

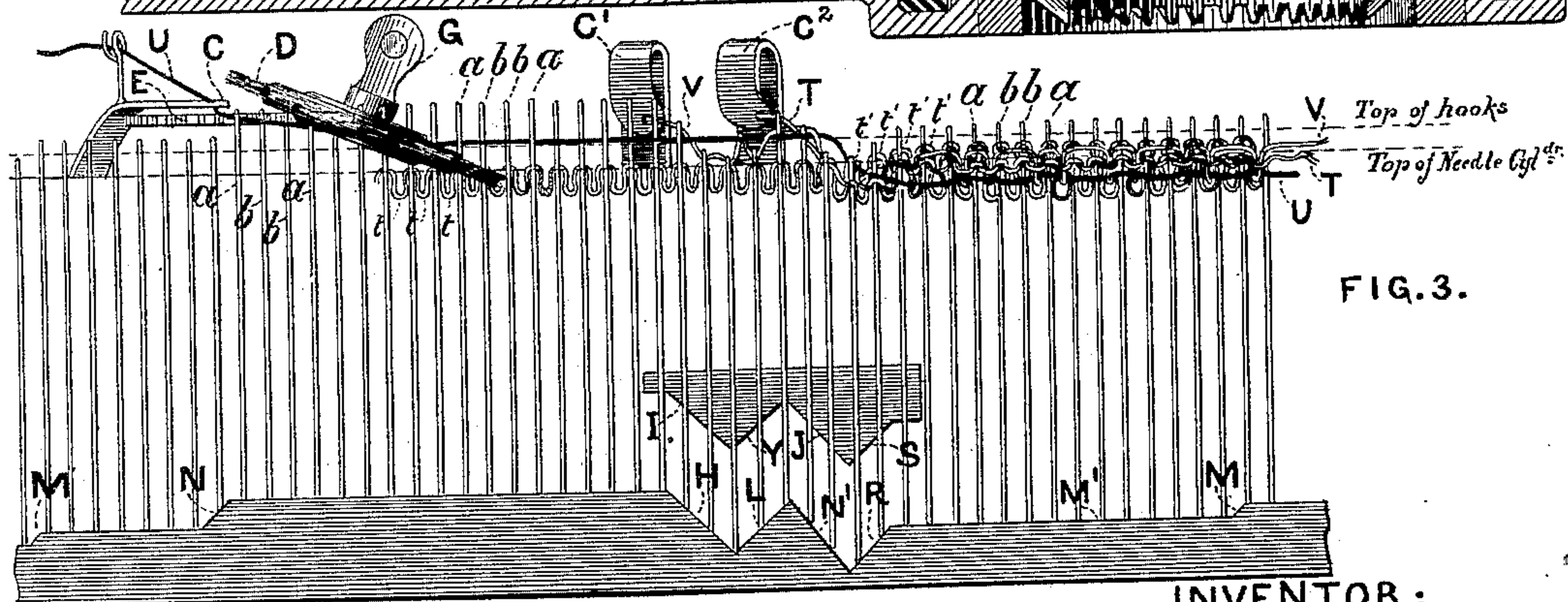
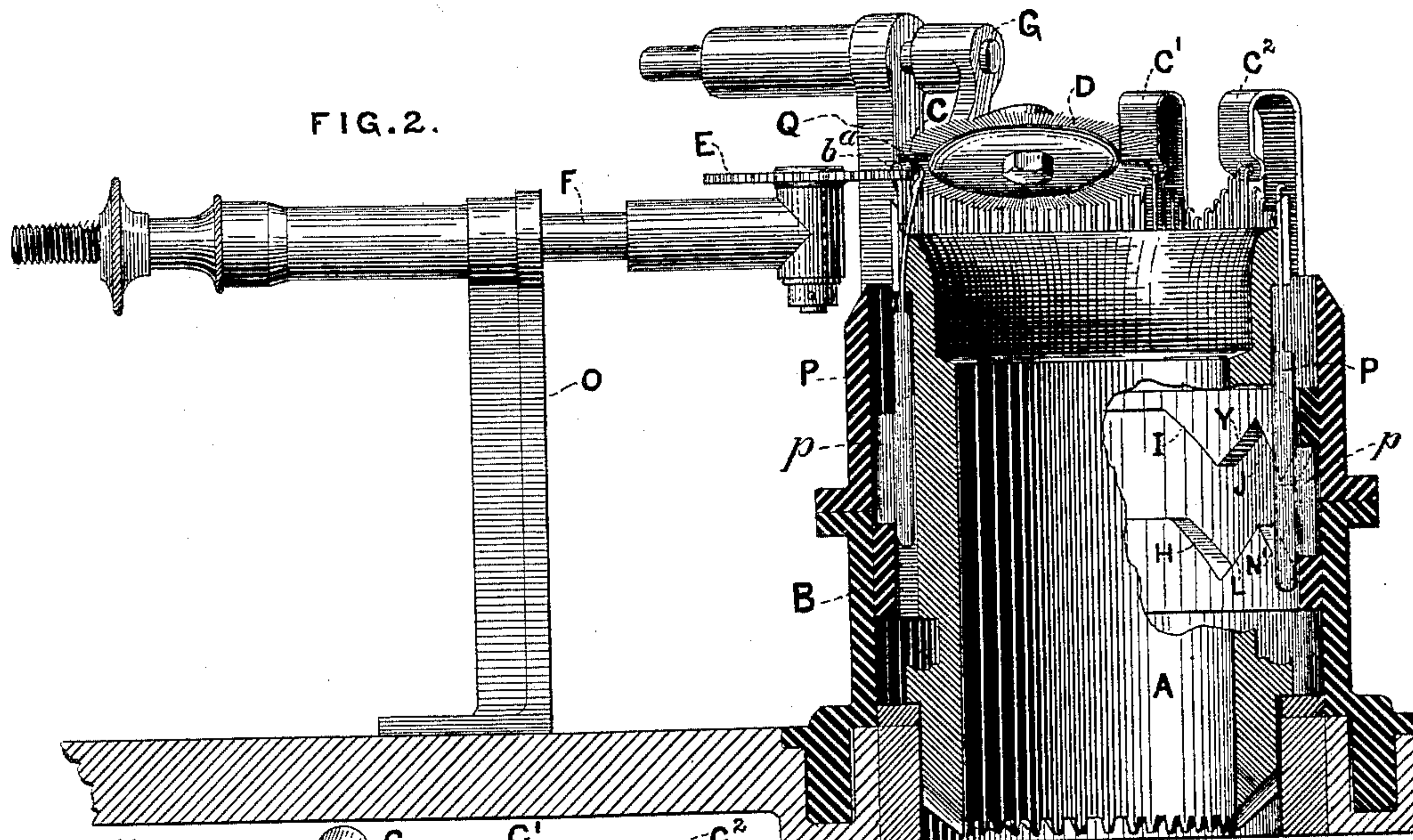
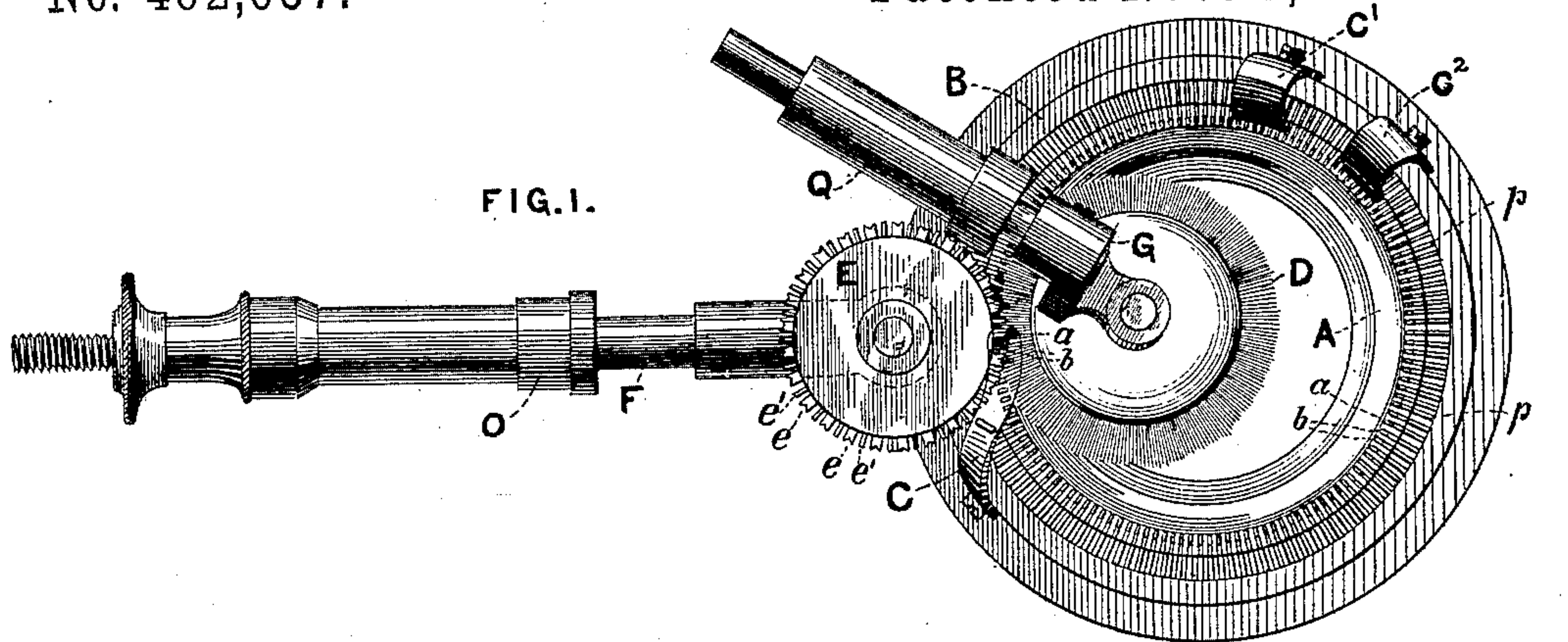
(No Model.)

