(No Model.) 3 Sheets—Sheet 1.

G. SPEIGHT, S. CHAPMAN & R. TODD.

SEWING MACHINE.

No. 494,038. Patented Mar. 21, 1893.

Fig. 1.

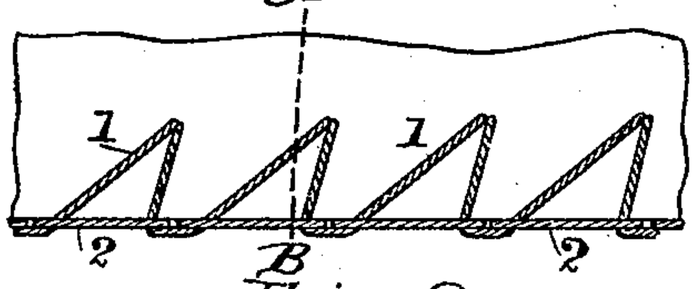


Fig. 2.

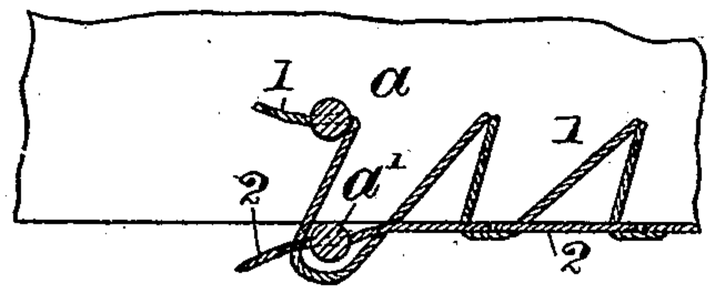


Fig. 3.

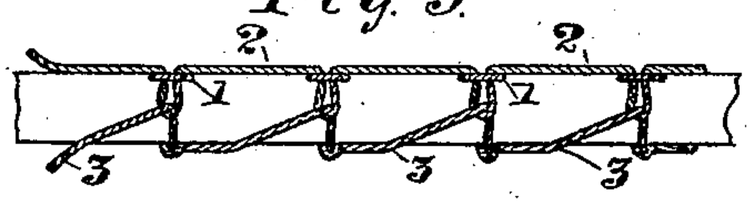


Fig. 4.

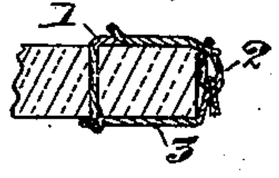
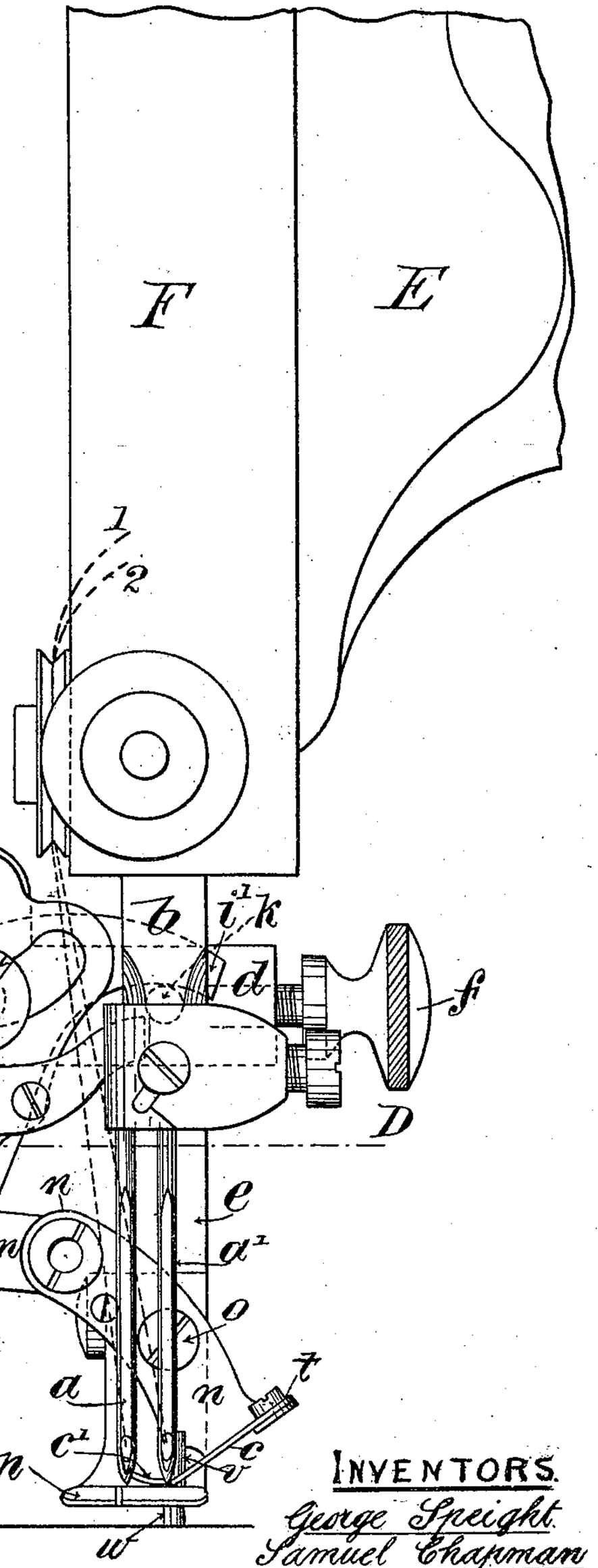


