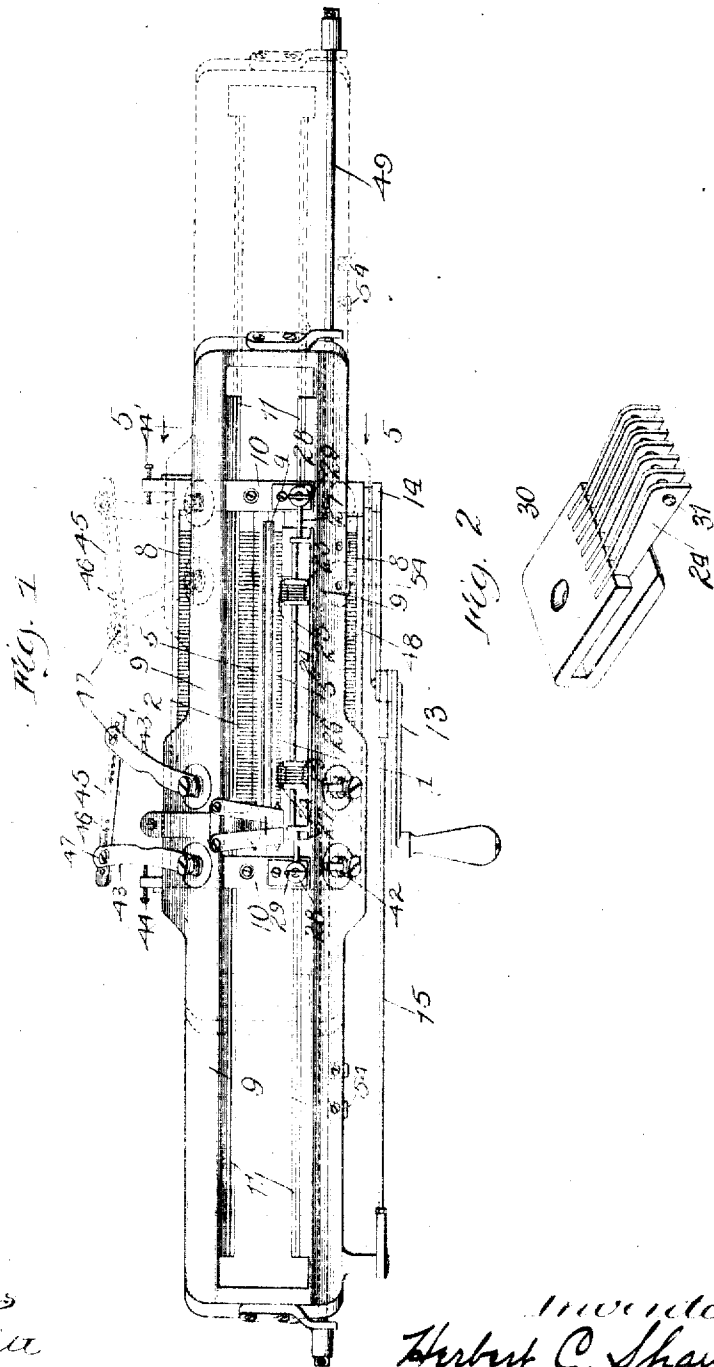


H. C. SHAW.
ELASTIC WARP KNITTING MACHINE.
APPLICATION FILED JULY 9, 1906.

1,009,446.

Patented Nov. 21, 1911.
7 SHEETS—SHEET 1.



