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(54) Pedal-operated inflator.

(57) Pedal-operated inflator having a simplified structure and allowing automated production including a substantially cylindrical bellows-like body (2) at which there is a spring (3) that acts between a lower disk (5) and an upper disk (4) which are connected to the bellows-like body and are movable with respect to one another in contrast with, and by virtue of the action of, the spring.

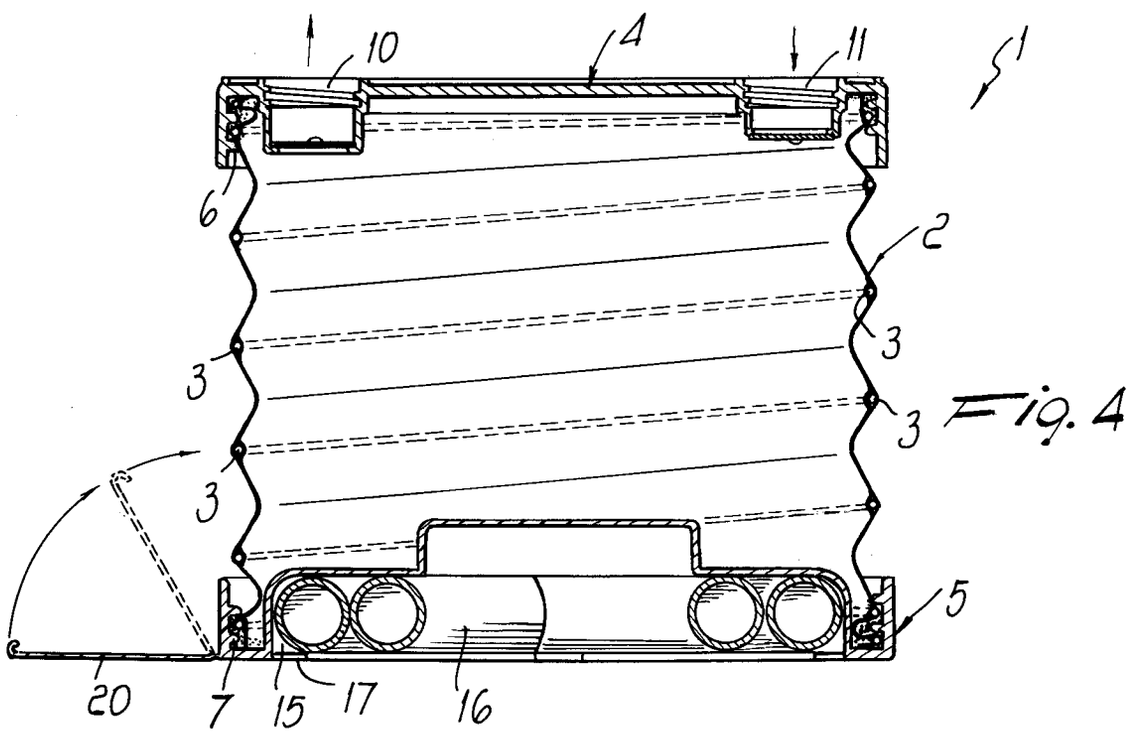

Fig. 4

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The present invention relates to a pedal-operated inflator which has in particular a simplified structure and which allows for an automated production.

It is known that various types of pedal-operated inflators are already commercially available and are used for inflatable mattresses and dinghies and inflatable items in general.

Known inflators entail the production of a polyvinyl chloride body which is formed by centrifugal molding and normally has a low capacity, generally up to 1.5 liters, and utilize, for their operation, the elastic deformation of the material of which they are made. These inflators are generally slow and do not inflate very effectively.

Inflators have also been provided that have a bellows-like body obtained by blow-molding; said body is connected, at its ends, to compression plates that are mutually articulated outside the bellows, and a spring is furthermore provided inside the bellows to move the compression plates apart.

This solution is constructively very complicated and generally scarcely effective.

Most inflators are currently manufactured by using a band of fabric or polyvinyl chloride which is connected to the peripheral region of two mutually pivoted rigid plates between which a spacing spring acts.

With this type of embodiment, the most troublesome part is constituted by the joint between the fabric band and the rigid plates, which must be provided by hooping with metal or plastic straps.

The attempts made so far to eliminate the straps, such as mutually glueing or welding the band and the plates, have not yielded good results, both because the resulting end product has a poor quality and because production is considerably complicated.

