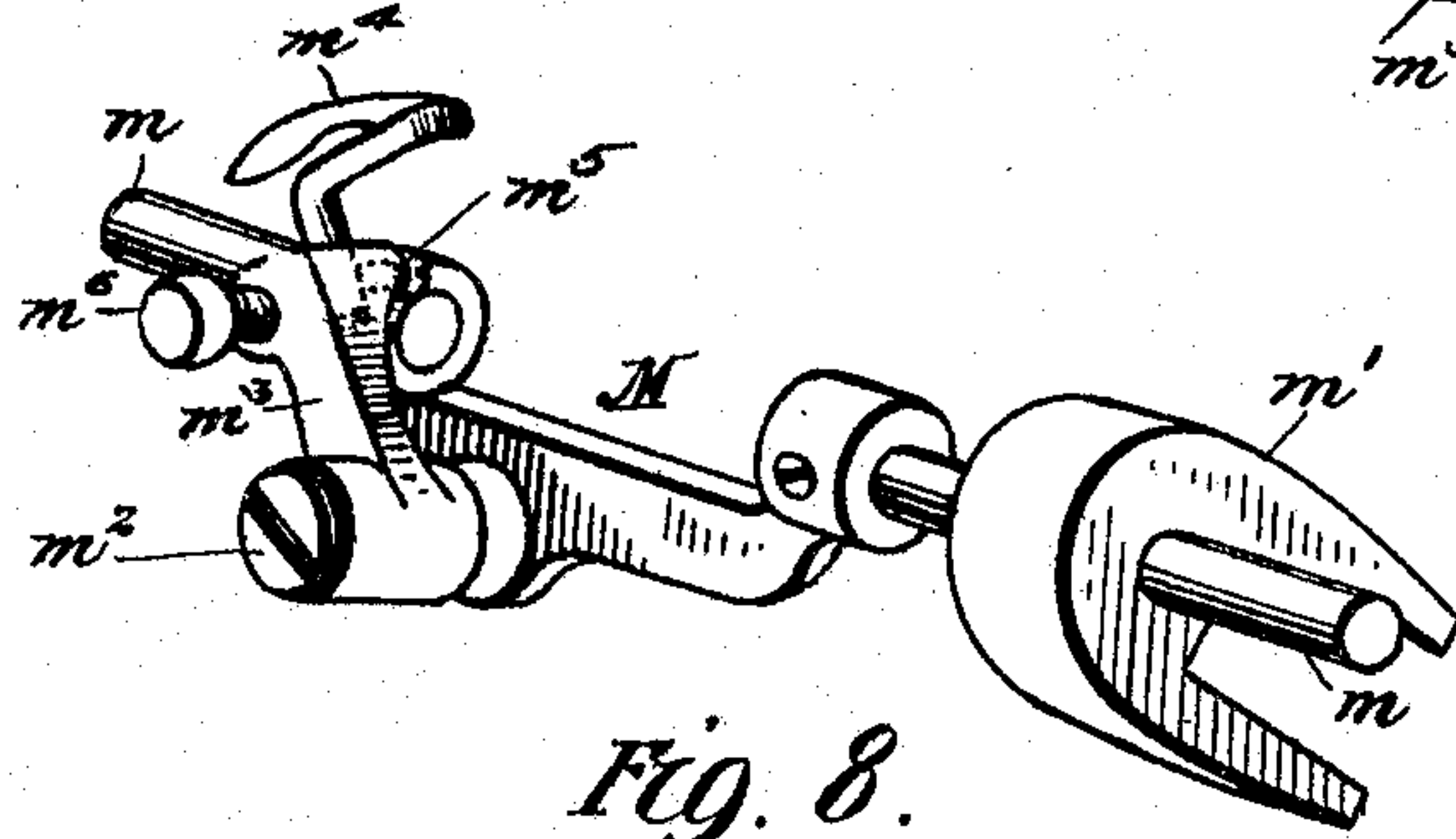
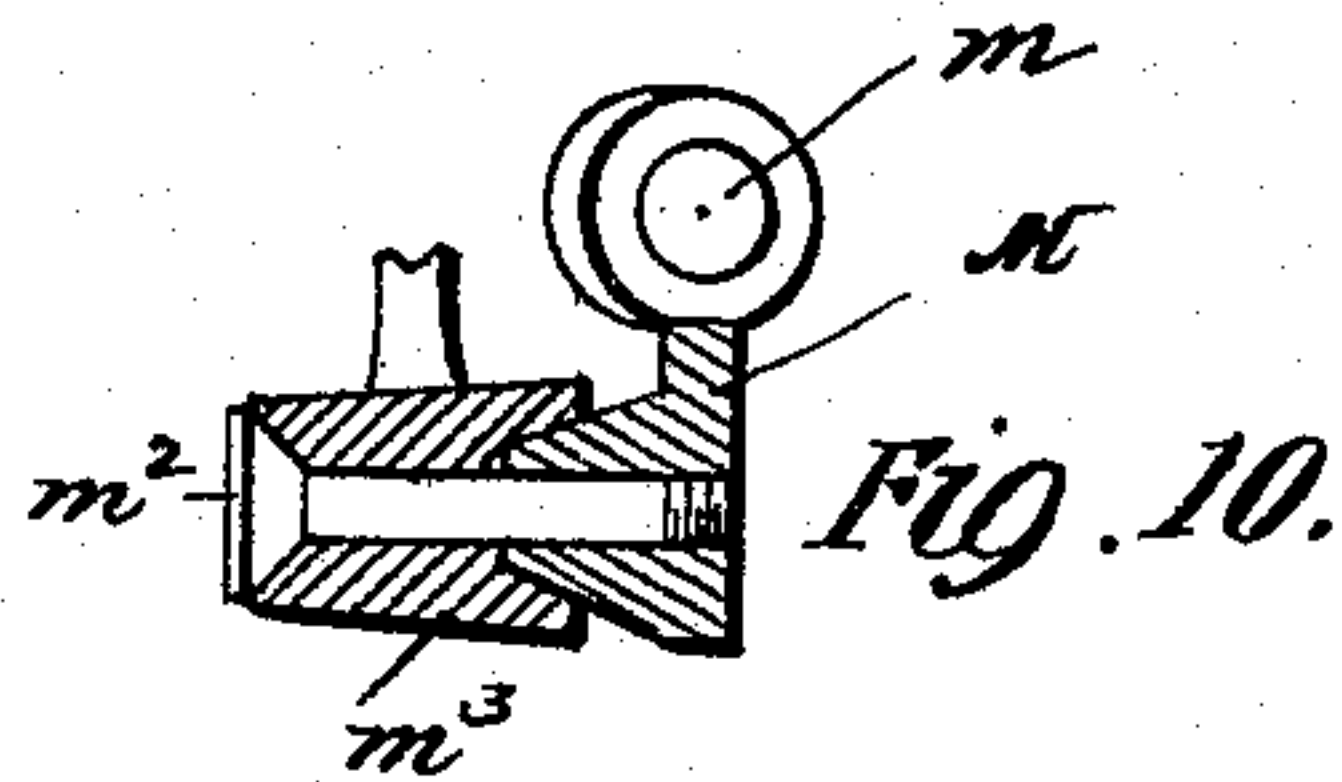
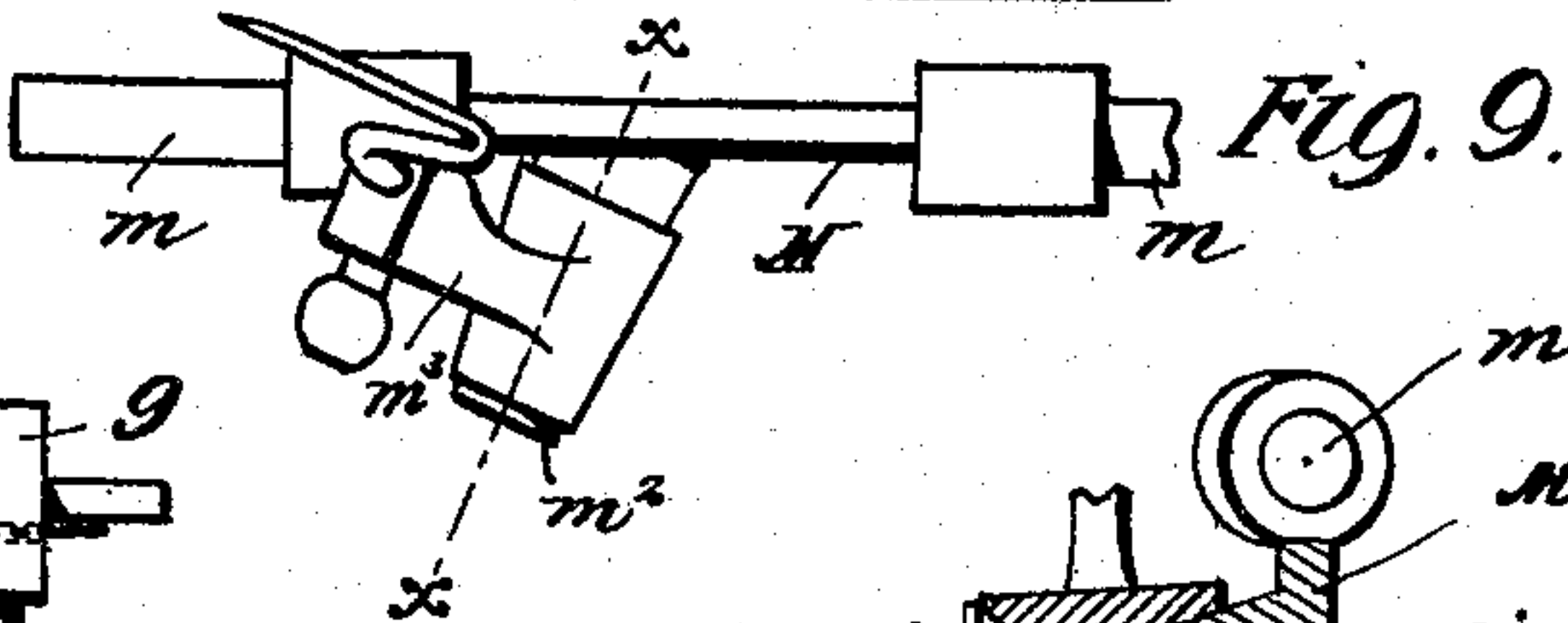
