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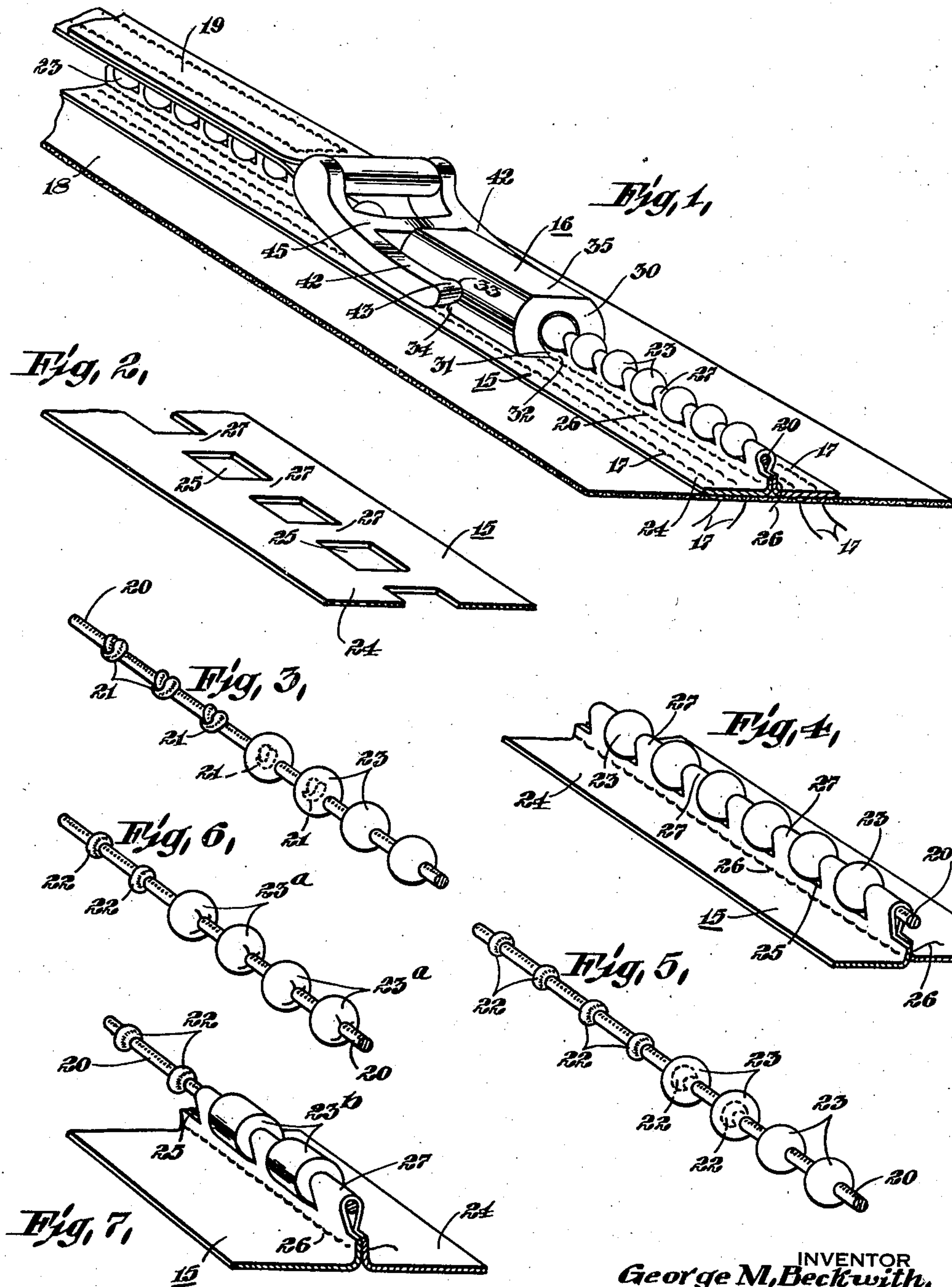
G. M. BECKWITH ET AL

