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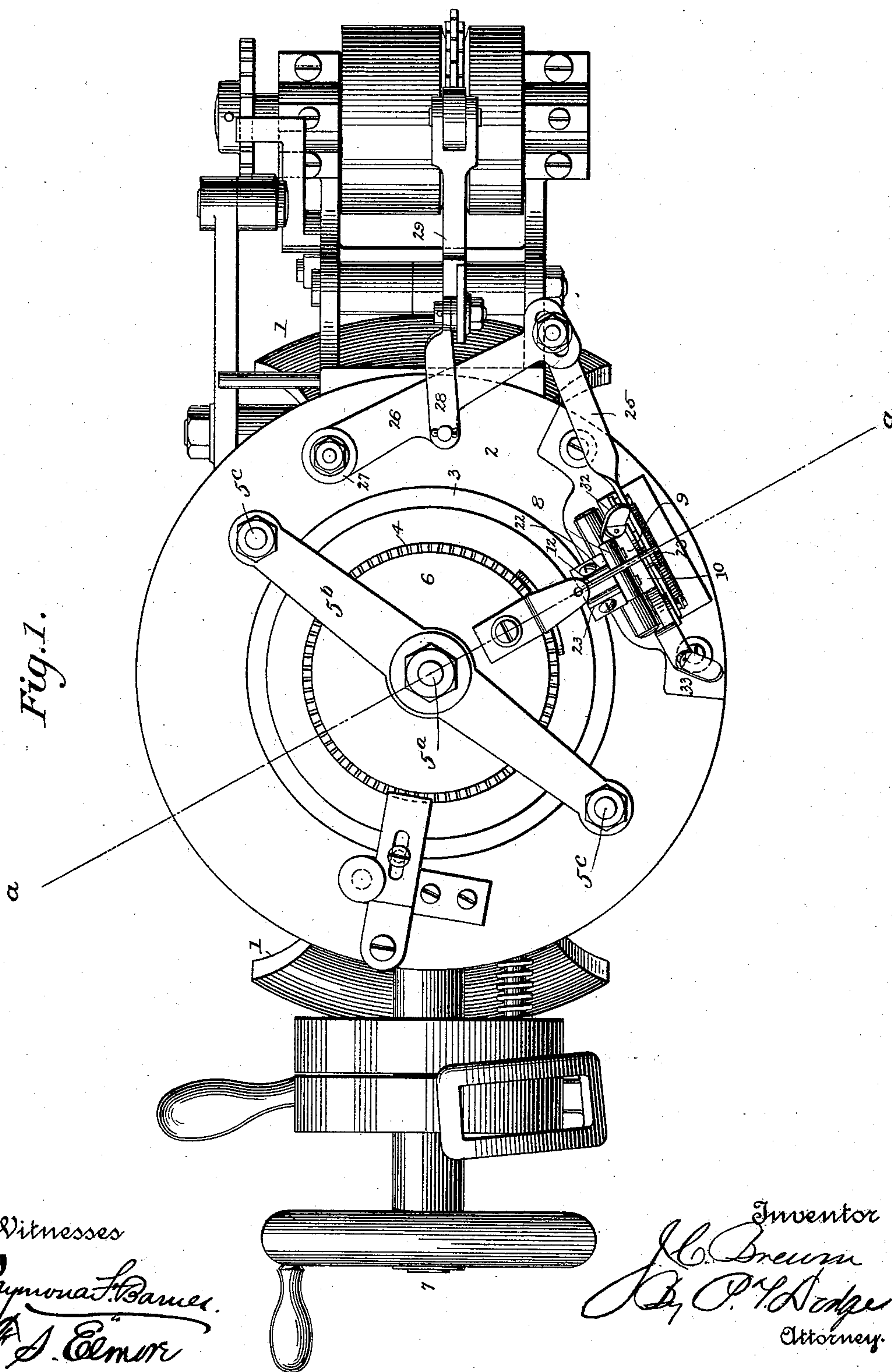
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J. C. BREWIN.

THREAD SUPPLYING DEVICE FOR KNITTING MACHINES.

No. 539,791.

Patented May 28, 1895.



Witnesses
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(No Model.)

3 Sheets—Sheet 2.

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Fig. 4.

