(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 161 333**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **84112198.1**

(22) Date of filing: **11.10.84**

(51) Int. Cl.⁴: **D 06 G 3/02**

(30) Priority: **10.05.84 IT 2175584 U**

(43) Date of publication of application: **21.11.85 Bulletin 85/47**

(84) Designated Contracting States: **AT BE CH DE FR GB LI LU NL SE**

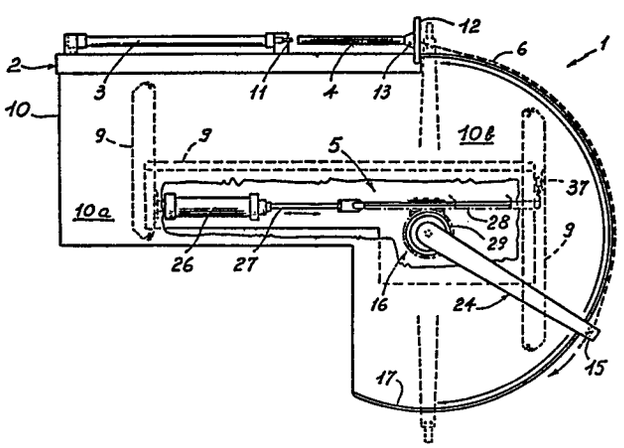
(71) Applicant: **O.E.M.A. S.r.l., Via Milano, 16, I-22079 Villa Guardia -Como (IT)**

(72) Inventor: **Frangi, Angelo, Via Per San Fermo, 22, I-22100 Como (IT)**

(74) Representative: **Lunati, Vittoriano, LUNATI & MAZZONI S.a.s. Via Carlo Pisacane, 36, I-20129 Milano (IT)**

(54) A machine for turning tubular wearing articles inside out.

(57) A machine for turning inside out tubular wearing articles as neckties (1) having a loading tube (4) over the exterior whereof a wearing article (6) is fitted, a rod (11) adapted for insertion through the loading tube (4) and dragging the wearing article (6), and a puller device (5) operative to pick up through a gripper (15) the article (6) as carried on the rod (11) and to cause the gripper (15) to follow a path along an arc of a circle adjacently to a guiding wall (17).



EP 0 161 333 A1

0161333

A machine for turning tubular wearing articles inside out

This invention relates to a machine for turning tubular wearing articles, in particular neckties, inside out.

As is known, there are some wearing articles of tubular construction which are first formed and sewn, and then turned inside out. A typical example are man's neckties, which are formed by folding over a cloth strip and uniting it with a fabric web known as the "reinforcement". The folded over cloth strip and "reinforcement" are secured to each other by means of a sewn seam which is also effective to close the folded over cloth strip into a tube. The latter is then turned inside out to bring the reinforcement on the inside and partly conceal the seam. This is followed by finishing and ironing steps leading to the universally known final product.

Turning such wearing articles inside out represents an important processing step, not only on account of its being an indispensable step and requiring a significant time length to carry out, but also because the inside out turning operation is to be carried out carefully not to damage either the seams or the sewn cloth. It should be remembered here that the wearing articles in question are often valuable ones formed from highly delicate and readily damaged cloths.

Man's neckties have been so turned inside out, heretofore, during the manufacturing thereof, with the aid of a simple loading tube and a rod adapted to be inserted axially through the tube. In fact, the inside

out turning operation has been carried out by fitting the neckties over the outer surface of said loading tube, inserting one end thereof through the mouth of the loading tube inside bore, and then applying a rod to said end and into said bore so as to drag through the bore the neckties until they come out of the loading tube from the opposite end to the rod inlet end. In moving from the outside to the inside of the loading tube, the neckties are turned inside out.

With the above prior equipment, at least one operator must be provided to manually grip the ends of the neckties carried through by said rod as the latter emerges from said bore in order to allow withdrawal of the rod and prevent the neckties from falling off. Moreover, the operator usually effects most of the inside out turning operation by fully sliding the neckties off the loading tube; owing to the length dimension of such wearing articles, said rod can only perform the inside out turning operation in part, even where driven for a considerable extent out of the loading tube after going through it.

It is apparent that manual intervention by at least one operator is a costly and comparatively slow procedure. Further, manual pull can only be applied at a varying rate and may result, in some instances, in the article suffering overstretching or damage. This is especially likely to occur where the manual pull is applied in a jerky fashion and other than in line with the axis of the cited loading tube. In consideration of the length dimension of neckties and the like, an

operator is apt to complete the manual withdrawal operation in a series of successive pulling actions, and hence relatively slowly, or alternatively with a single action which unavoidably also stretches the neckties in a transverse direction to the axis of the loading tube.

