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

(11) Publication number: **0 366 445 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89311001.5**

(51) Int. Cl.5: **G05G 1/10 , F24C 3/12**

(22) Date of filing: **25.10.89**

(30) Priority: **26.10.88 GB 8825104**

(43) Date of publication of application:
02.05.90 Bulletin 90/18

(84) Designated Contracting States:
DE FR IT

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(54) Rotary control knobs.

(57) A flush rotary control knob for use with gas taps which include niting, comprises a pair of opposed generally cylindrical members 1,2 each having a plurality of axially disposed fingers 3 spaced around the circumference thereof, the fingers 3 of one of the members 1,2 intermeshing with the fingers 3 of the other of members 1,2, and a rotary member 4 disposed inside the fingers 3 and having a circumferential surface 6 adjacent a circumferential surface of the fingers 3. The rotary member 4 is provided with a continuous cam track 7 in its circumferential surface 6 and each of the fingers 3 is provided with a cam follower peg 8 which extends into the cam track 7. A compression spring 5 is provided to bias the opposed members 1,2 apart. Axial movement between the opposed members 1,2 causes the rotary member to rotate to retain the control knob in retracted and extended positions and also in an intermediate position which is used to overcome the niting of the gas tap.

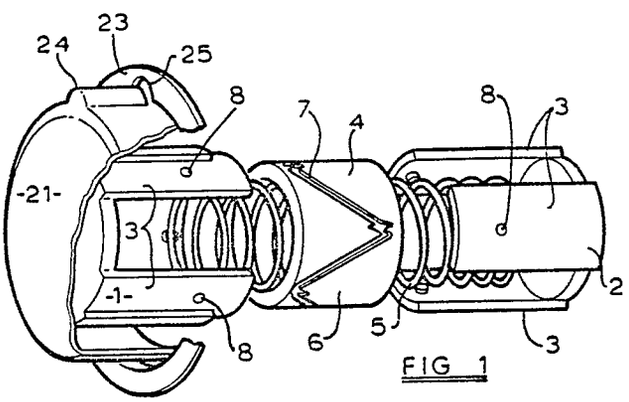

FIG 1

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Rotary Control Knobs

This invention relates to rotary control knobs and more specifically to a rotary control knob which is retractable so that it affords a flush appearance.

It is becoming increasingly popular, especially on electric cookers, to make use of so-called flush rotary control knobs which in their normal retracted position are flush with the knob surround but which may be axially pressed to cause the body of the knob to be ejected from its retracted position to an extended position where it may be manually rotated to effect the required control. Such flush rotary control knobs not only afford a streamlined appearance but they are, to a large extent, childproof in that when they are in their retracted position it is obviously difficult to inadvertently turn them ON.

It is becoming increasingly desirable to use such flush rotary control knobs on gas cookers, but gas control taps used on gas cookers are often provided with a niting which requires the knob to be axially depressed before it can be rotated. This axial movement of the knob to overcome the niting has obviously to be taken account of, bearing in mind that the knob is itself axially moveable in order to achieve the flush appearance.

It is an object of the present invention to provide a flush rotary control knob which can be especially adapted for use with gas controls having niting but which may also have wider application to rotary controls in general.

According to the present invention there is provided a rotary control knob comprising a pair of opposed generally cylindrical members each having a plurality of axially disposed fingers spaced around the circumference thereof, the fingers of one of the members intermeshing with the fingers of the other of the members, a rotary member having a circumferential surface adjacent a circumferential surface of said fingers, the rotary member having a continuous cam track formed in said circumferential surface, each of said fingers having a cam follower peg which extends into said cam track, and spring means for biassing said opposed members axially apart, said cam track being shaped whereby in a first position of said knob, said pair of opposed members are held in a retracted position by said rotary member, axial movement of said members towards each other causing said rotary member to be rotated to cause said members to be released and moved under the action of said spring means to an axially extended position.

In one arrangement for carrying out the invention, said continuous cam track may be shaped such that subsequent axial movement of said members towards each other causes said rotary member to be further rotated to hold said members in said retracted position.