2,343,826

ADJUSTABLE FASTENING DEVICE

Filed March 13, 1942

2 Sheets-Sheet 1



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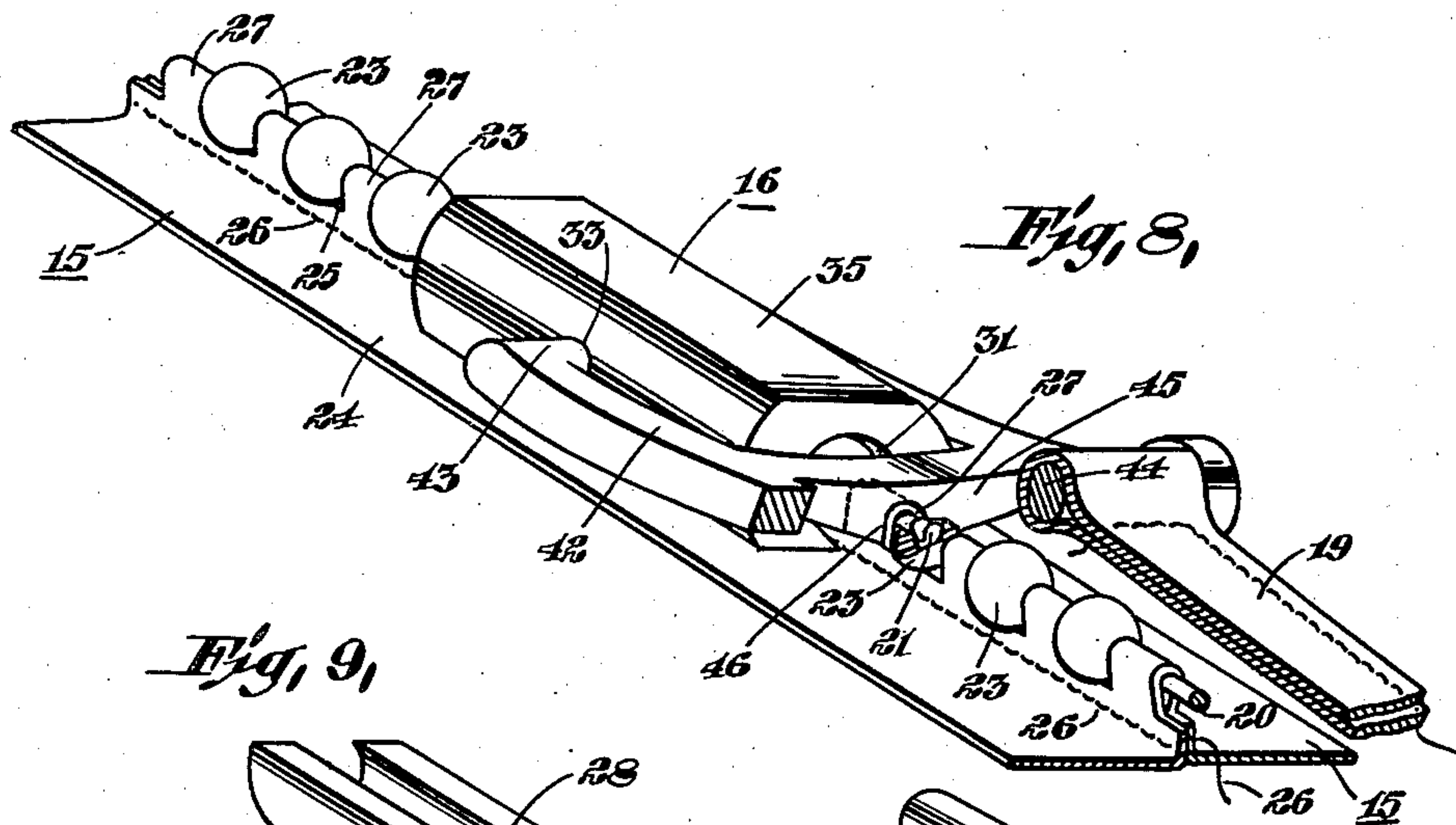
