

Nov. 26, 1935.

F. B. MILLER

2,022,474

TRUSS

Filed Aug. 24, 1933

3 Sheets-Sheet 1

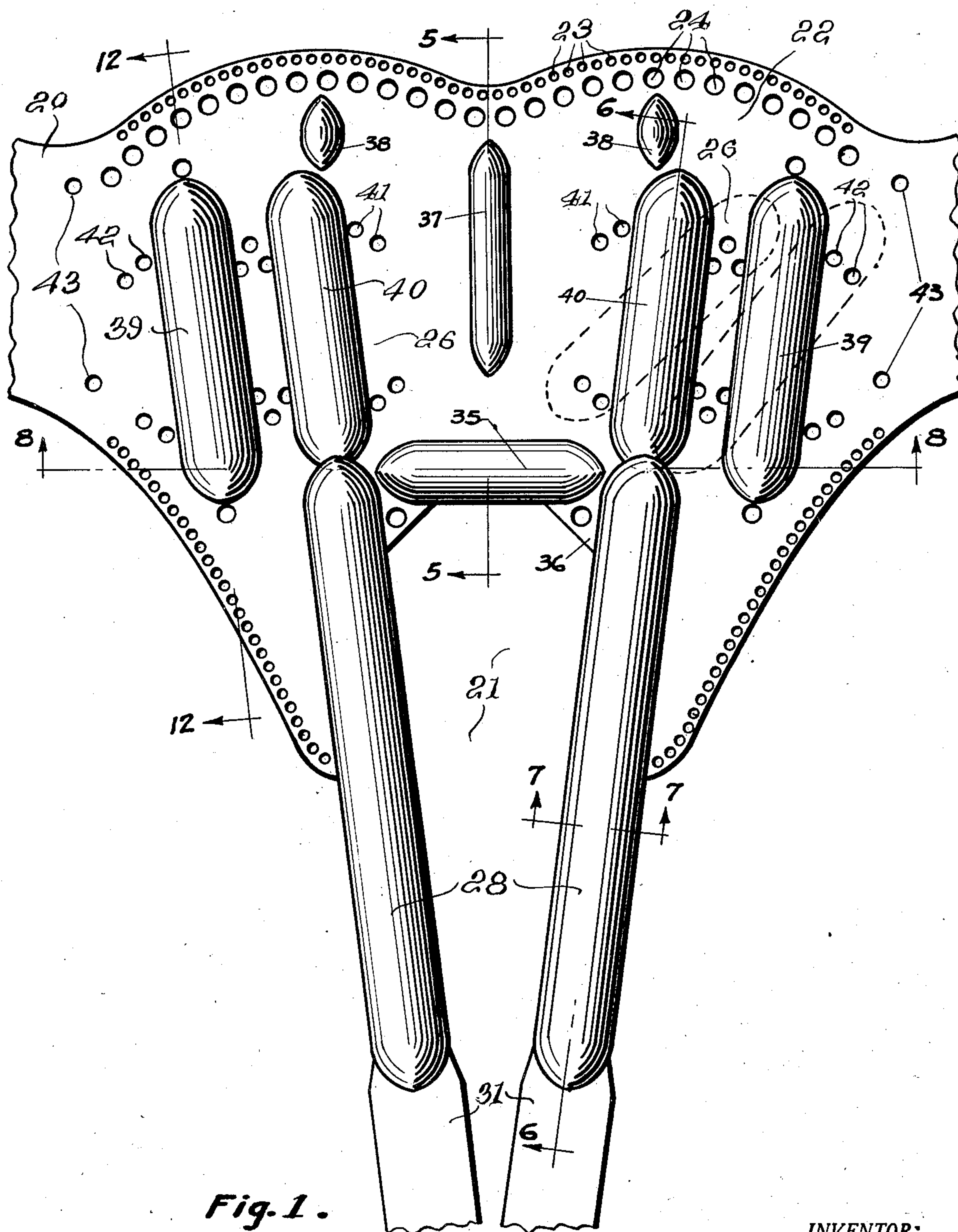


Fig. 1.