2 Sheets—Sheet 1.

J. W. ADAMS.
KNIT FABRIC.

No. 462,657.

Patented Nov. 3, 1891.



WITNESSES:

Geo A. Vaillant.
James H. Bell.

INVENTOR:

Joseph W. Adams
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Attorneys

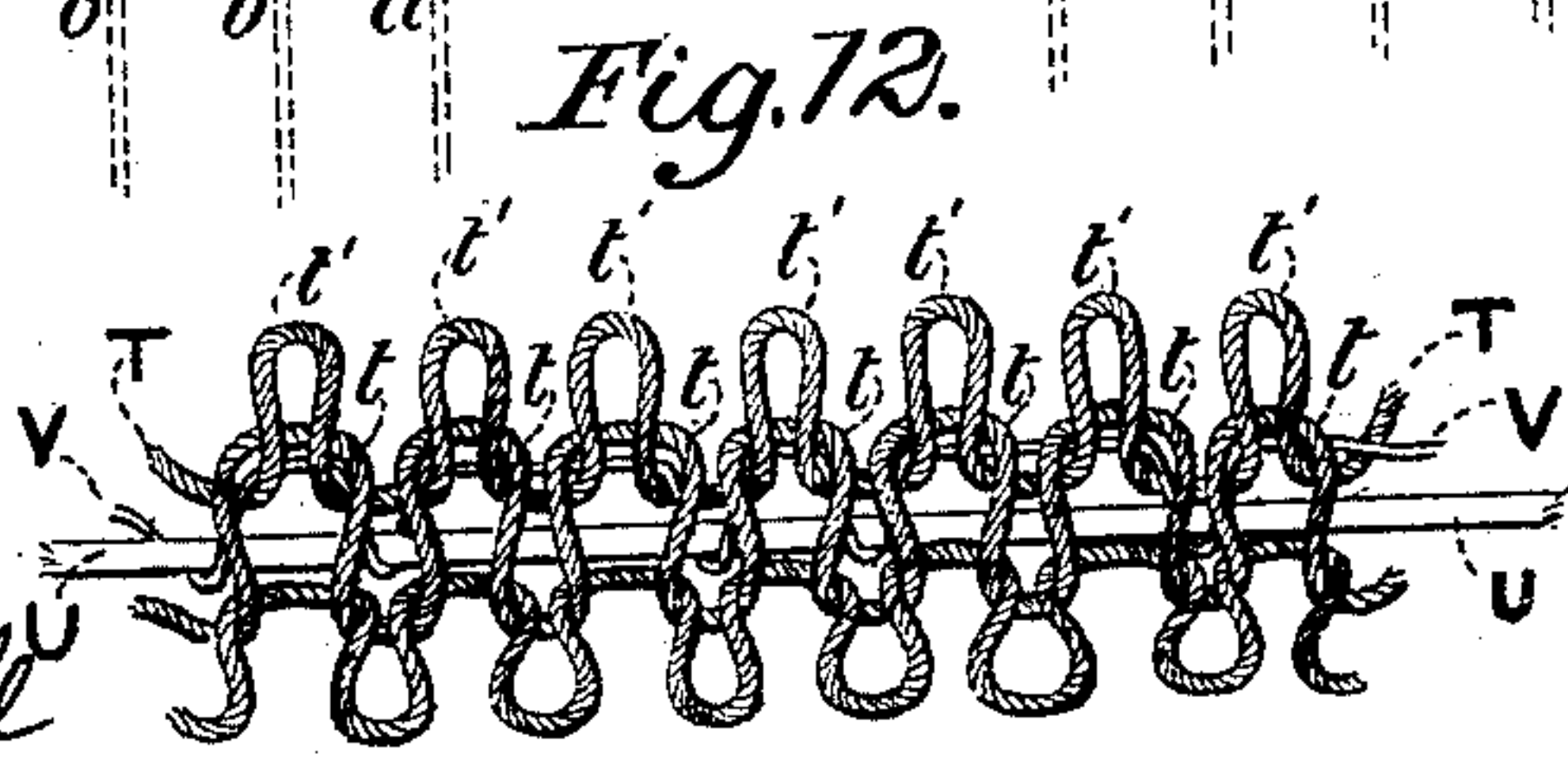