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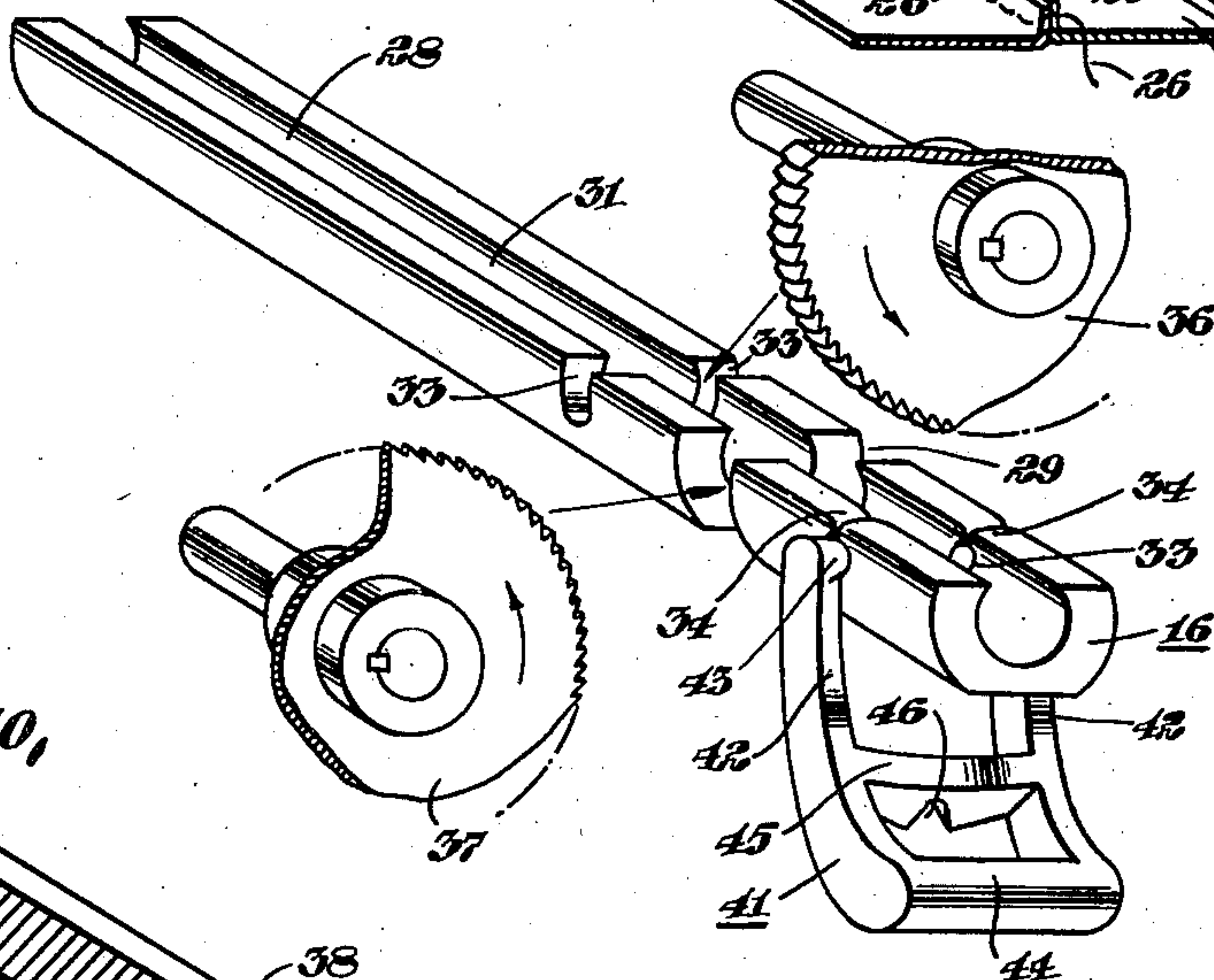
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