

No. 749,437.

PATENTED JAN. 12, 1904.

W. E. GOODYEAR.
BUTTONHOLE SEWING MACHINE.

APPLICATION FILED AUG. 7, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.

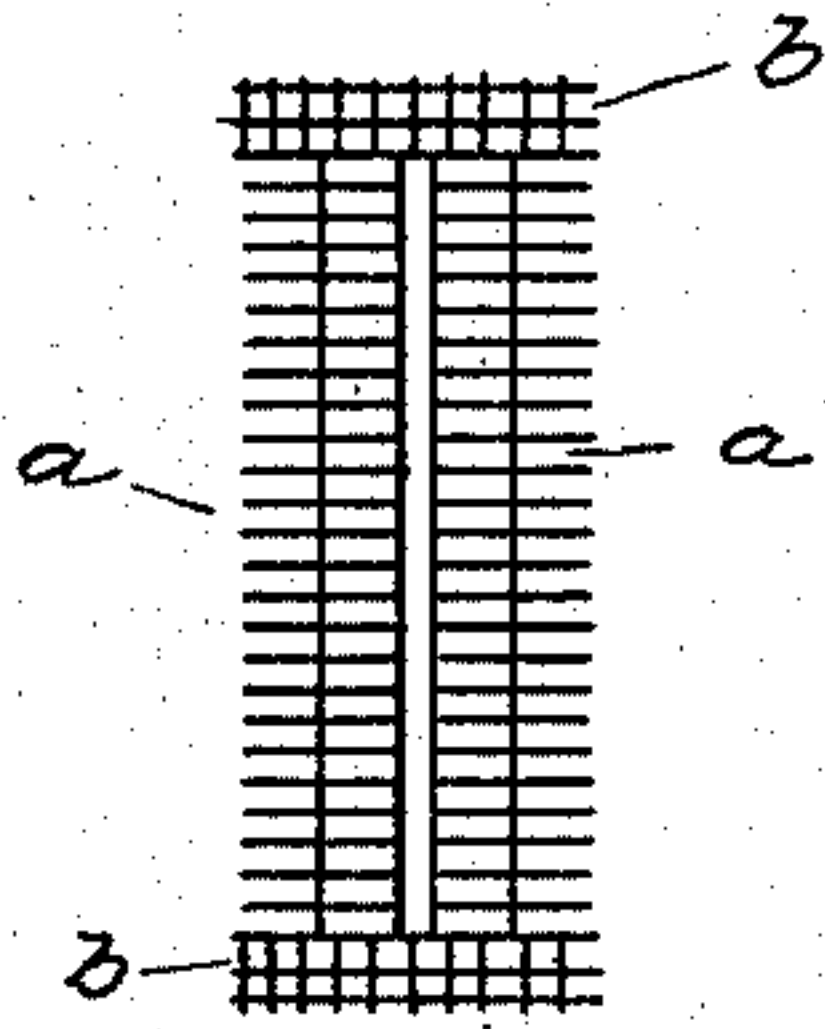


Fig. 5.

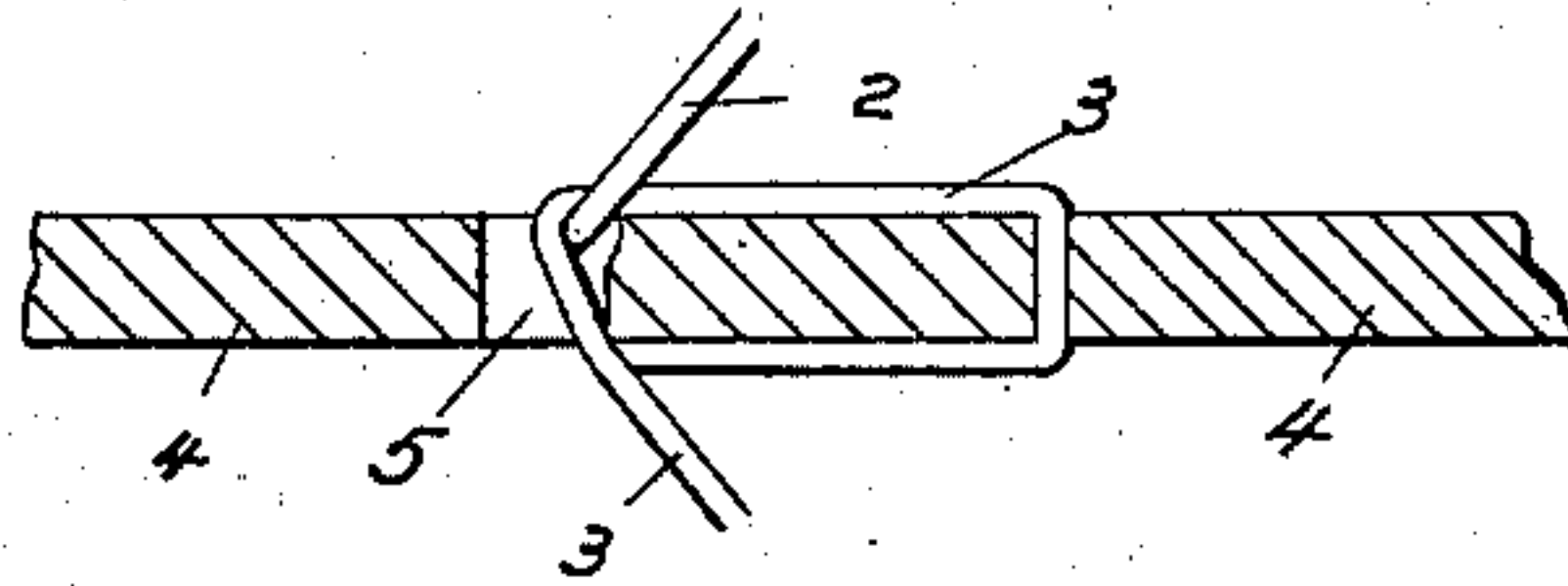


Fig. 6.

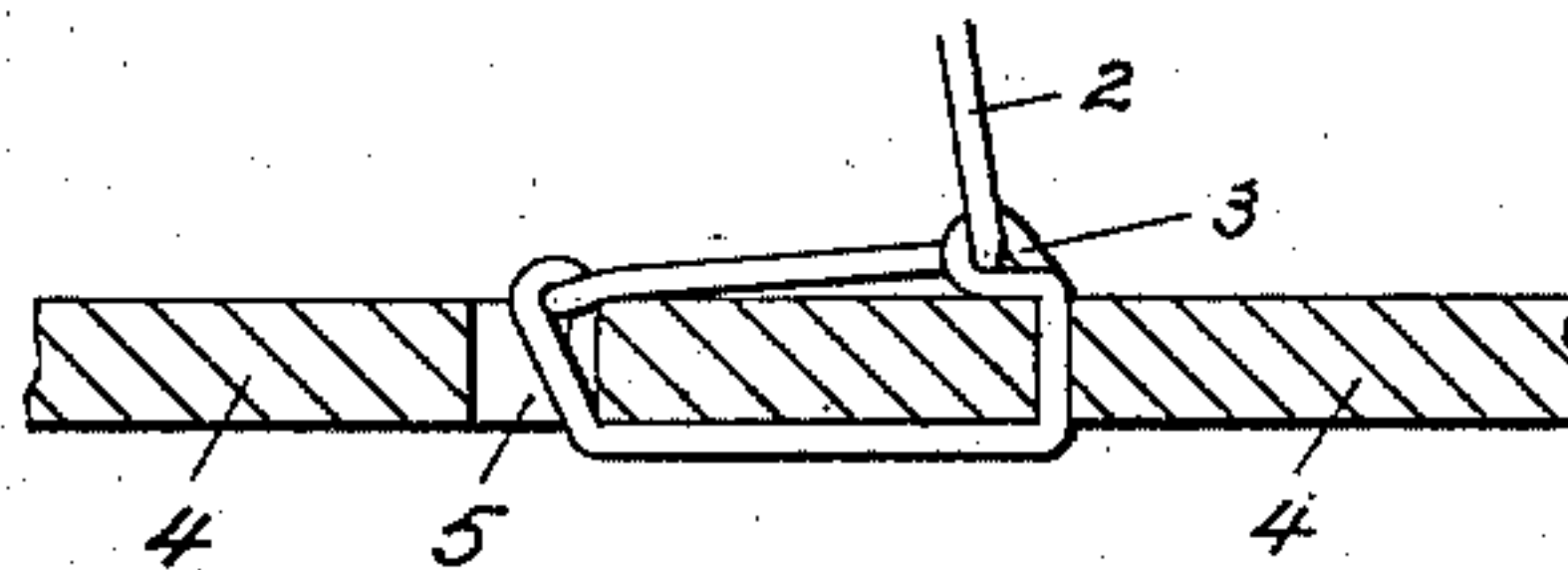


Fig. 2.

