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(71) Applicant (for all designated States except US): **TE-COMEC S.R.L.** [IT/IT]; Strada Della Mirandola 11, I-42124 Reggio Emilia (IT).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **CIGARINI, Enrico** [IT/IT]; Via San Bartolomeo 38, I-42123 Reggio Emilia (IT).

(74) Agent: **PAPARO, Aldo**; BUGNION S.P.A., Via Vellani Marchi 20, I-41124 Modena (IT).

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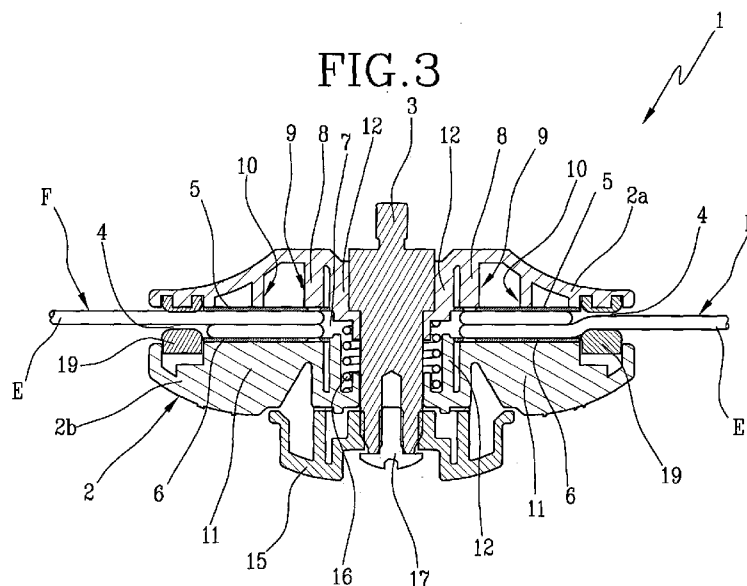
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(54) Title: HEAD FOR A LINE HEDGE TRIMMER



(57) Abstract: Head for hedge trimmer comprising an external casing (2, 102) having an axis of rotation (X) and equipped with at least one lateral exit hole (4, 104) for a cutting wire (F), the external casing (2, 102) internally having a seating for the storage of a part of the cutting wire (F) so that an end portion (E) of the wire (F) exits from the casing (2, 102) through a lateral hole (4, 104). The head (1, 101) comprises, within the seating, a pair of presser discs (5, 6, 105, 106) facing each other and defining between them an annular shaped housing (7, 107) to contain said part of the cutting wire (F), the presser elements (5, 6, 105, 106) being movable towards each other along said axis of rotation (X) for compressing between them the part of the cutting wire (F) stored between them.

DescriptionTitle

HEAD FOR A LINE HEDGE TRIMMER

Technical Field

The present invention relates to a head for hedge trimmers.

As is known, hedge trimmers are normally used in gardening for cutting excess vegetation, weeds, etc., and are particularly suitable for use on uneven or unlevel ground or that is not easily reachable by mowing machines equipped with wheels.

Hedge trimmers can be worn by a user and generally comprise a rod to be worn by the user, an internal combustion engine and a cutting head applied to the lower end of the rod.

The head carries within it one or more skeins of cutting wire, wound onto respective support reels, whose ends exit from lateral opposite holes and to which the centrifugal force generated by the strong rotation of the head confers cutting properties.

The presence of the reel of cutting wire inside the head allows the worn ends of the wire to be replaced with new portions unwound each time from the reel, following manual intervention or activation of automatic release systems of sections of wire.

Disadvantageously, it has been noted that the cutting heads of the known type, loaded with a reel of cutting wire, have substantial dimensions and, also where lowered heads with a shorter height have been designed, the dimensions cannot be reduced as much as would be desirable due to the minimum dimensions of the cutting wire reels used.

Furthermore, heads loaded with a reel of cutting wire can have disadvantages during the operation of the hedge trimmer.

In fact, it can happen that the reel of wire becomes twisted inhibiting the subsequent exit of the wire itself from the head.

5 There are also solutions that provide for the loading into the head of a chunk of cutting wire which, after disassembling the head, is inserted inside it with its ends exiting from special lateral holes in the head. The reassembly of the latter blocks the wire gripping it in position in correspondence with the central section. In this configuration, no wire is stored in the head but, on the contrary, in the event of
10 needing to replace the wire it is necessary to disassemble the head every time, manually unwind the chunk of wire, insert a new chunk and reassemble the head. Therefore, disadvantageously, these systems are less practical to use and require laborious manual intervention every time it is necessary to replace the cutting wire.

15 Object of the invention

The technical task of the present invention is therefore to provide a head for a hedge trimmer which overcomes the disadvantages of the known art described above.

The object of the present invention is to provide a head for a hedge trimmer which
20 is highly practical to use, with particular reference to the reintegration of the cutting wire, and, at the same time, with reduced dimensions.

The stated technical task and the specified object are substantially reached by a hedge trimmer head with the characteristics expressed in one or more of the appended claims.

25 Brief description of the drawings

Further characteristics and advantages of the present invention will become more apparent from the following indicative, and hence non-limiting, description of a preferred, but not exclusive, embodiment of a head for a hedge trimmer, as illustrated in the appended drawings, in which:

- 5 - Figure 1 is a perspective view of a head for a hedge trimmer in accordance with the present invention;
- Figures 2 and 3 are sectional representations, according to two different perpendicular planes passing through the axis of rotation of the head, of the head of Figure 1 in a first embodiment;
- 10 - Figures 4 and 5 are two different exploded perspective views of the head of Figure 1 in the first embodiment;
- Figures 6 and 7 are sectional representations, according to two different perpendicular planes passing through the axis of rotation of the head, of the head of Figure 1 in a second embodiment;
- 15 - Figures 8 and 9 are sectional representations, according to two different perpendicular planes passing through the axis of rotation of the head, of the head of Figure 1 in a third embodiment;
- Figure 10 is an exploded perspective view of the head of Figure 1 in the third embodiment;
- 20 - Figure 11 is an exploded perspective view of a first group of components of the head of Figure 1 in the first embodiment;
- Figure 12 is a cutting wire wound in a spiral with coplanar coils used in head 1 according to the present invention;
- Figures 13 and 14 are exploded perspective views, from two different angles, of
- 25 a second group of components of the head of Figure 1 in the third embodiment;

- Figure 15 is a perspective view of a further component of the head of Figure 1 in the third embodiment;
- Figure 16 is a perspective view of a further component of the head of Figure 1 in the third embodiment.
- 5 - Figure 17 is a perspective view of a variation of a component of the head of Figure 1 in the first embodiment;
- Figure 18 is an exploded perspective view of the head of Figure 1 in a fourth embodiment;
- Figure 19 is an exploded perspective view of the head of Figure 1 in a fifth
10 embodiment.

Detailed description of the preferred embodiments of the invention

In accordance with Figures 1-5, 1 denotes in its entirety a head for hedge trimmers in accordance with a first embodiment of the present invention. Such first embodiment refers to a head of the type with manual replacement of the cutting
15 wire.

As can be seen in Figure 1, head 1 comprises an external casing 2 of a substantially cylindrical or discoidal shape around an axis "X" which constitutes the axis of rotation of head 1 when assembled at the lower end of the rod of a hedge trimmer (not illustrated).

20 The head 1 also has a pin 3 partially inserted inside the casing 2 and partially exiting from it for the grasping and setting in rotation around axis "X" by the (known) gripping means of the hedge trimmer.

Therefore, the axis of rotation "X" of the head is defined by the axis of symmetry of the pin 3.

25 The casing 2 internally defines a seating for the storage of a part of a cutting wire "F" and laterally (that is transversally with respect to the axis of rotation "X") has

at least one opening or a lateral hole 4 so that an end portion "E" of the cutting wire "F" stored inside the casing 2 exits from the casing through the lateral hole 4 (or opening) so as to define the cutting tool of head 1.

It is specified that in the continuation of the present description the term lateral
5 hole, indicated with the numerical reference 4, will be referred indistinctly to both a hole and an opening.

In the illustrated embodiment, the casing 2 has a pair of lateral holes 4 diametrically opposite, from which respective end portions "E" of cutting wires exit.

10 The casing 2 is defined by a pair of semi-shells 2a, 2b joinable through movement towards each other along the axis of rotation "X".

Between the two semi-shells 2a, 2b two plugs 19 are interposed, each equipped with an opening through which the end "E" of the cutting wire exits.