A further problem affecting conventional practice is the following: on completion of the inside out turning operation, the equipment provided to carry out the final finishing steps must be loaded manually, which further slows down the manufacturing process for such wearing articles while adding to labour requirements.

In view of the above described situation, it is a primary object of this invention to provide a machine for turning tubular wearing articles, in particular neckties, inside out, which can substantially obviate the cited prior shortcomings.

Another object of the invention is to provide a machine which, while affording a fast rate of operation, can prevent damaging or overstretching the wearing articles in question.

It is a further object of this invention to provide such a machine which can be readily adapted to process tubular wearing articles of different sizes, while being construction-wise simple and easy to manufacture by the involved industry.

Still another object of the invention is to provide such a machine which, despite the length dimension of neckties and the like tubular wearing

articles, can be made compact in the linear direction.

These objects are essentially achieved by a machine for turning tubular wearing articles inside out, which comprises a supporting structure and a loading tube mounted to said structure cantilever-fashion, and is characterized in that it comprises a fluid operated cylinder engaging with said structure in a position of alignment with said loading tube and having a piston rod adapted for insertion through said loading tube from the free end thereof, and a puller device carried on said structure and being provided with a gripper operative to grip one said wearing article, said puller device being operative to move said gripper from a first position close to the end of said loading tube fast with said structure to a second position away from said end of said loading tube.

Further features and advantages of the invention will be more clearly understood from the description which follows of a preferred, though not exclusive, embodiment of a machine for turning wearing articles inside out, to be read with reference to the accompanying illustrative drawings, where:

Figure 1 is a partly cutaway plan view of the machine according to the invention;

Figure 2 illustrates the construction of a loading tube and some elements directly connected thereto;

Figure 3 shows the elements used in the construction of a man's necktie;

Figure 4 shows how those same elements are engaged with one another;

Figure 5 shows one portion of the machine according to the invention, with the necktie of Figure 4 fitted over a loading tube;

Figure 6 is a similar view to Figure 5 showing the inventive machine at a different operating step thereof;

Figures 7 and 8 are sectional views of a pivoting arm shown at two different operating steps thereof;

Figures 9 and 10 show in plan view and in perspective, respectively, the shape of a movable element placed at the end of the arm of Figures 7 and 8; and

Figures 11 and 12 show structural elements provided to control the machine operation.

Making reference to the drawing views, a machine according to this invention is generally designated with the reference numeral 1 in Figure 1. It comprises, in essence, a supporting structure 2, a fluid operated cylinder 3, a loading tube 4, and a puller device 5. The machine 1 is set in particular to turn inside out neckties 6 comprising a cloth strip 7 (Figure 3) and a web 8 of another fabric, called the "reinforcement", which will be located on the interior of the necktie 6 upon turning inside out.

More detailedly, the supporting structure 2 includes a base frame 9, shown by dash lines in Figure 1, and a working table 10 defined substantially by two

portions, namely a first portion 10a of rectangular shape and a second portion 10b in the shape of a half circle. Arranged on one edge of the first rectangular portion of the working table 10 are the fluid operated cylinder 3 and loading tube 4, in mutually aligned positions. These are both carried on the structure 2, and in particular the loading tube 4 is mounted cantilever-fashion with its free end close to the fluid operated cylinder 3. The latter has a rod 11 adapted to fit with some clearance within the loading tube 4 and being sufficiently long to fully penetrate it.

In fact, as shown in Figure 2, the loading tube 4 defines a completely open internal bore 4a. Figure 2 further shows that the loading tube 4 is supported by the structure 2 through a flange 12 of disk-like shape and a fitting 13. Advantageously, the latter is welded to the loading tube 4 and merely threaded to the flange 12. The flange 12 may be of a standard size unrelated to the diameter of the loading tube 4, any mismatch being accommodated by assembling different fittings 13. The fittings 13 also define a flared bottom 14 for the bore channel 4a through the loading tube 4.

The puller device 5 comprises a gripper 15 (shown detailedly in Figures 5 to 10) adapted to grip a necktie being carried on the rod 11, a drive means 16 operative to move the gripper 15 from a first position closely against the flange 12 to a second position away therefrom, and a guiding wall 17 adapted to position a necktie 6 while being turned inside out by

the gripper 15. More specifically, the gripper 15 comprises a pair of small bars 18 laid side-by-side and lined with rubber which extend vertically (Figures 5 and 7), and a dimpled shaped plate 19 to fit on the bars 18 (Figures 9 and 10). The shaped plate 19 is supported on a small rod 20 formed with a first end hole 21 for pivotal connection and, at an intermediate location thereon, with a lug 22 having a second end hole 23 (Figures 9 and 10) for pivotal connection.