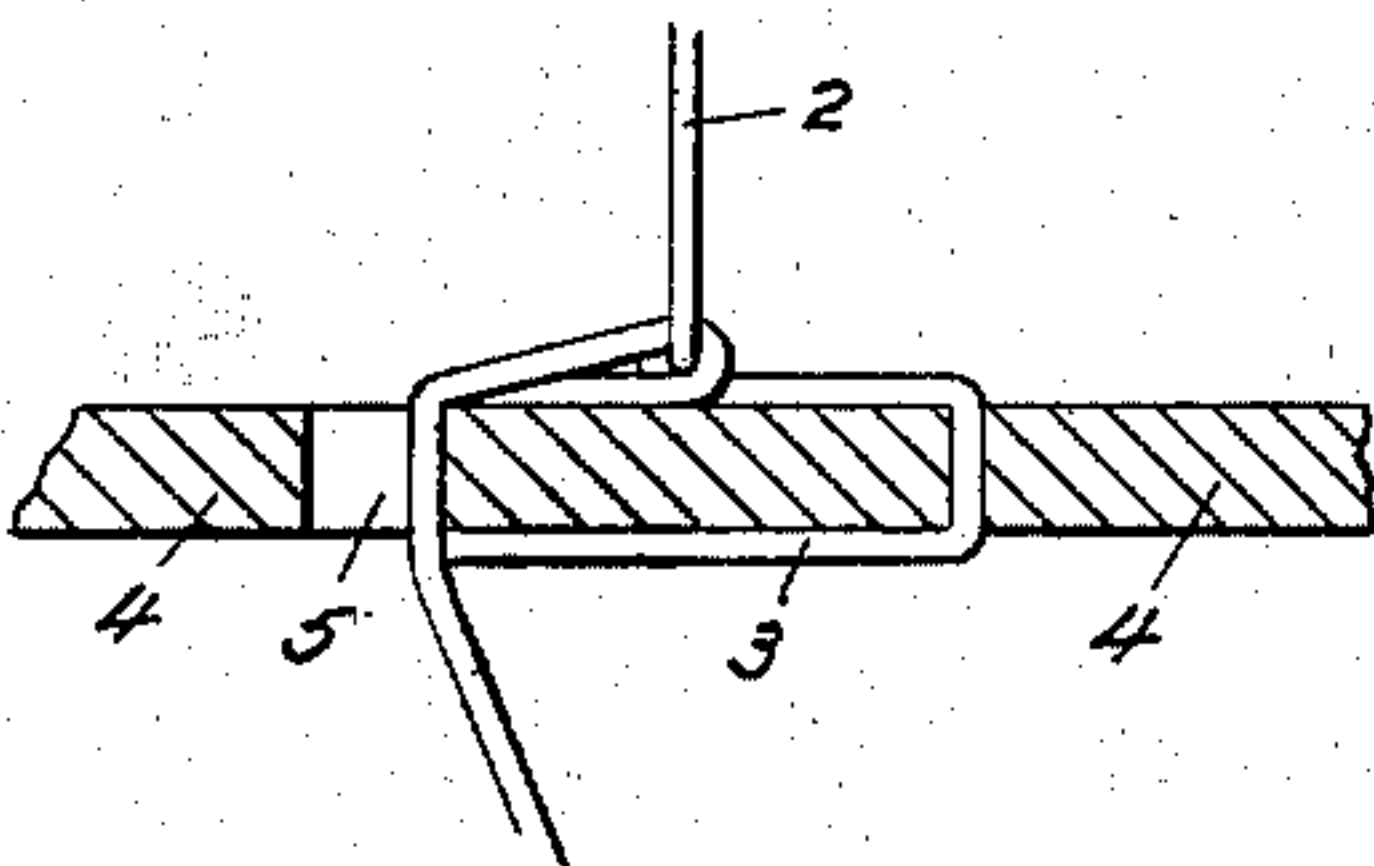


Fig. 7.

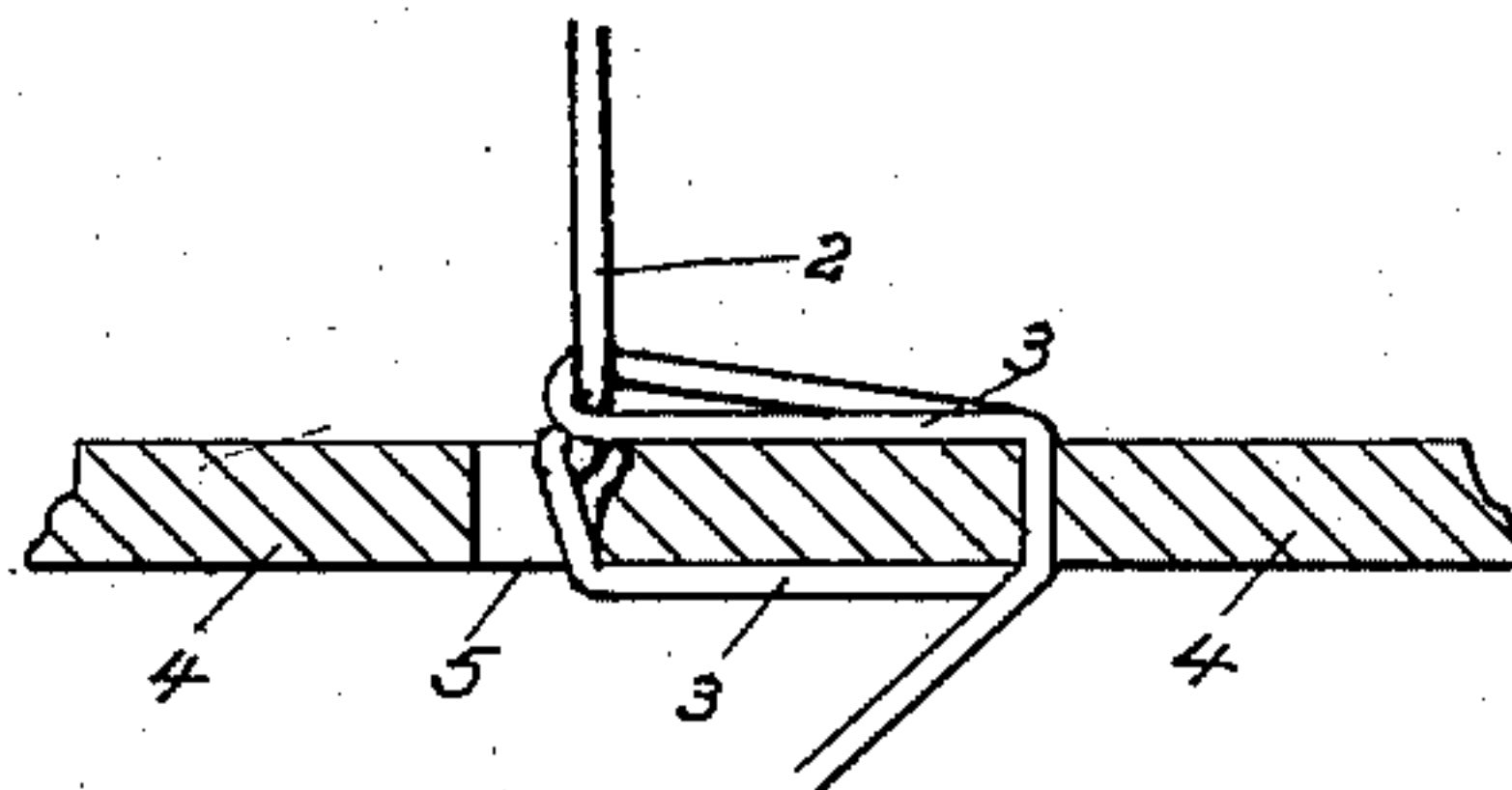


Fig. 3.