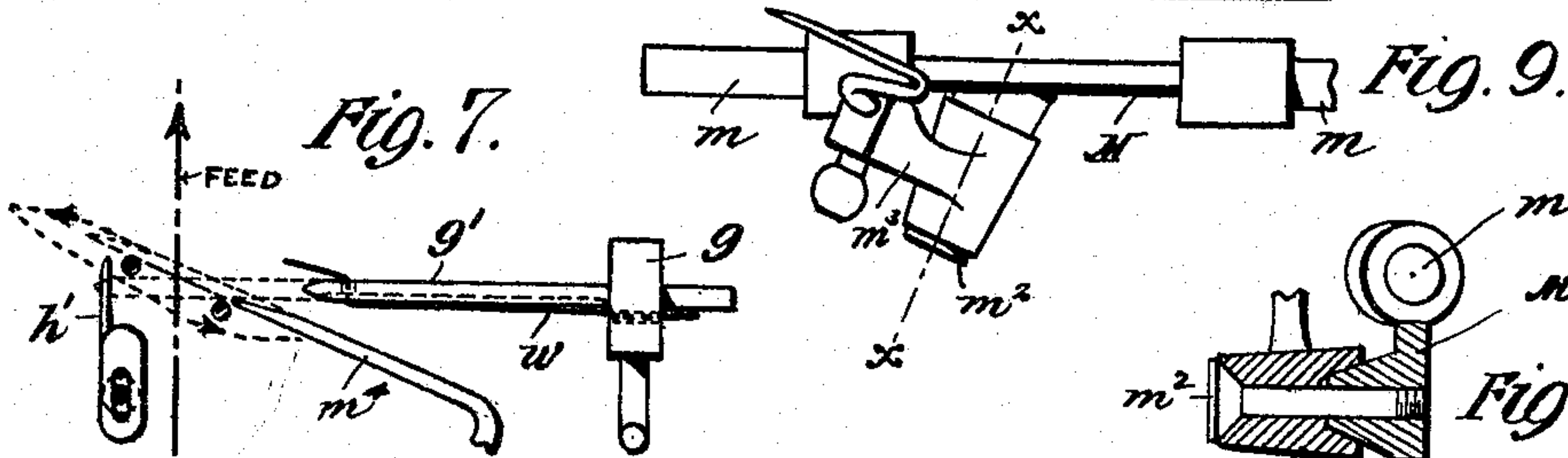
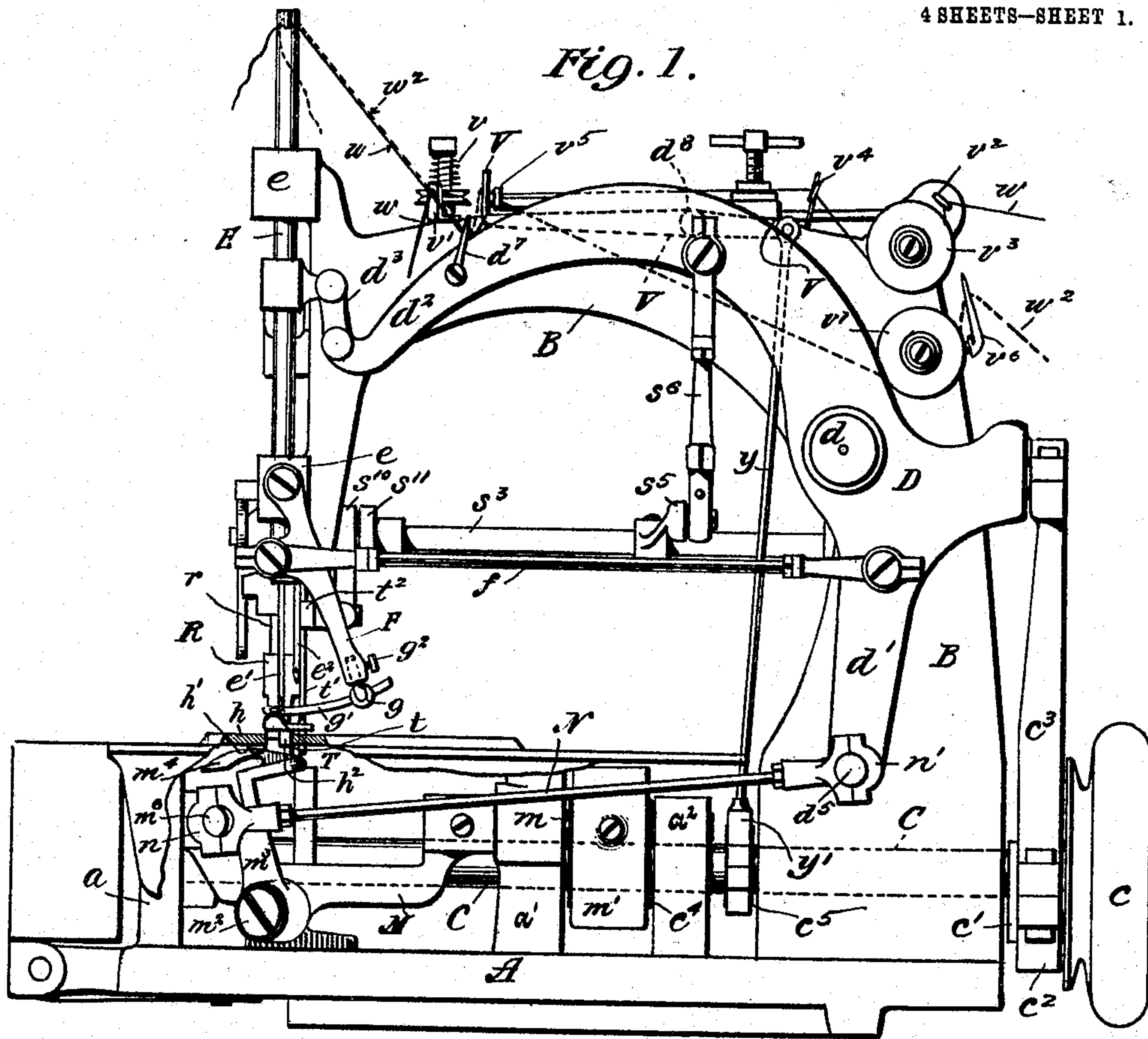


