

No. 719,376.

PATENTED JAN. 27, 1903.

B. SALZER & G. WALTHER.

KNITTING MACHINE.

APPLICATION FILED APR. 9, 1901.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 4.

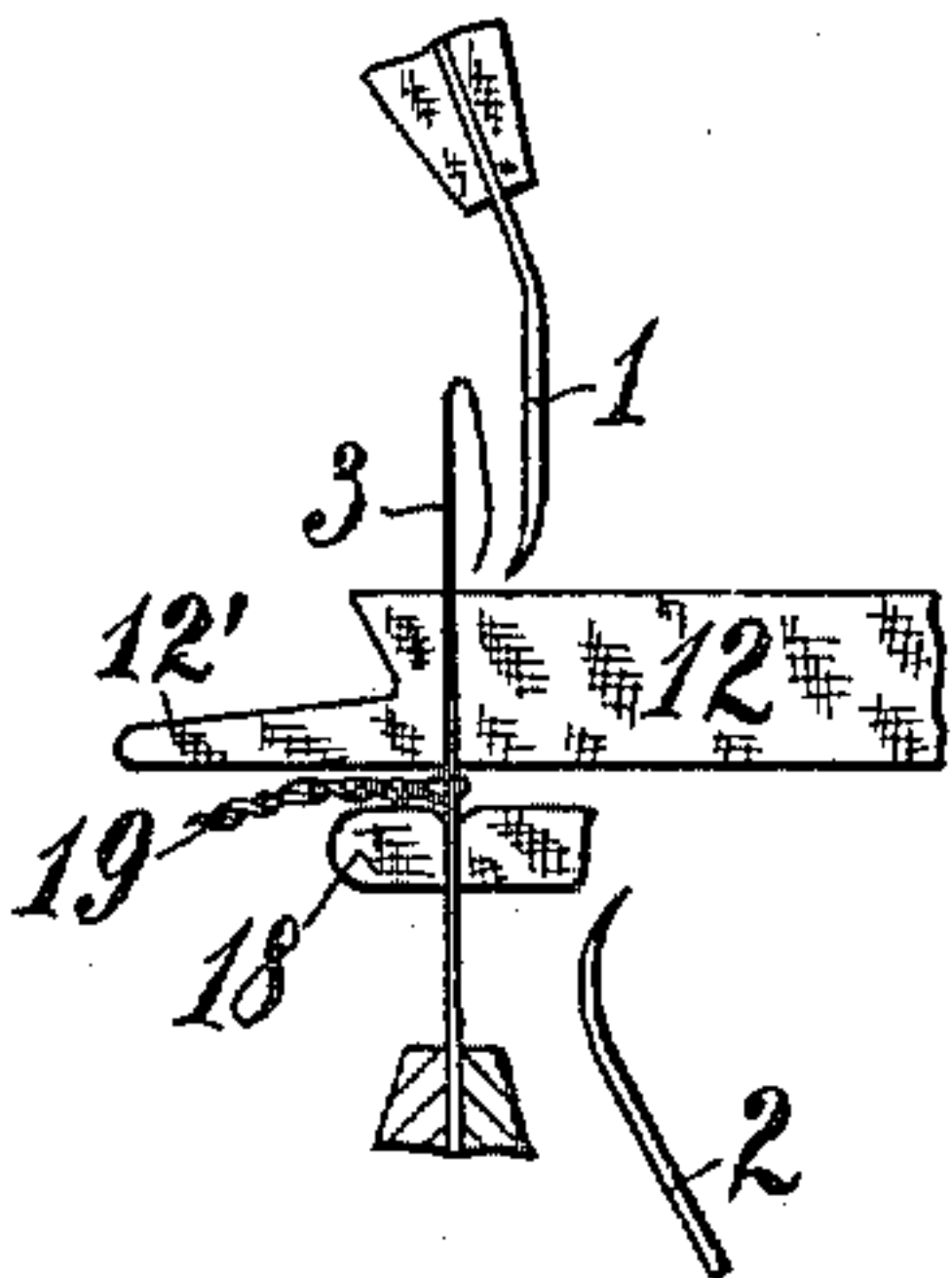


Fig. 1.