Advantageously, according to a characterising aspect of the invention, inside the
15 seating defined by the external casing 2 a pair of presser elements 5, 6 is arranged, facing each other and defining between them an annular shaped housing 7, that is toroidal, for the containment of a part of the cutting wire. Furthermore, advantageously, the presser elements 5, 6 are movable towards each other along the axis of rotation "X" so as to compress between them the mentioned part of
20 cutting wire stored between them.

Preferably, the housing 7 extends around the axis of rotation "X" between a circumference of minimum diameter "d" and a circumference of maximum diameter "D", shown in Figure 11. Advantageously, each of the presser elements 5, 6 has at least one portion which extends radially, that is, moving away from the
25 axis of rotation "X", between the circumferences of minimum diameter (d) and maximum diameter (D).

In principle, the presser elements 5, 6 can be of any shape, as long as the mentioned portion extending between the circumferences of minimum diameter (d) and maximum diameter (D) can be obtained.

5 In the embodiment illustrated in Figures 2-5 and 11, the presser elements 5, 6 have a full annular shape, that is, discoidal equipped with a central hole 5c, 6c, with two opposing and staggered flat surfaces along the axis of rotation "X". A first surface 5a, 6a, of each presser element 5, 6, facing the other presser element hence rests in a perpendicular plane to the axis of rotation "X", defining a constant thickness of the housing 7.

10 Each presser element 5, 6, therefore has a second surface 5b, 6b, facing a corresponding semi-shell 2a, 2b and, preferably, this is also flat and parallel to the first surface 5a, 6a.

A further embodiment of the presser elements is illustrated in Figure 17, which represents a single presser element 5 specifying the identity to the other presser
15 element 6.

With reference to the aforementioned presser element 5, the latter has an annular shape equipped with a central hole 5c and a plurality of lightnings 5d.

As previously described the aforementioned presser element 5 envisages a first surface 5a and a second surface 5b, opposite to the previous one.

20 The plurality of lightnings 5d, obtained radially between the two surfaces 5a, 5b, is equitably distributed on the annular shape of the presser element.

In the embodiments equipped with two presser elements 5 and 6, each first surface 5a, 6a, is facing the other presser element defining a constant thickness of the housing 7.

In such embodiments the respective plurality of lightnings 5d, 6d are staggered from each other so that a respective lightning is facing a respective full portion of the corresponding presser element.

In this way, when the presser elements intercept between them at least one cutting
5 wire F, they deform the cutting wire defining, through the plurality of lightnings, binding areas against the wire itself.

In other words a portion of the cutting wire F is deformed by binding against a longitudinal portion of the lightnings.

In the embodiments equipped with a single presser element 5, the first surface 5a
10 faces the cutting wire F whereas the second surface 5b faces a respective semi-shell 2a, 2b.

Also in this case, by exploiting the deformability of the cutting wire F and the pressure generated by the presser element 5 and the pair of semi-shells, the lightnings 5d generate binding areas of the cutting wire keeping it in position.

15 Each semi-shell 2a, 2b, has a central thrust portion 8 abutable onto a corresponding presser element 5, 6, and in particular onto its second surface 5b, 6b. Said central thrust portion 8 is preferably defined by at least one circular rib (9, 10), preferably two ribs, arranged around the axis of rotation "X" and coaxial with it, as can be seen in Figures 2-5 and 11.

20 Furthermore, preferably, each semi-shell 2a, 2b, also has a plurality of radial ribs 11 extending from the circular rib 9 moving away from the axis of rotation (X), and adapted to exert pressure on the second surface 5b, 6b of the corresponding presser element (5, 6).

Each semi-shell 2a, 2b, is connected to the respective presser element 5, 6
25 rotationally integral with respect to the axis of rotation "X", that is, so as to prevent mutual rotation between semi-shell 2a, 2b and presser element 5, 6 around

the axis "X". Preferably, this is obtained through a grooved connection between the central hole 5c, 6c, of the presser element 5, 6 and a central sleeve 12 of the semi-shell 2a, 2b, extending along axis "X".

This grooved coupling, in the embodiment illustrated in figure 11, is defined by
5 the coupling between lateral teeth 13 obtained on the sleeve 12 and corresponding notches 14 obtained on the presser element 5, 6, in correspondence with the central hole 5c, 6c.

Furthermore, also the semi-shells 2a, 2b, are integral in rotation with each other around the axis of rotation "X".

10 The head 1 also comprises clamping means provided to generate movement towards each other of the presser elements 5, 6, so as to clamp between the presser elements 5, 6 the part of the cutting wire stored between them.

In the embodiment of Figures 2-5, the clamping means comprise a threaded connection acting between the two semi-shells 2a, 2b, so as to clamp the semi-
15 shells 2a, 2b to each other, in a packed configuration in which the semi-shells 2a, 2b, keep said presser elements close to each other.

The threaded connection, as can be seen in Figures 2 and 3, exploits the pin 2 of head 1, which generates an undercut on the first semi-shell 2a and extends up to the second semi-shell 2b exiting from it by engaging, through screwing, with a
20 clamping knob 15 which grips onto the second semi-shell 2b. In this way the clamping of knob 15 generates the movement towards each other of the two semi-shells 2a, 2b, which press on the presser elements 5, 6, clamping the cutting wire arranged between them.

Preferably, in the current embodiment the clamping means also comprise a
25 compression spring 16 interposed between the two semi-shells 2a, 2b, so as to

keep sufficient tension on the aforementioned threaded connection, preventing the latter from coming loose during the operative rotation of head 1.

Preferably, as can be seen in the exploded views in Figures 4 and 5 and even better in Figure 11, each presser element 5, 6, has, on its own portion nearest to
5 the axis of rotation "X" and facing the other presser element 5, 6 (hence on its own first surface 5a, 6a), a plurality of areas of increased adherence 18 so as to increase a gripping action exerted by the presser element 5, 6 on the part of the cutting wire contained in housing 7.

In the illustrated embodiment, the mentioned areas of increased adherence 18
10 comprise a plurality of areas locally deformed of the presser element 5, 6, which define sharp edges extending along the axis of rotation "X" towards the other presser element 5, 6.

Preferably, the areas of increased adherence 18 are angularly distributed around the axis of rotation "X" and, in line with the above description, they are located
15 near or at the central hole 5c, 6c, of the presser element 5, 6.

In use, in the event of needing to reintegrate the cutting ends of the cutting wire with new chunks, the operator must stop the rotation of head 1, release the threaded connection by unscrewing the knob 15, then loosen the compression between the two semi-shells so as to allow the manual extraction of a part of the
20 cutting wire previously stored in casing 2 of head 1, then cut the worn ends "E" of the cutting wire and clamp the two semi-shells 2a, 2b again, by acting on the knob 15.

Figures 6 and 7 show a different embodiment of head 1 but structurally similar to that described above and illustrated in Figures 2-5. In particular, this embodiment
25 differs from the previous one in that the second semi-shell 2b, that is, the one facing the ground during the use of the hedge trimmer, has a cavity facing the

ground provided to contain at least partially the knob 15 so as to reduce the axial dimensions of head 1.

The remaining characteristics of head 1 remain unvaried with respect to the embodiment of Figures 2-5 and, therefore, Figures 6-7 use the same reference
5 numbers to identify the same structural components as Figures 2-5.

Figures 8-10 show a third embodiment of the present invention. Such third embodiment refers to a head of the type with automatic replacement of the cutting wire, so called "tap-and-go".

In the description of this embodiment, corresponding elements to the elements
10 already described for the first embodiment will be associated with the same numbers to which "100" will be added.

Also in this embodiment, head 101 comprises an external casing 102 of a substantially cylindrical or discoidal shape around an axis "X" which constitutes the axis of rotation of the head 101 when assembled at the lower end of the rod of
15 a hedge trimmer (not illustrated).

The head 101 also has a pin 103 partially inserted inside the casing 102 (also in this case in accordance with Figure 1) and partially exiting from it for the grasping and setting in rotation around axis "X" by the (known) gripping means of the hedge trimmer.

20 Therefore, the axis of rotation "X" of the head is defined by the axis of symmetry of the pin 103.

The casing 102 internally defines a seating for the storage of a part of a cutting wire "F" and laterally (that is transversally with respect to the axis of rotation "X") has at least one lateral hole 104 so that an end portion "E" of the cutting wire
25 "F" stored inside the casing 102 exits from the casing through the lateral hole 104 so as to define the cutting tool of head 101.

In accordance with the illustrated embodiment, the casing 102 has a pair of lateral holes 104 diametrically opposite, from which respective end portions "E" of cutting wires exit.

The casing 102 is defined by a pair of semi-shells 102a, 102b joinable through
5 movement towards each other along the axis of rotation "X".

