

No. 710,942.

Patented Oct. 14, 1902.

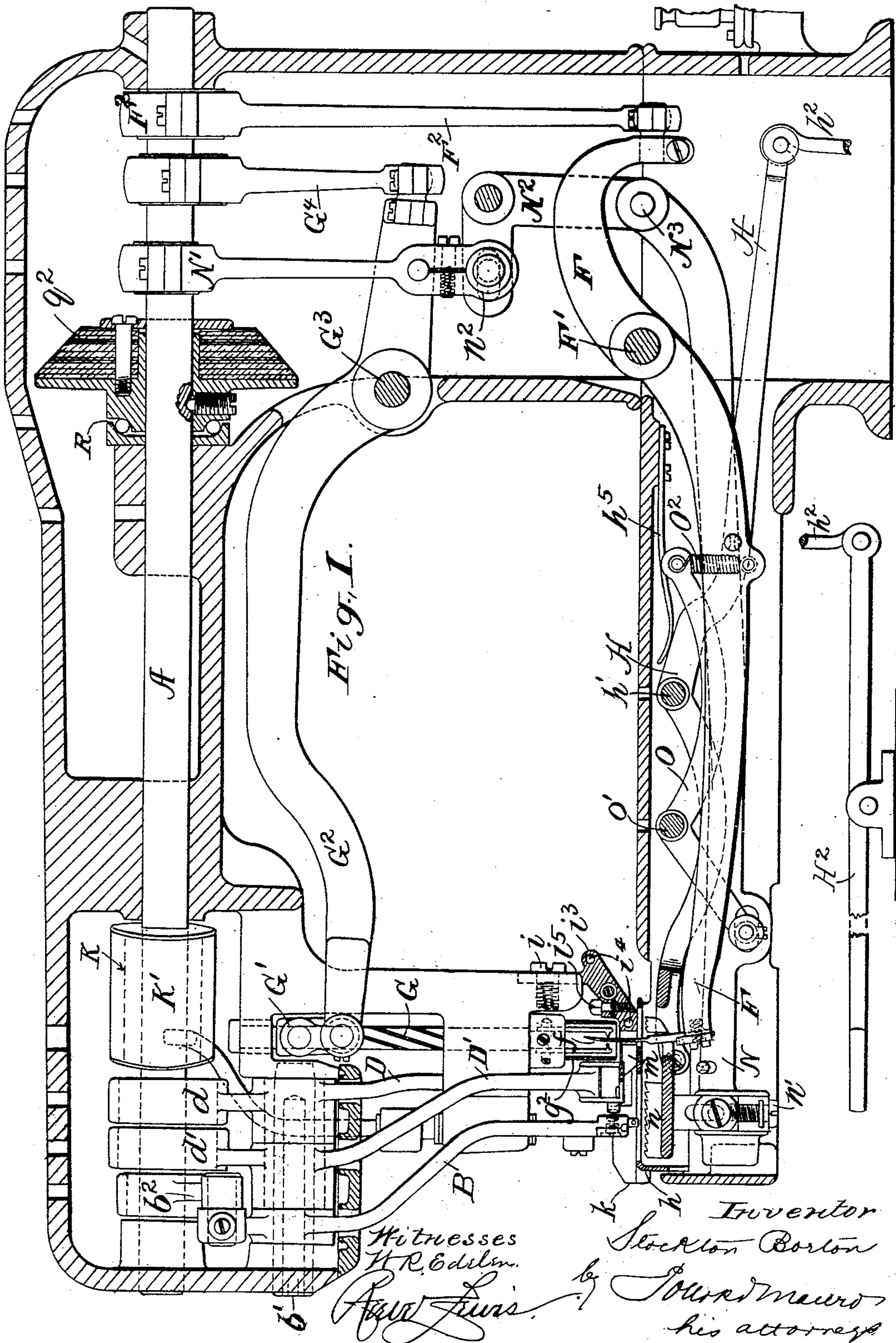
S. BORTON.

OVERSEAMING SEWING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

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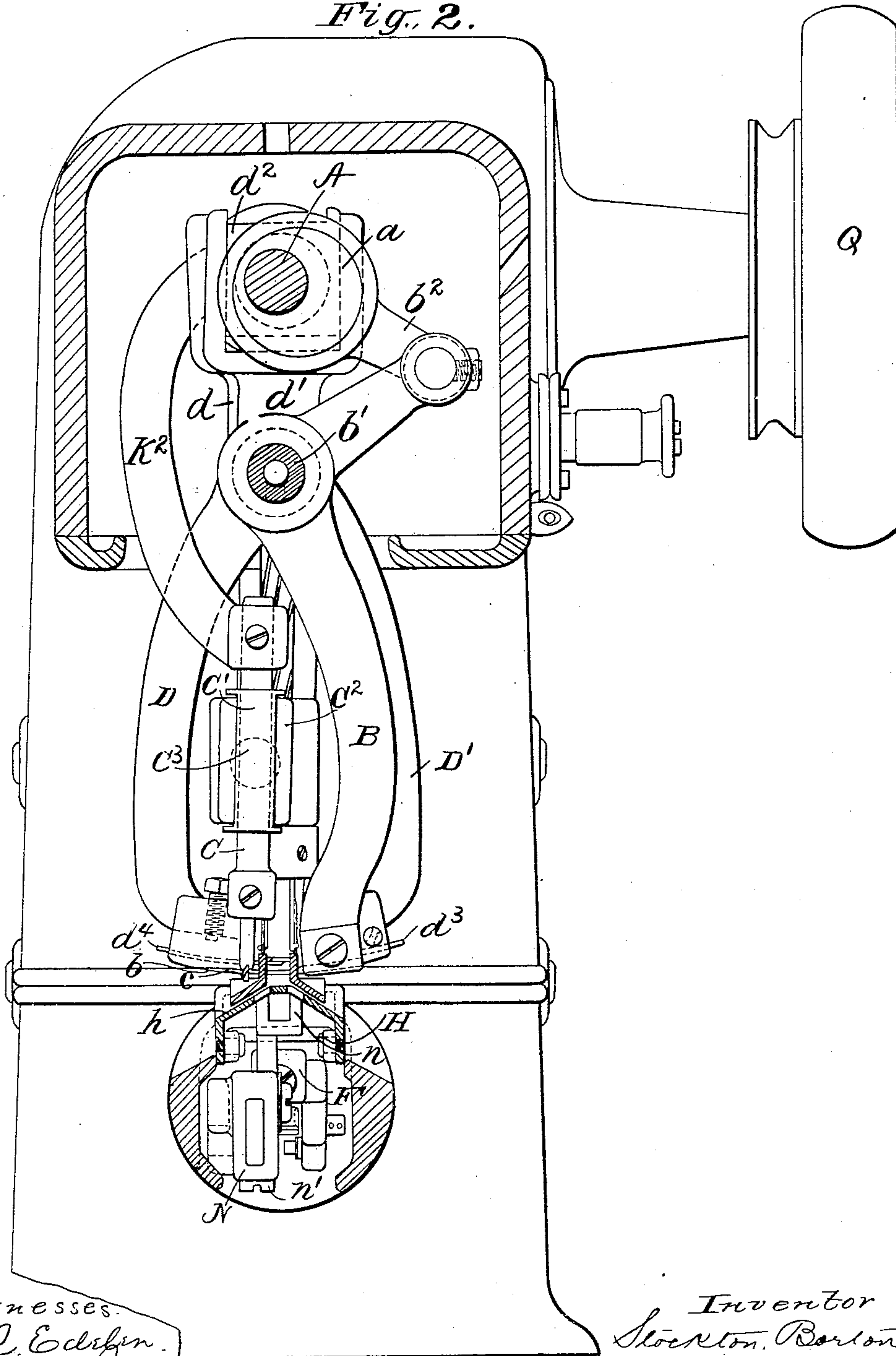
S. BORTON.
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(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 2.

Fig. 2.



Witnesses.

H. R. Edgley.

[Signature]

Inventor

Stockton Borton

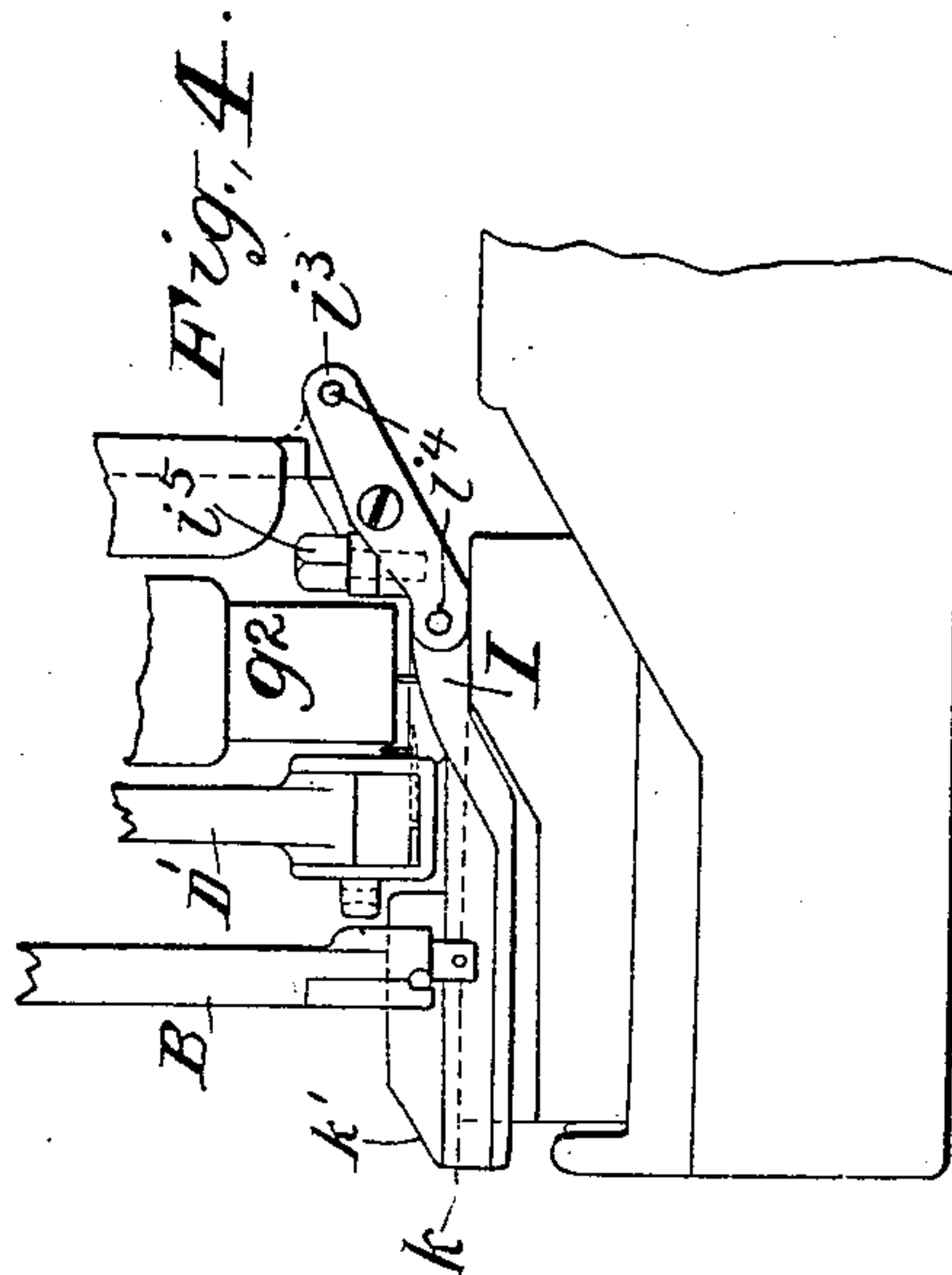
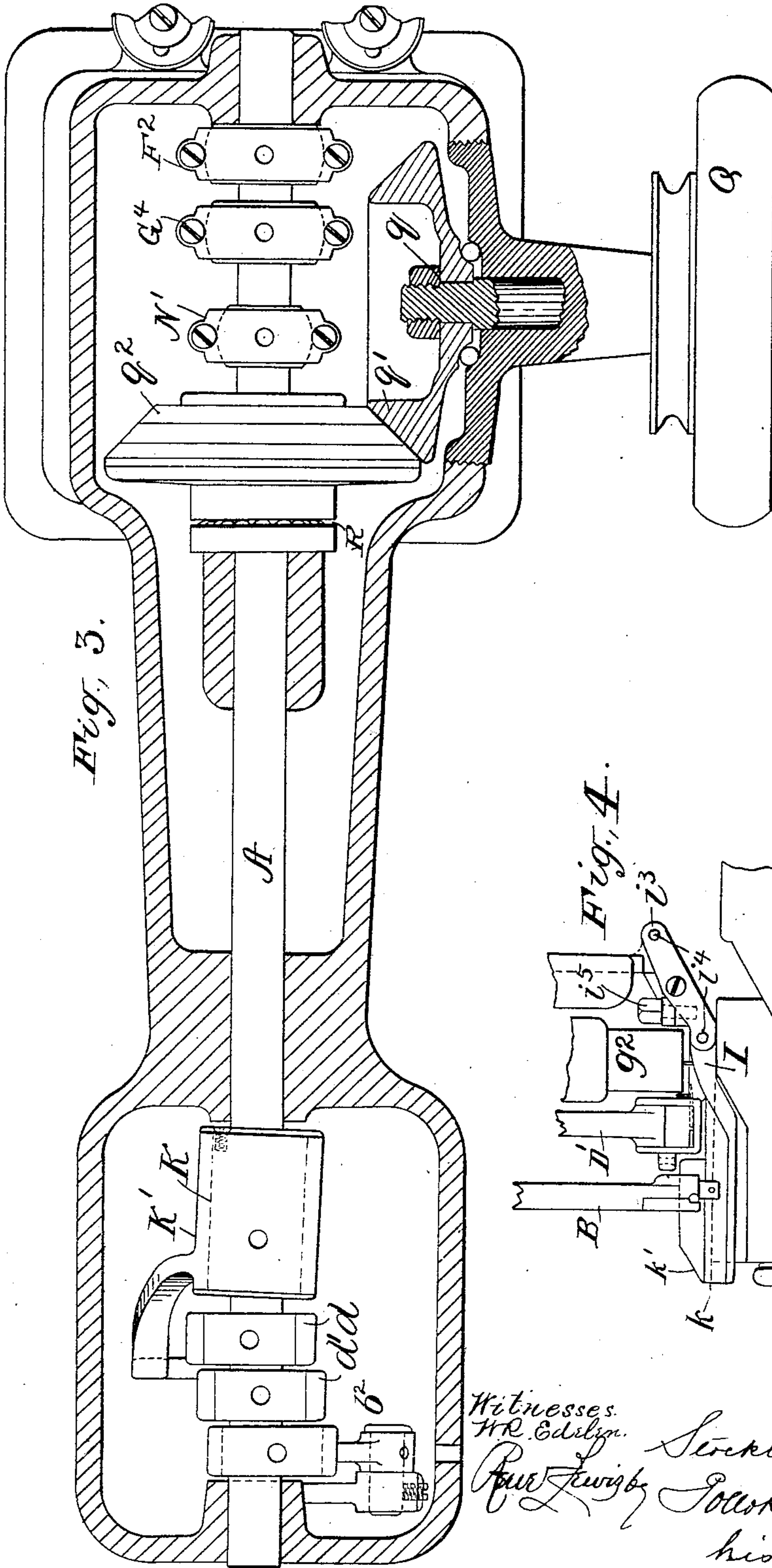
by *[Signature]*
his attorney

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OVERSEAMING SEWING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 3.



Witnesses:
H. R. Edgely

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Inventor

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Solomon Mauro,
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(No Model.)

9 Sheets—Sheet 4.

Fig. 13.

