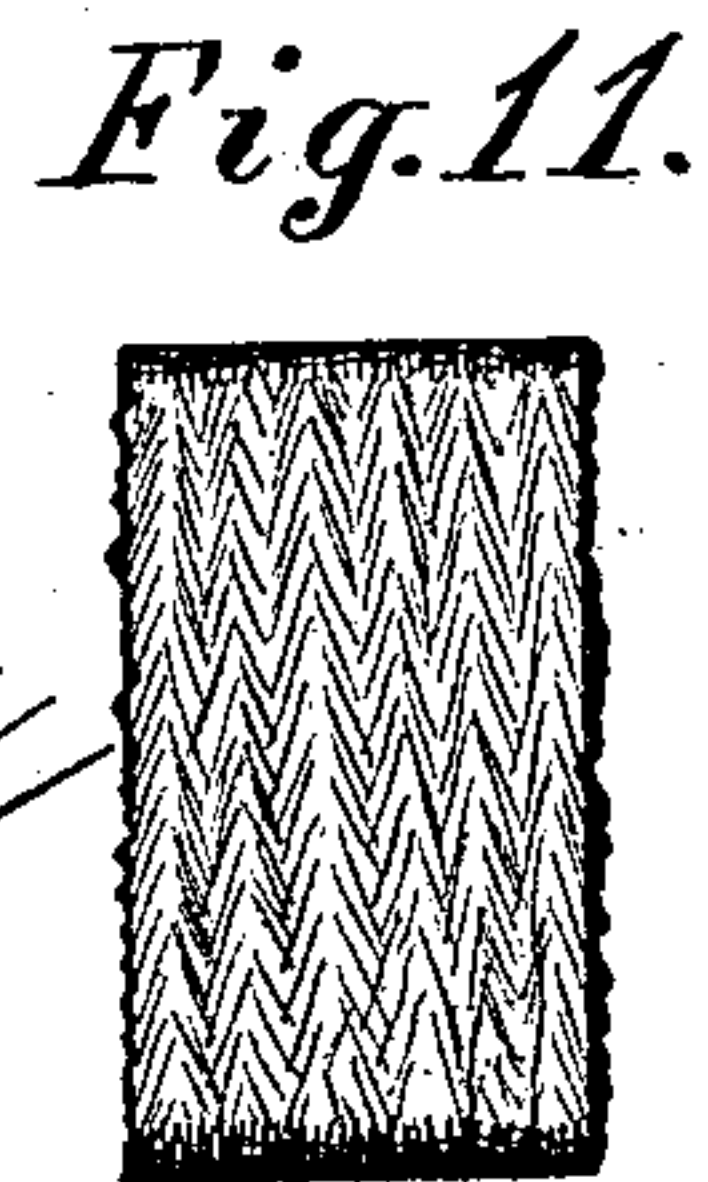
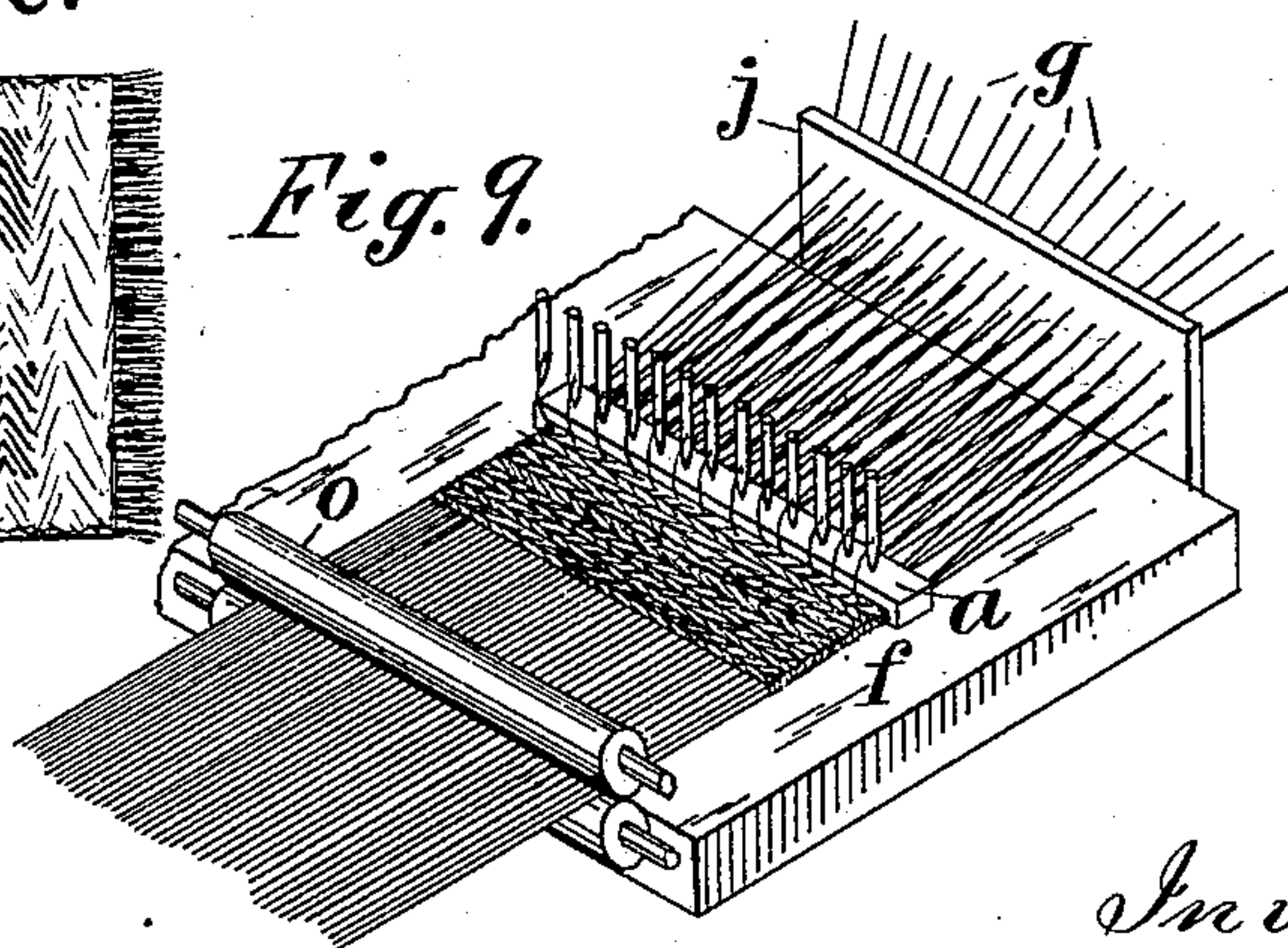