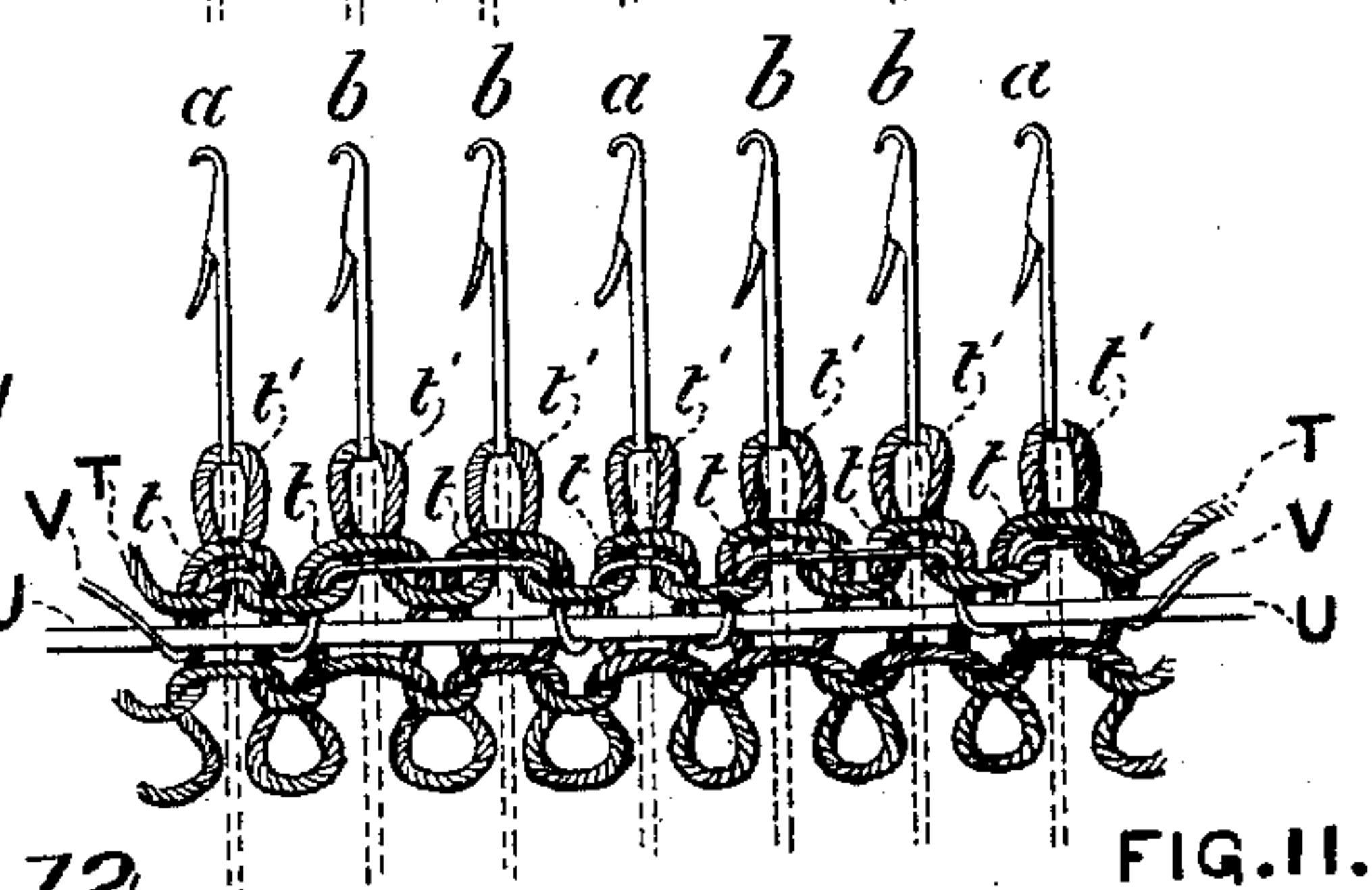
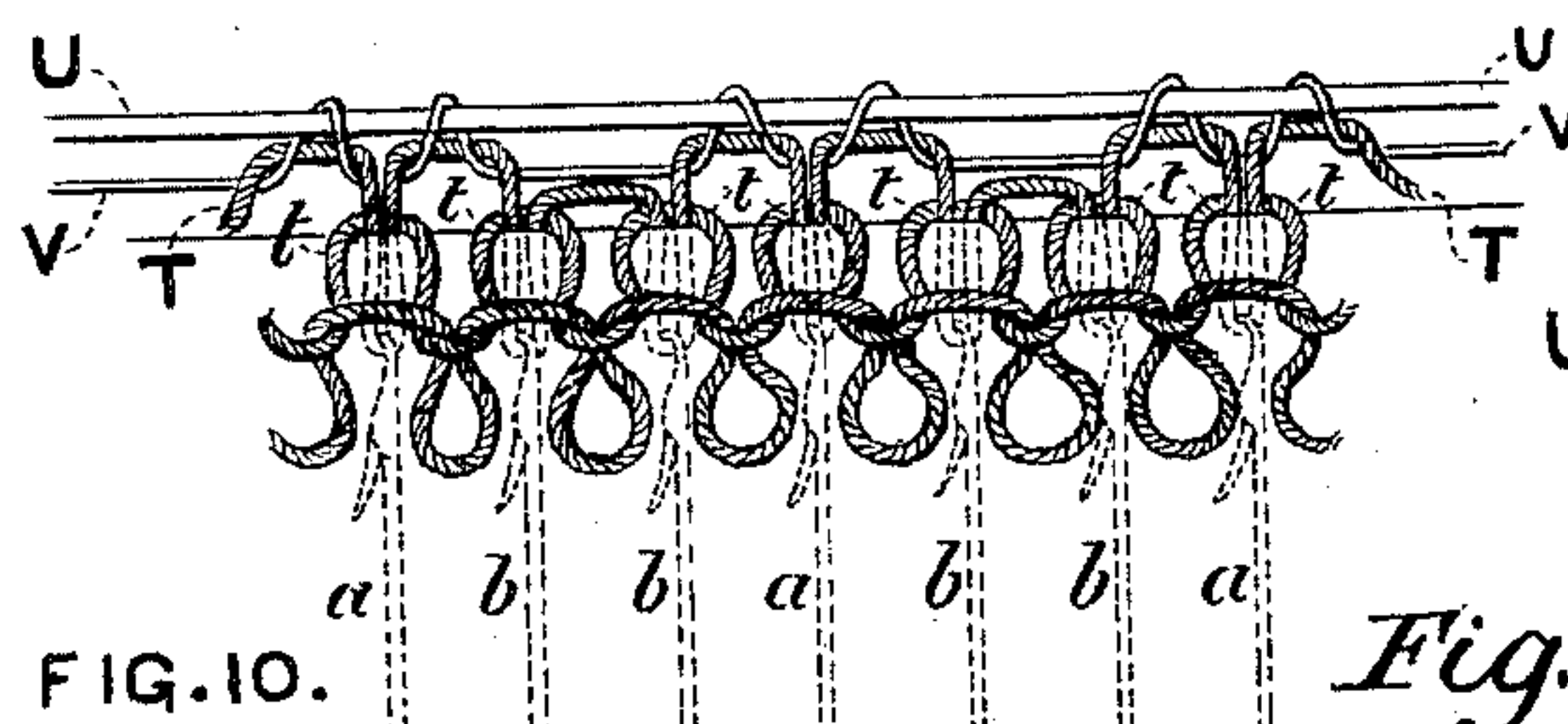
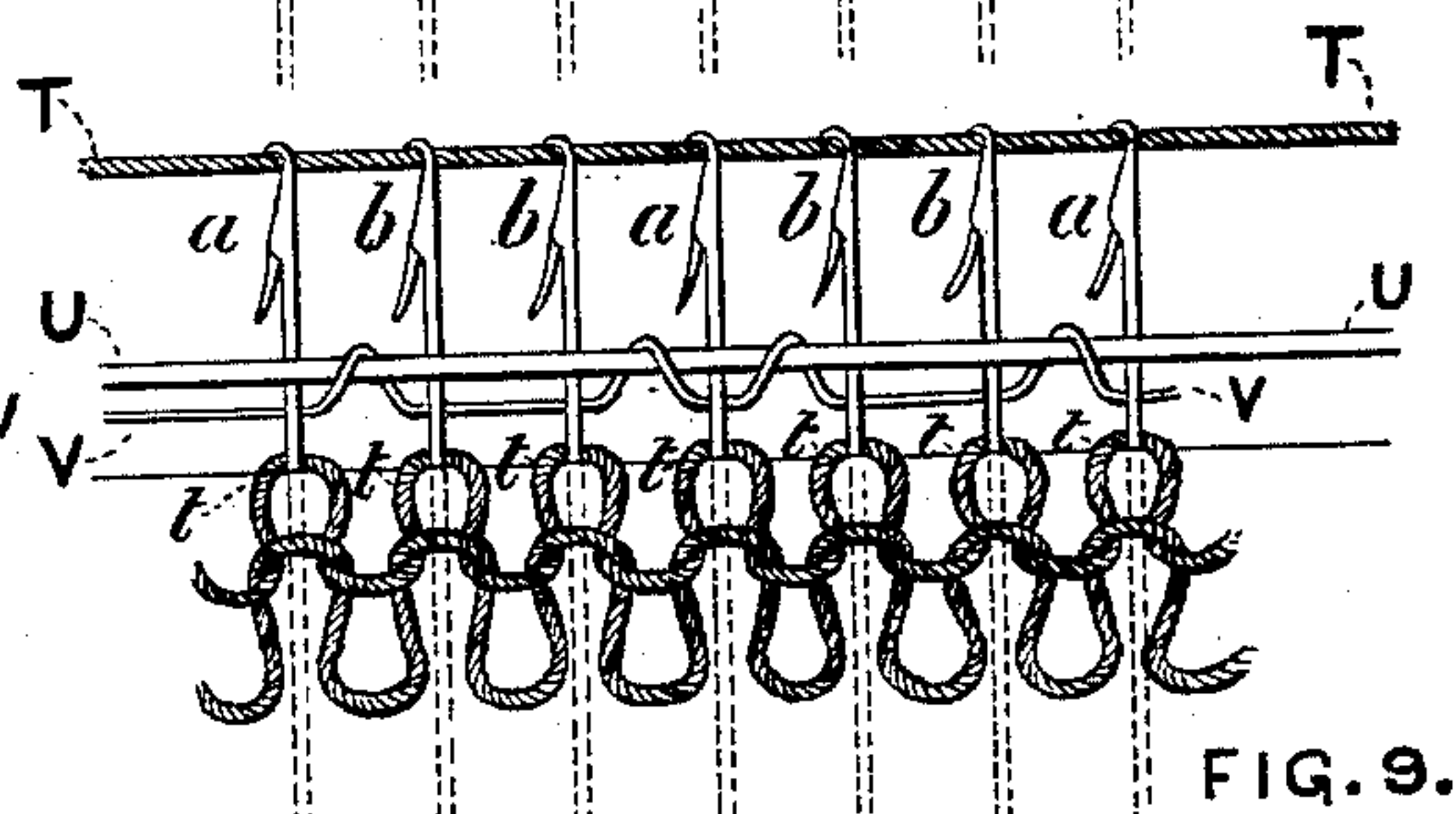