Witnesses
Harry R. Lohr
M. A. Kiddle

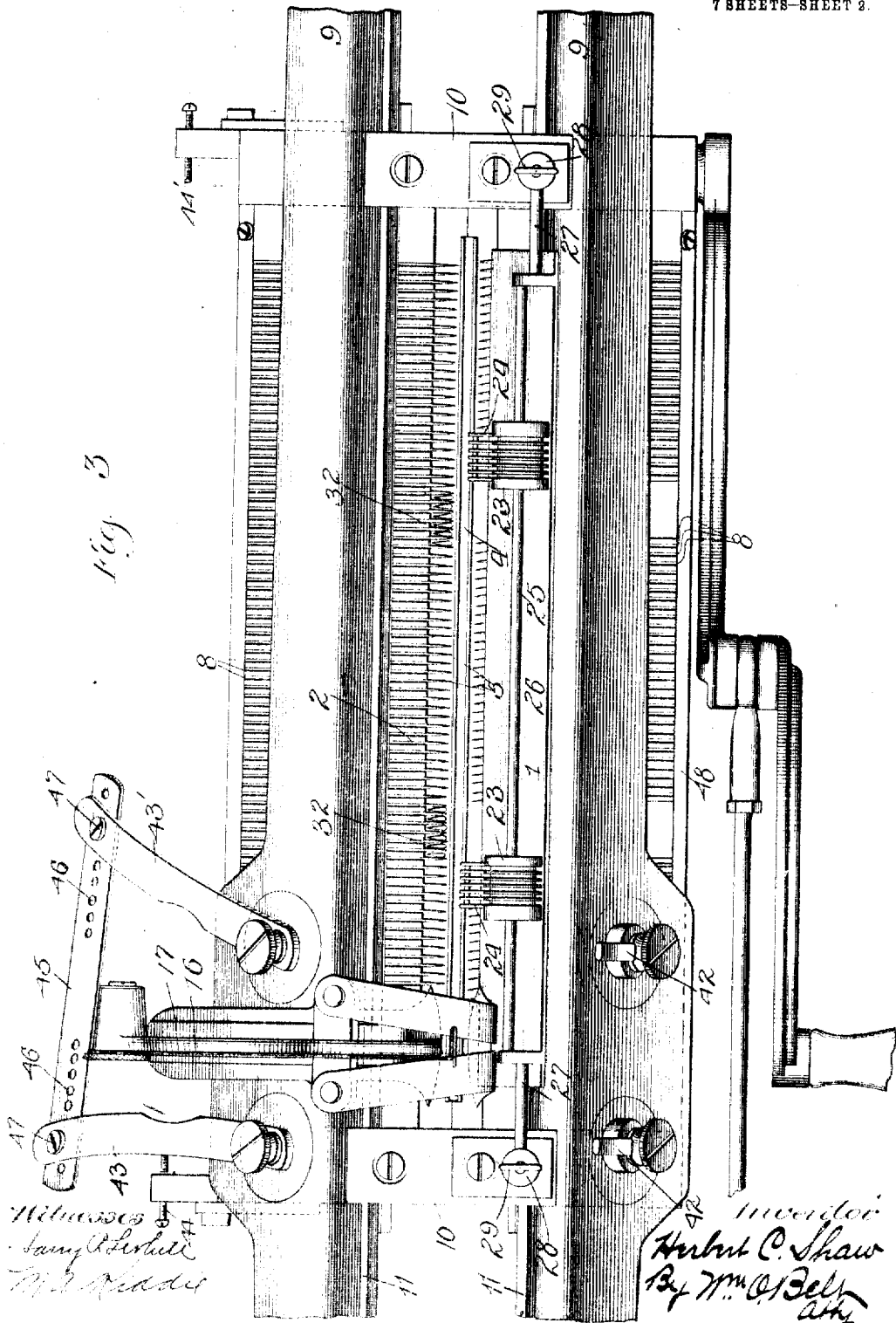
Inventor
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7 SHEETS—SHEET 2.