In a preferred arrangement for carrying out the invention, said continuous cam track may be shaped such that subsequent axial movement of said members towards each other causes said rotary member to be rotated to an intermediate position in which further axial movement of said members towards each other is prevented, said members, when axially released, being caused to be moved to said axially extended position under the action of said spring means, and being effective for causing said rotary member to be rotated relative to said intermediate position, subsequent movement of said members towards each other causing said rotary member to be further rotated to hold said members in said retracted position.

Conveniently, said rotary member may be of cylindrical form.

In one arrangement, the cylindrical rotary member is disposed inside said intermeshing fingers, with said continuous cam track being disposed in the outer circumferential surface of said cylindrical rotary member, and said spring means being disposed inside said cylindrical rotary member, and between said opposed members.

In another arrangement, said cylindrical rotary member is disposed around said intermeshing fingers, said continuous cam track being disposed in the inner circumferential surface of said cylindrical rotary member.

In a preferred arrangement according to the present invention, there is provided a finger supporting member disposed between adjacent fingers of said opposed members, the finger supporting member being axially attached to said rotary member and rotatable relative thereto.

Advantageously, each of said opposed members will comprise three axially disposed fingers spaced around the circumference thereof, in which case said continuous cam track will consist of three identical cam track portions disposed in the circumferential surface of said rotary member.

It may be arranged that one of said pair of opposed members is adapted to be attached to a spindle to be rotated, and the other of said pair of opposed members forms or is adapted to receive an operating knob portion.

Advantageously, means may be provided operable when the operating knob portion is in its axially extended position for preventing said knob portion from being moved to said retracted position unless said knob portion is rotated to a predetermined angular (e.g. OFF) position.

Conveniently, a fixed bezel may be provided which surrounds said operating knob portion, a radial protrusion being provided on said knob portion which co-operates with a corresponding groove in said bezel when said knob is in said predetermined angular position, and which prevents said knob portion from being moved to said retracted position unless said knob portion is rotated to said predetermined angular position.

An exemplary embodiment of the invention will now be described, reference being made to the accompanying drawings, in which:-

Fig. 1, is an exploded, partially cut-away, side view of a flush control knob in accordance with the present invention;

Figs. 2 and 3, are partially cut-away views of the flush control knob of Fig. 1, shown in the retracted and extended positions, respectively;

Fig. 4, depicts the cam track formed in the rotary member of the knob of Fig. 1;

Fig. 5, is an exploded, partially cut-away, side view of a modified form of the flush control knob of Fig. 1; and

Figs. 6 and 7, are partially cut-away views of the flush control knob of Fig. 5, shown in the retracted and extended positions, respectively.

In Figs. 1 to 3 of the accompanying drawings, there is depicted a flush control knob which is adapted to be used on a gas cooker, and specifically on a gas tap thereof which incorporates a niting facility.

The flush control knob shown comprises a pair of opposed, generally cylindrical members 1 and 2, each having three axially disposed fingers 3 disposed around the circumference thereof, the fingers 3 of the two members 1 and 2 being arranged to intermesh. Within the intermeshing fingers 3 of the two members 1 and 2 is disposed a cylindrical rotary member 4, through the centre of which extends a compression spring 5 which has the effect of biassing the members 1 and 2 apart. In the outer circumferential surface 6 of the rotary member 4 is formed a continuous cam track 7 the shaping of which controls the operation of the knob as will hereinafter be explained. Each of the fingers 3 of the two members 1 and 2 is provided with a radially disposed peg 8, the inner end of each of which extends into the cam track 7. The cam track 7 extends completely around the outer surface 6 of the rotary member 4, and consists of three identical portions, each of which co-acts with a respective one of the three fingers 3 of the two members 1 and 2.

In use of the knob shown in Figs. 1 to 3 of the drawings, the opposed member 1 will be provided either integrally or separately with a decorative end portion 21 by means of which the knob would be operated, and the opposed member 2 will be adapted to be attached to the rotary spindle of a gas tap (not shown).

In Fig. 4 of the drawings there is depicted a development of the cam track 7 of the rotary member depicting the three identical portions thereof, and the operation of the flush control knob will now be described with reference to Fig. 4.