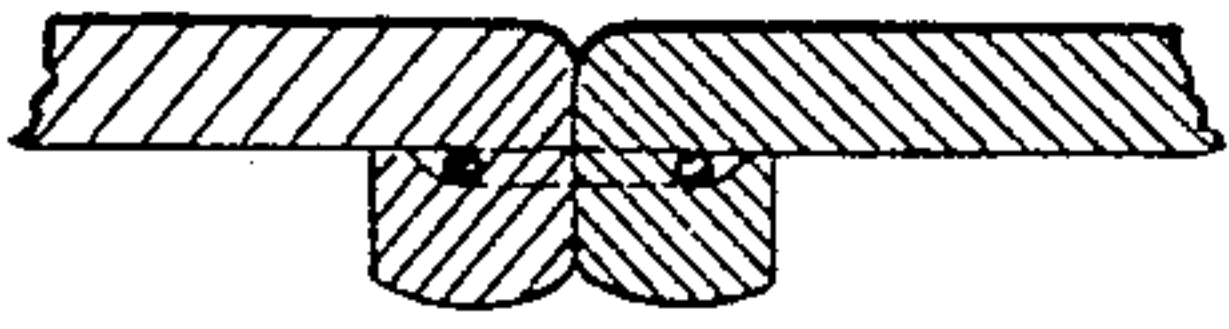


Fig. 7.

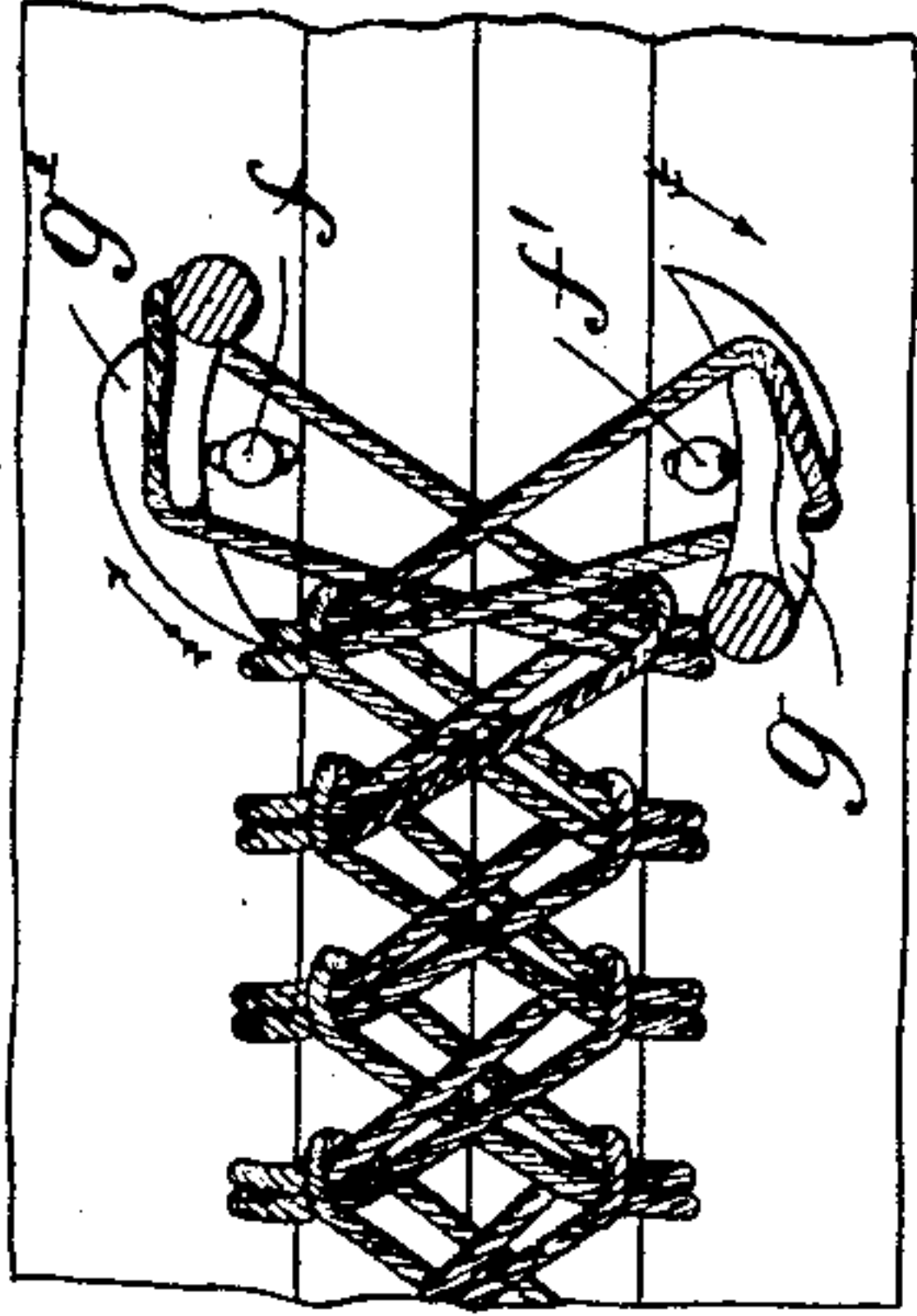


Fig. 6.

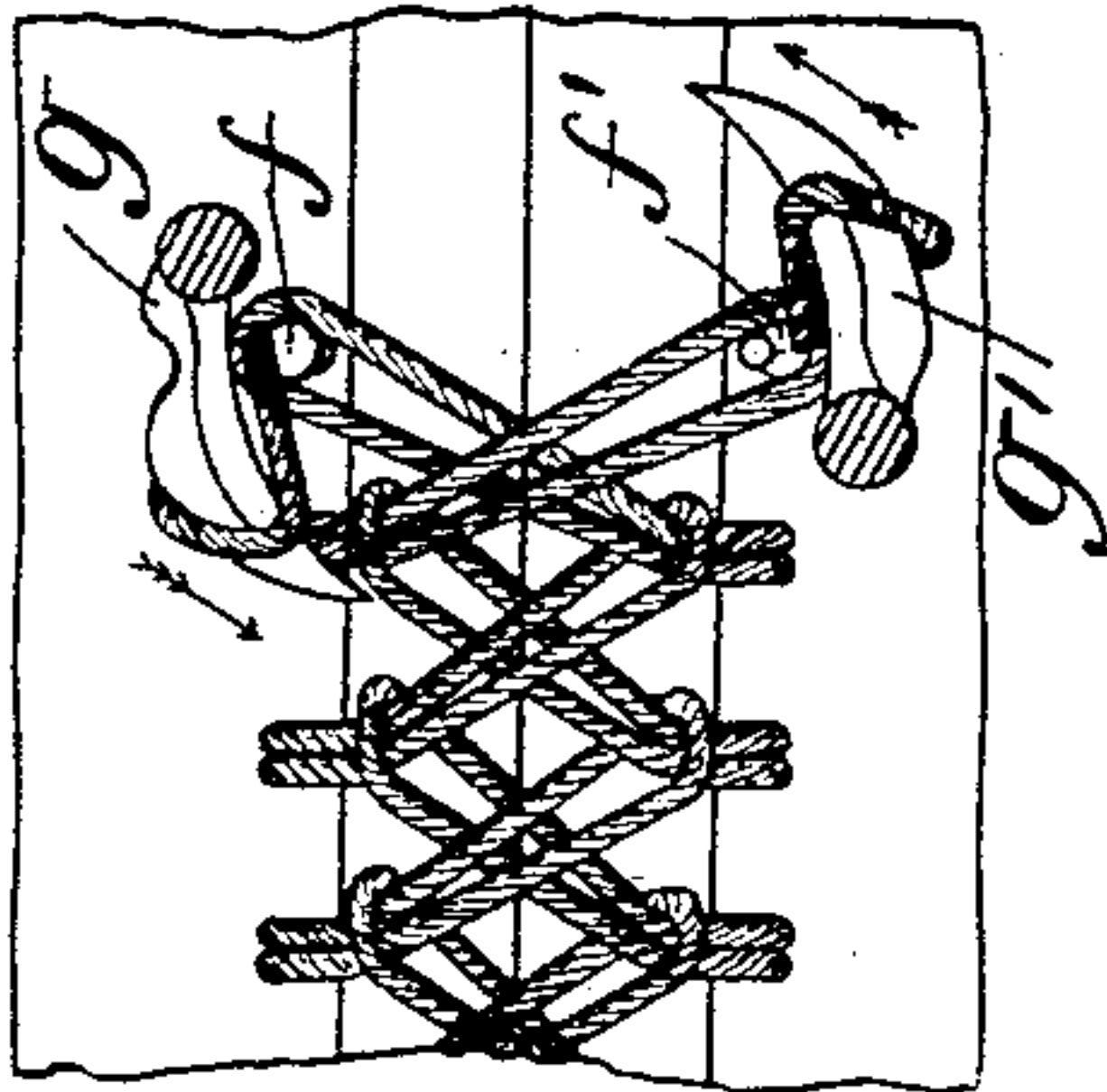


Fig. 5.

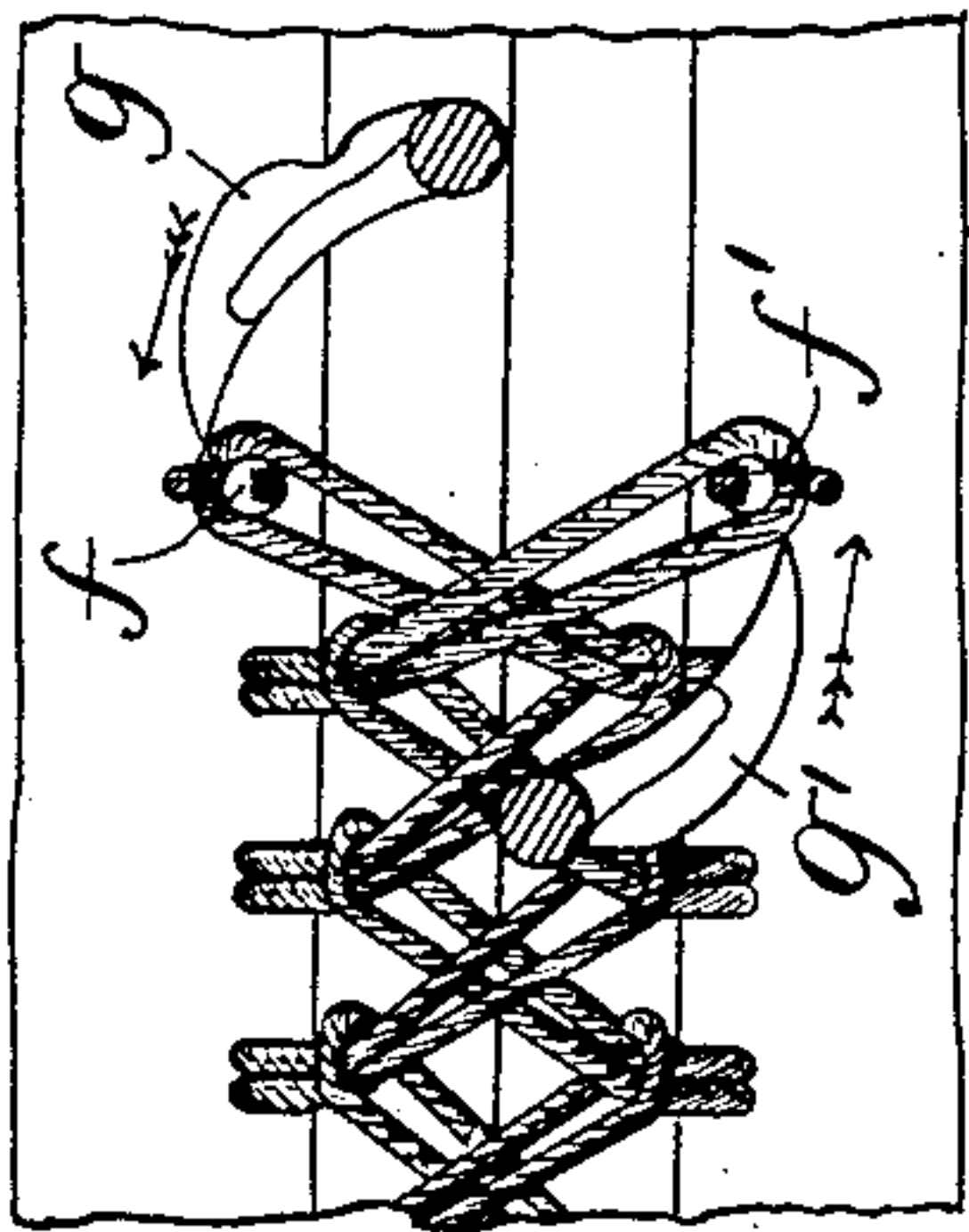


Fig. 12.

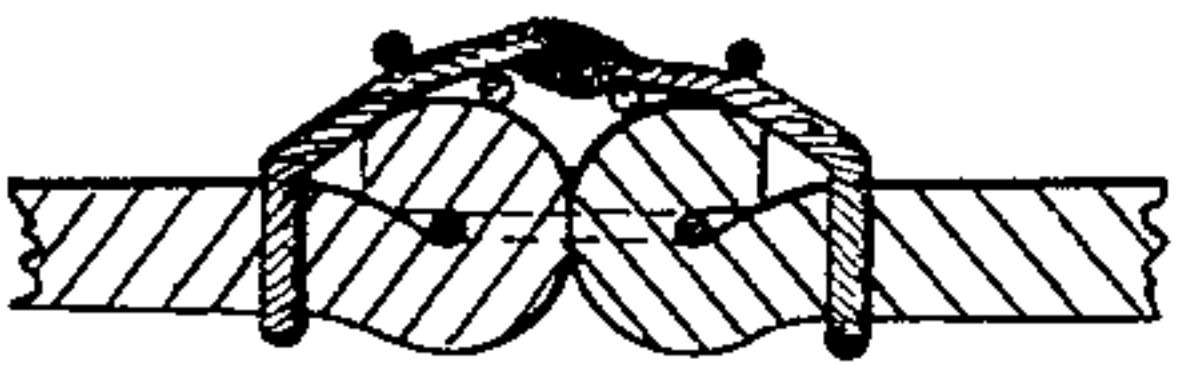


Fig. 11.



Fig. 10.

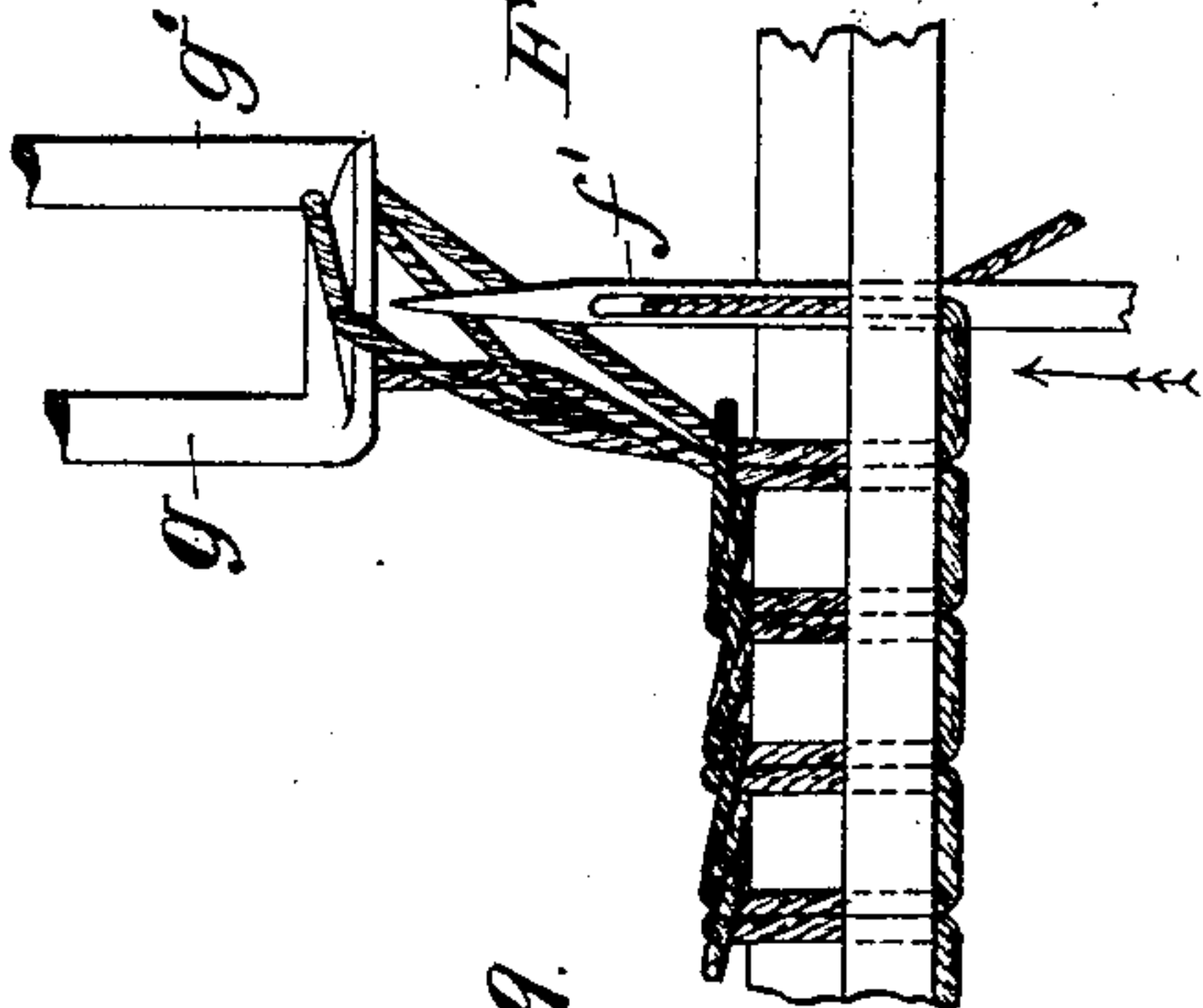


Fig. 9.

