5 is a vertical section through the parts shown in Fig. 4; and Figs. 6, 7, 8, and 9 are detail views, respectively, of the piercing and carrying mechanism and the progressive formation of the stitch.

The machine therein represented has two pairs of needles, each pair comprising an eyed and a hooked needle. The number of pairs employed may, however, be varied according to the length of the sheets to be stitched. In some instances one pair only will suffice, while in other instances more than two pairs would be provided. The hooked needles are each placed in a block 1, forming a needle-bar guide. The needles derive their movement from a cam-disk 15, Fig. 1, which acts upon an arm 18. This arm 18 is connected, by means of a rod 19, with one of a pair of arms 14, keyed upon an axle 13. The ends of the arms 14 are connected by a rod 16, which by means of links 17 is connected with the cross-heads 5 at the upper ends of the shafts which carry the needles. Each shaft 3, which carries a hooked needle 2, has in its upper portion extending half-way around the periphery of the shaft a spiral groove 4, which is engaged by a screw-stud 6, firmly secured in the cross-head 5. In that portion of the shaft 3 which passes through the needle-bar guide 1 are formed two circumferential grooves 7 and 8, which are situated at a certain distance apart and are mutually connected by two diametrically opposite longitudinal grooves 9 and 10, which form inclines running from the bottom of one circumferential groove to the edge of the other. In the grooves 7 and 8 there engages a catch 12, Figs. 2 and 3, which is acted upon by the spring 11, fastened to the block 1, and slides alternately in the grooves 9 and 10. The thread-laying devices 20 are secured upon a

shaft 22, which is mounted in the upper part of the lever 21 and which, by means of a sleeve 23, mounted on its rear end, and of the draw-bar 24, secured by a pivot in ears on the sleeve 23, is connected with the upper end of a lever 26, Figs. 1, 5, and 6. This lever is mounted to oscillate upon the stud 25 and is moved to and fro by the action of the curved disk 27 upon its lower end, whereby a longitudinal reciprocatory motion is imparted to the shaft 22. By means of a spiral spring 29, mounted on the other end of this shaft and secured at one end to the sleeve 23, a tongue 28, fixed upon the front end of the shaft 22, is always pressed against a guide 30, situated immediately below it and provided throughout a portion of its length with a sharply-inclined surface, which, when the tongue 28 travels up it, causes the shaft 22 to make a slight rotation and, together with the thread-laying device, to turn slightly toward the front.

The apparatus described operates as follows: The sheet to be secured by stitching is first perforated by the punching-needles 31, and through the holes thus produced are simultaneously passed the eyed needle 32, carrying the thread, and the hooked needles 2, with their hooks facing to the front and surrounded by the thread-loop formed when the preceding sheet was stitched. During this operation the spring-catch 12, engaged in the circumferential groove 8, will enter the longitudinal groove 10, standing opposite to it, and upon the descent of the rod 16 and of the needle-bar 3 it will engage the upper circumferential groove 7, and thus secure the needle-bar 3 in this position. The thread passed through the sheet by the eyed needle 32 is now seized by the thread-laying device 20, which carries it forward and lays it beside the hooked needle 2, as shown in Fig. 5. At this moment the tongue 28 upon the thread-laying shaft 22 travels up the steep surface of the guide 30, and the shaft 22, together with the thread-laying device 20, turns slightly toward the front and places the thread carried by it upon the hooked needle 2. The rod 16 now moves upward, and as the bar 3 is held by the catch 12, engaged in the circumferential groove 7, the stud 6, secured in the cross-head 5 and engaging the spiral groove 4, will during its upward movement turn the bar 3 through a half-revolution, and thus bring the catch 12 into position in front of the deep part of the longitudinal groove 9, cause the catch to enter the said groove, and thus allow the bar 3 to complete its upward movement, whereupon the catch 12 again engages the circumferential groove 8 and secures the bar 3 fast in its upper position. With the semi-revolution of the bar 3 that has taken place the hooked needle 2, secured therein, is also rotated and its hook caused to take up a position under the thread that lies against it. This thread is now carried upward by the hook

upon the continuation of its upward movement and is drawn through the loop formed when the preceding sheet was stitched, which still surrounds the needle, Fig. 10. By the operation of the tongue 28, which is fastened at the end of its shaft 22 and which leaves the sharply-inclined surface of the guide 30 upon the return motion of the shaft 22, the thread-laying device 20 is meanwhile returned to its normal lateral position behind the eyed needle 32. A new sheet is now brought under the needles and perforated by the punching-needles 31, and upon the next downward movement of the rod 16 the bar 3, held fast in the groove 8 by the catch 12, is again by the operation of the screw 6 and the spiral groove 4 caused to make a semirevolution, so as to turn the hook of the needle 2 toward the front, the catch 12 is again brought into position before the groove 10, so as to allow the bar 3 to continue its downward movement, and the entire operation is repeated. By means of the last semirevolution of the hooked needle last referred to the thread-loop held by it is prevented from becoming unhooked as the hooked needle moves downward.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a book-stitching machine, the combination, with a suitable support, of a needle-bar guide mounted thereon, needle-bars slidably mounted within the guide, annular grooves formed upon the needle-bars, a catch mounted in the guide and engaging one of the annular grooves, inclined grooves leading from the bottom of one annular groove to the circumference of the bar adjacent of the other annular groove and serving as a path for the catch, means for imparting longitudinal movement to the needle-bar, and means for converting said longitudinal movement into a partial rotary movement of the needle-bar.