In the retracted position of the flush control knob as shown in Fig. 1, the pegs 8 in the fingers 3 of one of the opposed members 1 and 2 will extend into the cam track 7 at the points indicated at 9 in Fig. 4, and the pegs 8 in the fingers 3 of the other one of the opposed members 1 and 2 will extend into the cam track 7 at the points indicated at 10 in Fig. 4. The relative movement between each peg 8 and the cam track 7 is the same for all the pegs 8, so, for the purpose of explanation, only one of the pegs 8 will be considered.

When the flush control knob is in its retracted position as depicted in Fig. 1, a peg 8 in the fingers 3 of one of the members 1 and 2 will extend into the cam track 7 at the point 9 in Fig. 4.

In order to cause the flush control knob to be extended as depicted in Fig. 2, the member 1 is axially moved towards member 2, which causes peg 8 to engage the opposite inclined surface 11 of the cam track 7 to cause the rotary member 4 to be rotated until the peg 8 moves to the end position 12.

When the member 1 is released, member 1 moves axially away from member 2 under the action of the spring 5 and causes the peg 8 to traverse the portion 13 of the cam track 7 until it reaches end stop 14 which corresponds to the extended position of the knob as shown in Fig. 2 of the drawings. In this position of the knob, it may be used to effect rotary control of rotary control device with which it may be associated.

However, in the case of gas taps as used on a gas cooker, it is often necessary to overcome the niting provided on the tap before it can be rotated. This is achieved in the flush control knob described, by providing an intermediate position of the rotary member, in which position the members 1 and 2 are effectively locked together so that the niting of a gas tap can be overcome.

When the knob is in the extended position with the peg 8 at the end stop 14, axial movement of member 1 towards member 2 causes the peg 8 to engage the opposite inclined surface 15 of the cam track 7, causing the rotary member 4 to be rotated until the peg 8 engages the point 10 of the cam track 7. In this position, axial movement of the member 1 is transferred to member 2 and can be used to overcome the niting of a gas tap to which the knob is attached.

When the member 1 is released, the peg 8 which is at point 10 engages the opposite inclined

portion 16 of the cam track 7, causing the rotary member 4 to be rotated until the peg 8 engages the point 17 of the cam track 7 which also corresponds to the extended position of the knob. In this position normal rotary control of a gas tap may be effected.

When a gas tap is finished with and it is required to move the knob to its retracted position, the member 1 is moved towards the member 2, which causes the peg 8 at position 17 to traverse the inclined portion 18 to the end stop 19, and when the member 1 is released, the peg 8 engages the opposite inclined portion 20 of the cam track 7, causing the rotary member 4 to be rotated and causing the peg 8 to enter the point 9 of the cam track 7 which corresponds to the retracted position of the knob.

In the flush control knob thus far described, the niting of a gas tap is overcome by suitably shaping the cam track 7 to provide the intermediate position of the rotary member 4, at which position both of the opposed members may be moved axially. Whilst this is a preferred form of the invention, it is also envisaged that the niting problem can be overcome simply by arranging that the axial force exerted by spring 5 in the flush control knob is more than the axial force needed to overcome the niting of the gas tap. By so doing, it is possible to simplify the shaping of the cam track 7, but the pressure needed to operate the knob may be unacceptably high.

One of the prime requirements of a flush control knob is that there should be sufficient movement between its retracted and extended positions. In the flush control knob thus far described, one of the factors that limits the movement between its retracted and extended positions is the need for the fingers 3 of the two members 1 and 2 to overlap sufficiently to maintain a reasonably rigid structure.

In Figs. 5 to 7 of the accompanying drawings there is shown a modification of the knob of Figs. 1 to 4 which enables increased movement to be obtained.

This is achieved by providing a finger support member 22 of cylindrical form which is adapted to fit between the fingers 3 of the opposed members 1 and 2. As can be seen from Fig. 2, the fingers 3 overlap the finger supporting carrier 22 and enable greater movement between the retracted and extended positions of the knob to be achieved. The finger support member 22 is provided at each of its ends with an internal flange 23 by means of which it is axially coupled to the rotary member 4, but the support member 22 is rotatable independently of the rotary member 4.