In this embodiment, however, the second semi-shell 102b (that is, the one arranged on the side of head 101 intended to face the ground) has a peripheral portion 102b' that can be permanently associated with the first semi-shell 102a and a central portion 102b'', applied slidably to the peripheral portion 102b' to
10 slide with respect to the latter along the axis of rotation "X".

As can be seen in Figure 10, the central portion 102b'' has a cap conformation.

Furthermore, the first semi-shell 102a and the peripheral portion 102b' of the second semi-shell 102b are rotationally integral around the axis of rotation "X", in particular through a pair of snap teeth 124 visible in Figure 8.

15 Between the two semi-shells 102a, 102b two plugs 119 are interposed, each equipped with an opening through which the end "E" of the cutting wire exits.

Advantageously, according to a characterising aspect of the invention, inside the seating defined by the external casing 102 a pair of presser elements 105, 106 is arranged, facing each other and defining between them an annular shaped housing
20 107, that is toroidal, for containing a part of the cutting wire. Furthermore, advantageously, the presser elements 105, 106 are movable towards each other along the axis of rotation "X" so as to compress between them the mentioned part of cutting wire stored between them.

Also in this embodiment, the housing 107 extends around the axis of rotation "X"
25 between a circumference of minimum diameter "d" and a circumference of maximum diameter "D", shown in Figure 11 (although Figure 11 refers

specifically to the first or second embodiment, the presser element 5 shown in it is identical to the presser element of the third embodiment).

Advantageously, each of the presser elements 105, 106 has at least one portion which extends radially, that is, moving away from the axis of rotation "X",
5 between the circumferences of minimum diameter (d) and maximum diameter (D).

In principle, the presser elements 105, 106 can be of any shape, as long as the mentioned portion extending between the circumferences of minimum diameter (d) and maximum diameter (D) can be obtained.

10 Also in this embodiment, the presser elements 105, 106 have a full annular shape, that is, discoidal equipped with a central hole 105c, 106c, with two opposing and staggered flat surfaces along the axis of rotation "X". A first surface 105a, 106a, of each presser element 105, 106, facing the other presser element hence rests in a perpendicular plane to the axis of rotation "X", defining a constant thickness of
15 the housing 107.

Each presser element 105, 106 also has a second surface 105b, 106b, facing a corresponding semi-shell 102a, 102b.

Preferably, the presser elements 105, 106 of the current embodiment have, on their own portion nearest to the axis of rotation "X" and facing the other presser
20 element 105, 106 (therefore on their own first surface 105a, 106a), a plurality of areas of increased adherence 118 to increase a gripping action exerted by the presser element 105, 106 on the part of cutting wire contained in housing 107. This is similar to what has already been described for the other two embodiments and the configuration illustrated in Figure 11.

25 In particular, the mentioned areas of increased adherence 118 comprise a plurality of areas locally deformed by the presser element 105, 106, which define sharp

edges extending along the axis of rotation "X" towards the other presser element 105, 106.

Preferably, the areas of increased adherence 118 are angularly distributed around the axis of rotation "X" and, in line with the above description, they are located
5 near or at the central hole 105c, 106c, of the presser element 105, 106.

Inside the external casing 2 a pair of auxiliary discs 120, 121 is also arranged, each abutable resting against the aforementioned second surface 105b, 106b of a respective presser element 105, 106.

A first auxiliary disc 120 rests against the second surface 105b of the first presser
10 element 105 whereas the second auxiliary disc 121 rests against the second surface 106b of the second presser element 106.

Preferably, the auxiliary discs 120, 121 each have an annular portion in a discoidal shape overlappable with the respective presser element 105, 106.

Furthermore, the first auxiliary disc 120 has a central sleeve portion 122 which
15 extends along the axis of rotation "X" and is inserted, through a grooved coupling, in a central hole 123 obtained in the second auxiliary disc 121, so as to allow mutual translation between the two auxiliary discs 120, 121 along the axis of rotation "X" but not mutual rotation.

The head 1 also comprises clamping means provided to generate movement
20 towards each other of the presser elements 105, 106, so as to clamp between the presser elements 105, 106 the part of the cutting wire stored between them.

In the current embodiment, the clamping means comprise a compression spring 116 interposed between the first semi-shell 102a and the respective first auxiliary disc 120. Preferably, a bowl 129 is interposed between the spring 116 and the first
25 auxiliary disc 120.

Hence the compression spring 116 keeps the first auxiliary disc 120 pressed, and along with it, the first presser element 105, against the cutting wire stored in the housing 107 which, from the opposite part, unloads said compression action on the second presser element 106, which presses against the second auxiliary disc 121.

In turn, the second auxiliary disc 121, in correspondence with its own peripheral portion, strikes against the second semi-shell 102b, in particular against the peripheral portion 102b' and/or against the central portion 102b'' of the second semi-shell 102b.

It ensues that said central portion 102b'' is activatable, through lifting if the orientation of Figures 8 and 9 is observed, in translation against the second auxiliary disc 120 and therefore towards the second presser element 105b to move the presser elements 105a, 105b towards the first semi-shell 105a contrasting the thrust action exerted by the spring 116.

As can be seen in Figure 13, the first auxiliary disc 120 has, on a first peripheral portion facing the first semi-shell 105a, a plurality of projections 125 facing the first semi-shell 105a and engageable within respective seatings 126 (visible in Figure 16) obtained in the first semi-shell 105a.

Likewise, the second auxiliary disc 121 has, on its peripheral portion facing the second semi-shell 106a, a plurality of projections 127 facing the second semi-shell 105b and engageable within respective seatings 128 (visible in Figure 15) obtained in the peripheral portion 102b' of the second semi-shell 105b.

Preferably, the aforementioned seatings 126, 128 of semi-shells 102a, 102b have a slot shape and have a pre-set angular extension around the axis of rotation "X" so as to allow a predetermined angular movement of each auxiliary disc 120, 121

with respect to the respective semi-shell 102a, 102b around the axis of rotation "X".

Furthermore, the projections 125 of the first auxiliary disc 120 are disengaged from the respective seatings 126 of the first semi-shell 102a when the projections
5 127 of the second auxiliary disc 121 are engaged within the respective seatings 128 of the second semi-shell 120b. The mentioned projections 125, 127 are engageable in the respective seatings 126, 128 and disengageable, through translation of the auxiliary discs 120, 121 along the axis of rotation "X", in particular by the central portion 102b'' of the second semi-shell 102b or by the
10 compression spring 116.

Figure 18 illustrates a fourth variation of the head 1 of Figure 1 with the same components as the first variation with the exception of the pair of presser elements 5, 6.

In fact, said head 1 comprises a single presser element 6, whereas the other
15 presser element 5 is defined by a semi-shell 2a, 2b.

Figure 19 illustrates a fifth embodiment of the head 1 of Figure 1 with the same components as the first variation with the exception of the pair of presser elements 5, 6.

In such a variation the pair of presser elements 5, 6 is defined by the pair of semi-
20 shells 2a, 2b integrated by a further presser element 20 interposed between the latter.

Said further presser element 20 performs both the role of striker wall for the pressure exerted by the pair of semi-shells and the role of friction element preventing any slipping between two cutting wires F, F'.

25 In the configuration of Figure 19 the first semi-shell 2a presses the cutting wire F against the further presser element 20 and the other semi-shell 2b presses the

further cutting wire F' against the same presser element 20. The further presser element 20 prevents any slipping between the cutting wires F and F'.

In use, starting from an identical configuration to that shown in Figure 8, the lifting of the central portion 102b'' of the second semi-shell 102b (obtained for example by pressing or hitting the head 101 on the ground during the operative rotation of the head 101) performs the lifting of the package, comprising:

- the two auxiliary discs 120, 121,
- the two presser elements 105, 106 and
- the cutting wire "F" compressed between them through the spring 116.

This lifting takes place against the thrust of the spring 116.

The lifting described above performs the disengagement of the projections 127 of the second auxiliary disc 121 from the seatings 128 of the second semi-shell 102b.

This makes the aforementioned package rotationally independent from the semi-shells 102a, 102b and from the pin 103 and therefore the package can rotate around the axis "X" with respect to the semi-shells 102a, 102b, with release by centrifugal action of a section of cutting wire through the lateral holes 104.

During the lifting of the mentioned package, following the complete disengagement of the projections 127 of the second auxiliary disc 121 from the seatings 128 of the second semi-shell 102b, (after a predetermined time also connected to the excursion of the package along axis "X") the engagement of the projections 125 of the first auxiliary disc 120 in the seatings 126 of the first semi-shell 102a takes place.