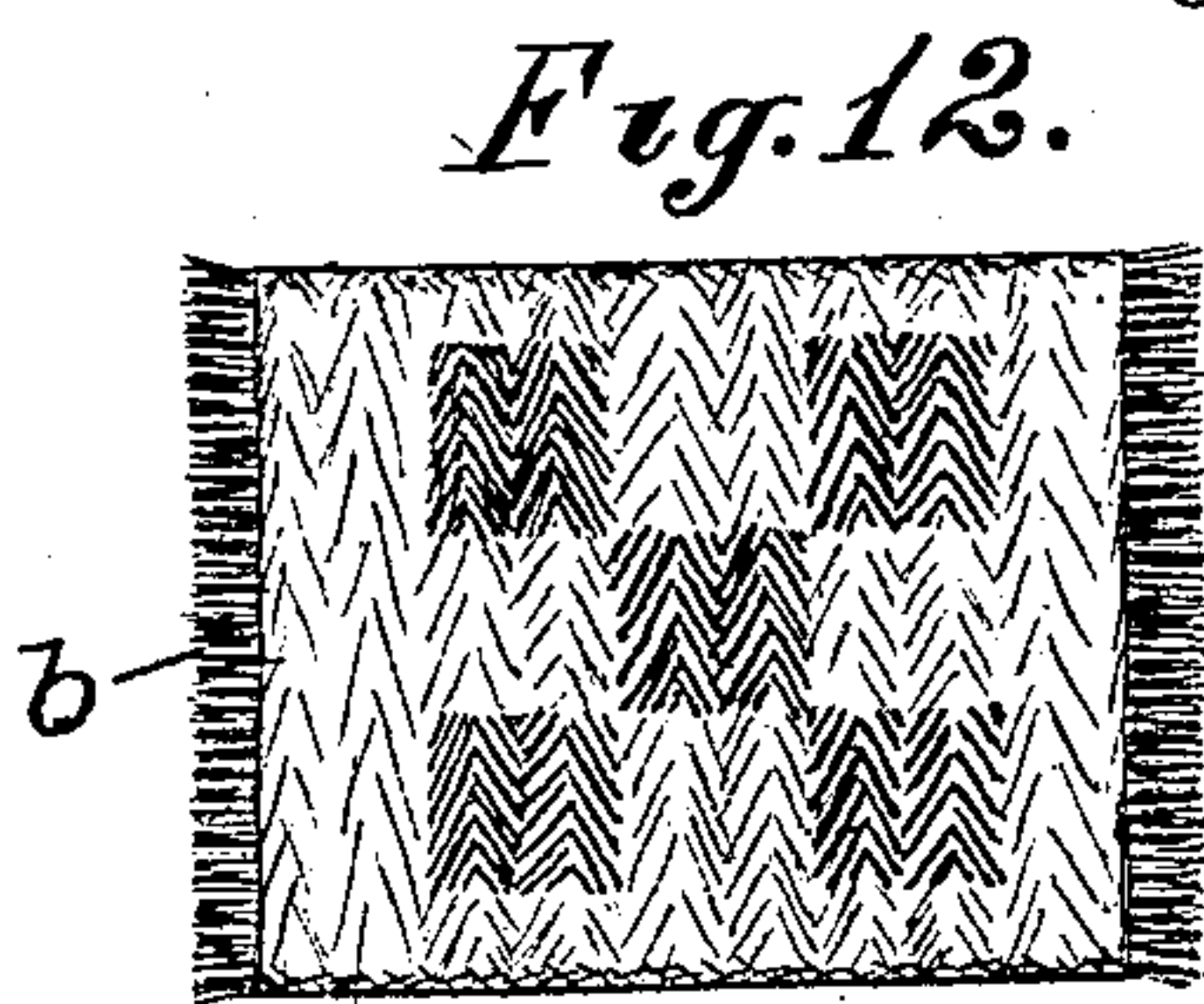