One disadvantage of the flush control knob which has been described is that when the control knob is attached to a rotary spindle of, say, a gas tap, and after it has been set to a required angular position, it is possible that a user could forget that the knob has been operated and it could inadvertently be left in this position. In order to overcome this, the flush control knob described with reference to the accompanying drawings is provided with a fixed bezel 23 which surrounds the decorative end portion 21 of the knob. The end portion 21 is provided with a radial protrusion 24 which, in the OFF position of the flush control knob, aligns with a groove 25 in the inner surface of the bezel 23, and which prevents the end portion 21 from being moved axially unless it is rotated to its OFF position.

Although the flush control knob which has been specifically described has been primarily designed for use with gas taps having niting, it should be appreciated that knobs in accordance with the present invention may be applicable to rotary controls of any form.

Claims

1. A rotary control knob comprises a pair of opposed generally cylindrical members each having a plurality of axially disposed fingers spaced around the circumference thereof, the fingers of one of the members intermeshing with the fingers of the other of the members, a rotary member having a circumferential surface adjacent a circumferential surface of said fingers, the rotary member having a continuous cam track formed in said circumferential surface, each of said fingers having a cam follower peg which extends into said cam track, and spring means for biassing said opposed members axially apart, said cam track being shaped whereby in a first position of said knob, said pair of opposed members are held in a retracted position by said rotary member, axial movement of said members towards each other causing said rotary member to be rotated to cause said members to be released and moved under the action of said spring means to an axially extended position.

2. A knob as claimed in claim 1, in which said continuous cam track is shaped such that subsequent axial movement of said members towards each other causes said rotary member to be further rotated to hold said members in said retracted position.

3. A knob as claimed in claim 1, in which said continuous cam track is shaped such that subsequent axial movement of said members towards each other causes said rotary member to be rotated to an intermediate position in which further axial movement of said members towards each other is

prevented, said members, when axially released, being caused to be moved to said axially extended position under the action of said spring means, and being effective for causing said rotary member to rotated relative to said intermediate position.

4. A knob as claimed in claim 3, in which subsequent movement of said members towards each other causes said rotary member to be further rotated to hold said members in said retracted position.

5. A knob as claimed in any preceding claim, in which said rotary member is of cylindrical form.

6. A knob as claimed in claim 5, in which said cylindrical rotary member is disposed inside said intermeshing fingers.

7. A knob as claimed in claim 6, in which said continuous cam track is disposed in the outer circumferential surface of said cylindrical rotary member.

8. A knob as claimed in claim 6 or claim 7, in which said spring means is disposed inside said cylindrical rotary member, and between said opposed members.

9. A knob as claimed in any of claims 1 to 4, in which said cylindrical rotary member is disposed around said intermeshing fingers.

10. A knob as claimed in claim 9, in which said continuous cam track is disposed in the inner circumferential surface of said cylindrical rotary member.

11. A knob as claimed in any preceding claim, comprising a finger supporting member disposed between adjacent fingers of said opposed members.

12. A knob as claimed in claim 11, in which the finger supporting member is axially attached to said rotary member and is rotatable relative thereto.

13. A knob as claimed in any preceding claim, in which each of said opposed members comprises three axially disposed fingers spaced around the circumference thereof, and in which said continuous cam track consists of three identical cam track portions disposed in the circumferential surface of said rotary member.

14. A knob as claimed in any preceding claim, in which one of said pair of opposed members is adapted to be attached to a spindle to be rotated, and the other of said pair of opposed members forms or is adapted to receive an operating knob portion.

15. A knob as claimed in claim 14, comprising means operable when the operating knob portion is in its axially extended position for preventing said knob portion from being moved to said retracted position unless said knob portion is rotated to a predetermined angular position.

16. A knob as claimed in claim 15, comprising a fixed bezel which surrounds said operating knob portion, a radial protrusion being provided on said knob portion which co-operates with a corresponding groove in said bezel when said knob is in said predetermined angular position, and which prevents said knob portion from being moved to said retracted position unless said knob portion is rotated to said predetermined angular position.