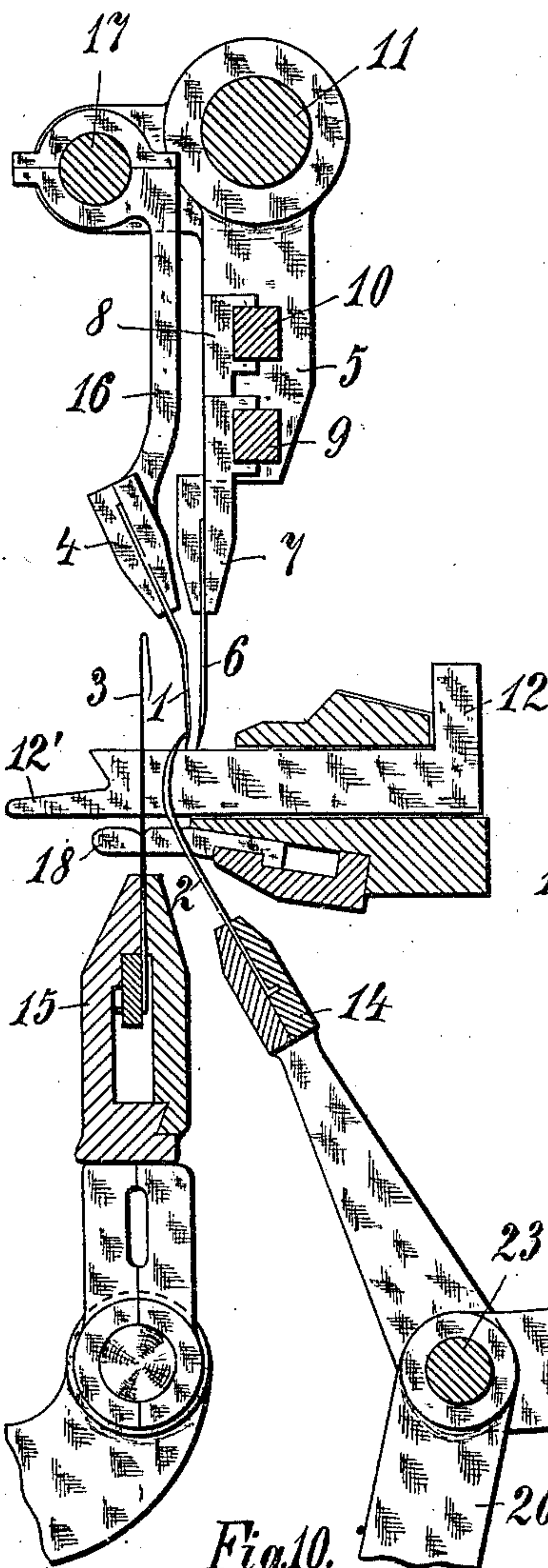


Fig. 7.

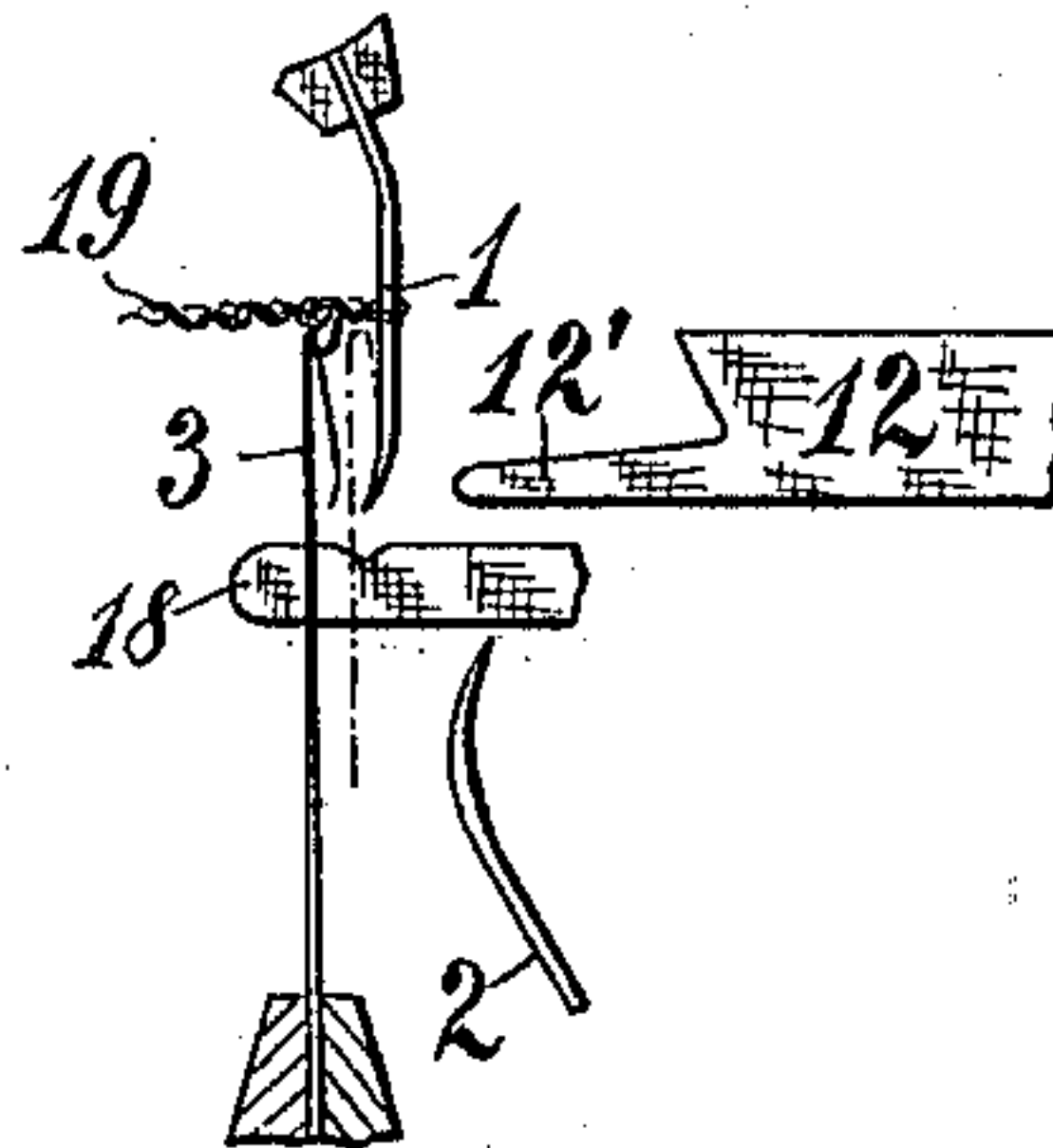


Fig. 5.

