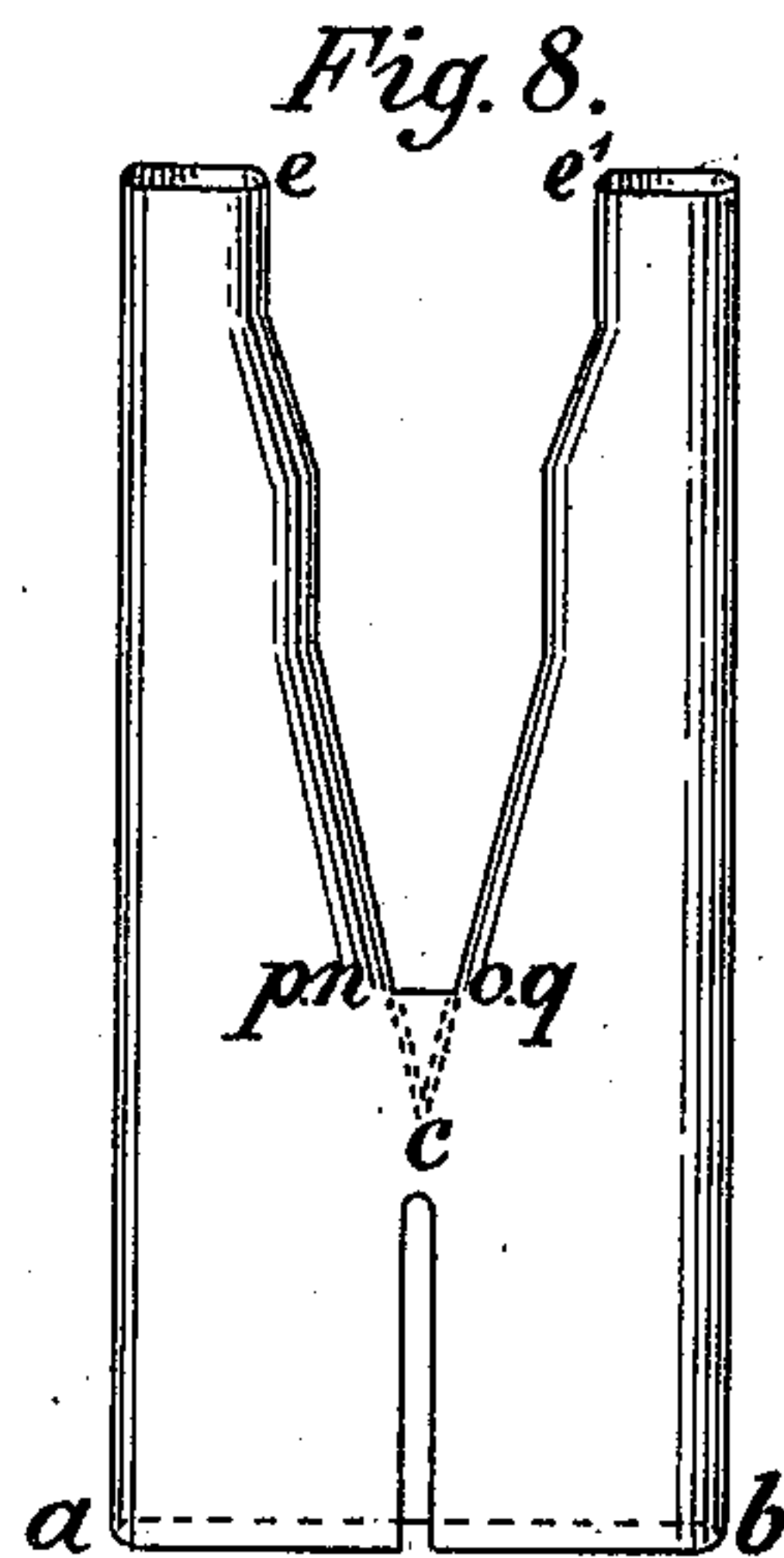