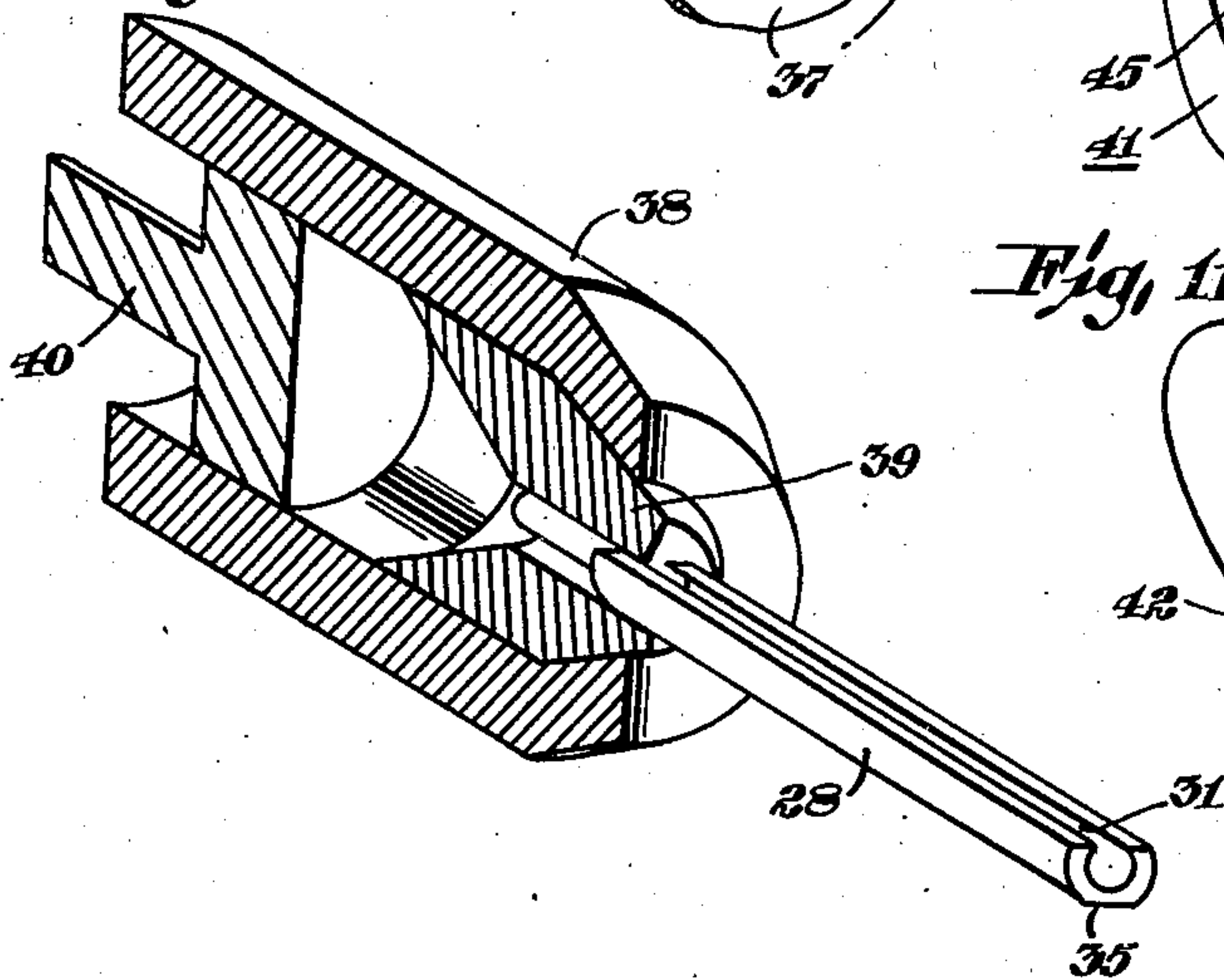
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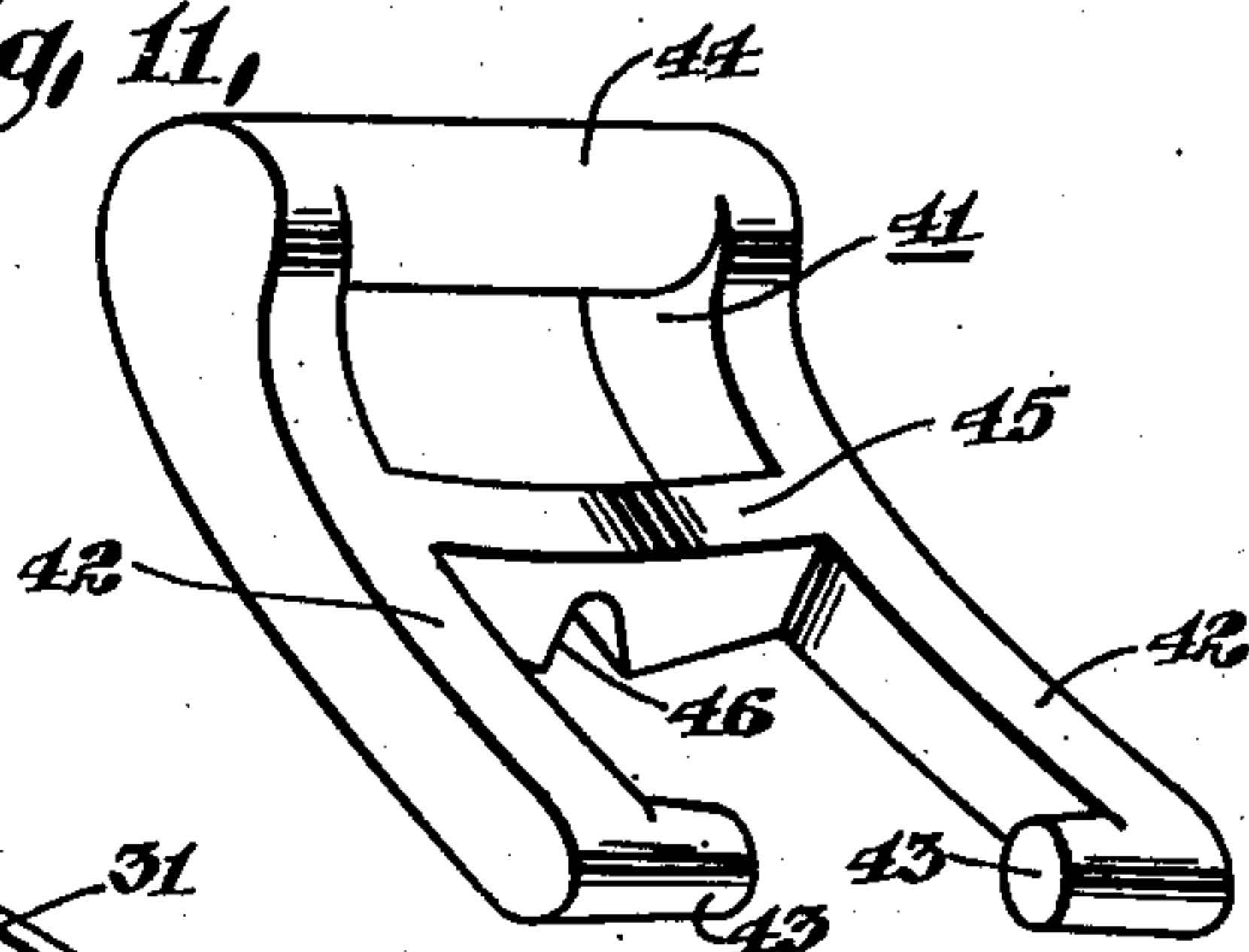
*Fig. 9,*