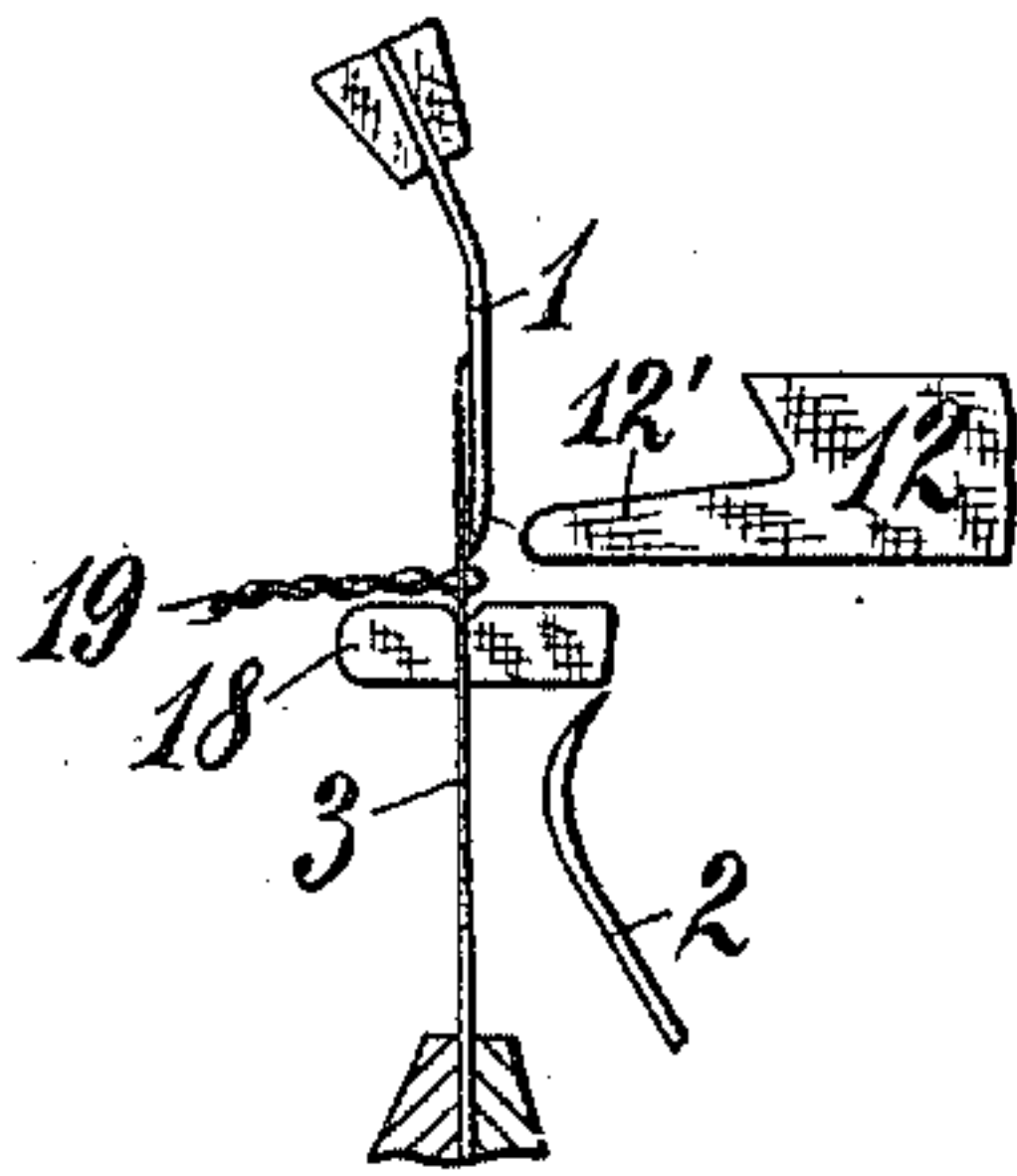


Fig. 8.

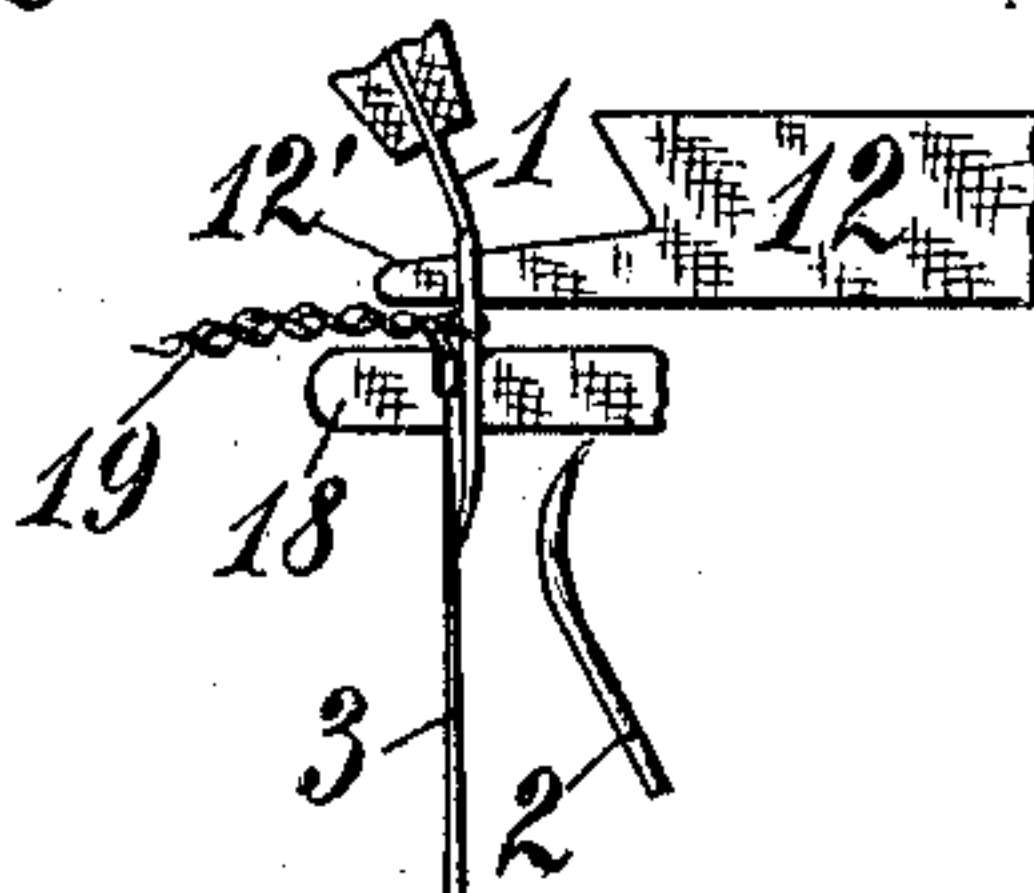


Fig. 6.