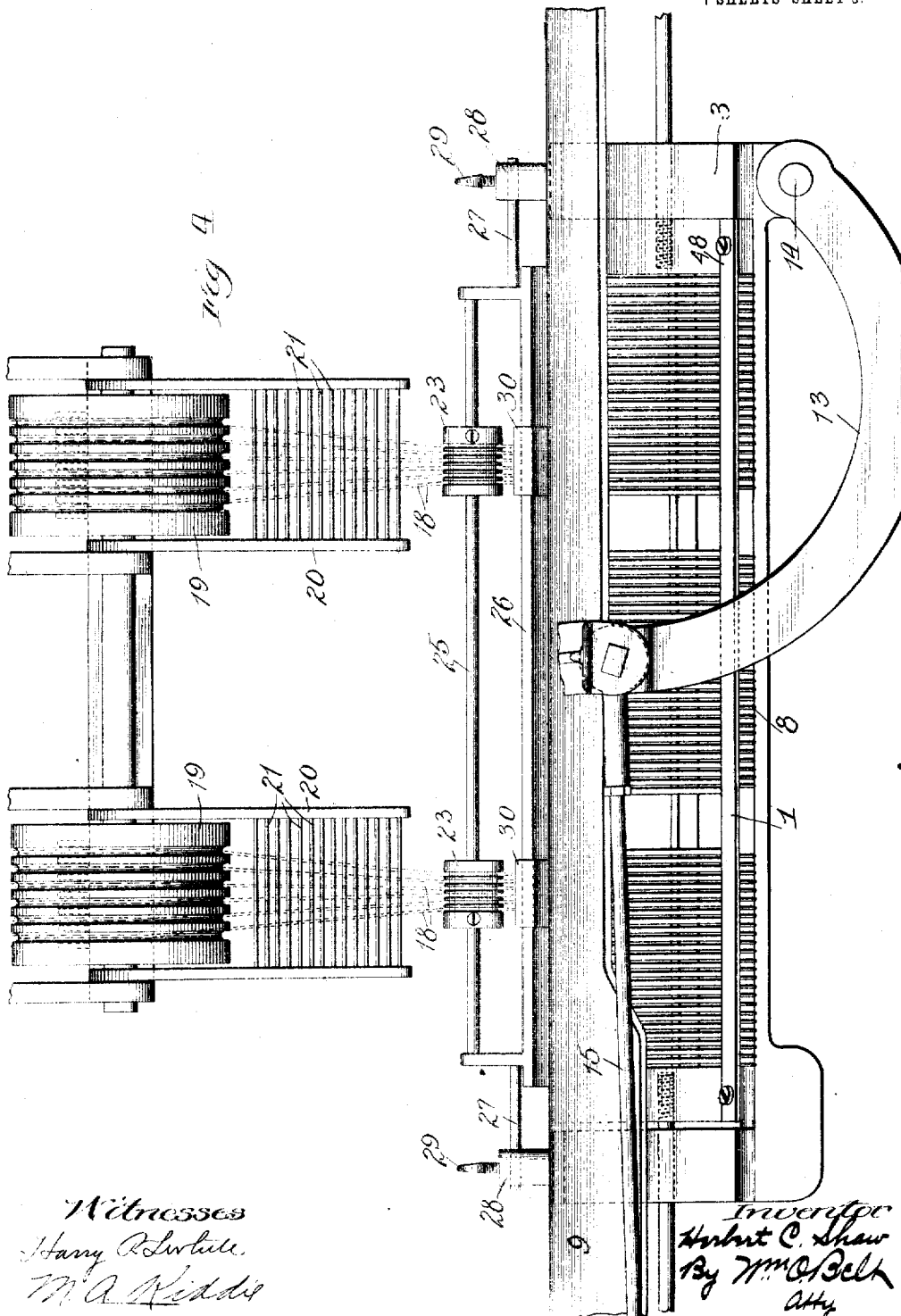


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7 SHEETS—SHEET 3.

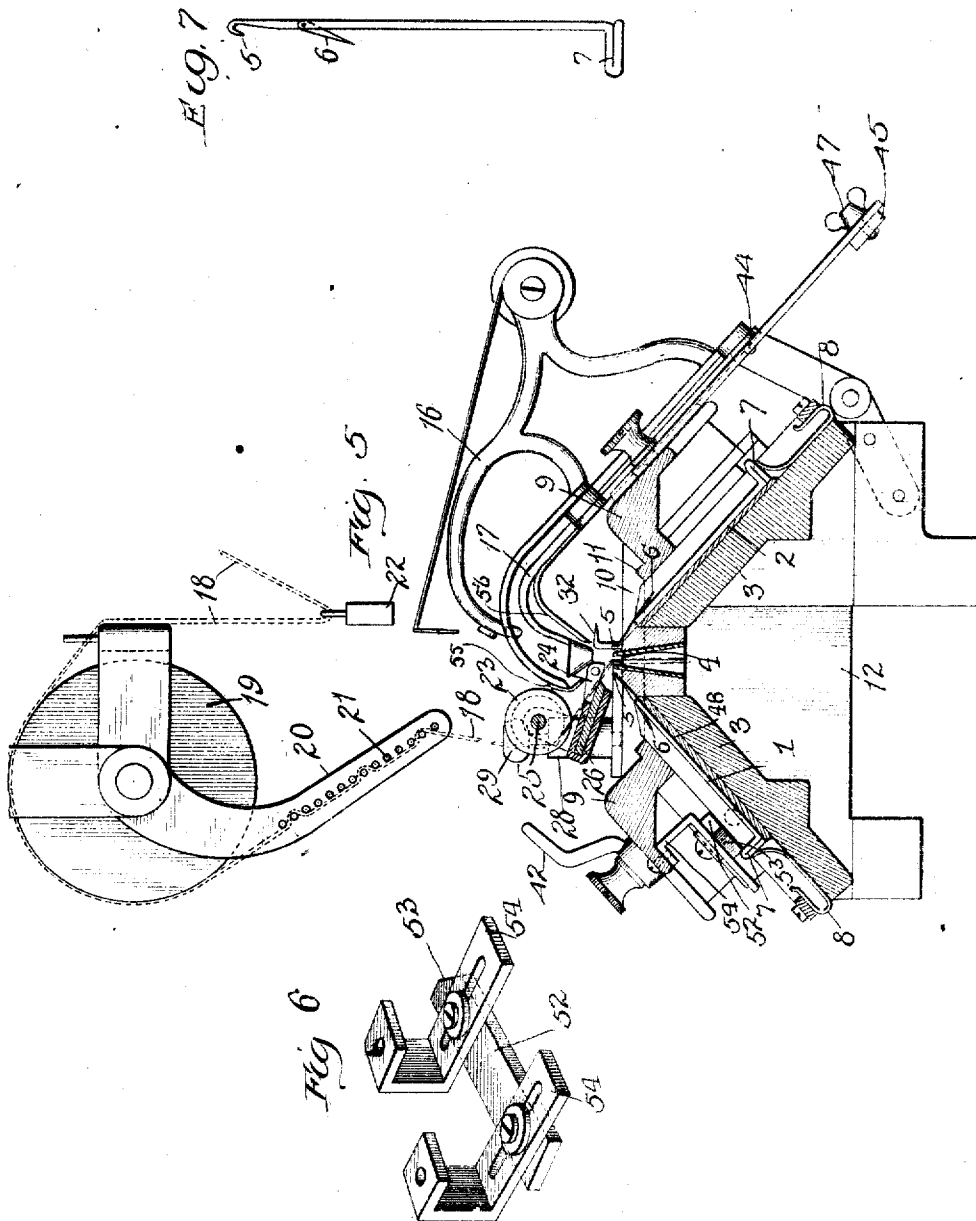


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7 SHEETS-SHEET 4.