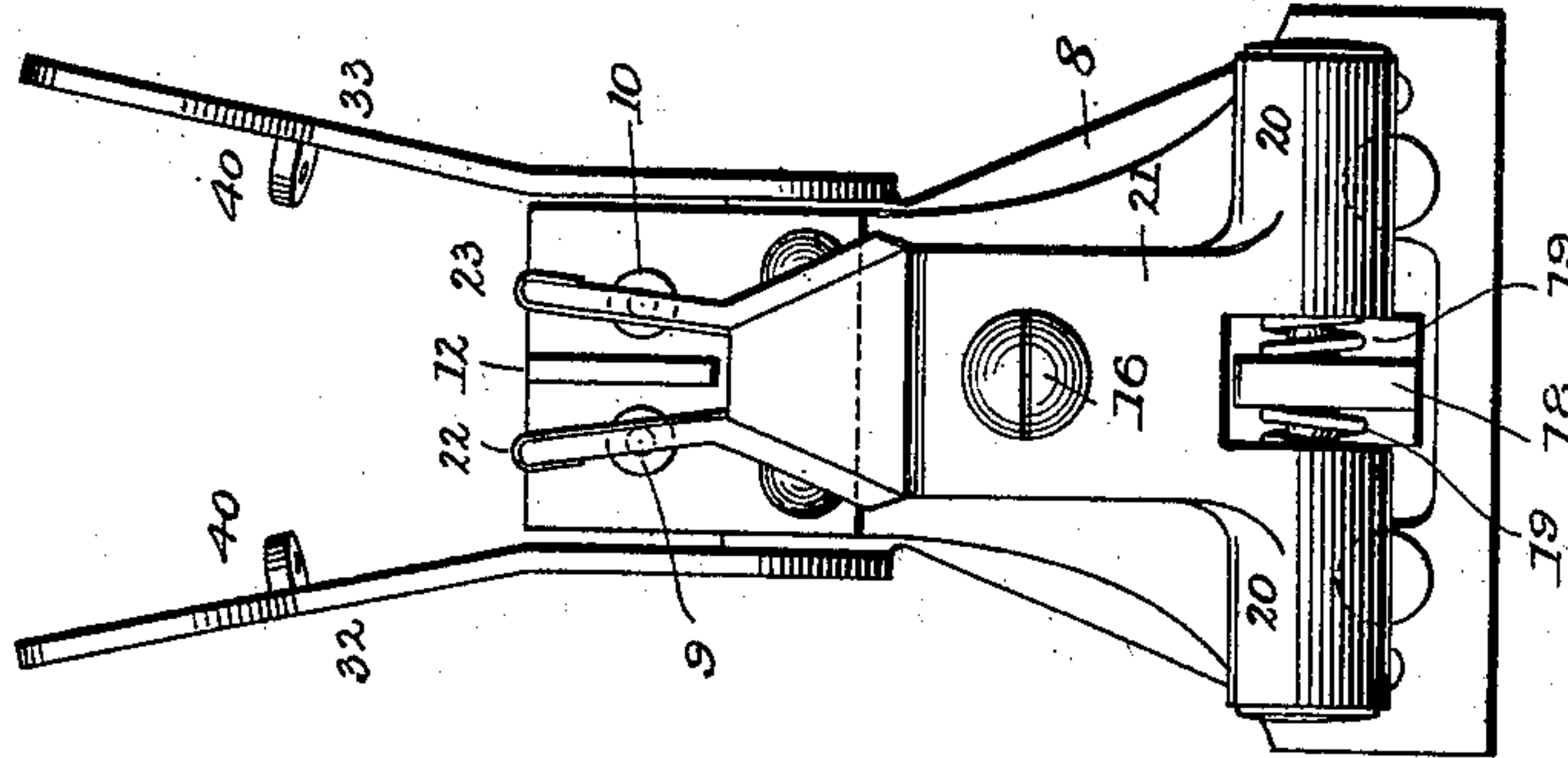


Fig. 3.