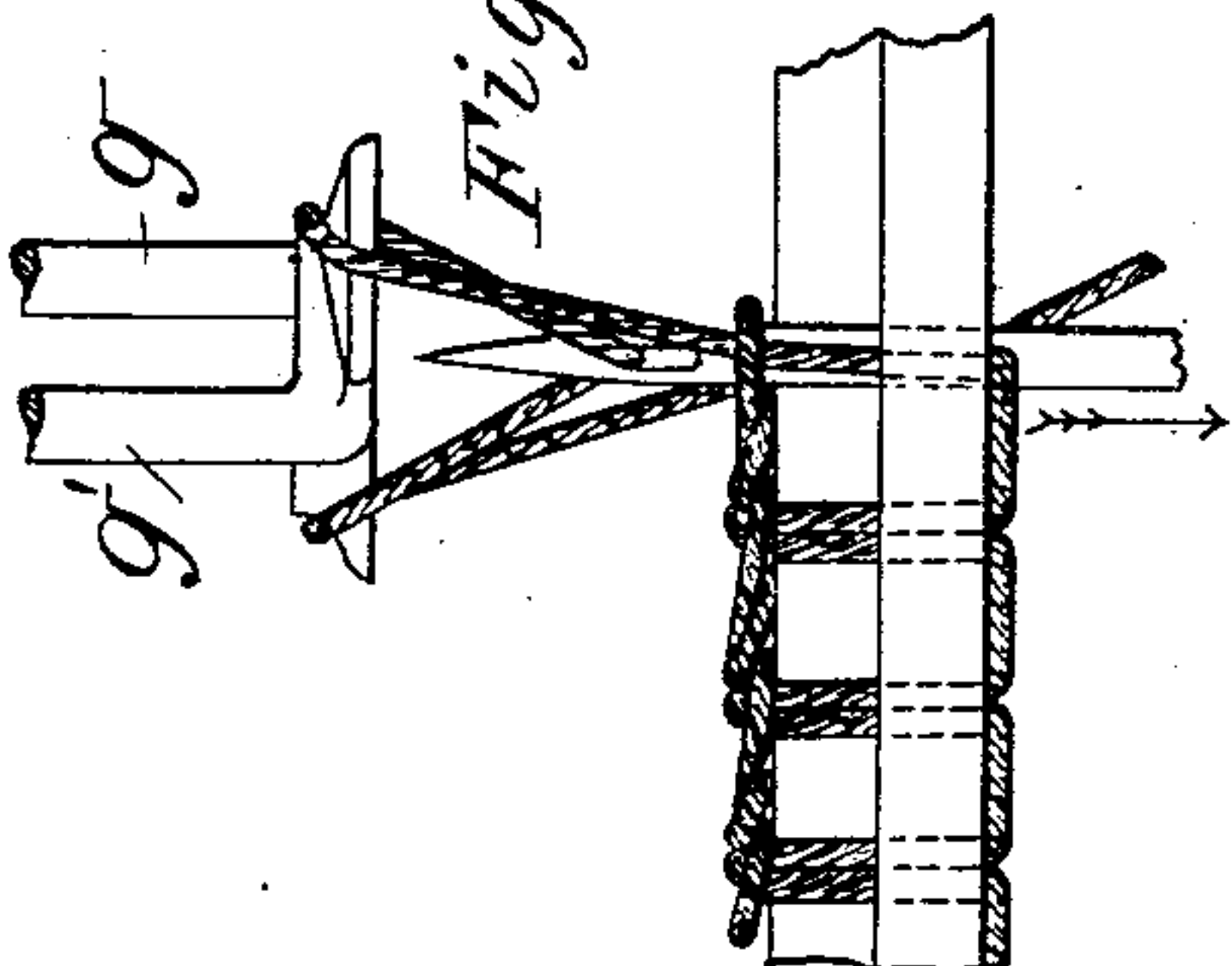
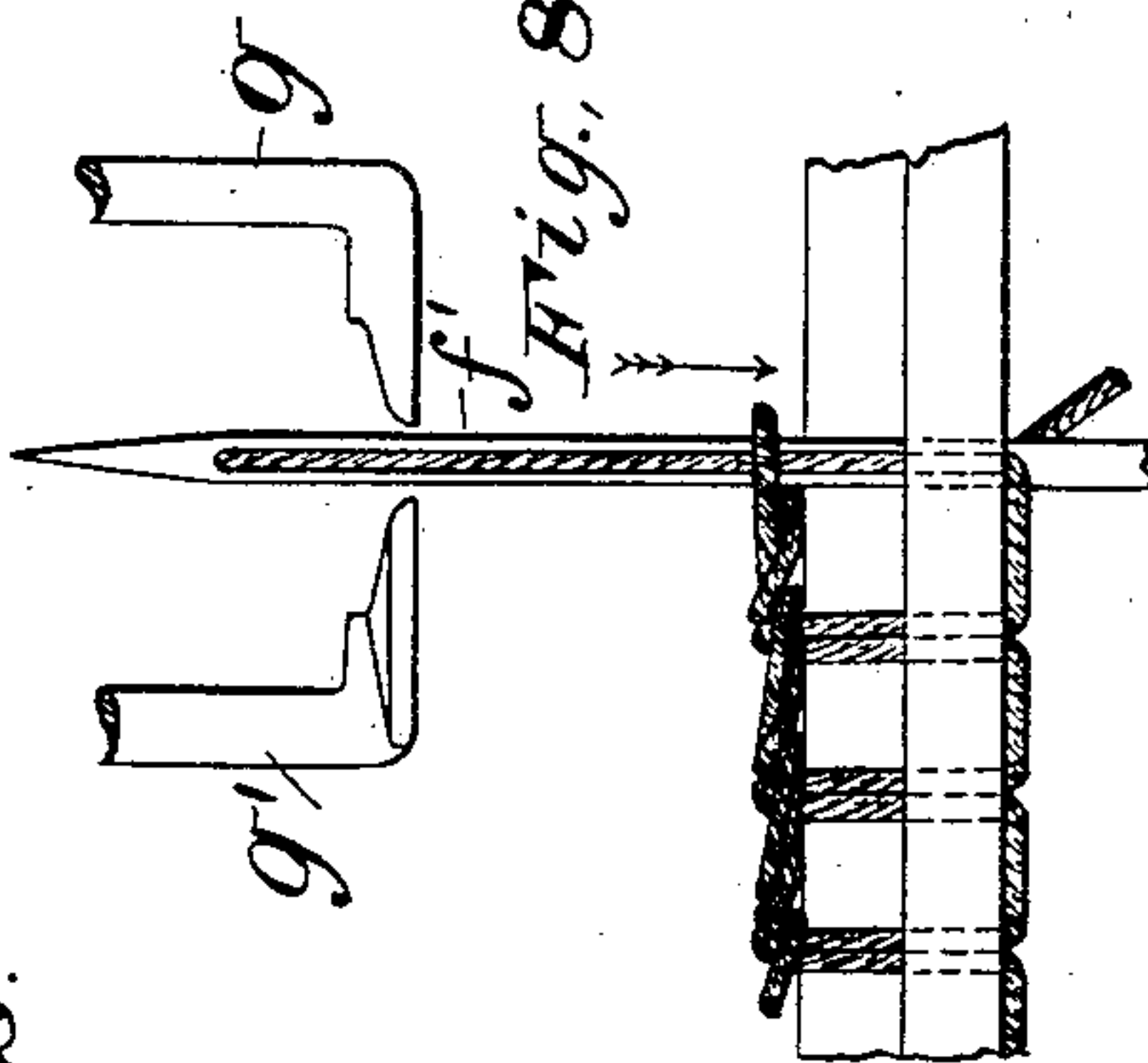


Fig. 8.



Witnesses
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OVERSEAMING SEWING MACHINE.

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(No Model.)

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Fig. 14.

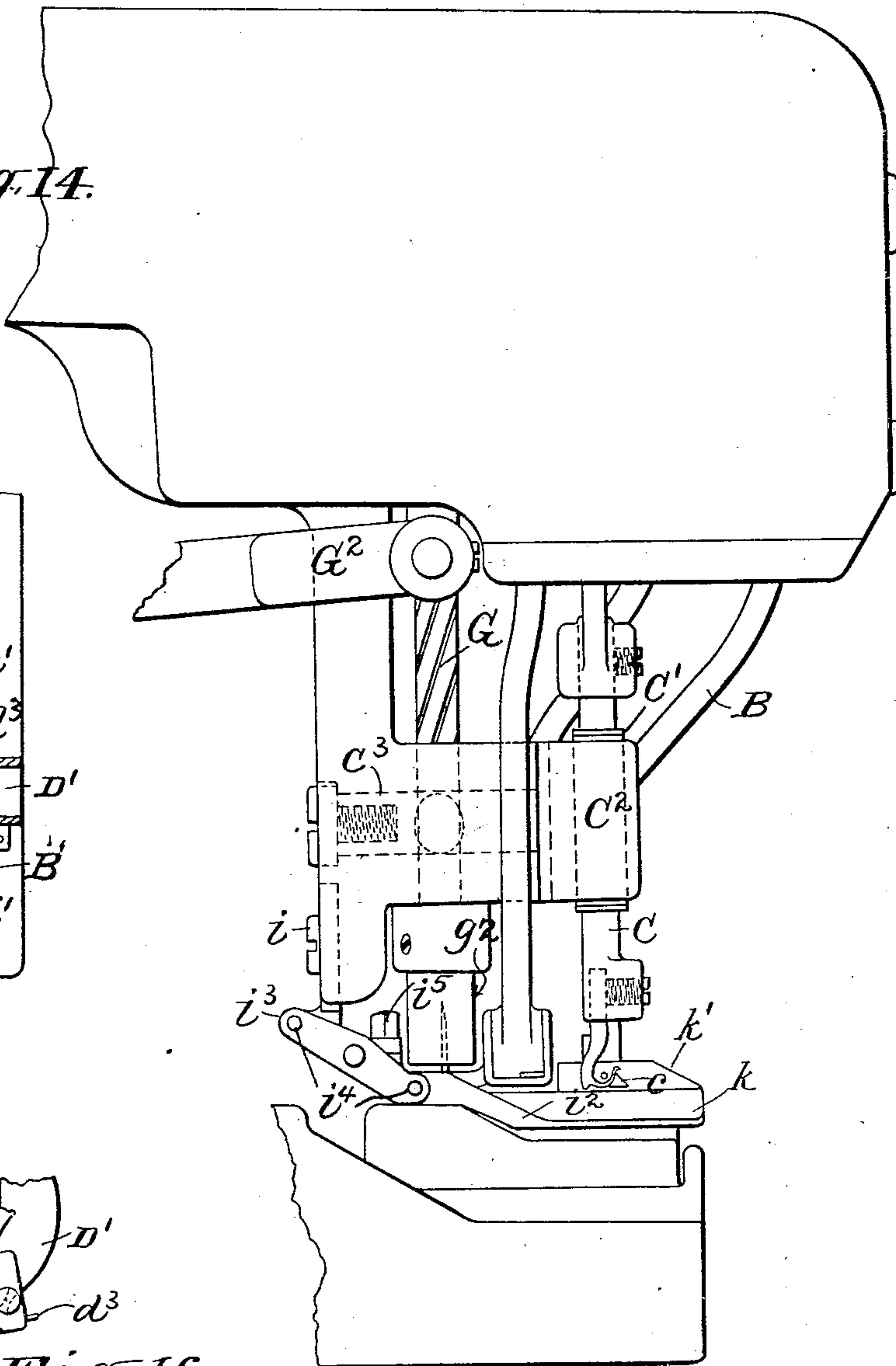


Fig. 15.