Fig. 5



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 6

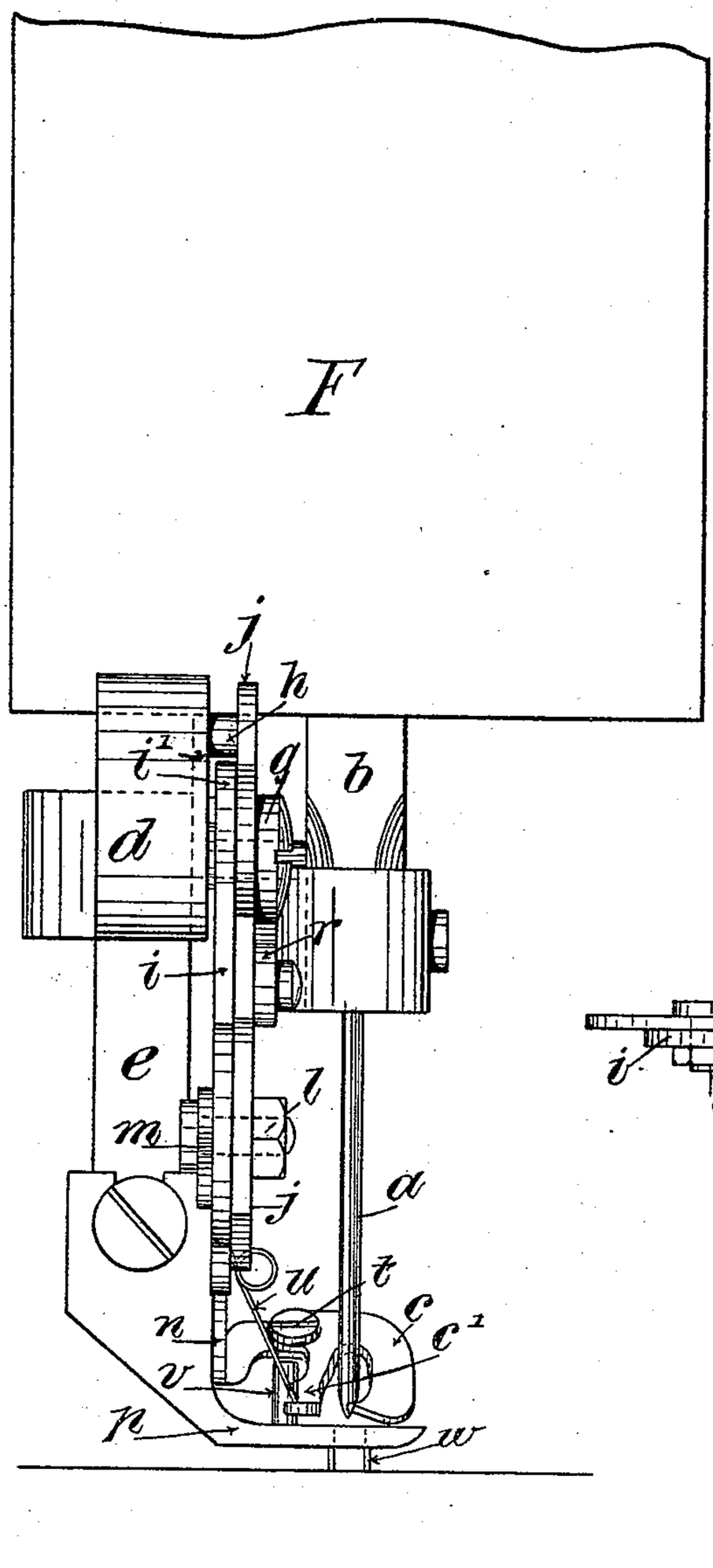


Fig. 7.

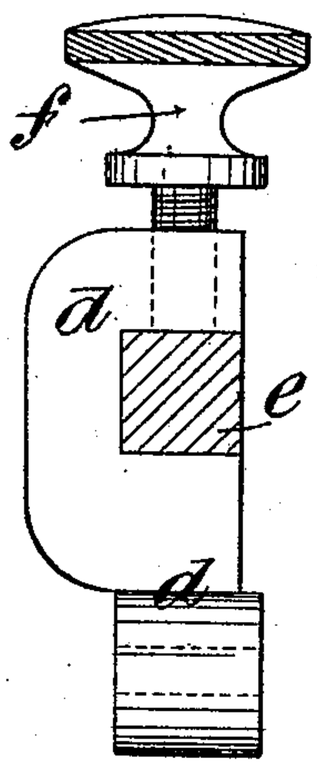


Fig. 8.

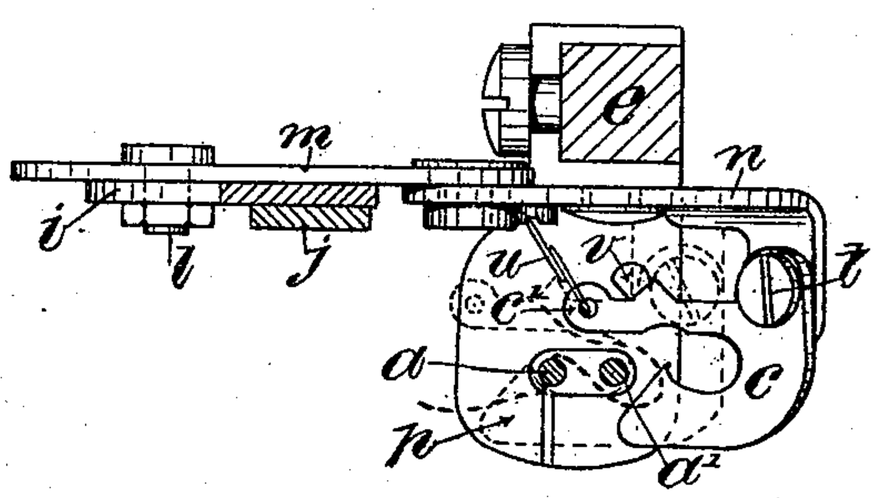
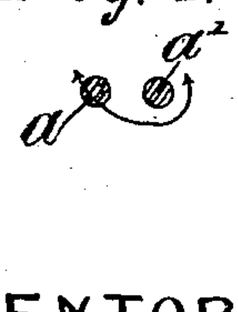


Fig. 9.



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(No Model.) 3 Sheets—Sheet 3.

G. SPEIGHT, S. CHAPMAN & R. TODD.

SEWING MACHINE.

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Fig. 10.