*Fig. 10,*



*Fig. 11,*



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## UNITED STATES PATENT OFFICE

2,343,826

## ADJUSTABLE FASTENING DEVICE

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Application March 13, 1942, Serial No. 434,594

7 Claims. (Cl. 24—206)

This invention relates to adjustable fastening devices and, in particular, to such devices including a track comprising a plurality of spaced stops, abutments, or the like supported in flexible manner and a cooperating slider member slidable with respect to the track and adapted to be locked, selectively, in various predetermined positions against movement longitudinally of said track.

It is an object of this invention to provide such a fastening device embodying a new and improved track construction which may be readily and economically produced and wherein assembly of the component parts may be quickly and conveniently accomplished with but little skill.

It is a further object of this invention to provide a new and improved slider construction for such devices which embodies a new principle of operation, which is of extreme simplicity, and which may be cheaply produced and easily assembled.

It is a further object of this invention to provide new and improved methods of forming and assembling the component parts of such adjustable fastening devices.

These and other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawings which forms a part thereof, and will be pointed out in the appended claims.

In the drawings:

Fig. 1 is a fragmentary view, in perspective, of a garment equipped with an adjustable fastening device according to this invention;

Fig. 2 is a fragmentary view of apertured tape forming a part of the track of the fastening device of Fig. 1;

Fig. 3 is a diagrammatic view, in perspective, showing flexible cord equipped with predetermined spaced stop members, another component part of the track of the fastener shown in Fig. 1, and illustrating the manner in which the cast or molded-on stops are secured against longitudinal movement on the cord;

Fig. 4 is a fragmentary perspective view of the track or trackway of the fastening device shown in Figs. 1 and 2;

Fig. 5 is a view similar to Fig. 3 but showing a cord having integral formed-in enlargements over which the stops are secured, the stops being cast or molded on the cord;

Fig. 6 is a view similar to Figs. 3 and 5 but showing stop members formed as hollow beads from sheet material and secured over the enlargements on the cord;

Fig. 7 is a view similar to Fig. 4 but showing a fragment of the track similar to that of Fig. 4 but embodying cylindrical stop members;

Fig. 8 is a fragmentary view, in perspective, of the adjustable fastening device shown in Fig. 1, as seen from a substantially opposite direction;

Fig. 9 is a diagrammatic view in perspective illustrating the manner in which the slider body is formed and the pull member attached thereto;

Fig. 10 is a perspective view illustrating one method of forming the slider body stock of Fig. 10, by extrusion; and

Fig. 11 is a view in perspective of the pull member of the slider shown in Figs. 1, 2 and 10.

The adjustable fastening device illustrated in Figs. 1 and 2 is of the general type illustrated in U. S. Letters Patent No. 1,887,826, granted November 15, 1932, to Noel Statham, inasmuch as it comprises a track or trackway generally designated 15 which is secured to a garment, for instance, or one end of a belt, and which track is adapted slidably to support a slider, generally designated 16, which slider is secured to another part of the garment, or the other end of the belt, and which slider may be selectively adjusted longitudinally of the track and locked in desired position.

More particularly, the track or trackway is of the general type illustrated in U. S. Letters Patent No. 2,245,255 granted June 10, 1941, to George H. C. Corner, wherein the trackway comprises a flexible cord or wire with predetermined spaced stop members secured thereon and supported by a flexible carrier or tape to which it is suitably secured. The stop members support the body of the slider and the spaces therebetween are utilized by means incorporated in the slider to secure the slider against movement longitudinally of the track or trackway.