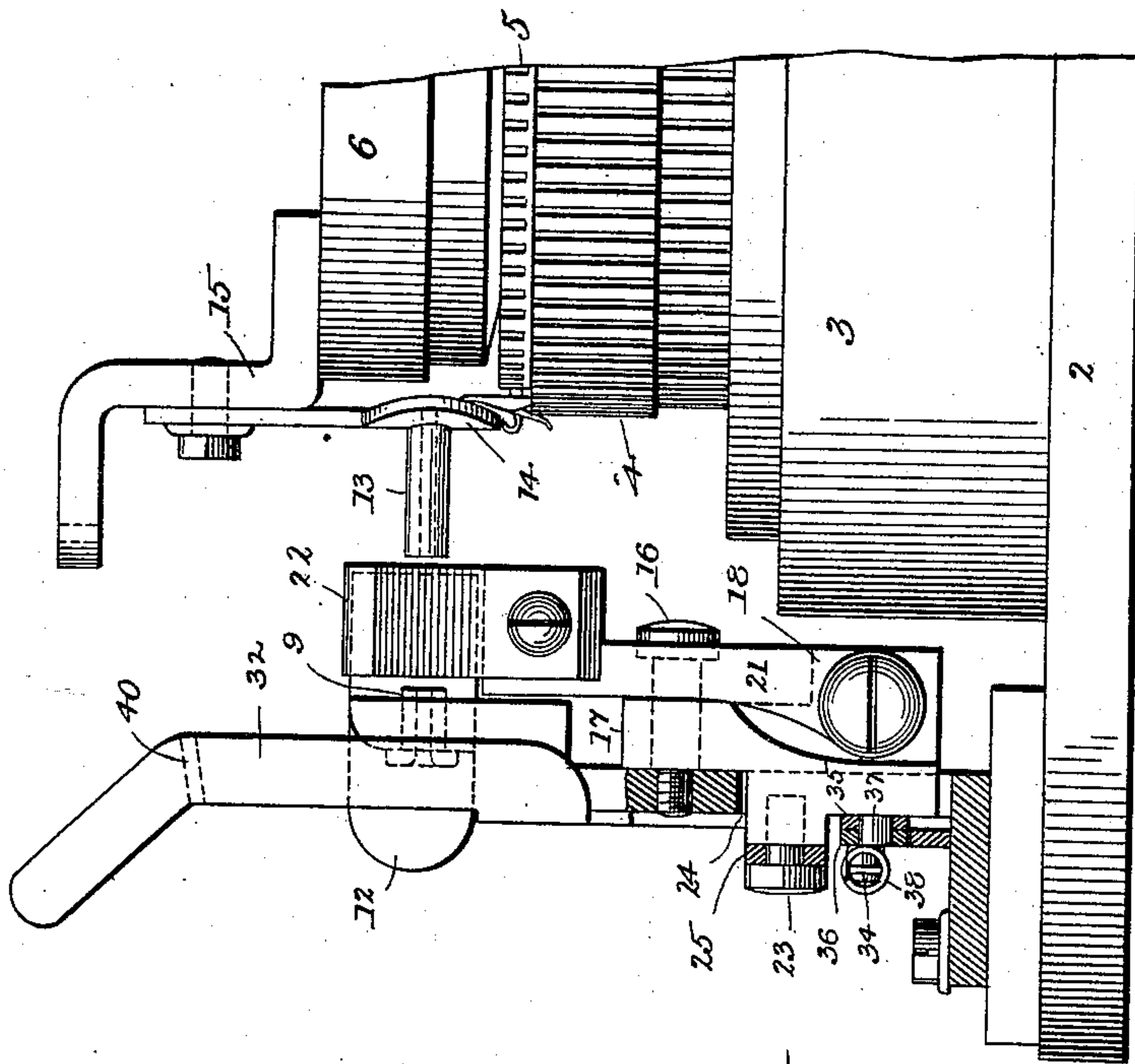
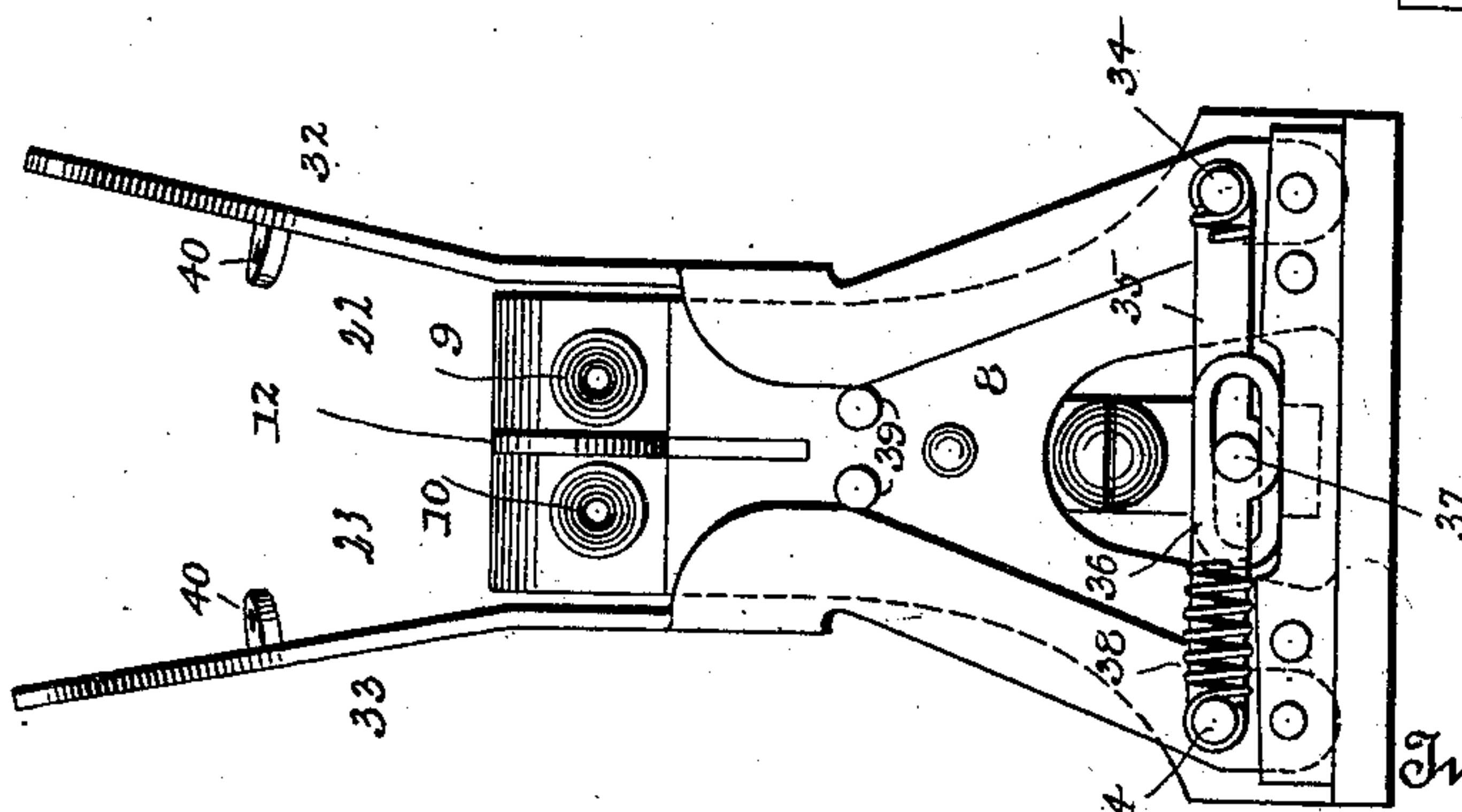