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3 Sheets-Sheet 2

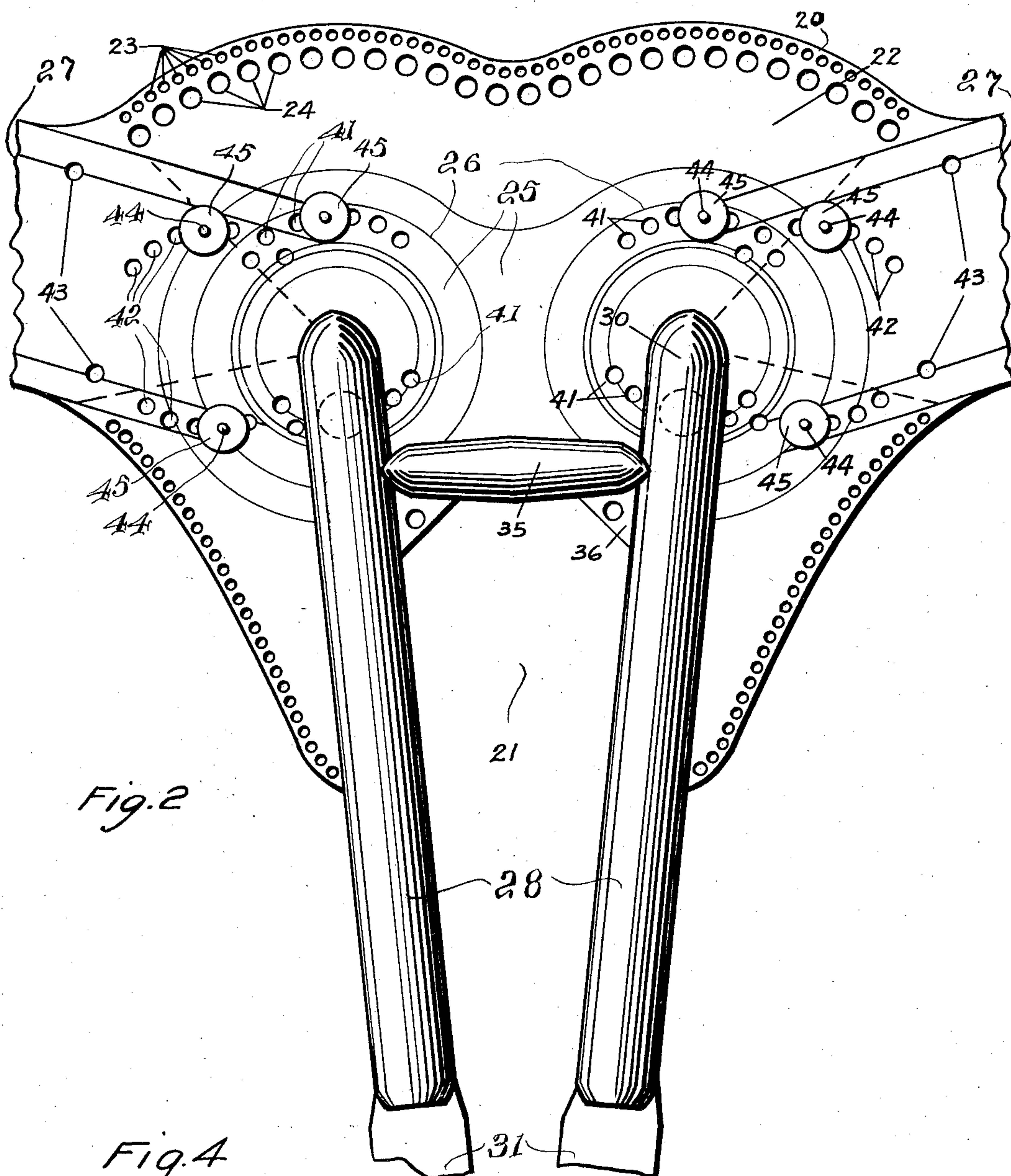


Fig. 2

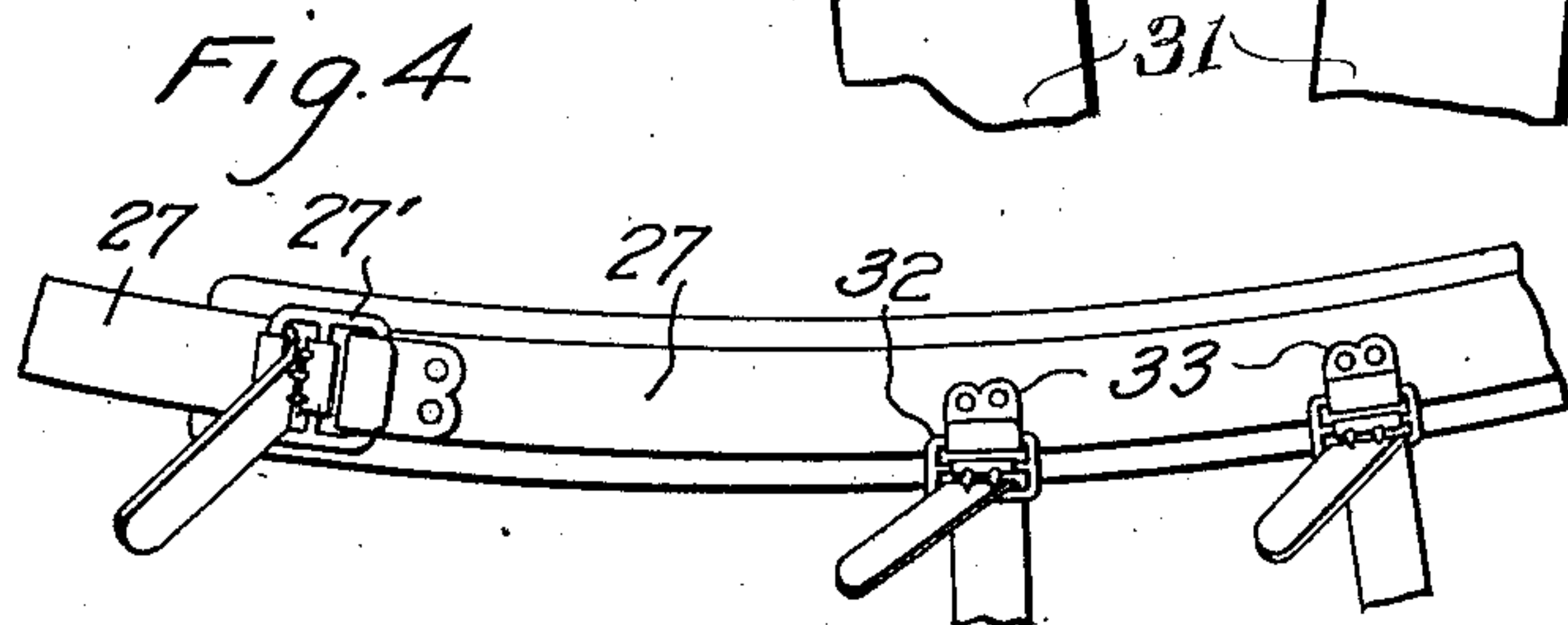