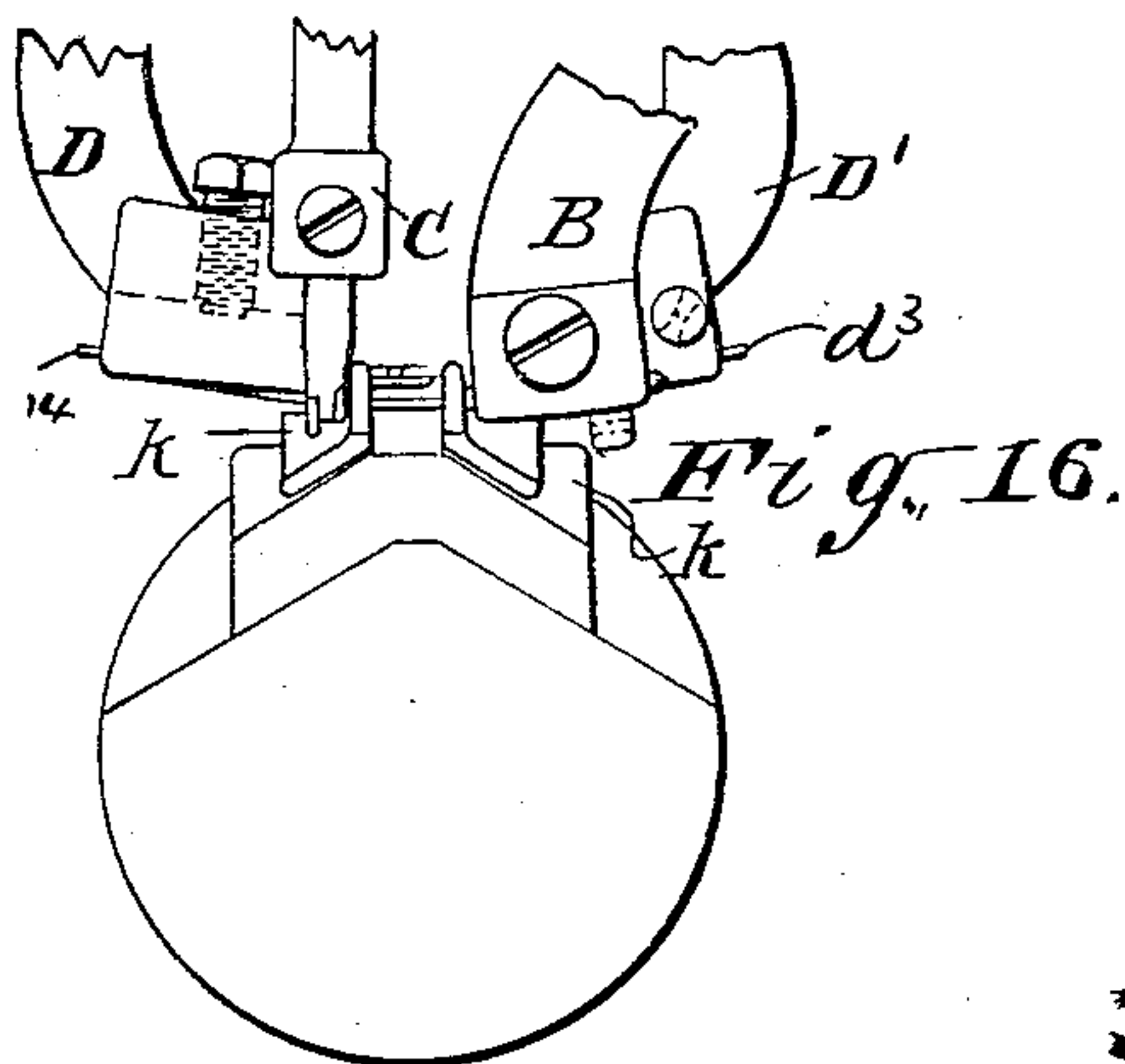
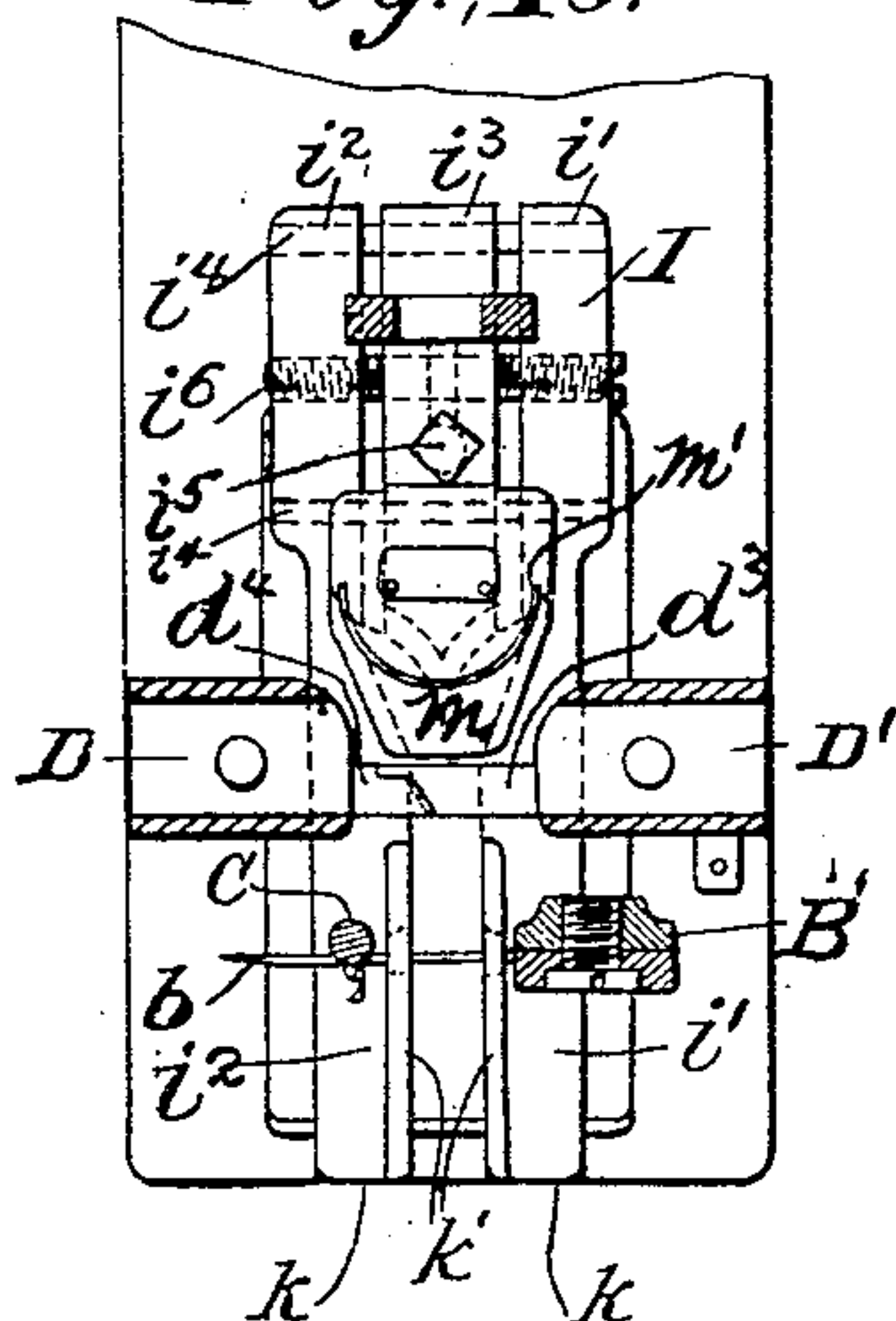
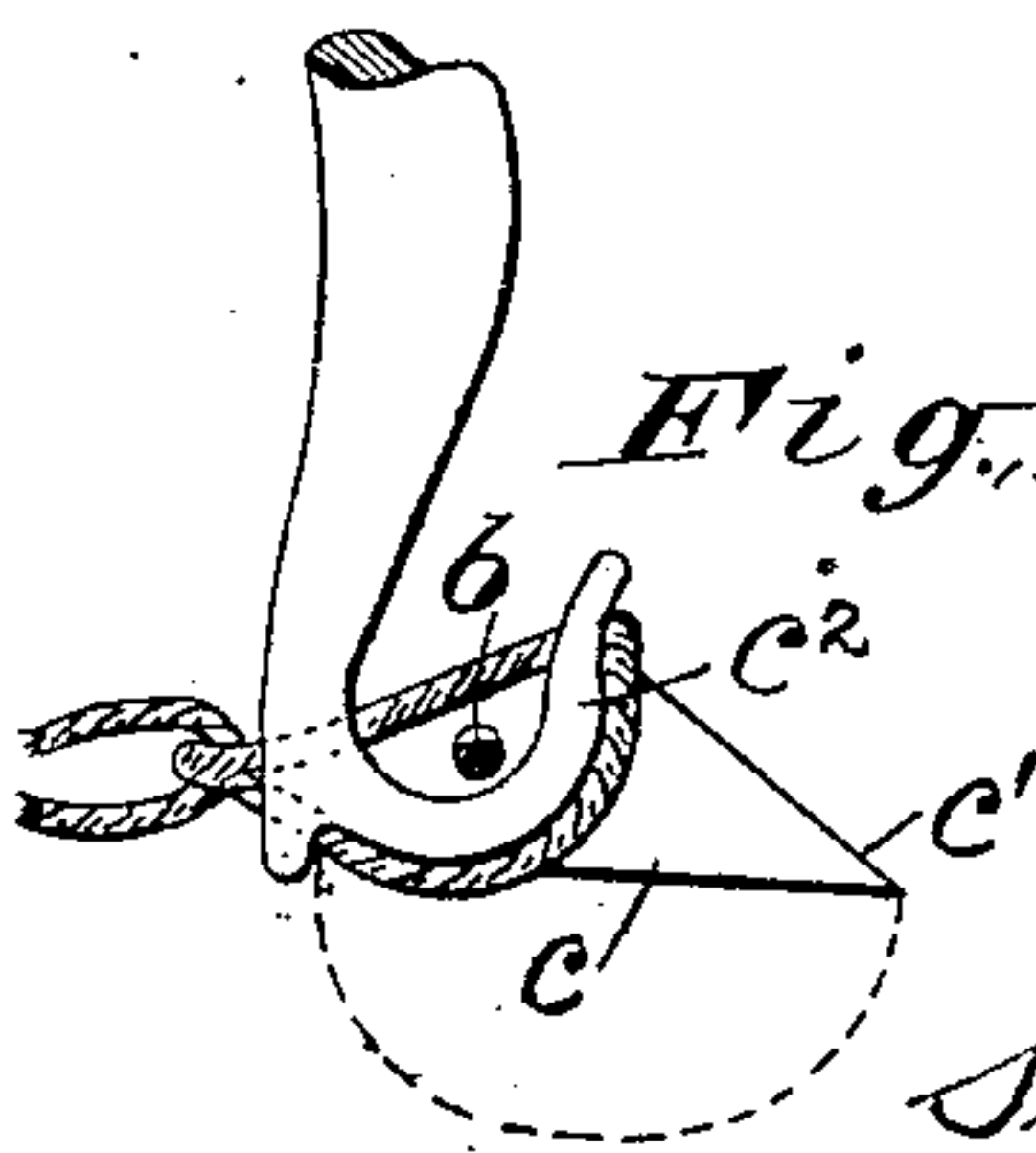


Fig. 16.

Fig. 17.



Witnesses.
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S. BORTON.

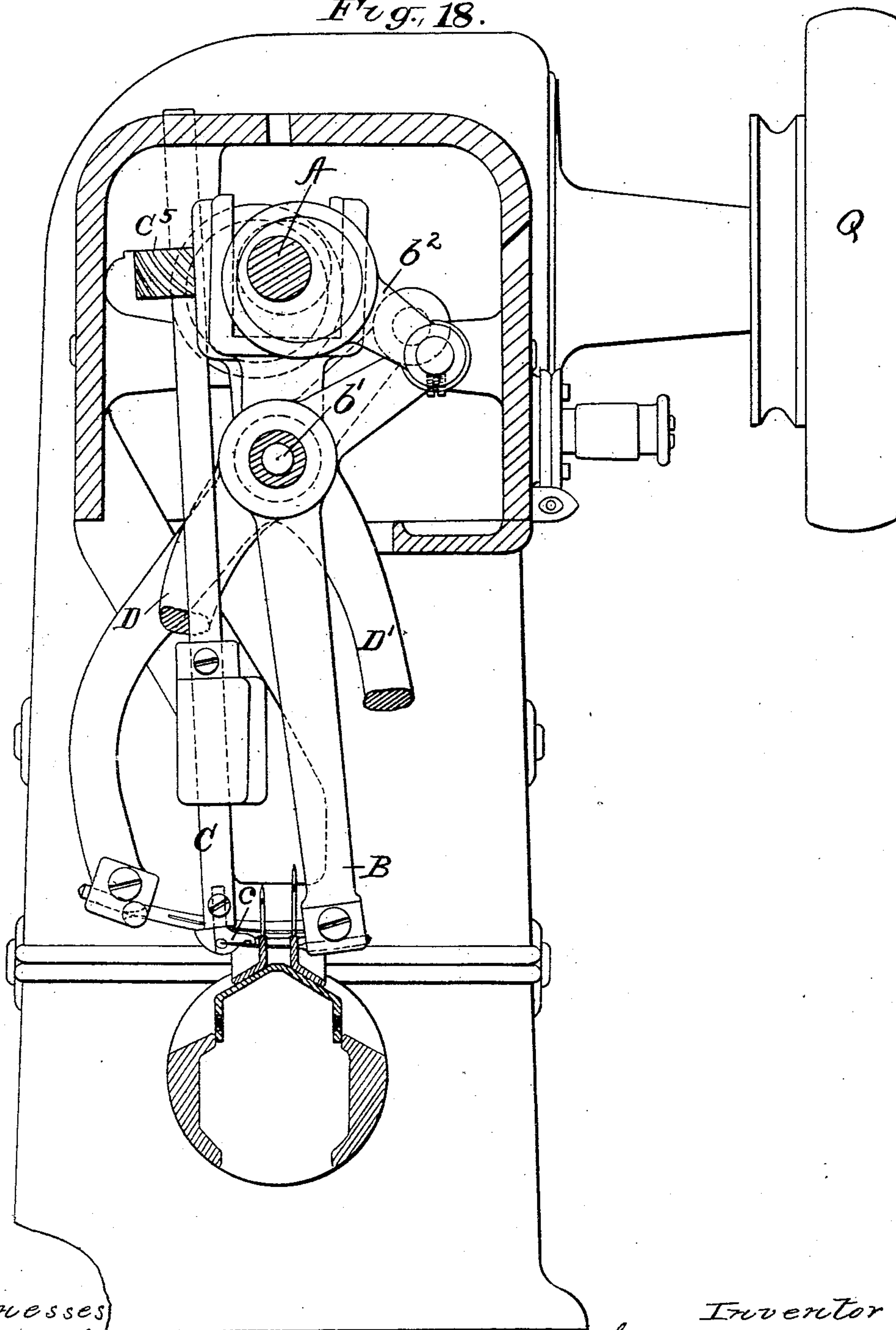
OVERSEAMING SEWING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 6.

Fig. 18.



Witnesses

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Patented Oct. 14, 1902.

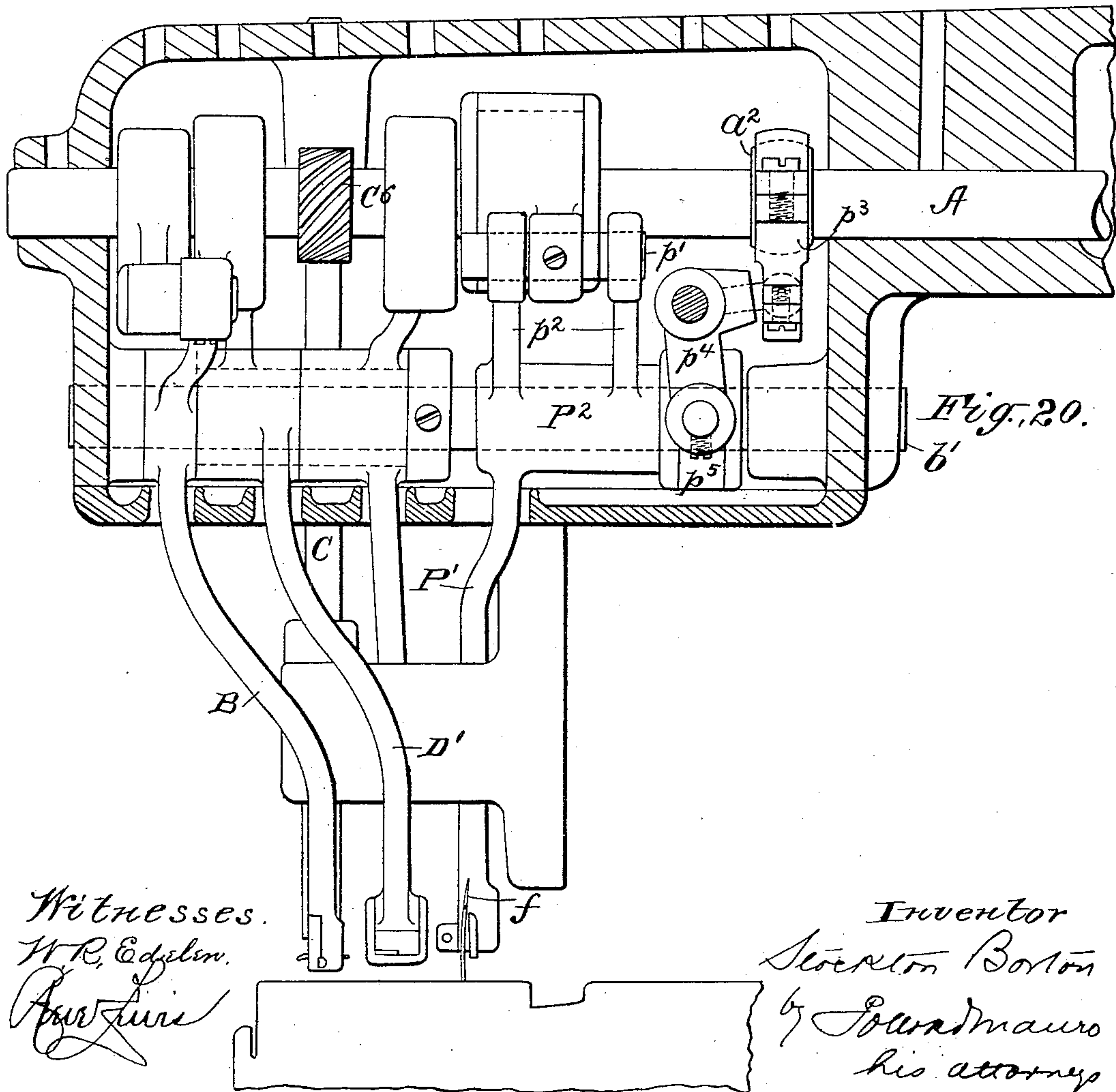
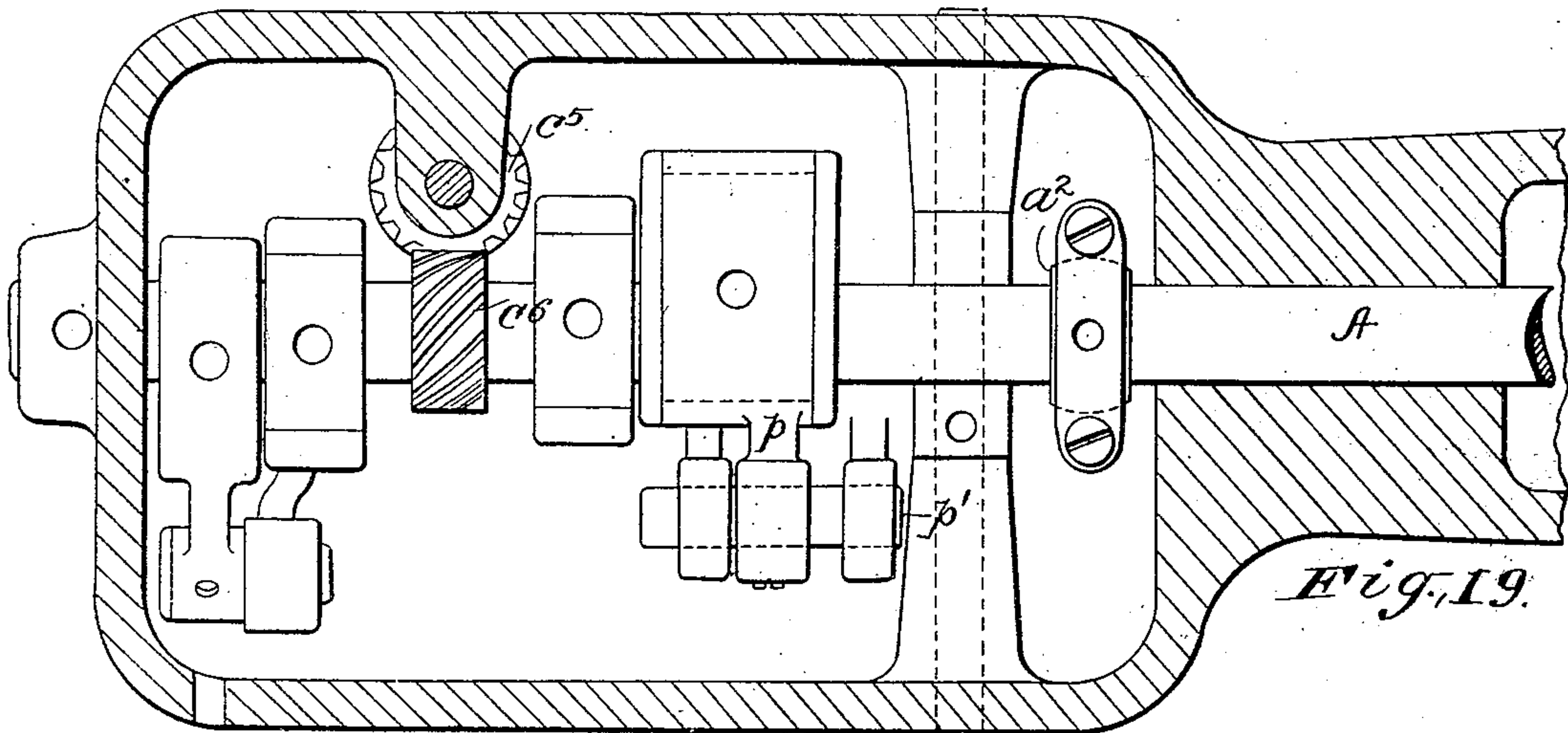
S. BORTON.