The gripper 15 is supported and driven by a drive means 16 including an arm 24 set for pivotal movement about a pin 25 (Figure 11) extending through the second semicircular portion of the working table 10. The drive means 16 further comprises an actuating cylinder 26 (Figure 1) the piston rod 27 whereof is terminated with a rack 28 meshing with a gear wheel 29 attached to the pin 25 and arm 24.

Figures 7 and 8 illustrate the construction of the arm 24. It comprises a box-like housing 30 wherein an auxiliary cylinder 31 is accommodated for driving the gripper 15. The auxiliary cylinder 31 is, in fact, engaged by a pivot pin 32 inserted through the first hole 21 in the small rode 20.The latter is further engaged, through a second pivot pin 33 provided at the second hole 23, with the box-like housing 30. The auxiliary cylinder 31 also drives an oscillating plate 34 which is terminated, at the end of the arm 24 next to the pin 25, with a detent 35 adapted to engage a micro-switch 36 in abutment relationship when the oscillating plate 34 is at its position of travel limit in the

direction toward the gripper 15 (Figure 8). A second microswitch 37 is shown in Figure 12. This second microswitch is engageable by the rack 28 driven by the actuating cylinder 26, with the rack 28 at its forward limit position, as shown by dash lines in Figure 1.

The machine 1 is provided with a pneumatic circuit controlling the fluid operated cylinder 3, actuating cylinder 26, and auxiliary cylinder 31, and being slaved to microswitches, in particular the microswitches 36 and 37, to sequentially control the various machine operations. In other embodiments, the pneumatic circuit could be provided with control members of its own, adapted to sequentially operate the cited cylinders without the assistance from microswitches.

The arm 24 is set above the cited guiding wall 17. The latter is advantageously semicircular in shape and located close to the gripper 15, on the side next to the small bars 18 of the latter. The guiding wall 17 extends upwards sufficiently to slidably guide the neckties 6 even when the latter sag considerably downwards while being dragged by the gripper 15. Figures 5 and 6 show, in fact, that the guiding wall 17 also extends below the working table 10.

The machine according to the invention operates as follows.

Initially, a necktie 6 or the like article is fitted over the loading tube 4, as shown in Figure 5. The necktie fitting is accomplished by pleating it and presenting one end thereof to the inlet of the bore channel 4a, at the end of the latter facing the fluid

operated cylinder 3 and rod 11. The latter will be retracted inside the fluid operated cylinder 3, while the gripper 15 is in its open position as shown in Figure 7 and the arm 24 is positioned to hold the gripper 15 close to the flange 12 and the flared bottom 14 of the bore channel 4a.

On starting the machine, the fluid operated cylinder 3 is first actuated to move the rod 11 in the direction of the loading tube 4. The forward moving rod 11 will interfere with one end of the necktie 6 and accordingly drag the latter through the bore channel 4a of the loading tube 4, turning it inside out (Figures 5 and 6).

The rod 11 movement continues until it projects beyond the flange 12 whereat the gripper 15 is located in the open position. On reaching its travel limit, the rod 11 causes the auxiliary cylinder 31 to become operative which, in extending its respective piston rod, will force the shaped plate 19 to rotate about the second pivot pin 33 in the direction toward the small bars 18. The approaching movement of the shaped plate 19 to the small bars 18 results in one end of the necktie 6 being caught firmly.

The rod 11 is at once retracted from its fully extended position to assume its starting position.

As shown in Figure 8, the forward movement of the piston rod of the auxiliary cylinder 31 not only results in the gripper 15 closing but also in the oscillating plate 34 being moved forward, which will bring the detent 35 against the microswitch 36. The

latter will then control the piston rod 27 of the actuating cylinder 26 to move forward and drive arm 4. The forward movement of the piston rod 27, and rack 28 attached thereto, causes the gear wheel 29 and pin 25 to rotate. Consequently, the arm 24 will turn as indicated in Figure 1, allowing the gripper 15 to move through a half circle. This movement of the gripper 15 results in the whole necktie 6 being dragged out of the bore channel 4a of the loading tube 4. Despite the circular path followed by the gripper 15, the drag movement occurs in line with the loading tube 4 at the area adjoining the flange 12, owing to the provision of the guiding wall 17. In practice, the latter will prevent a necktie 6 from extending along the chord of the arcuate path followed by the gripper 15. The sliding movement of the necktie 6 is further favored by the flared bottom 14 of the fitting 13.