Fig. 4

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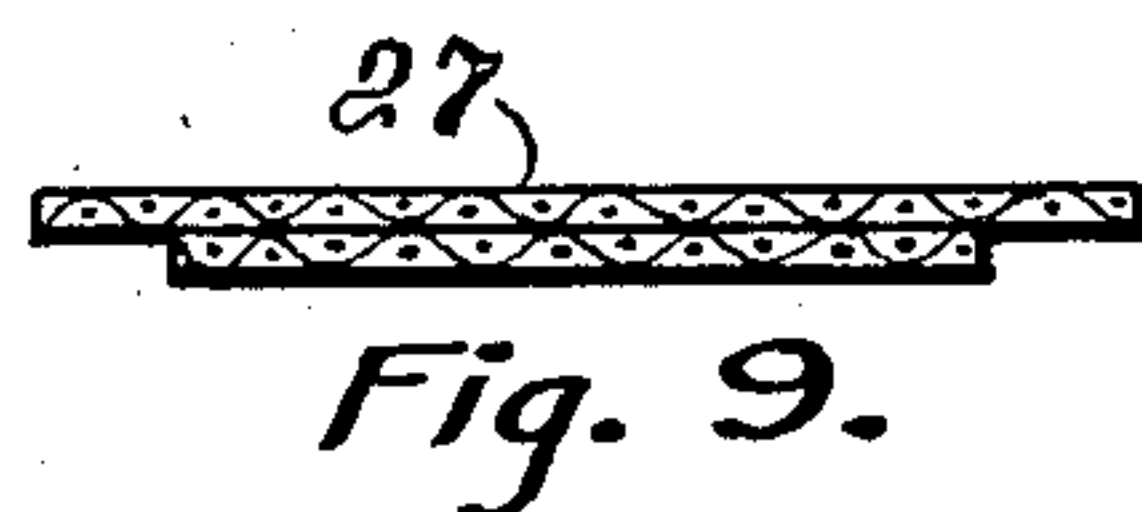
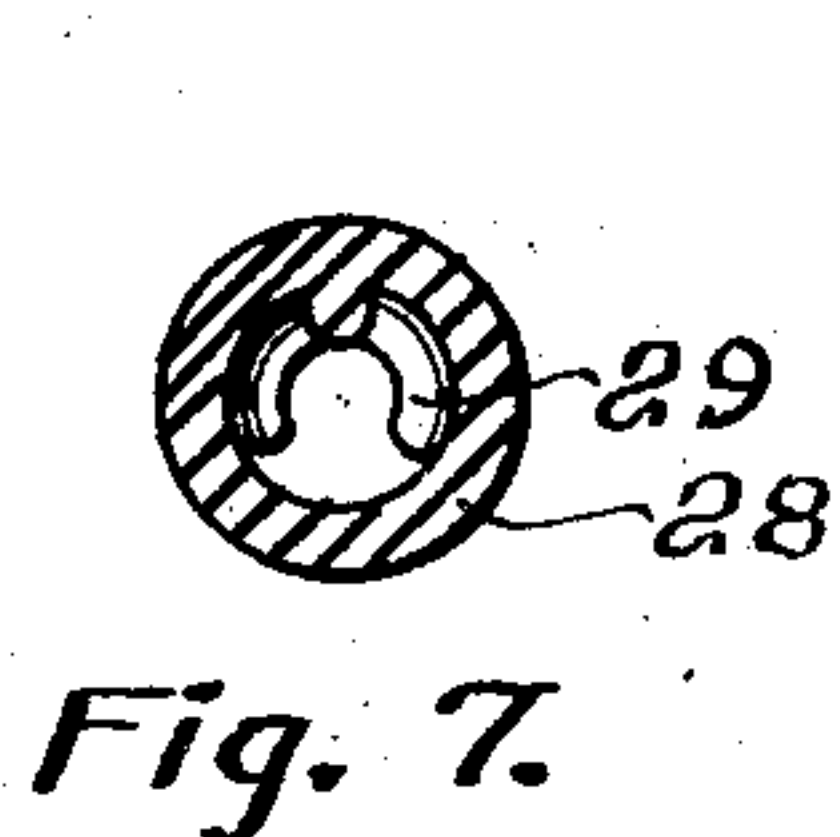
