

No. 744,311.

PATENTED NOV. 17, 1903.

J. C. DUEMLER.  
KNITTING MACHINE.

APPLICATION FILED JULY 19, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.

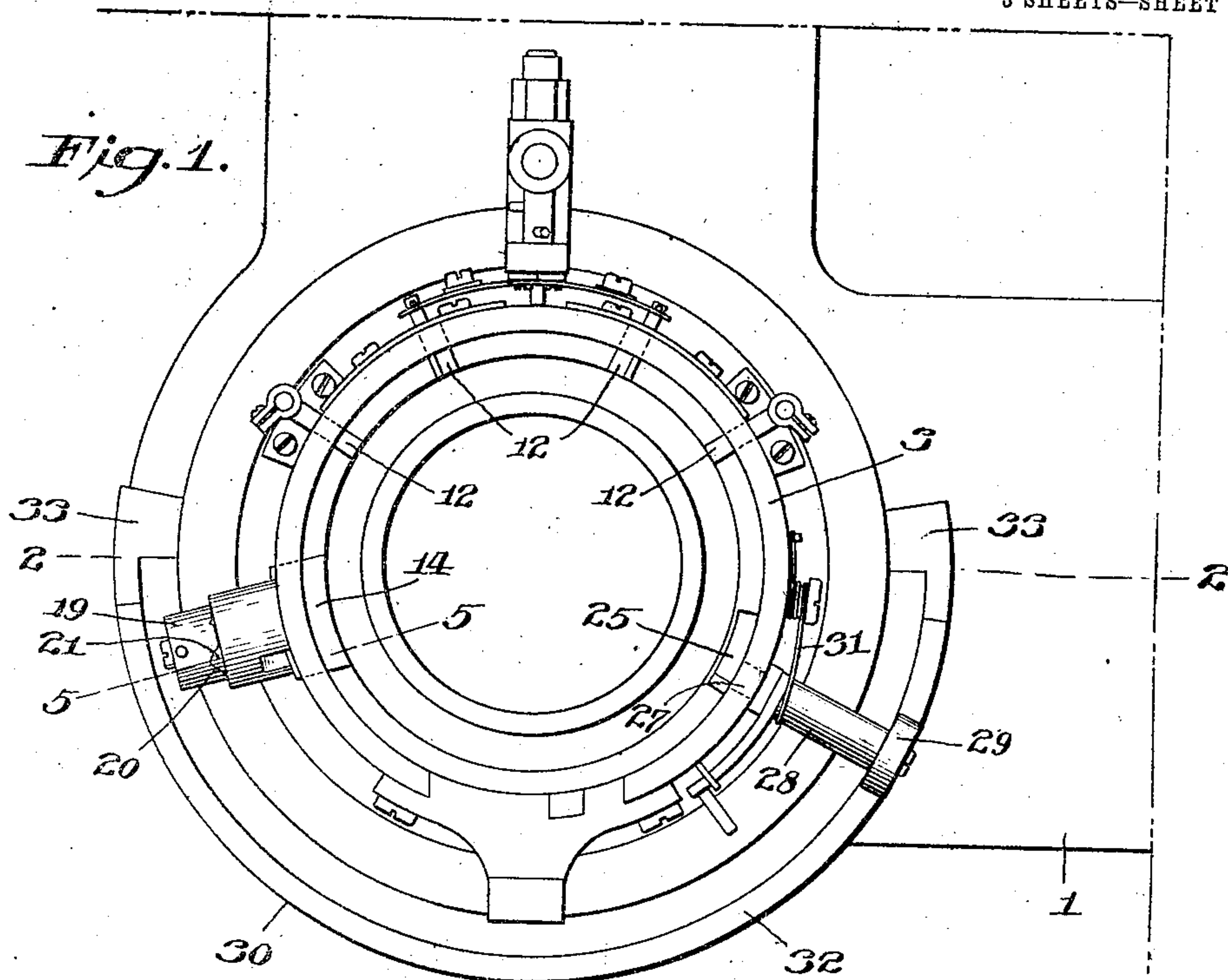
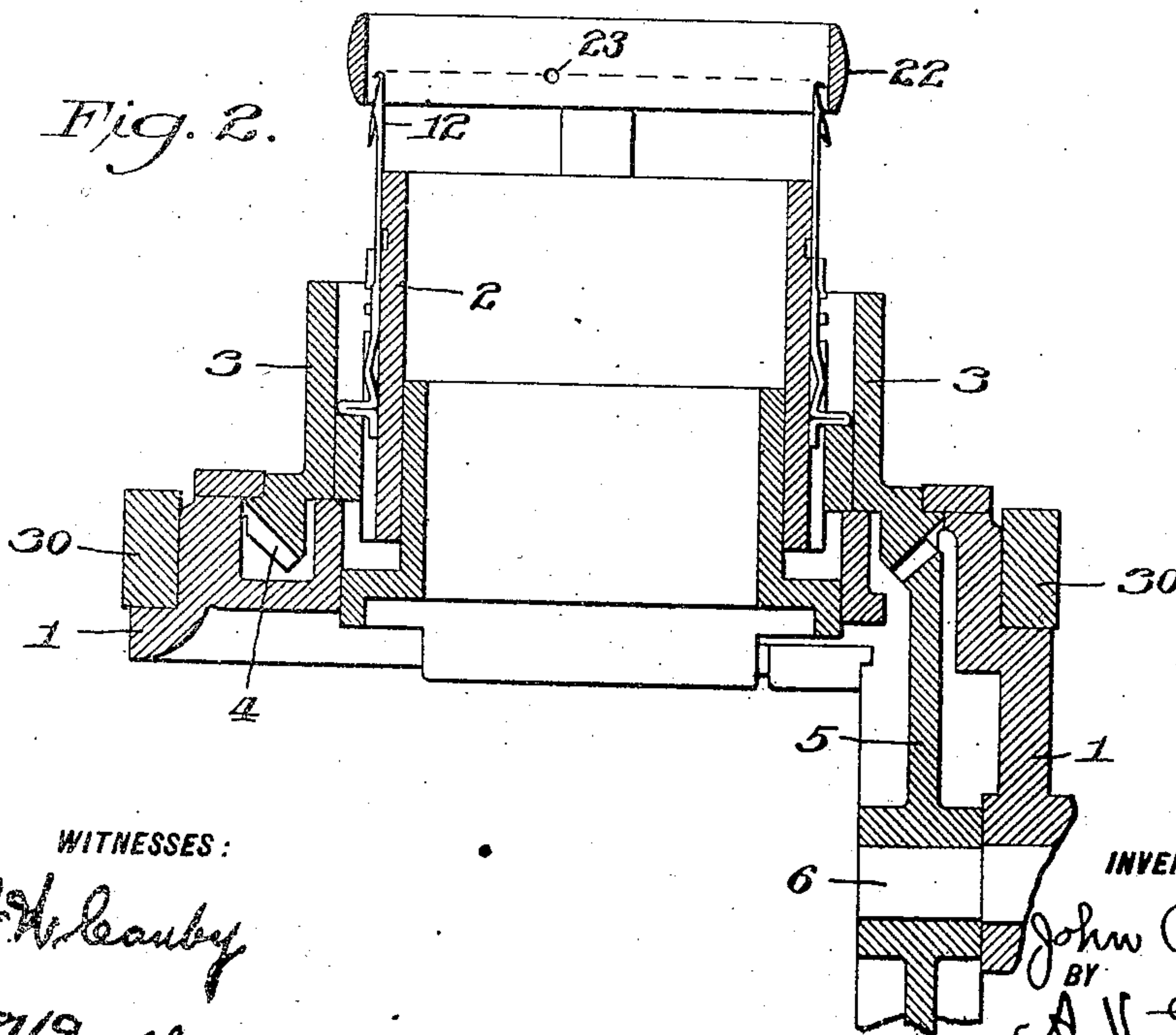