Witnesses
Harry B. White.
M. A. Kiddie

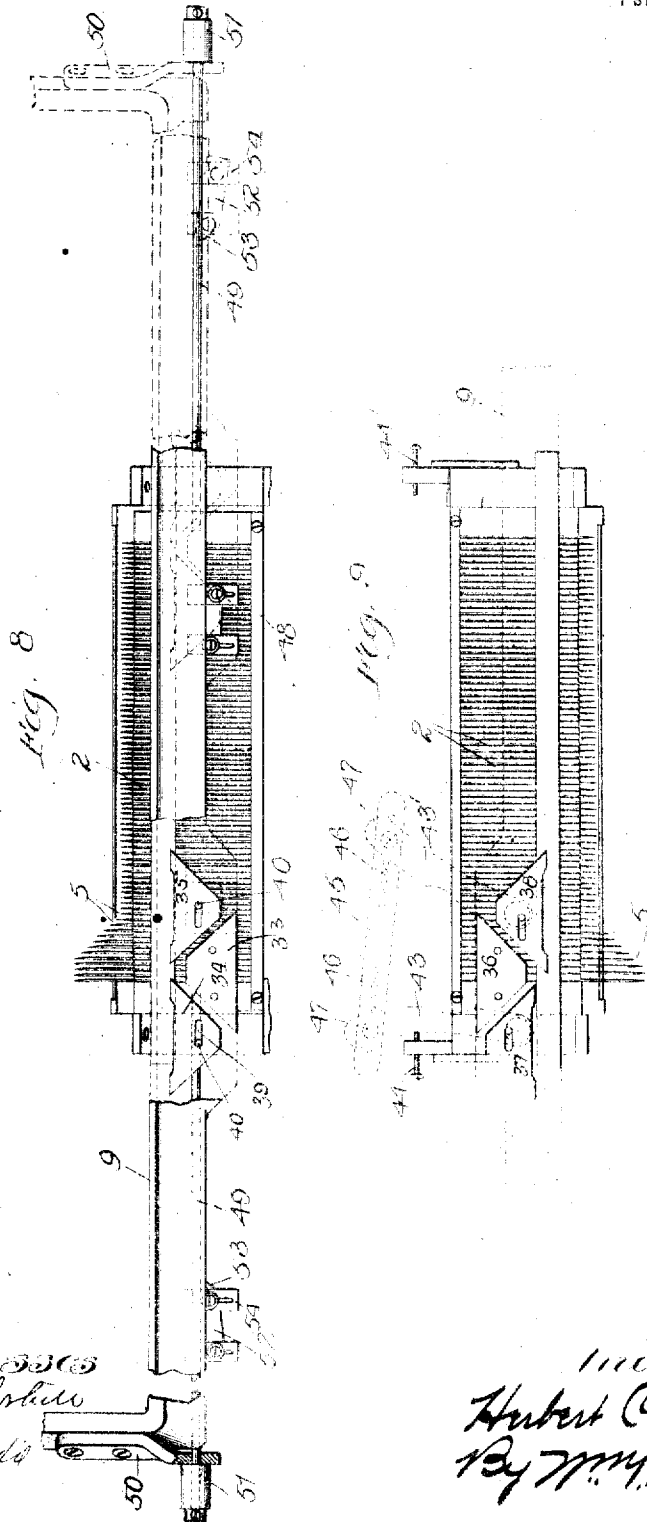
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7 SHEETS—SHEET 5.



Witnesses
Harry R. L. L. L.
M. C. K. L. L.