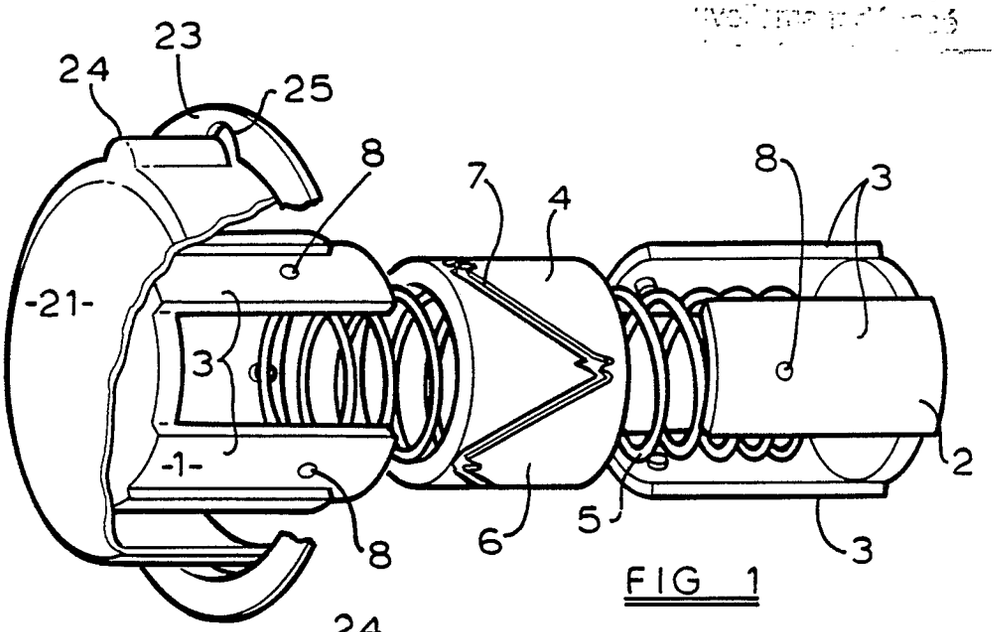

FIG 1

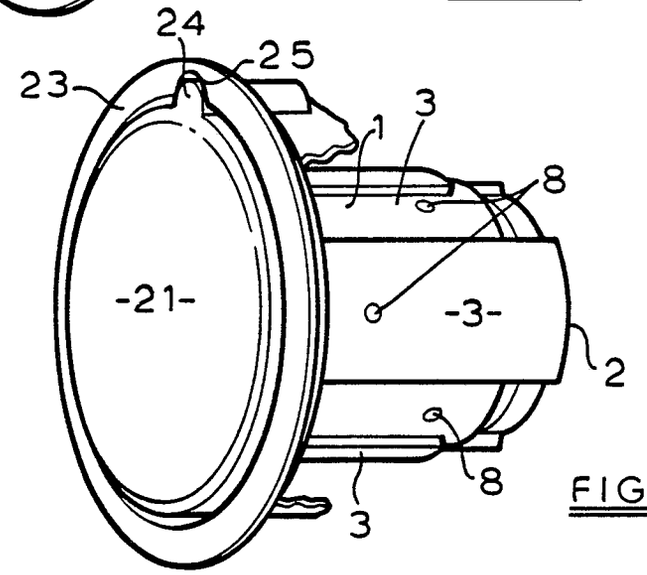

FIG 2

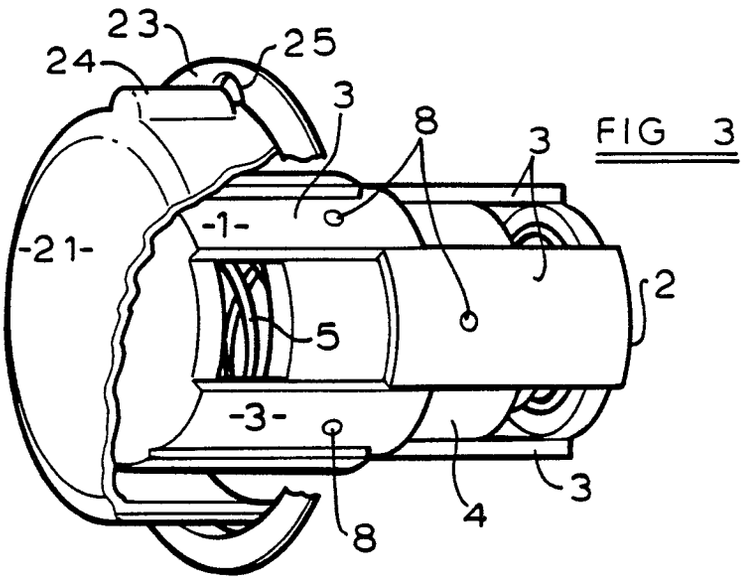

FIG 3

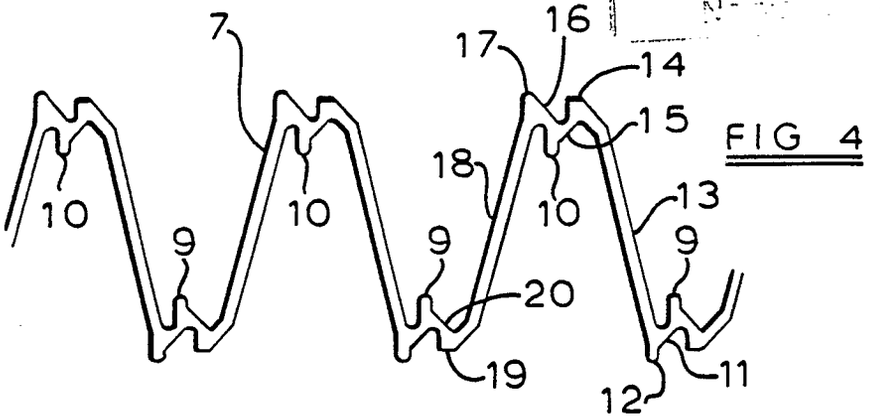