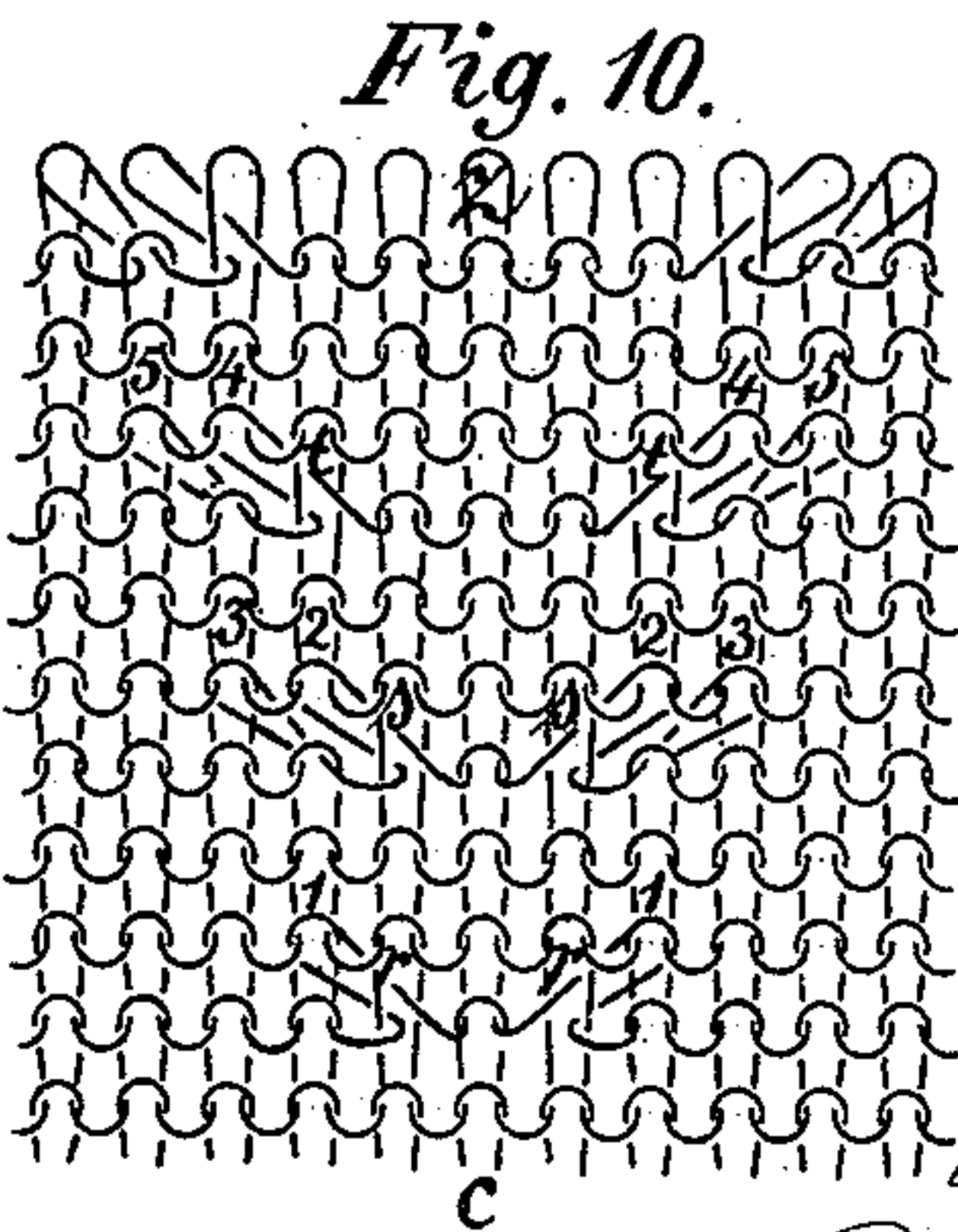
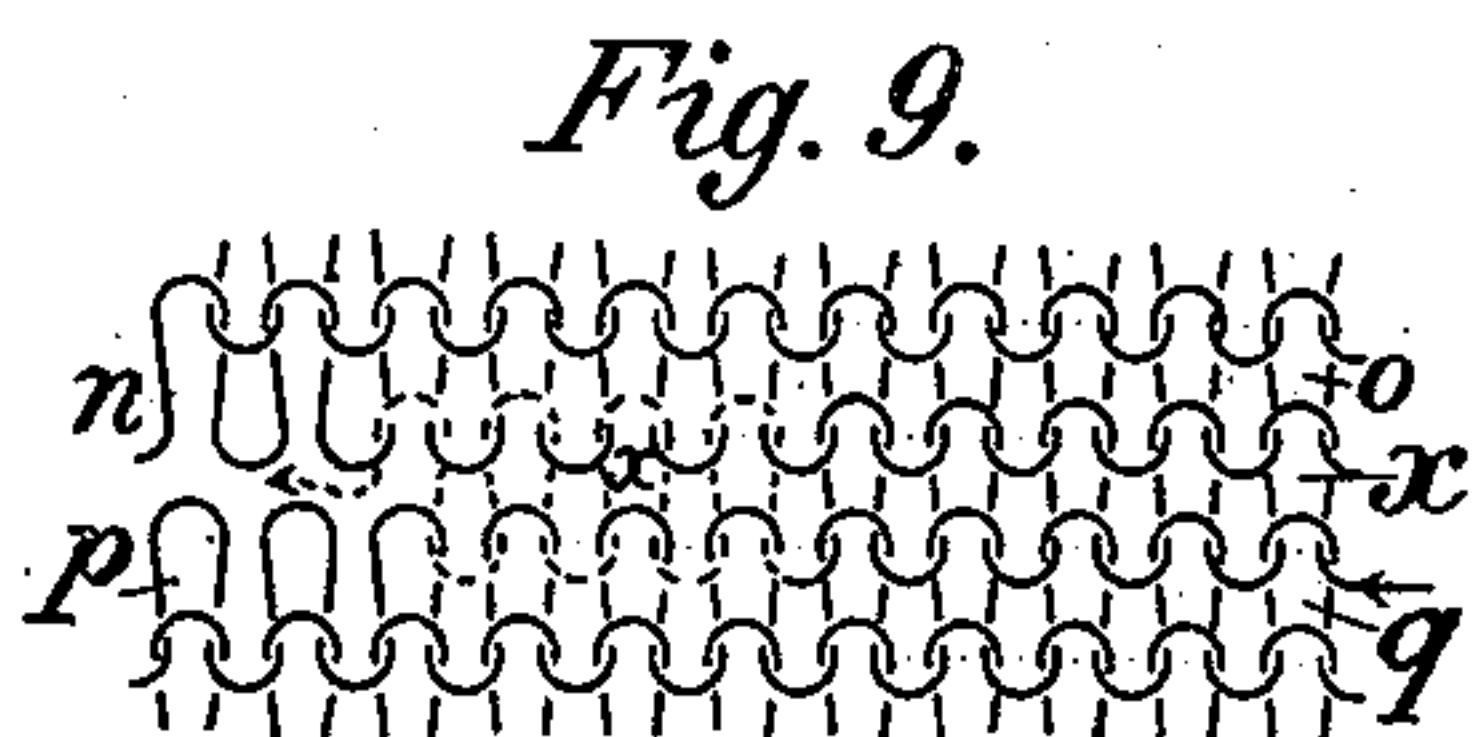