Another drawback that can be ascribed to known solutions is furthermore constituted by the fact that if mutually pivoted plates are used, the useful inflation volume at each cycle is unavoidably reduced.

The principal aim of the present invention is indeed to solve the problems described above by providing a pedal-operated inflator having a simplified structure and allowing automated production that allows to significantly reduce all the operating steps, especially as regards the step for connecting the band or body that forms the inflation chamber to the external parts, that is to say, to the plates on which one acts.

A particular object of the invention is to provide a pedal-operated inflator that allows to significantly increase the useful inflation volume.

Another object of the present invention is to provide a pedal-operated inflator having simplified structure that allows to automate the steps for mutually coupling the inflating body and the external plates.

Another object of the present invention is to provide a pedal-operated inflator having simplified structure and allowing automated production which is capable of giving the greatest assurances of reliability and safety in use by virtue of its particular constructive characteristics.

According to the present invention, there is provided a pedal-operated inflator which comprises a substantially cylindrical bellows-like body at which there is a spring that acts between a lower disk and an upper disk which are connected to said bellows-like body and are movable with respect to one another in contrast with, and by virtue of the action of, said spring.

The characteristics and advantages of the invention will become apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of the pedal-operated inflator according to the invention;
figure 2 is a top plan view of the inflator;
figure 3 is a bottom plan view of the inflator;
figure 4 is a diametrical sectional view of the inflator in extended position;
figure 5 is a diametrical sectional view of the inflator in closed position; and
figure 6 is a schematic view of the steps for the assembly of the inflator.

With reference to the above figures, the pedal-operated inflator having a simplified structure and allowing automated production, according to the invention, which is generally designated by the reference numeral 1, comprises a substantially cylindrical bellows-like body 2 which is constituted by a tubular portion made of plastics which is applied by extruding it in place and/or by welding and/or by gluing to a cylindrical spiral spring 3 which is in practice embedded in the bellows-like body.

An upper disk 4 and a lower disk 5 are applied respectively at the axial ends of the bellows-like body 2.

In order to allow to automate the coupling of the bellows-like body 2 to the disks 4 and 5, at the inner edge of the disks 4 and 5 there are ridges 6 and 7 which are arranged in a thread-like manner and in which in practice it is possible to screw the end of the spring located in the body 2, thus achieving a firm mechanical coupling.

Adhesive material is furthermore applied and seals the body 2 and the disks 4 and 5, thus obtaining a perfect seal.

The upper disk has an air outlet 10 and an air inlet 11 which have the conventional one-way valves.

The lower disk 5 advantageously has a recessed central portion 15 that forms in practice the region for accommodating the air discharge hose 16 that can be applied to the outlet 12 and is kept in position by radial tabs 17 formed at the edge of the recessed portion 15.

Folding flaps 20 are furthermore provided on the external peripheral region of the lower disk 5 and can be coupled to the edge of the upper disk 4 so as to keep the pedal-operated inflator in closed position.

With the described arrangement, the disk 4 is movable with respect to the disk 5 by virtue of the action of, and in contrast with, the spring 3.

This type of arrangement accordingly allows to have a greater useful volume for the inflation chamber that is formed by the bellows-like body 2, with the same stroke used by conventional solutions in which the disks, by being mutually articulated, in practice form an inflation chamber that is approximately half the size.

Furthermore, the elastic element constituted by the spring 3 is not subjected to deterioration, since it is fully embedded in the plastic film that forms the body 2.

Another important aspect is furthermore constituted by the fact that the spring acts on the peripheral region of the disks 4 and 5, thus allowing to have good mechanical strength even when thin disks are used; this cannot be achieved with the solutions of the known art, in which it is necessary to increase the thickness of the plates, with a consequent increase in costs, to avoid deformations at the regions where the spring acted.

The above described arrangement allows to easily automate the production of the pedal-operated inflator, as shown schematically in figure 6.

It is in fact sufficient to provide a feeder 30 for the lower disks; a station 31 for applying the adhesive material on the edge of the disk; a station 32 for coupling to one end of the bellows-like body, which is cut to size from a tubular element or is formed automatically by coated thread, to the required size; and a station 33 for "screwing" the body 2 to the disk, consequently gluing one end.