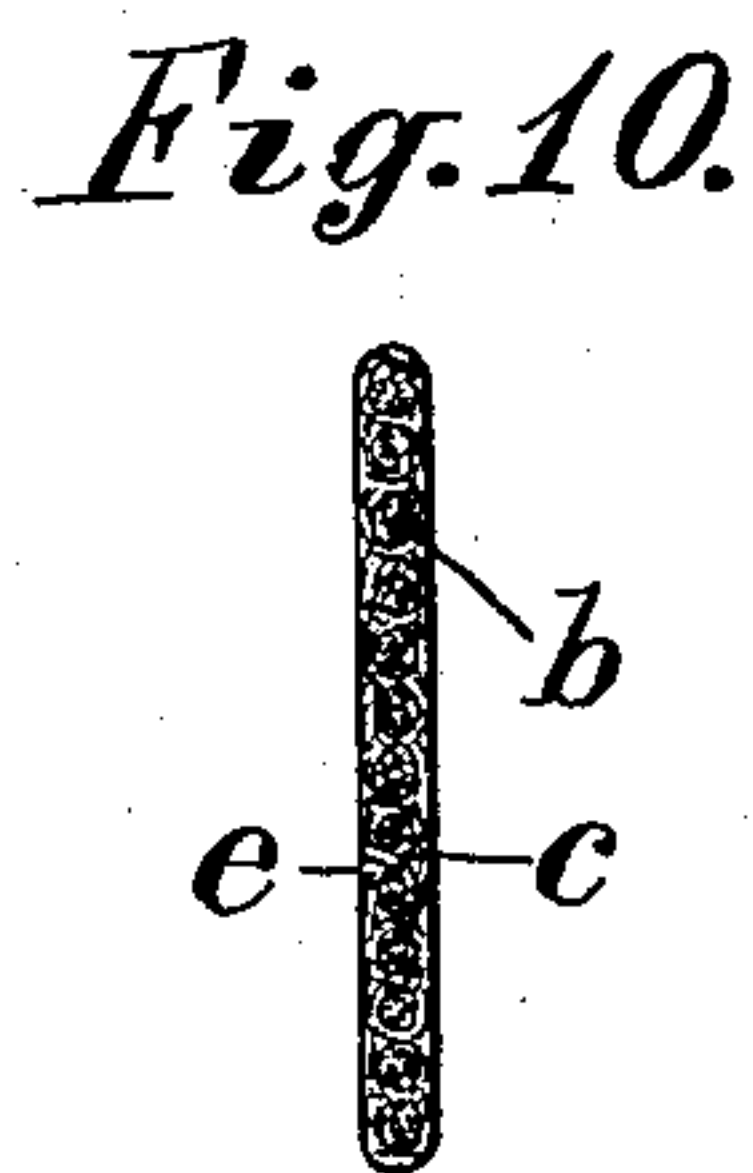
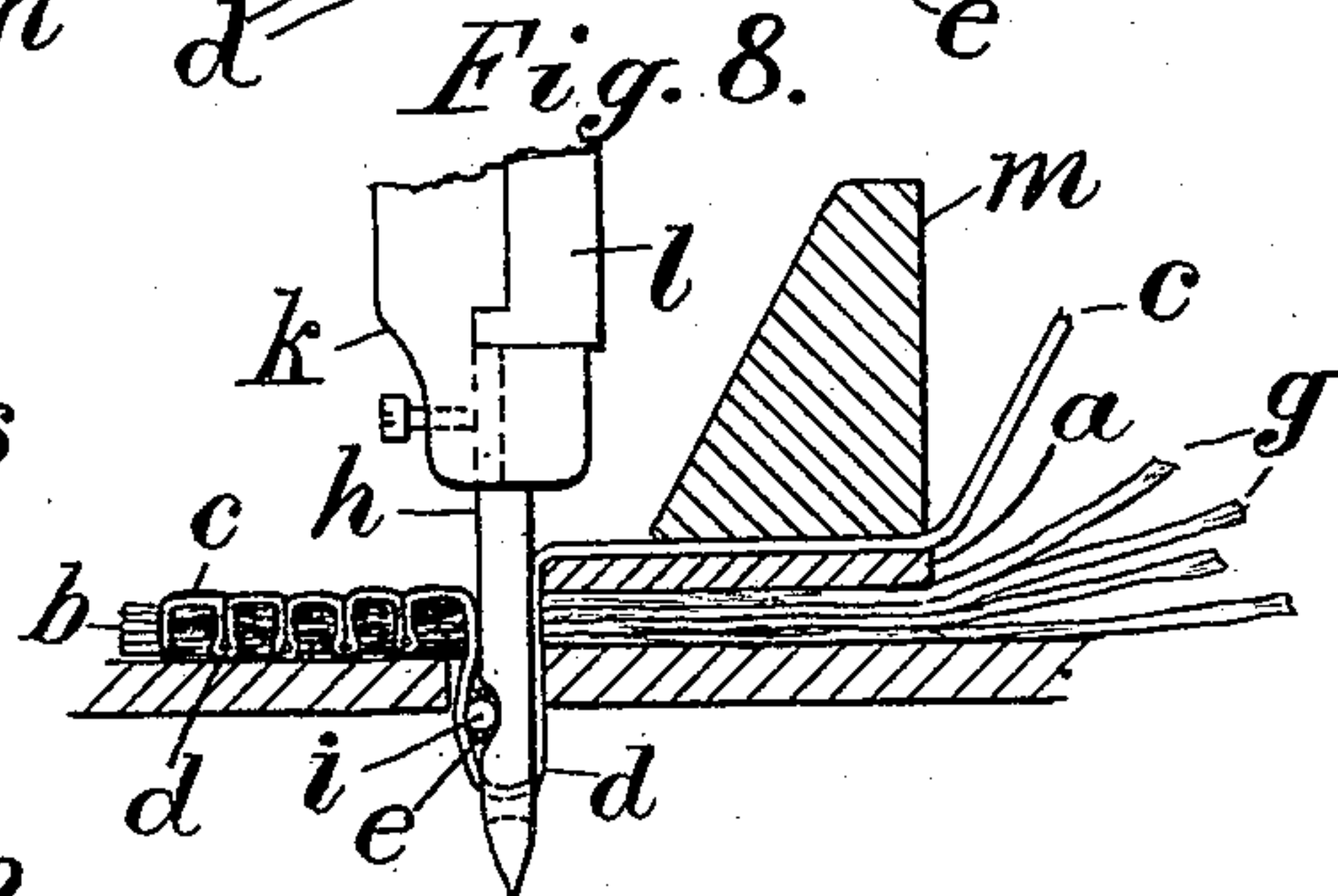