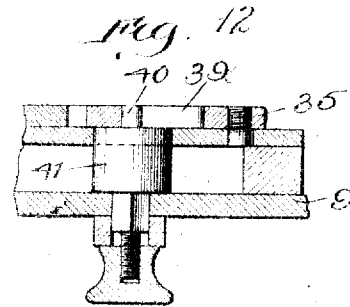
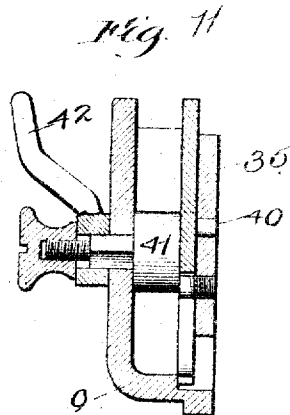
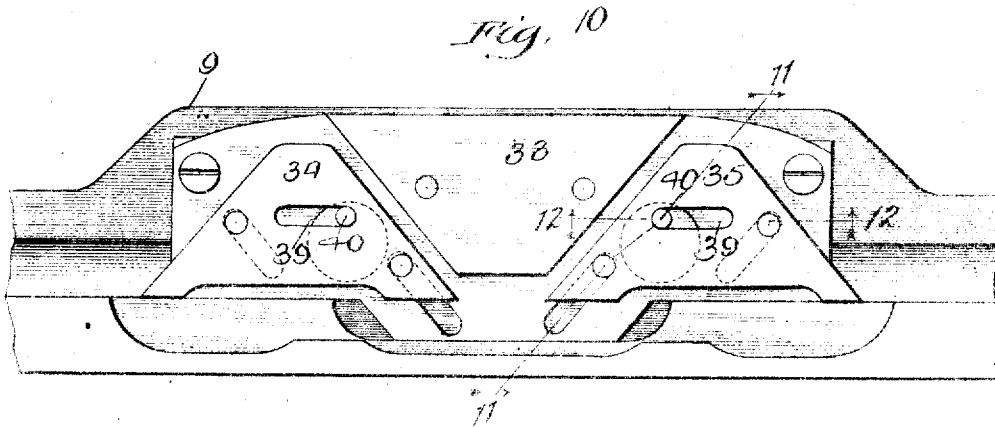
Inventor
Hubert C. Shaw
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7 SHEETS-SHEET 6.



Witnesses
Henry R. White
M. A. Feltner

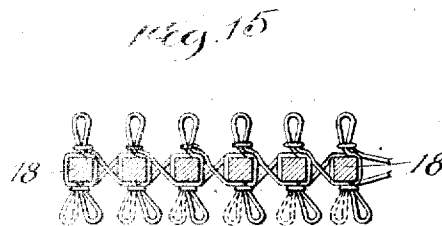
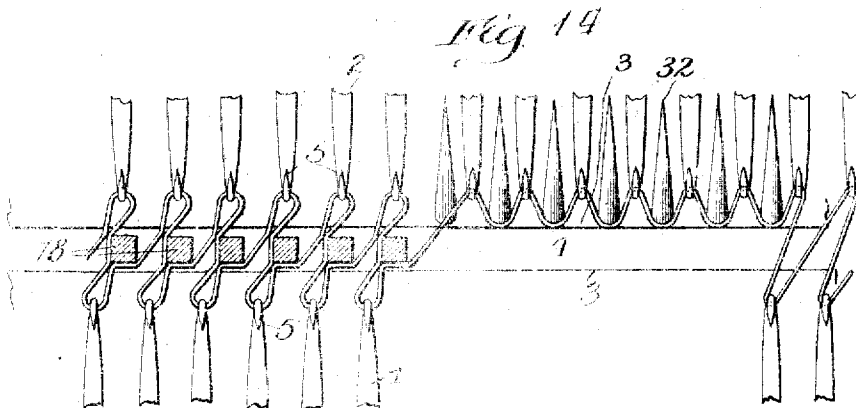
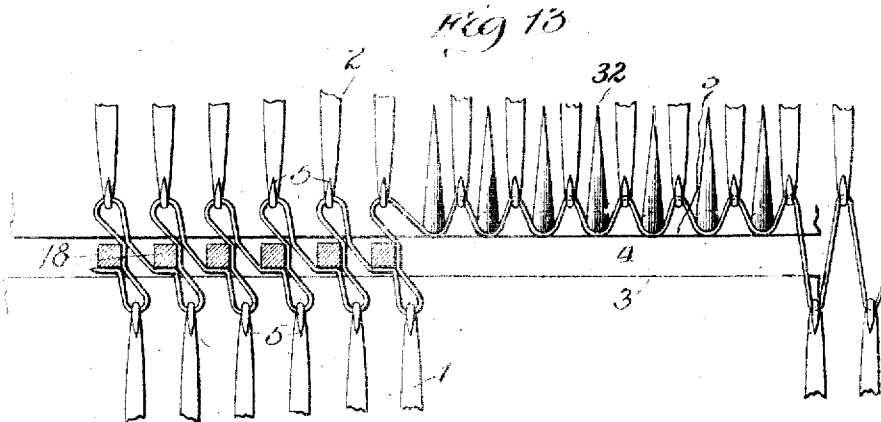
Inventor
Hubert C. Shaw
By J. M. Bell
Attorney

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1,009,446.

Patented Nov. 21, 1911.

7 SHEETS-SHEET 7.



Witnesses
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M. A. Hedderley

Inventor
Herbert C. Shaw
By *Wm. H. Bell*
Att'y

UNITED STATES PATENT OFFICE.