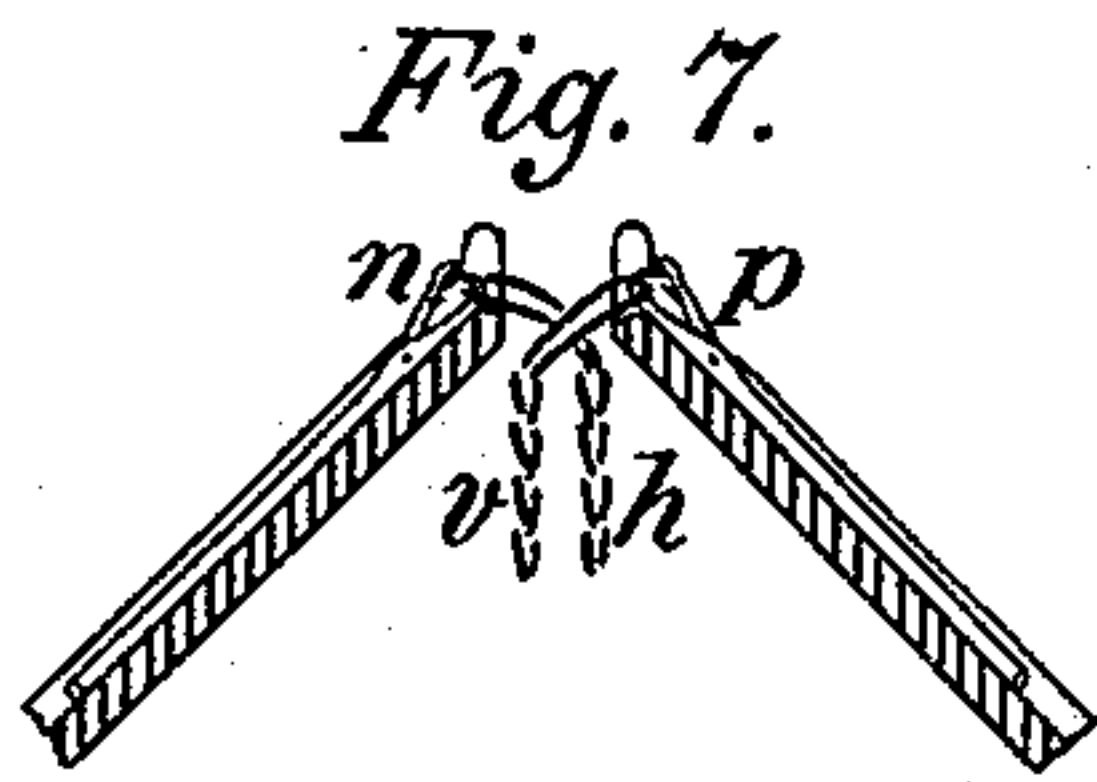