930,369.

Patented Aug. 10, 1909.

4 SHEETS—SHEET 1.



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Fig. 8.

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SEWING MACHINE.

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930,369.

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4 SHEETS—SHEET 2.

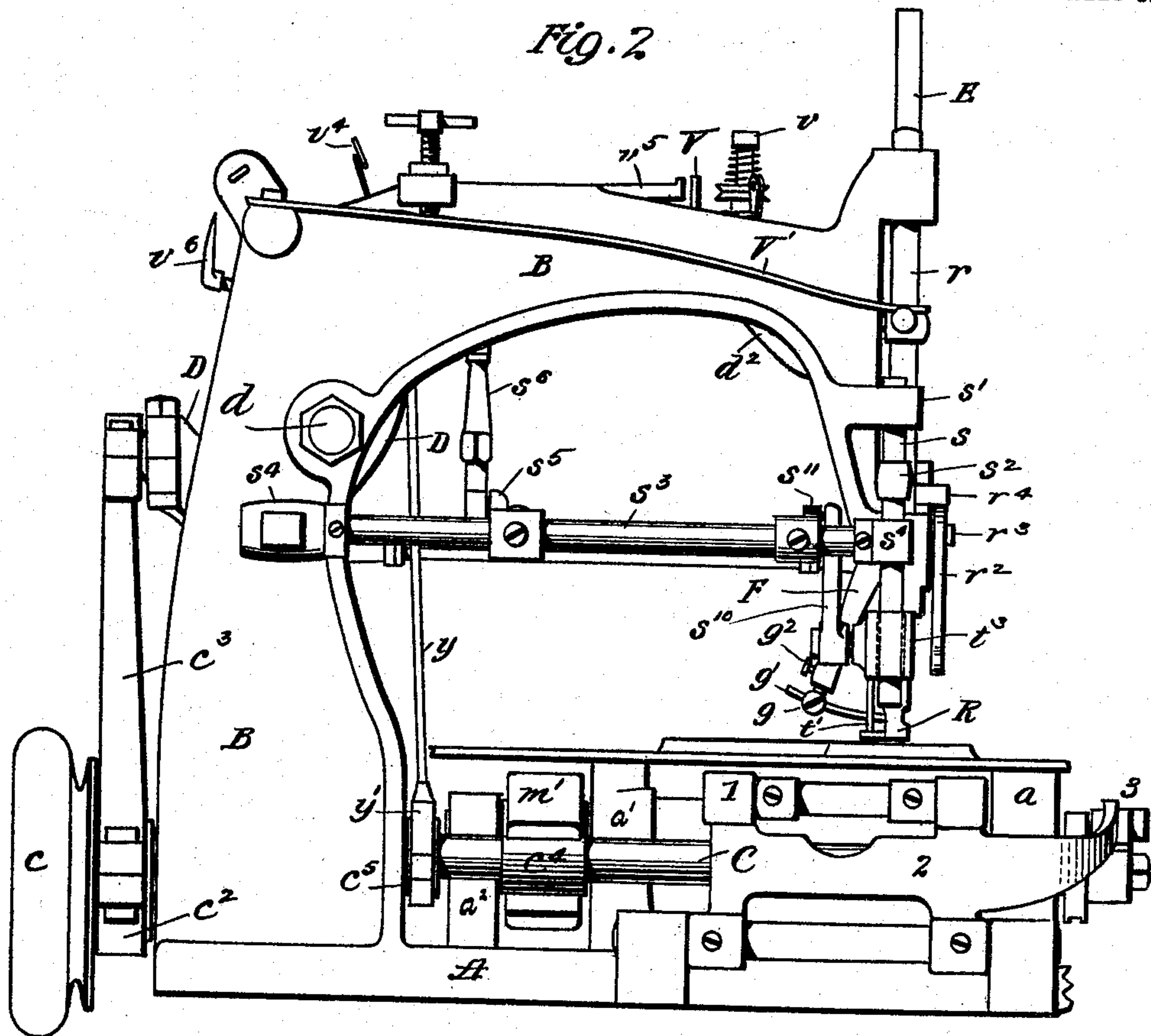


Fig. 11.

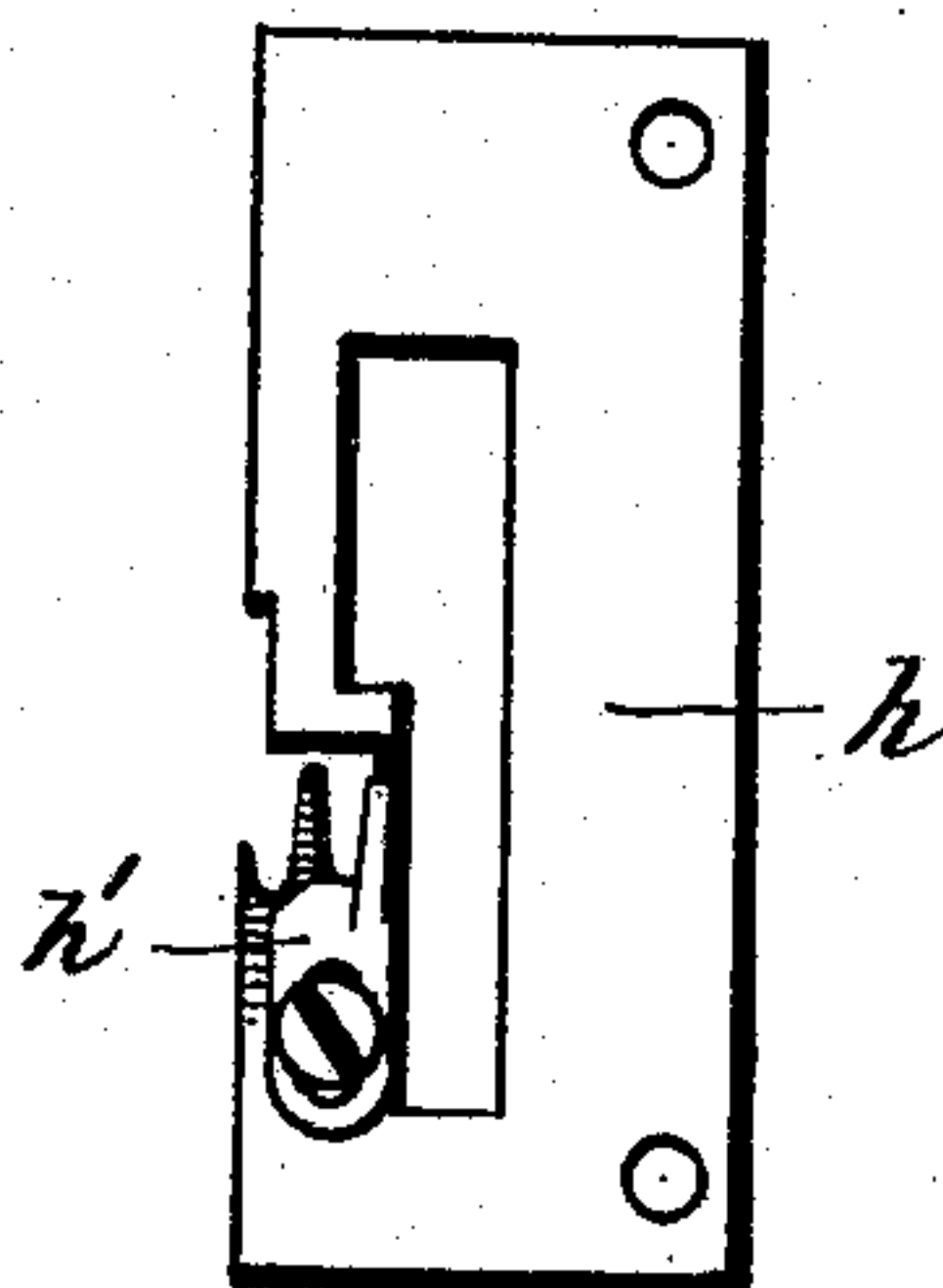
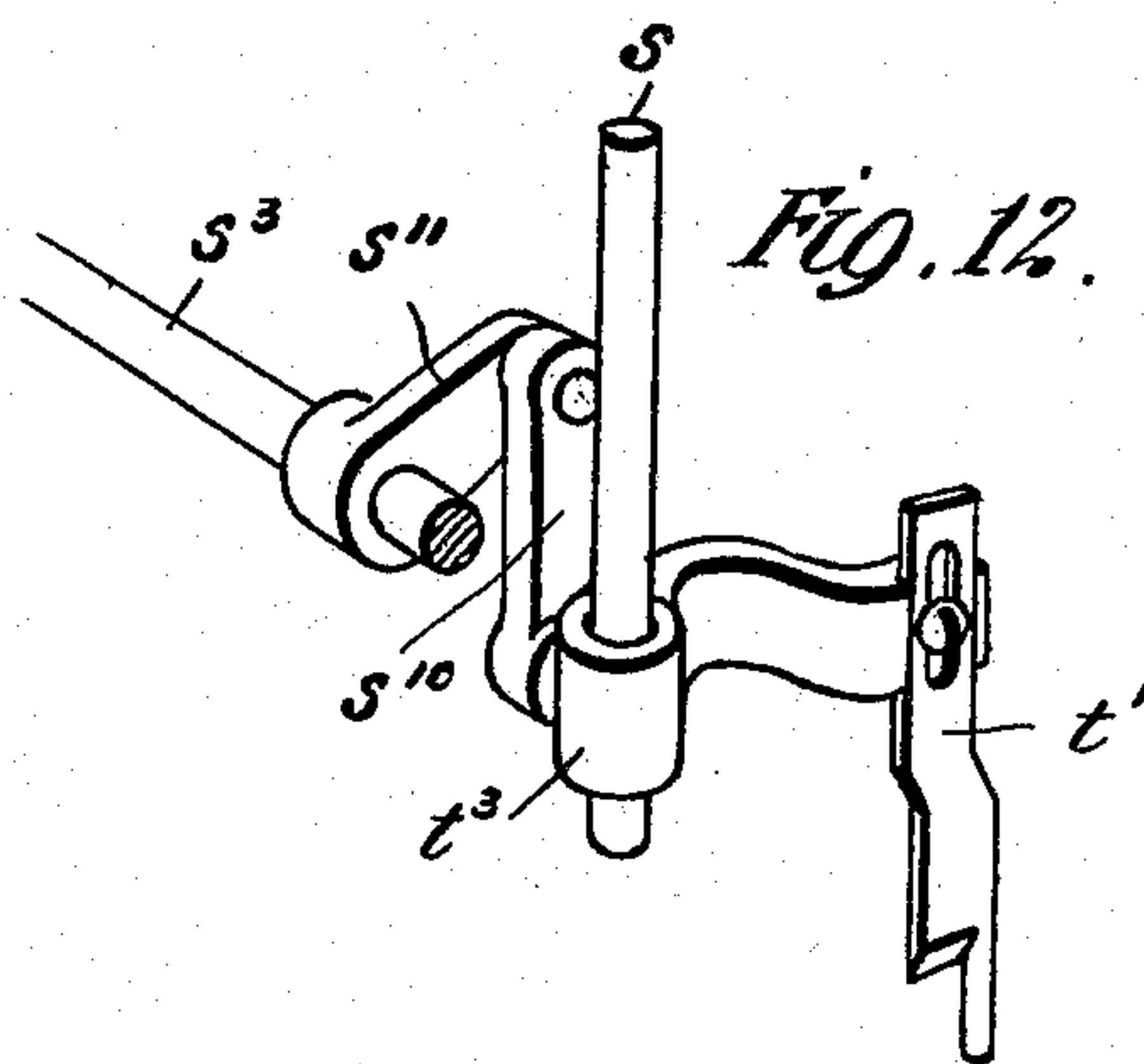