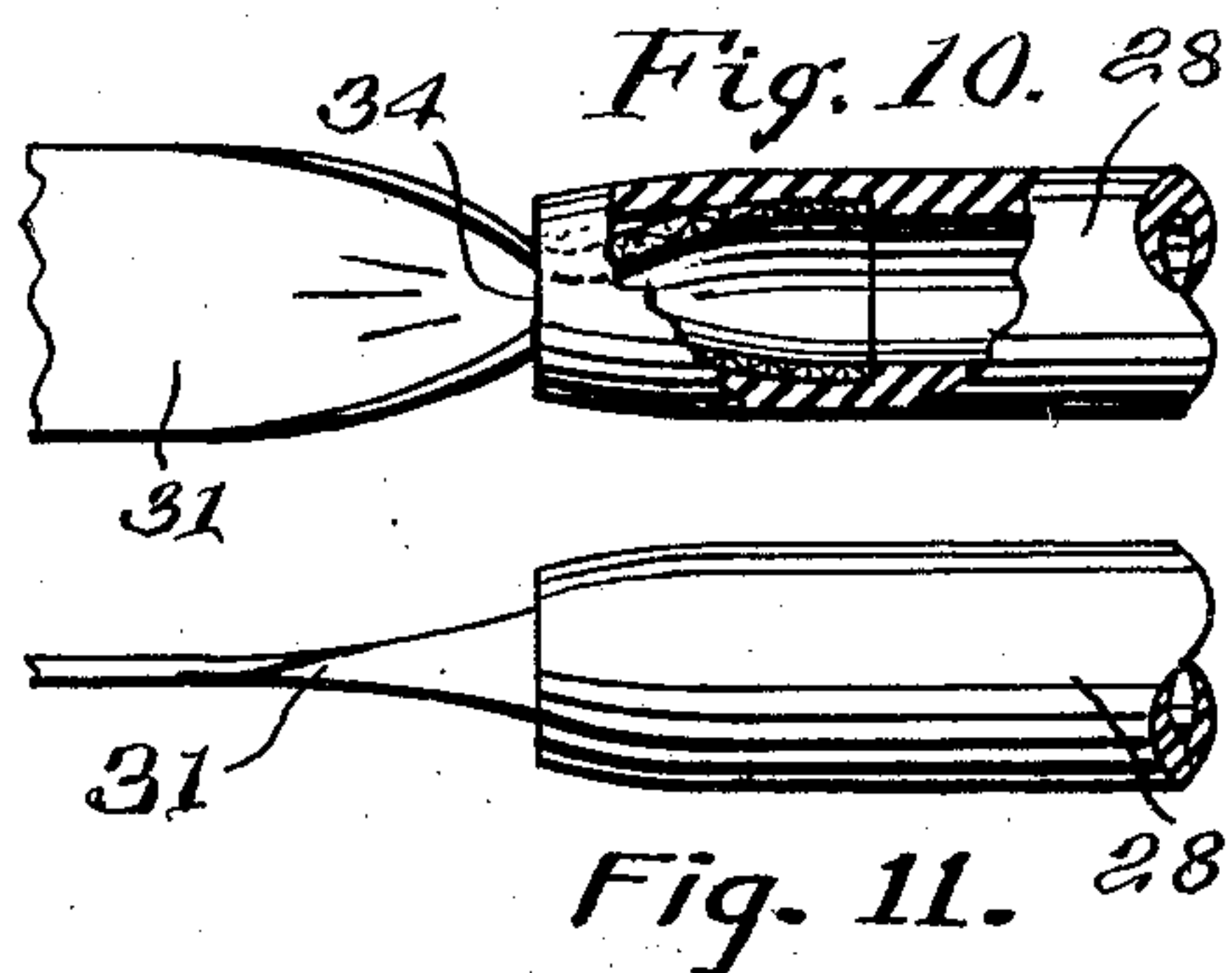
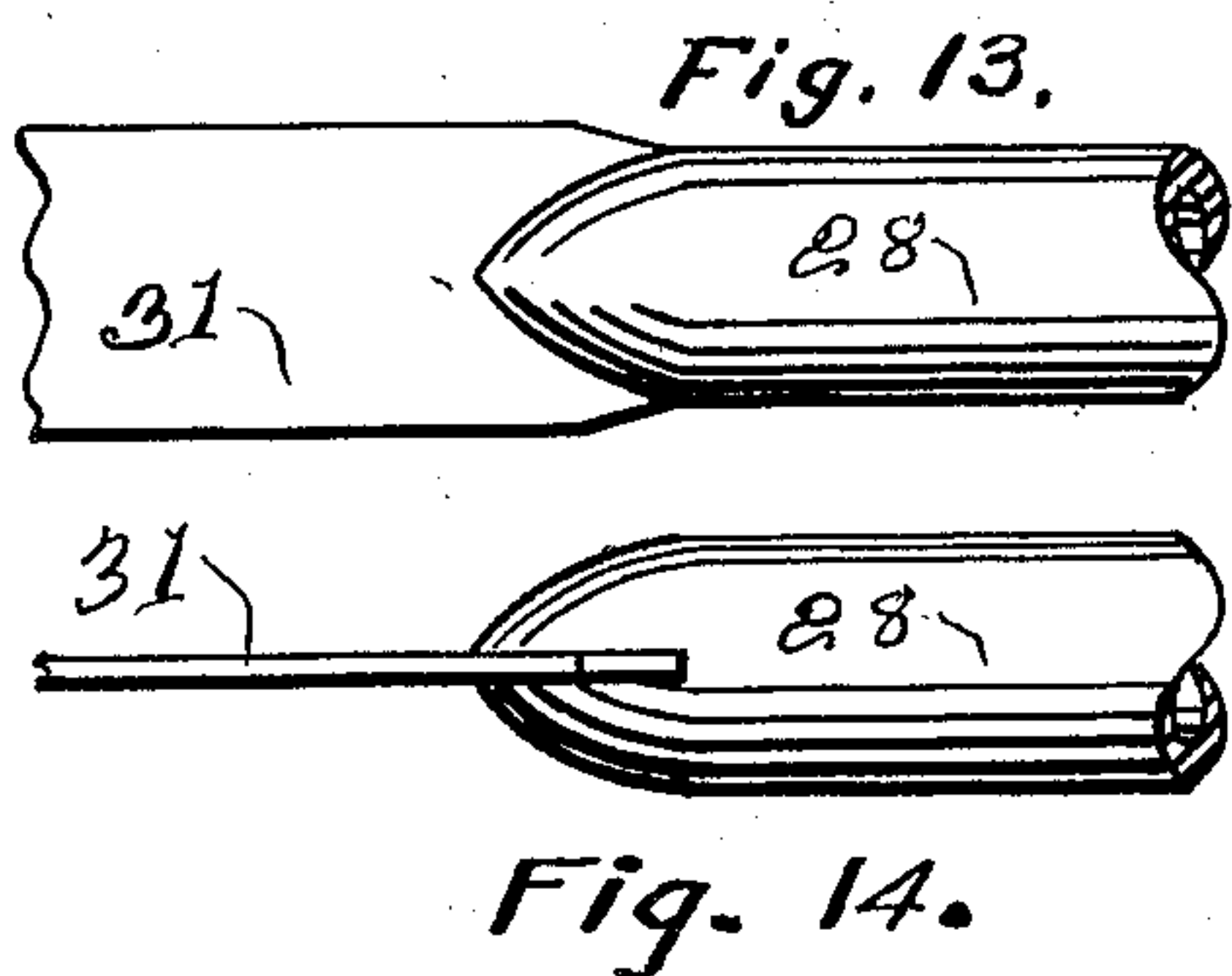
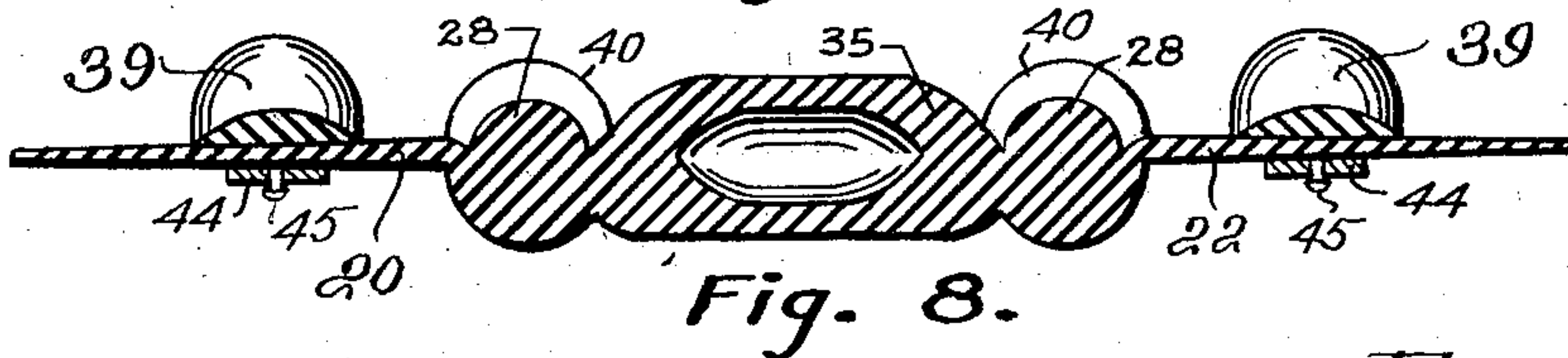
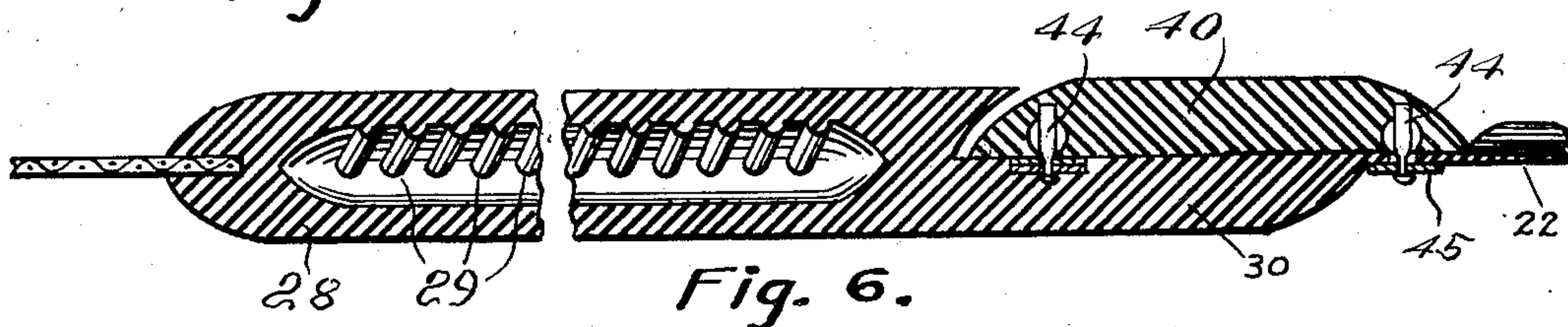
