(No Model.) 2 Sheets—Sheet 1.

J. J. ADGATE & S. P. KITTLE.

KNITTING MACHINE NEEDLE.

No. 332,372. Patented Dec. 15, 1885.

Fig. 1.

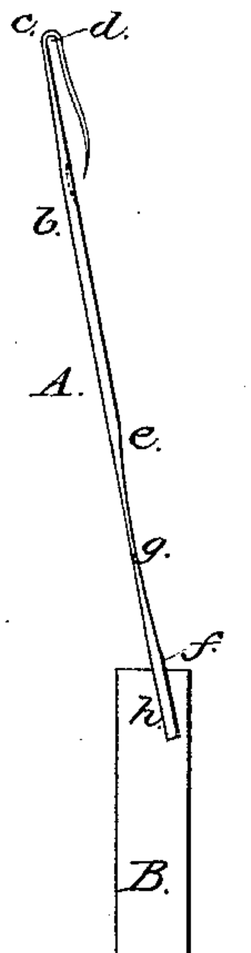


Fig. 2.

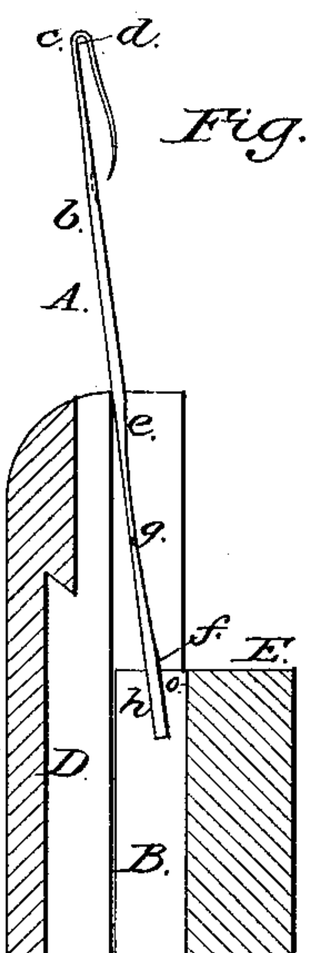


Fig. 3.

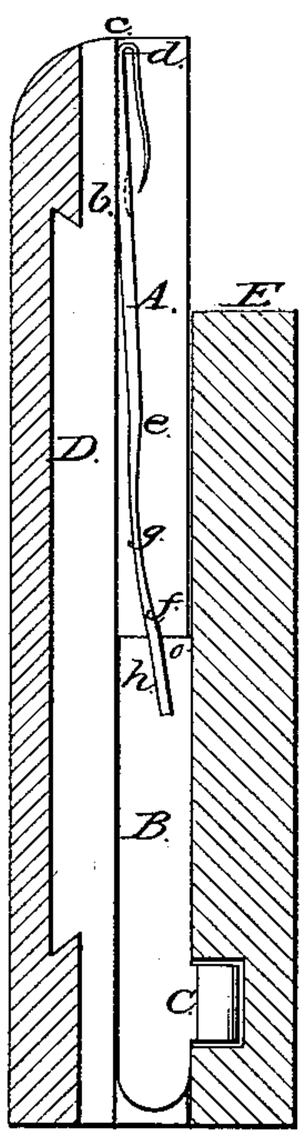


Fig. 4.

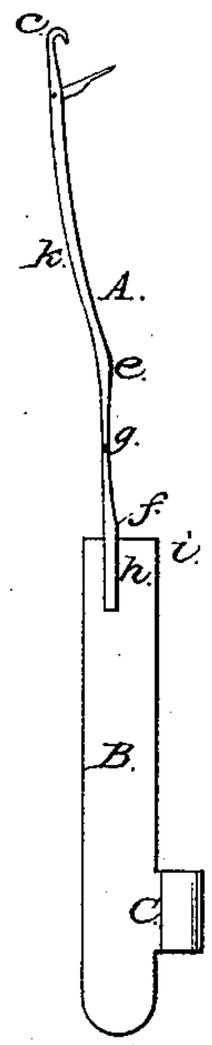
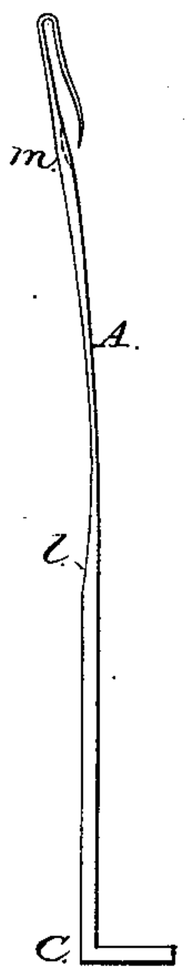


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

J. J. ADGATE & S. P. KITTLE.

KNITTING MACHINE NEEDLE.