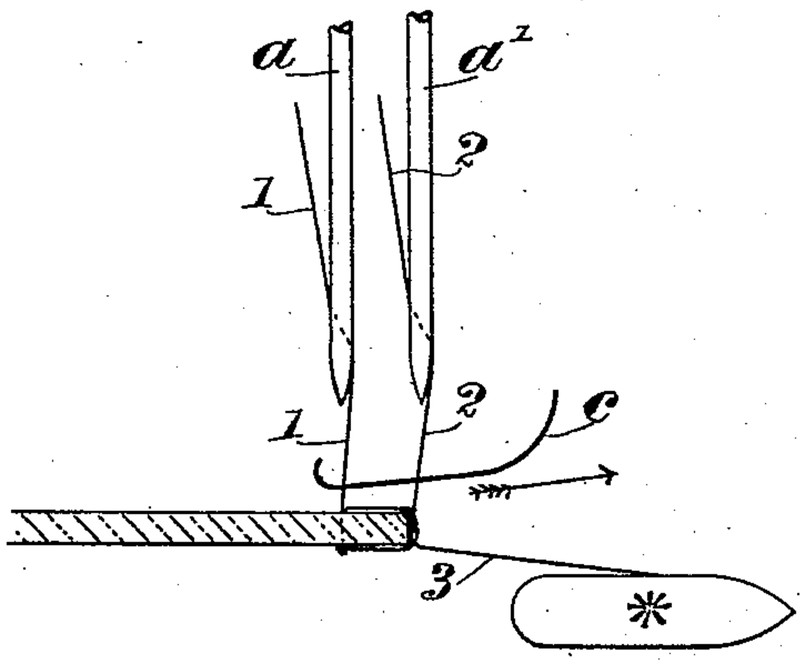

Fig. 11.

Fig. 12.

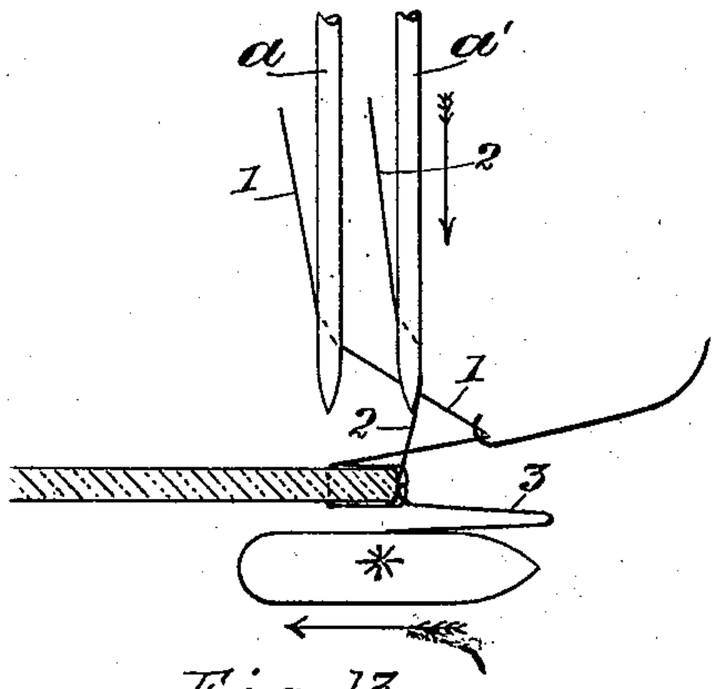

Fig. 13.

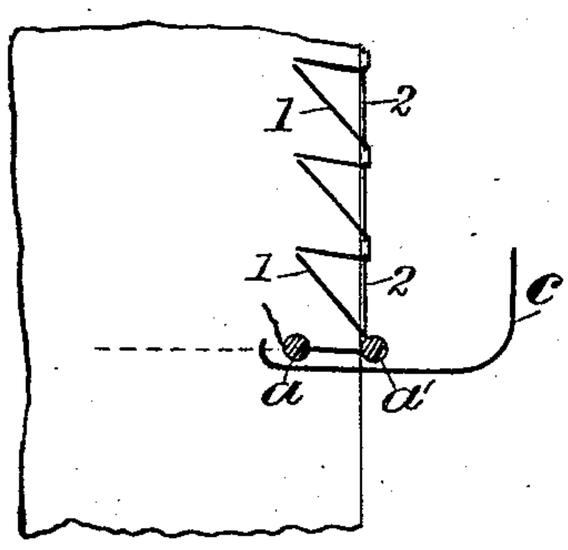

Fig. 14.