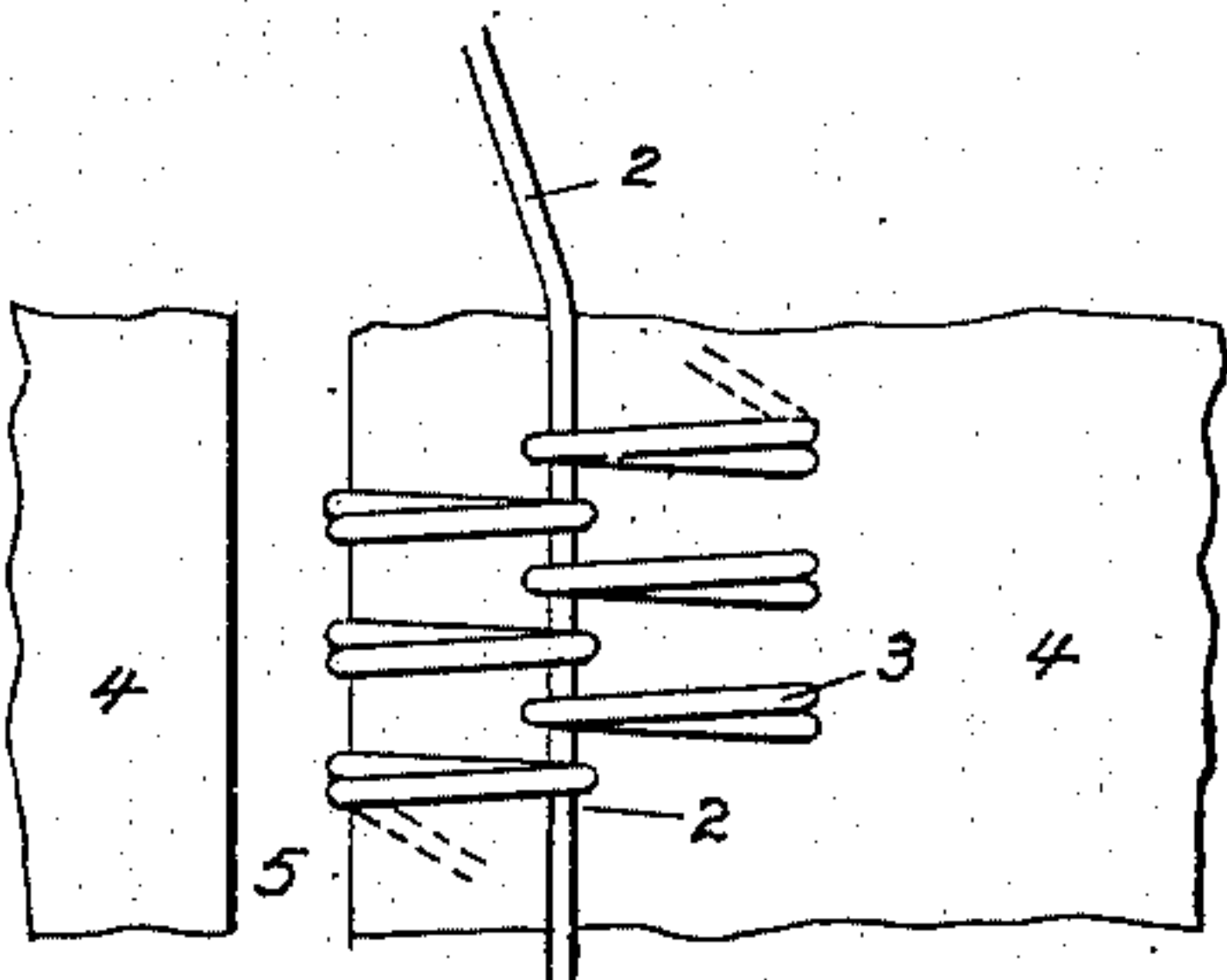


Fig. 8.

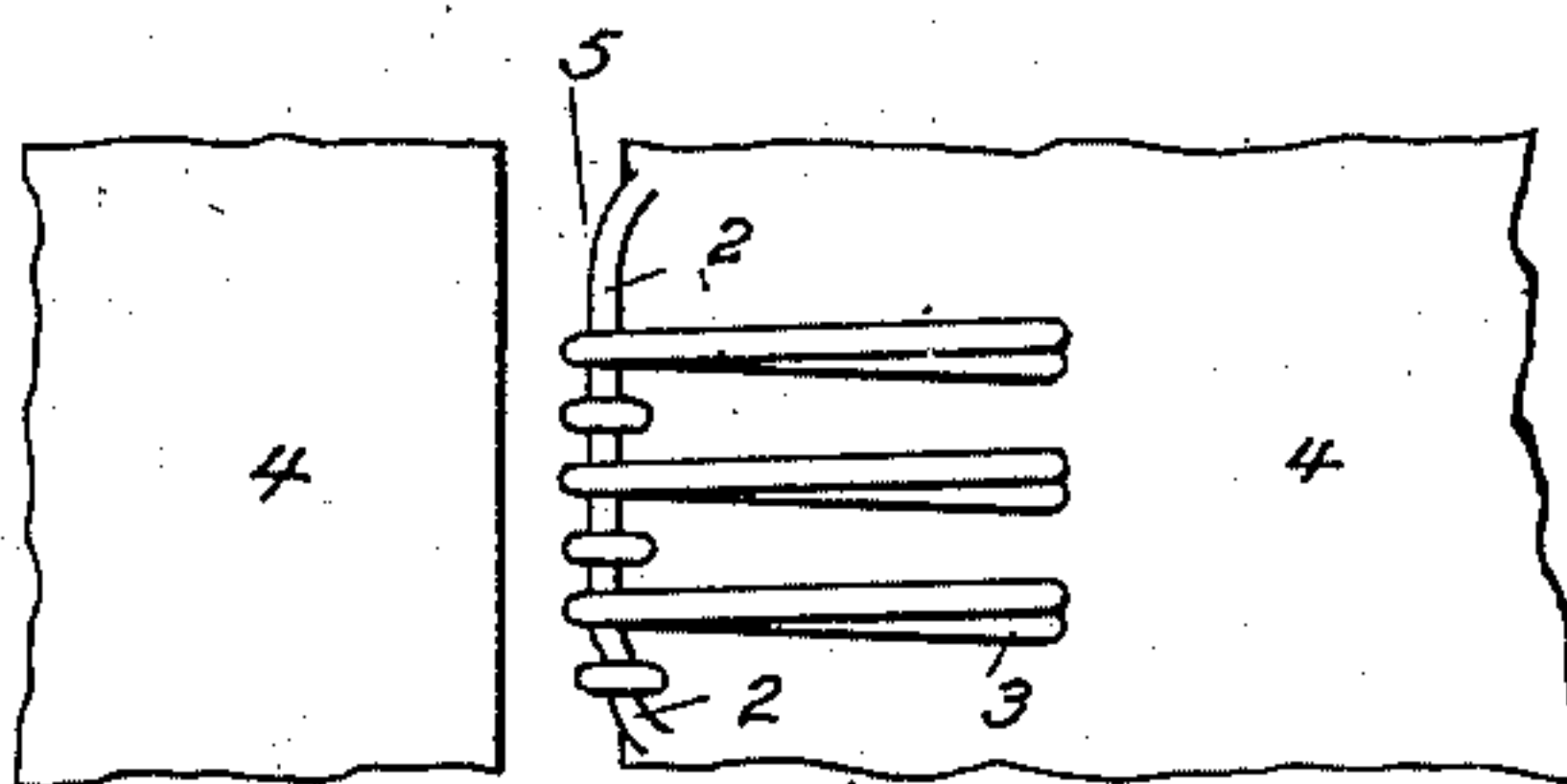
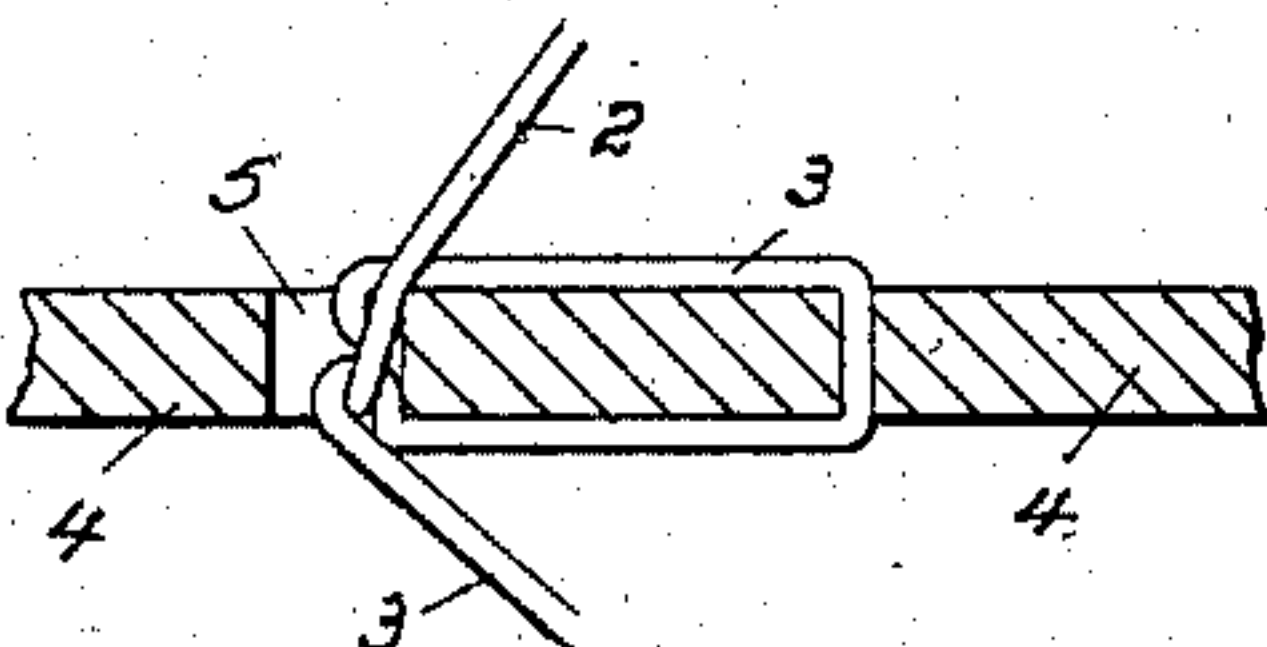


Fig. 4.



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4 SHEETS—SHEET 2.

Fig. 11.