OVERSEAMING SEWING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 7.



Witnesses.
W. R. Edgell.
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S. BORTON.
OVERSEAMING SEWING MACHINE.

(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 8.

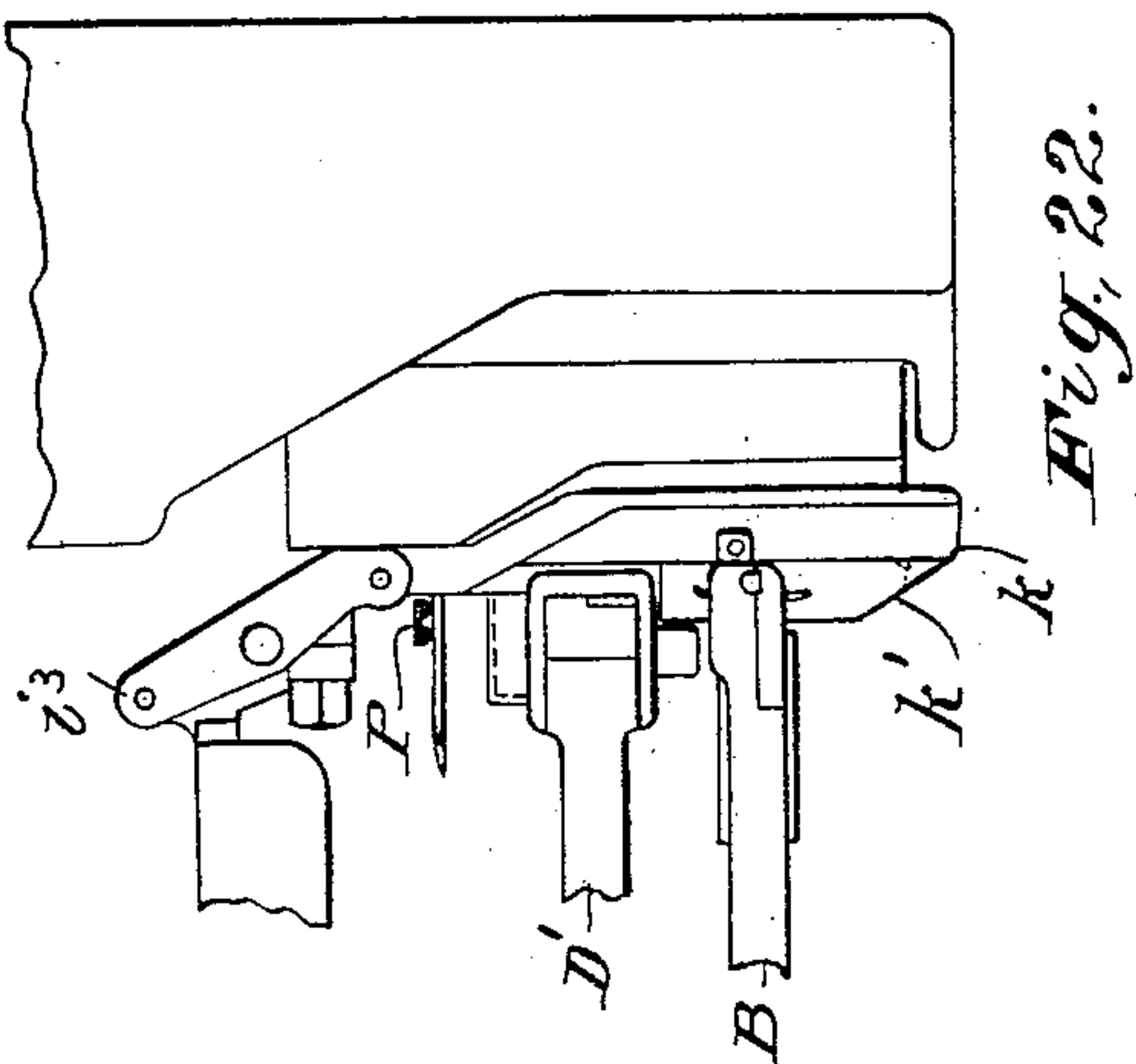


Fig. 22.

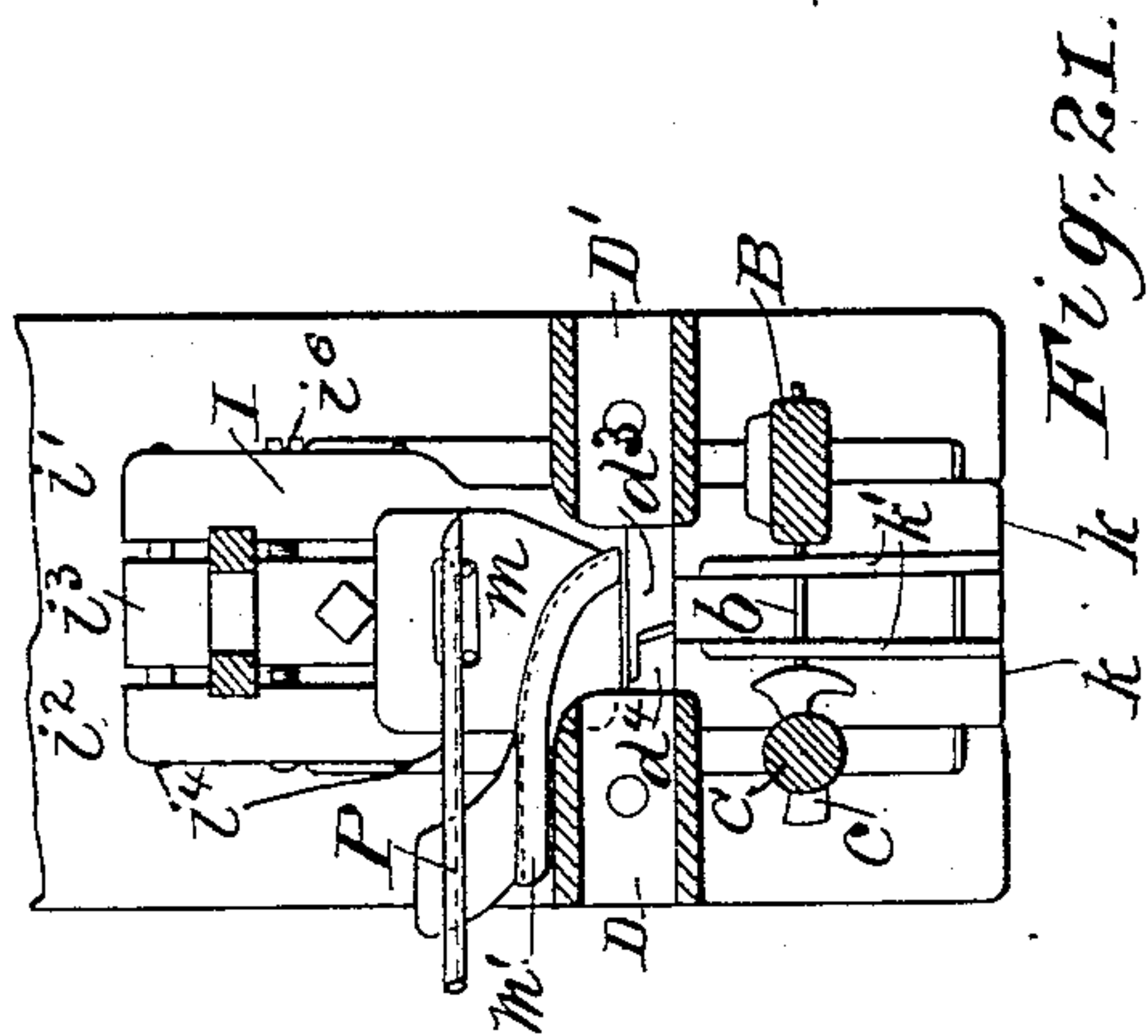


Fig. 21.

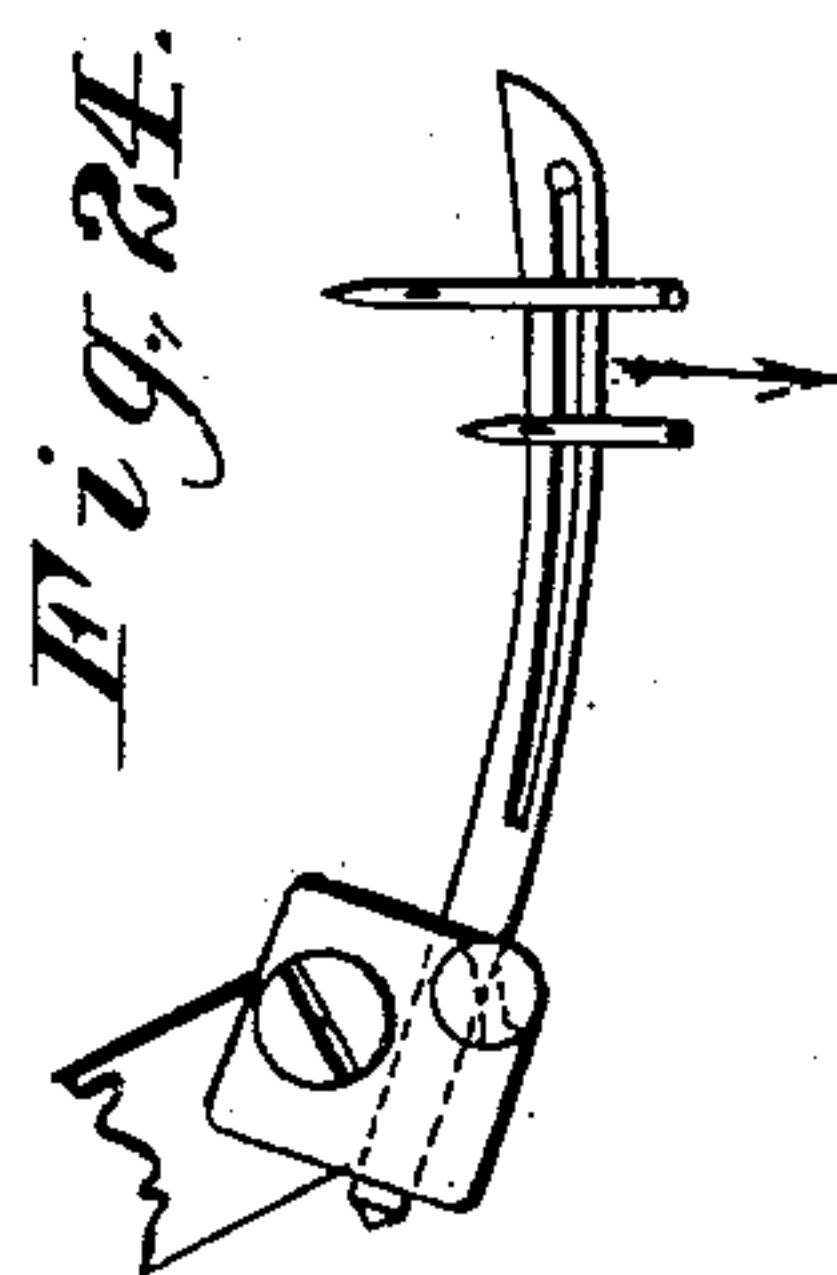


Fig. 24.