This causes a new jamming of the rotation of the package with respect to the semi-shells 102a, 102b which interrupts the release of the cutting wire through the lateral holes 104.

The same thing happens in the subsequent release of the thrust action exerted by the central portion 102b'' of the second semi-shell 102b with a lowering of the package into the inserted position with the second semi-shell 102b.

In all the embodiments described, the presser elements 5, 6, 105, 106 are
5 conformed so as to contain, within the housing 7, 107 formed between them, a cutting wire arranged to strike against the first surfaces 5a, 6a, 105a, 106a of the presser elements 5, 6, 105, 106 and configured according to a spiral winding with coils all resting on the same perpendicular plane to the axis of rotation "X".

In other words, the aforementioned presser elements 5, 6, 105, 106, mainly due to
10 the conformation and arrangement described above, are adapted to contain and permanently hold between them a cutting wire "F" of the type illustrated in Figure 12.

The mentioned spiral of cutting wire "F" is wound onto, and resting in, a perpendicular plane to the axis of rotation "X".

15 Without leaving the scope of protection of the present invention, it is possible to provide, as an alternative position, the mentioned spiral of cutting wire "F" wound onto, and resting in, a plane not perpendicular to the axis of rotation "X".

Preferably, in the event of providing a sharp end "E" of wire exiting the head (variation not illustrated), at least one spiral of wire can be arranged packaged
20 between the presser elements 5, 6, 105, 106.

In the same way, in the event of providing two sharp ends "E" of wire exiting the head (Figure 1), at least two spirals of wire can be arranged overlapping along the axis of rotation "X" and packaged between the presser elements 5, 6, 105, 106.

As can be seen in Figure 12, the spiral of cutting wire "F" has a central opening
25 "A" for inserting a part of said casing intended for coupling with a head movement pin.

In more detail, the cutting wire "F" has, on its lateral surface, at least one groove 130 and at least one rib 131 opposite to the groove 130. The groove 130 and the rib 131 extend along the prevalent lengthwise direction of the wire "F", so that the groove 130 of a first winding of the spiral houses the rib 131 of a second winding of the spiral adjacent to the first winding. Therefore partial interpenetration ensues between subsequent windings of the spiral, which gives the spiral the final compact configuration of Figure 12.

Therefore, in a cross-section wire view, the wire "F" takes on a substantially "Y" shaped section in which the upper part of the "Y" is defined by the groove 130 whereas the leg of the "Y" defines the rib 131.

The present invention reaches the proposed object, overcoming the described disadvantages of the known art.

The particular structure of the head referred to in the present invention makes it suitable for the use of a spiral of cutting wire of the type shown in Figure 12. Since it is wound in a perpendicular plane to the axis of rotation of the head, such spiral requires for its housing in the head a space with a much smaller axial dimension which therefore allows the use of a head whose dimension along the axis of rotation can also be reduced below the dimension of the lowered heads of the known type.

In particular, what makes the head suitable for the use of the mentioned spiral of cutting wire is the provision of the presser elements and the possibility to move them towards each other so as to compress the spiral between them.

The cooperation of said two characteristics therefore solves the technical problem of being able to assemble on the head a larger amount of wire than the simple chunk of wire strictly necessary for a use cycle, therefore storing it within the

heads and, at the same time, reducing the dimensions of the head with respect to the known heads using rigid reels with the wire wound onto them.

Furthermore, the structure of the presser elements that support the spiral along its whole radial extension prevents the spiral, during rotation and in the event of shocks, even violent ones, from losing its planarity and causing the unwinding of the coils with their dispersion within the head.

The invention as described is applicable both to heads with manual reintegration of the wire and heads with automatic reintegration (tap-and-go).

Claims

- 1). Head for hedge trimmer, comprising an external casing (2, 102) intended to rotate around a respective axis of rotation (X) and equipped with at least one lateral exit hole (4, 104) for a cutting wire (F), said external casing (2, 102) internally defining a housing for the storage of a part of the cutting wire (F) so that an end portion (E) of said wire (F) exits from the casing (2, 102) through said lateral hole (4, 104); characterised in that it comprises, inside said housing, a pair of presser elements (5, 6, 105, 106) facing each other and defining between them an annular shaped housing (7, 107) to contain said part of the cutting wire (F), said presser elements (5, 6, 105, 106) being moveable towards each other along said axis of rotation (X) so as to compress between them said part of the cutting wire (F) stored between them.
- 2). Head according to claim 1, in which said housing (7, 107) extends around said axis of rotation (X) between a circumference of minimum diameter (d) and a circumference of maximum diameter (D) and in which each of said presser elements (5, 6, 105, 106) has at least one portion extending away from said axis of rotation (X) between said circumferences of minimum diameter (d) and maximum diameter (D) and provided to come into contact with said wire (F) stored in the housing (7, 107).
- 3). Head according to claim 1 or 2, in which each presser element (5, 6, 105, 106) has a full discoidal shape equipped with a central hole (5c, 6c, 105c, 106c) and having a first surface (5a, 6a, 105a, 106a), facing the other presser element (5, 6, 105, 106), resting in a perpendicular plane to said axis of rotation (X).
- 4). Head according to any of the previous claims, in which said presser elements (5, 6, 105, 106) are conformed so as to contain, inside said housing (7, 107) formed between them, a cutting wire (F) arranged to strike against said presser

elements (5, 6, 105, 106) and configured according to a spiral winding with coils all resting on the same perpendicular plane to the axis of rotation (X).

5 5). Head according to any of the previous claims, also comprising clamping means (3, 15; 116) provided to generate movement towards each other between said presser elements (5, 6, 105, 106) so as to clamp between said presser elements (5, 6, 105, 106) said part of the cutting wire (F) stored between them.

10 6). Head according to claim 5, in which said external casing (2) is defined by a pair of semi-shells (2a, 2b) joinable through movement towards each other along said axis of rotation (X) in which each semi-shell (2a, 2b) has a central thrust portion (8) abutable onto a corresponding presser element (5, 6), said clamping means (3, 15) comprising a threaded connection (3, 15) acting between said semi-shells (2a, 2b) to clamp said semi-shells (2a, 2b) to each other in a packaged configuration in which said semi-shells (2a, 2b) keep said presser elements (5, 6) close to each other.

15 7). Head according to claim 6, in which said central thrust portion (8) comprises at least one circular rib (9, 10) arranged around the axis of rotation (X) and in which each semi-shell (2a, 2b) also has a plurality of radial ribs (11) extending from the circular rib (9) away from the axis of rotation (X), and adapted to exert pressure on the corresponding presser element (5, 6).

20 8). Head according to claim 5, in which said external casing (102) is defined by a pair of semi-shells (102a, 102b) joinable through movement towards each other along said axis of rotation (X) and in which said clamping means (116) comprise a compression spring (116) arranged between a first of said semi-shells (102a) and a first of said presser elements (105) so as to keep said presser element (105) pressed towards the second presser element (106); the second semi-shell (102b) 25 having a peripheral portion (102b') to be permanently associated with the first

semi-shell (102a) and a central portion (102b''), slidable with respect to the peripheral portion (102b') along said axis of rotation (X) and acting on the second presser element (106) to move said presser elements (105, 106) towards the first semi-shell (102a) against the thrust action exerted by said spring (116).

5 9). Head according to claim 8, also comprising a pair of auxiliary discs (120, 121), each abutable resting against a surface (105b, 106a) of a respective presser element (105, 106) facing the opposite side with respect to said housing (107), in which said compression spring (116) is interposed between the first semi-shell (102a) and a respective first auxiliary disc (120) and in which each auxiliary disc
10 (120, 121) has a plurality of projections (125, 127) facing the corresponding semi-shell (102a, 102b) and engageable within respective seatings (126, 128) obtained in the respective semi-shell (102a, 102b) to make each auxiliary disc (120, 121) and the respective semi-shell (102a, 102b) integral between each other.

10. Head according to claim 9, in which said seatings (126, 128) of semi-shells
15 (102a, 102b) have a slot shape for a predetermined angular extension around the axis (X) so as to allow a predetermined angular movement of each auxiliary disc (120, 121) with respect to the respective semi-shell (102a, 102b) around the axis of rotation (X).

11). Head according to claim 9 or 10, in which said auxiliary discs (120, 121) are
20 rotationally integral between each other around the axis of rotation (X).

12). Head according to claim 11, in which the first of said auxiliary discs (102a) has a central sleeve portion (122) arranged along the axis of rotation (X) and slidably inserted, through a grooved coupling, within a corresponding central hole (123) in the second auxiliary disc (102b).