Fig. 12.



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4 SHEETS—SHEET 3.

Fig. 3.

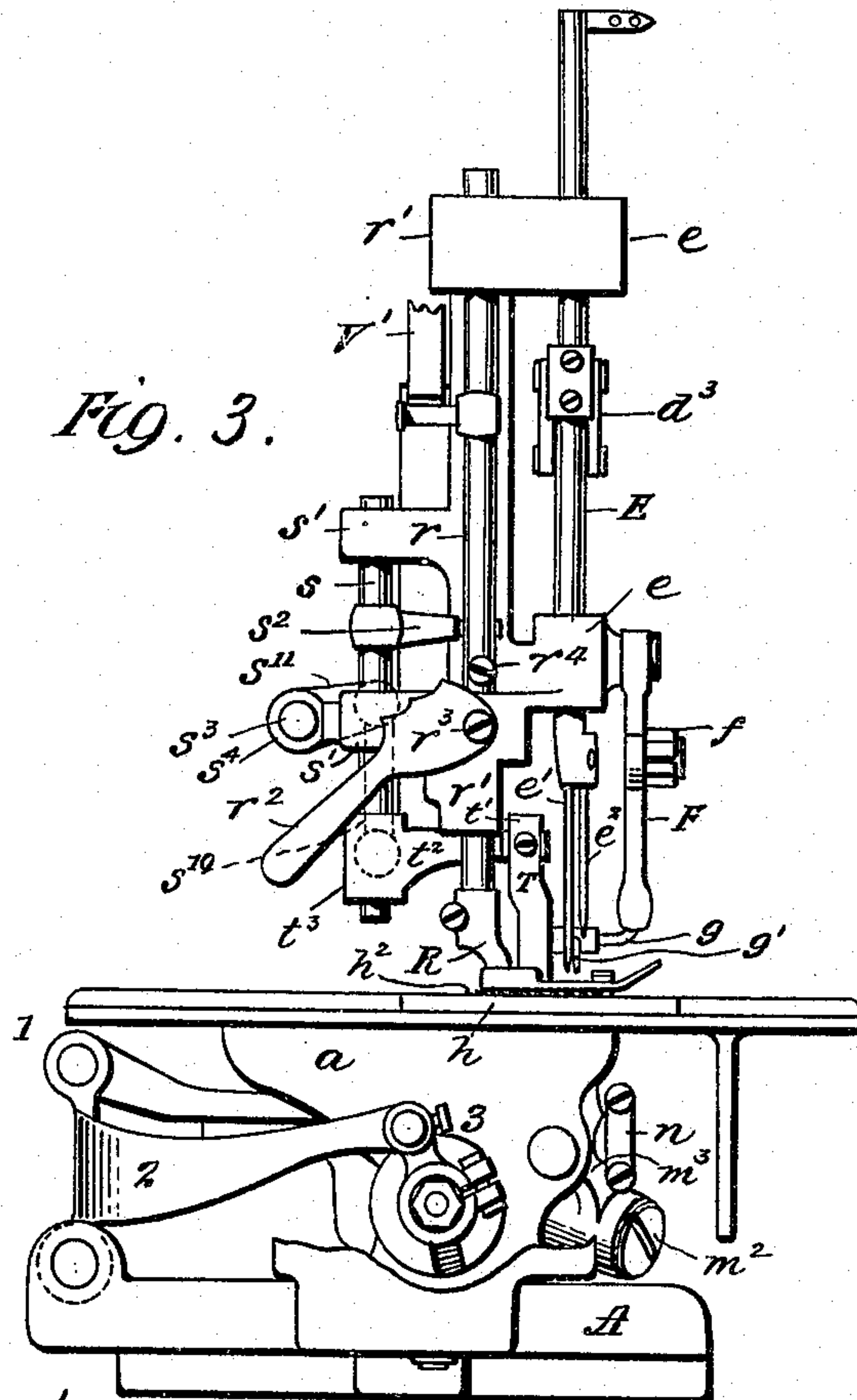


Fig. 4.