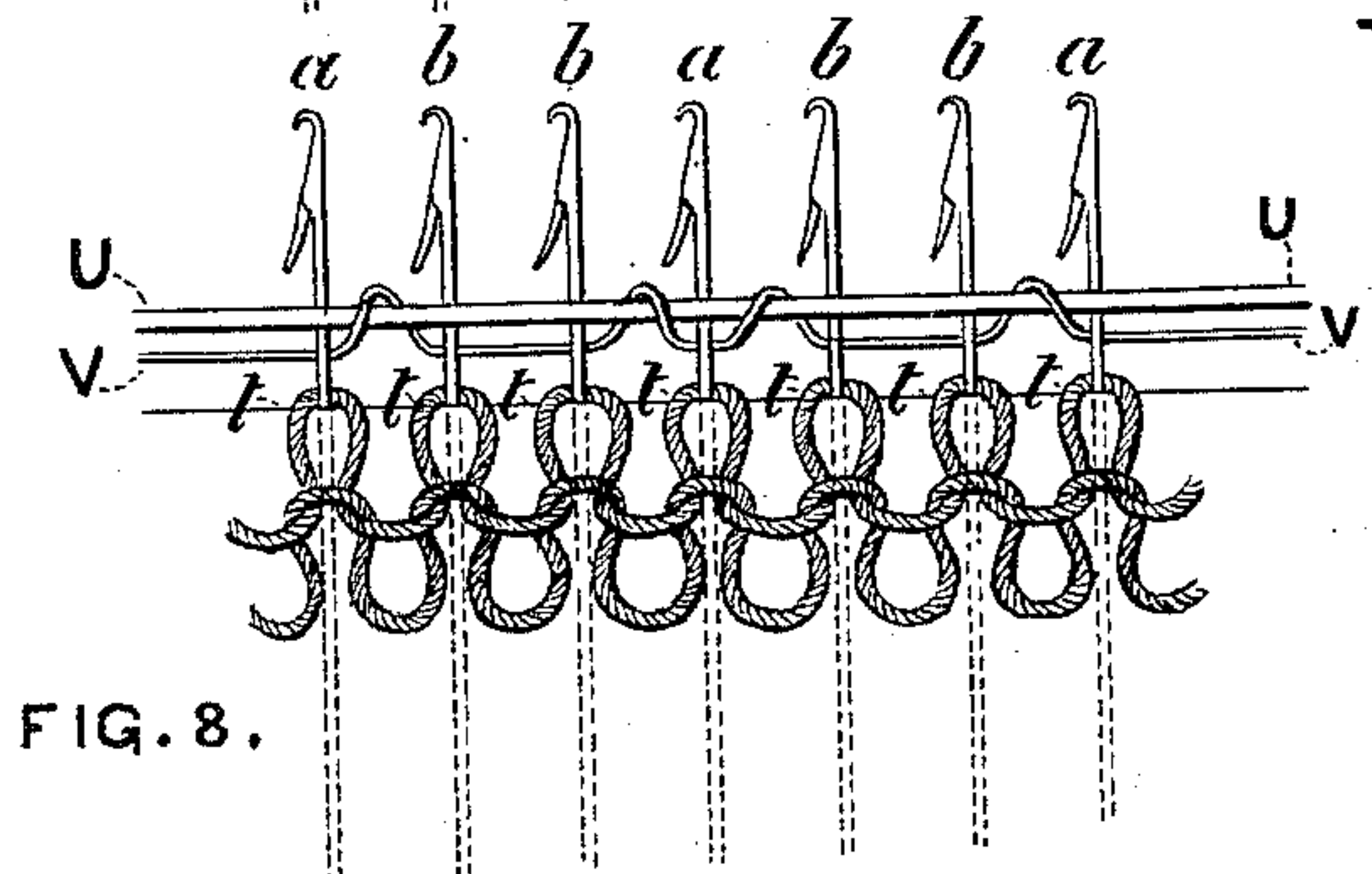
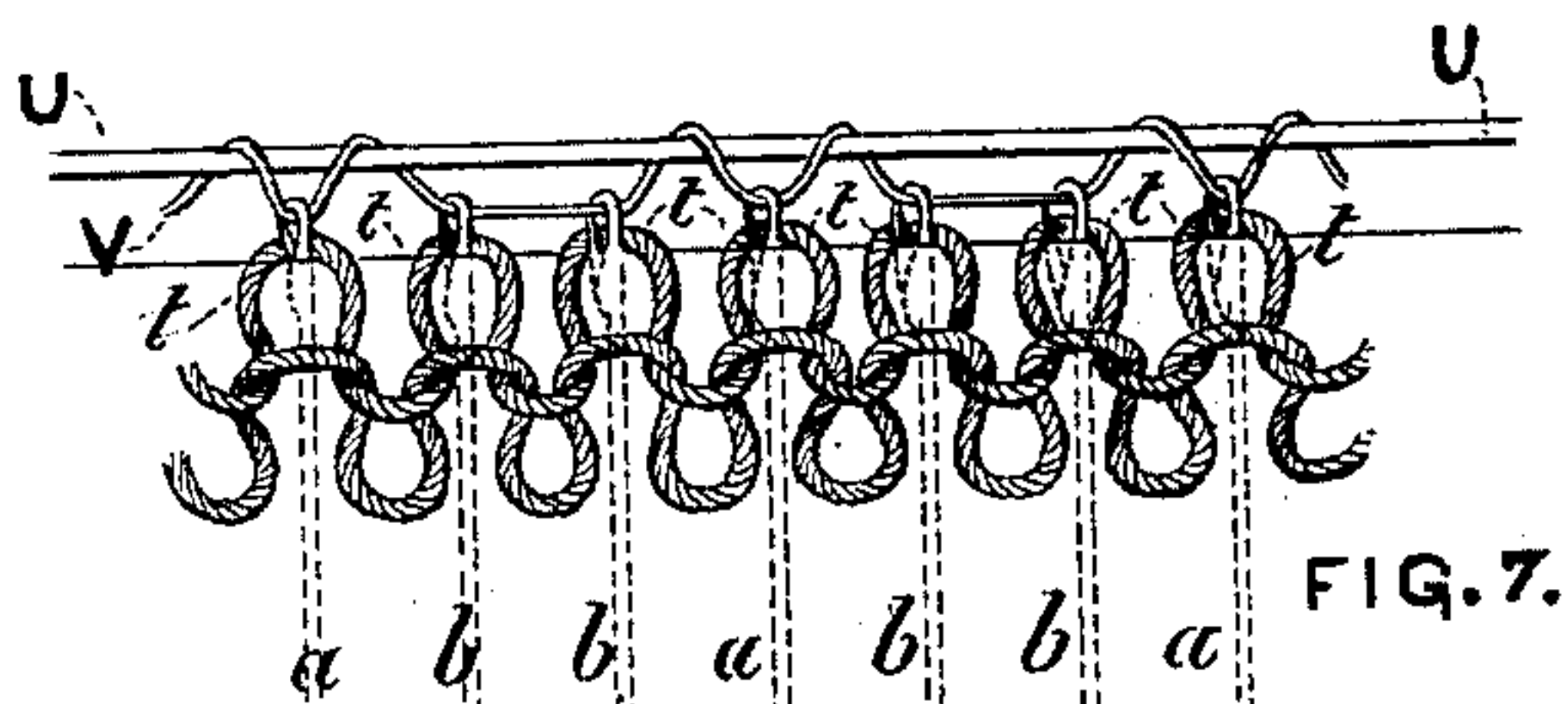
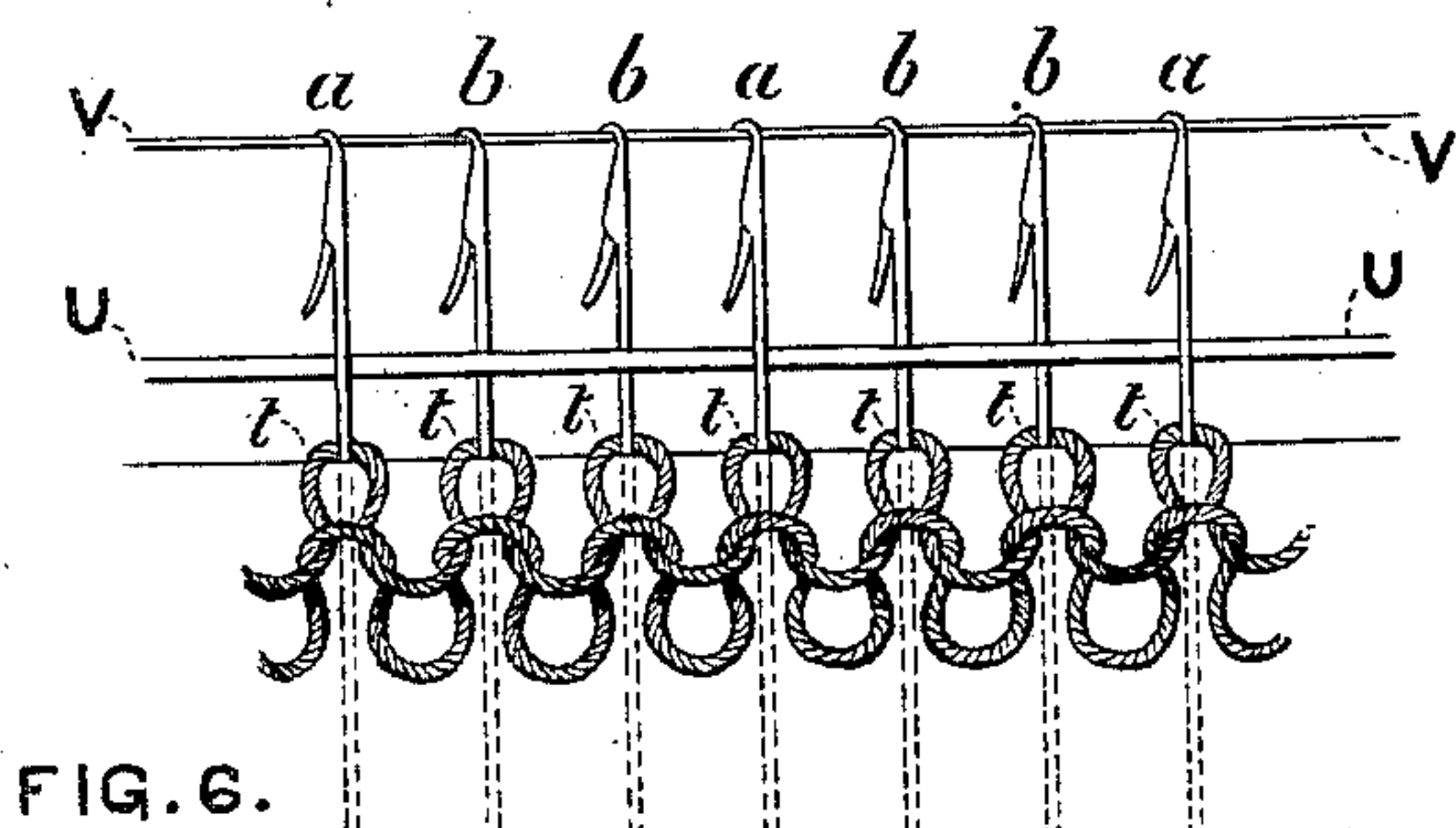
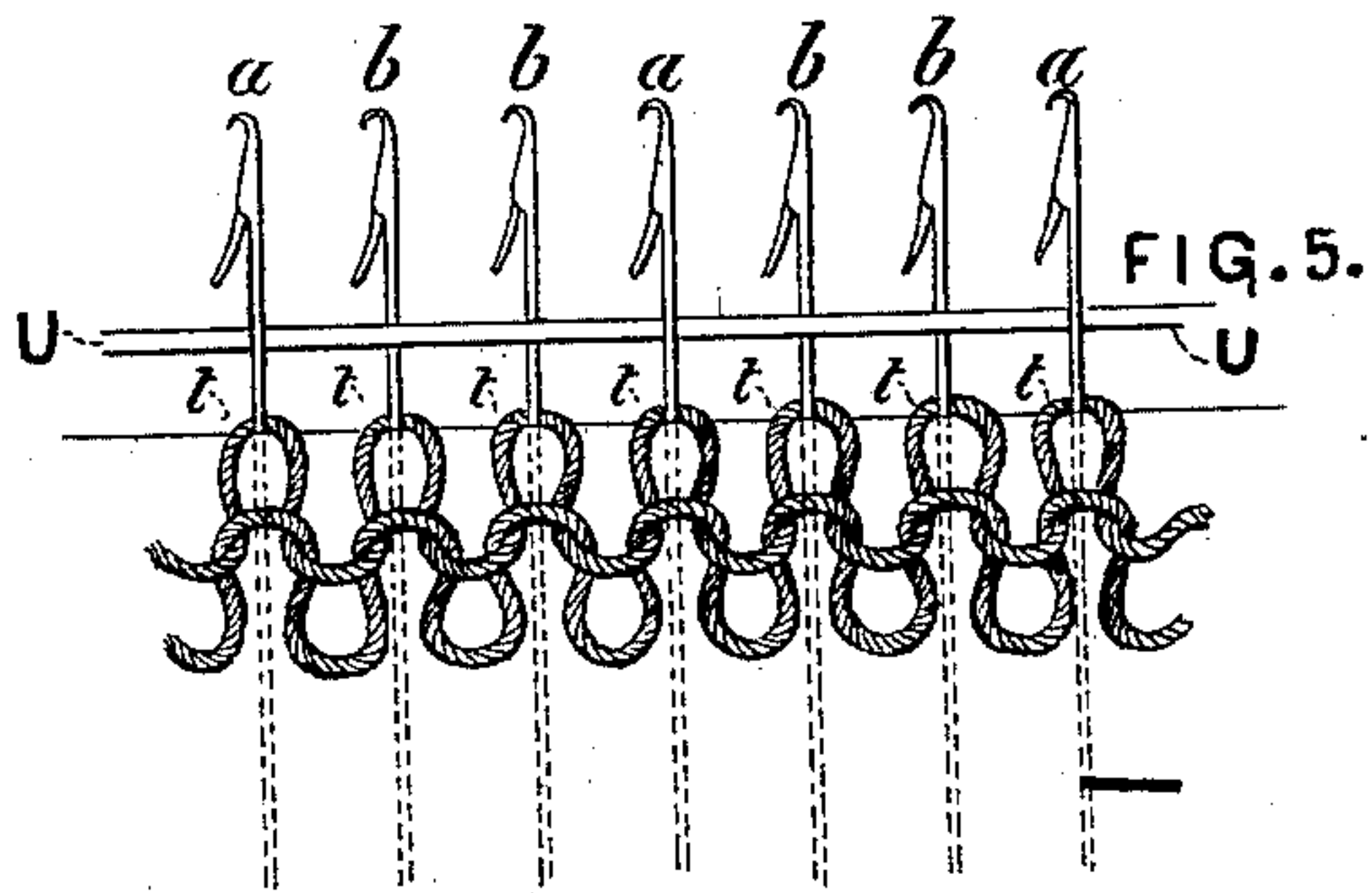