25 13). Head according to any of claims 9 to 12, in which the projections (125) of a first of said auxiliary discs (120) are disengaged from the seatings (126) of the

respective first semi-shell (102a) when the projections (127) of the second auxiliary disc (121) are engageable within the seatings (128) of the respective second semi-shell (102b), said projections (125, 127) being engageable and disengageable in/from said respective seatings (126, 128) through translation of
5 said auxiliary discs (120, 121) along the axis of rotation (X).

14). Head according to claim 6 or 8, in which said semi-shells (2a, 2b, 102a, 102b) are rotationally integral between each other around the axis of rotation (X).

15). Head according to any of claims 1 to 3, in which each presser element (5, 6, 105, 106) has, on its own closest portion to the axis of rotation (X) and facing the
10 other presser element (5, 6, 105, 106), a plurality of areas (18, 118) of increased adherence so as to increase a gripping action exerted by the presser element (5, 6, 105, 106) on said part of the cutting wire (F) contained in said housing (7, 107).

16). Head according to claim 15, in which said areas (18, 118) of increased adherence comprise a plurality of locally deformed areas of said presser element
15 (5, 6, 105, 106), said areas (18, 118) locally deformed defining sharp edges extending along the axis of rotation (X) towards the other presser element (5, 6, 105, 106).

17). Head according to claim 15 or 16, in which said areas (18) of increased adherence are angularly distributed around the axis of rotation (X).

20 18). Head according to any of the previous claims, also comprising a spiral of cutting wire (F) arranged in said housing (7, 107) striking against said presser elements (5, 6, 105, 106).

19). Head according to claim 18, in which said spiral of cutting wire (F) is wound onto, and resting in, a perpendicular plane to said axis of rotation (X).

20). Head according to claim 18 or 19, in which said spiral of cutting wire (F) has a central opening (A) for inserting a part of said casing (2, 102) intended for coupling with a head (1, 101) movement pin (3, 103).

21) Head according to any of claims 18 to 20, in which said cutting wire (F) has, on one of its lateral surfaces, at least one groove (130) and at least one rib (131) opposite the groove (130), said groove (130) and rib (131) extending along a mainly lengthwise direction of the wire (F), so that the groove (130) of a first winding of said spiral houses the rib (131) of a second winding adjacent to the first winding.

22). Head according to claim 20, in which said groove (130) and said rib (131) of the wire wound in a spiral shape rest on the same perpendicular plane to said axis of rotation (X).

23). Head according to any of claims 17 to 22, in which said cutting wire (F) has a cross section substantially conformed in a "Y" shape.

24). Head according to any of the previous claims, characterised in that it does not comprise a skein of cutting wire pre-wound onto a rigid reel of a fixed shape.

25). Head according to claim 1, in which said external casing is defined by a pair of semi-shells (2a, 2b) joinable through movement towards each other along said axis of rotation (X), said clamping means (3, 15) comprising a threaded connection (3, 15) acting between said semi-shells (2a, 2b) to clamp said semi-shells (2a, 2b) to each other in a packaged configuration.

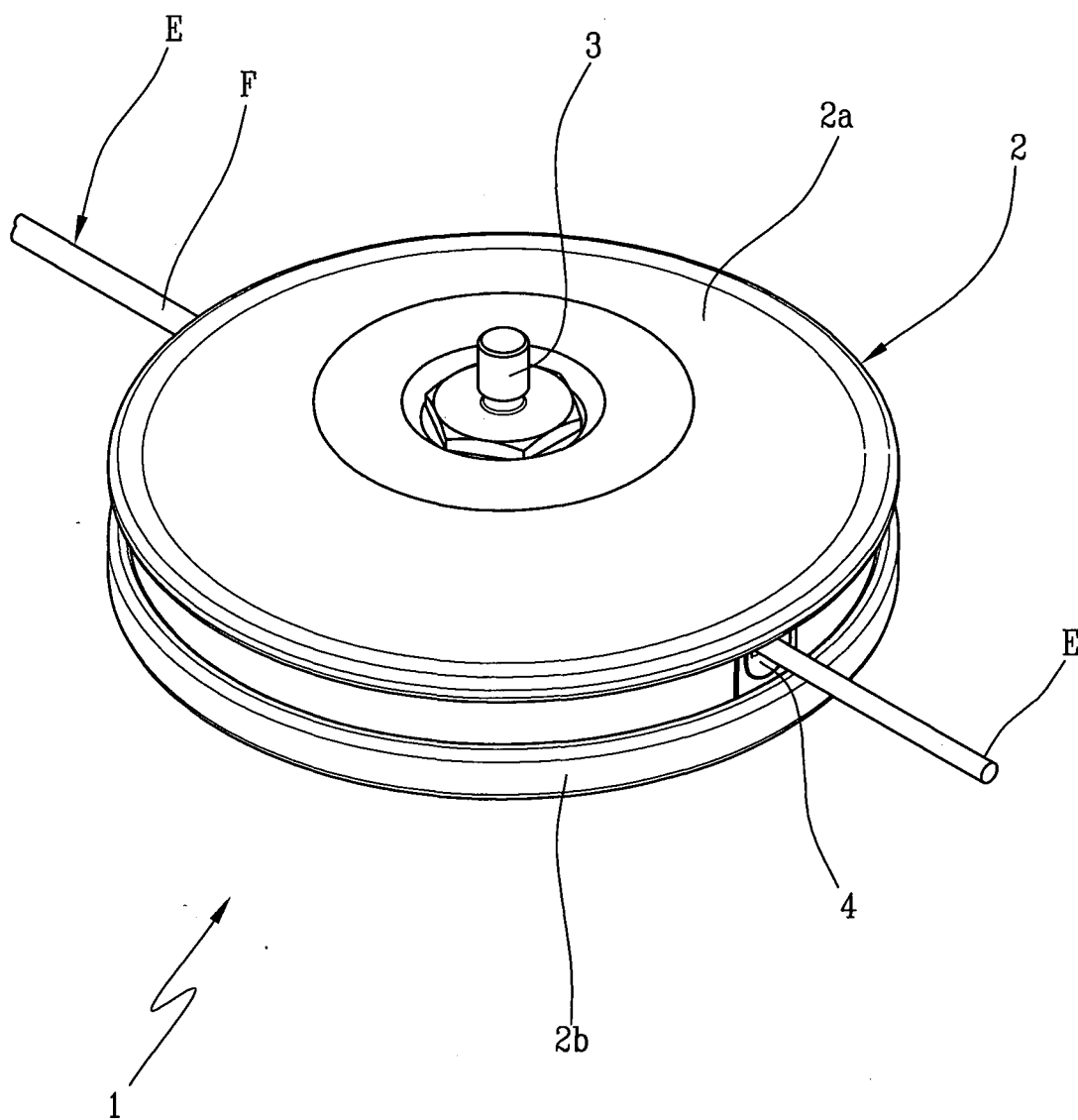
26). Head according to claim 25 characterised in that at least one of the presser elements (5, 6, 105, 106) is defined by a semi-shell (2a, 2b).

27). Head according to claim 25 characterised in that said pair of presser elements (5, 6, 105, 106) is defined by said pair of semi-shells (2a, 2b); said head also comprising a third presser element (20) interposed between said semi-shells (2a,

2b) to define, at least between one of said semi-shells (2a, 2b) and said third presser element (20), a said annular shaped housing (7, 107) to contain said part of the cutting wire (F) and preferably to define, between said third presser element (20) and each semi-shell (2a, 2b), a respective annular shaped housing (7, 107) to
5 contain a part of a respective cut (F).