Referring to the drawings in detail, the track or trackway 15 is secured by rows of stitching 17 to a portion of a garment 18 at one side of a closure or opening, the end 19 of a belt or the like being secured to the slider 16, as shown in Fig. 1. The track or trackway 15 is formed by a flexible stringer such as a cord, wire or the like 20 provided with predetermined spaced knots 21 (Fig. 3) or formed-in lumps or enlargements 22 (Figs. 5, 6 and 7) over which generally spherical stops or abutments 23 are formed, i. e., cast or molded (Figs. 3, 4, 5 and 7), these stop members or abutment members being formed of die cast metal or of suitable non-metallic plastic material. Alternatively, the stop or abutment



members (23a) may be formed of relatively thin sheet material formed into generally spherical members, clamped over the knots or enlargements, as shown in Fig. 6. Likewise, the stop or abutment members may be of substantially cylindrical form, as shown in Fig. 7, these stop members 23b being securely held on the cord 20 against longitudinal movement by the knots or enlargements in the cord over which they are cast or molded.

The provision of the knots 21, or woven-in lumps or enlargements 22 constitutes an important feature of this invention, inasmuch as the security of attachment of the stop members or abutment members 23, 23a, 23b to the stringer 20 is substantially enhanced thereby. Where, as is illustrated in the aforementioned Corner Patent No. 2,245,255, such stop or abutment members are cast upon smooth cord, the zone of attachment is substantially cylindrical and there is no substantial interlocking connection between the stop or abutment members and the supporting cord. Where, however, knots 21 or enlargements 22 are provided, the zone of attachment is non-cylindrical and more nearly spherical, whereby there is a distinct interlocking relation by means of which the stop members 23 are secured in predeterminedly spaced relation on the cord 20 irrespective of the security of the bond between the material of the stop members 23 and those portions of the cord 20 over which they are attached. In other words, even though the bond between the material of the stop members and the cord be partially or wholly destroyed, nevertheless the predeterminedly spaced relationship of the stop members 23 will not be disturbed.

Likewise, since the textile or other material of the cord is substantially cheaper than the material of the stop members, the volume of stop forming material in a stop of given size is reduced by the presence of the knot 21 or woven-in enlargement 22 and the cost is thus materially reduced. Furthermore, since the shape of knot 21 or enlargement 22 is generally similar to that of stop members 23 (especially after the stop members 23 are formed over them) the thickness of the surrounding stop forming material is substantially more nearly uniform throughout. In other words, this material forms, in effect, a hollow shell or envelope of substantially uniform thickness surrounding the knot 21 or enlargement 22. Since curing of non-metallic plastic materials varies with the thickness thereof and since the outer portions of plastic members, adjacent the surfaces, contain the hardest, toughest and strongest parts of the plastic material, the presence of the knots 21 or enlargements 22 substantially enhances the strength and toughness of the stop members by reducing the thickness of the plastic envelope and making the thickness more nearly uniform throughout, in addition to decreasing the cost.

This cord with formed-in enlargements 22 may, for instance, be formed by using as one or more of the constituents "seed yarn," a twisted yarn, wherein one or more systems of threads in a multiple system yarn is intermittently fed at a speed different from that of the others during the twisting operation in order to cause predeterminedly spaced pile-ups appearing as predeterminedly spaced lumps or enlargements in the finished cord.

The cord 20 with attached predeterminedly spaced stop members 23, 23a, or 23b, is sup-

ported by a carrier comprising a strip of flexible tape 24 provided with a row of centrally disposed, longitudinally spaced apertures 25 through which the stop members 23 are passed when the tape is folded over the cord 20, as shown in Fig. 6, and secured in folded relationship by a row of stitching 26 whereby the portions 27 between the apertures 25 extend over those portions of the cord between the respective spaced stop members 23 flexibly to support the cord 20 and the attached stop members 23.

In order to prevent fraying, the margins of the apertures 25 may be suitably impregnated or otherwise treated with suitable sizing or other material such as one of the well known resins or plastic materials or, alternatively, the tape may be woven in such manner that the apertures 25 are formed in the weave as shown, for instance, in Fig. 6 of Corner Patent No. 2,245,255. However, it is preferred, in the interest of economy, that the carrier shown in Fig. 2 be formed of a textile or other tape or strip into which the apertures 25 are cut by any suitable mechanism such as a rotary cutter, sizing or fray preventing impregnation being applied either before or after the apertures 25 are cut in the tape or strip 24.