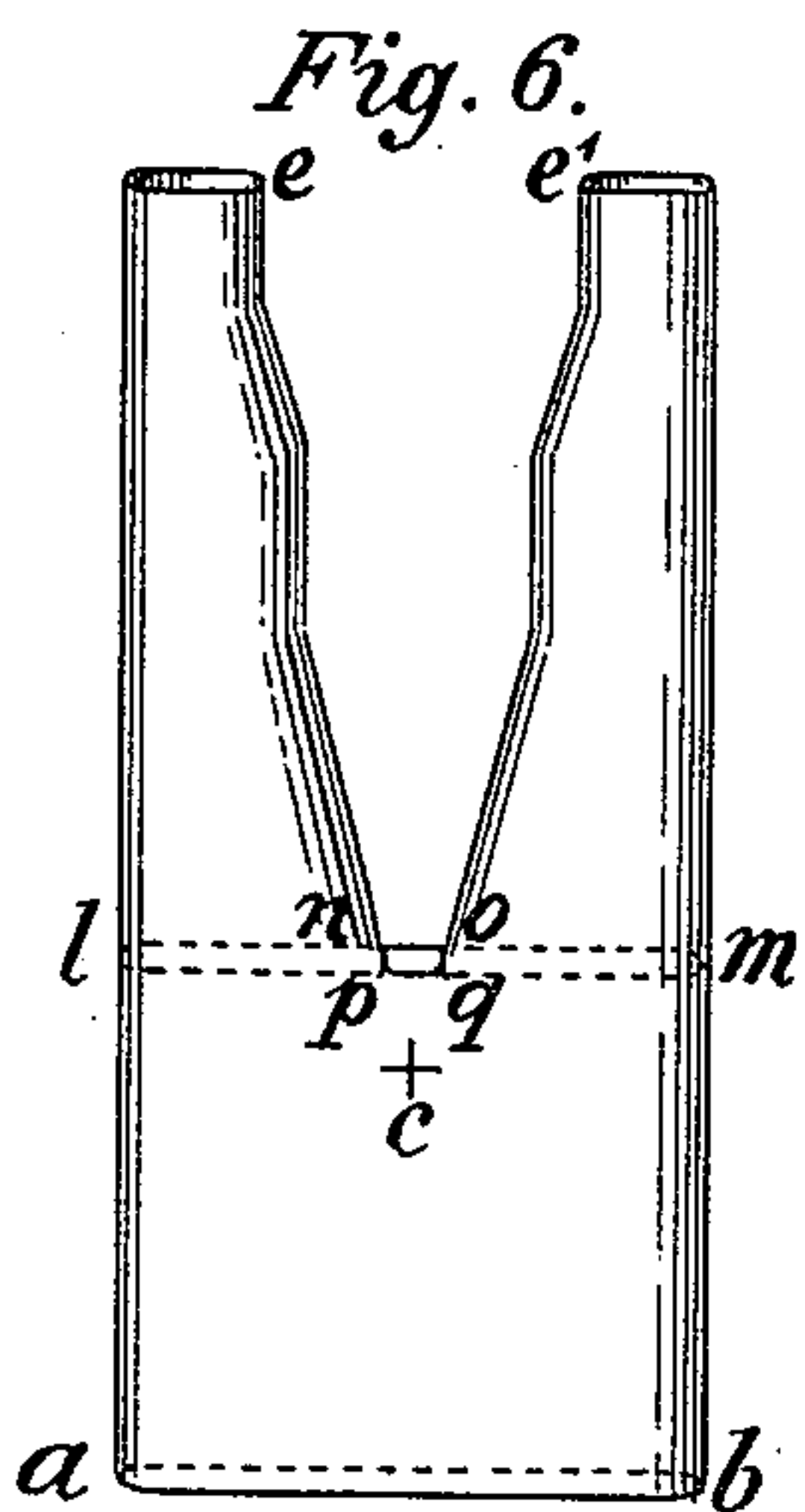
