

No. 816,403.

PATENTED MAR. 27, 1906.

E. TOMPKINS.
LOOP UNIFYING AND CAST-OFF BUR.

APPLICATION FILED APR. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

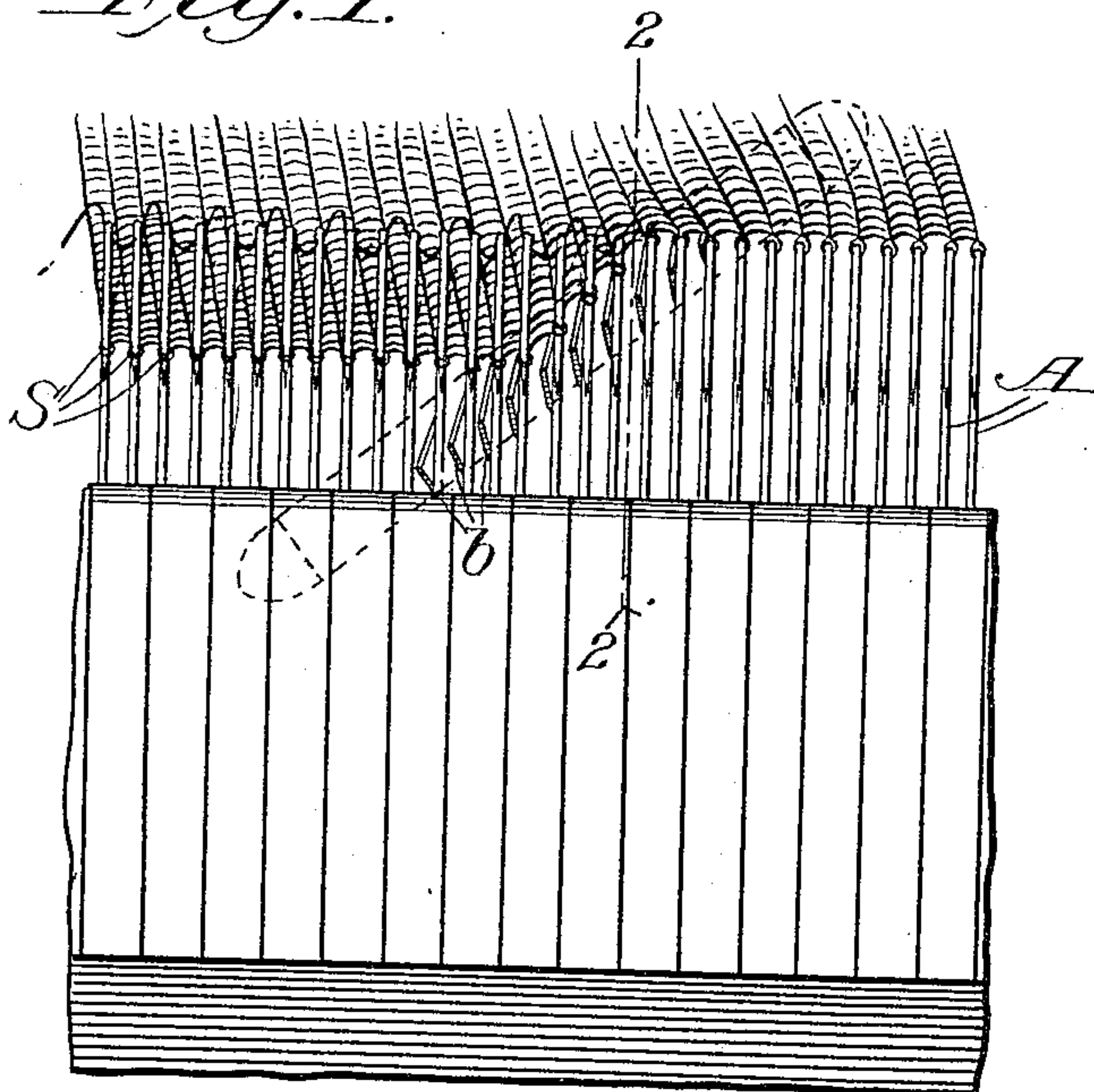


Fig. 2.