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 8.

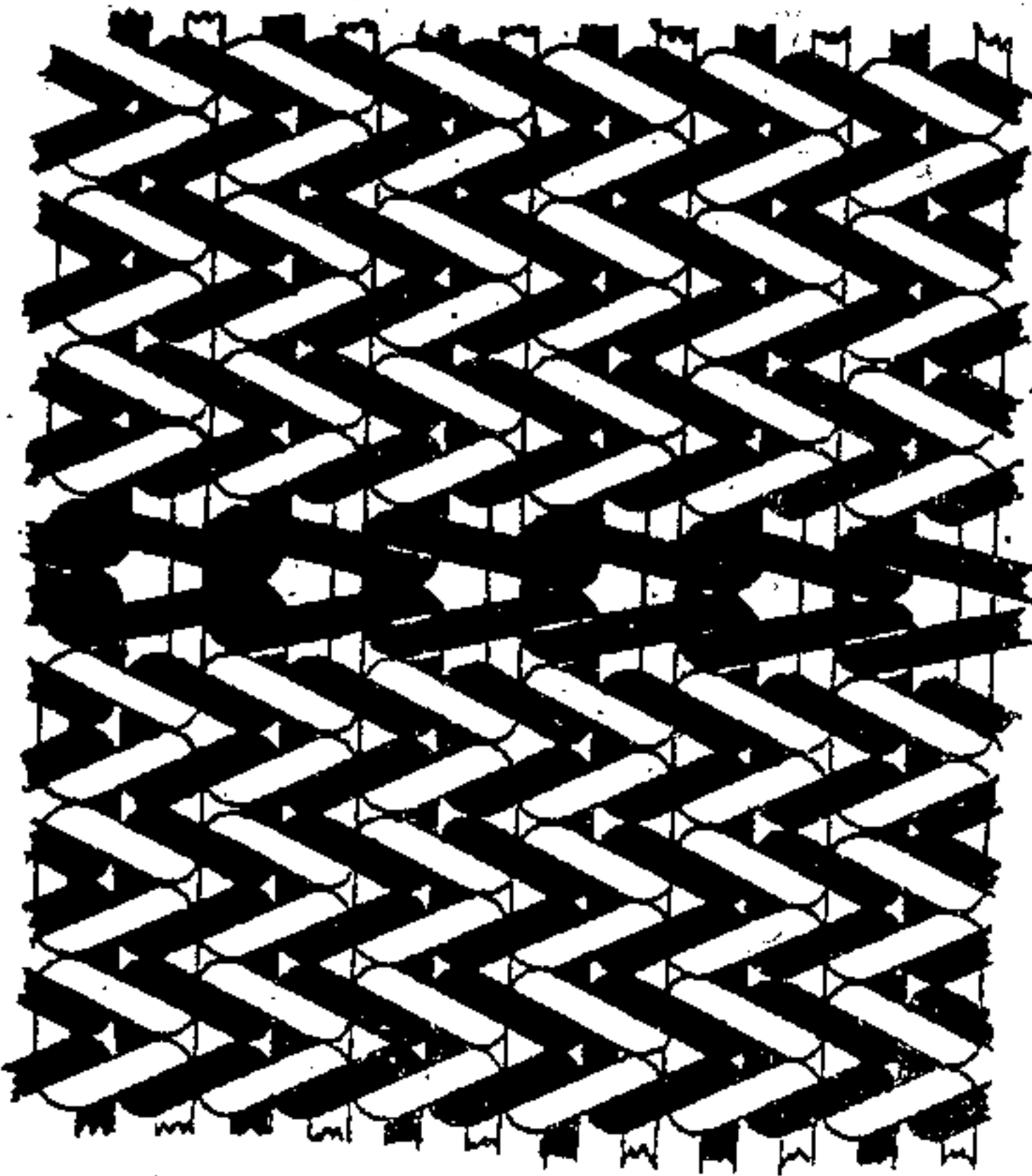


Fig. 4.