Then there are a station 34 for feeding the other disk and a station 35 for applying the adhesive to the disk so as to reach a final station 36 in which the body 2, already connected to the other disk, is applied to the second disk; coupling is again achieved by rotation.

From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that the new structure adopted, and in particular the use of a bellows-like body in which the spring, which has the shape of a cylindrical spiral, is directly embedded in the film that forms the tubular portion allows to enormously simplify the steps of manufacture, since coupling to the disks can be achieved simply by gluing and screwing, furthermore obtaining a higher operating capability since the inflation chamber thus obtained is substantially twice the size of those of the known art for an equal stroke of the disks.

Furthermore, the provision of a spring that acts on the peripheral region of the plates allows, for an equal mechanical strength, to reduce the thickness of said disks, with a further saving in material.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

Thus, for example, if the inflator must be used to perform aspiration it is preferable to add an additional spring to increase the return action.

All the details may furthermore be replaced with other technically equivalent elements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Pedal-operated inflator having a simplified structure and allowing automated production, characterized in that it comprises a substantially cylindrical bellows-like body (2) at which there is a spring (3) that acts between a lower disk (5) and an upper disk (4) which are connected to said bellows-like body and are movable with respect to one another in contrast with, and by virtue of the action of, said spring.

2. Pedal-operated inflator according to claim 1, characterized in that said spring (3) is embedded in a film that forms said bellows-like body (2).

3. Pedal-operated inflator according to one or more of the preceding claims, characterized in that said spring (3) is shaped like a cylindrical spiral.

4. Pedal-operated inflator according to one or more of the preceding claims, characterized in that said lower (5) and upper (4) disks have, at their respective inner edge, ridges (6,7) that form a threaded portion for engagement with said spring (3) so as to provide a mechanical coupling between said bellows-like body (2) and said disks, hermetic coupling being

achieved by means of adhesive materials.

5. Pedal-operated inflator according to one or more of the preceding claims, characterized in that said upper disk (4) has outlets (10) and inlets (11) that are provided with one-way valves.

6. Pedal-operated inflator according to one or more of the preceding claims, characterized in that said lower disk (5) has, on its outer face, a recess (15) which is suitable to act as seat for an air delivery hose (16).

7. Pedal-operated inflator according to one or more of the preceding claims, characterized in that it comprises flaps (20) which extend radially from said lower disk (5) and can be removably coupled to the edge of said upper disk (4) in order to retain said pedal-operated inflator in closed position.

8. Pedal-operated inflator having a simplified structure and allowing automated production, characterized in that it comprises one or more of the described and/or illustrated technical features.