HERBERT C. SHAW, OF CHICAGO, ILLINOIS, ASSIGNOR TO BAUER & BLACK, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ELASTIC-WARP-KNITTING MACHINE.

1,009,446.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed July 9, 1908. Serial No. 325,227.

To all whom it may concern:

Be it known that I, HERBERT C. SHAW, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Elastic-Warp-Knitting Machines, of which the following is a specification.

This invention relates to that class of knitting machines which produce a strip of a given width and as long as may be desired to be worked up in various ways and for different purposes.

The fabric for making a suspensory bandage pouch is produced in this way and heretofore it has been customary to knit the strip from one side edge to the other, inclosing a plurality of elastic cords therein, and leaving a raw edge. To prevent the raw edge from running down a needle threaded with an elastic cord is drawn by hand through each stitch along the raw edge thereby finishing the strip. This adds greatly to the labor and expense of producing the fabric, which depends entirely upon the accuracy of the hand stitching to prevent it from running down, and is objectionable in many ways.

It is my object to avoid this hand work by producing a machine for knitting the fabric from end to end instead of from side to side and for inclosing the elastic cord at each side edge of the knitted strip during the knitting operation in the machine.

In the accompanying drawings I have illustrated one embodiment of the invention and referring thereto Figure 1 is a plan view showing the carriage in full lines in position at the limit of its movement to the left and in broken lines in position at the limit of its movement to the right, and omitting the thread carrier and guide. Fig. 2 is a detail perspective view of a toothed guide for the elastic cords. Fig. 3 is an enlarged plan view without the ends of the carriage. Fig. 4 is a front elevation of as much of the machine as is shown in Fig. 3, the operating handle being broken away. Fig. 5 is a transverse sectional view on the line 5--5 of Fig. 1. Fig. 6 is a detail perspective view of one device for locking certain needles against upward movement. Fig. 7 is a detail view of one needle. Figs. 8 and 9 are plan views showing the cams for operating the needles.

Fig. 10 is an enlarged detail view showing the cams for operating the rear bank of needles. Figs. 11 and 12 are sectional views on the lines 11--11 and 12--12, respectively, of Fig. 10. Fig. 13 is a diagrammatic view showing the elastic cords in section and illustrating the position of the front bank of needles relative to the elastic cords and the running of the yarn while the carriage is moving from right to left. Fig. 14 is a similar view showing the position of the front bank of needles and the running of the yarn while the machine is moving from left to right. Fig. 15 is a sectional view showing the stitch.

The machine comprises a front bank 1 and a rear bank 2 of needles supported in oppositely inclined positions on a bed 3 which is provided with a throat 4. Each of the needles (Fig. 7) comprises a hook 5, a pivoted latch 6, and a butt 7. The needles are held up in operative position by springs 8 which can be adjusted to permit the needles to be moved out of operative position. A carriage 9 is arranged to reciprocate on the needle bed and it is held in place thereon by plates 10 fastened to the bed and overlapping the ribs 11 on the carriage. The needle bed is supported on a frame 12 of any suitable character and the carriage may be reciprocated by a handle lever 13 pivoted at 14 to the frame and pivotally connected by a link 15 to one end of the carriage (Fig. 1), or the carriage may be reciprocated by power applied in any suitable manner according to the method and with the means heretofore commonly employed in the art. The carriage is provided with a yarn carrier 16 and a shifting guide 17.

The parts heretofore described are common in knitting machines and I have not considered it necessary to enter into a more detailed description thereof for that reason and also because my invention is not limited in its application to a machine in which these parts are of the particular construction herein shown. The foregoing description is deemed sufficient for the purpose and will be readily understood by those skilled in the art.

The machine which I have chosen for illustrating the invention is adapted and adjusted to produce a strip for making a suspensory bandage pouch with a plain stitched

part adjacent to each side edge of a central rib zig-zag stitched part and having an elastic border at each side edge made with a rib zig-zag stitch inclosing six parallel elastic cords. These cords 18 travel to the machine from supply bobbins (not shown) over grooved rollers 19, suitably supported above the machine, and through tension devices 20 suspended below said rollers. These tension devices comprise a plurality of transverse bars 21 spaced apart and between which the elastic cords are laced to provide the proper tension. In view of the difficulty of feeding the elastic cords direct from the bobbins to the machine, owing to the tendency of the cords to stretch unevenly, I have found it desirable for the operator to pull a considerable slack from the bobbins and to hold this slack taut with weights 22, so that the cords feed from the taut slack between the bobbins and the rollers 19. When the slack is exhausted the operator repeats the operation and this prevents the elastic cords from being woven in the fabric at unequal tension. The elastic cords also pass under grooved rollers 23 and thence at an angle of about 60° more or less between guide fingers 24 to the throat. The rollers 23 are mounted on a revoluble shaft 25 which is supported on an adjustable plate 26. This plate is provided with rods 27 at its ends which enter openings in posts 28 on the plates 10 mounted on the front needle bed, and the plate is held in its adjusted position by thumb screws 29 operating in the posts against said rods 27, (Fig. 4). The guide fingers 24 are carried by a bracket 30 which is secured in place on the plate 26. The fingers are spaced apart and provided with a transverse rod 31 (Fig. 2) to prevent the cords from being pushed up by the needles. I provide one set of these fingers beneath each of the rollers 23 and the rollers may be adjusted on the shaft 25 and the bracket 30 may be adjusted on the plate 26, longitudinally thereof, as required.