2. In a book-stitching machine, the combination, with a suitable support, of a needle-bar guide mounted thereon, needle-bars loosely mounted within the guide, two annular grooves formed upon each needle-bar, a yielding catch mounted in the guide and adapted to engage one of the annular grooves, diametrically opposite inclined grooves leading from the bottom of one annular groove to the circumference of the bar adjacent to the other annular groove and adapted to serve as a path for the yielding catch, means for imparting longitudinal movement to the needle-bar, and means for converting said longitudinal movement into a partial rotary movement of the needle-bar.

3. In a book-stitching machine, the combination, with a suitable support, of a needle-bar guide mounted thereon, a needle-bar loosely mounted within the guide, spaced annular grooves formed upon the needle-bar, a spring-

pressed catch adapted to engage the annular grooves, diametrically opposite inclined grooves leading from the bottom of one annular groove to the surface of the needle-bar adjacent to the other annular groove and serving as a path for the catch from one annular groove to the other, means for imparting a longitudinal movement to the needle-bar, a circumferential spiral groove formed in the needle-bar, a lug carried by the operating means and adapted to engage in said spiral groove, whereby during a portion of the longitudinal stroke of the operating means the needle-bar will be held by the spring-pressed catch against longitudinal movement and will be partially rotated and thereupon the inclined groove will permit a longitudinal movement until the spring-catch engages the other annular groove.

4. In a book-stitching machine, the combination, with a suitable support, of a needle-bar guide mounted thereon, a pair of needle-bars loosely mounted within the guide, an eyed needle carried by one bar, a hooked needle carried by the other bar, a thread-carrier adapted to engage the thread held by the eyed needle and transfer the same to a point adjacent to the hooked needle, a tongue having fixed relation to the thread-carrier, a projection mounted upon the support and having an inclined face adapted to be engaged by the tongue, whereby the thread-carrier will be moved laterally into such position as to place the loop of thread upon the hooked needle, a spring-pressed catch mounted upon the needle-bar guide, spaced annular grooves formed upon the needle-bar provided with a hooked needle and adapted to receive the spring-pressed catch, diametrically opposite inclined grooves parallel to each other and connecting the bottom of one annular groove with the surface of the needle-bar adjacent to the other annular groove, a circumferential spiral groove formed in the needle-bar, a cross-head connected with the operating means, a lug carried by the cross-head and adapted to engage the spiral groove, whereby longitudinal and rotary movement will be intermittently imparted to the needle-bar and the needles carried thereby.

5. In a book-stitching machine, the combination, with reciprocating eye-needles, reciprocating hook-needles, and a thread-carrier passing to and fro between them, of means for imparting to each hook-needle a partial rotation comprising a bar carrying said hook-needle, a spiral groove extending over part of the circumference of the bar, two circumferential grooves connected by longitudinal grooves inclined in the same direction on opposite sides of said bar from the bottom of the one circumferential groove to the edge of the other, a spring-actuated catch adapted to engage the circumferential grooves, and a lug

adapted to move up and down in engagement with the spiral groove, whereby the longitudinal movement of the operating means is intermittently converted into a partial rotary movement of the needle-bar.

6. In a book-stitching machine, the combination, with a reciprocating eye-needle, a reciprocating hook-needle, and a thread-carrier passing to and fro between them, of means for imparting to the hook-needle a partial rotation comprising a bar carrying the hook-needle, a spiral groove extending over half the circumference of the bar, two furrow-shaped circumferential grooves encircling said bar, two diametrically-opposed longitudinal grooves inclined in the same direction on opposite sides of said bar from the bottom of one circumferential groove to the edge of the other, a reciprocating lug engaging with the spiral groove, a spring-actuated catch engaging with the circumferential grooves and the longitudinal grooves, whereby the longitudinal movement of the operating means is intermittently converted into a partial rotary movement of the hook-needle bar, a bar having the thread-carrier mounted thereon, a tongue mounted on said bar, a guide provided with an inclined surface, and a spring serving to press the tongue against the inclined surface, whereby the forward movement of the thread-carrier is converted into a momentary horizontal lateral movement and the thread placed against and in engagement with the hook-needle.

7. In a book-stitching machine, the combination, with a suitable support, a needle-bar guide mounted thereon, needle-bars slidably mounted within the guide, annular grooves formed upon the needle-bars, a catch mounted in the guide and engaging one of the annular grooves, inclined grooves leading from the bottom of one annular groove to the circumference of the bar adjacent of the other annular groove and serving as a path for the catch, means for imparting longitudinal movement to the needle-bar, and means for converting said longitudinal movement into a partial rotary movement of the needle-bar, of means for carrying the thread from one needle to the other, and means for imparting to the carrier a lateral movement with respect to the general direction of its path.

8. In a book-stitching machine, the combination, with a suitable support, a needle-bar guide mounted thereon, needle-bars loosely mounted within the guide, eye and hook needles carried by the bars, two annular grooves formed upon each needle-bar, a yielding catch mounted in the guide and arranged to engage one of the annular grooves, oppositely-disposed inclined grooves leading from the bottom of one annular groove to the circumference of the bar adjacent to the other annular groove and serving as a path for the yielding catch, means for imparting longitudinal move-

ment to the needle-bar, and means for converting said longitudinal movement into a partial rotary movement of the needle-bar, of a thread-carrier mounted for movement from the eye-needle to a point adjacent to the hook-needle, an inclined surface arranged to impinge against the thread-carrier and deflect the same from a straight path sufficiently to place the thread carried thereby upon the hook-needle, and means for imparting motion to the thread-

carrier in unison with the movement of the needle-bars.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRIEDRICH KUGLER.

Witnesses:

A. M. LIEBERKNECHT,
E. BLUM.