Fig. 2.



Witnesses

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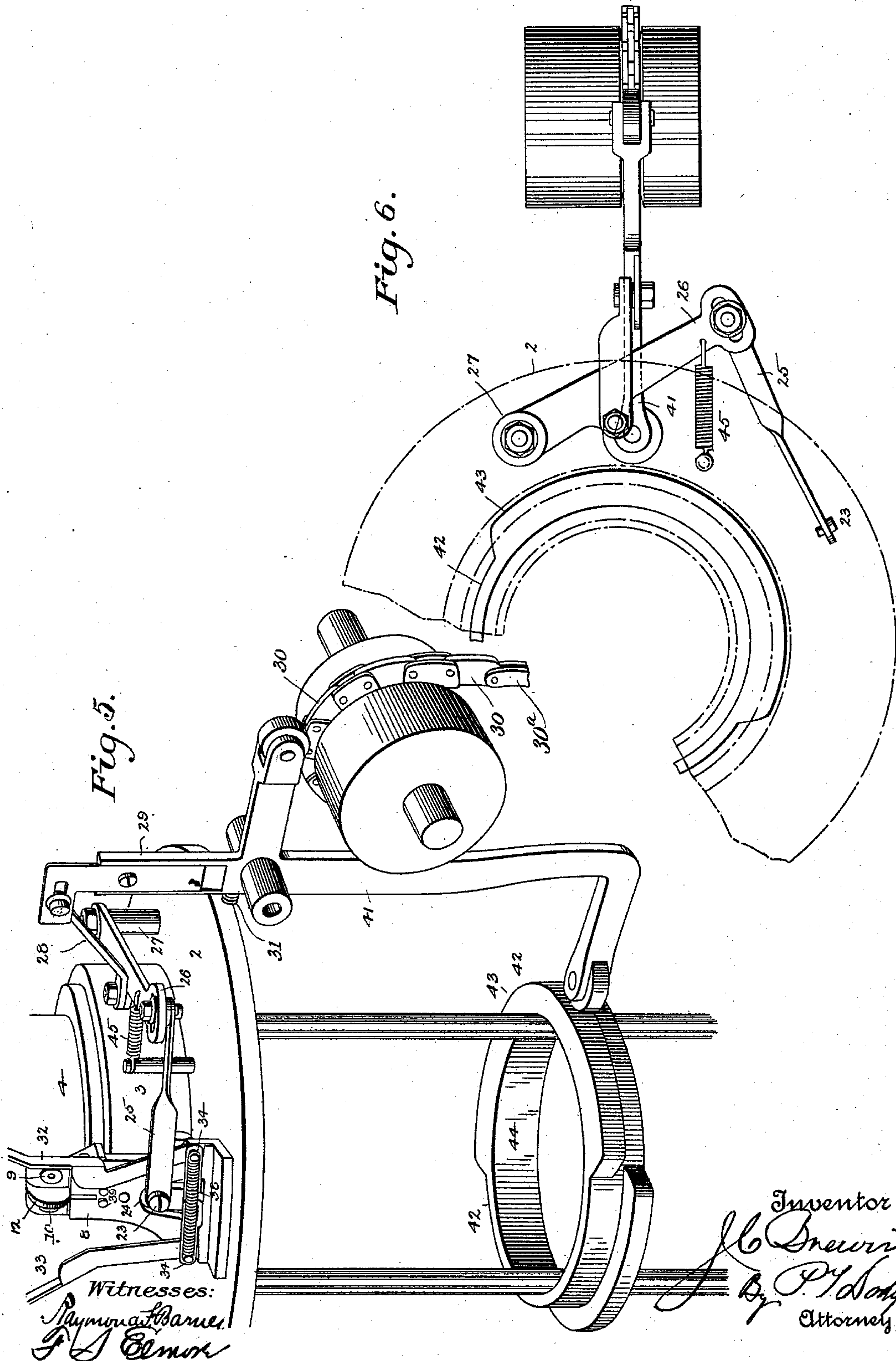
3 Sheets—Sheet 3.