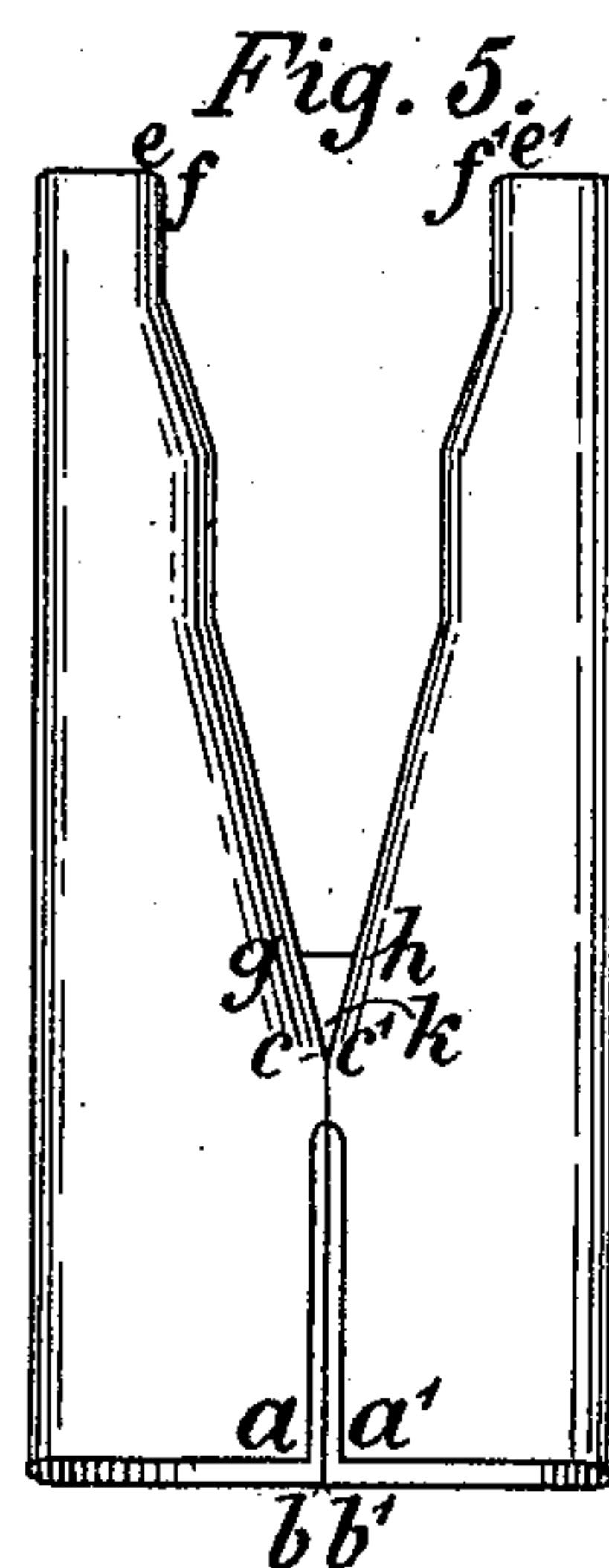
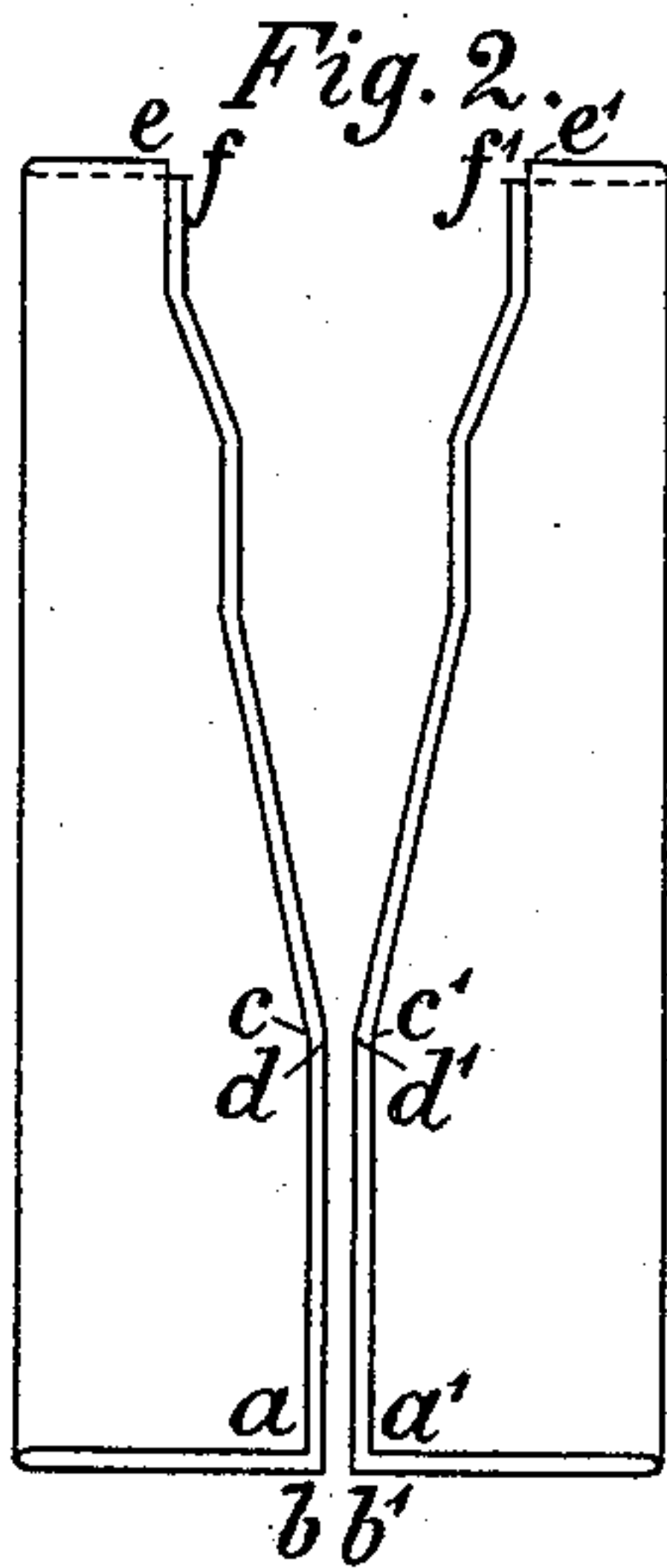