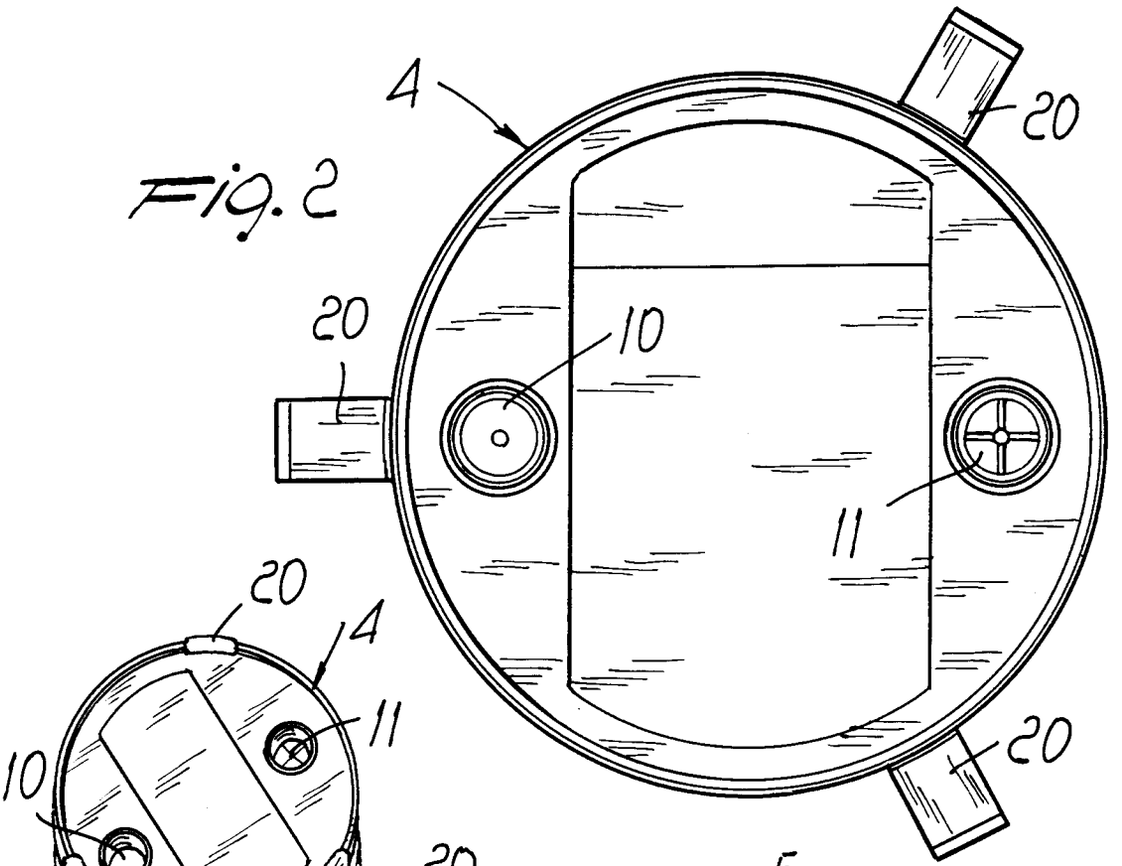


Fig. 2

Fig. 1