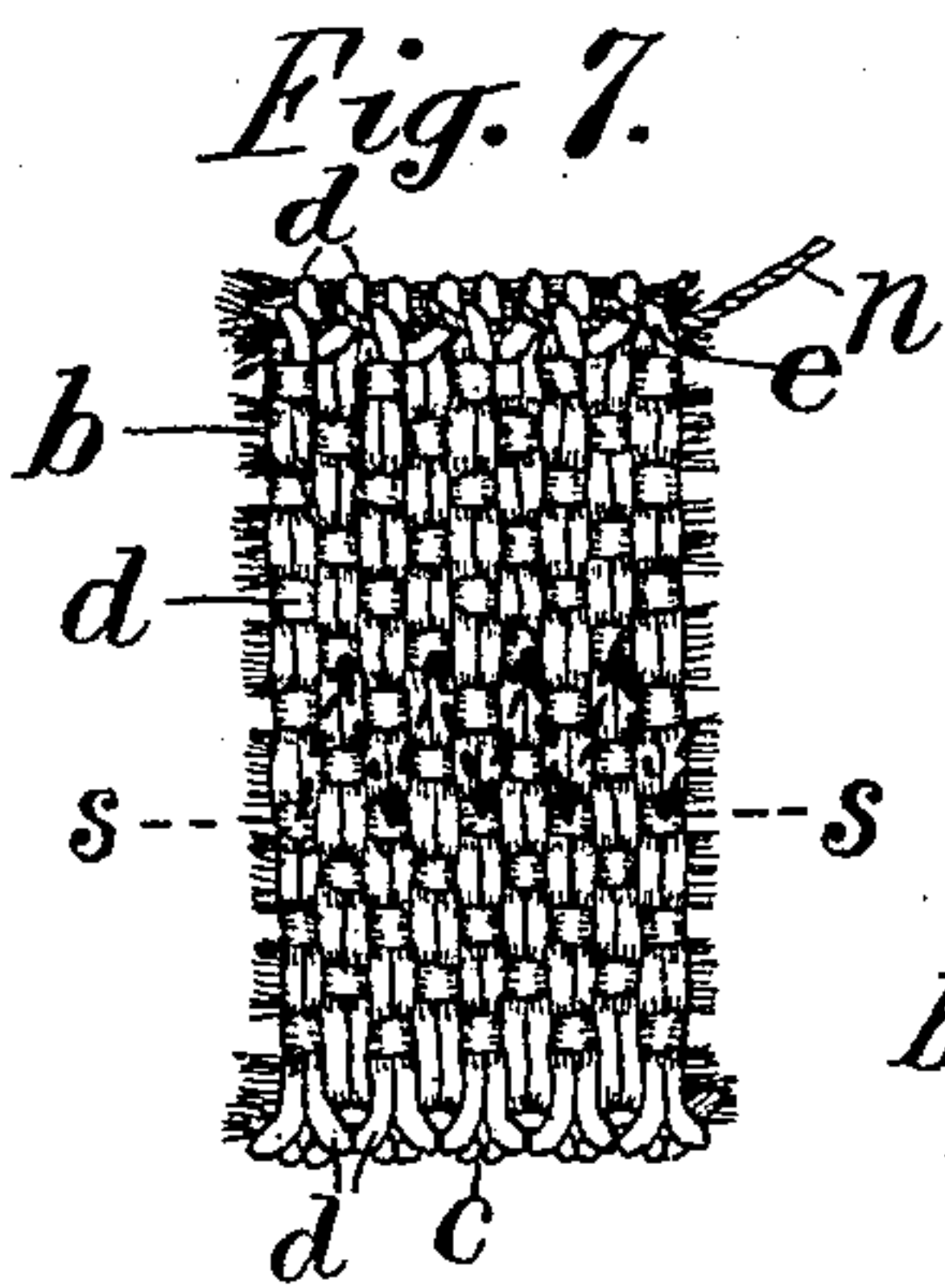