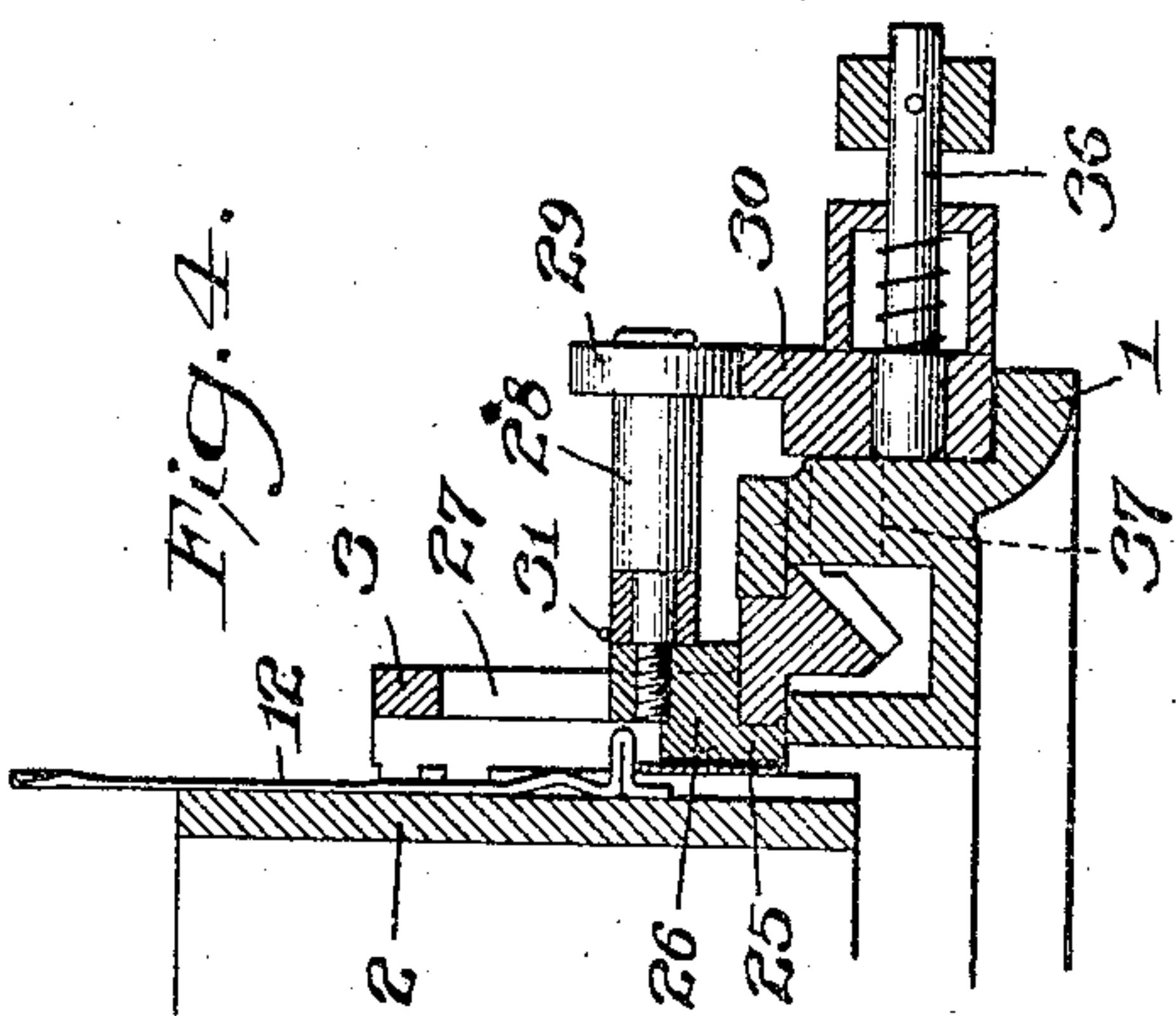


Fig. 5.