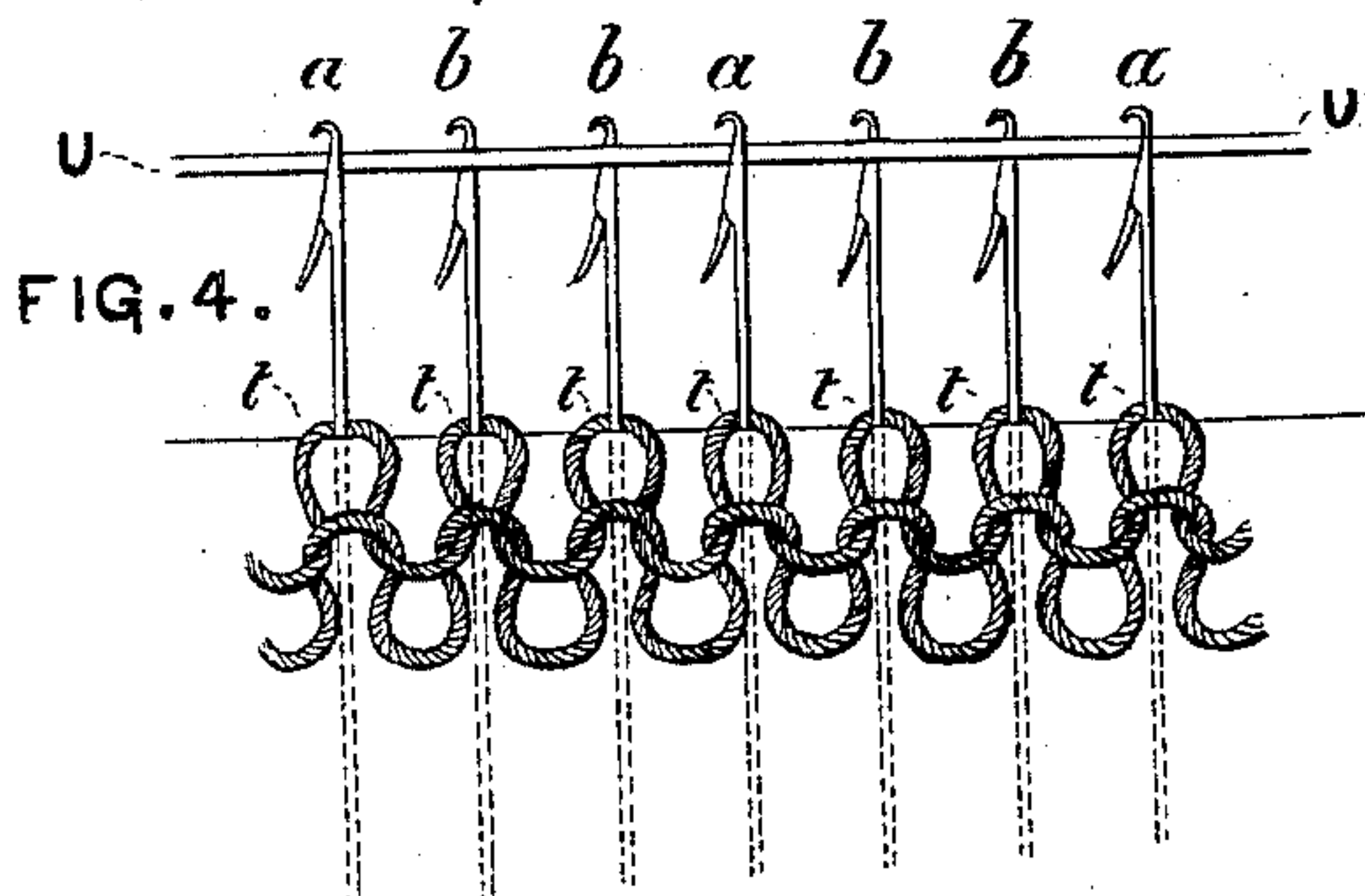
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2 Sheets—Sheet 2.