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FIG 4

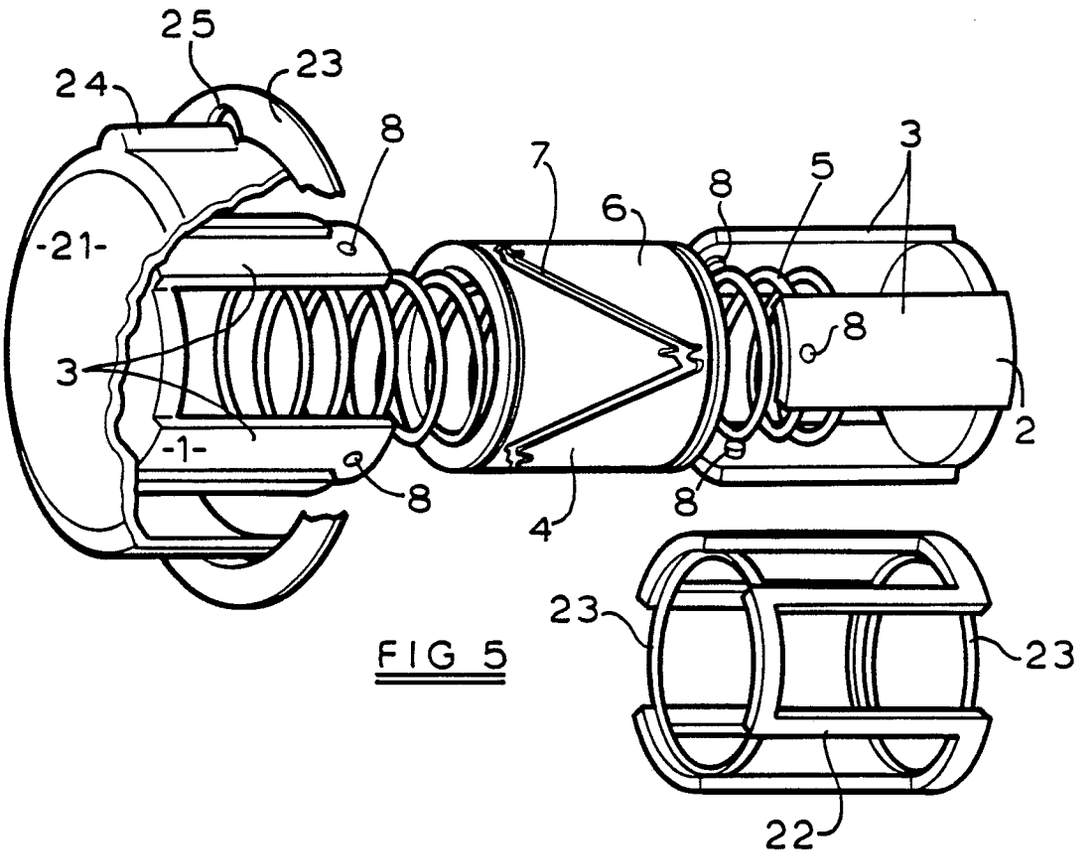
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FIG 5