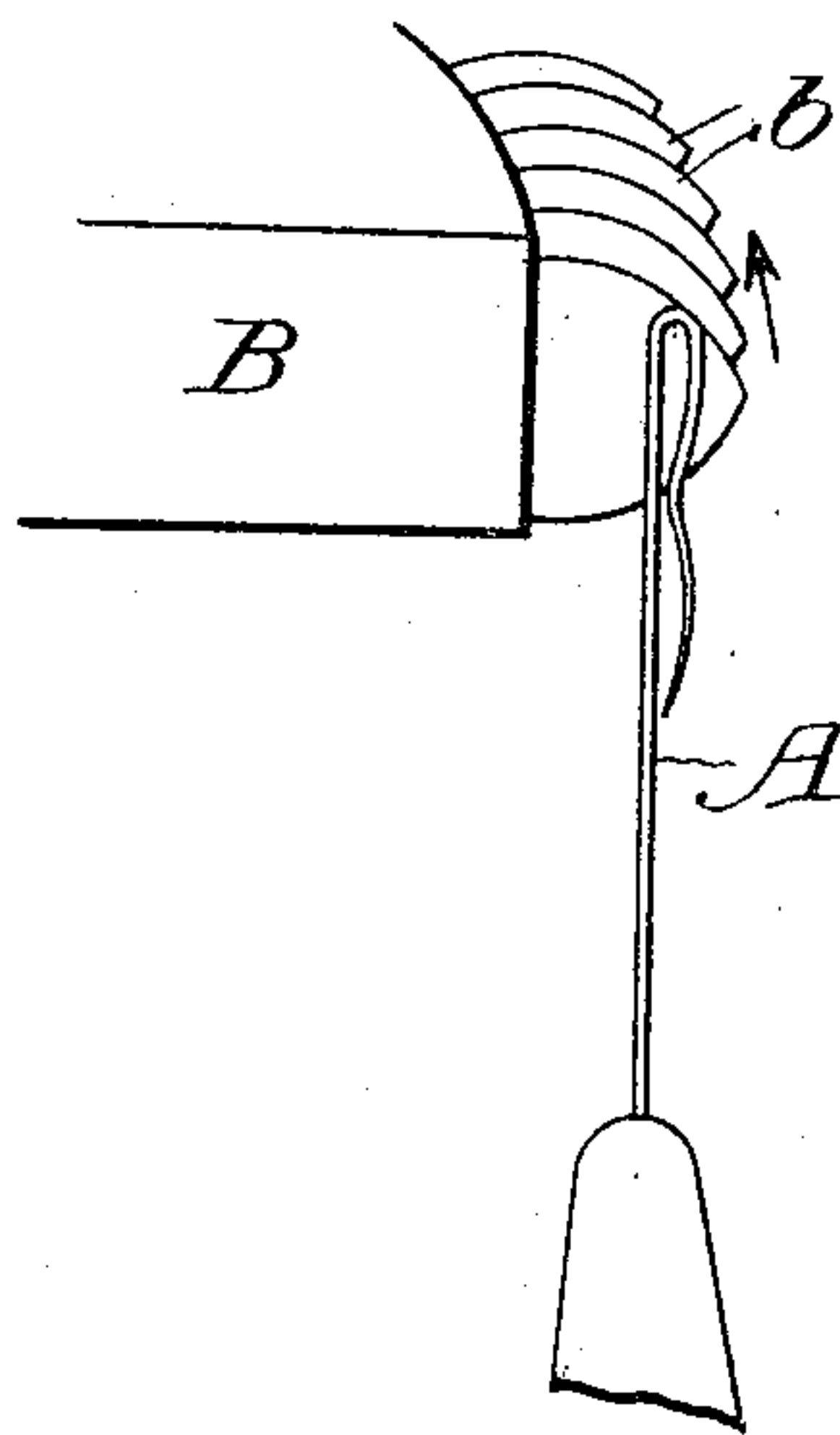


Fig. 3.