With the rack 28 at its travel limit position, the rack will interfere with the second microswitch 37 which controls the actuating cylinder 26 to retract and the gripper 15 to reopen which, in the meantime, has advantageously passed the necktie end gripped therein to further processing members provided for additional processing. Thus, the arm 24 can be returned to its starting position toward the loading tube 4, whereon another necktie 6 will have been mounted in the meantime, at least in part.

Thus, the invention achieves its objects. The gripper 15 can firmly grip a necktie 6 without

damaging it, and by arranging the necktie 6 to be dragged along an arc of a circle, the machine space requirements are reduced substantially, particularly in the length direction which would otherwise be quite considerable on account of the length of neckties. Neckties are pulled out and turned inside out in an optimum manner, without being subjected to cross stretching, thanks to the presence of the guiding wall 17.

The machine can turn inside out neckties in a range of sizes: it will be sufficient to thread out the loading tube 4 and respective fitting 13 from the flange 12 and install another loading tube 4 of the appropriate size. The different dimensions of the loading tubes in the diametrical direction will be accommodated by the fittings 13.

Claims

1. A machine for turning tubular wearing articles inside out, comprising a supporting structure (2) and a loading tube (4) mounted to said structure (2) cantilever-fashion, characterized in that it comprises a fluid operated cylinder (3) engaging with said structure (2) in a position of alignment with said loading tube (4) and having a rod (11) adapted for insertion through said loading tube (4) from the free end thereof, and a puller device (5) carried on said structure (2) and being provided with a gripper (15) operative to grip one said wearing article, said puller device (5) being operative to move said gripper (15) from a first position close to the end of said loading tube (4) fast with said structure (2) to a second position away from said end of said loading tube (4).

2. A machine according to Claim 1, characterized in that said puller device (5) is arranged to cause said gripper (15) to follow a path along an arc of a circle, and that located adjacently said path is a guiding wall (17) effective to guide said wearing articles during the pull-out operation to prevent them from arranging themselves along the chord of said arc of a circle.

3. A machine according to Claim 2, characterized in that said puller device (5) comprises an arm (24) overlying said guiding wall (17) and carrying at one end said gripper (15) and at the opposite end being pivoted through a pin (25) driven rotatively by a fluid

operated actuating cylinder (26).

4. A machine according to Claim 3, characterized in that said pin (25) is made rigid with a gear wheel (29) meshing with a rack (28) adapted to be moved by said fluid operated actuating cylinder (26).

5. A machine according to Claim 1, characterized in that said gripper (15) comprises at least one small bar (18) engageable with a shaped plate (19) set for oscillation about a pivot pin (33) extending substantially transversely to said small bar (18).

6. A machine according to Claim 5, characterized in that said gripper (15) comprises a pair of small bars (18) extending substantially vertically and one said shaped plate (19) adapted to mate with said small bars (18) and for oscillation about to one said pivot pin (33) located thereabove, and that said shaped plate (19) is driven by an auxiliary cylinder (31) operative to impose on said shaped plate (19) an open position transversely to said small bars (18).

7. A machine according to Claim 1, characterized in that said loading tube (4) is engaged with said supporting structure (2) by a flange (12) attached to said supporting structure (2), and that interposed between said loading tube (4) and said flange (12) is a fitting (13) threadably engaged therewith.

8. A machine according to Claim 1, characterized in that said supporting structure (2) defines upwardly a working table (10) having a substantially rectangular first portion (10a) and a second portion (10b) substantially in the shape of a half circle.