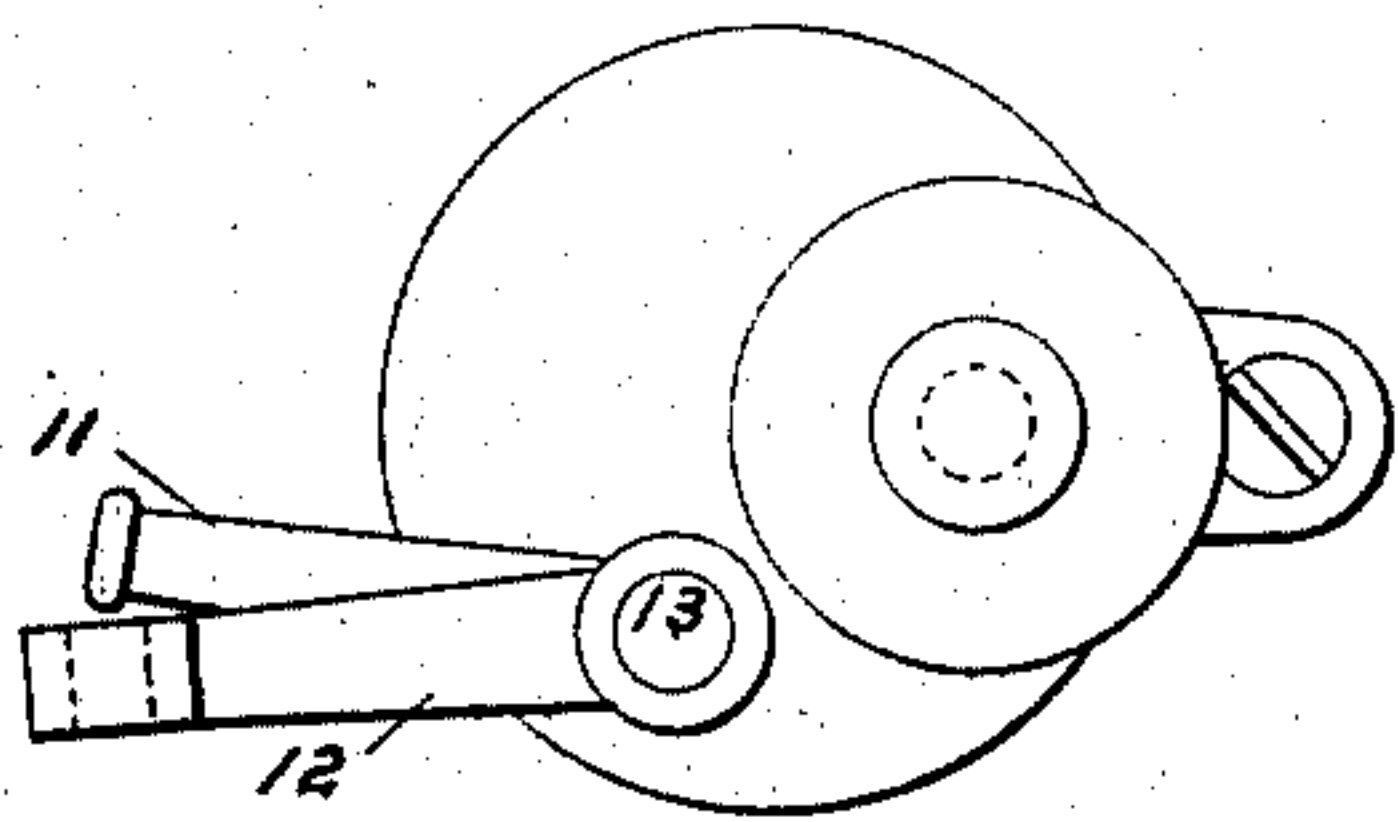


Fig. 10.

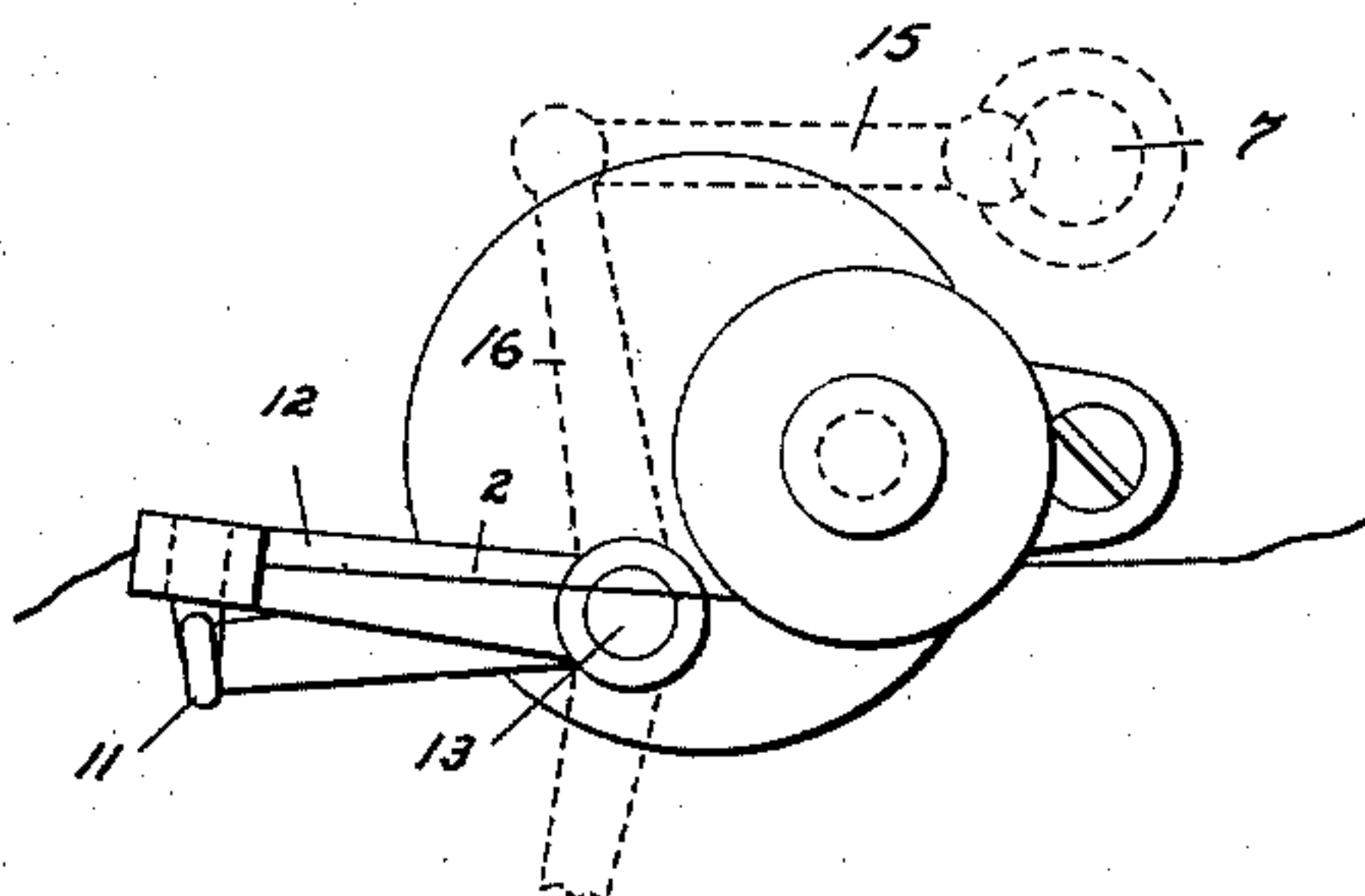
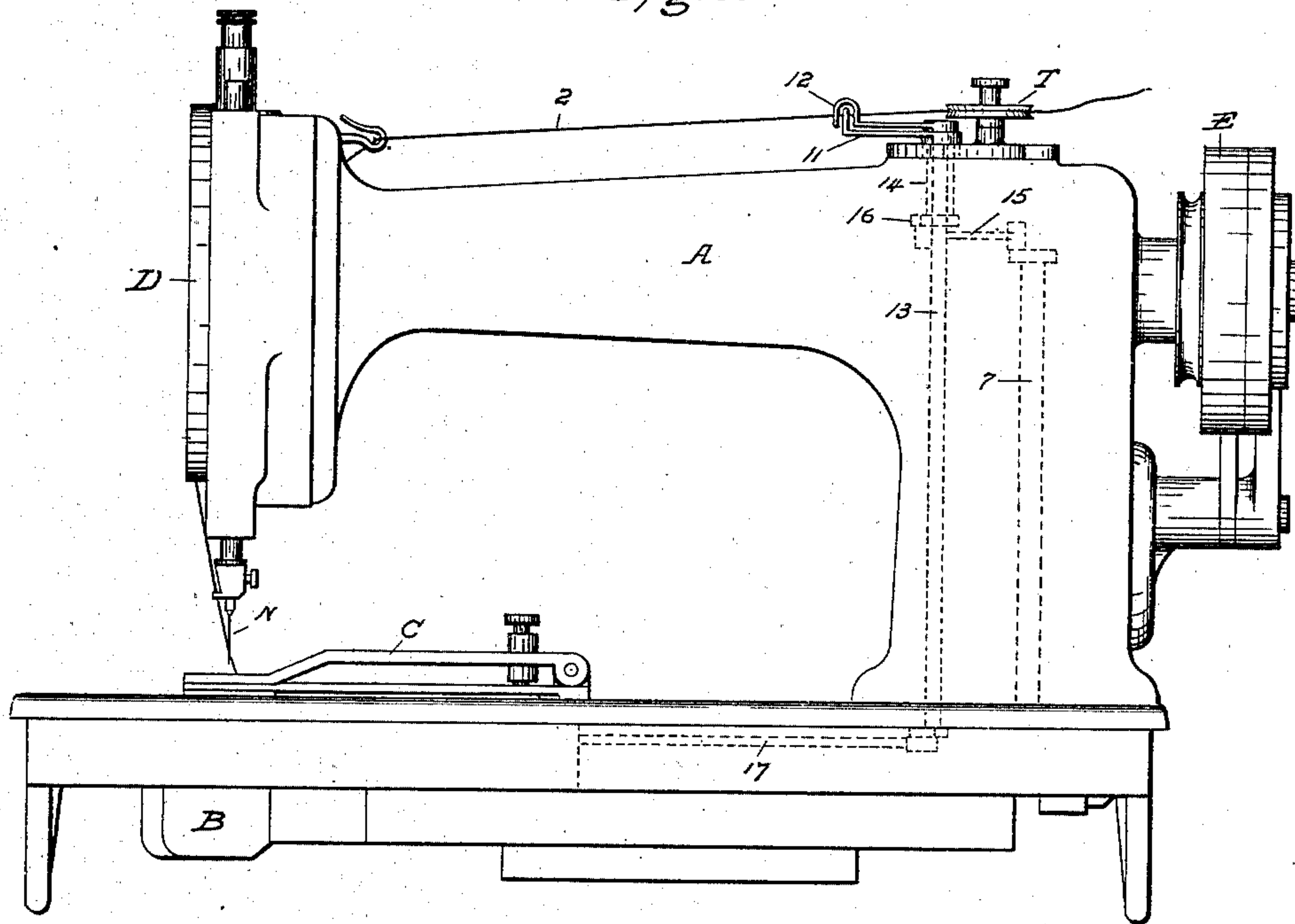


Fig. 9.