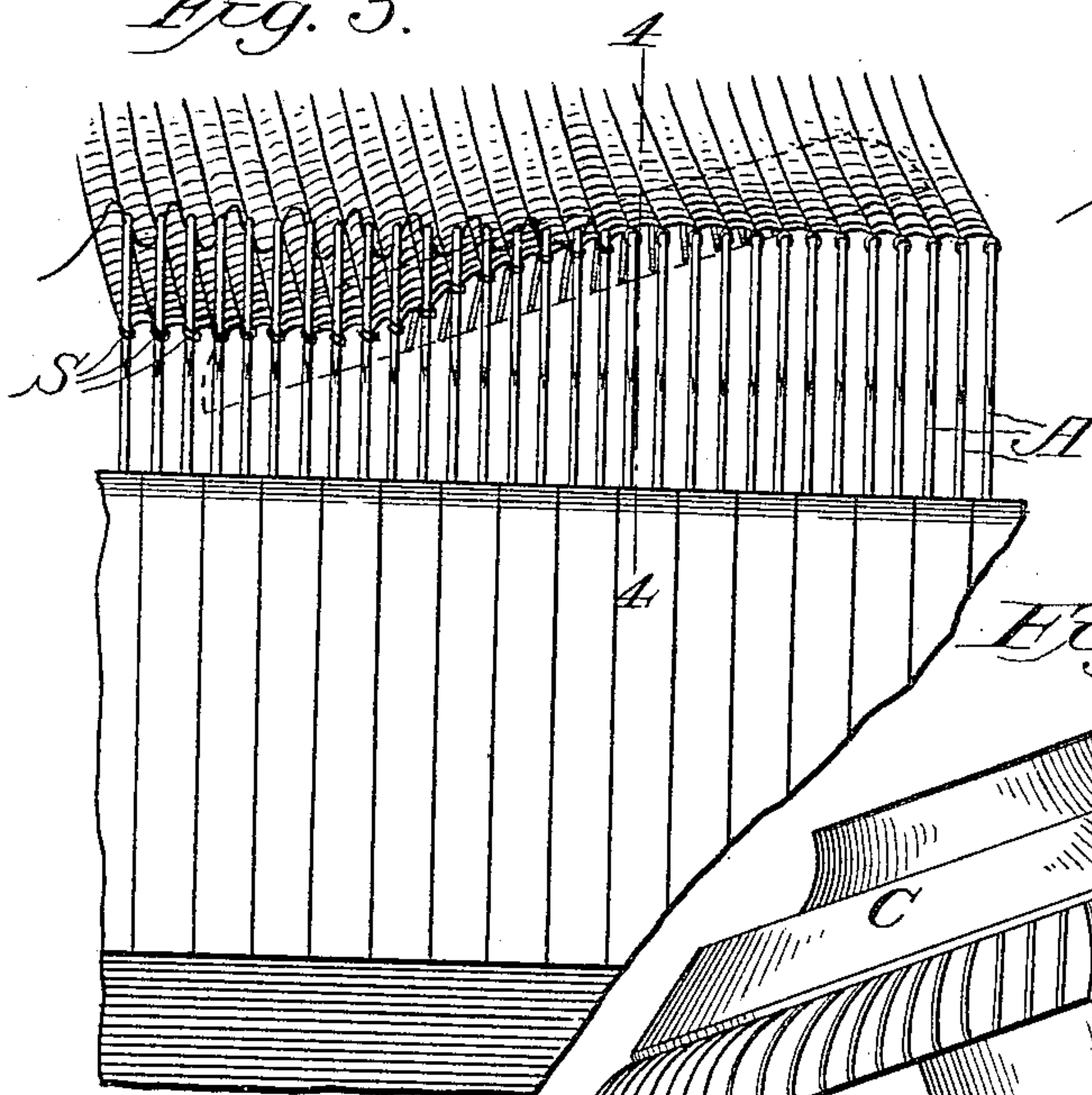


Fig. 4.