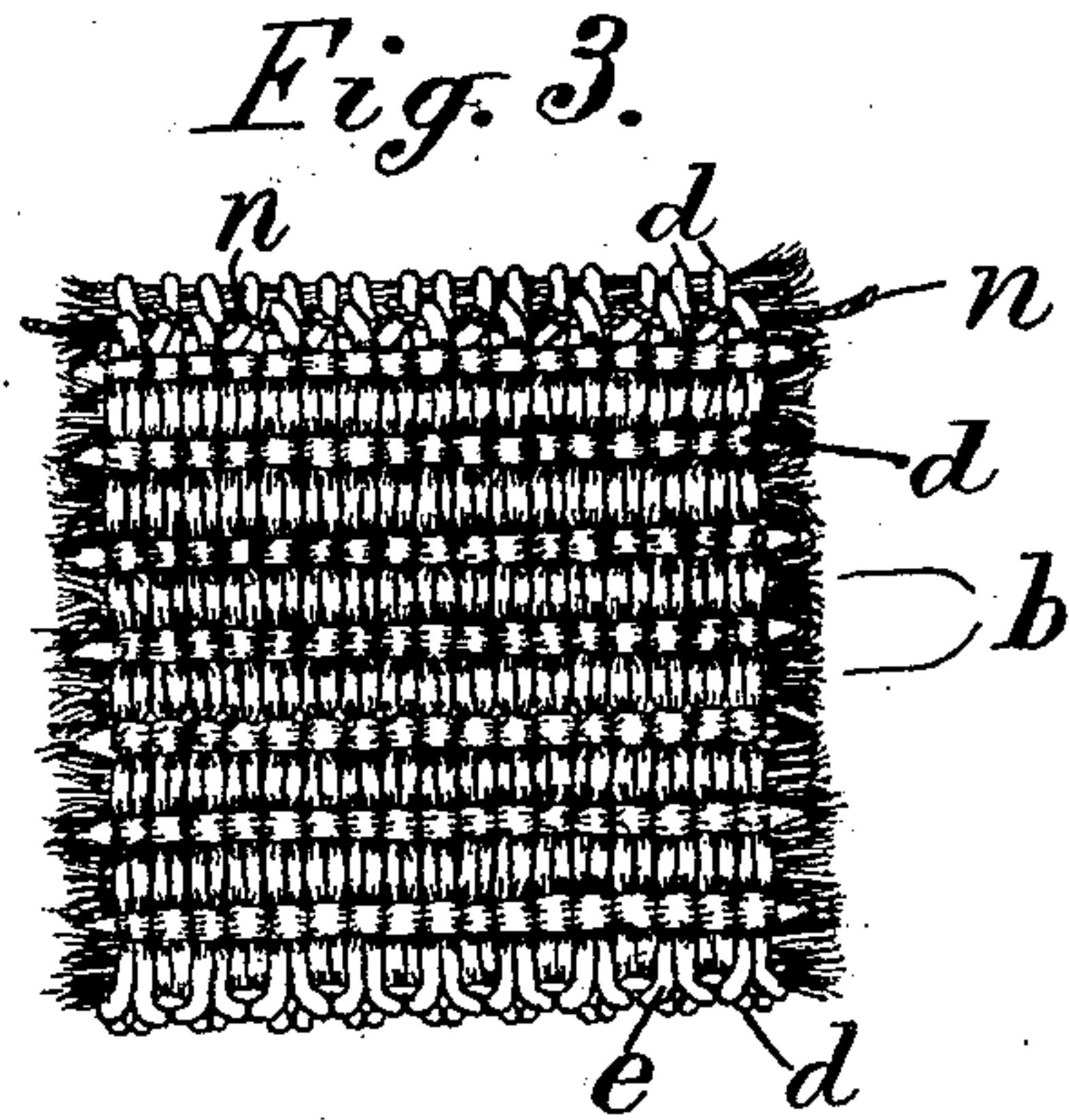
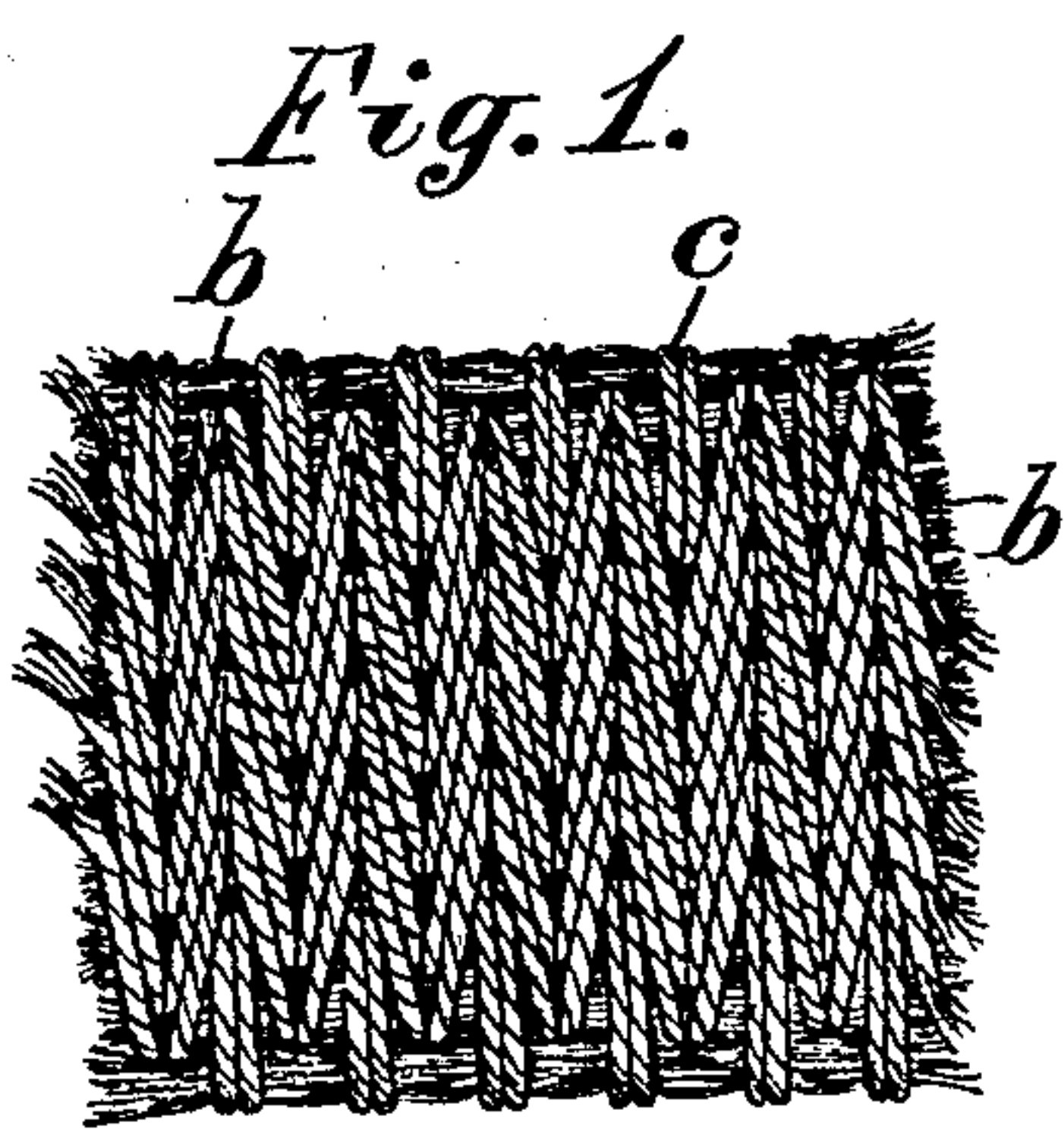