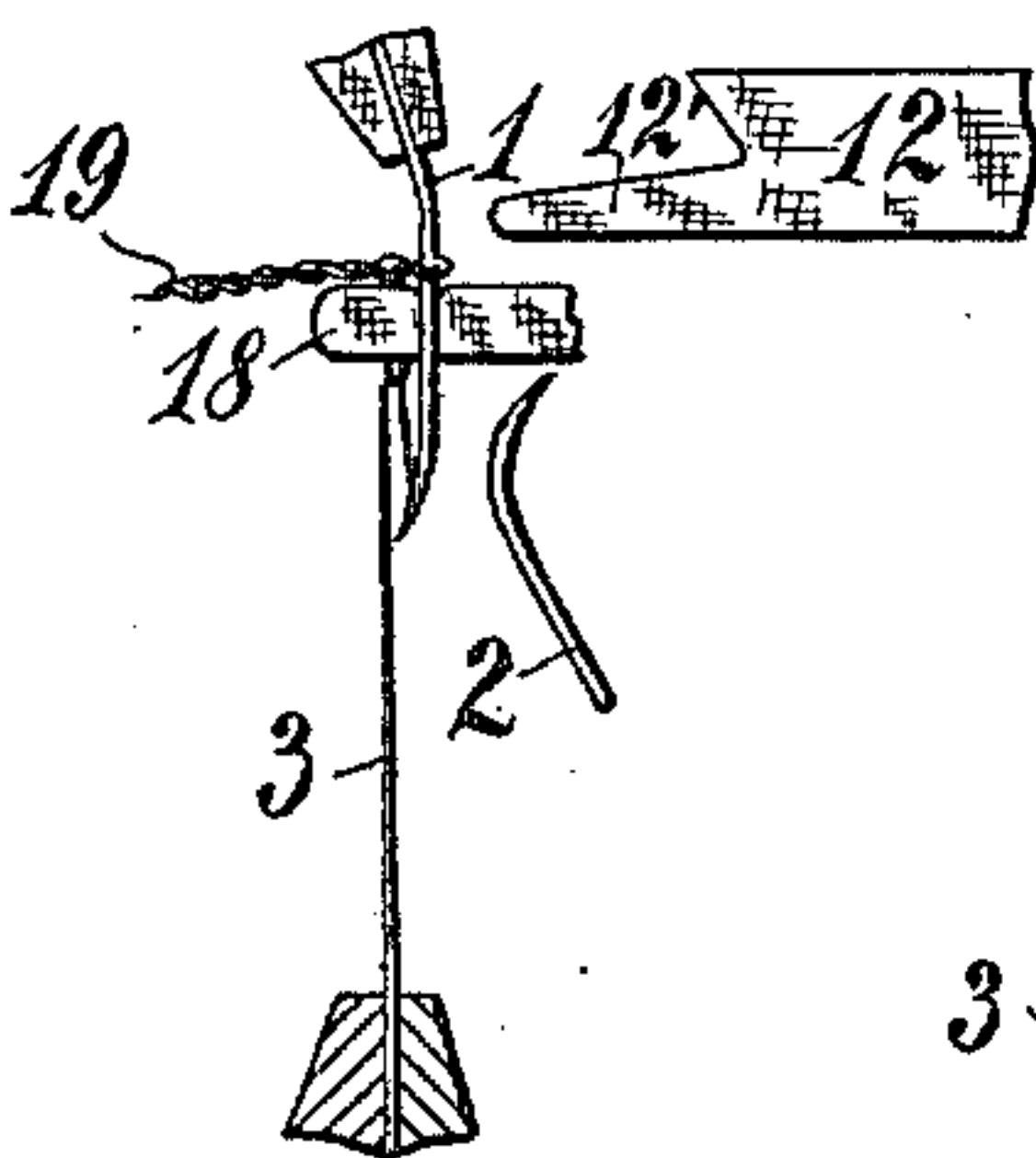


Fig. 9.