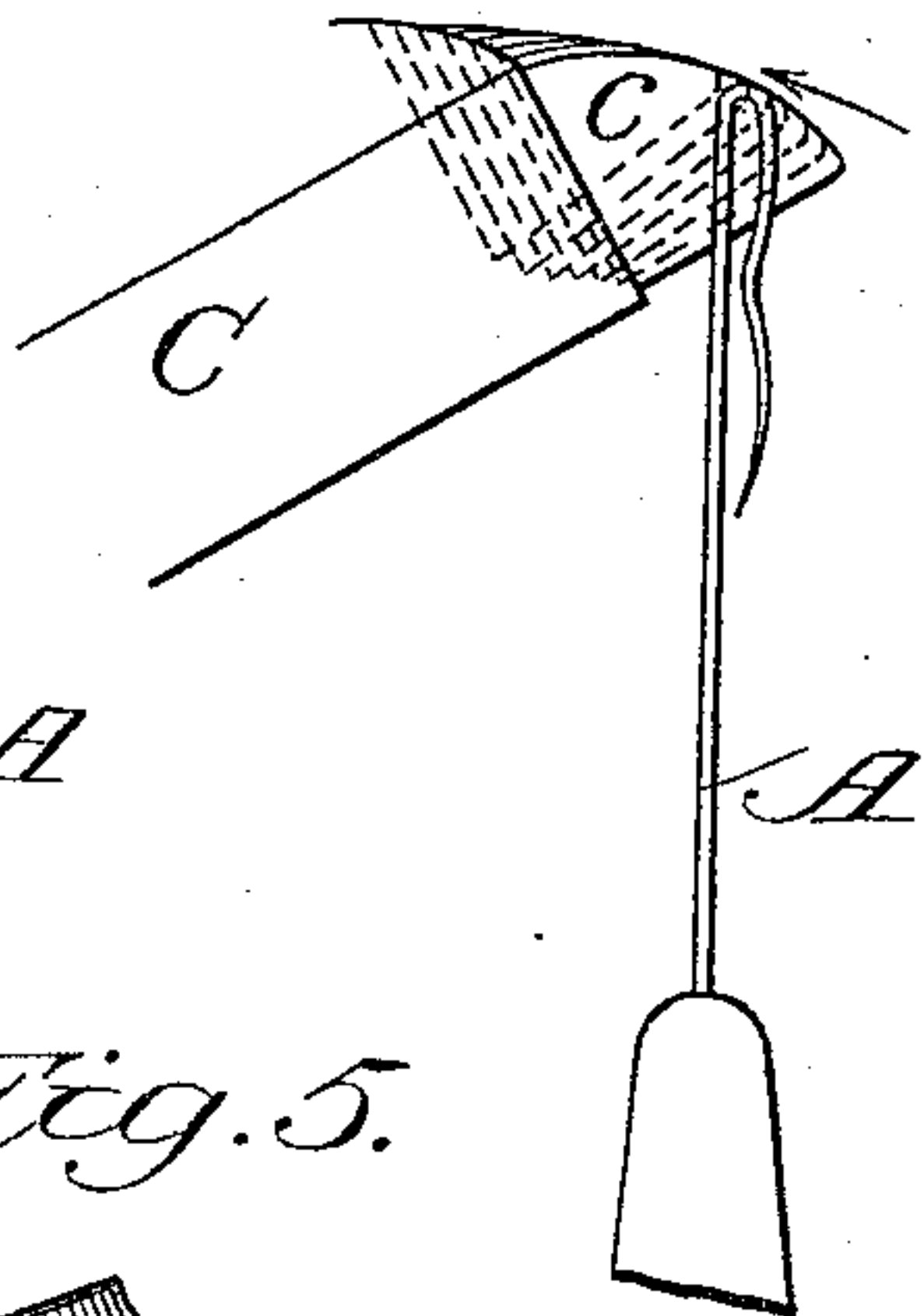