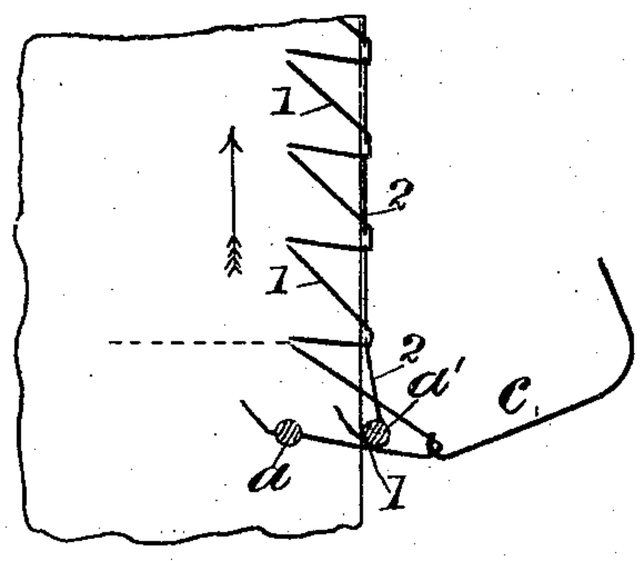

Fig. 15.

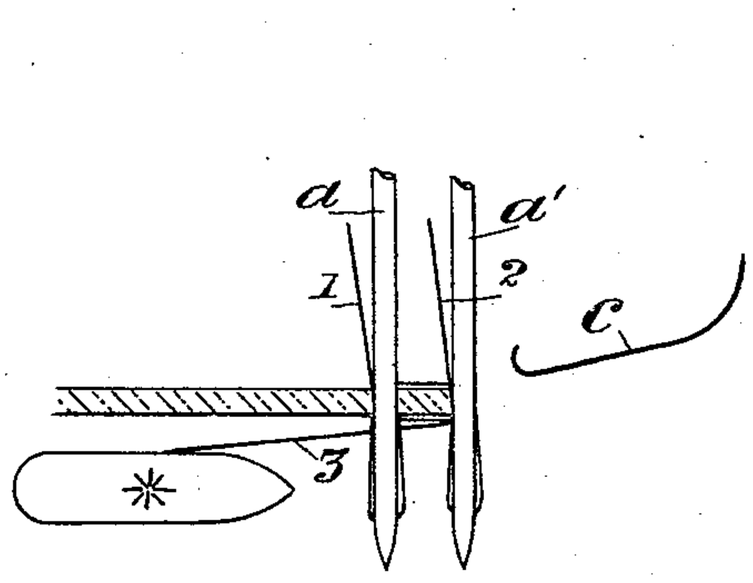

Fig. 16.