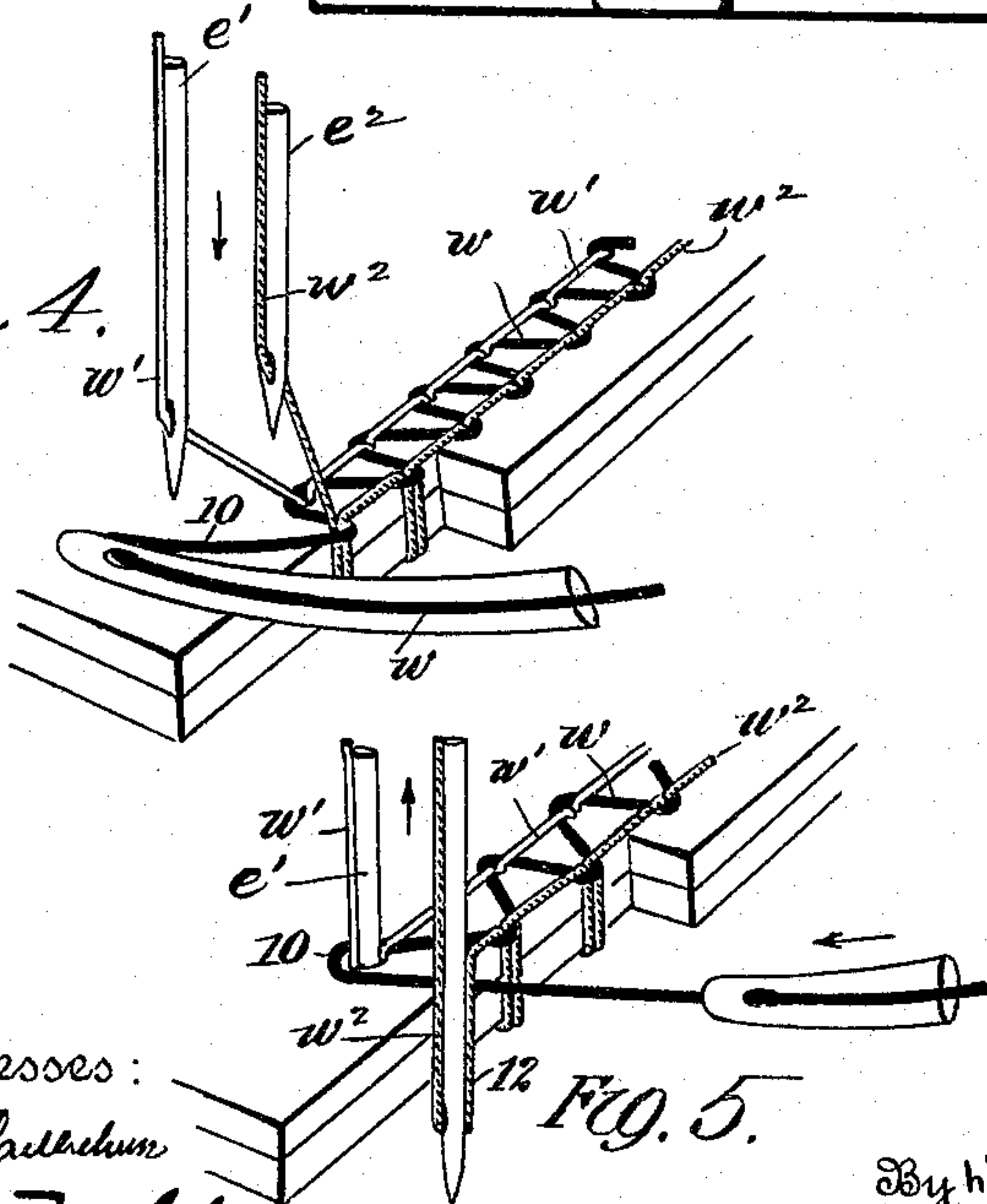
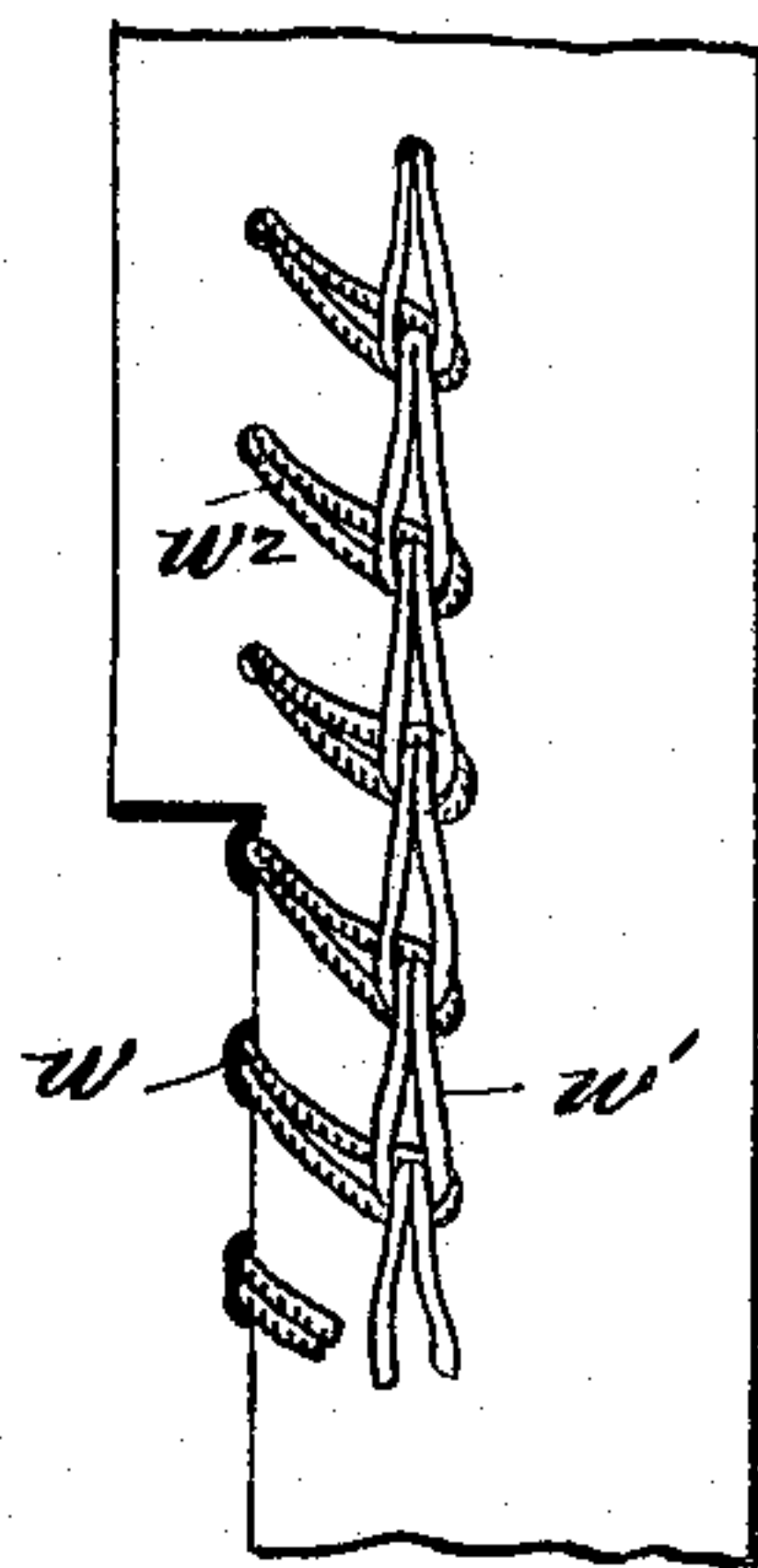


Fig. 5.



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Fig. 5.

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4 SHEETS—SHEET 4.

Fig. 13.