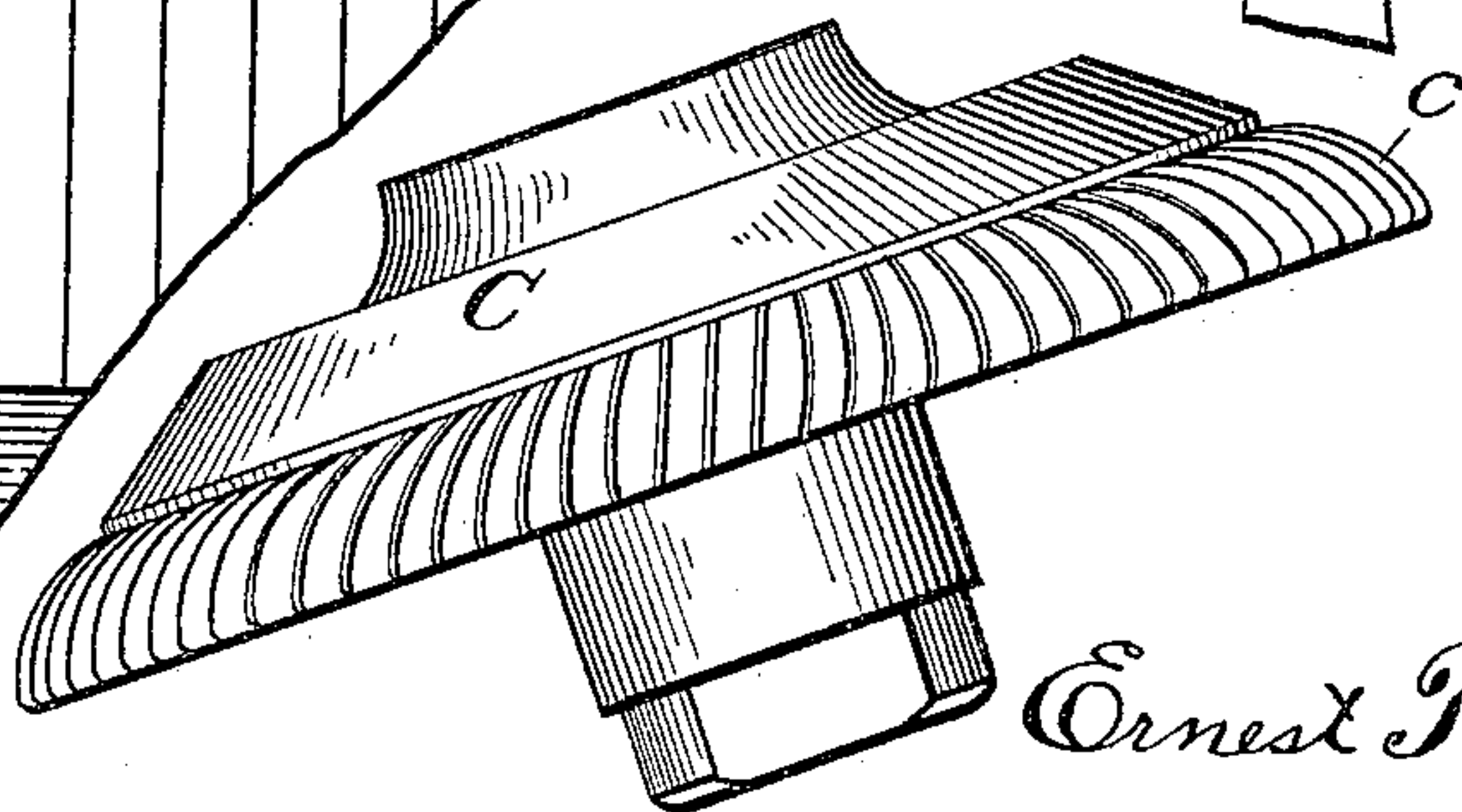