J. W. ADAMS.
KNIT FABRIC.

No. 462,657.

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UNITED STATES PATENT OFFICE.

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KNIT FABRIC.

SPECIFICATION forming part of Letters Patent No. 462,657, dated November 3, 1891.

Application filed November 26, 1888. Serial No. 291,893. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. ADAMS, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Knit Fabrics, whereof the following is a specification, reference being had to the accompanying drawings.

In said drawings, Figure 1 represents a plan view of a balmoral-knitting machine adapted to form my improved fabric. Fig. 2 is a vertical central section through the cylinder of the machine, a portion of the interior being broken away to show the configuration of the knitting-cams. Fig. 3 is a view from the inside of the cylinder, showing the needles and cams developed upon a plane. Figs. 4 to 11, both inclusive, are diagrams illustrating on an exaggerated scale each step in the formation of the fabric; and Fig. 12 is a view illustrating on a similar scale the grouping of the threads as seen from the face of the finished fabric.

My invention relates to that class of knit fabrics whose opposite sides or the conspicuous portions of whose opposite sides are of different material or of material which by the method of its treatment appears different to the eye. Fabrics of this general class have heretofore been constructed in several ways. In some instances they have been made from two threads of different material, each entering essentially into the structure of both the face and the back. In other instances the face has been knit from two similar threads, each of which is essential to its structure, while the back was composed of a third thread of different material tied to the face by rearwardly-projecting extra loops of one of the face threads. In this latter fabric (which is now generally termed "stockinet") the binding-thread which ties the backing to the face is regularly knit into and interlocked with each of the successive courses of the face, of which it forms an integral and essential part, and the successive courses of the binding-threads are also knit into and interlocked with each other. In a patent for a third fabric of this class the face is described as knit from one thread and the backing as tied thereto by a binding-thread which is regularly knit into

and interlocked with the loops of the face thread at intervals, the courses of said binding-threads, however, not being knit into or interlocked with one another. In this third variety of fabric, however, the loops of the binding-thread are knit by means of tuck-bits and become actually integral with the structure of the face, forming what might be termed a "false rib" thereon—that is to say, some of the courses of the face are practically double.

My invention consists of a fabric whose face loops are single and whose back is composed of a main backing-thread tied to the loops of the face fabric by a secondary or binding thread, which is not knit into and does not interlock with the loops of the face, nor do the successive courses of said binding-thread interlock with each other. The advantages of this method of construction will be described later on, and I will now proceed to specify the preferred method of making it.

Referring now to the drawings, A represents the rotating needle-cylinder of a Balmoral latch-needle machine having the needles *a b* arranged in the usual manner.

B is the cam-cylinder, which in this case is stationary.

C, C', and C² are the thread-guides. Immediately adjacent to the thread-guide C (by which the main backing-thread is introduced) I arrange on the outside of the series of needles a horizontal toothed presser-wheel E, having alternating large and small teeth *e e'*, respectively. The larger teeth *e* are of such dimensions that when the said wheel E is rotated by the needles in passing every third needle *a* shall be pressed inward, as shown in Fig. 2, to such an extent that when the thread is delivered by the guide C it is laid in front of the needle *a* and behind the two adjacent needles *b* on each side thereof, and so on alternately around the series. Said presser-wheel E is mounted upon the end of a horizontal stem F, adjustable toward and from the needles and supported by a standard O. On the inside of the series of needles and at a point intermediate between said presser-wheel E and the next thread-guide C', is a circular brush D, supported in an adjustable overhanging arm G, which is mounted

in a standard Q, exterior to the cam-cylinder. Said brush D is inclined at an angle, as shown clearly in Fig. 3, its bristles entering between the needles, which rotate the brush in passing.