J. W. HYATT.  
SEWED WARP FABRIC.

(Application filed Mar. 11, 1901. Renewed Mar. 27, 1902.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY.

## SEWED-WARP FABRIC.

SPECIFICATION forming part of Letters Patent No. 711,898, dated October 21, 1902.

Application filed March 11, 1901. Renewed March 27, 1902. Serial No. 100,177. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. HYATT, a citizen of the United States, residing at No. 141 Commerce street, Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Sewed-Warp Fabrics, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of the present invention is to furnish a novel fabric in which a layer of warp-threads is united by stitching-threads in a sewing-machine. Such fabric forms a continuous flat band adapted for many uses, as

15 ribbons, neckties, driving-belts for machinery, rugs, &c. In the manufacture of this fabric a series of warp-threads is drawn from suitable spools and led through a guide to form a layer across the needle-bed of a sewing-machine and a row of needles is provided with

20 stitching-threads and operated to form zigzag stitches upon the surface of the layer, so as to connect the warp-threads together laterally. The several stitching-threads are conveniently

25 connected together upon the under side of the fabric by a continuous lock-thread extended back and forth across the width of the layer and passed through all the loops of the stitching-threads. The engagement of

30 the lock-thread with the stitching-threads at opposite edges of the layer serves to fold the stitching-threads over the edges of the band and form a strong and even selvage. The loop of the lock-thread which is carried by

35 the forward end of the looper is readily engaged with the stitching-thread at the outer edge of the fabric by means of a shuttle worked transverse to the thickness of the fabric. To make zigzag stitches, the needles are

40 preferably mounted upon a reciprocating or vibrating carrier, and where the carrier is reciprocated a distance equal to the space between the needles the warp-threads are formed into parallel strands each equal in

45 width to such space and the stitching-thread of each needle is carried back and forth over the top of the same strand. With such a movement of the needles the strands are connected together only by the transverse locking-threads upon the under side of the fabric,

50 as none of the stitching-threads extend from the body of one strand into the body of an-

other strand. By doubling the stroke of the needle-carrier each needle-thread is carried back and forth over two of the strands, thus locking them together laterally, while the alternate needles upon the needle-carrier lock different pairs of the strands together, so that the whole is firmly united independent of the locking-threads. Other proportions of the stroke to the distance between the needles may be made, and the disposition of the stitches upon the surface and the grouping of the warp-threads into strands may be correspondingly modified. While the needles are in the fabric the feed mechanism is reversed and the warp pulled slightly backward, which operates like the "lay" in a loom to beat the stitches closely together, and the successive rows of stitching-threads are thus pressed firmly into contact with one another and serve to cover the entire surface of the fabric with the stitching-threads. The fabric produced by sewing with a gang of needles operating across the entire width of the fabric can be produced with much greater rapidity and cheapness than by weaving, as the needles travel only a very short distance compared with the movement of a shuttle, which is thrown across the entire width of the fabric.