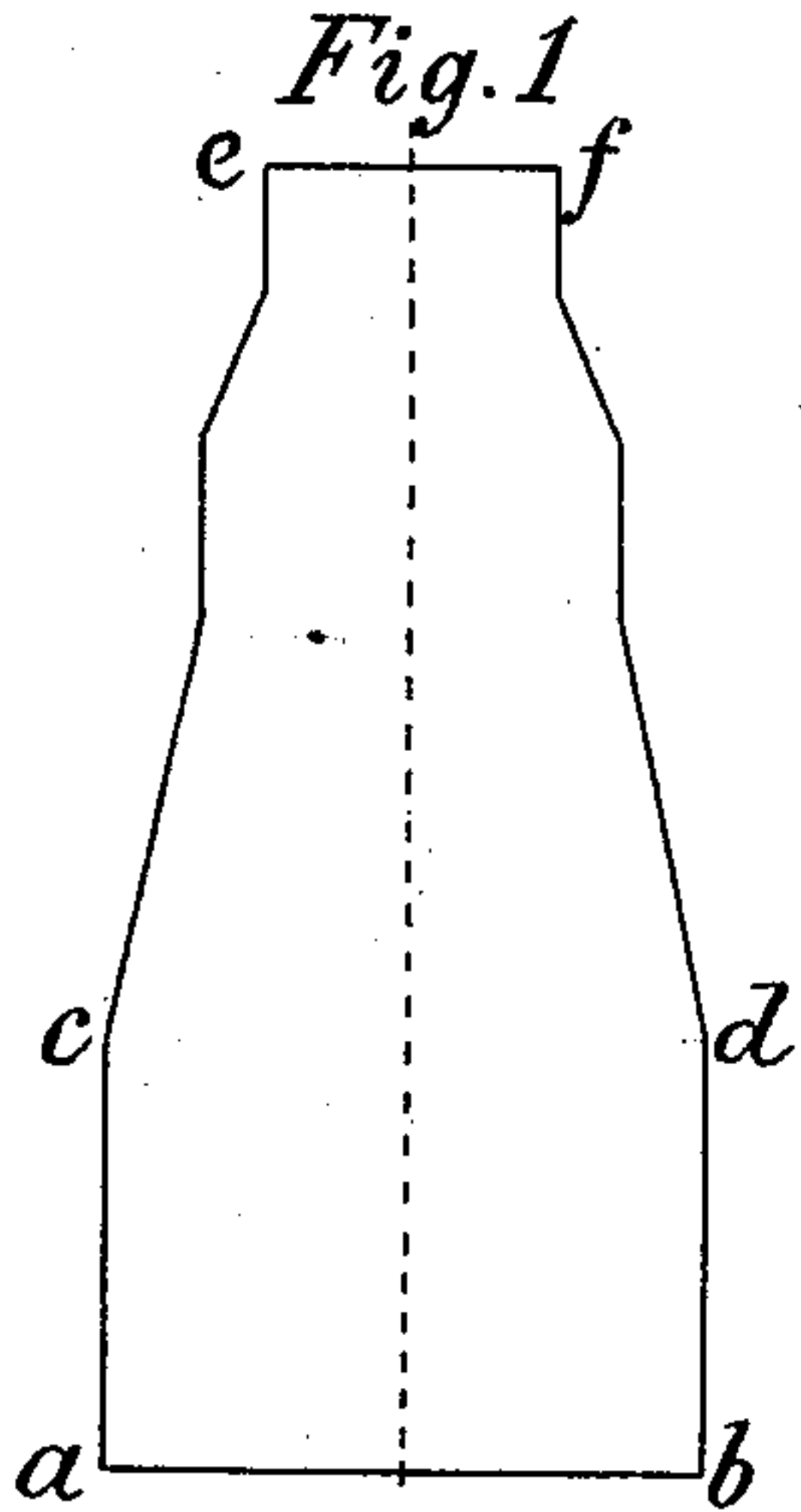