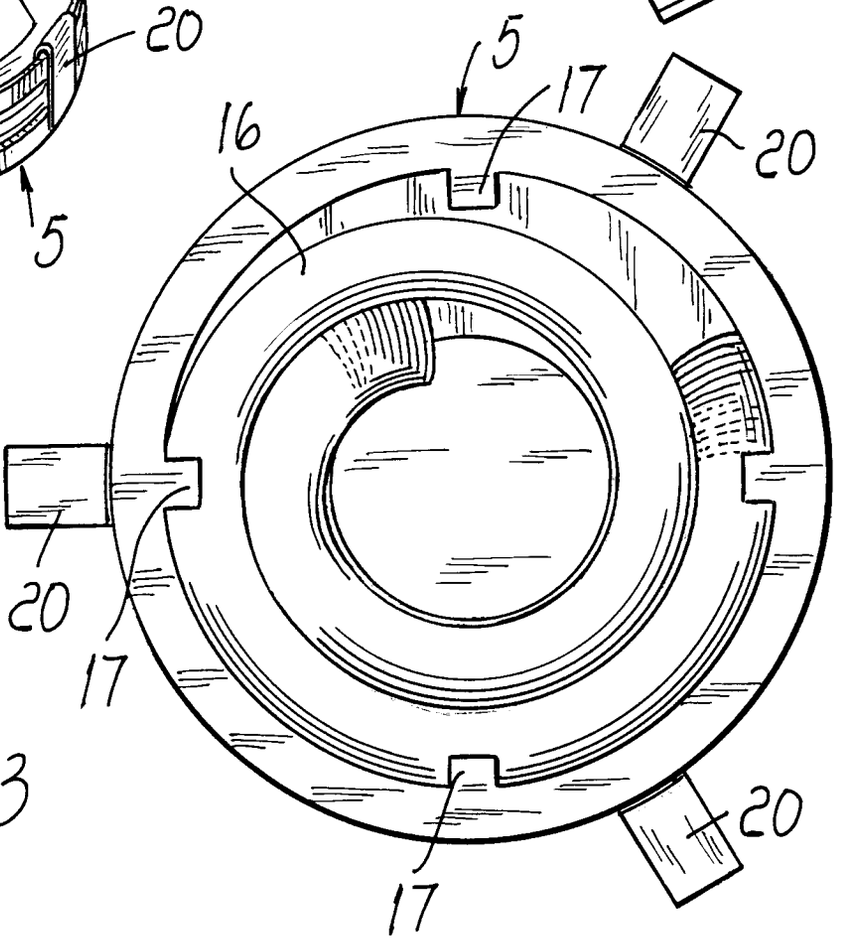
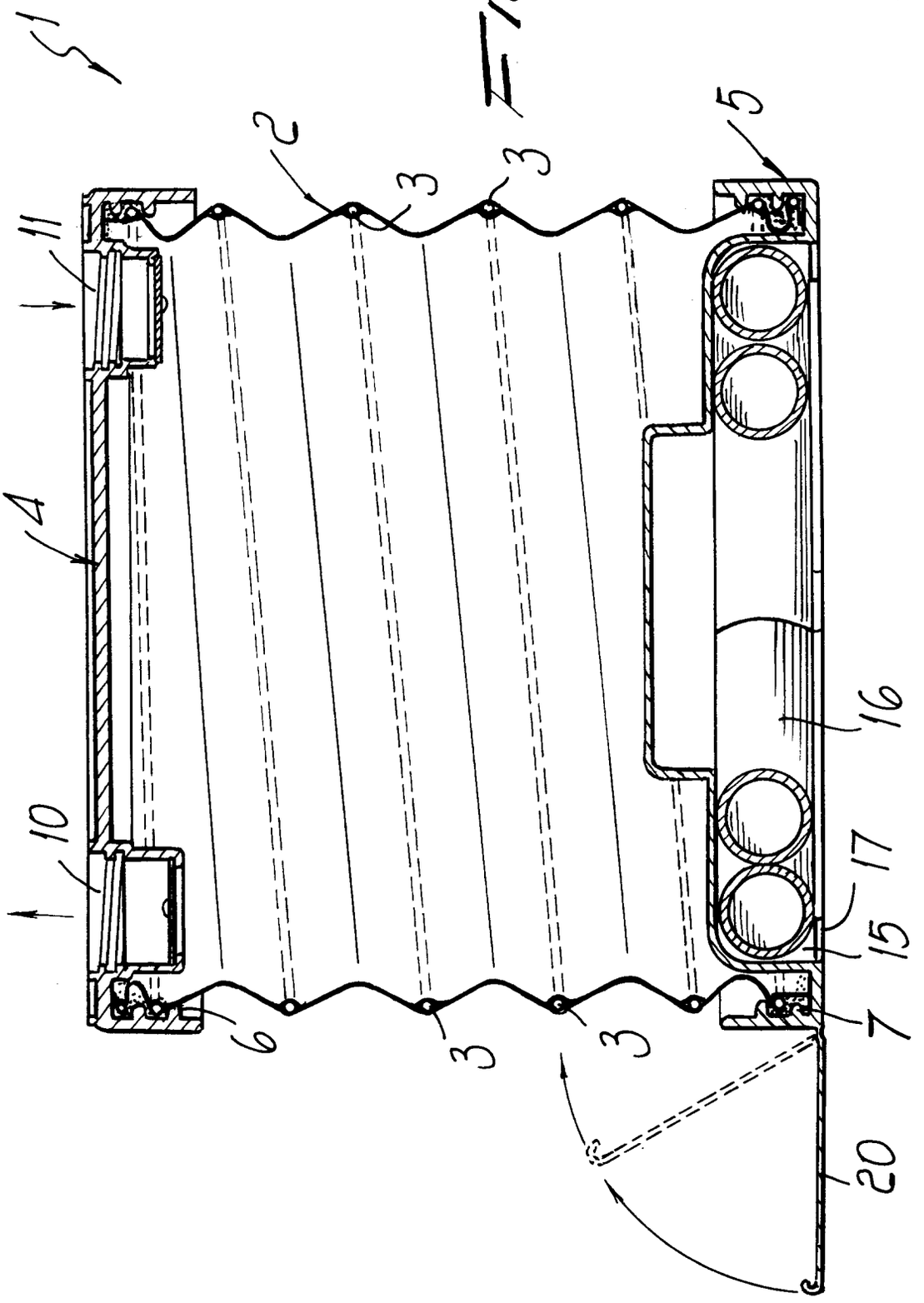