The body 30 of the slider 16 is of elongate form provided with a substantially cylindrical channel 31 extending from end to end and opening through a slot 32 at one side, as shown in Figs. 1 and 8. Intermediate its length, the body 30 is provided with a pair of similar transverse slots 33 extending inwardly from the open side of the slider body and adapted to receive and support trunnions of the pull member, as hereinafter described. Optionally, the body is provided with a flattened upper or outer surface 35 for the sake of appearance and compactness. Since the slot 32 is narrower than the diameter of the stop members 23, 23a or 23b, the body 30 when threaded on the track or trackway is slidably maintained thereon by the substantially spherical stop members 23 or 23a (or cylindrical stop members 23b) in the channel 31.

Slide bodies 30 are preferably formed from elongated strip or stock 28 (Fig. 10) cut to appropriate length as at 29 (Fig. 9) by a cut-off device such as rotary saw 37, the notches or slots 33 being applied to each slider body by a slotting device, such as a rotary slotting tool 36, immediately prior to operation of the cut-off device 37. The elongated strip or stock 28 may be formed either of metal or non-metallic plastic material. It may be rolled or cast in the case of metal, or cast or extruded in the case of non-metallic plastic material.

Illustrative apparatus for extruding non-metallic plastic material to form the strip or stock 28 is diagrammatically shown in Fig. 10. This apparatus comprises a press, including a cylinder 38 provided at one end with an extrusion die 39 of appropriate shape to produce the desired section in the strip or stock 28. A piston 40 is slidable in the cylinder 38 toward the die 39 to cause heated plastic material in the cylinder to be extruded through the die 39 and formed into continuous strip or stock 28 of desired predetermined cross section. As shown in Fig. 11, the die is preferably of such shape as to form a strip 28 which is of the exact cross section desired and which necessitates only the operation of the slotting device 36 to form the slots 33 and of the cut-off device 37 to cut off the strip 28, after slotting, into predetermined desired lengths completely to form the slider body 30.



The pull member, generally designated 41, is shown in Fig. 13. This pull member is constituted by a pair of similar substantially parallel longitudinal leg members 42 provided at their inner ends with oppositely, inwardly directed trunnions 43 which are adapted to be seated in the above described slots 33. At their outer ends these leg members 42 are connected by a bar 44 which is adapted to provide a support for the end of a belt or the like, secured thereto, such as 19 of Figs. 1 and 8. Intermediate the trunnions 43 and bar 44 is a locking member 45 in the form of a cross bar offset from the plane common to the trunnions 43 and bar 44, this locking member being provided at its under side with a notch 46 which is adapted for engagement with any desired portion 27 of the tape overlying the cord 20 between a pair of adjacent stop members 23 to lock the slider 16 against longitudinal movement on the trackway. The dimensions of the notch 46 are preferably such that a slight clamping action is secured. While the form of pull member illustrated is suitable for production as an integral unit by molding or die casting, it is, of course, to be understood that it may be made up of a plurality of pieces secured together in any suitable known manner.

The method of attaching the pull member 41 to the slider body 30 is illustrated in Fig. 9. As shown in Fig. 9, the trunnions 43 of the pull member 41 are placed in the slots 33 after a slider body 30 has been severed from strip or stock 28 and a portion of the slider body adjacent the slot is upset and pressed inwardly of the slot, as shown at 34, in order to secure the pull member pivotally to the slider body 30 and prevent its detachment therefrom. Where strip or stock 28 is formed of metal, the upsetting may be accomplished by impact, or by heat and/or pressure, and where it is formed of non-metallic plastic material it may be accomplished either by the use of a solvent and pressure or by heat and pressure, depending upon whether the non-metallic plastic material of which it is formed is of thermosetting or thermoplastic type.

As may be readily seen from Figs. 1, 2 and 12, the bar 44 is slightly offset upwardly from the locking member 45 and the trunnions 43. Because of this offset, the strip or belt-end 19 is supported in spaced relation upwardly of, or outwardly of the row of stop members 23 in order to prevent contact of the member 19 with the stop members 23 which might affect operation of the locking means. Also, because of this offsetting of the bar 44, the application of tension to a member having the track 15 at one end and the member 19 at the other will exert a toggle action causing the locking member 45 to be set in locking position between an adjacent pair of stop members 23 to lock the slider 16 against longitudinal movement on the track.

It will thus be seen that we have provided a new and improved adjustable fastening device of extreme simplicity, cheapness, strength and durability, particularly adapted for production by the convenient method herein disclosed which forms a part of our invention.

Likewise, the improved slider, because of the embodiment of a new principle of operation, operates more completely with the flexible track to secure and maintain the fastening device in adjustment with respect to the track totally without necessity for springs or other lock biasing or impelling means.