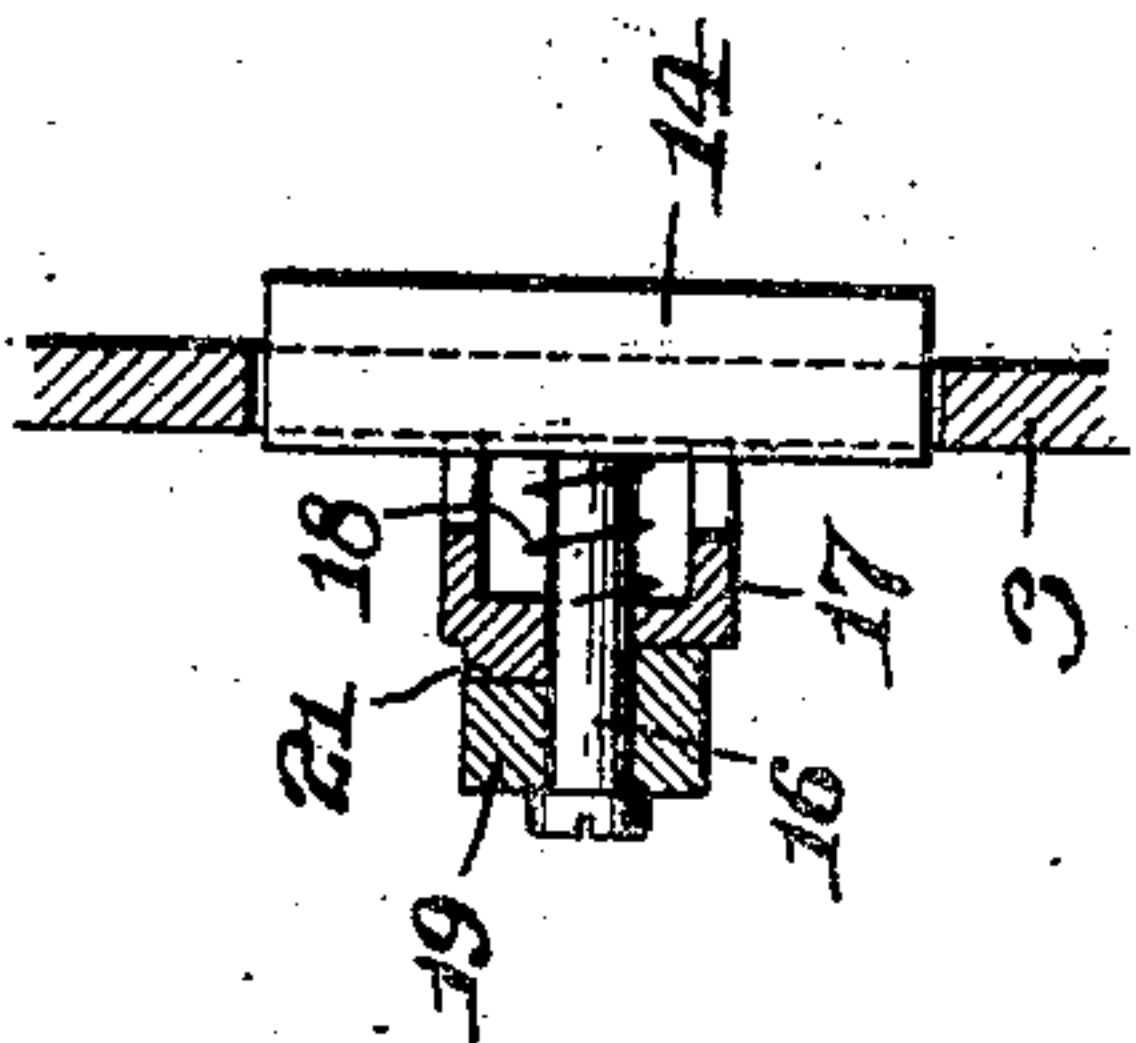
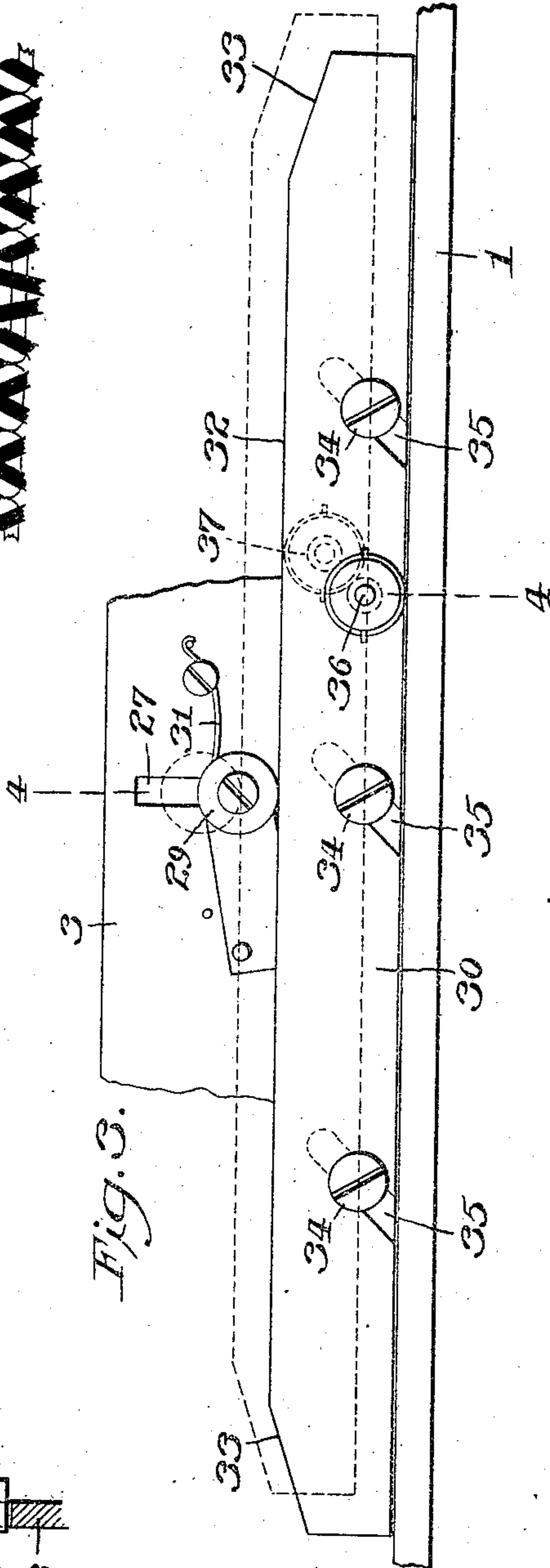