No. 332,372. Patented Dec. 15, 1885.

Fig. 6.

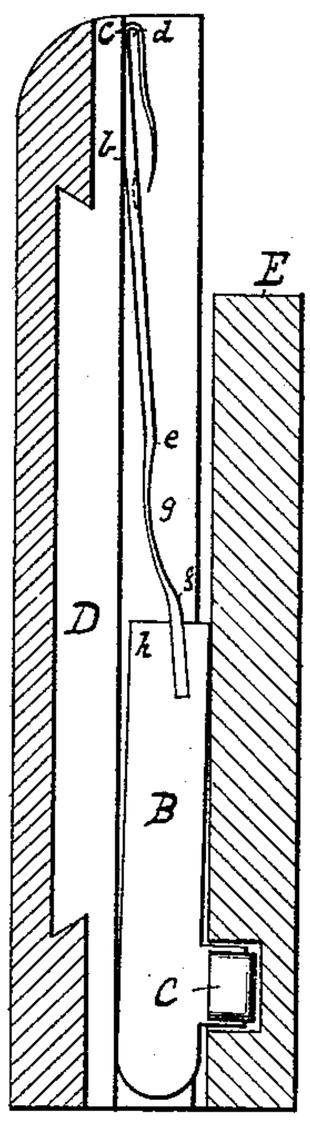
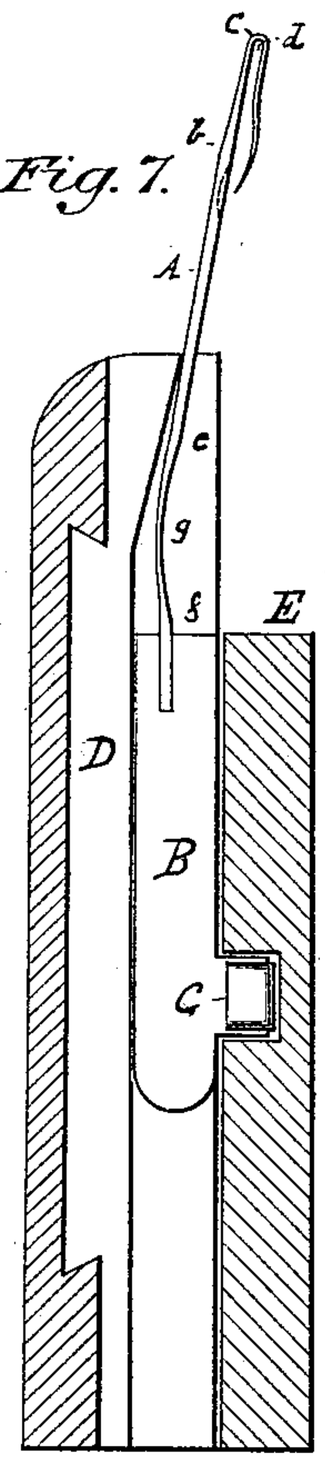


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSEPH J. ADGATE AND SAMUEL P. KITTLE, OF NEW YORK, N. Y., ASSIGNORS TO THE ADGATE ROTARY LOOM COMPANY, OF SAME PLACE.

KNITTING-MACHINE NEEDLE.

SPECIFICATION forming part of Letters Patent No. 332,372, dated December 15, 1885.

Application filed November 13, 1883. Renewed May 20, 1885. Serial No. 166,175. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH J. ADGATE and SAMUEL P. KITTLE, both of the city, county, and State of New York, have invented certain new and useful Improvements in Knitting-Machine Needles, of which the following is a specification.

Our invention relates to knitting-machine needles, the upper ends of which are made to fall back behind the vertical plane of the bottom of the needles' grooves when the needles ascend, thereby throwing the needles out of line, with other needles which ascend and descend vertically, so as to take up and incorporate into the knitted web a second or weft thread.

Spring-needles as heretofore constructed have been made of a uniform size through the whole length of their bodies or shanks up to the recess for the beard, and the flexure has been distributed through the whole length of the needles. This construction of the needles causes an excessive strain on that portion at the top of the jack and increases the danger of breaking or snapping the needles at that point when they are bent. It also causes the pressure of the needle against the needle-groove to come upon a single point of the needle, which, when the needle has descended the full distance in making a stitch, will be the extreme end. This causes undue wear and friction of the needle-groove, and needles thus constructed cannot have a smooth and even motion in their grooves, especially when subjected to the tension of the knitted fabric. We overcome these objections and obtain a perfectly-working needle by making a flattened or reduced elastic portion or spring in the body or shank of the needle, so that the flexure may be in this reduced spring portion, and by giving the rear edge or back of the needle the form hereinafter described we obtain a smoooth and even bearing of the needle in the neeedle-groove and avoid all unnecessary friction and wear of the needle in the groove.