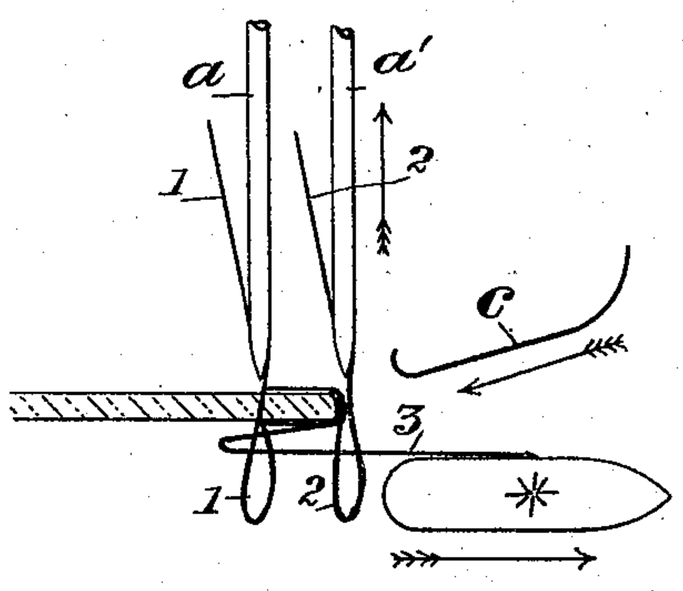

Fig. 17.

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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,038, dated March 21, 1893.

Application filed March 21, 1892. Serial No. 425,797. (No model.) Patented in England November 23, 1891, No. 20,321.

To all whom it may concern:

Be it known that we, GEORGE SPEIGHT, dry-salter, of Smith Street, Bradford, county of York, SAMUEL CHAPMAN, machinist, of 70 Herbert Street, Blackley, and RICHARD TODD, embroiderer, of 13 Mason Street, Manchester, county of Lancaster, England, subjects of the Queen of Great Britain and Ireland, have invented certain Improvements in Sewing-Machines for Stitching Button Holes and for other Analogous Purposes, (patented in England November 23 1891, No. 20,321;) and we do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our said invention relates to an improved attachment for application to ordinary lock-stitch sewing machines whereby such ordinary machines are rendered capable of stitching button holes or of edging, lining or overcasting as is well understood.

Our attachment can be easily applied to and removed from a sewing machine by an unskilled person so that an ordinary machine can be quickly transformed into a button hole or overcasting machine and as quickly returned to its normal condition.

Our improved attachment has also the property of providing a button hole stitch having the same appearance as that produced by hand.

To render our invention fully understood we will now proceed to describe the same particularly and with reference to the annexed two sheets of drawings.

On the said sheets the first four figures illustrate the button hole stitch and its formation.

Figure 1 is an enlarged plan view of the button hole stitch executed by our improved appliance. Fig. 2 is also a plan view showing the two needles in the act of executing the stitch. Fig. 3 is an edge view of the button hole stitch. Fig. 4 is a sectional view at the line A. B. (Fig. 1) in further illustration of the stitch. The remaining five figures illustrate the mechanism for executing the stitch. The said figures are drawn to an enlarged scale and only so much of the sewing machine is shown as is necessary to render our invention perfectly clear. Fig. 5 is a side elevation of our improved button holing appliance. Fig. 6 is a front view of Fig. 5. Fig. 7 is a section of the presser foot bar showing the detachable bracket *d* upon which the greater part of the mechanism is pivoted. Fig. 8 is a horizontal section of Fig. 5 at the line C D Fig. 5. Fig. 9 shows the path described by the hooker relatively to the needles *a a'*. Fig. 10 is a side view of the needles and of the shuttle and section of the cloth at the commencement of the stitch. Figs. 12, 14 and 15 are like views showing the positions of the needle and the shuttle during the progress of the stitch. Figs. 11 and 13 are plan views of the threads and sections of the needles made during the progress of the stitch.

Referring to the said figures a portion of the arm E of the sewing machine appears in Fig. 5 and also the lower end of the needle bar box F. In carrying our invention into effect we use two needles *a a'* as is the case in other forms of button holing appliances. These two needles *a a'* are fixed side by side in the ordinary needle bar *b*. Through the eye of the needle *a* we pass a thread 1 and through the eye of the needle *a'* we pass a thread 2 the said threads being led from spools carried on the arm of the machine as is usual and passing through the ordinary or suitable tension appliances. The threads 1 and 2 are indicated by dotted lines in Figs. 5, and 8. The shuttle thread which is marked 3 in the illustrations of the stitch, acts in unison with the threads 1 and 2 as will be afterward explained, the thread 3 is preferably wound upon a bobbin placed within the shuttle and operated below the sewing table and adapted to reciprocate from side to side by any well known method.