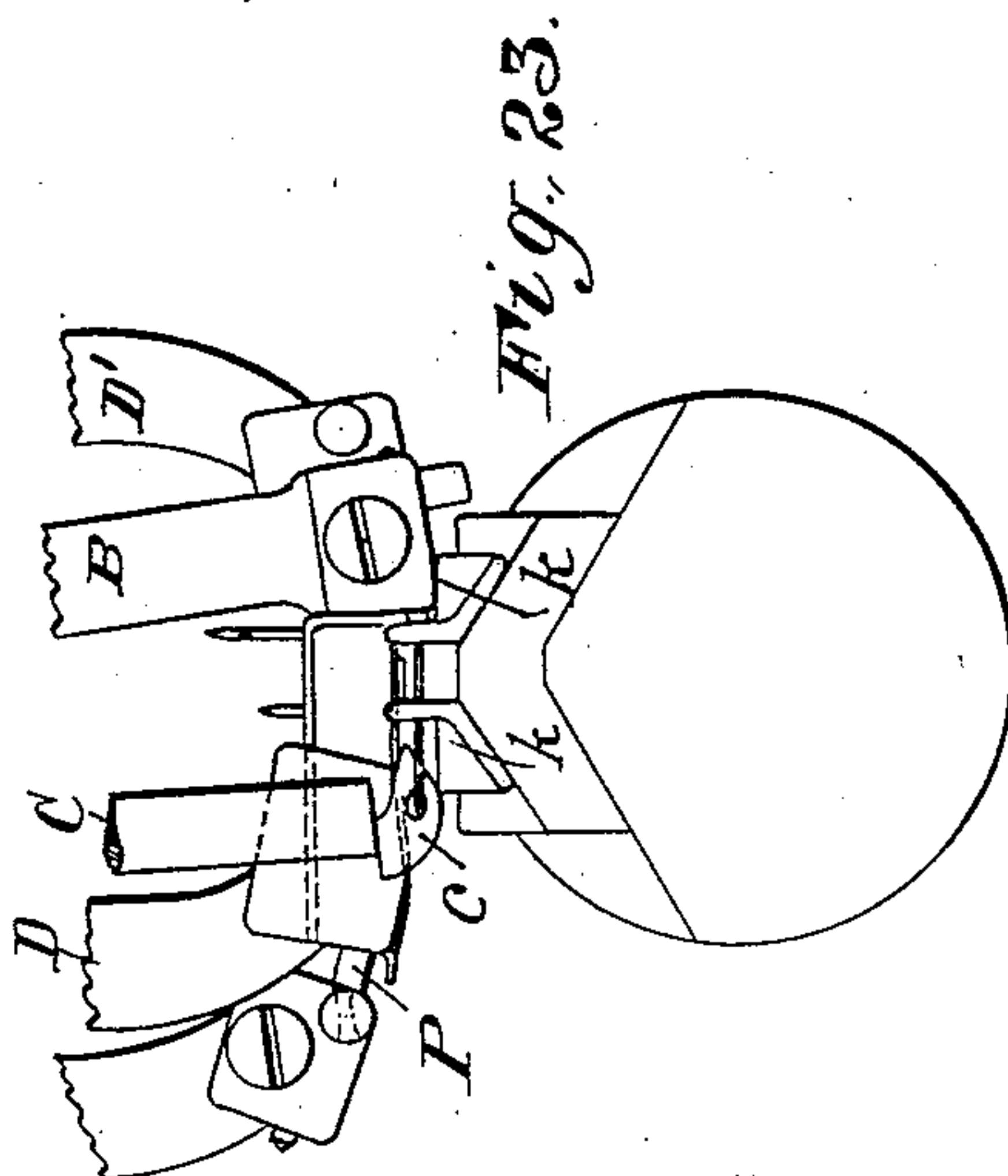


Fig. 23.

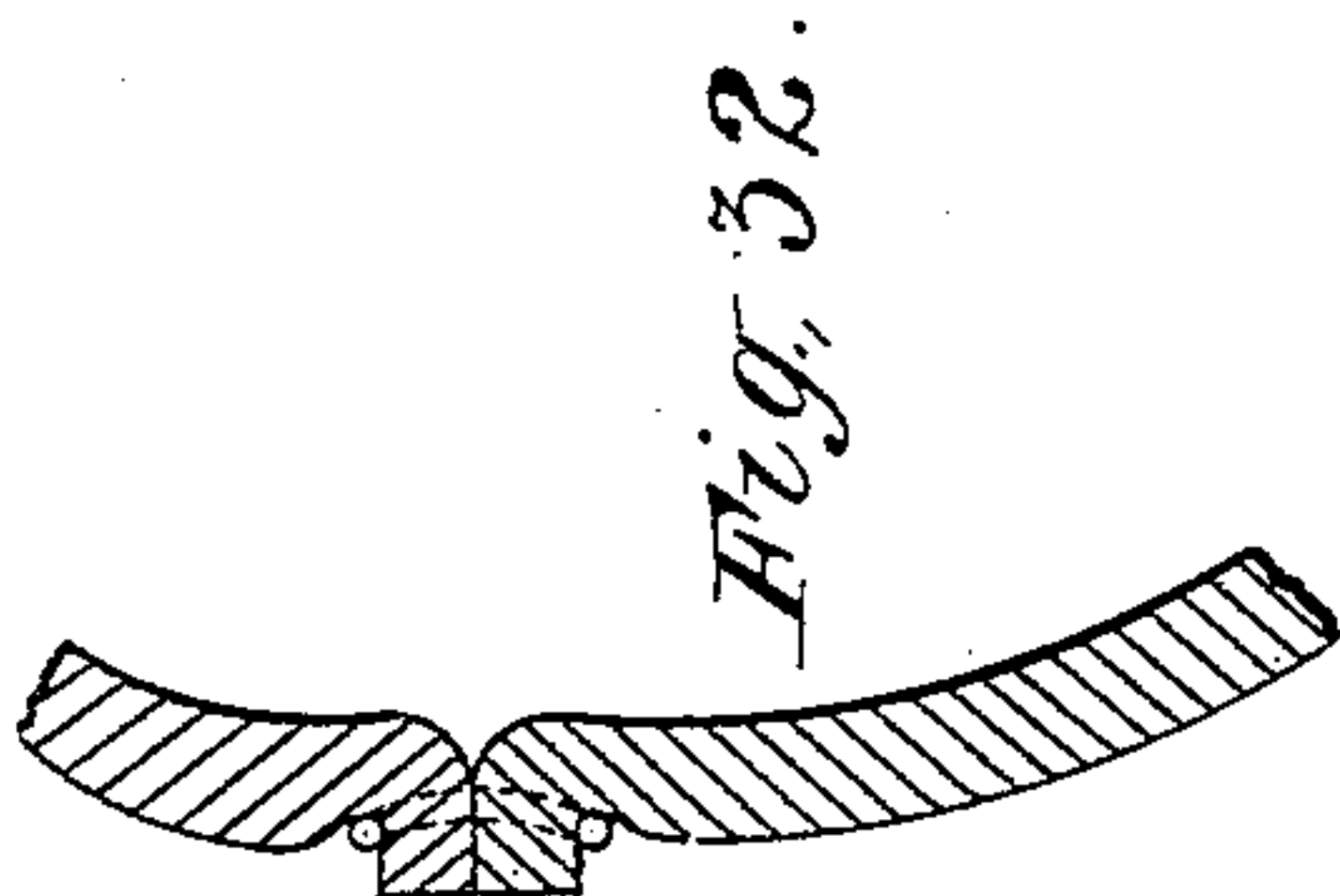


Fig. 32.

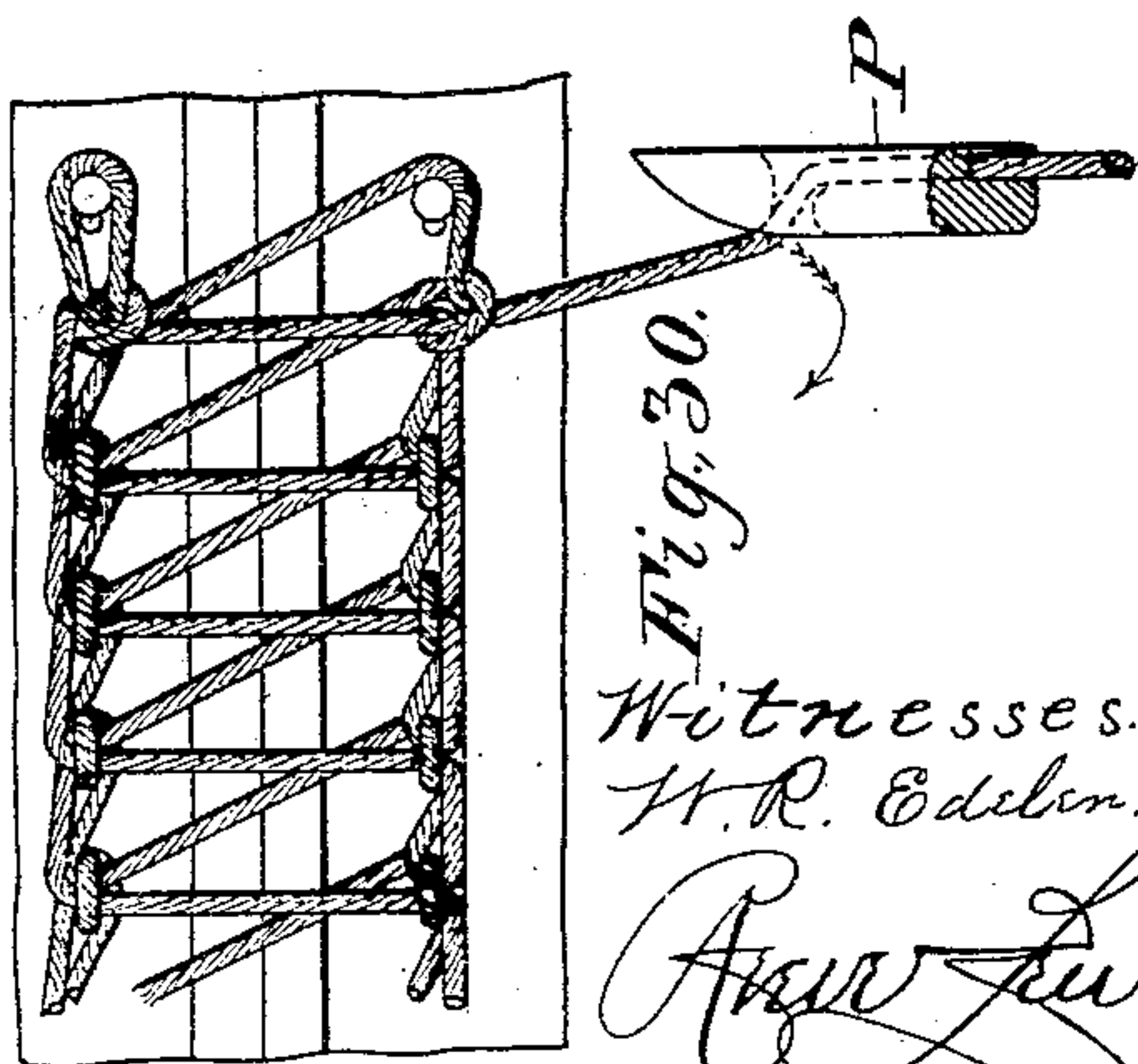


Fig. 30.

Witnesses.
H. R. Edelen.

Amos Lewis

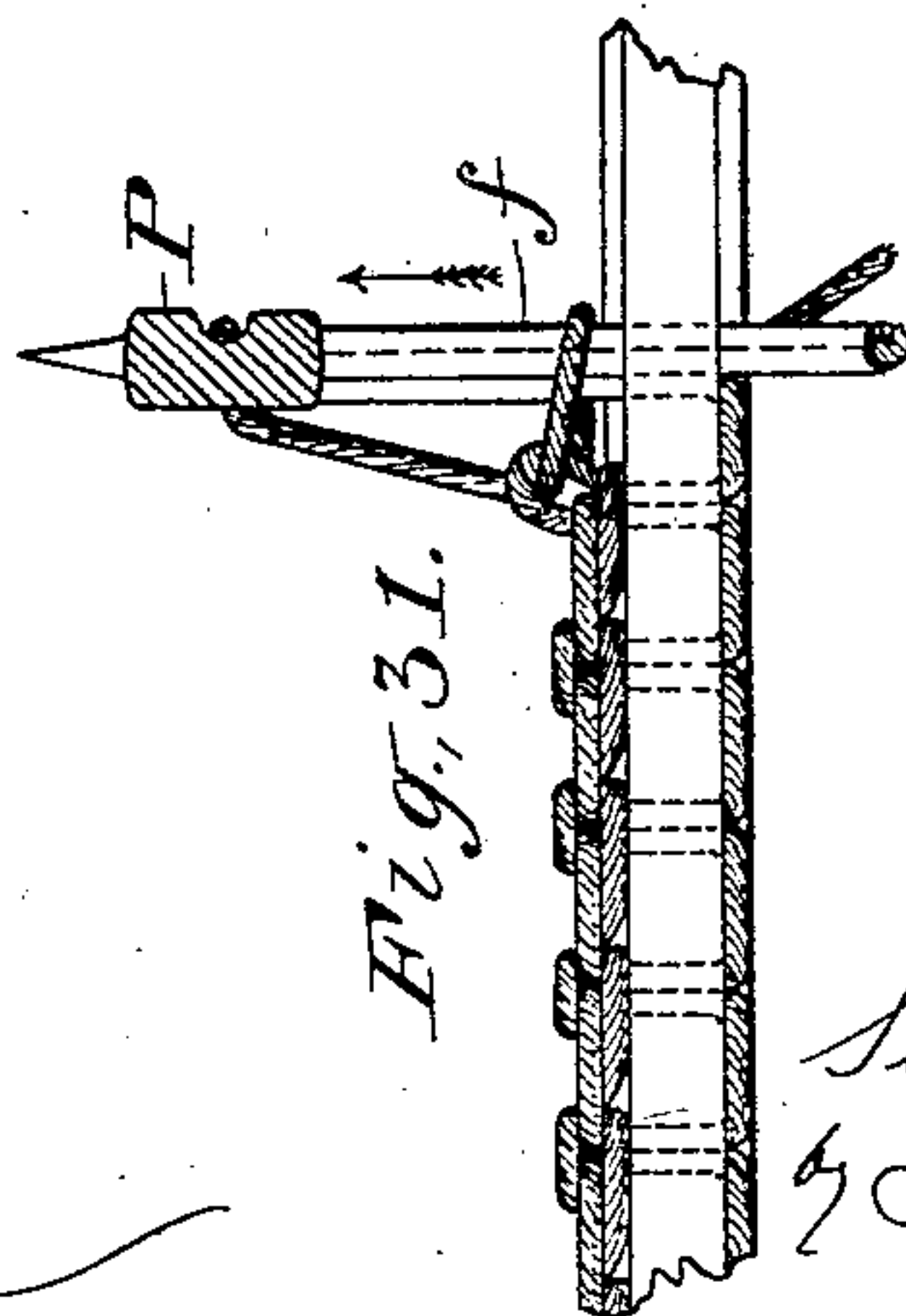


Fig. 31.

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by J. J. Mauro
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No. 710,942.