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4 SHEETS—SHEET 3.

Fig. 13a

Fig 13

Fig. 14.

Fig 14.a

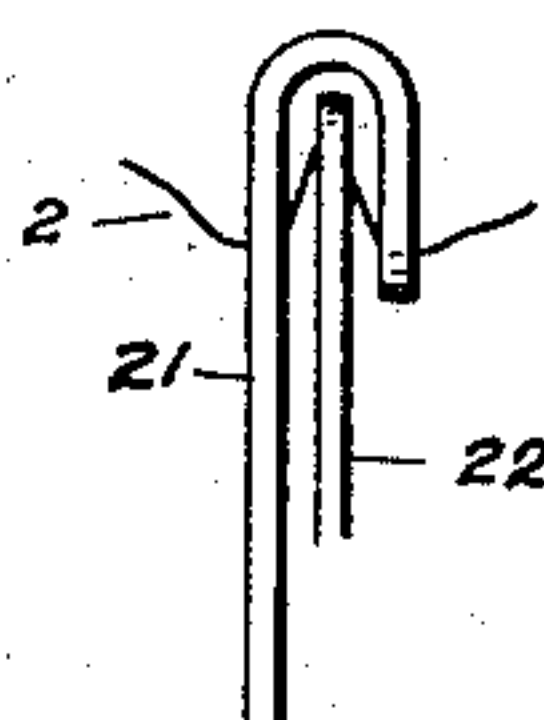
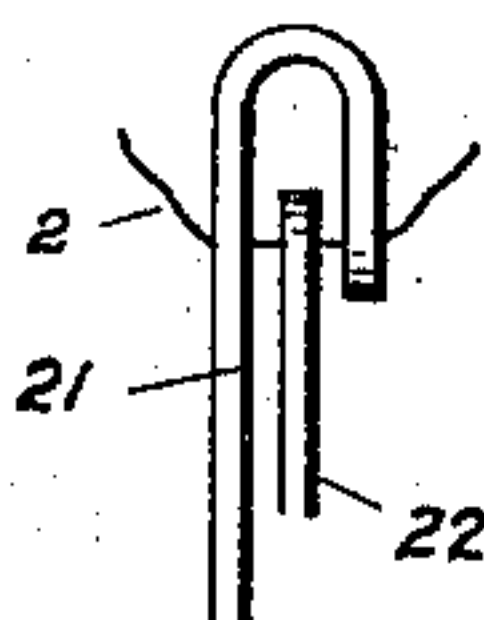
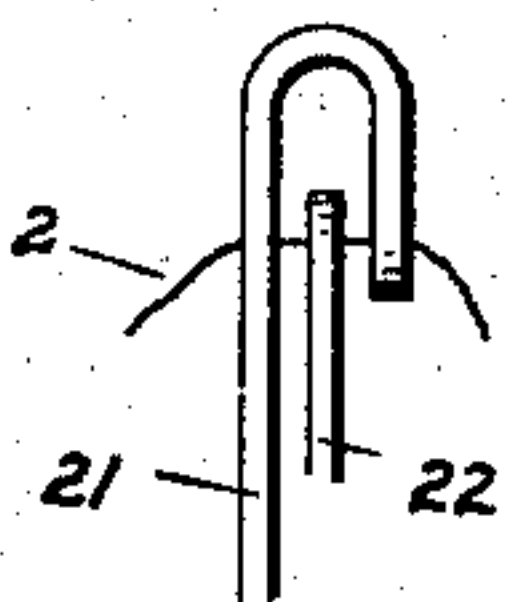
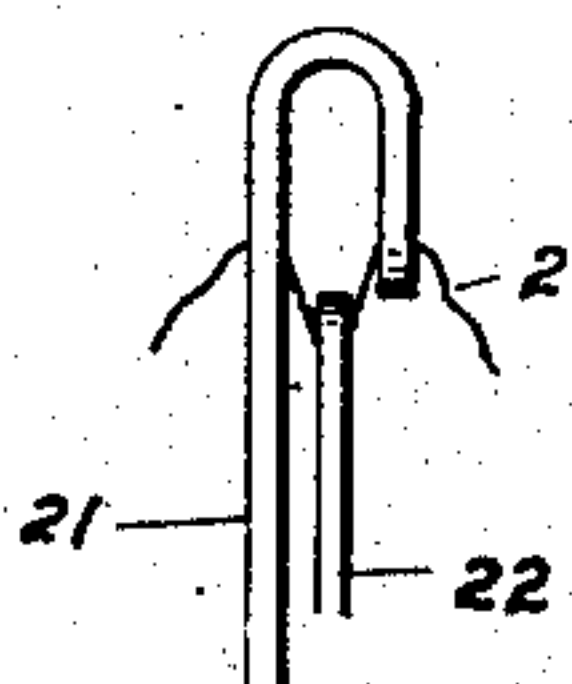
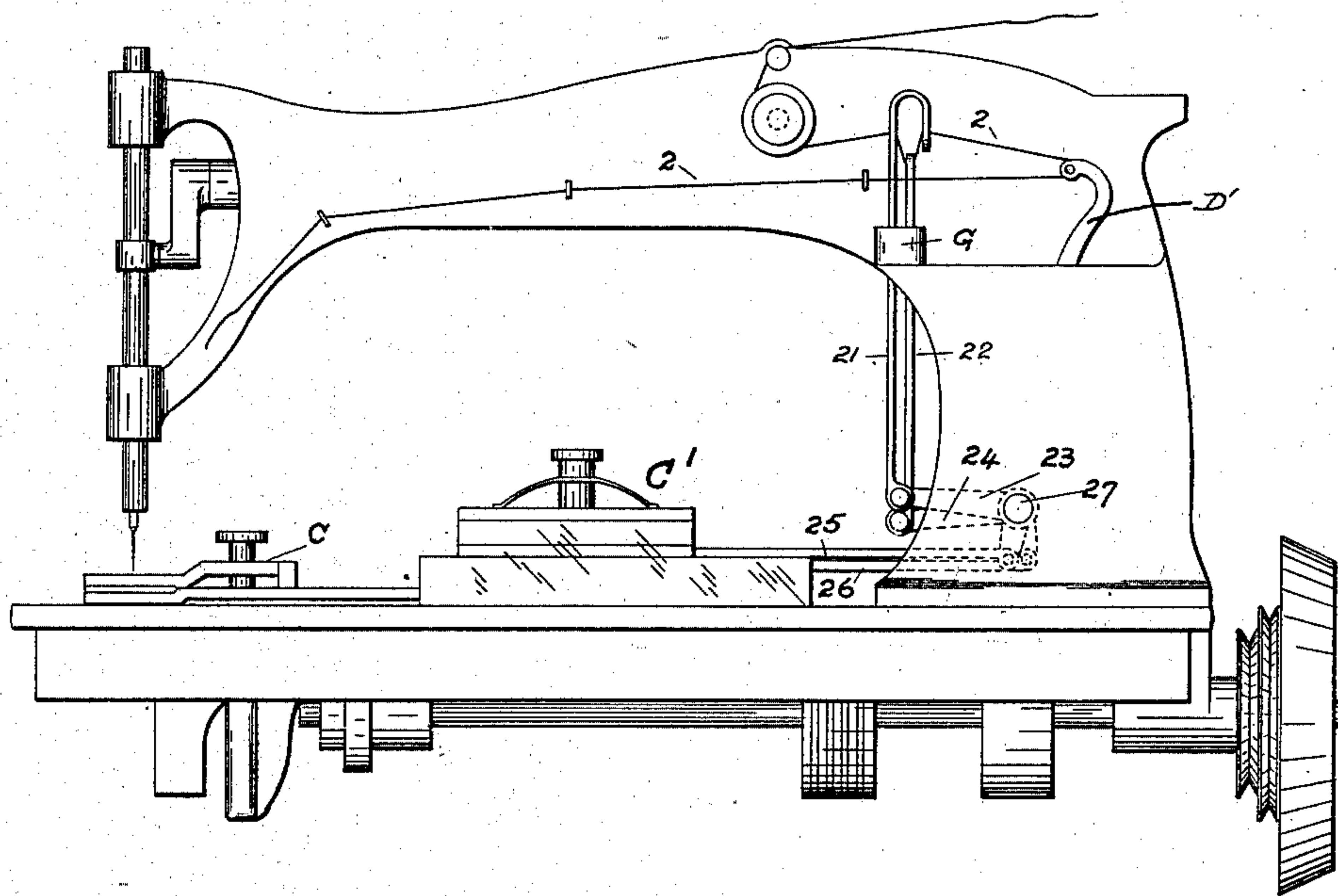


Fig. 12.