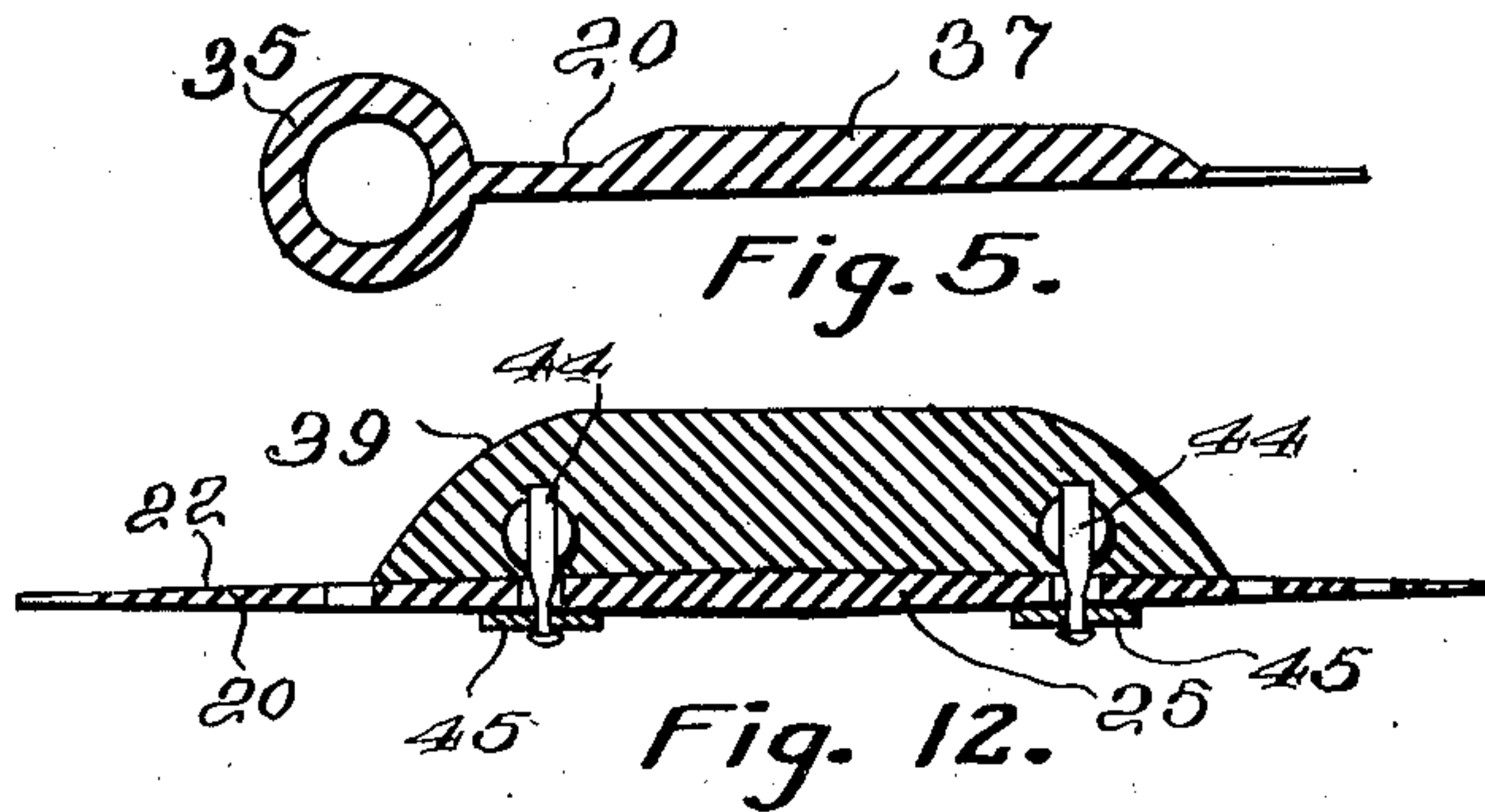
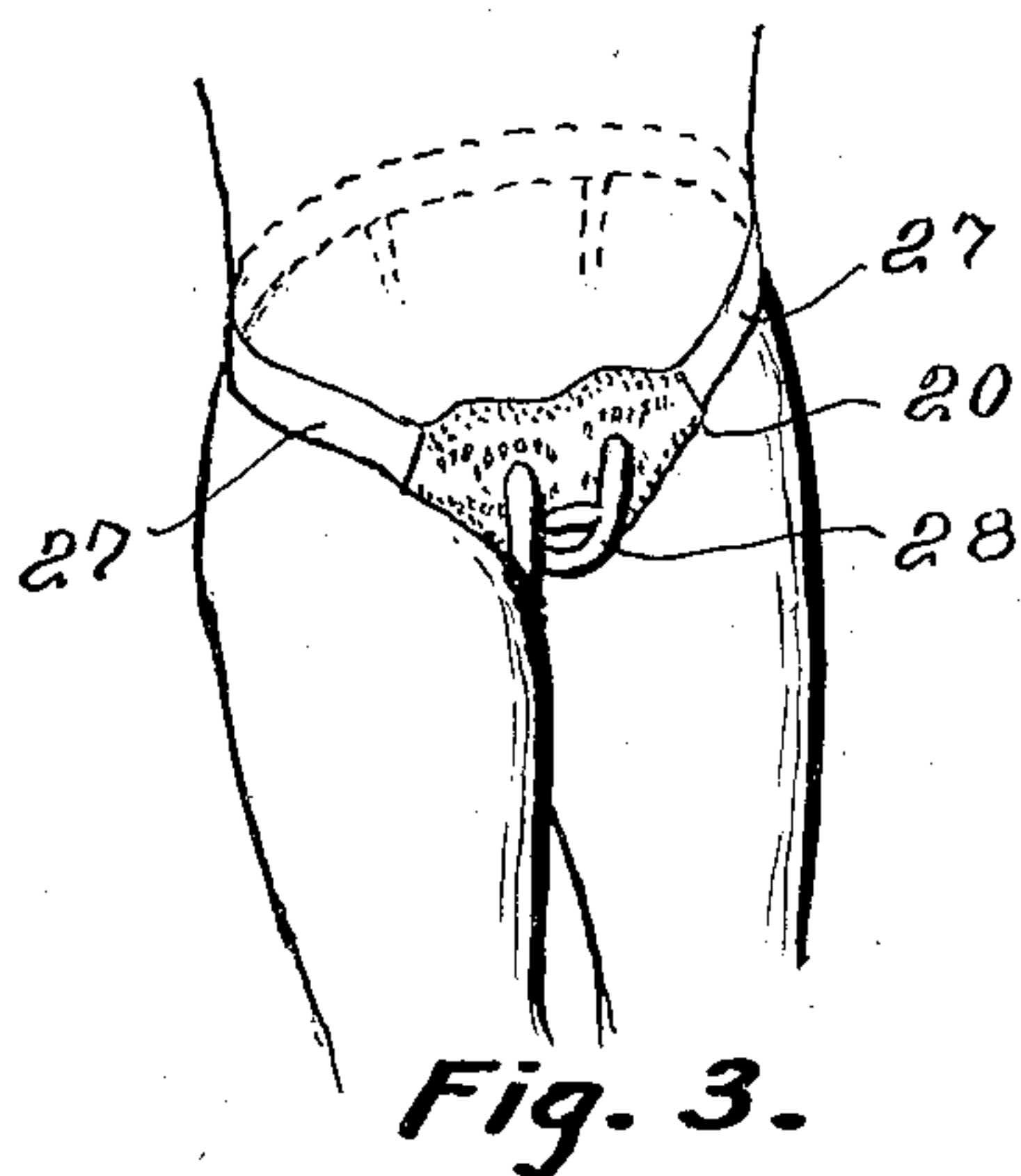
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,022,474