(No Model.)

H. GRÄNZ.  
KNIT DRAWERS.

No. 464,118.

Patented Dec. 1, 1891.



Witnesses:  
C. G. Northrup  
H. B. Kingsbury.

Inventor:  
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# UNITED STATES PATENT OFFICE.

HERMANN GRÄNZ, OF LIMBACH, ASSIGNOR TO FRIEDRICH RABE, OF  
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## KNIT DRAWERS.

SPECIFICATION forming part of Letters Patent No. 464,118, dated December 1, 1891.

Application filed June 16, 1891. Serial No. 396,418. (No specimens.)

*To all whom it may concern:*

Be it known that I, HERMANN GRÄNZ, a subject of the King of Saxony, residing at Limbach, in Saxony, German Empire, have invented certain new and useful Improvements in Knit Drawers, of which the following is a specification.

The said invention relates to knit drawers and a method or process of producing the same without seam and with the gusset at the fork worked into the rest of the fabric.

In order that this invention may be more clearly understood I will proceed to describe the same with reference to the accompanying drawings.

Figure 1 represents a leg-piece with the body-piece thereof as produced on an ordinary hand or power frame. Fig. 2 represents two such leg-pieces with their body-pieces, the edges being half open. Fig. 3 shows in detail the gusset, and Fig. 4 shows the same folded. Fig. 5 shows a completed pair of drawers with the gusset in place. Fig. 6 shows a pair of seamless drawers as produced on a wide Lamb knitting-machine. Fig. 7 is a detail view illustrating in detail the manner of crossing the loops  $n p$  to effect the joining of the corners  $p n q o$  of the leg-pieces. Fig. 8 shows a pair of drawers with the gusset knitted in. Figs. 9 and 10 are detailed views hereinafter referred to.