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THREAD SUPPLYING DEVICE FOR KNITTING MACHINES.

No. 539,791.

Patented May 28, 1895.



UNITED STATES PATENT OFFICE.

JOHN C. BREWIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
NYE & TREDICK.

THREAD-SUPPLYING DEVICE FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 539,791, dated May 28, 1895.

Application filed August 25, 1894, Serial No. 521,263. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BREWIN, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Thread-Supplying Devices for Knitting-Machines, of which the following is a specification.

My invention has reference to knitting-machines and relates more particularly to an attachment for automatically supplying to the needles a thread of a color different from that of which the body of the fabric is formed, in order that the design or pattern of the fabric may be varied. The mechanism may be operated to cause the new thread to take the place temporarily of the main thread when a stripe is to be made in the fabric, or the mechanism may be operated to permit both threads to be fed to the needles together for the purpose of reinforcing or thickening the fabric. My invention is peculiarly applicable for knitting hosiery in which stripes are to be formed and in which it is usual to reinforce the knee and heel portions.

The invention consists in the various combinations and arrangements of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a top plan view of the machine. Fig. 2 is a front elevation of my improved attachment. Fig. 3 is a side elevation of the same, partly in section, showing portions of the cam and needle cylinders. Fig. 4 is a rear view of said attachment. Fig. 5 is a perspective view showing the mechanism for operating the device when used to reinforce the fabric. Fig. 6 is a broken top plan view showing the connections for adapting the attachment to be used for reinforcing.

Referring to the drawings: 2 designates the annular bed plate of the machine on which is securely fixed a cylindrical shell 3 containing on its interior, suitable cams for operating the cylinder needles. The annular plate is formed to receive a rotary needle cylinder 4, which is provided on its outer surface with vertical grooves in which are mounted vertical reciprocating needles.

5 represents a horizontal rotary dial, formed in its upper surface with radial grooves to

receive the dial needles and mounted loosely on a vertical post 5^a sustained at the center of a cross tree 5^b, which is in turn supported at its ends by two posts 5^c rising from the fixed annular plate. A dial plate 6 is fixed above the rotary dial and is provided on its under side with suitable cams adapted to be engaged by the heels of the dial needles as the dial is rotated and serving to cause said needles to reciprocate in the proper manner to co-operate with the cylinder needles and form the stitches. The rotary dial receives motion from the cylinder through the medium of the usual driving lugs, the said cylinder being provided with an annular bevel gear, which is engaged by a bevel pinion mounted on a horizontal driving shaft 7 on the outer end of which are suitable driving pulleys receiving motion from any appropriate source.

The foregoing parts constitute a circular knitting machine of the well known "dial and cylinder" type, and except in so far as hereinafter indicated, said parts of themselves form no part of the present invention.

In applying my invention to a machine of this character, I secure to the fixed annular plate at one side, a vertical bracket 8, provided in its upper end with two horizontal perforations 9 and 10, through which the two threads extend, being separated by a partition in the form of a plate 12, projecting from opposite sides of the bracket between the two perforations therein. From the two perforations the yarn enters a horizontal tube 13, constituting a yarn guide. This tube is fixed to a vertical plate 14 extending downward at the side of the dial plate 6 from a fixed bracket 15, the said plate where it joins the tube, being perforated for the passage of the yarn to the needles and being so arranged in relation to the needles, that the yarn extending through the tube will be caught by the cylinder needles as they descend and carried downward to form the stitch in the usual manner.

The purpose of the foregoing construction is to provide for the feeding to the needles of the two threads separately or together, according as it is the desire to form in the fabric a stripe or to reinforce the same.

In forming a stripe, it is the practice to tem-

porarily substitute for the running thread of which the body of the fabric is formed, a thread of a different color, said new or different-colored thread being fed in with the running thread until it is taken by the needles before the running or prevailing thread is severed. It has been found, however, that the new thread will frequently fail to be taken by the needles, the result being a cessation of the knitting operation. To avoid this, the new thread prior to the severing of the old thread is released, and after the machine has run for a short time, preferably a half revolution, with the two threads running together, the old thread is severed. As the result of this manner of proceeding, the old thread by its traction with the new one during the continued operation of the machine, will carry the new thread with certainty and feed the same to the needles. To effect this action, I form the bracket 8 on its inner side near its center with a horizontal stud 16 upon which is loosely mounted the upper end of a lever 17. At its lower end the lever is formed with an inwardly projecting lug 18 which extends between the inner ends of two horizontal spiral springs 19, seated in horizontal sockets 20 in the lower end of a clamping lever 21. This clamping lever is mounted loosely at its center on the stud 16, and is provided at its upper end with two vertical clamping plates 22 and 23, extending on the opposite sides of the inner end of the partition plate 12, before alluded to. These two clamping plates, when the clamping lever is moved on its stud, cooperate with the partition plate in such manner as to clamp and hold one or the other of the two threads to cause the same to be severed or broken, as more fully described hereinafter. These plates extend at a slight inclination outward from each other, so that when moved against the partition plate to clamp the yarn, they will lie flatly against the same.