Fig. 5.



Witnesses

C. H. Walker.
James P. Mansfield.

By

Alexander F. Fowell
Attorneys

Inventor
Ernest Tompkins

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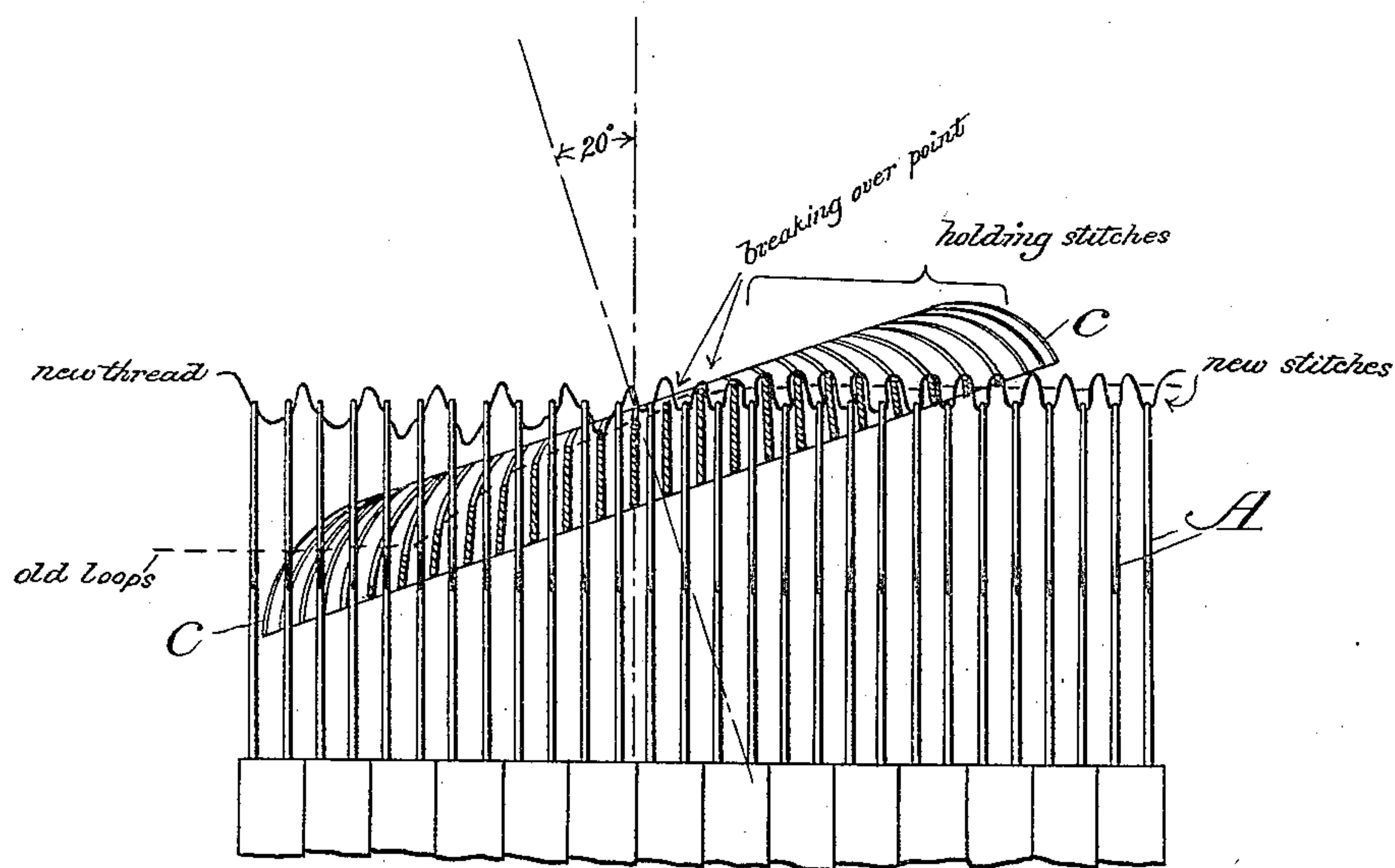
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2 SHEETS—SHEET 2.

Fig. 6.



WITNESSES

C. H. Walker
James B. Mansfield

INVENTOR

By: *Ernest Tompkins*

Alvan T. Fowell
Attorney

UNITED STATES PATENT OFFICE.

ERNEST TOMPKINS, OF TROY, NEW YORK.

LOOP-UNIFYING AND CAST-OFF BUR.

No. 816,403.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed April 6, 1905. Serial No. 254,156.

To all whom it may concern:

Be it known that I, ERNEST TOMPKINS, of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Loop-Unifying and Cast-Off Burs; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in knitting-machines, and has particular reference to the burs employed in casting the stitches off the needles after the yarn or thread for the new stitches has been placed under the beards of the needles.

The object of the invention is to insure an even formation and uniform tension of the stitches, thus preventing one loop or stitch drawing from an adjacent loop, and thereby producing irregularities in the appearance of the work and to do this without the employment of jacks for casting off the stitches, all of which is accomplished by the novel construction and arrangement of the improved cast-off bur, which positively holds the stitches against the heads of the needles and evens them by applying uniform tension in the direction of the axis of the needles and holds a number of the stitches simultaneously, so that the stitches being brought up to the needle-heads cannot pull back thread from previously-formed loops.