It is, of course, to be understood that the above description is merely illustrative and in nowise limiting and that we desire to comprehend within an invention such modifications as are included within the scope of the appended claims.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In an adjustable fastener device comprising a track and a slider selectively adjustable on said track, a track including a flexible stringer having predeterminedly spaced integral enlargements throughout a portion at least of its length, and stop members formed over and surrounding said enlargements on said stringer, the interlocking relationship between said enlargements and the surrounding stop members enhancing security of said stop members against longitudinal forces tending to move them longitudinally of the stringer.

2. An adjustable fastening device adapted for attachment between members subjected to tension comprising a flexible track having stop members spaced longitudinally thereof and attachable to one of said members, and a slider member adapted for selective adjustment on said track, said slider member comprising a body having a channel slidably receiving said stop member, and a pull member pivotally attached to said slider body, said pull member having means at its outer end adapted for attachment to the other of said first named members, and means on said pull member cooperating with said stop members to lock said slider in adjustment on said track.

3. An adjustable fastening device adapted for attachment between members subjected to tension comprising a flexible track having stop members spaced longitudinally thereof, and a slider member adapted for selective adjustment on said track, said slider member comprising a body having a channel slidably receiving said stop members, and a pull member pivotally attached to said slider body, said pull member having a portion at its outer end adapted for attachment to one of said members, and a locking member intermediate its length projectable between adjacent stop members on said track to lock said slider in adjustment on said track.

4. In an adjustable fastening device adapted for attachment between two members subjected to tension, a flexible track having stop members spaced longitudinally thereof and attachable to one of said members, and a slider adapted for selective adjustment on said track, said slider comprising a body having a channel slidably receiving said stop members, and a pull member pivotally secured to said slider body, said pull member having a bar at its outer end attachable to the other of said first named members, and a transverse locking member intermediate the length of said pull member projectable between adjacent stop members on said track to lock said slider in adjustment on said track.

5. An adjustable fastening device adapted for attachment between members subjected to tension and comprising a flexible track attachable to one of said members, and a slider selectively adjustable on said track and attachable to another of said first named members, said track comprising a flexible cord having enlargements predeterminedly spaced longitudinally thereof, stop members formed over said enlargements,



a flexible tape having spaced apertures therein adapted to receive said stop members, said tape being folded over said cord with the portions between said apertures disposed between said stop members and with said stop members protruding through said apertures, and stitching securing said tape together at opposite sides of said apertures to confine said stop members in said apertures, said slider comprising a body having a channel slidably receiving said stop members, and a pull member pivotally attached to said slider body, said pull member having a bar portion at its outer end attachable to one of said first named members, and having thereon a transverse locking member intermediate its length projectable between adjacent stop members on said track to secure said slider against longitudinal movement on said track, said transverse locking member having therein a notch clampingly engageable with folded-over portions of said tape between adjacent stop members on said track for locking said slider in adjustment on said track.

6. In an adjustable fastening device adapted for attachment between members subjected to tension and comprising a flexible track and a slider selectively adjustable longitudinally of said row of stops, said track comprising a flexible stringer with predeterminedly spaced stops thereon, and a flexible carrier provided with stop receiving apertures folded over said stringer with carrier portions between said apertures enclosing the stringer portions between said stops; a slider comprising an elongated body having a channel slidably receiving said stops and a pull member having at its inner end a pair of trunnions pivotally connecting said pull member to said slider body, an attaching portion at the outer end of said pull member attachable to one of said first named members, and a cross

bar intermediate the ends of said pull member offset from a plane common to said trunnions and said bar portion in the direction of said track when said pull member is adjacent locking position, said cross bar being projectable between adjacent stops to prevent relative longitudinal movement between said track and said slider, and said cross bar having a notch clampingly engaging carrier portions between said stops to retain said slider in adjustment on said track.

7. In an adjustable fastening device adapted for attachment between members subjected to tension and comprising a flexible track and a slider selectively adjustable longitudinally of said track, said track comprising a flexible stringer with predeterminedly spaced stops thereon, and a flexible carrier provided with stop receiving apertures and folded over said stringer with carrier portions between said apertures enclosing the stringer portions between said stops; a slider comprising an elongated body having a channel slidably receiving said stops and a pull member having at its inner end a pair of trunnions pivotally connecting said pull member to said slider body, a bar portion at the outer end of said pull member attachable to one of said first named members, and a locking member intermediate the ends of said pull member offset from a plane common to said trunnions and said bar portion, said locking member engaging between adjacent stops to prevent relative longitudinal movement between said track and said slider, and said locking member being held in locking position by tension applied between members connected to said slider and said track respectively.

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