Fig. 3

Fig. 4



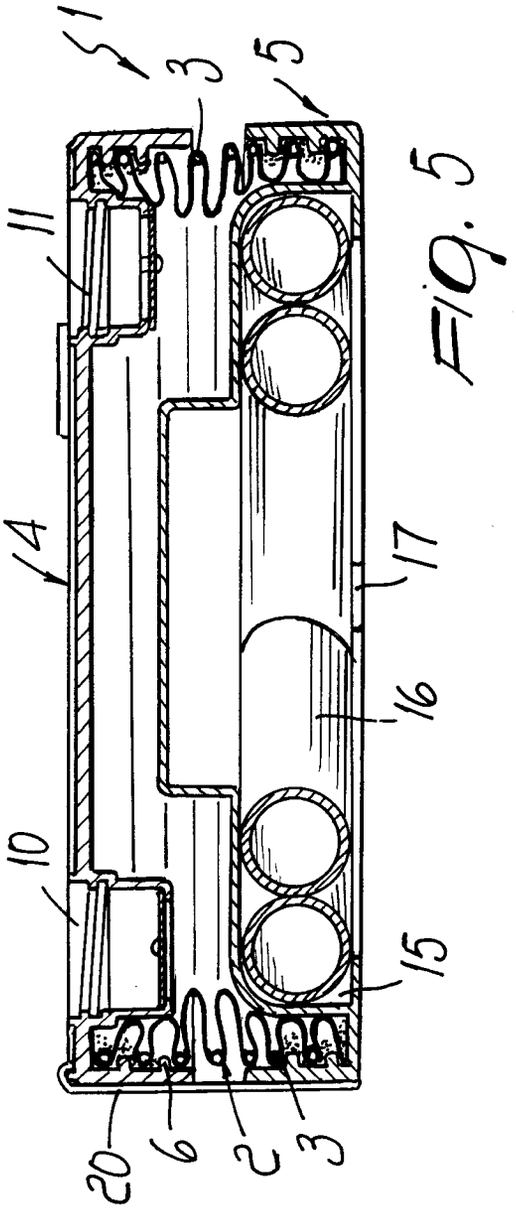


FIG. 5

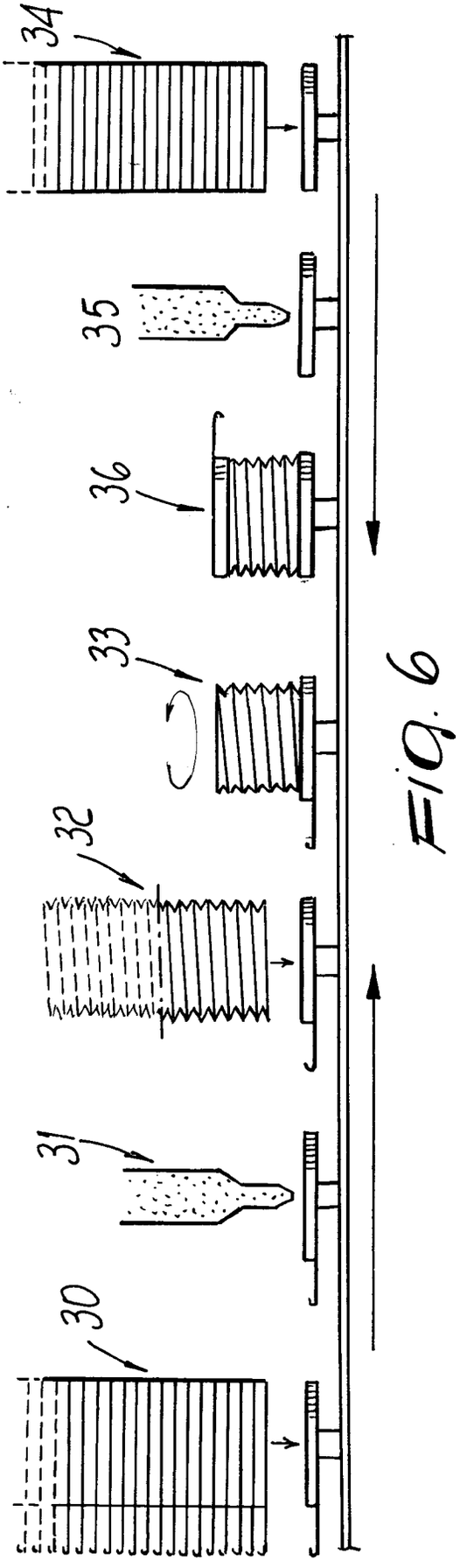


FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 0617

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.6)
X	DE-U-85 24 367 (WÜRTZ) * page 5, paragraph 3 - page 6, paragraph 1; figure 1 *	1,3,5,8	F04B45/02 F04B43/00
X	DE-C-871 189 (MÄRZ) * the whole document *	1,3,5,8	
A	FR-A-1 592 658 (HARTMANN) * figures 3,7,10 *	1,3,4,8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 May 1995	Von Arx, H

CATEGORY OF CITED DOCUMENTS

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