Fig. 3.



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# UNITED STATES PATENT OFFICE.

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JOHN E. LONERGAN AND HENRY BRINTON, OF PHILADELPHIA, PENN-  
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## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 744,311, dated November 17, 1903.

Application filed July 19, 1902. Serial No. 116,137. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN C. DUEMLER, a citizen of the United States, residing at South Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Knitting-Machines, (Case A,) of which the following is a specification.

This invention relates to knitting-machines, and especially to circular-knitting machines, such as are employed in the production of stockings, the object being to provide a mechanism whereby various designs of knitted fabric may be produced.

To this end the invention, as generally stated, consists in the employment of a plurality of thread-feeds and a series of needles in combination with means whereby a novel relative action between the needles and the stitches is effected, as will be hereinafter particularly described and claimed.

In the drawings, Figure 1 is a plan of a portion of a circular-knitting machine embodying my invention, certain parts being omitted. Fig. 2 is a vertical section thereof as on the line 2 2 of Fig. 1, including the needle-cylinder, the needles, and the latch-guard. Fig. 3 is a development of a portion of the exterior of the cam-cylinder, the frame, and the segmental cam. Fig. 4 is a vertical section thereof as on the line 4 4 of Fig. 3, including the needle-cylinder. Fig. 5 is a sectional detail as on the line 5 5 of Fig. 1. Fig. 6 is a diagrammatic view illustrating a development of the interior of the cam-cylinder and the positions of the parts during the knitting of the leg portion of a stocking. Fig. 7 is a similar view showing the positions of the parts during the knitting of the foot portion of a stocking. Fig. 8 is an enlarged view of a piece of fabric produced by my invention.

1 designates the bed-plate, 2 the needle-cylinder supported thereby, and 3 the cam-cylinder. The cam-cylinder has its bearings in the bed-plate and is provided with bevel-teeth 4, with which coact the teeth of a bevel gear-wheel 5, affixed to the driving-shaft 6. The cam-cylinder is provided with

the usual cams, which include the oppositely-disposed stitch-cams 7 8 and the adjacent raising-cams 9 10, leading to the supporting-ledge 11, the cams 9 and 10 being arranged in rear of the stitch-cams 7 and 8, respectively, according to the direction of rotation of the cam-cylinder. The cam-cylinder is also provided with the usual picker device 12, by means of which certain needles are successively moved into and out of action during the reciprocations of the cam-cylinder in knitting the heel and toe portions of a stocking.