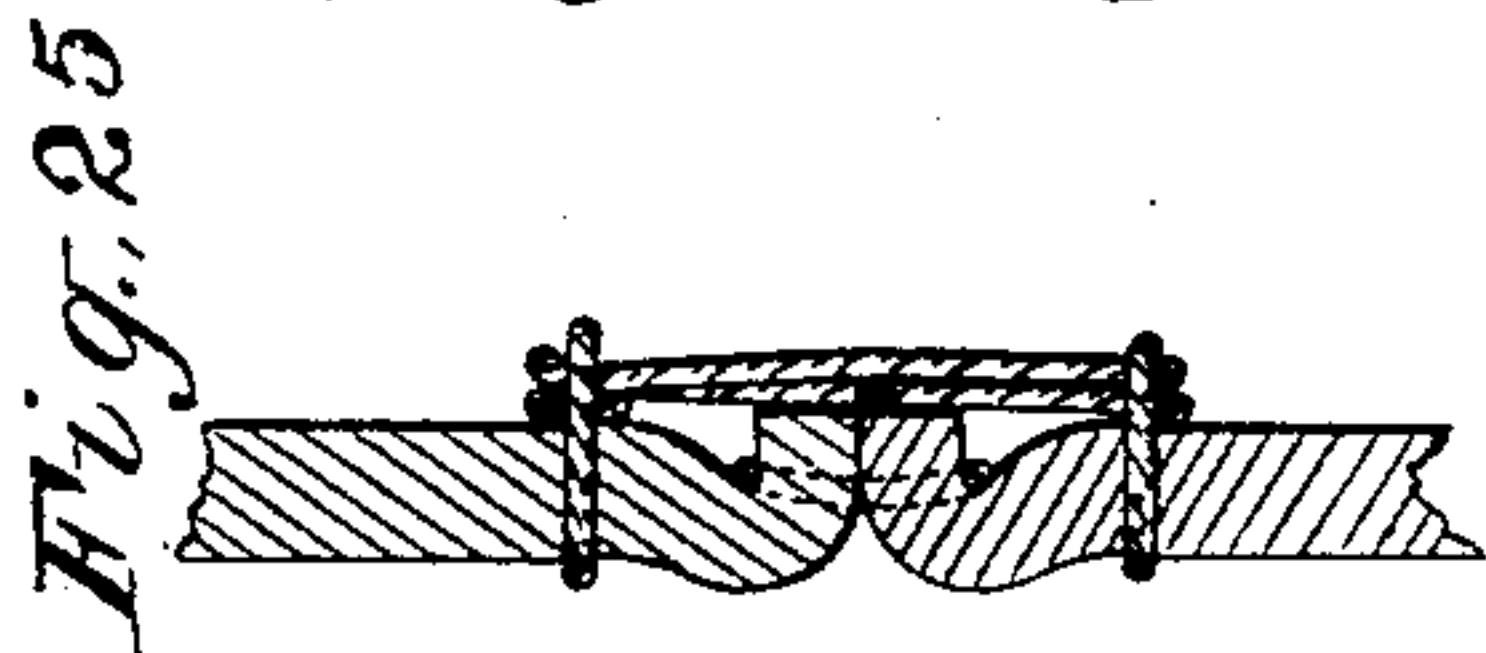
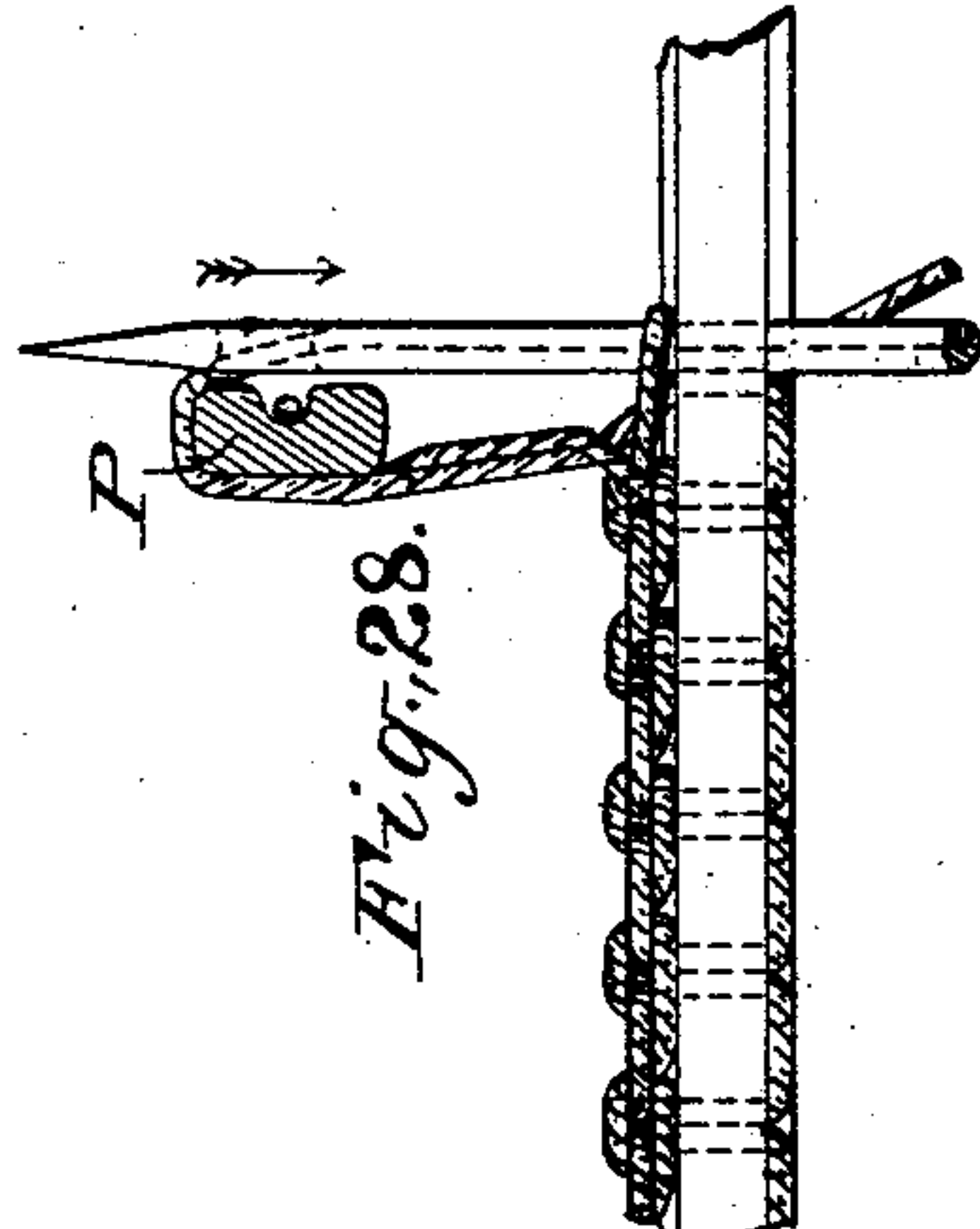
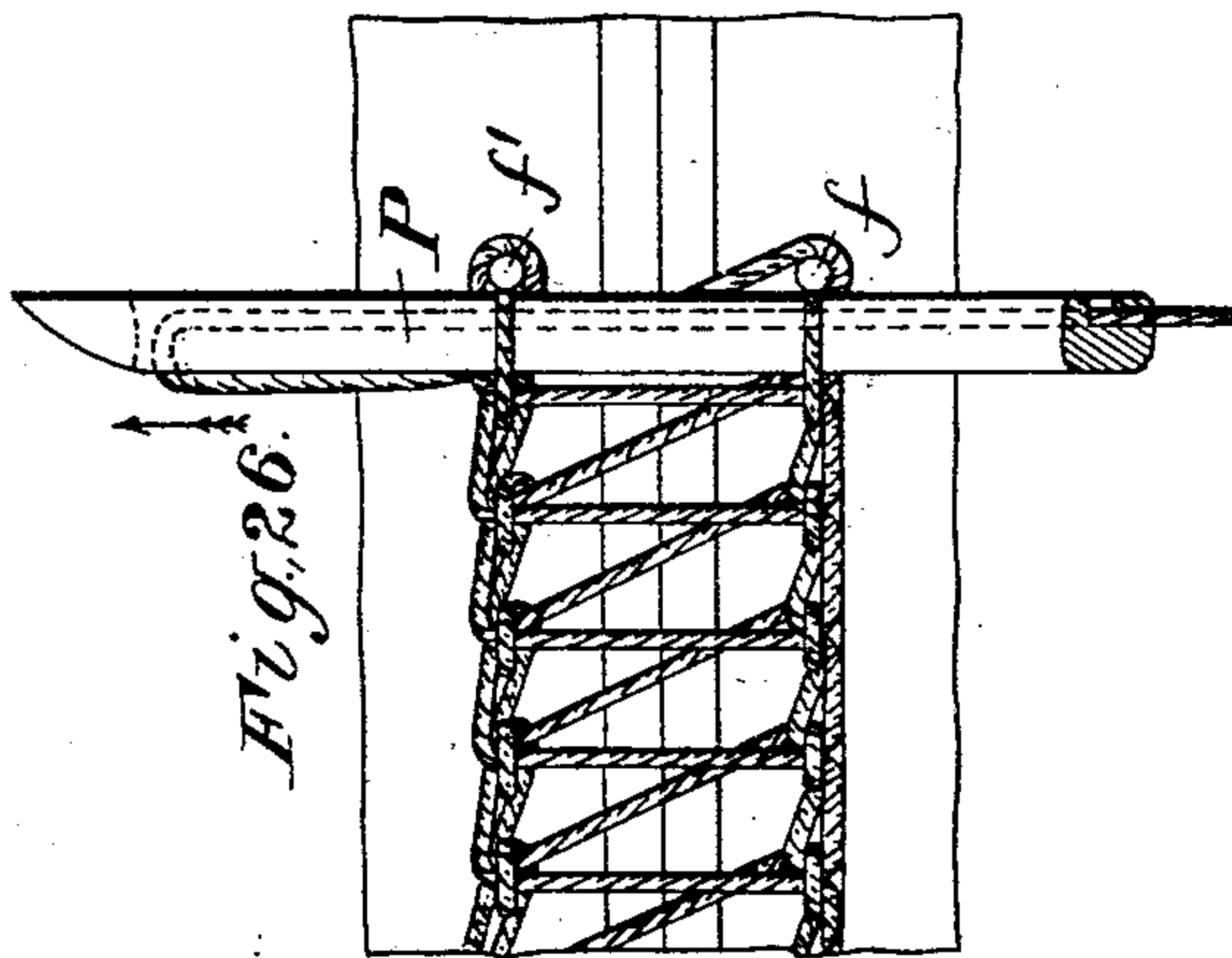
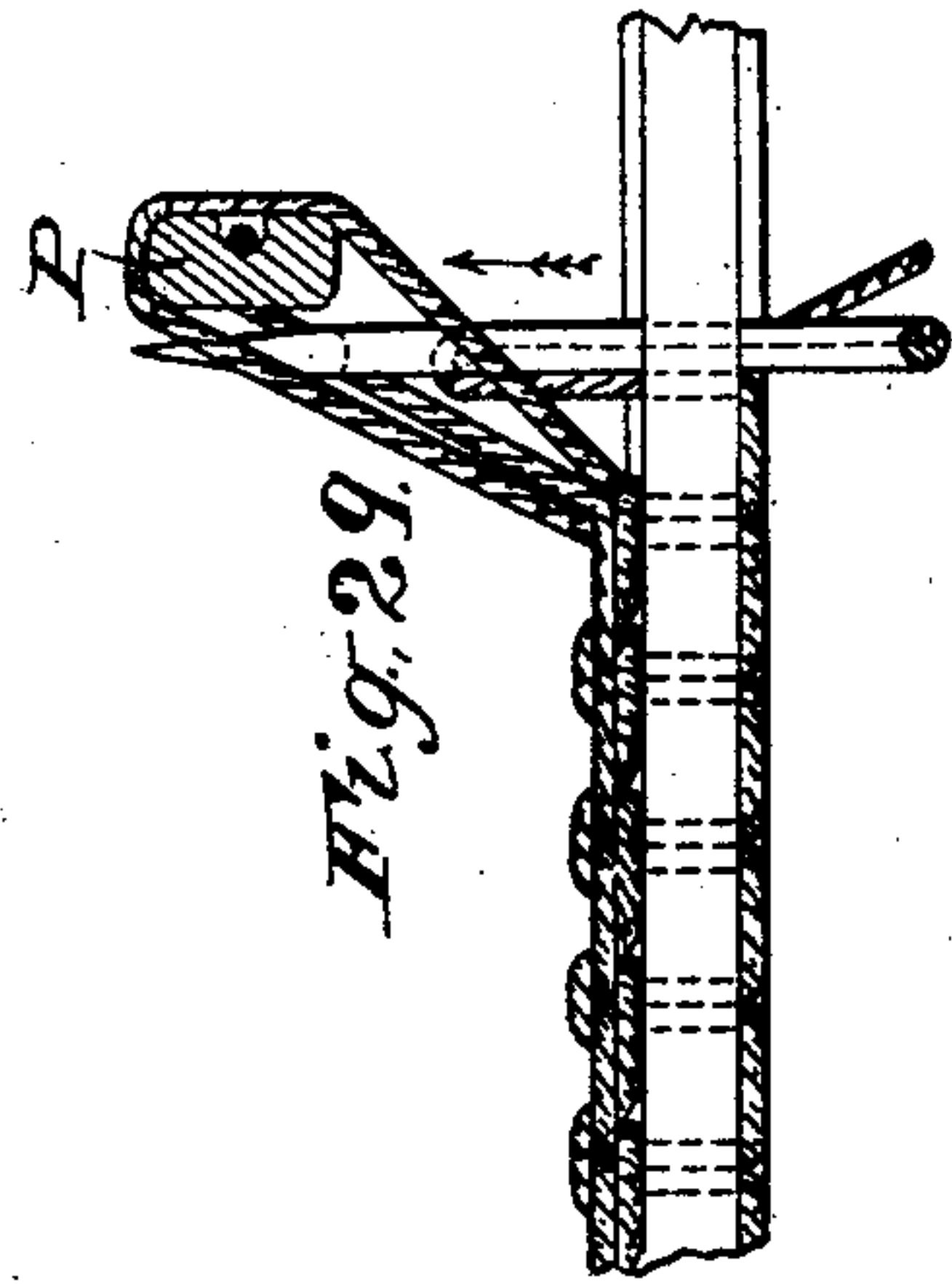
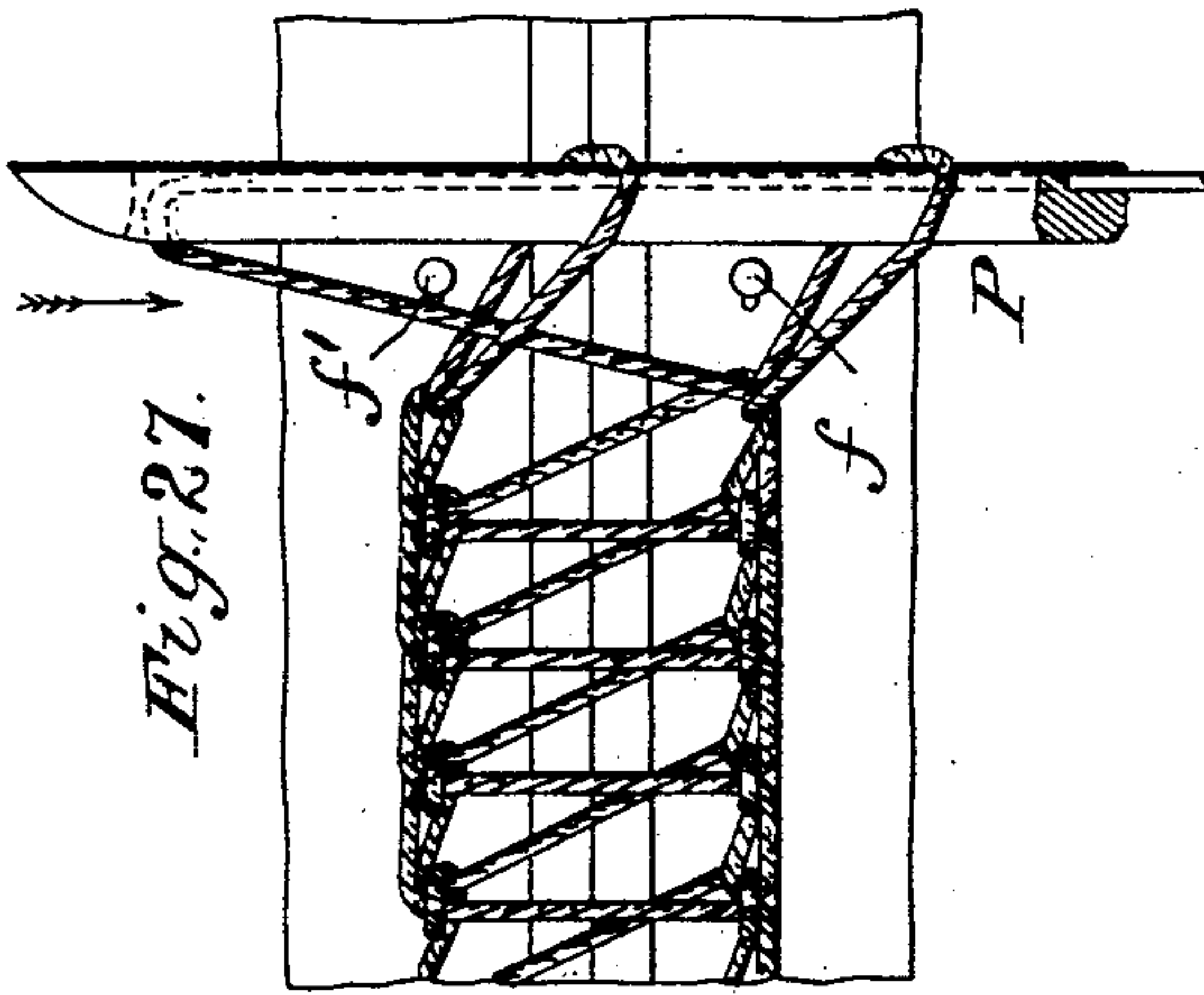
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(Application filed June 9, 1898.)

(No Model.)

9 Sheets—Sheet 9.



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Paul Lewis.

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UNITED STATES PATENT OFFICE.

STOCKTON BORTON, OF PROVIDENCE, RHODE ISLAND.

OVERSEAMING SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 710,942, dated October 14, 1902.

Application filed June 9, 1898. Serial No. 683,003. (No model.)

To all whom it may concern:

Be it known that I, STOCKTON BORTON, of Providence, Rhode Island, have invented a new and useful Improvement in Overseaming Sewing-Machines, which improvement is fully set forth in the following specification.