The lever 17 is provided near its lower end on its outer side with a stud 23, which extends through a recess 24, formed in the bracket, and to this stud is connected one end of a horizontal link 25, having its opposite end pivoted to a horizontal lever 26, which is mounted loosely at its end on the upper end of a post 27, rising from the fixed annular plate 2. A link 28 is pivoted at one end to the horizontal lever, and at its opposite end is connected to the upper end of an elbow lever 29 pivoted to the frame and provided with a roller overlying a pattern chain 30. This elbow lever is acted on as usual by a spiral expansion spring 31, which tends normally to throw its upper end outward and through the connections to hold the clamping lever so that its clamping plate 22 will rest tightly against the partition plate and hold the yarn.

In operation, when the end of the elbow lever is elevated by the passage thereunder of a link higher than the preceding link, the up-

per end of the lever will be moved inward against the influence of the expansion spring, which action will shift the clamping lever and move the other clamping plate 23 against the partition plate, and hold the other yarn, the intermediate position of the clamping lever with the clamping plates equal distances from the partition plate, releasing both yarns. The clamping plates are capable therefore of three functions in conjunction with the partition plate, first to hold one yarn, second to release both, and third to hold the second yarn. These movements may be effected by any suitable means, but I prefer to employ a pattern chain with links of three different sizes, the smallest permitting the elbow lever to be held by its spring to clamp one thread, the next highest link moving the elbow lever to cause the clamping lever to occupy its intermediate position, releasing both threads, and the highest link throwing the clamping lever beyond its center and clamping the second thread.

Assuming that a fabric is being formed of a thread of a given color and it is desired to incorporate a stripe in the fabric, the thread of the permanent or prevailing color will be fed through perforation 10, and the tubular thread guide to the needles, while the thread to form the stripe, will be fed through the other perforation 9, and through the tubular guide alongside the running thread. The lowest link of the chain will be beneath the elbow lever, in which position, the clamping plate 22 will be held tightly against the partition plate and will clamp the striping thread and prevent it from running to the needles. By suitable mechanism the roller supporting the pattern chain will be rotated one step, which will bring the next highest link beneath the end of the elbow lever, which action will cause the clamping lever to occupy its intermediate position, thereby releasing the striping thread. Owing to the fact that this thread extends within the tube alongside the running thread, it will be caught by traction, and carried along with the running thread to the needles. The links on the chain are so formed, that the two threads will be permitted to run together for half a course and this in order that the new thread will be fed with certainty to the needles. The highest link now moves beneath the elbow lever, thereby moving the clamping lever to the opposite side, and causing the clamping plate 23 to move against the partition plate and clamp the running yarn of which the body of the fabric is formed. This yarn being thus held the rotation of the machine will cause it to be broken. After the machine has been operated sufficiently to form a stripe of the desired width, which is determined by the number of high links in the chain, an intermediate link will move beneath the elbow lever, which will cause the clamping lever to again occupy its intermediate position, permitting the striping thread in its turn to take up by traction the other thread,

and when the machine has completed a half revolution with the parts in this position, the lowest link will again move beneath the elbow lever, allowing its expansion spring to throw its upper end outward and causing the parts to occupy their former positions, the striping thread being again held by clamping plate 22, and the prevailing thread released, and the machine knitting plain work.

From the foregoing description, it will be seen that when a stripe is to be made, the running thread carries the striping thread to the needles, and that this action is reversed with the striping thread carrying the other thread when the stripe is to be terminated.

It is important that when one or the other of the clamped threads is first released, there will be as little obstruction and resistance to its movement as may be, to the end that the traction of the running thread will not be interfered with in carrying the new thread to the needles. With this in mind, I have adopted a mechanism for automatically supplying slack to the thread immediately upon its release, so that the released yarn instead of pulling from the bobbin will be free to move forward and take up its slack. This mechanism comprises two arms 32 and 33 pivoted at their lower ends to the front of the bracket near its base at opposite sides. Above the pivots the arms are provided with studs 34, to which the outer ends of horizontal links 35 and 36 are pivoted, the inner ends of said links overlapping and being formed with slots through which extends a stud 37 projecting outward from the lower front end of the lever 17. A spiral spring 38 is connected at its ends to the two studs on the arms and tends normally to draw said arms inward toward each other, their movement being limited by two stop pins 39 projecting from the front side of the bracket, as shown in Fig. 4. Near their upper ends the two arms are provided with guiding eyes 40, through which the yarns pass from the bobbins to the perforations 9 and 10 thence together into the thread guiding tube before alluded to.