The mechanism for operating the hooker *c* consists of the following parts. We provide a bracket *d* having an open side and adapted to be secured to the presser foot bar *e* by a screw *f*. This bracket is separately shown in plan in Fig. 7. Upon this bracket are pivoted the parts which operate the hooker *c*. It will be noted that on the bracket *d* there are two pivots one marked *g* and the other *h*. Upon the pivot *g* there is hung a plate *i* and upon

the pivot h a plate j. The upper part of the plate i is formed with a horn i' which lies immediately over a pin k projecting from the needle bar b. The foot of the plate i carries a stud l adjustable in a slot in the plate and the said stud l engages with a slot in the outer end of a hasp link m which connects the plate i with the upper end of a pivoted carrier n, which is pivoted at o to the presser foot p. The plate j as has been said is pivoted at h to the bracket d and is formed with a curved slot as shown so as to vibrate free from interference with the pivot stud g. The foot of the plate j carries a stud pin q which enters a slot in the tail of the plate i. Thus the plates i and j are connected at the foot so as vibrate together although being hung at different points their movements are differentiated from each other. The reason of these differential movements of the plates i and j will become evident from what follows. It will be seen that upon the plate j a finger r is secured. This finger projects toward and at times comes beneath the stud k according to the position occupied by the parts. In Fig. 5 the needle bar is supposed to be rising, lifting the horn i' and vibrating the plates $i\,j$ inward toward the needles. When the needle bar is at the top of its stroke it will be found that the finger r owing to the larger radius through which it swings and consequent slower movement has come beneath the stud k. On the return downward stroke of the needle bar the stud k pushes down the finger r thus swinging both plates i and j outward and the outward motion is continued until the finger r by virtue of its differential movement has swung clear of the stud k whereupon the outward motion of the plates ceases and they remain at rest until the needle bar has completed its descent and is again rising. This pause at the end of the inward and outward motions of the plates $i\,j$ gives the dwell which is necessary to allow of the completion of the stitch and which will be hereinafter further alluded to. It will now be understood that the said intermittent to and fro swing of the plates is communicated by the hasp link m to the pivoted carrier n. The said carrier has centered upon it at the foot a hooker c which vibrates freely upon its pivot t and is constantly drawn toward the carrier n by a spring u one end of which is secured to the carrier while the other free end engages with the arm c' of the hooker and tends to draw the hooker inward.

To enable the hook nose of the hooker to pass across in front of the needle a' and at the same time to get round rather to the rear of the needles at the end of each stroke, in short to describe a curved path similar to that indicated at Fig. 9 with relation to the needles, we form the arm c' of the hooker with V shaped cam surfaces or inclines as clearly shown at Fig. 8 which cam inclines act in concert with a stud v and with the spring u in such a manner that when the hooker c is carried across the needles it is at the same time moved outward by the arm c' slipping up and over the stud v, thus pushing the hook nose out and allowing it to pass around in front of the needle a'. The dotted lines in Fig. 8 indicate the position occupied by the hooker at the end of its outward stroke. The presser foot is formed on its lower side with a toe or projection w which acts as a guide in sewing button holes or in edging cloth.

Having in the foregoing description tried to make the construction and arrangement of the parts of our appliance plain to the reader we will now describe the operations of the mechanism when put to work. It has already been pointed out that the stitch consists of three threads viz. the thread 1 passing through the needle a: the thread 2 passing through the needle a' and the binding thread 3 which is the shuttle thread which is carried within the shuttle below the pressure foot. It will be seen in Fig. 1 that the stitch formed by the thread 1 is drawn up to the edge of the fabric and that a loop of the thread 2 passes between the stitches at the edge as most clearly seen at Fig. 2 while the loop of the thread 2 is in its turn looped and held by the shuttle thread 3, which at the same time engages with and binds the thread 1 at the under side of the fabric.