To form the plain stitched section between the central ribbed section and the elastic outer section of the fabric I provide a plurality of knocking over bits 32 alternating with the needles in the rear bank. In the front bank the needles are omitted in front of the knocking over bits. These knocking over bits are made in the form of rearwardly extending hooks which are fastened rigidly to the bed in the position indicated in Fig. 5 and cooperate with the needles in the rear bank to make the ordinary single stitch.

The needles are operated by cams of the usual kind which are arranged in relation to each other to form cam grooves to receive the butts of the needles. Means are provided to adjust some of the cams in the usual way for regulating the movement of the needle to make a longer or shorter stitch

as may be desired, and I also provide means for automatically shifting the cams to operate the rear bank of needles in order to carry out of operative position during each movement of the carriage that cam which would move the needles down to their lowered position.

Referring to Figs. 8 and 9, 33 is a stationary cam and 34 and 35 are adjustable cams for the front bank of needles and 36 is the stationary cam and 37 and 38 are the adjustable cams for the rear bank of needles. The stationary cams 33 and 36 are fastened rigidly on the underside of the carriage and the movable cams 34, 35, 37 and 38 are provided with slots 39 to receive the eccentric pins 40 on the adjusting screws 41. The screws for the cams 34 and 35 are provided with handles 42 and are adjusted manually, the pins 40 sliding in the slots 39 to move the cams as desired. The screws for the cams 37 and 38 are provided with rearwardly projecting levers 43, 43' which are arranged to engage adjustable stops 44, 44' mounted on the bed of the machine. These levers are connected at their rear ends by a link 45, which is provided at each end with a series of openings 46 to receive the pivot screw or bolt 47, whereby the levers may be adjusted relatively as desired.

As the carriage reciprocates the lever 43 will engage the stop 44 to lower the cam 37 and raise the cam 38 and the lever 43' will engage the stop 44' to lower the cam 38 and raise the cam 37. I provide this device for automatically adjusting the cams 37 and 38 because it often happens that some of the needles move up more or less from their lowered position after the carriage has passed and the stitch is completed, owing generally to the fact that the yarn is rather tight especially around the elastic cords. Hence it is desirable to avoid pulling these needles down to the limit of their downward movement on the return movement of the carriage which would unnecessarily stretch the yarn and have a tendency to break the yarn and tear the fabric. As the carriage reaches the limit of its movement in either direction the automatic cam shifting device throws out of operative position that cam 37 or 38 which would precede the elevating cam 36 on its next movement and those needles which have been moved up after the passage of the carriage are left in that position without unduly stretching or breaking the yarn.

As heretofore briefly described it has been customary in the manufacture of a strip for making a suspensory bandage-pouch, which strip is provided with one or more elastic cords at each side edge and is knitted from side to side instead of from end to end, to finish the raw edge left at the side of the strip by picking up each stitch with a needle threaded with an elastic cord and draw-

ing the cord through all the stitches of the raw edge. With my improved machine this hand work is entirely avoided for the strip is knitted from end to end, instead of from side to side, and the elastic cord at each side edge of the strip is wholly inclosed within the knitted fabric. This is accomplished by mounting the needles of the front bank in a racking plate 48 which can be adjusted longitudinally on the bed of the machine (Figs. 1, 8). Rods 49 are fastened to the ends of the racking plate and project outward therefrom through brackets 50 on the ends of the carriage and carry cushion stops 51. As the carriage reciprocates the brackets engage the cushion stops and shift the racking plate endwise. Thus the front bank of needles is shifted a distance of one needle to the position indicated in Fig. 13 when the carriage reaches the limit of its movement to the right and to the position indicated in Fig. 14 when the carriage reaches the limit of its movement to the left, and this shifting of the front bank of needles provides for making the stitch to inclose the elastic cords at the outer side edges of the fabric strip as shown in Fig. 15.