From the foregoing construction, it will be seen that when the clamping lever is moved by the pattern chain from one side or the other to cause one or the other of the clamping plates to move against the partition plate, the stud 37, on lever 17 will act on one of the links connected to the arms and move one of the arms outward at its upper end, which action will draw a quantity of the yarn from the bobbins. The arrangement of the parts is such, that the arm controlling the clamped thread will be moved outwardly, and by reason of the slot in the link the operating stud 37 will be permitted to move independently of the other link within its slot, thereby allowing the other arm to remain stationary in its vertical position. When the clamping lever therefore is moved to its intermediate position with both threads released the spiral spring will act on the arm which was thrown

out and quickly draw the same inward, thereby supplying the necessary slack yarn which has been previously drawn from the bobbins. On the continued movement of the clamping lever to cause the other clamping plate to hold the running yarn, the stud on the lever 17 encountering the end of the slot in the link will move the other arm outwardly and cause it to draw from the bobbin, so that when the clamping lever is moved back again to release the thread, the arm will be moved inward and the slack yarn supplied as in the first instance. It will be seen, therefore, that the slack is automatically supplied to the clamped thread immediately upon its release in either case.

As before stated, the lug 18 on lever 17 is mounted between spiral springs carried by the clamping lever, this arrangement constituting a yielding connection between the clamping lever and the elbow lever overlying the pattern chain. The purpose of this construction is to admit of an independent limited movement of the elbow lever and its connections with respect to the clamping lever to the end that any irregularity or defect that may occur in the size of the links composing the pattern chain will not cause the movement of the clamping lever and the consequent release of the clamped thread before the proper time. If the connection between the parts were rigid, the clamped thread would be released by the passage under the elbow lever of a link differing but slightly in size from the preceding. Hence by the provision of the yielding connection as described, such a link while moving the elbow lever slightly, would not cause the clamping lever to be moved, and the latter would only be operated by a greater movement of the elbow lever, such as that caused by the passage thereunder of a link differing decidedly in height from the preceding and of the proper size to effect the release of the thread at the right time.

While I have shown my improved attachment applied to a dial and cylinder machine employing two sets of needles and containing a single feed, it is to be understood that the device is not to be confined in its application to a machine of this character, but is equally applicable to circular machines and others employing a single set of needles, and to machines having two or more feeds. In the latter case it will be but necessary to increase the number of striping attachments to correspond to the feeds, and to connect them in any suitable manner which will cause their individual operation as above set forth.

In using my attachment as a reinforcer to cause a second thread to be incorporated into the yarn, but two motions are imparted to the clamping lever, an intermediate adjustment to allow both threads to be fed to the needles and a movement of the clamping lever to one side to hold one of the threads and allow the machine to knit plain work. In reinforcing the knee, these two motions are given to the lever during the formation of

every course and to effect such movements repeatedly, it has been found that it will necessitate a pattern chain of unusual length, so long in fact as to be cumbersome and unsuitable for practical purposes. By my invention I dispense with the pattern chain and substitute for the same a rotary cam ring having its surface so formed that the elbow lever during every revolution of the cam ring will be moved back and forth to cause the clamping lever to move from its intermediate position to one side. In connection with this cam ring I provide a pattern chain containing at intervals links of different heights, as shown at 30, 30^a in Fig. 5, the higher links being of two such sizes that when engaged with the lever, the latter will be moved free of the cam ring and held so that the clamping lever will hold one of the threads, permitting the other to knit plain work. I have shown such a construction in Figs. 5 and 6. In these figures the elbow lever is shown as being provided with a vertical downwardly extending arm 41, in the end of which a friction roller is journaled in position to contact with cam surfaces 42 and 43 on the ring 44 fixed to the two side bars of the revolving take-up mechanism. The cam surface 42 is lower than the other, each extending half way around the ring and one forming a continuation of the other. The connection between the upper end of the elbow lever and the link connected to the horizontal lever 26 is formed to admit of a relative movement of the parts, the link being provided with a stud extending in a slot in the upper end of the lever. A spiral spring 45 is attached to the horizontal lever 26 and to the frame of the machine and tends to act on the parts in such manner as to hold the clamping lever so that its clamping plate 23 will contact with the partition plate and normally hold the reinforcing thread out of action.

When the machine is knitting plain work with but one thread running the reinforcing attachment is rendered inoperative, the elbow lever being held free of the actuating cam ring by the high link on the pattern chain before alluded to, in which position of the parts the spring 45 will act to hold the clamping lever with its plate 23 clamping the reinforcing thread. In reinforcing, the high link on the chain passes from beneath the lever, the lower end of which will move in the path of the cam ring. When the elevated cam 43 engages the lever, the upper end will be thrown inward, permitting the spring 45 to throw the clamping lever and hold the reinforcing thread. When the lower cam 42 of the cam ring arrives opposite the elbow lever, the latter will be moved outward by its expansion spring 31 which is stronger than the spring 45, which action will cause the clamping lever to occupy its intermediate position, releasing the reinforcing thread and allowing it to be taken up by traction by the running thread. The elevated cam again engaging

the elbow lever, will permit the spring 45 to cause the reinforcing thread to be clamped as before.