0161333

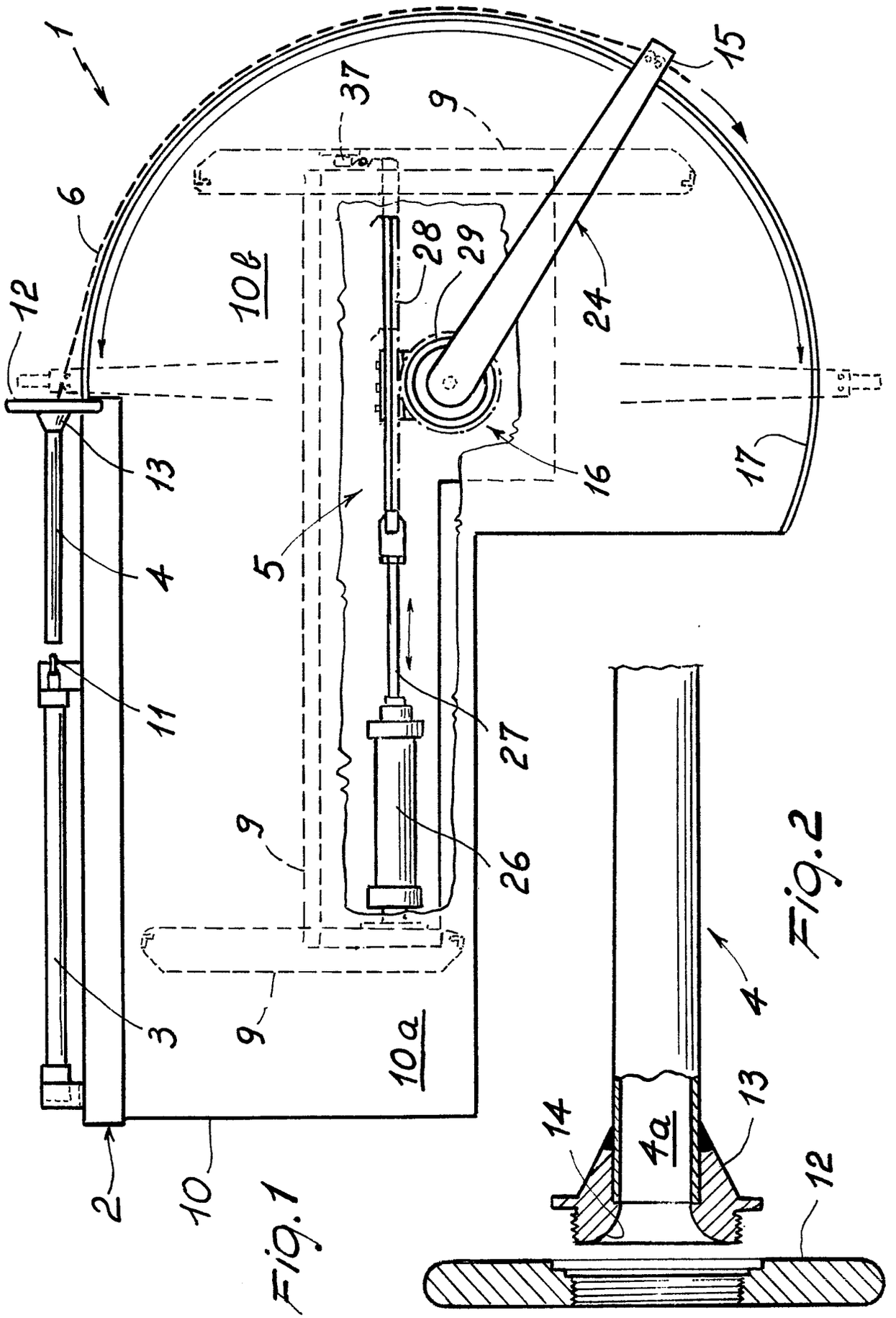


Fig.1

Fig.2

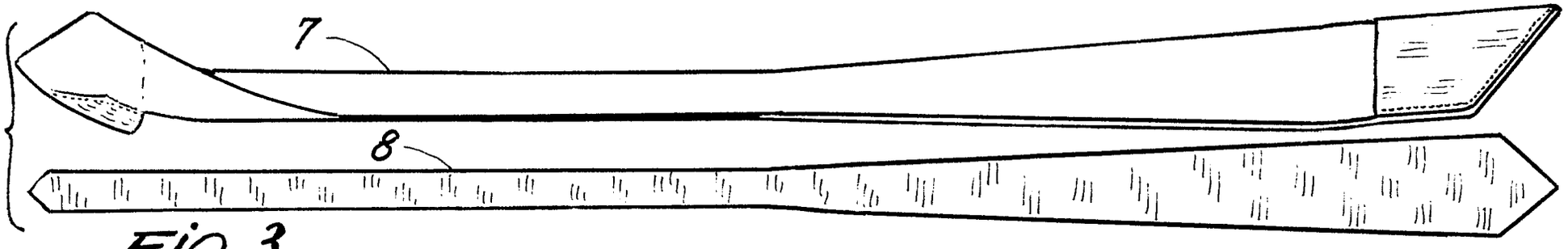
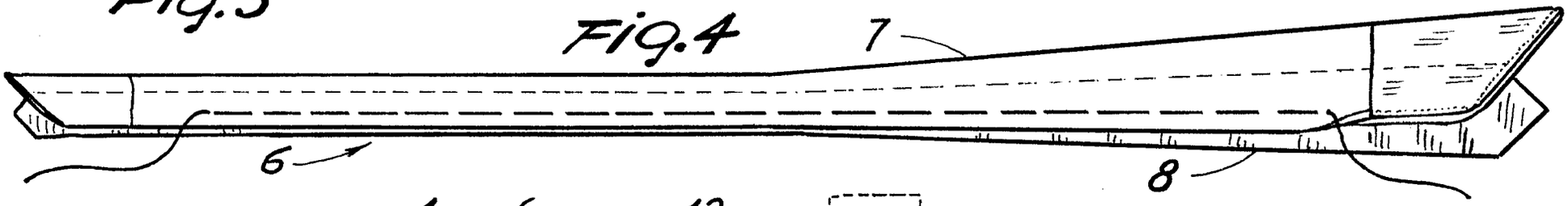