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4 SHEETS—SHEET 4.

Fig. 15.

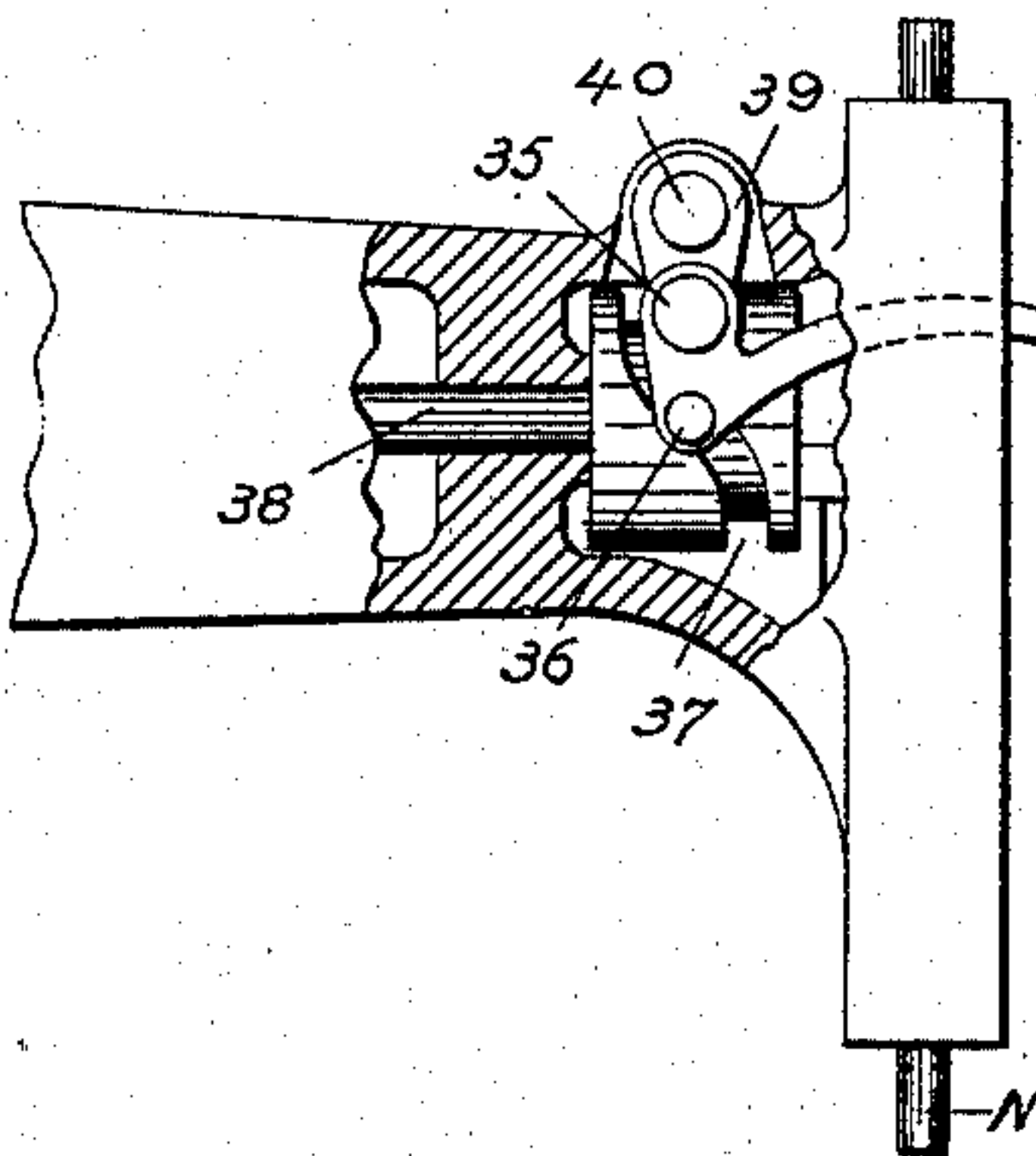


Fig. 16.

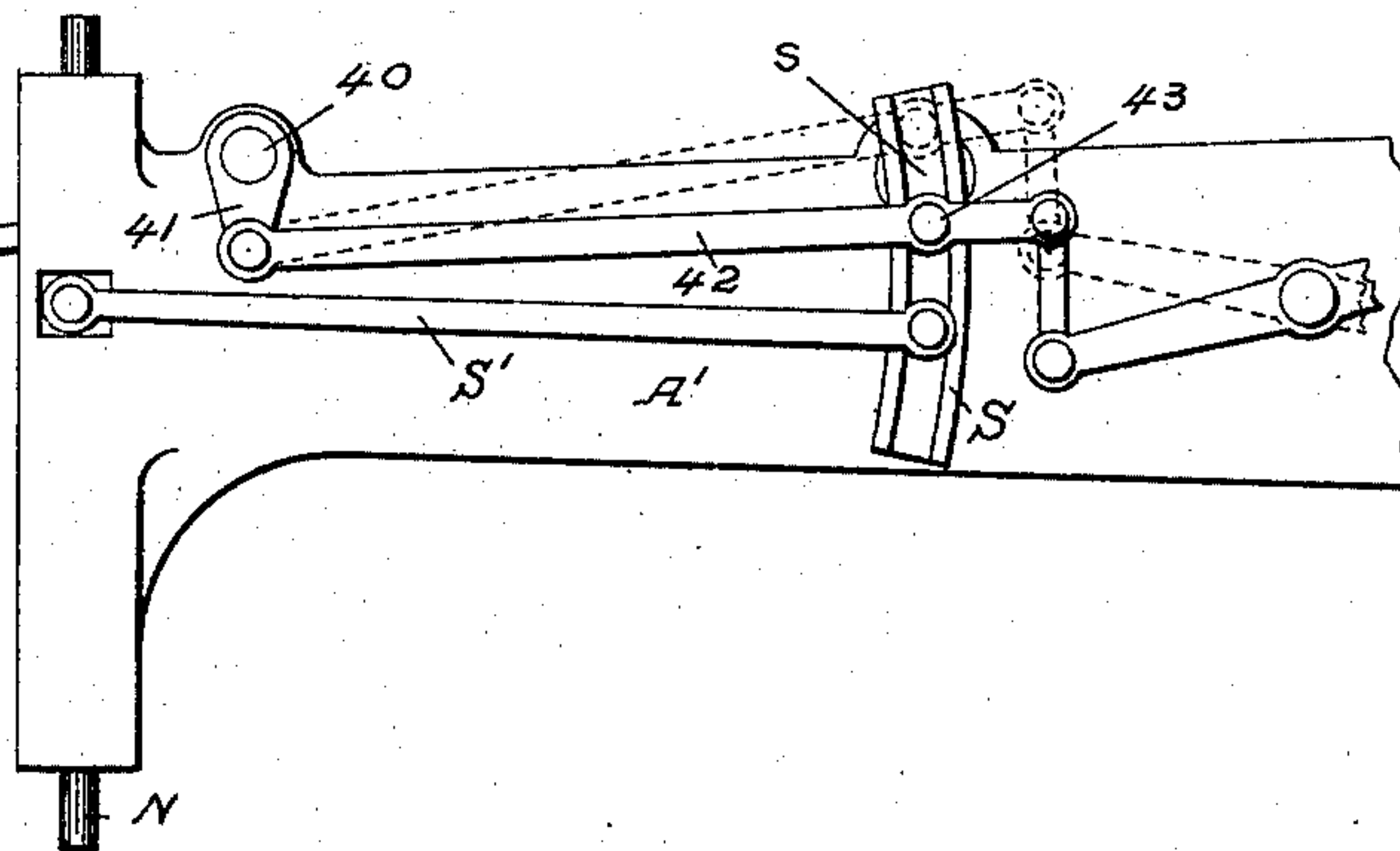


Fig. 17.