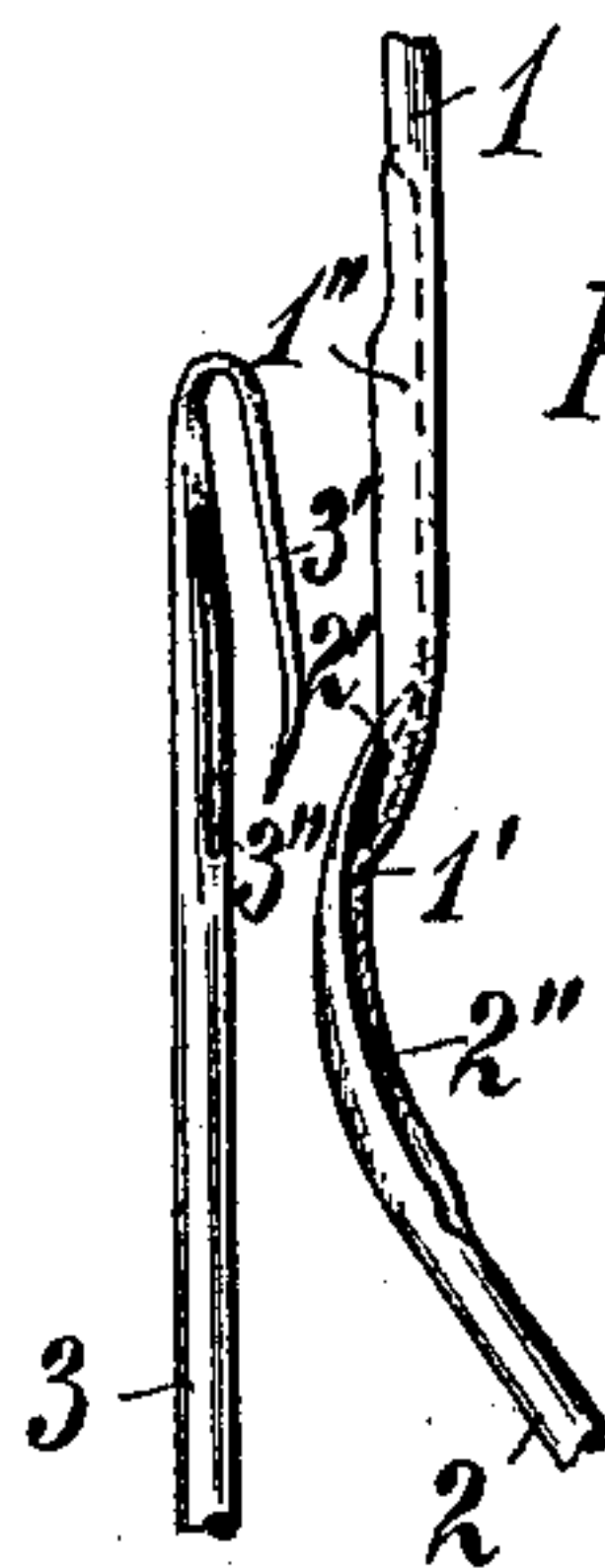
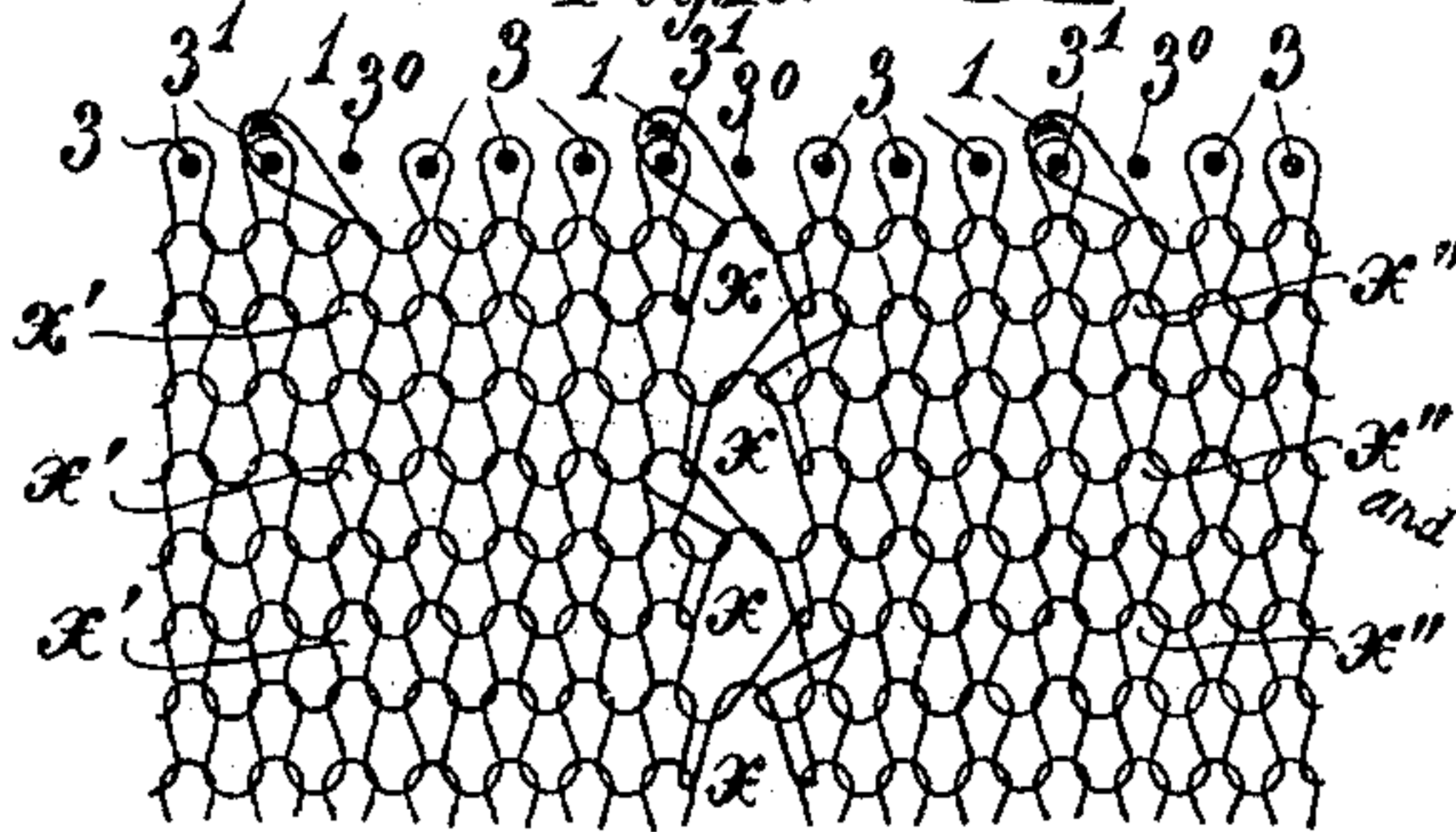


Fig. 10.



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3 SHEETS—SHEET 2.