It will be noted that as long as the lower end of the elbow lever is permitted to be engaged by the cam ring, the clamping lever will, during every revolution of the cam ring, move from its intermediate position with both threads running to one side, thereby clamping the reinforcing thread, which action, assuming that the knee of a stocking is to be reinforced, will cause a second thread to be incorporated into the knee portion.

Inasmuch as the clamping lever partakes of but two movements during the reinforcing operation, but one of the clamping plates is necessary, and but one of the arms for furnishing slack is required, the operation of said parts however, being the same as when the device is employed as a striper.

In the drawings, I have shown the cam ring as being provided with two sets of cams, an upper and a lower one, the elevated and the depressed portions being alternated in position. This construction is designed to adapt the device for the reinforcement also of the heel, which being on the opposite side from the knee will necessitate the reversal of the action of the reinforcing mechanism, which reversal is effected by providing a second elbow lever having its lower end extended in the path of the lower set of cams, and an additional pattern chain. When one elbow lever is in action, for instance in reinforcing the knee, the other lever will be rendered inoperative by the pattern chain and vice versa.

Having thus described my invention, what I claim is—

1. In a knitting machine the combination of the needles and means for actuating the same, a fixed clamping plate, guides for leading two threads on opposite sides of the plate, two movable clamping plates connected and moving together and arranged to co-act with said fixed plate to clamp either of two threads running through the guides, a pattern chain and devices to transmit motion to said movable plates comprising a yielding connection between the pattern chain and clamping plates, whereby irregularities in the chain or obstructions thereon are adapted to pass without detriment to the clamping apparatus.

2. In a knitting machine, the combination of the needles and means for actuating the same, a vertical fixed bracket provided with perforations for the passage of the threads, a fixed plate sustained by said bracket and extending therefrom between said perforations, a clamping lever pivoted to said bracket, clamping plates on said lever extending on opposite sides of the fixed plate, a pattern chain and devices to transmit motion to said movable plates comprising a yielding connection between the pattern chain and the pivoted clamping lever.

3. In a knitting machine, the combination of the needles and means for actuating the

same, a fixed clamping plate, two guides for leading two threads of yarn on opposite sides of the plate, a clamping lever, clamping plates fixed to said lever and extending on opposite sides of the fixed plate, a pattern chain, an elbow lever having its end overlying the chain, elastic or yielding connections between said elbow lever and the clamping lever and means for holding said elbow lever against the pattern chain.

4. In a knitting machine the combination of the needles and means for actuating the same, a fixed plate, a clamping lever, clamping plates on said lever movable to and from the fixed plate, spiral springs carried by said clamping lever and suitable devices to transmit motion to the clamping lever, said devices being connected with the lever between the springs.

5. In a knitting machine, the combination of the needles and means for actuating the same, a vertical bracket, a plate fixed at the upper end of the same, a clamping lever pivoted to the bracket, clamping plates on the lever extending on opposite sides of the fixed plate, spiral springs seated in the lower end of the clamping lever, a second lever pivoted to the bracket, a lug projecting from said lever between the springs and devices to transmit motion to the clamping lever said devices being connected to the second lever.

6. In a knitting machine, the combination of the needles, means for actuating the same, a fixed plate, a clamping lever, clamping plates on said lever extending on opposite sides of

the fixed plate, means for vibrating the lever, two arms pivoted at their lower ends and formed with guides for the threads, and links connecting said arms to the clamping lever.

7. In a knitting machine, the combination of the needles, means for operating the same, a fixed plate, a clamping lever, clamping plates extending on opposite sides of the fixed plate, two arms pivoted at their lower ends, and formed with thread guides, links connected at their outer ends to the arms and formed at their inner ends with slots, a stud on the clamping lever extending in said slot, a spring connecting said arms and means for operating the clamping lever.

8. In a knitting machine, the combination of the needles, a vertical bracket formed in its lower end with an opening, a plate fixed to said bracket and projecting therefrom, a clamping lever pivoted to the bracket, a clamping plate on the lever movable to and from the fixed plate, a second lever pivoted to the bracket and having yielding connection with the clamping lever, a stud on the second lever extending through the opening in the bracket, and suitable devices to transmit motion to the clamping lever, said devices connected to the stud on the second lever.

In testimony whereof I hereunto set my hand, this 19th day of July, 1894, in the presence of two attesting witnesses.

JOHN C. BREWIN.

Witnesses:

LAURA L. MULLINER,
JOSEPH B. GODSHALL.