The invention therefore consists in the novel construction and arrangement of the cast-off bur, and resides principally in the formation of the bur-blades or those portions thereof which engage the stitches which are set at such an angle to the needles and so curved on their thread-engaging portions that the blades act as cams to press the stitches vertically or longitudinally of the axis of the needles instead of horizontally or transversely thereof and so that after a blade has raised the stitch to the head of the needle it will hold it there during the formation of a number of subsequent stitches and gradually withdraw therefrom, the resultant effect being similar to that of the cast-off jacks heretofore employed for the purpose of insuring uniformity in size and tension of stitches, the improved bur positively casting off the stitches and holding a number of stitches intermediate the newly-formed stitch and that just cast off, thus preventing the stitches stealing from each other and in-

suring absolute uniformity thereof with consequent improved quality in the product of the machine.

As the new cast-off bur (apart from its location and operation in the machine) much resembles the ordinary cast-off burs in looks, (although operating in a different or superior manner with most important practical results wholly unobtainable with the old burs,) it is difficult to explain by descriptions and drawings. I have illustrated in Figures 1 and 2 the position and relative action of an old bur, and in Figs. 3 and 4 the position and action of the new bur, which is also shown in detail in Fig. 5. The drawings Figs. 1 and 3 have been copied from photographs of actual machines equipped, respectively, with the old and new burs, so that the differences illustrated therein are actual and not imaginary.

In said drawings, Fig. 1 is a detail view of part of a knitting-machine with the old cast-off bur. Fig. 2 is a detail view on line 2 2, Fig. 1. Fig. 3 is a view similar to Fig. 1 with my new bur in place. Fig. 4 is a similar view on line 4 4, Fig. 2. Fig. 5 is a side view of the new bur. Fig. 6 is a diagrammatical view showing a section of the bur along the surface defined by the needles when the bur is properly adjusted relatively thereto.

A A designate the needles of an ordinary cylinder knitting-machine.

B designates an ordinary cast-off bur rotatably mounted within the cylinder and behind the needles, but in sufficiently close proximity thereto to have its outermost blades mesh with the row of needles, which in moving past the bur rotates the same. This old bur is set at an angle of about forty-five degrees to the needles, and, as shown, ten of its blades *b* are simultaneously engaged with the needles and (passing from left to right) each blade successively assumes the positions shown by the several blades, although each blade remains engaged between but one pair of needles and operates only on the stitch formed between said needles.

The thread is looped over or around the lower points of the beards of the needles, as indicated at S, before they reach the cast-off bur, (and by the usual mechanism, not shown.) As the stitches pass the cast-off bur they are pushed outward and upward by the blades *b*, as indicated in Figs. 1 and 2, as each blade has an upward motion relative to the needles while engaged therewith, due

to the rotation and inclination of the bur on its axis, and it will be seen by reference to Figs. 1 and 3 that the blades *b* disengage the stitches and, in fact, push over them just as the stitches reach the tops of the needles, and there is nothing to prevent the next or succeeding stitch pulling back or stealing from the stitch just cast off. In fact, this defect is incident to all present forms of cast-off burs known to me, and it has been customary heretofore to employ cast-off jacks to prevent such inequalities in the loops or stitches. It will be observed by reference to Fig. 2 that the cam action of the blades on the stitches strains the needles transversely and outwardly, the strain increasing as the blades near the tops of the needles, and in practice the blades frequently deflect the needles so much that breakage results, and such deflection itself causes inequality in the stitch formations.

In Figs. 3 *et seq.* I have shown my improved form of bur, which differs from those previously known in the construction of its blades and in the angularity of its adjustment relatively to the needles, as I will now explain. The new bur *C* is preferably set at an angle of about twenty degrees relatively to the row of needles, so that a number of stitches may be drawn equally, and thus evened as they are cast off, and also a greater number of its blades can be engaged with the needles and less strain be placed on the needles in rotating the bur. In the construction shown in Fig. 3 it will be seen that for same size bur (as compared with Fig. 1) I engage about thirteen blades *c* with the needles as against ten on the old-style bur, and, moreover, twelve out of my thirteen blades are in active operation simultaneously on the stitches, while in the old style only six are in active operation, as the four lowermost blades are not acting on stitches. In order to obtain this lessened inclination of the bur and increased number of active blades, the blades *c* in the new bur are attached at a less angle to the axis thereof than the blades *b* in the old bur. The upper working surface or edge of the blades *c* of my new bur, moreover, is much larger than the corresponding edge of the blades of the old bur, and the curvature is such that while the edge of the blade lifts the loop on the needles it does so by an easy cam action whose pressure is exerted longitudinally of the needle, having a slight outward tendency as it first engages the loops on the lower ends of the beards, but this outward inclination or pressure constantly lessening until it is exerted almost entirely in a vertical direction by the time the blade has raised the loop to the top of the needles, so that the pressure or pull exerted on the raised stitches by the blades *c* is longitudinally of the needles and not laterally thereagainst. Consequently there is no deflection of the needles and the