5 The needles are provided with jacks P, whose outward projections *p* engage with a series of cams, part of which is indicated in Fig. 2, but which is fully shown developed on a plane in Fig. 3. Assuming that the normal surface of the cam-ring begins at M, (on the left-hand side of Fig. 3,) a short rise occurs at the incline N, which corresponds in position with a point immediately preceding the point of first contact with the presser-wheel 10 E. The surface of the cam-ring then remains horizontal until a point is reached which is a little beyond the second thread-guide C', where it descends, as indicated at H, to a level not sufficient to cast off the knitting-loop. It 20 then ascends at L to nearly the former level and descends again at N' the full distance required for casting off the knitting-loop, after which it rises at R to a level M' slightly below that of the point of commencement. 25 Above the cam-inclines H L N' R are correspondingly-inclined cams I Y J S, adapted to co-operate therewith and by acting upon the top of the projections *p* effect the proper movement of the needles, as is well understood in this class of machines. 30

The actuating mechanism whereby the needle-cylinder and its needles are caused to rotate within the cam-cylinder is not shown, as it may be of any ordinary kind.

35 The operation of the machine is as follows: The three threads are delivered to the needles in the order required by the rotation of the needle-cylinder, viz: The thread U, which is the main thread of the back, is first laid in in front of one needle *a* (which is for the time 40 being pushed back by the tooth *e* of the presser-wheel E) and behind the two needles *b b* on each side thereof. The inclined brush D then pushes said thread down to a level below the latches of the needles. By this 45 time the needles reach the second thread-guide C', where the secondary backing or binding thread V is introduced into the hook of each. The cams I H then carry down the 50 needles to a level below the main backing-thread U and cast it off, but do not cast off the previous loops of the fabric proper. The cams L Y then raise the needles to receive the face-thread T from the guide C², after 55 which the cams J N' carry the needles down far enough to cast off the loops of the face-fabric, leaving, of course, the new row upon them, as usual. The cams R S then raise the needles to the level M' preparatory to repeating the operation. The result of the series 60 of operations just described will now be explained by reference to the diagrams, Figs. 4 to 11.

For convenience of illustration I have here 65 represented the needles as all moving simultaneously; but it must of course be understood that they act successively in the or-

dinary manner. I have also represented the improved fabric as starting from an initial series of ordinary knit loops, since this 70 method better points out the peculiar grouping of the threads as distinguished from those of an ordinary knit fabric. Assuming that the edge row of loops *t* of a fabric is upon the needles *a b*, the presser-wheel E, co-operating 75 with the thread-guide C, causes the main thread U of the backing to be laid in in the manner indicated in Fig. 4—that is to say, said thread U passes in front of one needle *a*, then behind two needles *b b*, then in front 80 of one needle *a*, and again behind two, until the circle is complete. The thread, having been thus introduced, is pushed down by the brush D to the level indicated in Fig. 5, which is below the latches of the needles. The sec- 85 ondary or binding thread V of the backing is then introduced into the hook of each needle, as shown in Fig. 6. The needles then descend below the level of the thread U, but only to the point indicated in Fig. 7, where 90 it will be seen that although they have cleared the thread U, they have not been drawn through the initial row of loops *t*, so as to cast the latter off. When, therefore, the needles rise again, as indicated in Fig. 8, said 95 row of loops *t* remains upon them, as before, but the secondary or binding thread V of the backing has been thrown over the main thread U of the backing at points which are opposite to the needles *a*. The true knitting- 100 thread T of the face is then introduced into the hook of each needle, as shown in Fig. 9, and when the needles descend to finally cast off the loops *t*, as shown in Fig. 10, they incidentally cause certain parts of the secondary 105 thread V to engage with the said loops *t*, although not forming a knitting-loop therewith. The needles then ascend, as shown in Fig. 11, with the new row of loops *t'* (corresponding with the initial row *t*) now upon 110 them. This constitutes the entire group of operations which form a unit of the fabric.

Fig. 12 shows the opposite side of the fabric to that which is exposed in the other views, and by reference thereto it will be 115 seen that the face-thread T is directly knit to the loops *t*, and that the face of the fabric (which is there represented as nearest the observer) is a complete knit fabric formed of one thread only, and that although the sec- 120 ondary or binding thread can be seen by looking through the face-loops, it nowhere crosses into the face and always remains structurally independent thereof. Thus the main backing-thread and the secondary or 125 binding thread are both integral parts of the backing only, and neither of them is in any way knit to or interlocked with the face, but each depends solely upon the other for its connection therewith. Either will drop out if 130 the other be removed.

I have described what may be termed an "elementary machine" for producing the fabric in question, but do not limit myself to any

particular kind of machine, nor to the identical mode of operation above set forth. Thus, instead of introducing the backing-thread in front of every third needle, it might be laid in front of every second needle or every fourth needle, &c., without affecting the principle of construction of the fabric. Furthermore, by using a large frame on which the group of devices just described is repeated the fabric can be produced very rapidly. In such case the face of the fabric is of course not actually knit from a single thread, but from a number of threads, each one of which is, theoretically, identical with the others. Each group, however, of the three essential threads forms what may be called a "unit" of the fabric, and the structure of each unit is still precisely that above set forth. Hence in stating that the face is knit from one thread I do not use the word "one" as necessarily indicative of number, but in the sense of distinct, and I mean thereby that only one of a particular group of three is structurally an integral part of the face.

As compared with former fabrics of this class my invention possesses the following among other advantages. It differs, of course, from the fabrics first above mentioned as old in that the backing is not knit into the face. It differs from the fabrics of the second class above described—viz., ordinary stockinet, in that the secondary or binding thread of the backing is not essential to the continuity of the face structure, thus permitting the use of an inconspicuous or cheap thread for this purpose, instead of requiring the use of two threads of equal value to form the face and "wasting," so to speak, a large portion of one of them upon the back. It differs from the third fabric above mentioned in that the secondary thread of the backing is not knit into

the face, but is (like the main backing-thread) structurally independent thereof. Thus no false rib is produced in the face structure, and, furthermore, it will be noted that in my fabric the points where the secondary or binding thread is looped around the main thread of the backing need not lie in straight lines at right angles to the courses of the face; but by using a presser-wheel whose teeth are not a multiple of the number of needles in the whole series the points of connection will be shifted laterally at each course of face-loops. This fact not only renders the secondary or binding threads much less conspicuous when visible through the loops of the face, but greatly improves the back for gigging or finishing purposes, since the main backing-thread is disposed in loops which alternate instead of lying in straight lines at right angles to the courses of the face, as is necessarily the case where needles with tuck-bits are used to unite the backing and binding threads. In these latter cases the same needle must always operate upon the binding-thread, and the interlocking loops thereof must necessarily be in the straight lines referred to.

Having thus described my invention, I claim—

The hereinbefore-described fabric, consisting of an integral face knit from one thread, in combination with a main backing-thread, and a secondary or binding thread looped around said backing-thread and engaging at intervals with the loops of the face, but not interlocking or knit thereto and structurally independent thereof, substantially as set forth.

JOSEPH W. ADAMS.

Witnesses:

CHARLES F. ZIEGLER,
JAMES H. BELL.