To hold the needles of the front bank opposite the elastic cords down so that the racking may take place without interfering with the cords I provide adjustable cams on the carriage for engaging the butts of these needles. In the drawings (Figs. 1, 8, 9), I have shown one form of these cams which comprises a plate 52, having a cam surface 53 thereon, and adjustably mounted on brackets 54 fastened to the carriage, one cam being provided for operating each set of needles opposite the elastic cords. When the racking takes place these cam plates are directly over the butts of those needles opposite the elastic cords and they hold these needles down by engaging the butts thereof so that their heads may pass from one to the other side of the elastic cords. The latch openers 55, 56 (Fig. 5) are mounted one above the other on the thread carrier 16, the opener 55 extending across the throat to operate the latches of the front bank of needles and the opener 56 being arranged to operate the latches of the rear bank of needles.

The strip for a suspensory bandage pouch is preferably provided with six, more or less, parallel elastic cords at each side edge thereof, a plain single stitched section adjacent to each elastic section, and of about the same width, and a central section of a rib zig-zag stitch. The elastic sections are made with the rib zig-zag stitch like the central section, and this is found to be very satisfactory for suspensory bandage pouches. But it will be readily understood by those skilled in the art that the plain stitched section may be omitted, that all the fabric between the

elastic sections may be plain stitched, that elastic cords may be provided throughout the width of the fabric, and that other stitches may be substituted for the rib zig-zag and the plain stitches. I preferably use covered elastic cord but the covering may be omitted, as indicated in the drawings. As the fabric is made in a continuous length, finished at both side edges, it can be cut as made into exact lengths for suspensory bandage pouches or other articles. The elastic cords may be located at any position between the side edges of the fabric instead of adjacent to said edges and they may be spaced apart at any distance desired.

By knitting the fabric lengthwise I am enabled to finish both side edges in the machine and to inclose elastic cords at each edge, thus dispensing with the hand work heretofore necessary to finish one side edge and to inclose the elastic cord therein. This not only provides for the rapid manufacture of the fabric but also produces it in a finished condition ready to be made into suspensory bandage pouches or other articles.

What I claim and desire to secure by Letters Patent is:

1. In a knitting machine, a bed, front and rear banks of needles, a plate on the bed carrying the front bank of needles, a carriage, means on the carriage for operating the needles, and means on each end of said plate to be engaged and operated by the carriage for racking the front bank of needles automatically at the end of travel of the carriage in each direction.

2. In a knitting machine, a bed, front and rear banks of needles, a plate on the front of the bed carrying the front bank of needles, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, and means on each end of said plate to be engaged and operated by the carriage for racking the front bank of needles automatically at the end of travel of the carriage in each direction.

3. In a knitting machine, a bed, front and rear banks of needles, a plate on the front of the bed carrying the front bank of needles, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, brackets on the ends of the carriage, rods on the ends of said plate projecting through said brackets, and stops on said rods to be engaged by the brackets to automatically rack the front bank of needles at the end of travel of the carriage in each direction.

4. In a knitting machine, a bed, front and rear banks of needles, a plate on the bed carrying the front bank of needles, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, rods carried by said plate

and projecting outwardly from the ends thereof, brackets on the ends of the carriage through which said rods project, and cushion stops on the rods to be engaged by the brackets to automatically rack the front bank of needles at the end of travel of the carriage in each direction.

5. In a knitting machine, a bed, front and rear banks of needles on the bed, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, means for racking the front bank of needles automatically at the end of travel of the carriage in each direction, and means for holding down the needles in the front bank adjacent to said elastic cords.

6. In a knitting machine, a bed, front and rear banks of needles on the bed, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, means for racking the front bank of needles automatically at the end of travel of the carriage in each direction, and a cam plate on the carriage for engaging and holding down the needles in the front bank adjacent to said cords.

7. In a knitting machine, a bed, front and rear banks of needles on the bed, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine to form an elastic section at each side of the the fabric being produced, means for racking the front bank of needles automatically at the end of travel of the carriage in each direction, and cam plates on the carriage to engage the needles on the front bank adjacent to the said elastic cords to hold said

needles down away from the cords, while the front bank of needles is being racked.

8. In a knitting machine, a bed, front and rear banks of needles, a plate on the bed carrying the front bank of needles, a carriage, means on the carriage for operating the needles, means for guiding elastic cords to the machine, rods projecting outwardly from the ends of said plate, stops on said rods, brackets on the carriage for engaging said stops to automatically rack the front bank of needles at the end of travel of the carriage in each direction, and means carried by the carriage for holding the needles adjacent to said cords down away from said cords while the front bank of needles is being racked.

9. In a knitting machine, the combination of front and rear banks of needles, a plate carrying the front bank of needles, means for operating said needles, a carriage, means mounted on said carriage for actuating said plate to rack the front bank of needles at the end of travel of the carriage in each direction, cam devices on the carriage for operating the rear bank of needles, eccentrics for adjusting said cam devices, actuating means connected to said eccentrics, and suitable stops positioned in the path of said actuating means to cause the actuation thereof and shift the cam devices automatically as the carriage approaches the extremity of its movement in each direction.

HERBERT C. SHAW.

Witnesses:

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M. A. KIDDIE.