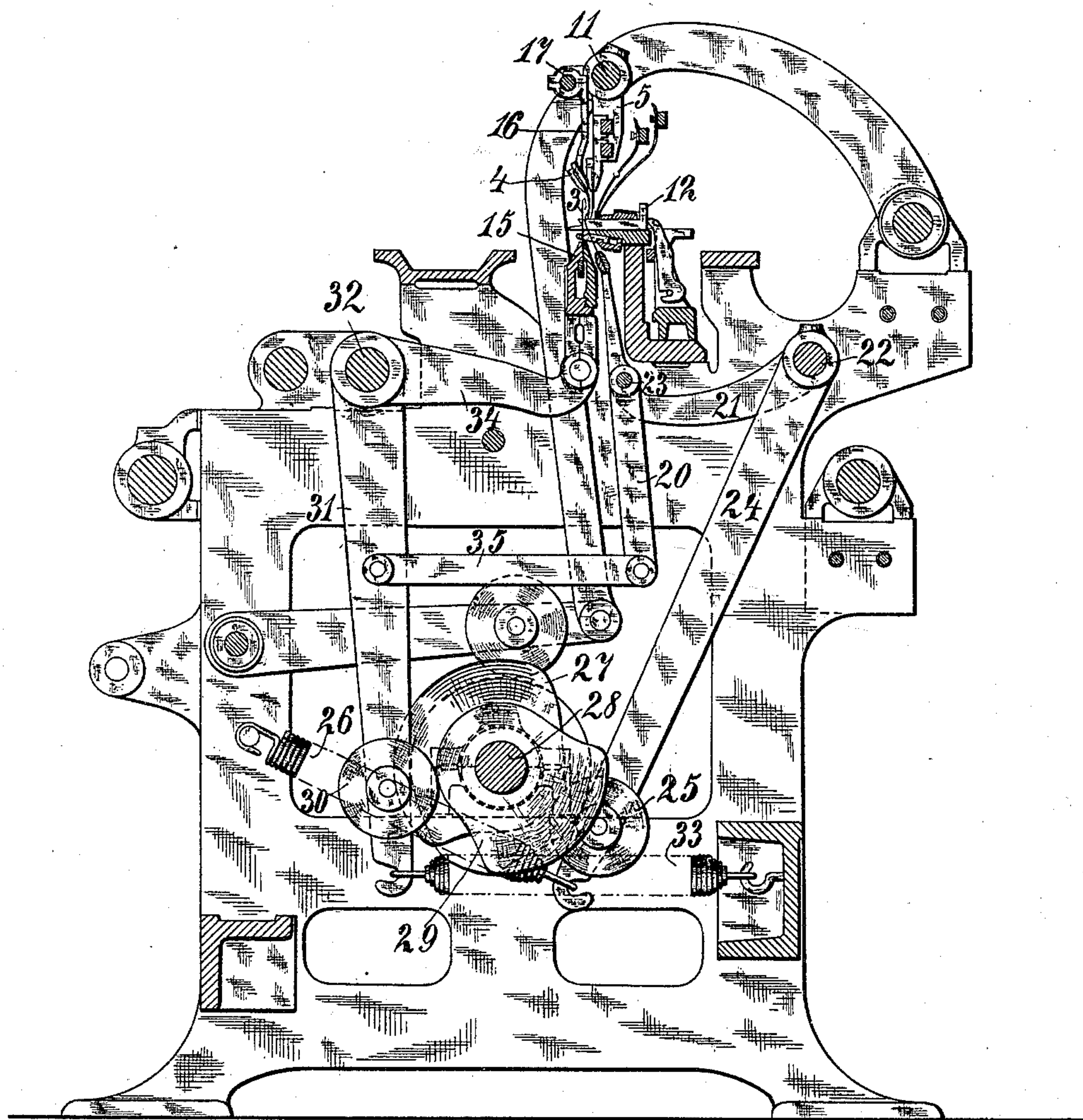


Fig. 2.

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3 SHEETS—SHEET 3.