In making a fabric by my invention the stitching-threads may when arranged to wholly cover the warp be made of an entirely-different class of material (as silk or worsted) from the warp-threads, which may be made of cotton, jute, or any cheap fibers possessing the required strength. A ribbon or necktie having an entire silk surface and a cotton warp may be produced by my invention, or a rug having an all-wool surface and a jute warp may be produced, thus forming an ornamental and valuable article at very cheap cost. By supplying different needles or groups of needles (upon the needle-carrier) with threads of different colors or material bands and stripes or blocks of various breadths may be formed upon the surface of the fabric and the latter thus ornamented in a considerable degree.

The invention will be understood by reference to the annexed drawings, in which—

Figure 1 represents the face of a band having the zigzag stitches formed upon its surface without crowding and the stitching-



threads carried across three of the warp-  
strands. Fig. 2 represents a similar band in  
which the rows of stitches are pressed closely  
together. Fig. 3 shows the bottom side of  
5 the band with the locking-threads intersected  
by the stitching-loops. Figs. 2 and 3 show  
stitching-threads carried across two of the  
warp-strands, thus bringing the stitching-  
loops in continuous rows. Fig. 4 shows the  
10 outer edge of the band with the loops of the  
lock-threads and stitching-threads united by  
a shuttle-thread. Fig. 5 shows the inner  
edge of the band where the lock-threads are  
engaged directly with the loops of the stitch-  
15 ing-threads. Fig. 6 is a cross-section of the  
band through one row of the stitches; and  
Fig. 7 shows the under side of a band with  
the stitches carried across one and a half of  
the warp-strands, thus making two rows of  
20 the stitching-loops upon the under side of the  
fabric. Fig. 8 is a cross-section, and Fig. 9  
a perspective view, both of diagrammatic  
character, showing the operation of stitching  
the fabric. Fig. 10 is a cross-section, and  
25 Fig. 11 a short piece, of a band treated with  
belt-stuffing or waterproof coating; and Fig.  
12 is a view upon a greatly-reduced scale of  
a rug of such fabric.

In Figs. 8 and 9 *g* designates the warp-  
30 threads, which serve to form the strands *b*  
shown in the other figures. *c* designates the  
stitching-threads, which operate where car-  
ried through the fabric to produce loops *d*,  
all of which are engaged and secured by lock-  
35 threads *e*.

To explain the nature of the fabric more  
clearly, I have shown in Figs. 8 and 9 a part  
of the means for constructing such fabric.  
In Fig. 9 the warp-threads *g* are carried  
40 through a guide-plate *j* and thence across the  
needle-bed *f* underneath a foot *a*, and the  
stitches are formed by a row of needles *h*,  
which are shown in Fig. 8 notched upon the  
front side to permit the looper *i* to move past  
45 their faces and carry the lock-thread *e*  
through the loops *d*. The warp-threads are  
delivered to the guide-plate *j* under tension  
and are kept stretched across the needle-bed  
by feed-rolls *o*, which are rotated after each  
50 reciprocation of the needles to feed the warp  
forward. The foot *a* has gages at the ends  
to determine the width of the layer of warp-  
threads, and the end needles in the row pass  
alternately outside each edge of the layer to  
55 loop the stitching-threads over the edge of  
the band to form a selvage. The needles are  
shown in Fig. 8 attached to a carrier *k*, which  
can be vibrated upon the vertically-recipro-  
cating needle-bar *l* to form the zigzag stitches  
60 in the usual manner. The needle-threads are  
carried over the top of the foot *a* and under a  
guide-bar, which is shown only in Fig. 8. This  
guide-bar is omitted from Fig. 9, as it forms  
no part of the present invention.

65 At the inner edge of the fabric the lock-  
thread *e* engages directly with the loops *d*, as  
shown in Fig. 5; but as the lock-thread is

continuous the closed loop at the outer end  
of the lock-thread cannot be engaged directly  
with the closed loop *d* of the stitching-thread, 70  
and a shuttle-thread *n* (see Figs. 3 and 7) is  
therefore used to join such closed loops, the  
shuttle in practice being reciprocated trans-  
versely at the edge of the fabric through the  
loop of the lock-thread beyond its engage- 75  
ment with the last of the stitching-thread  
loops.

The shifting of the needles in forming the  
zigzag stitches pierces the layer of warp-  
threads at regular points in its breadth and 80  
operates to divide it into the warp-strands *b*.  
(Shown in Fig. 6.)