Fig. 3

Fig. 4



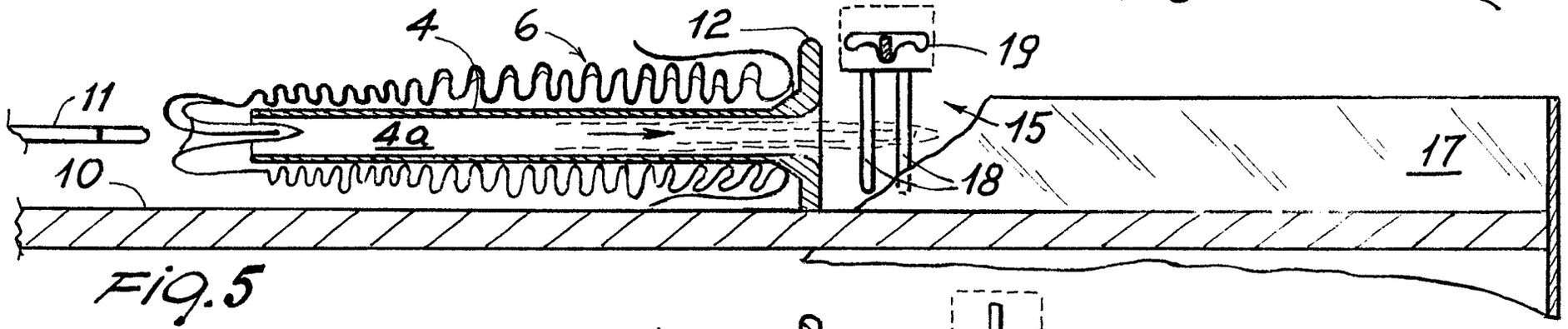


Fig. 5

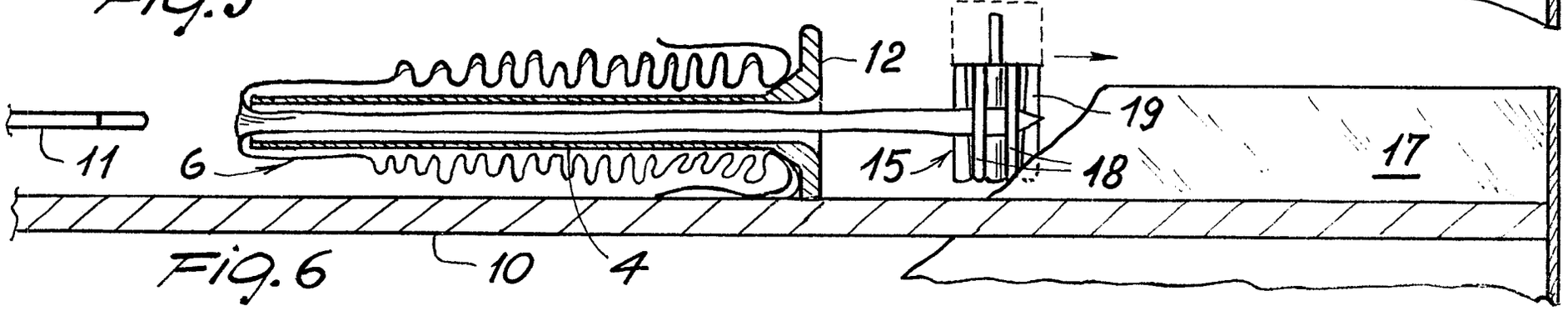


Fig. 6

G 16 13 33

0161333

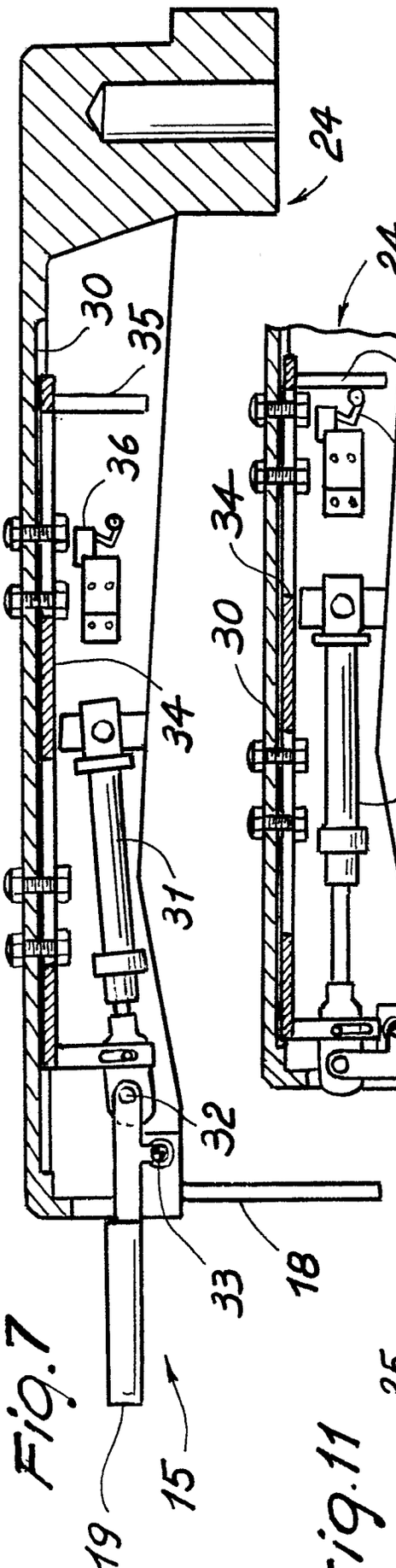


Fig.7

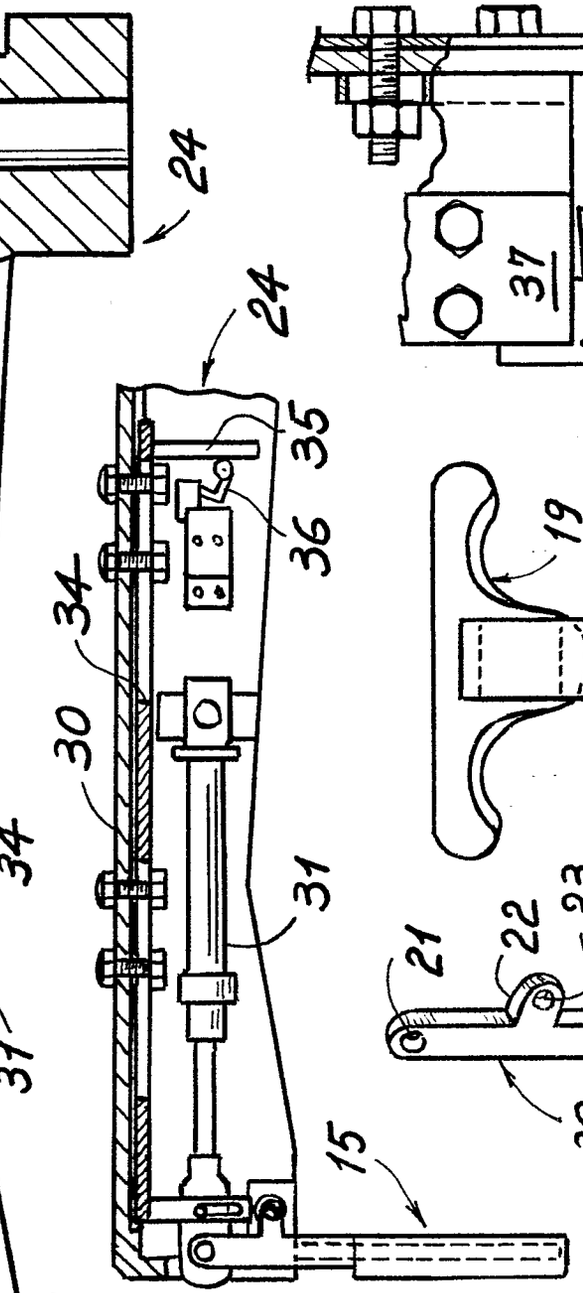


Fig.8

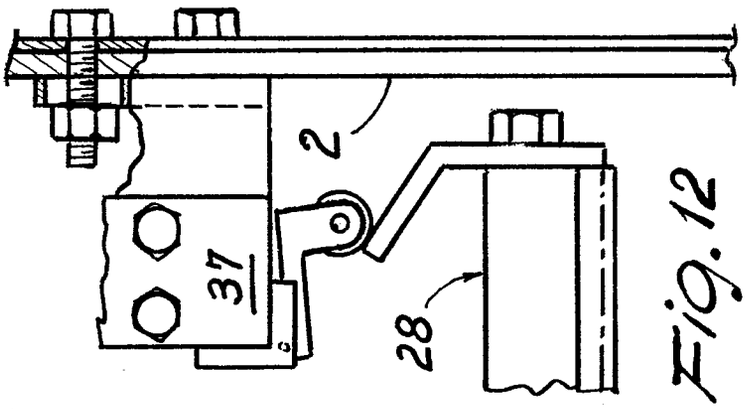


Fig.12