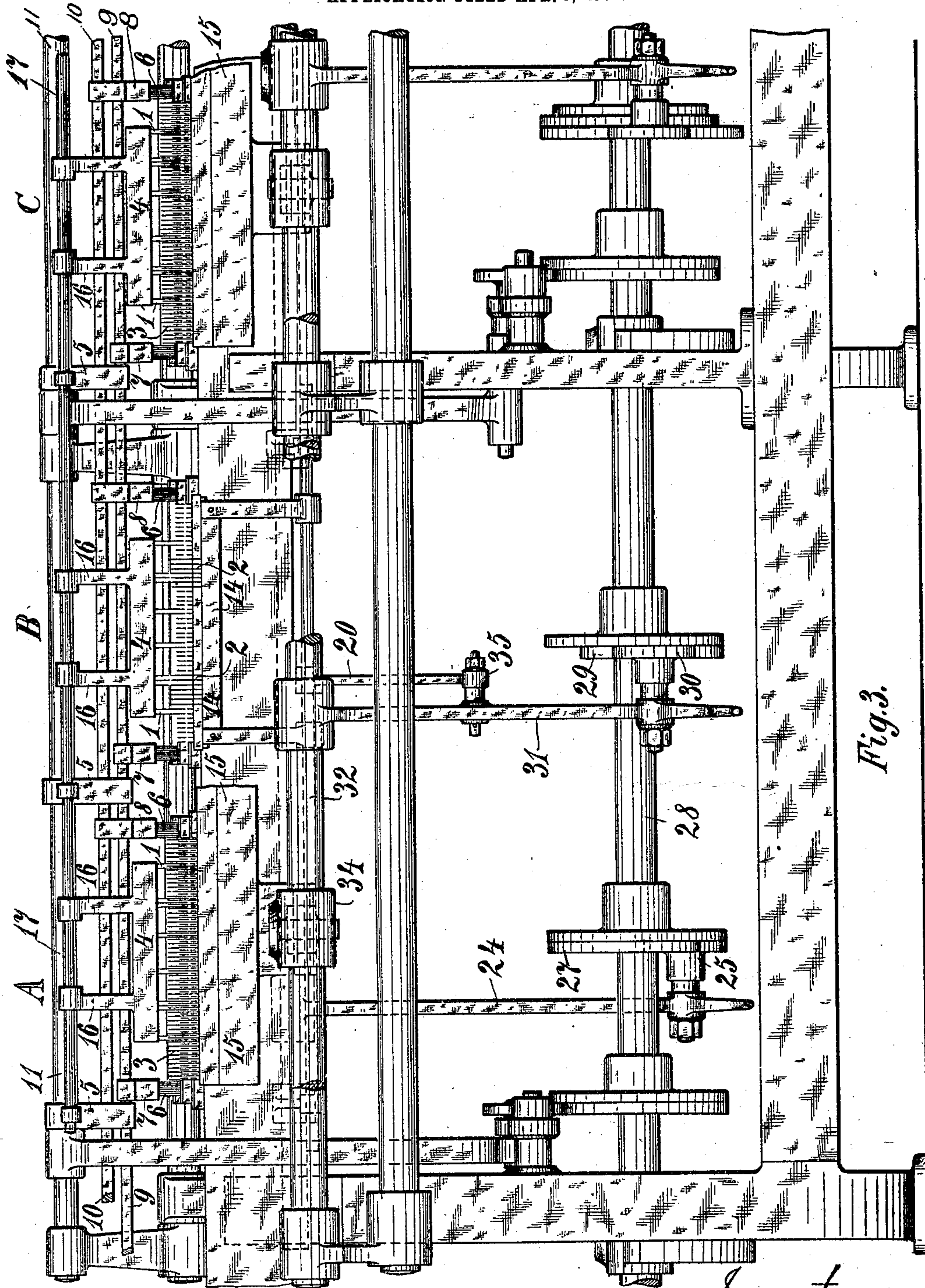


Fig. 3.

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UNITED STATES PATENT OFFICE.

BRUNO SALZER AND GUSTAV WALTHER, OF CHEMNITZ, GERMANY.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 719,376, dated January 27, 1903.

Application filed April 9, 1901. Serial No. 55,023. (No model.)

To all whom it may concern:

Be it known that we, BRUNO SALZER, residing at and whose post-office address is Adorferstrasse 13, and GUSTAV WALTHER, residing at and whose post-office address is Neefestrasse 26, Chemnitz, Saxony, Germany, subjects of the King of Saxony, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification.

Our invention relates to an improvement which renders it possible to exclude any desired number of point-shifting needles in knitting-machines, thus providing for ornamentation or greater variegation of the open-work patterns by having either all of the point-shifting needles or only a part thereof brought into operation.

In the accompanying drawings, Figure 1 is a vertical section through those parts of the machine which coöperate in the present invention. Fig. 2 is a vertical section through an entire straight-frame knitting-machine, only a small portion of which is shown in Fig. 1. Fig. 3 is a front elevation of the machine shown in Fig. 2, the entire machine being very long, consisting of as many as twelve divisions. Fig. 3 shows only a portion—namely, three of the divisions A B C. Figs. 4, 5, 6, 7, and 8 are reproductions of parts shown in Fig. 1 in the various positions assumed by the needles when the machine is in operation. Fig. 9 shows, on a very much enlarged scale, the form of the point-shifting needles, the stop-needles, and the knitting-needles. Fig. 10 shows very much magnified a small piece of the web which may be produced by the improved machine.

In all the figures of the drawings, 1 represents the lace-needles, 2 the stop-needles, and 3 the knitting-needles. The latter needles 3 are provided in larger numbers than the others and form a connected row in each of the divisions A B C, while the lace-needles 1 and the stop-needles 2 are comparatively few in number and stand in smaller groups of two or three, according to the nature of the open-work pattern to be produced. This can be observed clearly in Fig. 3, wherein in divi-

sion B the knitting-needles are omitted. The lace-needles 1 are secured in the lace-point bar 4, while the knitting-needles 3 are secured in the needle-bar 15. The lace-point bar 4 is suspended from the shaft 17 through the medium of the arm 16, and these parts 1, 4, 16, and 17 may be called the "open-work" attachment.

In order to show the machine with clearness, the fashioning or narrowing needles 6 are illustrated. However, these are not of the essence of the present invention. These narrowing-needles 6 are secured in the smaller needle-bars 7 8. All the needle-bars 7 are rigidly connected to the bar 9 and all needle-bars 8 to the bar 10. These enumerated parts 6 7 8 9 10 are mounted upon the shaft 11, through the medium of the lever 5 and may be designated as the fashioning or narrowing attachment. The sinkers 12 in their operation are moved to and fro horizontally. The knocking-over bits 18 remain fixedly in their place.

We will next explain how the operation proceeds when the needles 1 and 3 and the sinkers 12 work without the coöperation of the new stop-needles 2.