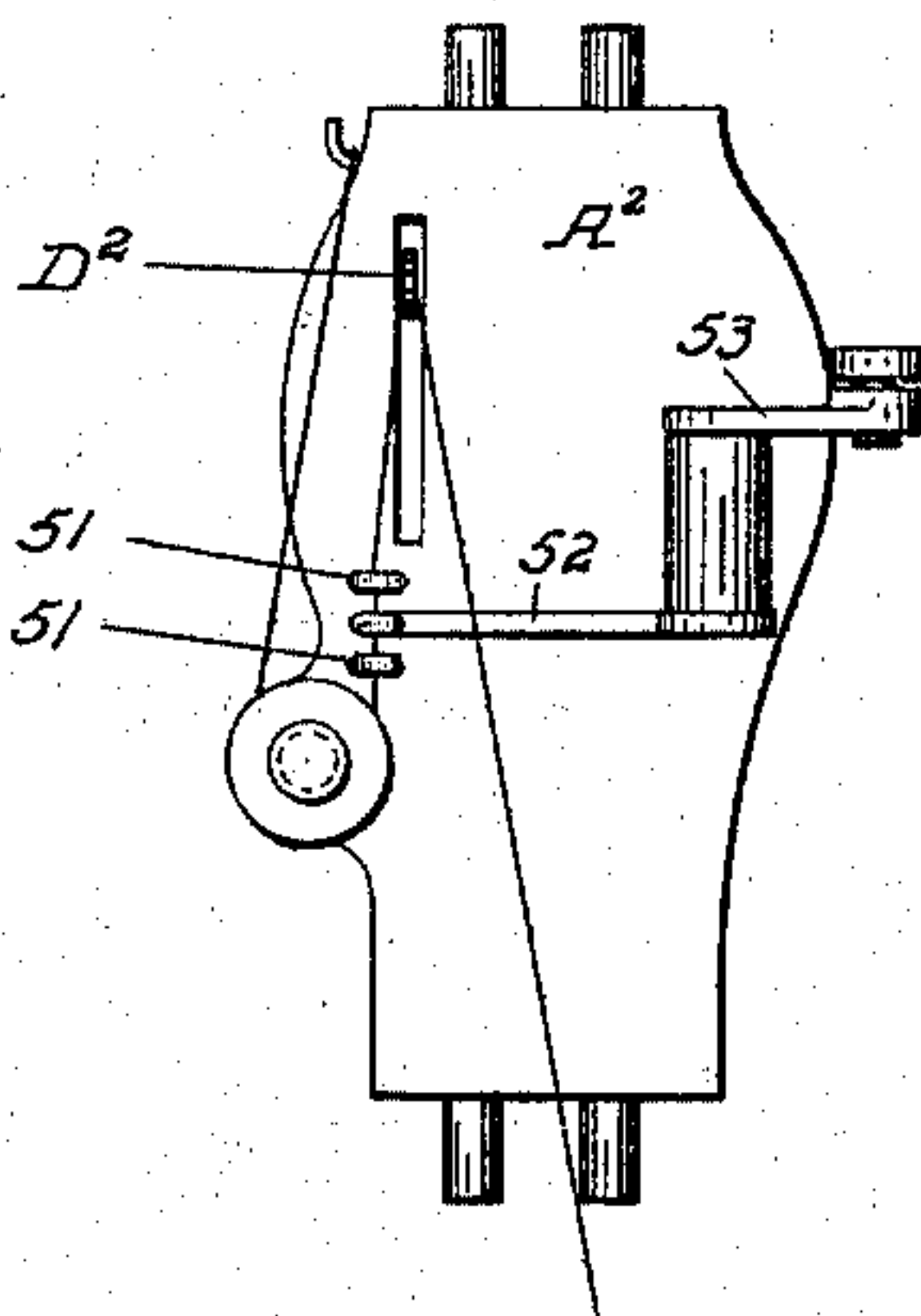
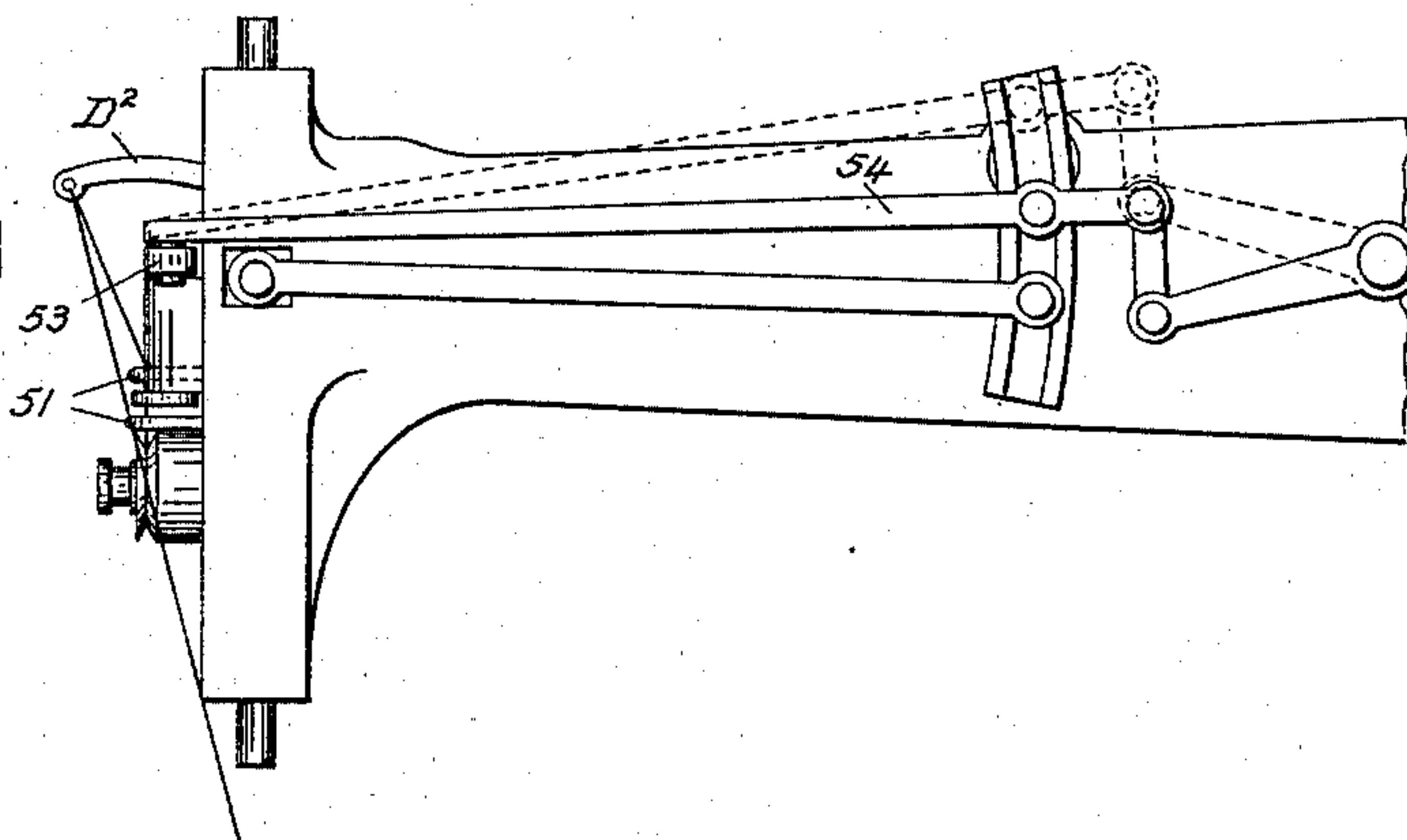


Fig. 18.



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UNITED STATES PATENT OFFICE.

WILLIAM EDWARD GOODYEAR, OF LONDON, ENGLAND, ASSIGNOR TO
WILLCOX AND GIBBS SEWING MACHINE COMPANY, OF NEW YORK,
N. Y., A CORPORATION OF NEW YORK.

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 749,437, dated January 12, 1904.

Application filed August 7, 1903. Serial No. 168,677. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM EDWARD GOODYEAR, a subject of the King of Great Britain and Ireland, residing in London, England, have invented Improvements in Buttonhole-Sewing Machines, of which the following is a specification.

My invention relates to buttonhole-sewing machines of that type which produces over-edge or buttonhole stitching by the use of two threads by the aid of means for changing the relative positions of the stitch-forming mechanism and the work at successive stitches, as by a laterally vibrating or jumping needle-bar or a reciprocating work-clamp. In machines of this class as now constructed the tension on the upper or needle thread is so far in excess of that upon the lower thread that the under thread is drawn up by the needle-thread at each ascent of the needle and the loops of under thread are held close together by the needle-thread, forming what is called the "purl," and this purl is formed upon the face of the fabric, making a ridge on such fabric face at a little distance from the edge of the buttonhole.

The main object of my present invention is to so construct a buttonhole-sewing machine of the class in question that the purl shall be formed automatically at the throat or within the edge of the buttonhole instead of on the surface of the goods, and thereby I produce a more durable and slightly buttonhole.

In the accompanying drawings, Figure 1 is a view of a barred buttonhole, such as is produced by the buttonhole-machines of the class in question as now constructed. Figs. 2 and 3 are enlarged sectional and face views of parts of such a buttonhole in process of manufacture. Figs. 4, 5, 6, and 7 are enlarged sectional views, and Fig. 8 a face view, of part of a buttonhole-stitching as it is produced by my invention. Fig. 9 is a side elevation of one type of two-thread buttonhole-machine provided with my invention. Figs. 10 and 11 are enlarged plan views of the auxiliary take-up used on said machine. Fig. 12 is a side elevation of another type of machine provided with another form of my improvement.

Figs. 13, 13^a and 14 and 14^a are enlarged views of a form of auxiliary take-up which may be used on the machine shown in Fig. 12. Fig. 15 is a sectional view, and Fig. 16 an elevation, of sufficient of another style (jumping needle) machine provided with another form of my invention. Fig. 17 is an end elevation, and Fig. 18 a side elevation, of another modification.

Referring to Fig. 1, *a a* indicate the over-edge-stitches at the sides of the buttonhole, and *b b* the "barring-stitches," formed at the opposite ends of the buttonhole in the ordinary manner of two-thread buttonhole-machines employing a jumping-needle or reciprocating work-clamp. In Figs. 2 and 3 I have shown, on an enlarged scale, how this stitch is formed, 4 representing the work, 5 the buttonhole, and 3 the under thread, loops of which are drawn up to the upper surface or face of the work by the needle-thread 2, which then lies along the surface of the work and forms the purl in a ridge on such surface, usually about midway of the width of the overseam, as shown.