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FIG.1



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FIG.2

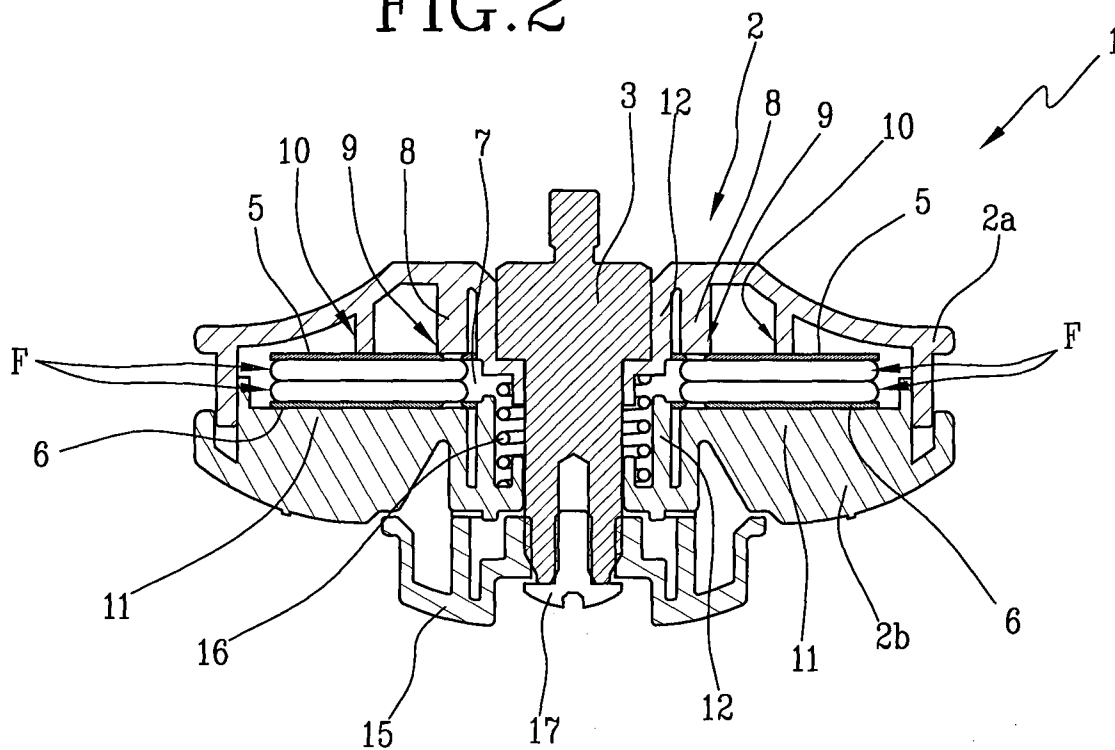


FIG.3

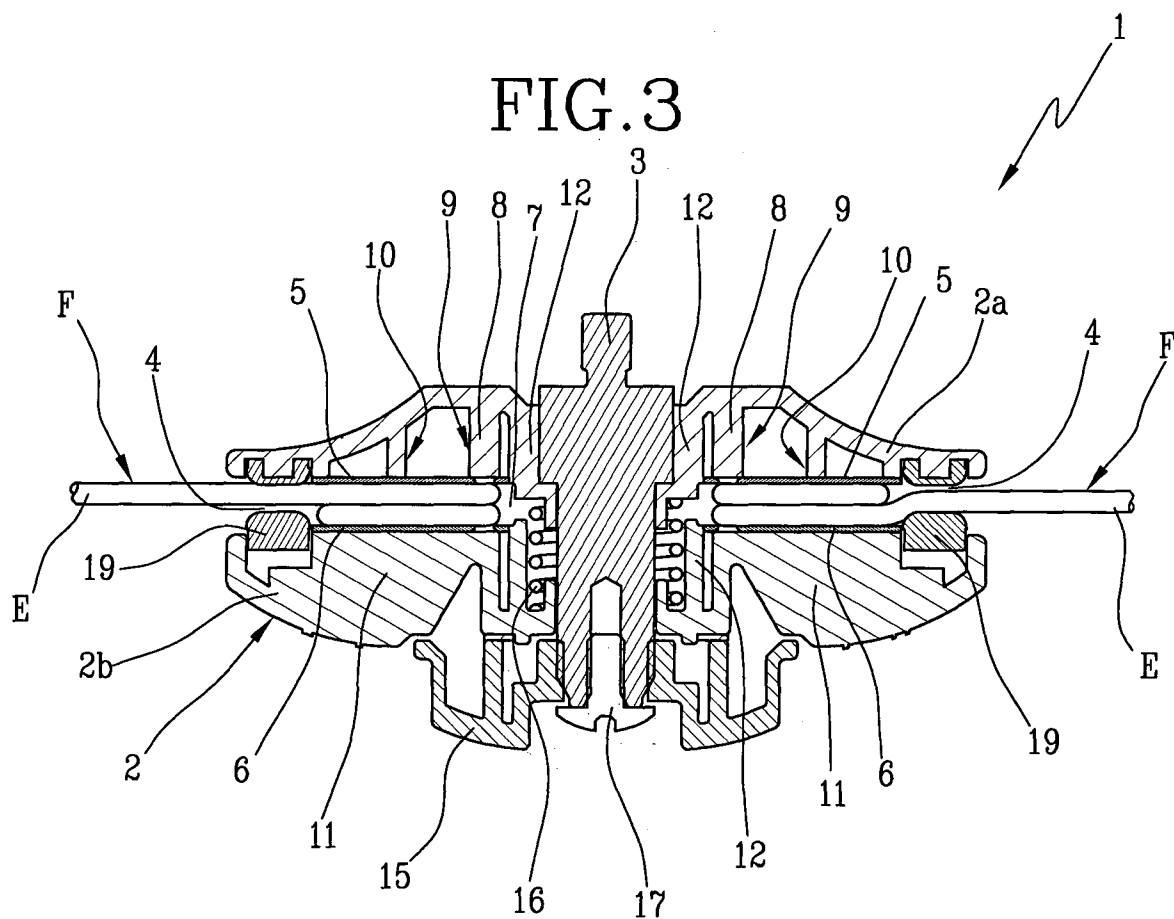