Fig. 4 shows the positions of the parts at the moment when the knitting-needles 3 have reached the highest point in their movement, the web 19 hanging on the knitting-needles, the sinkers 12 being projected, and the lace-needles 1 being about to lay their grooves upon the knitting-needles. In Fig. 5 the lace-needles have so laid themselves upon the knitting-needles 3 that their points 1' have entered the grooves 3'', Fig. 9, and the beard 3' is entirely covered by the groove 1'', Fig. 9. Thus tightly closed together the two needles move downward through the loops. The loops resting upon the jack 18 are stripped from the knitting-needles 3 and shoved upon the lace-needles 1. This series of steps in the formation of the loops takes place only where the lace-needles 1 are located in the lace-point bar 4. (See Fig. 3.) Those knitting-needles 3 which are not covered by lace-needles 1 retain their loops and produce a smooth web. Fig. 6 shows the next succeed-

ing moment of the needle operation. Web 19 no longer hangs upon the knitting-needles 3, but has now been fully pushed upon the lace-needles 1. The lace-needles 1 now begin to elevate themselves from the knitting-needles 3. In Fig. 7 both needles 1 and 3 have moved upward, the web 19 has been carried upward with them, and while this was taking place the lace-needle 1 has with them raised itself from the knitting-needle. In this elevated position of the needles the shaft 17, Fig. 2, together with all the parts mounted upon it, being one or too needles, according to the pattern of the goods, is moved to the left or right. Upon the shaft 17 is secured the lace-point bar 4 (see also Figs. 1, 2, 3) and the needles 1. Since upon each lace-needle 1 a loop hangs, Fig. 7, these loops will be taken laterally a distance of one or two needles, and at this point the knitting-needles 3, Fig. 7, move into the dotted position, so that the loop can be transferred from the needles 1 to the needles 3. This may be seen clearly in Fig. 10, where a number of knitting-needles 3 are shown from above in horizontal section. The knitting-needles 3 are hung with loops, excepting the needles 3⁰, which are cleared, in consequence of the lace-needles 1 having taken the loops from them and covered them by the neighboring needles 3', as is illustrated in Fig. 7. In Fig. 8 both of the needles 1 and 3 now move again downward. The web 19, which was elevated in Fig. 7, has been taken downwardly in Fig. 8 and again rests in the position which it assumed in Figs. 4, 5, 6 upon the knocking-over bits 18. The sinkers 12 now move forward horizontally and secure the web 19 so that it is confined between the knocking-over bits 18 and the beaks 12' of the sinkers. If now the needles 1 and 3, covered the one by the other, move upward in common, the loops are pushed from the needles 1 and slide among the needles 3 again. The lace-needles 1 are now free and again separated from the knitting-needles 3. The parts have now again reached a position similar to that shown in Fig. 4.

By the proceedings as outlined with reference to Figs. 4 to 8 beautiful open-work patterns may be produced. Fig. 10 is not given as a sample of a very artistic production. Fig. 10 is designed simply to show how a progressive series of openings $x x x$ may be produced. If the three lace-needles 1 in Fig. 10 are brought into operation, there would be produced not simply the single row of openings $x x x$ in the middle of the web, but two lateral rows of openings $x' x' x'$ and $x'' x'' x''$. We can with our invention accomplish the ornamentation of the pattern and the variegation thereof to a very much greater extent. This object is attained in consequence of our being able to interrupt one or more of the lace-needles 1 for the production of openings $x x x$ at will. It is also

practicable to omit openings and introduce plain work, just as often as may be desired, along the lines $x' x' x'$ and $x'' x'' x''$. If in Fig. 10 it should be desired to introduce a row of openings at 3⁰ 3⁰ 3⁰, this can likewise be accomplished by simply omitting all of lace-needles 1 1 1. In order to accomplish this purpose, we have invented the curved stop-needles 2, which are brought into engagement with the lace-needles 1 from below and bend the latter backward. Whenever a lace-needle 1 is thus engaged and bent backward, it cannot cover its corresponding knitting-needle 3 and no open-work will then be produced at such point, but instead the web will be entirely smooth. The effect at such time will be precisely the same as if no lace-needle had been provided at that point. According to our invention the stop-needles 2 may be permitted to work or be held at rest at will. Figs. 1 and 9 show the stop-needle in operation, while in Figs. 4, 5, 6, 7, and 8 it is shown at rest. The stop-needle 2 is formed with a groove 2'' (see Fig. 9) on the inner side of its curved portion, and the lace-needle 1 is formed with the groove 1''. The two needle-points 1 and 2 can therefore be made to engage with absolute certainty, inasmuch as the point 1' engages in the groove 2'' and the point 2' engages in the groove 1''.

The stop-needles 2 and the bar 14, which carries them, receive motion from the levers 20 and 21. The lever 21 swings about the shaft 22 and carries the lever 20, which swings upon the pivot 23. The shaft 22 is connected rigidly with the levers 21 and 24. The lever 24 carries on its end the guiding-roller 25 and is so held by a spring 26 that the roller 25 rolls upon the periphery of a cam 27, which is mounted upon the main shaft 28. Upon this main shaft 28 is also mounted a cam 29, upon which the roller 30 turns. The latter turns about the pivot, which is mounted upon the lever 31. The lever 31, mounted loosely on the shaft 32, will also be held by the spring 33 in such a position that the roller 30 remains upon the cam 29. The jointed rod 35 is connected to the lever 31, which connecting-rod 35 operates the lever 20 with its other end. The two cams 27 and 29 thus impart the necessary movement to the lever 20 and to the new stop-needles 2. The other levers shown in the drawings—for instance, the lever 34, which moves the needle-bar 15—which are well known, need not be described in detail here.

Having thus described our invention, the following is what we claim as new therein:

In an open-work attachment for knitting-machines, the combination with the vertical knitting-needle 3, the vertical lace-needle 1 arranged above the same, and having a groove, and the horizontally-positioned jack 18; of a stop-needle mounted below the jack 18 and curved at its end, having a groove on the inner side of its curved portion, means for

5 throwing the stop-needle upwardly from below and in advance of the jack 18, between the knitting-needle and the lace-needle, to engage the lace-needle, the points of each fitting in the groove of the other, and separate means for moving the stop-needle horizontally to throw the lace-needle into an inoperative position.

In witness whereof we have signed this specification in the presence of two witnesses. 10

BRUNO SALZER.
GUSTAV WALTHER.

Witnesses:

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H. THIELE.