In the drawings, Figure 1 is a view of our improved needle. Fig. 2 is the same showing the position of the needle when raised to the highest point by the cam-race. Fig. 3 is a view of the needle depressed to the lowest point by the cam-race. Figs. 4 and 5 are modified forms of our needle. Fig. 6 is a modification of our invention wherein part of the forward motion of the needle is provided for by allowing the jack to play forward. Fig. 7 is a modification wherein the needle which takes in the front thread only is made to spring forward.

Similar letters of reference designate similar parts in all the drawings.

A is our improved needle. B is the needle-jack. The straight needle shown in Figs. 1, 2, and 3 is set at an angle in the jack B, so that the upper end of the needle will, when the needle is elevated, project back of and out of line with the needle-jack. If all the forward motion of the needle is to be taken up by the spring, sufficient space only is left between the needle-cylinder and the cam-cylinder for the needle-cylinder with its needles to revolve within the cam-cylinder and for the jacks to rise and fall, but not to play to and fro. The portion of the body or shank of the needle A from *e* to *f* is made sufficiently elastic and thin to form the reduced spring portion *g* so that the needle may be sprung forward as it descends past the upper edge of the needle-cylinder, Fig. 3, and be brought into line with the vertical needles. The reduced spring portion *g* is below that part of the needle which traverses the loop. By reducing the thickness of the needle, as shown, from *e* to *f*, we are enabled to allow the forward spring of the needle to be in that portion only from *e* to *f*, and by this means to avoid the danger of breaking the needle in its lower portion near its union with the jack, and also to enable the upper end of the needle to lie smoothly and evenly in the groove as it ascends and descends, which is not the case where the spring of the needle is distributed in its whole length. Another advantage we obtain by thus reducing the thickness of the needle, as shown, from *e* to *f* is, that owing to the thinness of the needle in this portion it will spring easily and will not be liable to break, as are needles which are left nearly or entirely their full size in this portion. Such needles are liable to break at or near the upper end of the jack, and this liability we overcome by our improvement. The forward part

of the needle is straight and continues so up to the point *d*, where the beard is bent over. This construction enables the yarn to slide easily upon the needle as the needle ascends. The rear side of the needle, however, inclines gradually forward up to the upper end, as from *b* to *c*, so that when the needle descends, Fig. 3, this inclined portion of the needle will rest flatly against the bottom of the needle-groove. The length of this inclined portion of the needle will be regulated by the position of the needle in the jack, increasing as the needle is moved toward the rear of the jack; but it will not be found practicable to have this inclined portion extend the whole distance from the upper end of the jack to the upper end of the needle, for this would require the needle to be placed on the extreme inner edge of the jack, which would not be a practicable construction, and would, furthermore, interfere with the proper spring of the needle. This construction gives an even bearing in the groove and prevents uneven wear of the needle and groove; and this improvement of having the forward part of the needle straight and the rear part inclined for the purpose of allowing the thread to slide easily upon the needle may be applied to rigid needles, as well as our improved spring-body needles.

Our invention of forming an elastic or spring-body needle may be applied to the latch-needles as well as spring-beard needles, and another modification of our invention would be to have the needles which take in the front thread only spring forward as they ascend, as shown in Fig. 7.

We do not confine ourselves to a straight needle set at an angle in a jack, for the needle may have various forms, and part of the forward motion may be taken up by allowing the jack to play forward and the remainder by the spring of the needle. (See Fig. 6.) Nor do we confine ourselves to forming the spring in needles which are held in jacks, for a needle without a jack may be used if suitable provision is made to prevent or limit the to-and-fro movement of the part of the needle below the spring.

We claim as new and our invention—

1. A knitting-machine needle having the shank A provided with the reduced spring portion *g*, as described, and for the purposes set forth.

2. A knitting-machine needle having the shank A provided with the reduced spring portion *g* and the inclined back portion, *b c*, as described, and for the purposes set forth.

3. A knitting-machine needle having the shank A provided with the reduced spring portion *g*, the inclined back portion, *b c*, and the straight forward edge behind the beard for the yarn to slide upon, all substantially as set forth.

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SAMUEL P. KITTLE.

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WILLIAM D. NEILLEY.