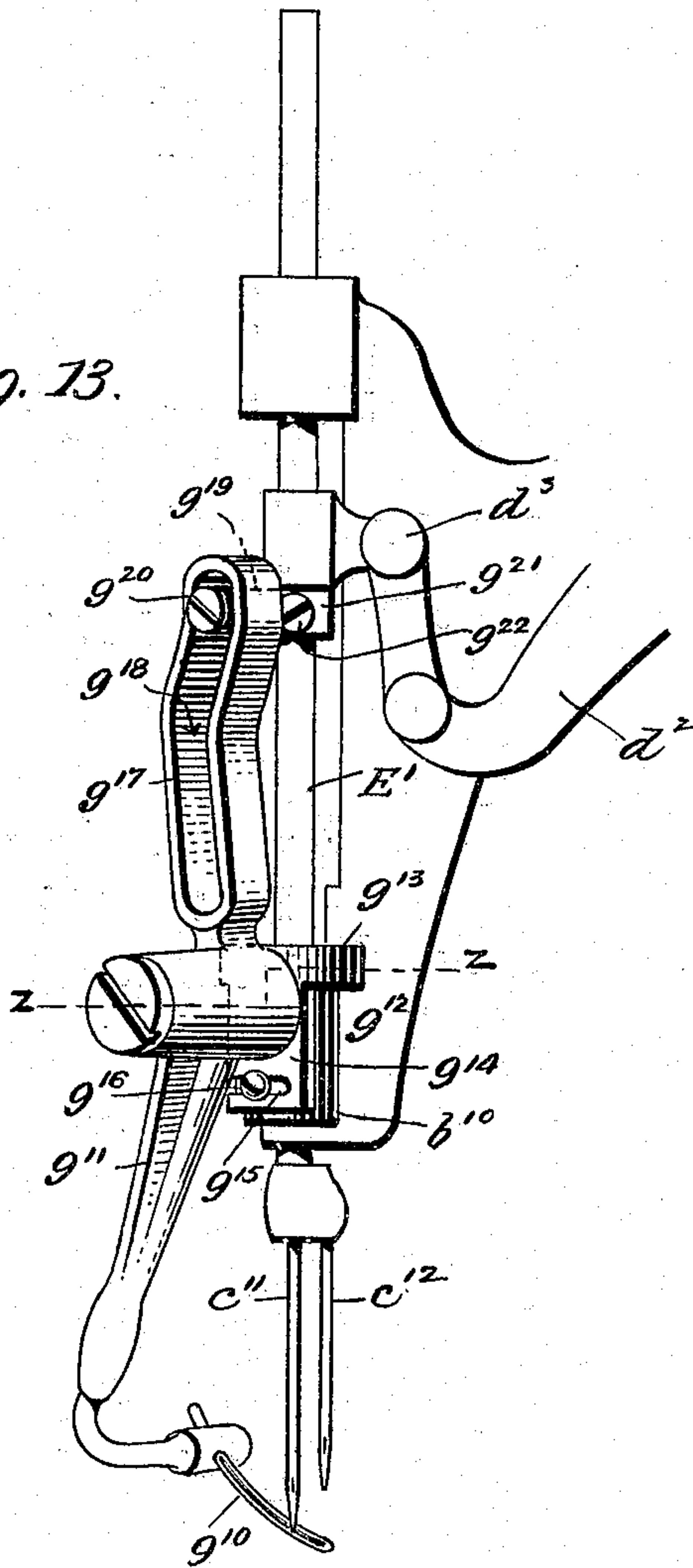


Fig. 14.

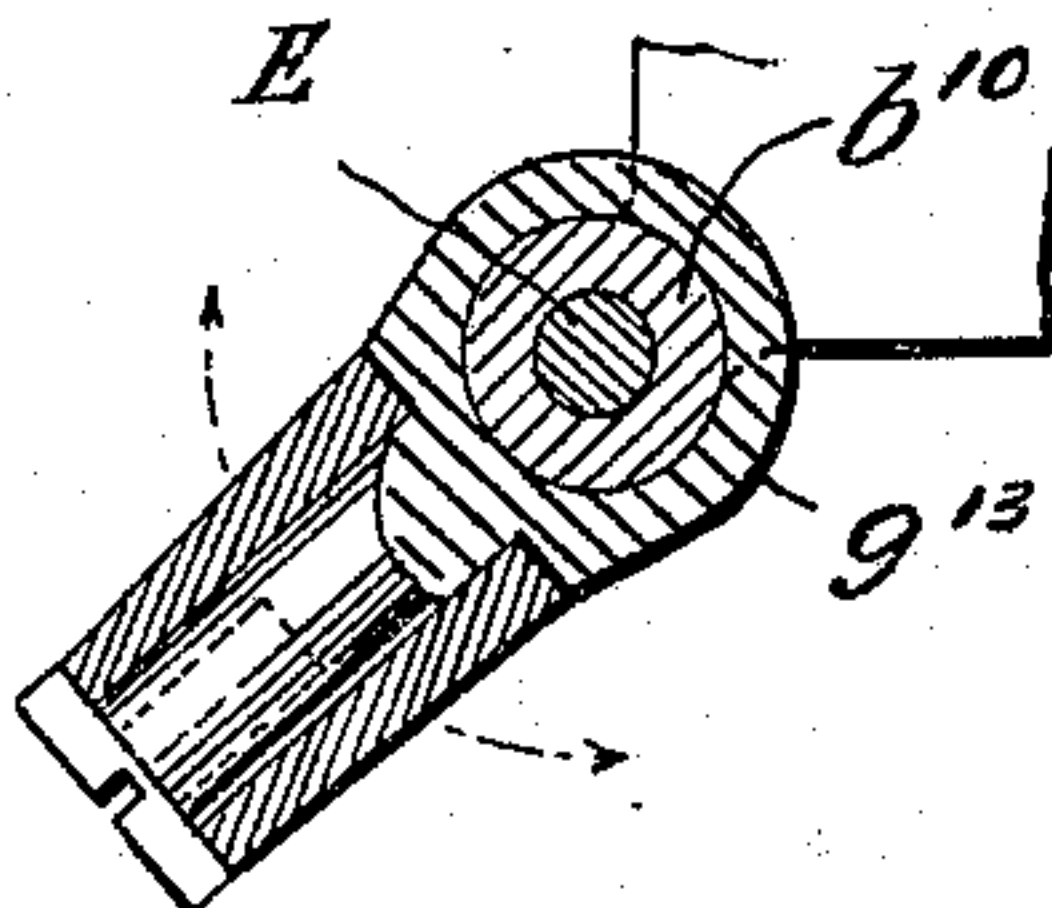


Fig. 15.

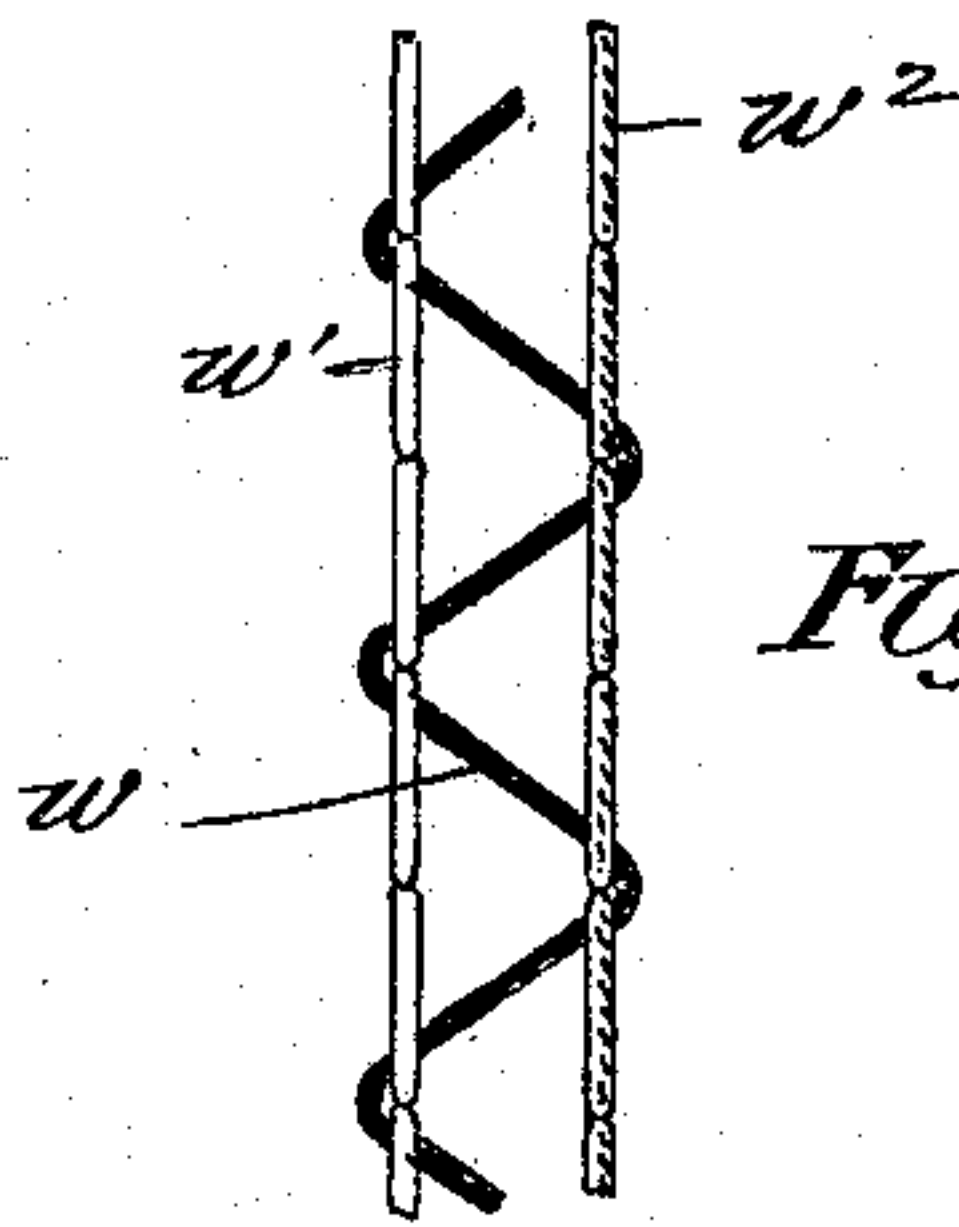
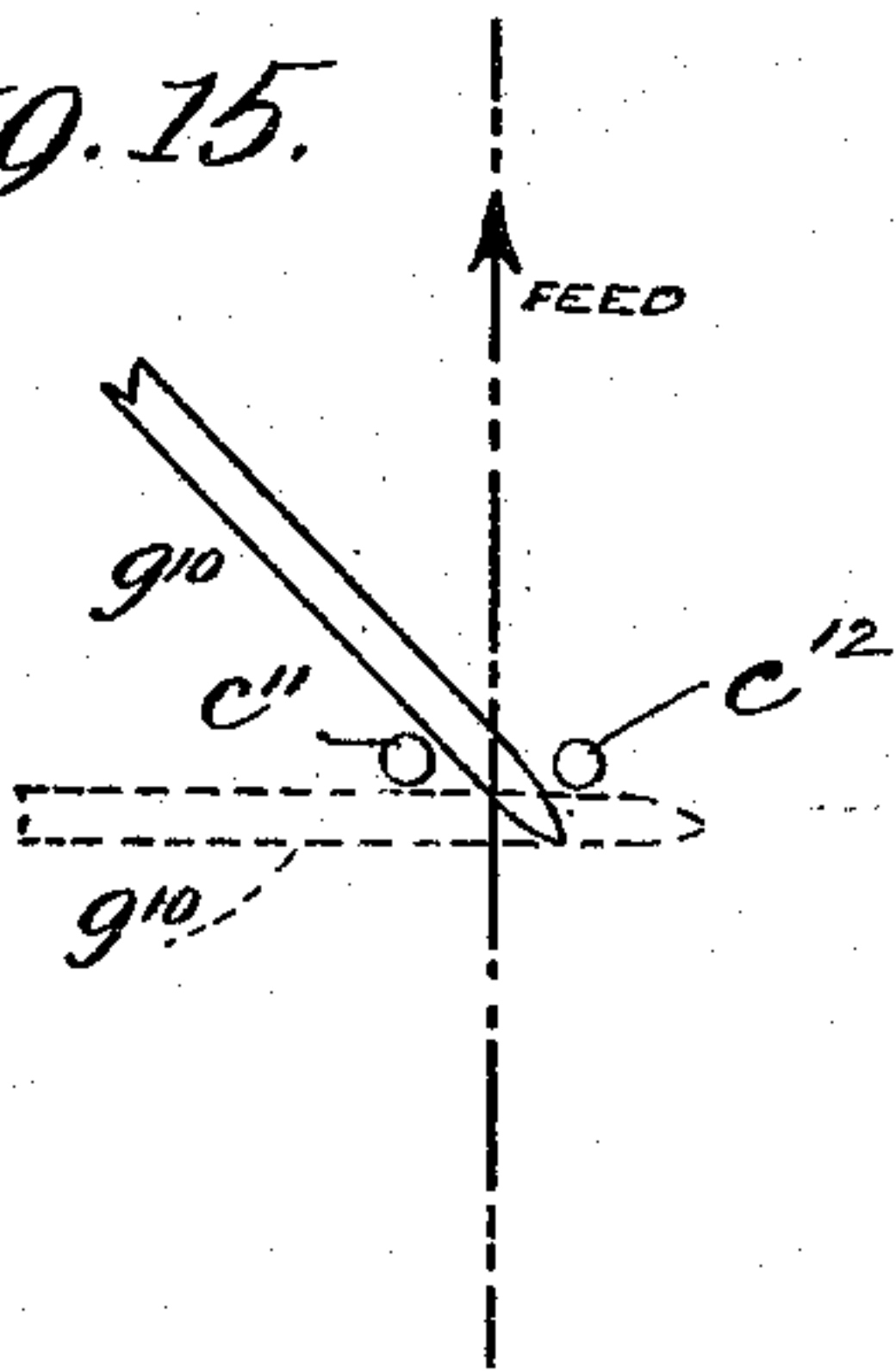