stitches must come to an exact and absolute size. Further, by reference to Figs. 3 and 4 it will be seen that the blades are so shaped that after they have fully raised and formed the loops they are still projected beyond the needles, and by reference to Figs. 3 and 4 it will be noticed that six of the blades *c* are holding loops, so that the last newly-raised loop cannot pull or steal thread from any of the preceding loops. After fully raising the loops, however, the blades *c* hold the loops in uniform parallelism, (see Fig. 6,) but gradually withdraw inwardly therefrom, casting off the stitches in an easy gradual manner without putting any lateral strain on the needles or fabric in so doing. In the old style the stitches are cast off immediately after formation, (see Figs. 1 and 2,) and there was nothing to retain them in form. Consequently there was nothing to prevent one loop pulling back from a preceding loop, and thus irregularities resulted which impaired the quality and value of the finished fabric, whereas by my improved bur each newly-formed loop is held under constant tension during the formation of a number of successive loops (see Figs. 3 and 6) and the latter cannot overcome the friction or tension of such a number of completed but still positively-controlled loops.

Thus I accomplish by the new and improved form and arrangement of my cast-off bur what has heretofore been considered impossible without the employment of auxiliary or supplemental special devices to regulate and uniformly tension the loops or stitches. It will be noted that my bur is self-contained, the blades being preferably fixedly attached to the bur, and need not move relatively to the bur-body in performing their work during the rotation of the bur.

This new cast-off bur has the advantages of jacks for casting off the stitches in that the new stitches are positively held and drawn even after the old ones are cast off, which advantages are that the stitches thus formed are made more uniform than has ever been possible with the use of the old-style cast-off, this uniformity being especially noticeable in the case of wool and silk and other fibers which require to be held in position while the stitches are being formed, and a tighter stitch may be knit than with the old style of bur, but with the advantages of the rotary cast-off—namely, relative low cost of manufacture, simplicity, durability, strength, and capability of high speed, all of which are retained.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a knitting-machine, a rotary bur provided with fixed blades adapted to positively cast off the old stitches and simultaneously hold a number of new stitches after drawing them to equal length.

2. In combination with a knitting-machine a rotating bur provided with fixed blades each adapted to engage the needles, raise a stitch thereon, tension the stitch, and
5 hold such stitch until a number of successive stitches have been raised, substantially as set forth.

3. In combination with a knitting-machine having a rotating series of needles; a
10 rotatable cast-off bur arranged beside the needle-path and provided with blades adapted to engage the needles, each blade being so constructed that by the mere rotation of the bur it is caused to first engage and raise a
15 stitch on the needle, draw the stitch to a uniform size, and then hold such stitch in form until a number of successive stitches have been formed, thus preventing shortening of the stitches and insuring uniformity of work,
20 substantially as described.

4. In combination with a cylinder knitting-

machine having a series of traveling needles, a rotary bur, located adjacent to the needles, and inclined at an angle of about twenty degrees thereto, and provided with radially-
25 projecting blades, each adapted to engage a needle, and as it moves therewith to push the stitch upwardly on the needle, moving the stitch longitudinally on the needle, to form the stitch, positively tension it, and retain it
30 under tension and in form until a number of succeeding stitches are raised and formed, and finally casting off the stitch, substantially as described.

In testimony that I claim the foregoing as
35 my own I affix my signature in presence of two witnesses.

ERNEST TOMPKINS.

In presence of—

JOHN J. GANNON,

FREDK. W. J. McKIBBIN.