Thus far the machine is of well-known construction and needs no detailed description herein.

In the present embodiment of my invention I employ two sets of needles 12 13, which are alike in every respect except that the latches of the set 13 are longer than those of the set 12. These needles are arranged in the relation indicated in Figs. 6 and 7.

Arranged in the cam-cylinder 3 adjacent to the usual stitch-cams are an additional stitch-cam 14 and a raising-cam 15, which in conjunction with stitch-cam 8 actuate the needles to effect the knitting of two rows of stitches into the fabric during each revolution of the cam-cylinder in the formation of the leg and foot portions of a stocking.

The cam-cylinder is provided in rear of the stitch-cam 14 with a raising-cam 15, which raises the needles so that the latches of the needles 12 will escape their engaged loops of thread, and the cam-cylinder is provided with cams 40 and 41, each of which is adapted to raise the needles so that all their latches will escape their engaged loops of thread, the cam 40 being arranged in advance of the stitch-cam 8, and the cam 41 being arranged in advance of the stitch-cam 7, according to the direction of movement of the cam-cylinder.

The cam 14 is mounted on a stem 16, which projects through a boss 17 on the cam-cylinder and is held normally inward, as shown, by the action of a spring 18. The outer end of the stem 16 is provided with a collar 19, in which is formed a V-shaped socket 20, which



registers with a V-shaped projection 21 on the boss. By turning the collar 19 so that the socket 20 escapes the projection 21 the cam 14 is withdrawn or moved out of action 5 to permit the cam-cylinder to be reciprocated during the formation of the heel and toe parts of the stocking.

The cam-cylinder is provided with the usual ring or latch-guard 22, containing eyes 23 24, 10 adjacent the cams 8 14, respectively, whereby thread is directed to the needles at each stitch-cam.

Mounted in the cam-cylinder 3, in rear of the stitch-cam 8, is an elevating-cam 25, which 15 is movable above and below the ledge 11. This cam 25 is formed on or secured to a block 26, which is slidably fitted to a vertical slot 27 in the wall of the cam-cylinder. Projecting outwardly from the block 26 is a stud 20 28, which is provided on its free end with an antifriction-roller 29, adapted to be acted upon by a cam 30, and thereby move the cam 25 above the ledge 11, for a purpose herein-after described. The cam 25 is maintained 25 normally depressed by the action of a suitable spring 31, arranged on the exterior of the cam-cylinder and bearing upon the stud 28. The cam 30 is mounted on the bed-plate 1 and comprises a segmental bar having a horizontal portion 32, which extends half-way 30 around the cam-cylinder, and two inclined portions 33 at the respective ends of the horizontal portion, whereby the roller 29 is guided to and from the horizontal portion.

In order that the cam 30 may be raised into the path of the roller 29 or lowered therefrom, the cam is supported by screws 34, projecting from the bed-plate 1 and passing through slots 35 in the cam, the latter being provided 40 with a pin 36, which is adapted to register with a socket 37 in the bed-plate, and thereby lock said cam in the raised position. The pin projects outwardly, as shown, and may be readily operated by hand and the cam 30 45 raised or lowered, as desired.

In Figs. 6 and 7 I have indicated by a line *x x* the top of the web or the plane where the loops are formed.

Assuming that a white thread 38 is being 50 delivered to the needles through the eye 24 at cam 14 and a black thread 39 through the eye 23 at cam 8, the operation of the machine is as follows: During the knitting of the leg portion of a stocking the cam 30 is down and the 55 cam 25 remains below the ledge 11. As the stitch-cam 8 passes the needles the latter are caused to engage and knit the black thread 39 into the fabric in the usual manner, and the elevating-cam 10 raises the needles to the 60 ledge 11. At this point the latches of the needles 12 are raised above and have escaped the black loops just formed, as in ordinary knitting, and the longer latches of the needles 13 remain in said loops. The needles 65 are next acted upon by the stitch-cam 14, where the white thread 38 is delivered to the needles. At this point the needles 12, hav-