Fig. 16.

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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE.

No. 930,369.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed March 19, 1907, Serial No. 363,299. Renewed December 22, 1908. Serial No. 468,857.

To all whom it may concern:

Be it known that I, HENRY H. FEFEL, citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to that class of sewing machines in which two needles and a thread-carrying looper are employed, the object being to provide a simple and efficient mechanism whereby a stitch of peculiar nature hereinafter described and particularly adaptable as a covering for the edges of lace or other open-work or loosely woven fabrics may be rapidly and economically produced; and it consists of a novel combination of elements and arrangement of parts as will now be specifically described, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a sewing machine embodying my invention; Fig. 2 is a rear elevation of the same; Fig. 3 is an end elevation; Fig. 4 is a diagrammatic perspective view illustrating the manner of forming the stitch; Fig. 5 is a similar view showing another step in the operation; Fig. 6 is a plan view showing the stitch as viewed from the under side of the goods; Fig. 7 is a diagram illustrating the relative arrangement of certain stitch making parts; Fig. 8 is a perspective view of a hook mechanism; Fig. 9 is a plan of the same; Fig. 10 is a section on line $x-x$ of Fig. 9; Fig. 11 is an under view of a throat plate; Fig. 12 is a perspective detail view of parts of a cutting mechanism; Fig. 13 is a detail view illustrating an alternative construction; Fig. 14 is a detailed sectional view taken along the plane of line z, z on Fig. 13. Fig. 15 is a diagram illustrating the relative arrangement of certain coöperating parts of said alternative construction; Fig. 16 is a diagram illustrating a result of a certain arrangement of coöperating parts.

Referring to the drawings by letter A represents a bed-plate having a curved arm or head B rising therefrom, and affording a bearing for one end of a horizontally disposed driving shaft C, the other end of said

shaft having its bearing in a block a forming a part of said bed-plate A. Shaft C extends through the arm B and has mounted thereon a driving pulley c and an eccentric c' , the latter being embraced by a strap c^2 connected to a link c^3 , jointed at its upper end to the needle-lever D, which is pivoted at d to the vertical part of arm B.

Needle-lever D is approximately a bell crank lever, having legs extending in two directions from its pivot, one d' depending in substantially vertical line, and the other d^2 extending forward in substantially horizontal line. The extreme end of leg d^2 is connected by a short link d^3 with the vertically disposed needle-bar E which is mounted in bearings e , and carries two needles e' and e^2 , the former set slightly in the rear of the latter along the line of feed and also being slightly the longer of the two.

Pivoted to a suitable part of the arm B, preferably in line with the axis of the needle-bar is a depending looper-finger F adapted to swing in the arc of a circle across the line of feed, at right angles thereto; said finger being connected by link f to the leg d' of the needle lever D. The extreme end of finger F is socketed and receives the end of a bracket g supporting the curved thread carrying looper g' , the arrangement being such that with each up-stroke of the needles said looper will be swung across the line of feed in a path passing between the vertical paths of the needles, and withdrawn from such position upon each down-stroke of said needles. A screw g^2 holds the looper g' in place and provides for adjustment of the same. The arc of travel of the looper g' lies above and close to the work-plate H which is provided with a throat-plate h carrying a loop retainer h' on the underside thereof and having holes or slots therein for the passage of the needles and the proper operation of the feed-dog h^2 .

A feed operating mechanism is designated by the numerals 1, 2 and 3, but will not be described in detail herein, since it is of well known construction and forms no part of the present invention.

M represents a swinging frame located below the work-plate H and mounted by trun-

nions m , in the bearings a , a' and a^2 rising from the bed-plate. A yoke m' secured to one of said trunnions embraces a cam c^4 on shaft C and imparts a swinging motion to frame M when the shaft is rotated. A pivot pin or stud m^2 is secured to the frame M and projects therefrom at an angle to said frame, and upon this pin or stud is mounted a rocker m^3 having a socketed end entered by the shank of a hook m^4 , a screw m^5 holding said hook in place and providing for adjustment of the same. Projecting outwardly at right angles to said rocker m^3 is a round-headed pin m^6 entering a socket n in the end of a connecting link N; a socket n' at the other end of said rod being entered by a round-headed pin d^5 projecting from the extreme end of leg d' of needle-lever D. It will thus be seen that in the regular operation of the machine that the hook will partake of a double or compound oscillatory motion, imparted in one direction by the cam c^4 and in another by needle-lever D. The angles of pin m^2 and hook m^4 are such that the hook will cross the line of feed at an angle thereto.