FIG.4

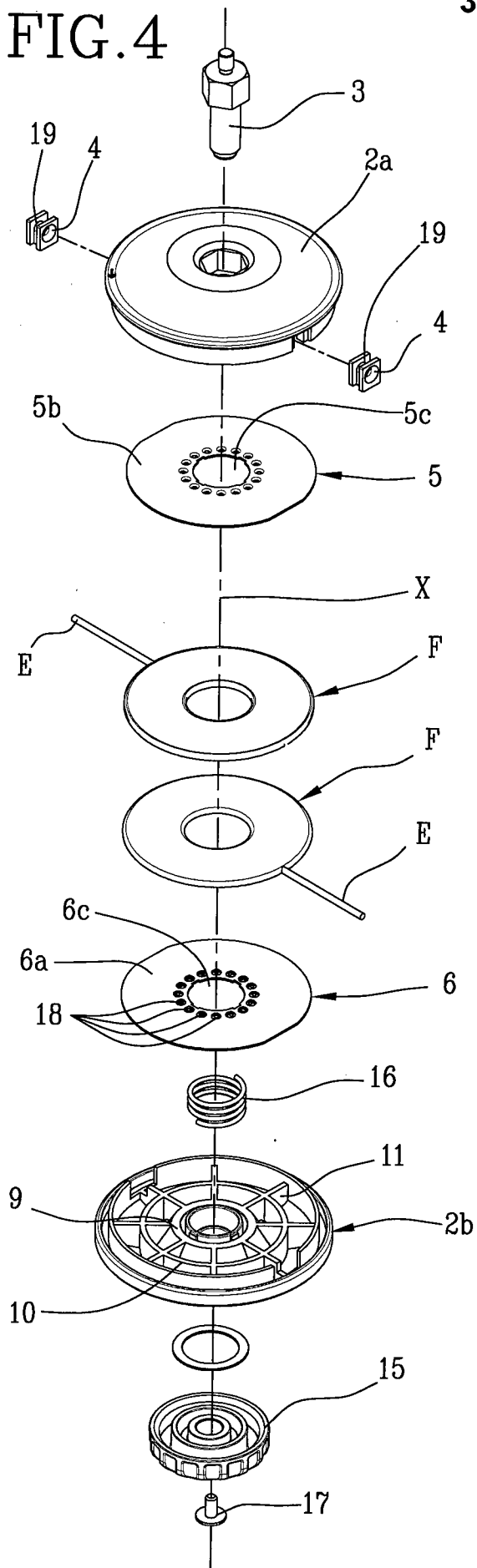


FIG.5

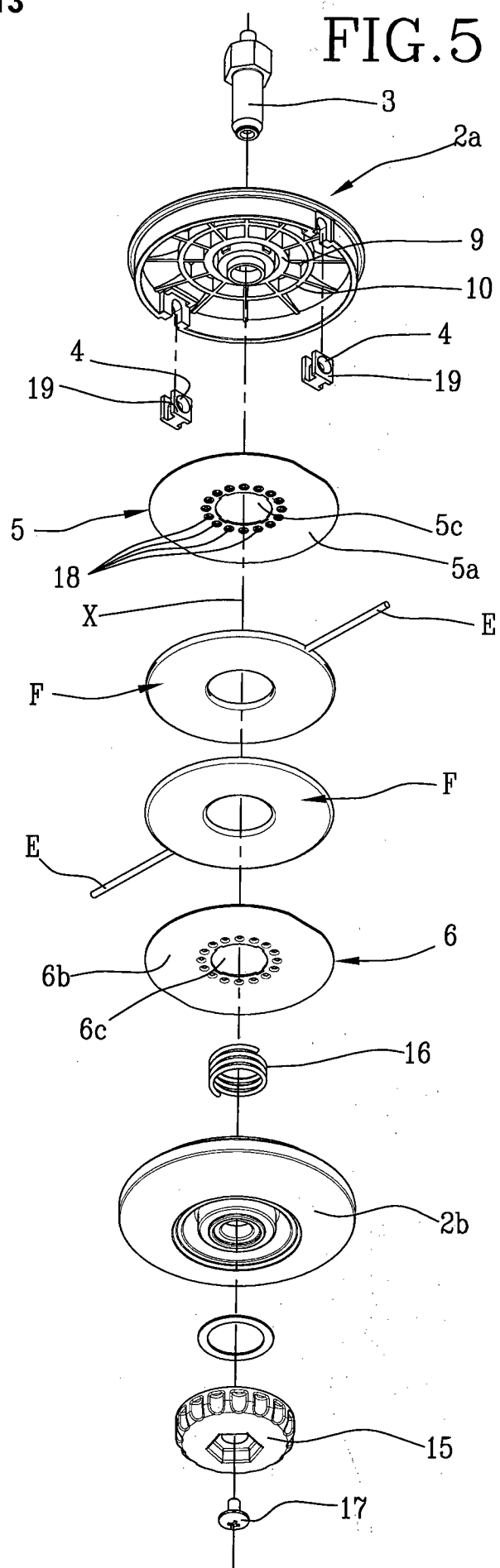


FIG. 6

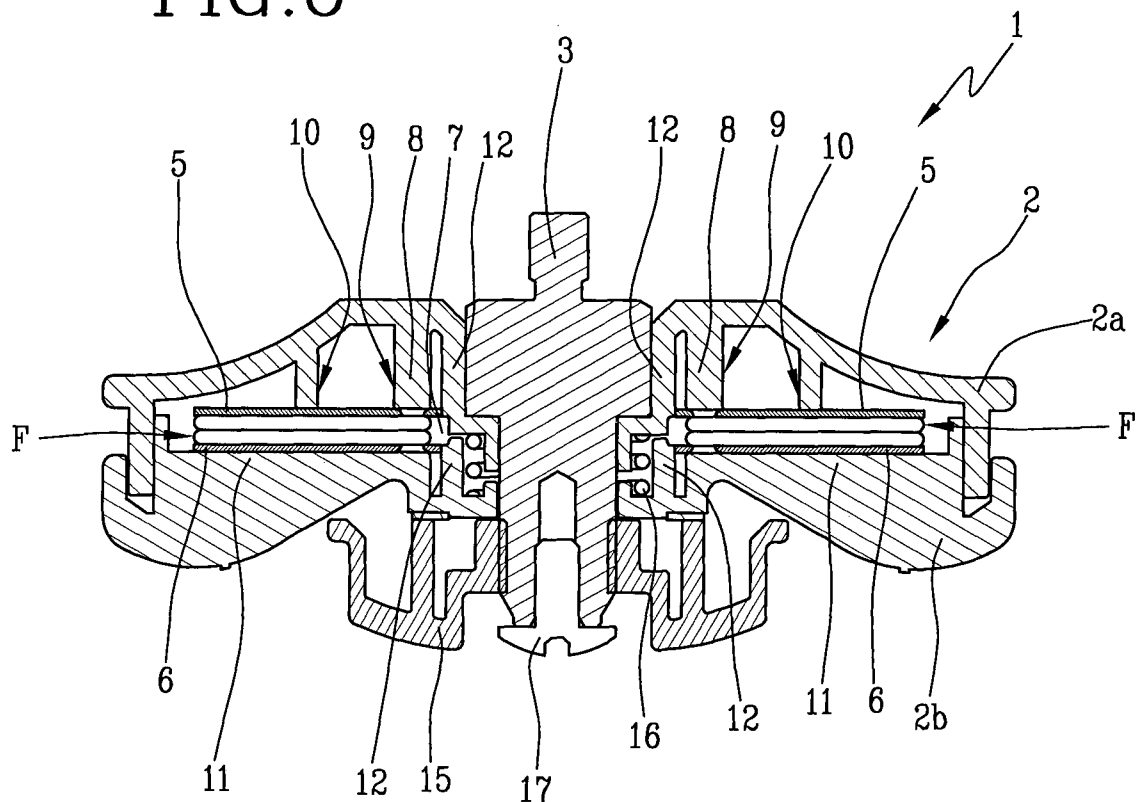
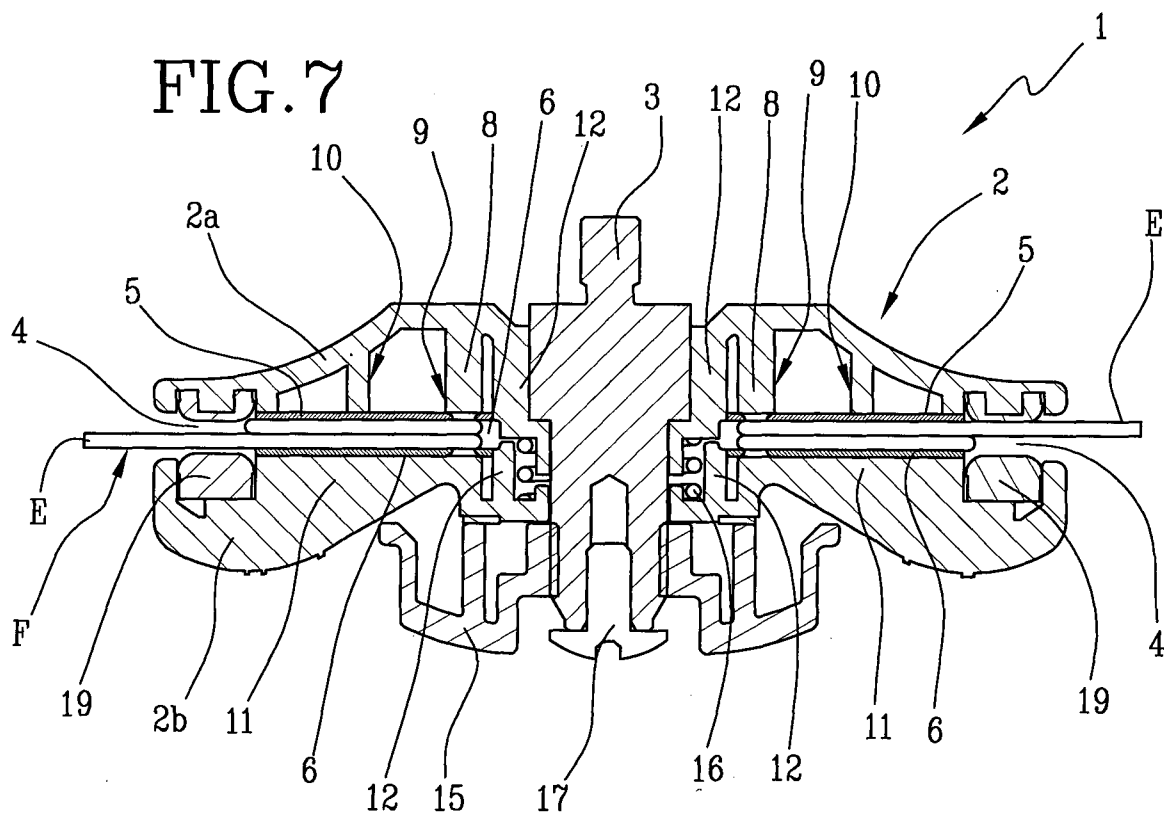