The warp-strands are separated by the  
rows of loops *d*, which are carried through  
the layer by the needles, and where the vi- 85  
bration of the carrier is a multiple of the  
space between the needles the loops form  
straight lines upon the under side of the  
fabric, as shown in Fig. 3, as each needle  
when shifted passes through the fabric upon 90  
the same line as some preceding needle.  
Figs. 2, 3, and 6 show the stitching-threads  
*c* thus carried across two of the warp-strands  
*b* by a vibration of the needle-carrier twice  
as great as the space between the needles, 95  
which brings the rows of loops *d* in straight  
lines upon the under side of the fabric. It  
may be assumed that Fig. 7 shows the loops  
*d* one-quarter of an inch apart in the rows  
transverse to the band, and such assumption 100  
would indicate a space of one-quarter of an  
inch between the needles upon their carrier;  
but the vibration of the carrier is such that  
the stitching-threads cross one of the loop-  
strands *b* and penetrate the center of the 105  
next one, the path of the needle over the sur-  
face of the fabric being indicated by the zig-  
zag dotted line *s*. Such vibration with nee-  
dles spaced one-quarter inch apart would  
need to be three-eighths of an inch, and other 110  
such vibrations are obviously possible. Three  
variations in the appearance of the stitches are  
thus shown in Figs. 1, 2, and 7, and others may  
obviously be formed with the same means.  
By making the feed long enough the zigzag- 115  
stitching threads may be spread apart upon  
the surface of the fabric, as shown in Fig. 1,  
and the stitching-threads correspondingly in-  
clined; but the stitches may be laid quite 120  
close together by suitably diminishing the  
feed and still closer together by a reverse  
movement of the feed-rolls *o* while the nee-  
dles are in the fabric. This causes the ten-  
sion of the warp-threads to draw the preced- 125  
ing rows of stitches firmly against the row  
last formed, and thus crowd or beat the rows  
of stitches close together, as shown in Fig. 2.  
As only the alternate loops of the stitching-  
threads cross the edge of the fabric to form  
the selvage, as shown in Fig. 2, they are free 130  
to spread laterally, and thus in practice op-  
erate to fully cover and conceal the warp-  
strands at the edge. As the lock-thread is  
continuous and is vibrated back and forth



across the under side of the fabric and locked in the selvage at both edges of the same, it is obvious that the fabric cannot be raveled when cut transversely, as the lock-thread, which is secured at both edges of the fabric, engages all the loops of the stitching-threads intermediate to both edges. Fig. 12 shows a rug made by such process having a width equal to that of the row of needles upon the needle-carrier and any length that may be cut from the web produced. The ends of the rug are shown formed of the frayed strands *b*, and five patches of lighter color are shown upon the surface of the rug, which would be formed by supplying the needles traversing such portion of the fabric with lighter-colored thread for a sufficient length of time to produce the blocks or patches shown, the light-colored thread being then removed from such needles and the same colored thread supplied that is used for the body of the stitching.

Owing to the longitudinal disposition of the strands *b*, the fabric makes a very strong and efficient belt for driving machinery. The fibers of such belt may be compacted by treatment with any suitable belt-stuffing which will leave the belt pliable. The surface of the belt is then waterproofed by any of the well-known belt-dressings which have an elastic and adhesive character, and the belt then presents a comparatively smooth surface, as shown in Figs. 10 and 11. In this belt the longitudinal strands sustain the pulling strain, while the transverse stitching-threads furnish a strong grip for the belt-hooks, fasteners, or lacings where they are applied to join the ends of the belt. I have found by experience that such stitching of the longitudinal strands together enables the fasteners to make a durable and strong joint, which is absolutely required in a driving-belt. I have claimed such a belt as a specific form of my invention.

Having thus set forth the nature of the invention, what is claimed herein is—

1. A fabric comprising a continuous layer of longitudinal warp-threads, longitudinal rows of stitching-threads having series of stitches disposed transversely to such warp-

threads and having loops extended through the layer, and a continuous lock-thread extended back and forth across the width of the layer and engaged with all the loops of the stitching-threads.

2. A fabric comprising a continuous layer of longitudinal warp-threads, longitudinal rows of stitching-threads having series of stitches disposed transversely to the warp-threads and having corresponding series of loops extended through the layer, and a continuous lock-thread extended back and forth across the width of the layer to engage all the loops of the stitching-threads, and the stitching-threads looped over the edges of the layer and engaged with the loops of such lock-threads to form a selvage thereon.

3. A fabric comprising a layer of longitudinal warp-threads, series of stitching-threads disposed transversely to the warp-threads and having loops extended in rows through the layer, and a continuous lock-thread extended back and forth across the width of the layer to engage all the loops of the stitching-threads excepting the last, and such last loop being engaged with the loop of the lock-thread by a separate shuttle-thread, as and for the purpose set forth.

4. A fabric comprising a continuous layer of longitudinal warp-threads, longitudinal rows of stitching-threads which form strands of the warp-threads, the stitching-threads being zigzagged or vibrated transversely to the warp-thread and having loops extended through the layer, a continuous lock-thread extended back and forth across the width of the layer and engaged with all the loops of the stitching-threads, and the lateral extension or zigzag motion of such stitching-threads being a multiple of the breadth of a single strand, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN W. HYATT.

Witnesses:

THOMAS S. CRANE,  
L. LEE.