ing their latches free, knit the white thread into the fabric in the usual manner, and the needles 13, having their latches engaged by 70 the black loops, merely draw down the black loops and the white thread together without knitting. The long-latched needles 13 are now embraced by both a white and black loop. As the cam-cylinder advances the needles 75 are raised by the cam 40 sufficiently to cause the latches of the needles 13 to escape their white and black loops. The cam 8 now meets the needles again, and the latter, having all their latches clear of the loops, knit 80 the black thread into the fabric in the usual manner, the needles 13 drawing the black thread 39 down to form stitches and at the same time casting off their superposed loop of the threads. Thus it will be seen that the 85 needles 13 do not knit the white thread 38, but knit a chain of black stitches down the face of the fabric, thereby producing a longitudinal stripe through the fabric at each point where the needles 13 occur, the needles 12 90 knitting alternate black and white transverse rows of stitches at right angles to and intersected by the longitudinal stripes. After the completion of the leg portion of the stocking the cam 14 is moved out of action, and the 95 cam-cylinder is reciprocated to knit the heel, the needles being thrown into and out of action in the usual manner. During this operation the black thread is employed. In order to continue the longitudinal stripes along the 100 top of the foot portion of the stocking and omit said stripes from the bottom thereof, I employ the cam 30 and just prior to commencing the knitting of the heel raise this cam to position indicated by dotted lines in 105 Fig. 3. When the said cam occupies this position, the cam 25 is raised and lowered thereby during each successive revolution of the cam-cylinder and maintained elevated during one-half of each revolution. The cam 25 being 110 thus elevated raises the needles in one-half of the needle-cylinder sufficiently to cause the latches of the needles 13 to clear their loops, and thereby knit the thread into the fabric similarly to the needles 12. As the 115 other half of the needles 13 are unaffected by the cam 25, they of course knit the longitudinal stripes in the fabric along the top of the foot portion of the stocking, as previously explained. 120

I claim—

1. In a knitting-machine, the combination with the needles having latches of different lengths, their support, and plural thread-feeds, of means for actuating said needles to 125 effect their operation upon the threads, and means whereby certain of the needles, having latches over a predetermined length, are caused to receive and retain superposed loops of the threads, and thereafter to receive and 130 act upon one of the threads to produce stitches thereby, and at the same time to cast off the superposed loops.

2. In a knitting-machine, the combination



with a plurality of sets of needles having latches of different lengths, their support, plural thread-feeds, the cam-carrier, actuating means therefor, and a stitch-cam for each thread-feed to effect the operation of the needles upon the threads, of means carried by the cam-carrier in rear of each stitch-cam whereby the latches of one set of needles are caused to escape their engaged loops of thread, and means carried by the cam-carrier in advance of one of said stitch-cams whereby the latches of all the needles are caused to escape their engaged loops of thread.

3. In a knitting-machine, the combination with a plurality of sets of needles having latches of different lengths, their support, plural thread-feeds, the cam-carrier, actuating means therefor, and a stitch-cam for each thread-feed to effect the operation of the needles upon the threads, of a cam carried by the cam-carrier in rear of each stitch-cam whereby the needles are raised to disengage the latches of one set from their engaged loops of thread, a cam carried by the cam-carrier in advance of one of said stitch-cams whereby all the needles are raised to disengage their latches from their loops of thread, a cam carried by the cam-carrier whereby both sets of needles are raised to disengage their latches from their loops of thread, and means for

moving the last-named cam into and out of action.

4. In a knitting-machine, the combination with a needle-cylinder, a plurality of sets of needles having latches of different lengths, a cam-cylinder, its actuating means, plural thread-feeds, and stitch-cams corresponding with its feeds; of a cam carried by the cam-cylinder in rear of each stitch-cam whereby the needles are raised to disengage the latches of one set from their engaged loops of thread, a cam carried by the cam-cylinder in advance of one of said stitch-cams whereby all the needles are raised to disengage their latches from their loops of thread, a movable cam carried by the cam-cylinder whereby the respective sets of needles are raised to disengage their latches from their loops of thread, a projection on said movable cam, a cam with which said projection coacts during a partial revolution of the cam-cylinder, and means for moving said last-named cam into and out of the path of said projection whereby periodical action of said movable cam is effected.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN C. DUEMLER.

Witnesses:

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