This invention has reference to mechanism for sewing fabric designed to produce a seam particularly applicable to cut knit goods. The main object sought in machines and methods designed for this class of work is to produce a seam which will firmly hold the raw edges of the fabric and at the same time form no objectionable welt or ridge. Heretofore a seam of this character has been made by first sewing through the two sides of fabric in the usual way and trimming the cut edges, this operation being performed on an ordinary sewing and trimming machine; second, opening the goods so that the two pieces of connected fabric lie in the same plane and cross-stitching over the line of seam, this operation being performed in a machine having two parallel needles (one acting on each side of the line of seam) and a looper or device which oscillates across the line of seam. This second operation has been performed by a zigzag or other suitable cross-stitching machine. This mode of procedure results in a strong durable seam, and the chief objection to its use is the cost of production relative to other methods of sewing knit goods. It is necessary to employ two machines and two distinct operations, and the attempt to devise a single machine capable of forming the seam at one operation would be met by the difficulty that after the first line of stitches is run the two layers of fabric must be opened out before the second or cross seam is made. Other difficulties present themselves, but need not be commented upon. According to the present invention the described seam is produced at a single operation and in a single machine with a resulting economy in time, labor, and machinery and with an improvement in uniformity of the product.

In carrying out the invention the two layers of fabric to be joined are not laid one on top of the other, but are laid edge to edge, with their meeting edges turned at an angle to the body of the goods. These edges are joined by a line of stitching and trimmed,

and the feed carries the goods to cross-stitching mechanism, which completes the operation.

The invention may be embodied in mechanism of many different forms, the essential things being the two sets of sewing mechanisms acting successively upon the goods, the first line of stitches being formed in such manner that it is not necessary to open out the goods before the cross-stitches are formed.

The invention will be better understood from the following description of an organization in which the same is embodied.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a sewing-machine constructed in accordance with the invention. Fig. 2 is a vertical cross-section thereof. Fig. 3 is a horizontal section in the plane of the main shaft. Fig. 4 is a detail in side elevation. Figs. 5 to 13, inclusive, are details illustrating the formation of the seam. Fig. 14 is a partial side elevation. Fig. 15 is a plan view of the foot and adjacent parts. Fig. 16 is an end view of the foot, and Fig. 17 is a detail of one of the hooks. Figs. 18 to 32, inclusive, illustrate a machine differing in certain features of construction from that shown in the other figures, but embodying the same invention. Fig. 18 is a vertical cross-section. Fig. 19 is a horizontal cross-section. Fig. 20 is a vertical longitudinal section. Figs. 21, 22, 23, and 24 are details illustrating the stitch-forming mechanism. Figs. 25 to 32, inclusive, are details illustrating the formation of the seam.

The main shaft A rotates in bearings in the arm or gooseneck and gives motion to a series of eccentrics in the head of the machine, from which various parts of the stitch-forming mechanism and the trimmer are operated.

B, Figs. 1 and 2, represents the arm, which carries the horizontal needle *b*, Fig. 15. This arm is pivoted on a rod *b'* beneath the main shaft and is oscillated through a connection-rod *b²* from an eccentric *a* on the main shaft. Coöperating with this needle to form an ordinary chain-stitch is a looper *c*, carried by a vertical arm or shaft C, Figs. 2, 14, and 17. The driving mechanism for the looper will be hereinafter described.

D D' represent the trimmer-arms. They are also pivoted on the rod *b'* and receive mo-

tion from suitable eccentrics on the main shaft, these eccentrics working in blocks d^2 , Fig. 2, which are embraced by yokes on the upper ends d d' of the trimmer-arms. The trimmer-blades d^3 d^4 , Fig 15, work in a horizontal plane, so as to act upon the upturned edge of the fabric.

In the rear of the trimming mechanism is the cross-stitching mechanism. It comprises two needles f f' , carried by a vibratory arm F and working upwardly through the cloth-plate, and two loopers g g' , Figs. 5 to 10, carried by a vertical shaft G, which has an oscillatory movement, as hereinafter explained. The needles f f' work in a plane approximately at right angles to that of the needle b . The foregoing constitute the principal groups of mechanisms which are essential to the accomplishment of the intended result; but the particular construction of each group may be changed, so long as the work it is designed to do is properly accomplished. The trimmer might in some cases be dispensed with; but for general purposes it is essential.

A detailed explanation will now be given of the mechanism illustrated in the drawings.

The bed of the machine is approximately circular in cross-section, so as to permit the sewing of tubular work, such as the sleeves of garments. The work rests during the sewing on the angular plate h , which is carried by the arm H, Fig. 1, pivoted at h' and connected by a rod h^2 with a treadle H^2 , so that it can be depressed by the operator's foot. Plate h thus corresponds in function with the presser-foot of an ordinary sewing-machine. Normally it is pressed upward by the flat spring h^5 . The foot I is rigidly clamped by screw i to the frame of the machine, the work being held between this unyielding foot and the yielding plate h . To introduce the work, the latter is depressed by the operator's foot. Plate h is loosely mounted on its supporting-bar, so that it can assume always a position parallel with the foot. The stationary or rigid foot I is composed, mainly, of two parallel bars or strips i^1 i^2 , which extend one on each side of the line of seam from the front of the machine back to a point behind the cross-stitching devices. They are attached to the foot-bar i^3 , Figs. 14 and 15, by two cross-pieces i^4 and screw i^5 . By loosening screw i^5 the two parts of the foot can be adjusted, by means of the right and left screw i^6 , toward or away from each other to suit the thickness of the goods. In this adjustment the parts of the foot freely move on the cross-pieces i^4 . When the desired adjustment has been attained, the screw i^5 is turned to tightly clamp the right and left screw i^6 . At the forward extremity of the foot are two uncurlers k , the form of which is clearly shown in Figs. 15 and 16 and which take the curl out of the upturned edges as the latter pass toward the first sewing mechanism between the vertical walls or guides k' on the foot. These walls are pierced

with holes for passage of the horizontal needle b , Fig. 15. This needle and its looper c are organized to make an ordinary chain-stitch, and the principal novelty in this part of the machine resides in the driving mechanism for the looper or hook c . This hook has a point c' , Fig. 17, which takes the needle-loop and spreads it, the loop slipping back on the point until arrested by the flange c^2 , which holds the distended loop in the path of the needle. To perform these operations properly, the looper must have a swinging motion parallel with the line of seam, as well as a vertical movement. The looper-arm C is capable of a vertical movement in a block C', Figs. 2 and 14, through which it passes. This block is itself loosely supported in a vertically-cleft head C². Block C' (and with it arm C) can oscillate in this head in a plane parallel with the line of seam. Head C² is carried on a horizontal stud C³, supported in the frame, so that the head can accommodate itself to different angular positions which the arm C will assume. All the motions of looper are imparted by an eccentric K, Figs. 1 and 3, which, as shown, is placed obliquely on shaft A. The ordinary operation of the eccentric acting through the strap K' and curved arm K², which is joined to the looper-arm C, imparts to the latter a vertical reciprocatory motion. Owing to the obliquity of the eccentric, the arm is also vibrated parallel to the line of seam and also given a slight movement transversely thereto. After the two pieces of fabric are joined by the operation of needle b and looper c the upturned edges are sheared by the trimmer-blades d^3 d^4 as close as desired to the line of stitching. The construction and operation of the trimmer have already been sufficiently explained, particularly as this mechanism (except in its relations to the other devices and to the operation as a whole) forms no part of the invention and may be replaced by any suitable trimming devices. After passing the trimmer the main portion of the fabric passes under the presser m , which forms the forward extremity of the foot-bar i^3 , Figs. 1 and 15. This presser is shaped like an inverted plowshare, and its function is to turn down and flatten the edges of the fabric preliminarily to the cross-seaming operation. The trimmed-off strip passes over the upper surface of the presser m and is deflected past the needles by a curved guide m' . The two needles f of the cross-stitching mechanism lie one on each side of the meeting edges of the fabric and are carried by an arm F beneath the work-plate and which vibrates in a vertical plane on pivot F'. Motion is communicated to this arm from an eccentric at the rear of the main shaft through a pitman F². The two loopers g , which cooperate with these needles, are carried by the vertical screw-shaft G. This shaft is engaged by a nut G', which is attached to a vibratory arm G², pivoted at G³ and vibrated by an eccentric on the main shaft

through pitman G^4 . The vertical reciprocation of the nut causes screw-shaft G to oscillate on its axis through an arc of about two hundred and seventy degrees. Any other suitable means for producing this oscillation could of course be employed. In consequence of this motion the two loopers g g' , turning on a common axis, swing from across the line of seam, as will be best understood by reference to Figs. 5 to 10. As shown in Fig. 5, looper g is taking a loop from the needle on one side of the line of seam, while looper g' is taking a loop from the needle on the other side. Continuing to revolve in the direction of the arrows, each looper carries its loop across to the opposite needle, which passes through it, as shown in Figs. 7 and 10. The loopers then retreat and repeat the operation, making a double chain-stitch, as clearly shown. The loopers are inclosed by a tubular sheath g^2 . While the form of loopers and operating mechanism shown in the drawings is preferred and is believed to be of special merit, other forms could be substituted which would perform the operation of interchanging the loops.

Fig. 13 shows in cross-section the positions of the two pieces of fabric before the cross-seaming operation. As shown in this figure, a margin of considerable width has been left by the trimmer and the edges turned over and flattened. This make a very strong seam. In Fig. 11 the margins are not turned over, and the seam is consequently flatter. Fig. 12 shows in cross-section a completed seam with the edges turned over.

The feed-dog n is adjustably attached to the end of feed-arm N by a slot-and-screw connection, an adjusting-screw n' being provided to adjust the feed-dog vertically. Arm N is reciprocated horizontally from an eccentric on the main shaft through bell-crank lever N^2 , to which arm N is pivoted at N^3 . The vertical movement of the arm N is derived from the needle-bar F through a lever O , pivoted at O' and connected with the needle-bar by a stiff spring O^2 , so that when the needle-bar descends the feed-bar rises. The spring O^2 causes the feed-surface to press against the work with yielding pressure, which is necessary or desirable, inasmuch as the foot I is unyielding. Connection-rod N is jointed to lever N^2 by a slot-and-screw connection, which affords means of adjusting the length of stitch.

The construction of the machine and the direction of feed require that the operator sits while at work facing the left-hand end of the machine, Fig. 1, which is therefore the front of the machine. For convenience, therefore, in starting the machine the band-wheel Q , Fig. 3, is placed at one side—that is, with the shaft q at right angles to the main shaft. The main shaft is driven from shaft q by bevel friction-gears q' q^2 . Gear q^2 is formed of layers of leather. The end thrust on the

main shaft is taken by ball-bearings R , Figs. 1 and 3.

The machine shown in Figs. 18 to 29 differs from that just described in respect of the construction of the stitch-forming mechanism. The needle-bar B operates as heretofore described; but the looper c , Fig. 21, has a continuous rotary motion in one direction, as in the well-known Willcox & Gibbs chain-stitch machine. The looper-shaft C receives its motion from the main shaft through worm-gears c^5 c^6 , Fig. 19. The cross-stitching is effected by a looper P , which vibrates across the line of seam and is common to both needles. As this looper is threaded, the resulting stitch is composed of three threads instead of two, as in the machine first described. This looper is carried by arm P' , which can turn and also slide on rod b' , Fig. 20. It is vibrated from an eccentric on the main shaft through connection-rod p , which is connected by a cross-rod p' to the upper bifurcated end of arm P' . The looper receives its movement parallel with the line of seam from an eccentric a^2 on the main shaft through connection-rod p^3 and bell-crank lever p^4 , the latter engaging in a grooved collar p^5 on the hub P^2 of arm P' . The operation of the looper and needles will be well understood by reference to the diagrams, Figs. 26 to 31, and as this part of the mechanism in itself forms no part of the present invention a more detailed description will not be required. The construction of the presser-foot and its adjacent parts, Fig. 21, is substantially like that described in connection with Fig. 15. The deflector m' is, however, of different form, being so constructed as to guide the strip to one side of the vertical needles and underneath looper P .

It will be obvious to those acquainted with the construction and operation of sewing-machines that many other modifications may be made in the various parts of the machine without departing from the spirit of the invention. It will also be understood that the invention embraces constructions which are specifically new and which are susceptible of use in machines of a different character and organized to do different work from that described herein.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sewing-machine the combination of mechanism for sewing the edges of two pieces of fabric when turned out of the plane of the body of the fabric, a trimmer, and independent cross-stitching mechanism, substantially as described.

2. In a sewing-machine, the combination of two sets of sewing mechanism acting successively on the same line of seam the needle of one set operating in a plane approximately at right angles to that of the other set, substantially as described.

3. The combination of two sets of stitch-forming mechanism, the needle of one set operating in a plane approximately at right angles to that of the other set, the intermediate trimmer, mechanism for feeding the fabric to said stitch-forming mechanism, successively, and actuating devices for the stitch-forming mechanism and trimmer, substantially as described.
 4. The combination of guides for holding together the upturned edges of two pieces of fabric, stitch-forming mechanism for uniting the two edges by through-and-through stitches, and independent cross-stitching mechanism, substantially as described.
 5. The combination of means for holding together the upturned edges of two pieces of fabric, stitch-forming mechanism for uniting the edges while so held, trimming mechanism, and independent cross-stitching mechanism, substantially as described.
 6. The combination of the uncurling devices, the guides perpendicular to the plane of the work, the needle working in a plane perpendicular to said guides, the looper cooperating with said needle, the trimmer, and the cross-stitching mechanism, substantially as described.
 7. The combination of an upwardly-working needle or needles, a needle-bar, an unyielding presser-foot, a movable or yielding cloth-plate beneath the foot, and feed mechanism, including a feed-bar, capable of yielding vertically and operatively connected with the needle-bar.
 8. The combination of an upwardly-working needle or needles, a needle-bar, an unyielding presser-foot, a yielding cloth-plate beneath the foot, and a feed-bar having a spring connection with the needle-bar.
 9. The combination of the hollow arm constituting the bed-plate of the machine, the unyielding presser-foot above said arm, the work-plate, a supporting-bar on which said plate is loosely mounted so that it can assume always a position parallel with the presser-foot, and means for depressing said plate to introduce the work, substantially as described.
 10. The combination with the two sets of stitching mechanisms arranged to act successively, of a presser-foot comprising two parallel strips adjustably attached to the presser-bar, said strips having at their forward part upturned guiding-flanges, and a seam-flattening device in advance of the second set of stitching mechanism, substantially as described.
 11. In a sewing-machine, the combination of a bed-plate in the form of a horizontal tubular arm, needles working upwardly through one side of said arm, and cooperating looper mechanism outside said arm and adjacent to the side thereof through which the needles work.
 12. In combination with the two sets of stitch-forming mechanism and the trimmer, a presser-foot comprising two parallel strips adjustable toward and away from each other, said strips having at their forward ends uncurling devices, and in the rear of these vertical guides having between them a space for the upturned edges of the fabric, substantially as described.
 13. The combination with the two sets of stitch-forming mechanism and the trimmer, of a presser-foot comprising two parallel strips adjustably attached to the foot-bar, vertical guides at the front part of the foot, and a presser at the rear of the trimmer for flattening the edges of the fabric, said presser being provided with a deflecting-guide for the cut-off strip, substantially as described.
 14. The combination with two parallel needles, of the two hooks working in a plane approximately at right angles to the plane of the needles, a shaft carrying said hooks, and means for oscillating said shaft on its axis so that the hooks carry two loops across the line of seam simultaneously.
 15. The combination with two parallel eye-pointed needles of two hooks carried by a common stem parallel with the needles and means for oscillating said stem on its axis so that the hooks describe arcs which carry them across the line of seam from one needle to the other, substantially as described.
 16. The combination with two parallel eye-pointed needles, of two hooks carried by a common stem and disposed about one hundred and eighty degrees apart, and means for oscillating said stem on its axis so that the hooks describe arcs which carry them in opposite directions across the line of seam from one needle to the other, substantially as described.
- In testimony whereof I have signed this specification in the presence of two subscribing witnesses.
- STOCKTON BORTON.
- Witnesses:
E. A. RACE,
L. B. H. ADAMS.