To make the buttonhole more durable and also more slightly, I so construct the machine that the purl is formed at the edge of the buttonhole, and this is accomplished by providing the sewing-machine with a take-up mechanism acting upon the upper thread to cause it to draw alternately long and short loops of the under thread.

My invention may be applied to various constructions of buttonhole-machines of the class in question, and my improvement itself may be embodied in various forms. In Fig. 9 I have illustrated a well-known construction of two-thread sewing-machine with buttonholing attachment and provided also with my improvements, and in Figs. 10 and 11 I have illustrated in plan view the auxiliary take-up which I have applied to this machine. The machine illustrated in this Fig. 9 is the Willcox and Gibbs sewing-machine, the detailed construction of which is shown and described in Patent No. 572,090, November 24, 1896, and Patent No. 695,438, June 4, 1901. I have shown this machine as provided with a recip-

rocating work-clamp C, operating in connection with the needle N and the lower thread mechanism (at B) to form the buttonhole-stitch in the usual manner. As described in the above-mentioned patents, this machine is provided at D with its usual rotary take-up to act upon the upper thread 2. In addition to this regular take-up to act upon the upper thread I provide an auxiliary take-up, which in the present instance I have shown as located on the top of the head A near the driving-wheel E. The upper thread 2 is shown as passing through a tension T and thence through eyes in the ends of two arms 11 and 12, the eyed part of the arm 12 being U-shaped and straddling the eyed end of the arm 11, and there being eyes on both legs of the U-shaped part of the arm 12, so that by moving one arm with reference to the other a portion of the thread passing through the eyes may be taken up, as is usual in other take-ups. The arm 11 is mounted upon the upper end of the sleeve 14 free to turn upon the vertical shaft 13, which carries at its upper end the arm 12. The sleeve 14 carries a crank-arm 16, Figs. 9 and 10, connected by a link 15 with a crank on the upper end of a vertical shaft 7, which latter is geared to the working part of the sewing mechanism in any suitable way, so as to make one revolution for every two stitches, so that the arm or lever 11 will act to take up thread only at every alternate stitch.

The action of the described mechanism will be more clearly understood on reference to Figs. 4 to 8. While the needle is forming the stitch within the slit of the buttonhole, or within that part of the work where the hole is to be formed, (when the buttonhole is to be cut after it is formed,) the eyed parts of the arms 11 and 12 of the auxiliary take-up will be practically in line with each other and exerting no take-up action upon the upper thread 2, so that such needle-thread 2 on drawing up the loop of under thread, Fig. 4, will pull up said loop only to the edge of the buttonhole, as shown in Fig. 5. When, however, the needle passes down through the work at the other edge of the seam and then draws up there another loop of thread, as shown at Fig. 6, the eyed arm 12 of the auxiliary take-up will have moved away from the arm 11, as shown in Fig. 10, and supplementing the action of the regular take-up D upon the upper thread will cause a long loop of under thread to be drawn up and pulled over to the edge of the buttonhole, as shown in Figs. 7 and 8. In other words, by thus causing the auxiliary take-up to operate at every alternate stitch long and short loops of the under thread will be drawn up alternately and the purl will be formed at the edge of the buttonhole, as described. In order that this may be done on both sides of the buttonhole without having to turn the work round at the end after the barring, I

provide means for changing the time of the take-up on reversing the direction of the feed of the work, so that the short pull may take place at the buttonhole-slit side of the seam. In the construction illustrated this result is accomplished by providing for the reversal of the position of the arm 12 with reference to the vibrating arm 11 at the end of the buttonhole. This may be done in any suitable way. In the case shown the vertical shaft 13, which carries the arm 12, may be connected by a link 17 to the mechanism for actuating the work-clamp C, so that when the end of the buttonhole is reached or the work-clamp feed is reversed the position of the arm 12 with reference to the arm 11 will be reversed, as indicated in Fig. 11.

In Fig. 12 I have shown my invention as applied to the well-known Wheeler and Wilson type of machine. In this case also I provide, in addition to the regular take-up D', an auxiliary take-up to act upon the upper thread 2 at every alternate stitch. This auxiliary take-up consists of a looped and eyed arm 21, between which works an eyed arm 22, the thread 2 passing through the eyes of these arms. The arm 22 is carried by a bell-crank lever 24 on a shaft 27 and connected by a link 26 to the operating part of the machine, so that it will receive a reciprocating movement at every second stitch of the sewing mechanism. Fig. 13 shows the arms 21 and 22 with the eyes in line, so that no action is had on the thread 2 by this auxiliary take-up; but on the second stitch when the long loop is to be drawn, as in Figs. 6 and 7, the arm 22 will be moved away from the arm 21, as shown in Fig. 13^a. To provide for the reversal when the second side of the buttonhole-slit has to be overedged, the arm 21 may be carried by a bell-crank lever 23, connected by a link 25 to the work-clamp mechanism C', so that when the direction of the feed movement of this work-clamp is reversed the arm 21 may have its position reversed with reference to the arm 22, as will be understood on reference to Figs. 14 and 14^a.

As I have already said, my invention may be applied not only to buttonhole-machines having reciprocating work-clamps, but also to those having jumping needle-bars. In Figs. 15 and 16 I have shown a form of my invention as applied to a machine with a jumping needle-bar N, the jumping movement being imparted to the needle-bar from a link motion comprising a vibrating grooved segment S, to which one end of the link S' is adjustably connected, while the other is united with the needle-bar N, Fig. 16. The segment S is pivoted to the head A' at s.

The auxiliary take-up means of my invention instead of being mechanically separate from the ordinary take-up may be mechanically combined with it. I have shown such combination in Figs 15 and 16, the take-up

arm 34 to act on the upper thread being similar to the ordinary take-up arm in that it is pivoted at 35, Fig. 15, and has an antifriction-roller 36 running in a cam-groove 37 on a hub 5 on the shaft 38, so that so far as this action of the cam-groove 37 is concerned this take-up arm acts at each stitch. Instead, however, of pivoting this take-up arm 34 to the frame, as usual, I have shown it as pivoted to a crank-arm 39 on a short shaft 40, which carries at its opposite end a crank-arm 41, Fig. 16, connected by a link 42 to the slotted segment S at 43. The result of this will be that at each alternate stitch and when the needle-bar is jumped 15 over to the position to pass through the cloth at the edge of the seam away from the buttonhole slit an auxiliary or additional movement will be imparted to the take-up arm 34 to draw up a long loop of the lower thread, as before 20 described. The extent of the length of loop drawn up may be varied by suitably adjusting the connection 43 in the slotted segment S with reference to the pivoting-point *s* of the segment, Fig. 16, as will be readily understood. To provide for the change of time of the take-up on the reversal of feed movement of the goods to overedge the second side of the buttonhole, the connection 43 of the arm 42 with the segment S can be transferred to 30 the other side of the pivoting-point of the segment S, as indicated by dotted lines in Fig. 16. This may be done by hand or by suitable mechanical connection with the feed-motion of the machine.

35 In Figs. 17 and 18 I have shown another modification of my invention as applied to a jumping-needle-bar machine. It is similar to that shown in Figs. 15 and 16, except that the auxiliary take-up arm is mechanically separate, as it were, from the regular take-up arm. In this construction the regular take-up arm is shown at D², while a supplemental take-up arm 52 is shown as working between 40 two fixed guide-eyes 51 on the sewing-machine head A². The vibrating take-up arm 52 is carried by a vertical shaft turning in a bearing in the head and having a crank-arm 53, connected by a link 54 to the link-motion, as the arm 42 is connected to its link-motion 50 in the construction illustrated in Fig. 16.

I claim as my invention—

1. A buttonhole-sewing machine, provided

with stitch-forming mechanism having an upper and an under thread carrying element, means for changing the relative positions of 55 the stitch-forming mechanism and the work at successive stitches, take-up mechanism for the upper thread and means for causing said take-up mechanism to produce at the successive stitches alternately long and short take- 60 ups of the upper thread and thereby draw alternately long and short loops of the under thread to form the purl at the throat of the buttonhole.

2. A buttonhole-sewing machine, provided 65 with stitch-forming mechanism having an upper and an under thread carrying element and provided with a regular take-up for the upper thread and an auxiliary take-up, in combination with means to cause the auxiliary take-up 70 to act at every second stitch, as and for the purpose set forth.

3. A buttonhole-sewing machine, provided with stitch-forming mechanism having an upper and an under thread carrying element, 75 means for changing the relative positions of the stitch-forming mechanism and the work at successive stitches, take-up mechanism for the upper thread and means for causing said take-up mechanism to produce at the successive 80 stitches alternately long and short take-up of the upper thread and thereby draw alternately long and short loops of the under thread to form the purl at the throat of the buttonhole, in combination with means for changing 85 the time of the take-up on reversing the direction of the feed of the work.

4. A buttonhole-sewing machine, provided with stitch-forming mechanism having an upper and an under thread carrying element and 90 provided with a regular take-up for the upper thread and an auxiliary take-up, in combination with means to cause the auxiliary take-up to act at every second stitch, and means for changing the time of action of the auxiliary 95 take-up on reversing the direction of feed of the work.

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

WILLIAM EDWARD GOODYEAR.

Witnesses:

HUBERT HOWSON,
F. WARREN WRIGHT.