TRUSS

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Application August 24, 1933, Serial No. 686,639

6 Claims. (Cl. 128—100)

The invention relates to pad devices and particularly pads and supports therefor having peculiar utility in the treatment of hernia in the abdominal region. It is specially adapted in the present embodiment to inguinal hernias but from the disclosure its adaptability to various other cases will be readily understood.

The invention has for an important object to provide a certain means for effecting pressure across the course of extension of the protrusion after reduction by manipulation, as well as to provide a satisfactory means to retain and reduce the hernia at the peritoneal or other aperture or point of protrusion of the displaced parts.

It is a further purpose to present a device of the character described which in a standard pattern of manufacture will be adaptable to various exceptional symptoms or conditions with highly efficient results. Thus, the inguinal hernia is of uncertain course and in some cases instead of following the inguinal canal, becomes displaced in other directions, toward the iliacal boundary or toward the pubic symphysis, or the inner opening may vary in location. It is a further object to present a truss which will permit growth of fat in such measure that tissues will be properly filled and nourished.

It is an important object to afford a novel form of support and pad combination, to the end that the support will have a certainty of position with relation to the iliac boundary especially, and to the general anatomical area in which inguinal hernias occur and are projected, with pad elements specially adapted to confine the hernia when properly located, and to hold closed the canal through which the hernia may have progressed, or which may have been formed by the progress of the hernia before treatment.

In this direction it is a particular object to present a novel mounting of the pad element proper. It is also an aim to present a novel construction of the pad elements per se. Another purpose is to present a support and pad structure in which liability of irritation of the skin of the wearer will be minimized in a novel manner. Another aim is to set forth a novel strap connection in the securing of the pad support upon the person of the patient. A still further aim is to embody a novel anchorage connection of the attaching strap to the pad support. It is an important purpose to construct the device in such manner that the anchorage of the attaching straps is made to serve as a pad element of peculiar value in indicated conditions, particularly scrotal extensions of hernias.

It is a further important aim to present a pad support, which while having great value in the definite maintenance of its position relatively to the extrusion or hernial orifice, and hernial canal, will yet be free of that irritating rigidity or

lumpiness which causes many to go without beneficial support, and will be elastic in the essential directions for comfort, while yet having great dependability in maintaining the essential location of the support.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention as will be more readily understood from the following description and accompanying drawings, wherein

Figure 1 is an inner side elevation of a support and pads constructed in accordance with my invention, the attaching straps being broken away,

Figure 2 is a similar view at the front or outer side of the device.

Figure 3 is a perspective view of the figure of a person wearing the appliance.

Figure 4 is a detail of the end strap connection.

Figure 5 is a section on the line 5—5 of Figure 1.