The method at present in use for producing knitted drawers is first to produce on a hand or power frame each leg-piece with the body-piece belonging thereto as a single piece of the shape shown in Fig. 1. Then two such pieces with their edges "half open" are placed together, as in Fig. 2. The leg-pieces are sewed up and the body-pieces are joined together at the back by a seam  $d d' b b'$ . A slit from  $a a'$  downward toward the fork is left in front and trimmed with suitable material for the reception of the buttons and button-holes. The seams of the leg and body pieces do not, however, meet in a point at the fork; but a gusset or clock is inserted there. This gusset is usually a separately-knitted square piece, as shown in Fig. 3, which is folded in the manner represented in Fig. 4, and sewed onto the leg-piece, so that the part  $i$  comes to  $d d'$  and  $k$  to  $c c'$ , when the finished garment appears

as illustrated in Fig. 5. Attempts have been made to diminish the number of seams arising from this mode of making drawers by knitting the leg-pieces on a knitting-machine, so as to close them all round; but this method of manufacture does not obviate the necessity for seams either in the body or in the gusset, where they are particularly objectionable.

In order to avoid seams of every kind, the drawers are made in the following manner: On a wide Lamb knitting-machine (or on any other knitting-machine having two rows of needles opposite to each other) the whole body-piece is produced as represented in Fig. 6, closed all round. A body-piece of this description is, however, not of the length which has hitherto been usual—that is, from  $a b$  to the level  $c$ , but is continued beyond this point to  $l m$ —that is to say, as much farther as corresponds to the length of the inserted gusset. At  $l m$  the leg-pieces are closed all round, but so worked as not to meet, as in  $c d$ , Fig. 2, but lie at such a distance apart from each other as corresponds to the width  $n o$ , Fig. 6, of the gusset formerly sewed in at this part. From  $l m$  onward two thread-guides are used, one for each leg-piece, and the meshes of the two center parts  $p q$  and  $n o$  are allowed to fall away from the needles. In order that the corners  $p n q o$  of the leg-pieces may be firmly joined, the loops at these places are crossed in the manner shown in Fig. 7 by hanging the loop  $p$  of the front row on the back needle, and the loop  $n$  of this row on the front needle. The leg-pieces are then finished by knitting them close round, so as to form fashioned work, and the two rows of meshes  $p q$  and  $n o$  of the center part are held against each other, as shown in Fig. 9, and joined together by a row of loops produced by hand. By this process the piece which has hitherto been inserted as a separate gusset is knitted onto the leg and body parts, while a seam at the line  $n o$ , Fig. 8, is avoided. The gusset knitted in in this manner may be left as even plain fabric; or, if desired, the seams produced by inserting a gusset may be imitated at  $n c$  and  $o c$  by a cover and drop-rib, as shown in Fig. 10. For this purpose the two loops  $l$  for the point  $c$  of the triangular imitation gusset are hung side-wise symmetrically with the middle loops  $c z$



at the distance of a needle, (say outward,) and the old loops *r* of the previous row are drawn upward onto the empty needles. After two or three rows two pairs of loops 2 3 are then  
 5 covered sidewise, and the old meshes *s* are again hung onto the empty needles. This process is continued and the pairs of meshes 4 5 each diverge the distance of a needle. By this means ornamental strips *c n c o*, Fig. 8, re-  
 10 sembling the old gusset, are produced.

By the process hereinbefore described a pair of drawers is produced entirely without perceptible seam. The front of the body part is then slit, as shown in Fig 8, and trimmed  
 15 in the ordinary manner.

I claim—

1. The method of producing on a knitting-machine provided with two rows of needles opposite to each other knitted drawers hav-  
 20 ing a gusset knitted into the fabric thereof,

consisting in forming the entire body part knitted, closed, and extended a distance corresponding to the length of the gusset beyond the junction of the leg part and forming the leg parts knitted closed at a distance apart 25 corresponding to the width of the gusset and effecting the final closing of the fabric at the fork by hand-knitting, substantially as described.

2. As a new article of manufacture, knitted 30 seamless drawers having a gusset worked therein and forming an integral part of the fabric, substantially as described.

In testimony whereof I have hereto set my hand in the presence of two subscribing wit- 35 nesses.

HERMANN GRÄNZ.

Witnesses:

MAX EUGEN HERRMANN,

CARL GOTTFRIED HOLBERG.