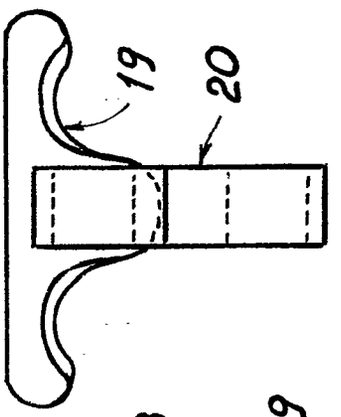


Fig.9

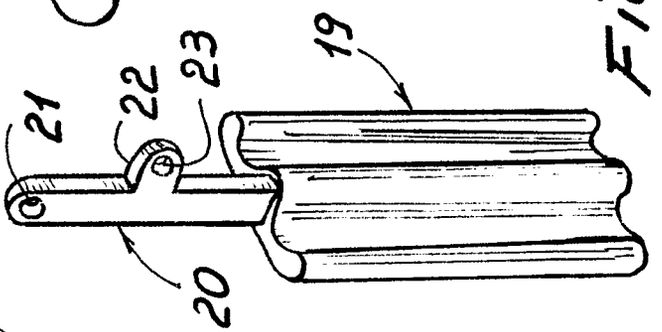


Fig.10

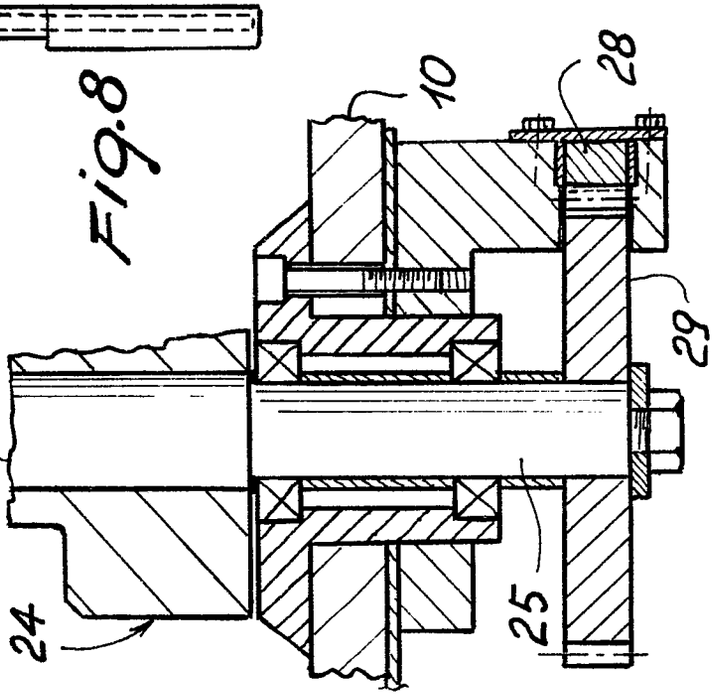


Fig.11

European Patent Office

EUROPEAN SEARCH REPORT

Application number 0161333

EP 84 11 2198

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	FR-A-2 157 348 (ANDREW BARON LTD.) * Page 1, line 33 - page 2, line 25; figures 1-4 *	1	D 06 G 3/02
A	DE-A-3 305 070 (VEB PLANET WÄSCHEKONFEKTION)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

D 06 G
A 41 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06-08-1985	NEHRDICH H.J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03 82