The combined operations of the various parts in producing the stitch are as follows:—for example, let it be supposed that the needles a, a' are at the top of their stroke as shown in Fig. 10, and in plan in Fig. 11, the hooker c then stands in the indicated position ready to catch and draw over the thread 1. The needles now begin to descend, as in Fig. 12; the fabric is fed forward the distance of a stitch; and the shuttle proceeds back to the other end of the race. At the same time the hooker c catches and draws the thread 1 into the position shown in Fig. 12 and as the last stitch is at the same time fed forward (see position of dotted line) the thread 1 forms a loop as clearly shown in Fig. 13. The consequence is that as the needles descend, the needle a' passes through this loop (see Fig. 13) taking the thread 2 with it. Now passing to Fig. 14 it will there be seen that the needles are at the bottom of their stroke. The hooker c has let the thread 1 go and the shuttle is about to advance. As the needles rise, the slack of the threads forms two open loops, as clearly shown in Fig. 15 and the shuttle passes through these loops so that the thread 3 binds the threads 1 and 2 beneath. As the needles rise the threads 1 and 2 are drawn taut, the stitch is completed and the parts are again in the position shown in Fig. 10. The requisite dwell in the movements of the hooker c to allow of the ascent and descent of the needles is brought about by the differentially pivoted plates $i\,j$ in the manner already described. By adjusting the tension appliances the looping together of the various threads can be consolidated and drawn to-

gether as nearly as possible along the upper edge of a button hole thus presenting an appearance similar to that of hand sewed button holes.

The whole appliance may be quickly removed and the sewing machine rendered capable of doing ordinary work by throwing the slotted hasp link *m* clear of the stud *l* and slackening the screw *f* of the bracket *d* thereby removing everything except the hooker and carrier which also can be taken away by removing the pivot screw *o*.

In addition to button hole stitching as hereinbefore described our invention may be used for line stitching, edging or embroidering, different effects being produced by varying the respective tensions of the threads and by using threads of different colors.

The whole attachment can be easily and cheaply produced as the various parts may be pressed stamped and bent from flat sheet metal.

The appliance does not require nice fitting or adjustment nor is it liable to get out of order. No material change is required to be made in the machine to which it is applied and its application or removal can be effected by an unskilled person in a short space of time.

What we claim as our invention is—

1. The combination with a sewing machine provided with the two needles *a* and *a'*, said needles being arranged side by side in the direction of the feed and operating simultaneously; a shuttle reciprocating below said needles; of a removable button-hole attachment therefor, consisting of the removable bracket *d* on the pressure foot bar; the lever *i* pivoted to said main bracket *d* and provided with the horn *i'*, the lever *j* pivoted to said bracket *d* at a point above the pivoting point of the lever *i* and connecting at its lower end to the lower portion of the lever *i*; the finger *r* secured to the lever *j*; the stud *k* on the needle bar for engaging said horn *i'* on the upstroke and said finger *r* on the down-stroke; the carrier *n* pivoted to the needle bar; the link *m* connecting said lever *i* and said carrier, and the hooker *c* centered upon said carrier and vibrating adjacent to and in conjunction with said needles *a* and *a'*, substantially as described.

2. The combination with a sewing machine provided with the two needles *a* and *a'*, said needles being arranged side by side in the direction of the feed and operating simultaneously; a shuttle reciprocating below said needle; of a removable button-hole attachment therefor, consisting of the removable bracket *d* on the pressure foot bar; the lever *i* pivoted to said main bracket *d* and provided with the horn *i'*; the lever *j* pivoted to said bracket *d* at a point above the pivoting point of the lever *i* and connecting at its lower end to the lower portion of the lever *i*; the finger *r* secured to the lever *j*; the stud *k* on the needle bar for engaging said horn *i'* on the upstroke and said finger *r* on the down stroke, the carrier *n* pivoted to the needle bar; the link *m* connecting said lever *i* and said carrier, and the hooker *c* centered upon said carrier and provided with a cam thereon; and the stud *v* on the pressure foot bar for engaging with said cam, substantially as described.

This specification signed and witnessed the 17th day of February, 1892.

GEORGE SPEIGHT.
SAMUEL CHAPMAN.
RICHARD TODD.

Witnesses:
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RICHARD IBBERSON.