Figure 6 is a vertical section longitudinally of one of the leg strap-pads on the line 6—6 of Figure 1.

Figure 7 is a cross section of one of the leg strap-pads on the line 7—7 of Figure 1.

Figure 8 is a horizontal section on the line 8—8 of Figure 1.

Figure 9 is a cross section of one of the girdle straps.

Figure 10 is a detail elevation of a preferred anchorage connection between the crotch-strap and strap-pad.

Figure 11 is a top view of the detail of Figure 10.

Figure 12 is a detail section on the line 12—12 of Figure 1.

Figures 13 and 14 are side and edge views of a simple back strap connection.

There is illustrated a truss sheet or support body 20, which is customarily molded integrally of elastic rubber, colored as desired. The material is preferably of a composition soft enough to minimize friction against skin surfaces. This support is substantially in the form of an isosceles triangle, the equal angles of which are at the upper part, and a medial slot 21 is formed from its lower apex on its medial line. The body in the main comprises a web 22 of elastic rubber the extreme outer edge portions of which are tapered to a thinness permitting it to be easily deflected by the skin and tissues of the wearer, without irritation, and in addition a series of very closely spaced small apertures 23 are formed close to the extreme edges throughout the length of the edges. These edges are approximately $\frac{3}{64}$ inch thick and the apertures about $\frac{1}{16}$ inch in diameter. A second series of apertures 24 some-

what larger in diameter may be formed in a series parallel to the first, as shown at the top of the web.

The body 20 is thickened substantially as at 5 25 in its central part over an oblong area immediately above the upper end of the slot 21, the major axis of this area being horizontal. On this thickened area there is included at each end a circular portion or base 26, these circular 10 portions being located with their centers close beside the os pubis when the device is worn, and the circular areas extend partly over the os pubis. The upper edges of the body 20 have respective parts concentric with these centers. 15 Embedded in the body 20 there are the ends of non-elastic waist straps 27, each consisting of two superposed bands stitched together, the outer one narrower than the other. Both are cut to a point the wider strap projecting slightly 20 beyond the circular part 26. With the body 20 they in effect comprise a belt.

Forming the sides of the slot 21 and also formed integrally with the web 22 there are respective strap anchorages and pad elements 28, 25 cylindrical in form and hollow, being substantially rectilinear and having their upper ends closed and on one side extended to the centers of the respective bases 26. The anchorages are convergent toward their extremities when free, 30 so that the upper part of the slot 21 is wider than the lower part, but owing to the flexibility of the parts this form of the slot is not rigidly fixed, and on the contrary, in use, the central parts of the tubes 28 will be variably spaced according to the positions of the wearer, and they 35 will yield readily to movements and pressure of engaged tissues. These tubular parts will extend under the crotch and may for the most part lie closely together while in use. The tubular 40 parts are formed with a multiplicity of interior short diagonal ribs 29 on the inner surface of the inner half of the tube which have the effect of giving the half of the tube sufficient stiffness to function properly as pad while at the same time 45 retaining adequate flexibility. The tubes are smoothly finished as plain cylinders exteriorly. The outer half of each tube is without stiffening, and beyond the tubular part is extended on the outer side of the web only as a reinforcement of the sheet 20 semi-circular in cross section, as 50 at 30.

At the extremities of the tubes back straps 31 are attached thereto, being secured by being vulcanized into the material of the tubes coincident 55 with molding of the body 20. The straps 31 are much smaller than the waist straps 27, and are provided with adjustable longitudinally adjustable buckles or the like, having a frame including a cross bar 32, which may be engaged in a hanger 60 33, of which one or more are fixed upon the respective waist straps at a suitable distance from the body sheet 20. These hangers are each of sheet metal having a lower edge portion turned upward in hook shape, so that the bar 32 may rest therein. These straps each may have the material of the tube firmly attached to the straps 65 at the extremity of the tube, but it is preferable to have these tubes attached as shown in Figure 10, where the strap enters loosely through a hole 34 in the end of the tube, the strap being transversely bent to accommodate itself readily in the hole. The extremity of the strap is vulcanized into the wall of the tube, beginning at a distance from the hole and extending within the 70 wall as a unitary part for a suitable distance con-

forming to the curvature of the wall, the strap being consequently bowed or arcuate in cross section. This makes it possible to secure an extended anchorage of the strap in the body of the tubular member without an excessive thickening of the structure in the tube and minimizing liability of breakage of the connection. The securing of the strap in this manner is attained by utilizing a two-piece core for the tubes when molding the article, the pieces being drawn out 10 through the open end of the tube beside the strap.

The tubes 28 are bisected by the mean plane of the body sheet 20 so that the stiffened halves are raised from the sheet. Across the top of the slot 21 a substantially cylindrical hollow 15 tubular pad and reinforcement 35 is formed integrally, the ends of this on the pad side being tapered and inclined toward the plane of the sheet 20 at the sides of the tubes 28, while on the outer side of the sheet 20, its ends are joined with the 20 tubes 28 to form a more substantial connection therewith. The wall of the element 35 on the pad side may be reinforced in the same manner as the corresponding halves of the tubes 28. The element 35 is of slightly less diameter than the 25 tubes 28. Small diagonal webs 36 extend between the part 35 and the tubes 28, strengthening the structure and preventing chafing and other discomfort. They may be apertured as shown to increase their flexibility. 30

The inner face of the sheet 20 above the element 35 is flat and smooth, except for a central small pad rib 37 of low altitude lying on the vertical medial axis of the sheet 20. It projects from the surface of the sheet less than a quarter 35 of an inch, and is slightly less than half the width of the tubes 28. It has no counterpart on the outer face of the sheet 20. It begins a short distance above the pad 35, and stops short of the series of openings 24. Two other shorter ribs 39 40 are formed to right and left of the rib 37 parallel thereto and extending a little further in the direction of the upper edge of the sheet, but stopping short of the edge the same distance. Their medial lines are close to or coincident with the 45 centers of respective bases 26. These ribs serve as stabilizers as well as pads, aiding in preventing displacement of the sheet 22 (especially at the upper part) from a preferred adjustment upon the wearer. 50

Above the upper end of each tube 28 on the inner face of the sheet 20, there are provided two pad elements 39 and 40, one outwardly of and the other on the line of the tube 28. A normal position for these two pads is shown in Figure 1, 55 the pad 40 being aligned with the tube 28 while the pad 39 is outwardly of the tube 28 and parallel to the first. These pads are formed as separately attached members and have been formed as solid elements semi-circular in cross section 60 so that they may lie flat against the sheet 20, and correspond to the form, height and width of the part of the tubes 28 there adjacent. The pads are of a length to extend from adjacent the upper ends of the tubes 28 upwardly, stopping 65 short of the upper edge of the sheet 20 an inch or more. In practice, the measurement of the sheet 20 has been about eight and one-half inches from the lower extremity of the tube 28 to the extreme top edge of the sheet 20 on the 70 medial line of the tube, and the other parts in the same proportions illustrated, but these proportions may be varied and the general size of the device altered as requirements may dictate.