The relative arrangement of needles, hook and looper g' is best shown in Fig. 7 wherein it will be observed that the looper in passing from full line to dotted line position crosses the line of feed at right angles thereto and between the needles, while the hook m^4 in passing from full line to dotted line position crosses the line of feed at an acute angle, and to the rear of both needles. At about the end of the forward stroke of the hook under the influence of needle-lever D, the cam C^4 acts and shifts said hook to the front of both needles and the hook retreats in this position, passing over to the rear of the needles at the end of the back stroke; the path of the hook being substantially an ellipse crossing the line of feed at an angle, see Fig. 7.

R represents a presser-foot carried at the lower end of a vertically disposed bar r slidably mounted in bearings r' in the forward end of arm B. A spring V' normally presses bar r toward the throat plate, there being a lifting lever r^2 for raising said bar, said lever being pivoted at r^3 to the arm B in proper operative relation to a pin r^4 projecting from said bar. Bar r is round and in order to prevent it turning in its bearings a second bar or rod s is mounted parallel thereto in bearings s' and connected thereto by a bridge piece s^2 .

T represents a trimming device located to the rear of the needles and, approximately in line with needle e^2 . It consists of a stationary lower blade t located beneath the throat plate and projecting into an opening in said plate, and a co-acting reciprocating upper blade t' carried in the end of a forwardly projecting arm of a bracket t^2 . Bracket t^2 is provided with a sleeve t^3 loosely surrounding the lower end of rod s the latter serving as a guide for said bracket and sleeve as well as

for the presser bar r . Sleeve t^3 is connected by a link s^{10} to a crank arm s^{11} projecting from a horizontally disposed shaft s^3 mounted in bearings s^4 at the rear of the machine. A second crank arm s^5 also projecting from shaft s^3 is connected by a link s^6 with the leg d^2 of needle arm D. Obviously from this description it will be seen that a downward stroke of the blade t' will accompany every down-stroke of the needles $e' e^2$.

In Fig. 1 I have shown portions of the several threads employed in the practical operation of the machine. w represents the thread of looper g' which is led from a suitable source of supply around tension device v , through eye v' thence to looper g' . w' represents the thread of needle e' which passes through eye v^2 , through tension device v^3 , eye v^4 an eye in the end of guide v^5 , to an eye in the finger d^7 on lever D, thence to an eye in the upper end of needle bar E, to needle e' . w^2 is the thread of the other piercing needle, which passes through eye v^6 , around tension v^7 , to eye in end of guide v^5 , thence to eye in take-up V, to an eye in upper end of needle-bar and down to needle e^2 . To avoid unnecessary drawing and the confusion of lines, the several sources of thread supply are omitted and the threads broken off short of their respective needles. The take-up V consists of a lever pivoted at d^8 to the arm B and connected by a link y to the strap y' embracing the cam c^5 on shaft C; and its function is to take up the surplus slack in the loop of needle thread formed on the needle e^2 after the hook begins to back out of said loop. As the needles ascend, the hook m^4 , which at this time is at its extreme right-hand position (Fig. 1), moves to the left, to the rear of the needles, and takes both loops from the needles and carries the same to the extreme left; whereupon the cam c^4 acts and causes the hook to rock in a direction opposite to the direction of the feed and toward the loop retainer h' . The loop retainer is plainly shown in Figs. 1, 7 and 11 and is adjustably secured to the underside of the throat plate h in such position that when the hook rocks toward the pointed end of the same (Fig. 7) the loops of the two needle threads will be engaged by said retainer and held thereby in spread condition while the hook backs out and the needles again descend. In descending the needle e' passes through both of said loops on retainer h' while the long end of the take-up rises and draws on the loop thread w^2 ; this action, assisted by the feed, serving to withdraw the loops from the retainer h' and set the stitch. Simultaneously with this operation the looper g' is laying its thread back and forth in zig zag form on the upper surface of the goods in a double series of loops, each loop of each needle thread being engaged by a correspondingly located loop of the

looper thread. A glance at Figs. 4 and 5 will show how this result is attained. The looper being at its extreme position to the left, Fig. 4, the needles e' and e^2 descend and pass to the rear and front of the looper respectively, needle e' taking a loop 10 from the looper as the latter moves to the right. As the needles ascend the feed takes place and since the needle e^2 has already laid a loop through the goods in front of thread w , the next movement of the looper to the left will of course loop said thread w around the loop 12 of needle thread w^2 , and carry the same across the line of feed to be engaged by the needle e' on the next descent of said needle.

In Fig. 13 the needles c^{11} and c^{12} stand side by side and not one in advance of the other as indicated in Fig. 3, and the looper g^{10} is arranged at an angle to the line of feed and adapted to pass to and fro between the needles, with the same result, obviously, as that of the arrangement above described. The looper carrying lever g^{11} is pivoted to an adjustable bracket g^{12} which has a ring portion g^{13} and a depending apron like portion g^{14} slotted at g^{15} . The ring g^{13} embraces the upper rounded portion of bearing b^{10} and is locked thereto by the set screw g^{16} passing through the slot g^{15} into a threaded opening in said bracket. It will thus be seen that the angular relation of the looper with respect to the needles may be nicely adjusted. To operate the looper I provide the lever g^{11} with an upward extension g^{17} having an elongated cam slot g^{18} therein entered by a roller g^{19} on a pin g^{20} projecting from a collar g^{21} secured to needle lever E' by set screw g^{22} .

In Fig. 15 the normal relation of looper and needles is shown in full lines, which as before stated will produce the same stitch as described above. The looper, however, is capable of being shifted to the position shown in the dotted lines (Fig. 15) in which it passes across the front of both needles instead of between them. The result of this arrangement is shown in Fig. 16, in which as shown the looper thread is looped around alternate loops of the needle threads instead of every loop of said threads.

Claims.

1. In a sewing machine the combination of two thread-carrying needles spaced apart and adapted to pass separate loops from the upper to the lower side of the goods, a throat-plate, complementary stitch forming mechanism located below said throat-plate, a looper carrying a third thread located above said throat plate and means for passing said looper to and fro across the line of feed in a path passing between the paths of the two needles.

2. In a sewing machine the combination of two thread-carrying needles spaced apart laterally and one located in advance of the other in the line of feed, a throat-plate, com-

plementary stitch forming mechanism located beneath said throat-plate, a thread-carrying looper located above said throat-plate, and means for passing said looper to and fro across the line of feed in a path passing between the paths of the two needles.

3. In a sewing machine the combination of two thread-carrying needles spaced apart laterally, and one located in advance of the other in the line of feed, a throat-plate, complementary stitch forming mechanism common to both needles located beneath said throat-plate, a thread carrying looper located above said throat-plate and means for passing said looper to and fro across the line of feed in a path passing between the paths of the two needles.

4. In a sewing machine the combination of two needles spaced apart laterally and one located in advance of the other in the line of feed, a throat-plate, a swinging frame located below said throat-plate, a fulcrum-pin projecting from said frame at an acute angle to the axis of oscillation of said frame, a single hook common to both needles, a rocker carrying said hook and mounted on said fulcrum-pin, and means for moving said frame and said rocker.

5. In a sewing machine the combination of two needles spaced apart laterally and one located in advance of the other in the line of feed, a throat-plate, a thread-carrying looper located above said throat-plate and adapted to pass to and fro across the line of feed and in a path lying between the paths of the two needles, a swinging frame located below said throat-plate, a rocker carrying a hook and pivoted to said frame at an angle to the axis of oscillation of said frame and means for moving said frame and said rocker.

6. In a sewing machine, the combination of a pivoted lever, means for rocking the same, a vertical needle-bar connected with one end of said lever and carrying two needles spaced apart laterally and one located in advance of the other in the line of feed, a pivoted finger adapted to swing in the arc of a circle, a thread carrying looper attached to the end thereof and adapted to pass to and fro across the line of feed in a path lying between the paths of the two needles, and complementary stitch forming mechanism.

7. In a sewing machine the combination of a reciprocating needle-bar, two needles carried thereby, a throat-plate, complementary stitch forming mechanism located beneath said throat-plate, a finger pivoted above said throat-plate and carrying a looper in the lower end thereof, the fulcrum of said finger being set at angular relation to the line of feed, and the looper adapted to pass to and fro across the line of feed at an angle thereto and in a path lying between the paths of the two needles, and means for rocking said finger.

8. In a sewing machine the combination
of a reciprocating needle-bar, two needles
carried thereby, a support mounted co-
axially with said needle bar and adapted to
5 be adjusted angularly with relation to said
bar, a lever fulcrumed to said support, a
thread carrying lever mounted in the end of

said lever and means for rocking said lever.

Signed at New York in the county of New
York and State of New York.

HENRY H. FEFEL.

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