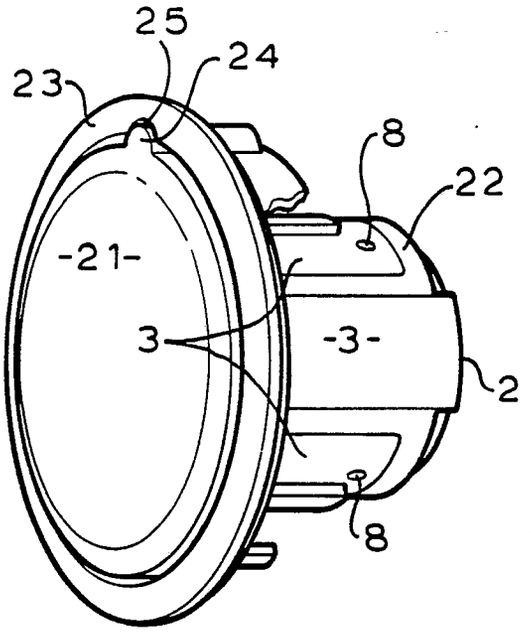

FIG 6

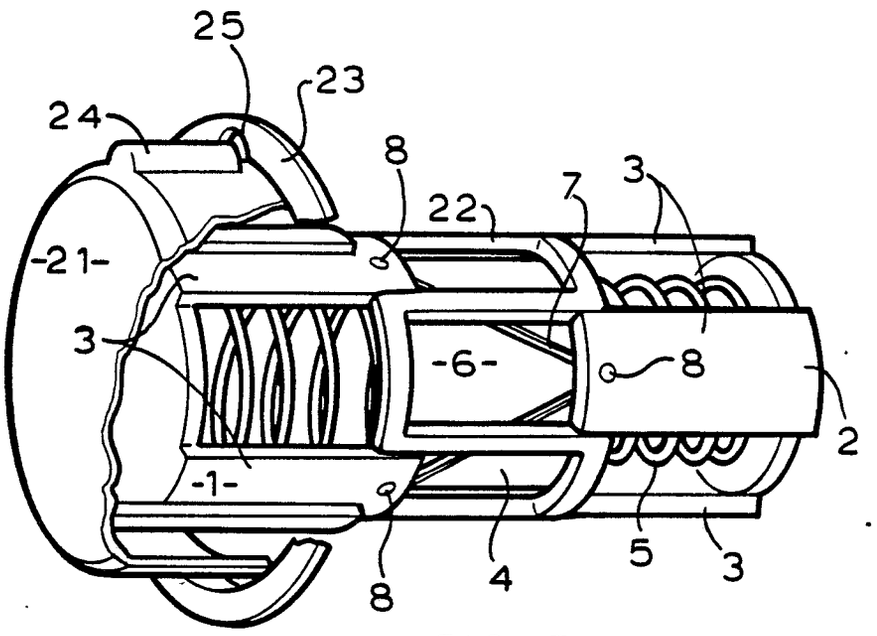

FIG 7