The pads 39 and 40 are secured in place by 75

two-piece separable snap fasteners. To facilitate adjustment of the pads 39—40 I have formed two series of apertures 41 and 42 in each lateral half of the sheet 20, each series including two arcs of apertures, one series being concentric with the base 26 while the other is concentric with a point laterally outward of the first center on the respective half of the sheet 20. Additional similar apertures differently arranged are also provided, as at 43. I secure the stud element 44 of a fastener by vulcanizing in each end of each pad 39—40 and use the socket member 45 of the fastener by pressing it upon the stud and against the outer face of the sheet 20 after the studs have been adjusted in the desired apertures of the sheet 20. The apertures 41—42—43 have thickened edges, whereby they are reinforced and the sheet 20 not materially weakened by the formation of the apertures. Each of the pads 39 and 40 may be adjusted at various angles on the sheet 20, by detachment of the fastener sockets 45, withdrawing the studs of the pad from the sheet 20 and rotating the pad on the axis of the aperture series 41 or 42 as the case may be, reinserting the studs and replacing the sockets 45. The adjustment shown in dotted lines in Figure 1 is useful to insure the adjustment of the pads across the line of displacement of viscera in certain peculiar conditions, and for higher than normal hernias or where the displacement tends laterally outward, the adjustment of a pad such as the ones 39 and 40 in the apertures 43 is available for effective treatment of such cases. By using the two pads 39—40 or more, spaced apart and adjusted to serve as dams in the path in which the hernia tends to develop, instead of using one large pad bearing upon a large area, the organism of the patient is enabled to build up fat tissue in the intervening spaces without undue restriction, and with resultant benefit in various ways. Fat becomes attached to fibrous tissues and ligaments as is well known, and so will operate as a dam. The formation of the ribs 29 has a similar advantage in respect to the tubes 28 and 35, though in lesser degree on account of the close spacing of the ribs 29.

In the use of the device, the waist or belt straps 27 are adjusted around the body of the wearer and connected by a buckle 27', the body 20 being adjusted as snugly as possible with its lateral edges and straps 31 defining the iliac boundary, and the pad 35 located and centered on the os pubis. The leg or back straps 31 are then adjusted and connected to the hangers 33 so as to hold the pad tubes 28 snugly in the crotch and to prevent the sheet 20 from being displaced upwardly.

One set of the pads 39 and 40 at one side may be omitted if not required. Those required are adjusted, so that one lies at the inner inguinal aperture or ring, and the other across the inguinal canal a distance from the first, in normal inguinal hernias. For exceptional cases the positions may be varied according to the direction of extension of the hernia from the inner ring, or from the inguinal canal, as the physician deems proper in accordance with the principles of reduction of hernias and taking advantage of the adaptability of my invention to novel use and special applications, as before indicated. In cases of scrotal hernia, the tubes 28 and the pubic pad 35 are useful in aiding reduction, and in enabling or caus-

ing a reuniting of tissues after reduction. As before explained, in case of development of the hernia toward the iliac boundary, from the inner inguinal ring one of the pads similar to the one 39 may have its studs engaged in apertures 43, and secured as described. In case of a variation of the inguinal or the hernial canal from normal position or direction the sockets 45 may be detached and the studs of the pads 39 and 40 withdrawn, and readjusted in other apertures of the sheet 20, so that the pads may lie across the path of the canal as intended, and the sockets then replaced, all of which may be done manually. This also permits the ready removal of parts for cleaning, or replacement. After initial treatment, it may be found desirable to substitute pads 39 and 40 of softer structure, or modified structure, which may be done without requiring purchase of an entire new truss, as will be understood.

It should be understood that the pad members 39 and 40 are more or less rigid relatively to the sheet, although of elastic material and capable of being manually flexed and otherwise manually distorted. But when the pads are initially adjusted for the hernia in case two apertures closest to the studs of the pads when so adjusted are not spaced exactly the same as the studs, the flexibility and elasticity of the sheet 20 will permit it to be stretched to receive the studs properly, and in the subsequent use of the article, no material variation from the desired position will occur.

I claim:—

1. A pad support comprising a sheet of elastic material having tapered edge portions and substantially of triangular form adapted to define the lower iliac boundaries, belt supports extended from the two upper angles thereof, a vertical slot being formed on its medial axis opening on the third angle, integral elastic tubes of substantial diameter forming the sides of the slot projecting above the plane of the sheet at the body engaging side of the sheet, and attaching straps extended from the outer extremities of respective tubes.

2. The structure of claim 1 in which the tubes have a stiffened body-engaging side portion.

3. The structure of claim 1 in which a multiplicity of internal diagonal ribs are formed on the tubes at the body engaging side.

4. The structure of claim 1 in which the outer ends of the tubes are apertured, said attaching strap members extended slidably into the outer ends of the tubes and united with the material of the tubes a distance from the said ends of the tubes.

5. A pad support comprising a sheet of elastic material substantially triangular in form, belt supports extended from two upper angles thereof, a vertical slot being formed on its medial axis opening on the third angle, integral thickened members raised above the body-engaging face of the sheet and forming the sides of the slot, straps extended respectively from the outer extremities of the side members of the slot, separate elongated pad members adjustably secured to the sheet, one adapted to form a continuation of one side member, and the other adapted to be spaced therefrom.

6. The structure of claim 5 in which said separate pad members are substantially semi-circular in cross section and rectilinear longitudinally.

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