FIG. 7



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FIG.8

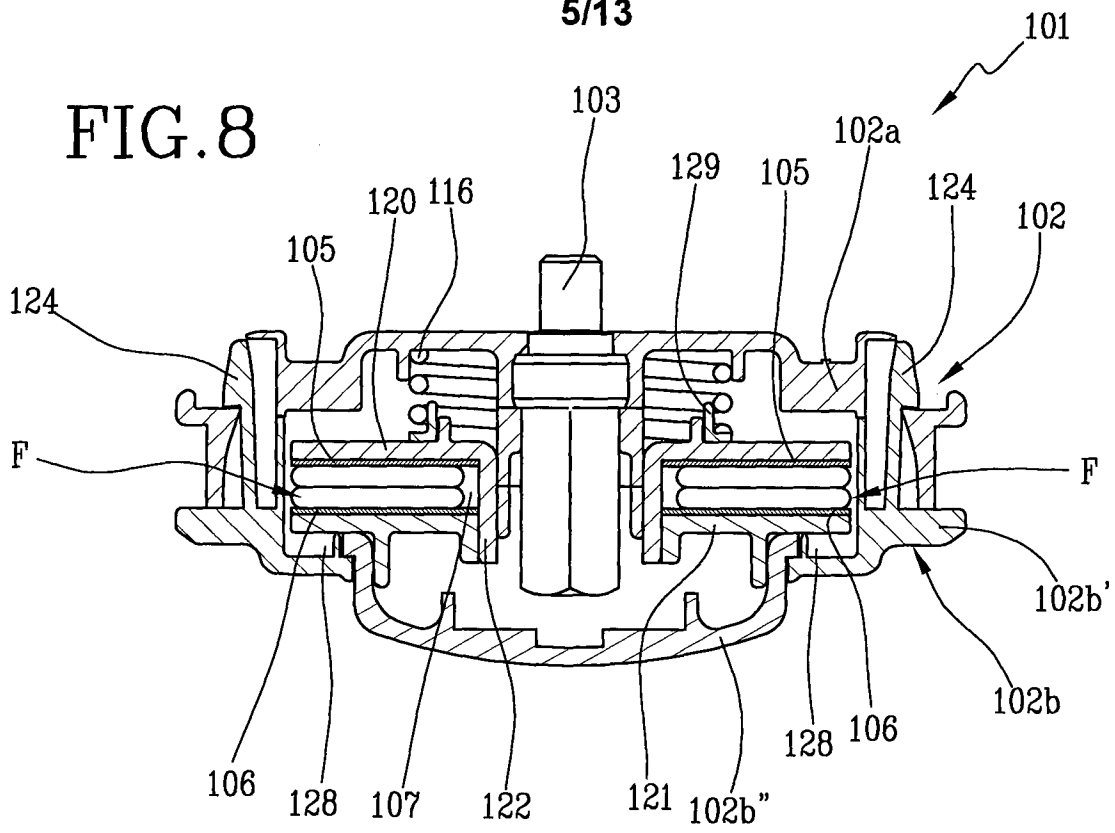
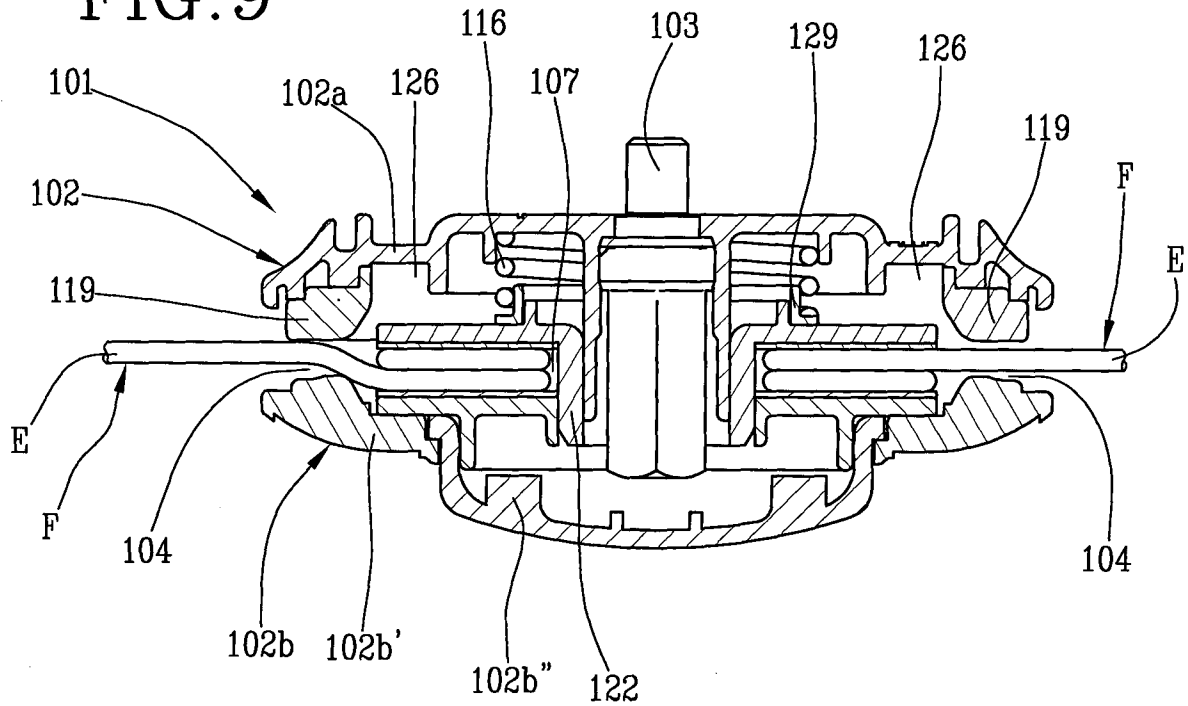


FIG.9



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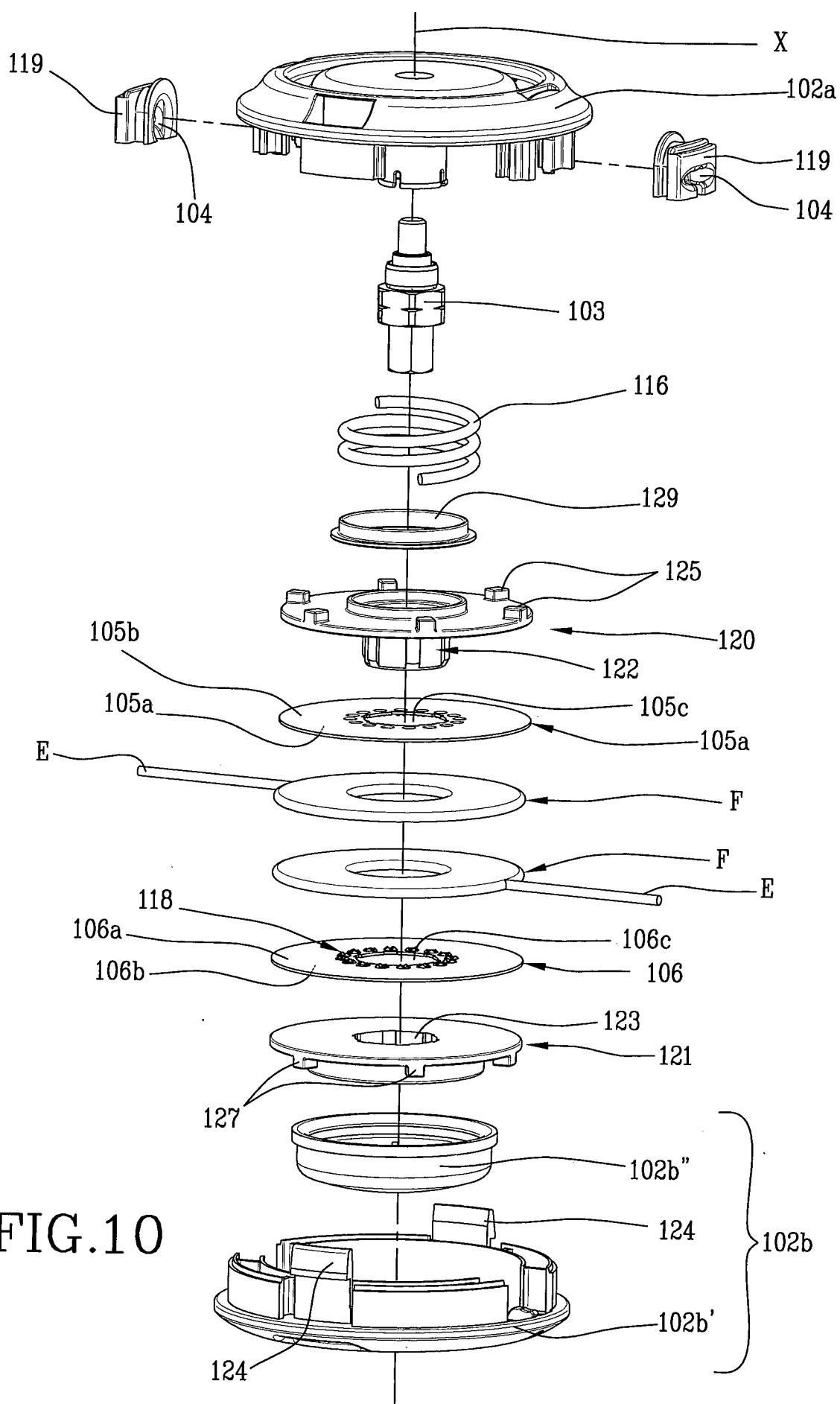
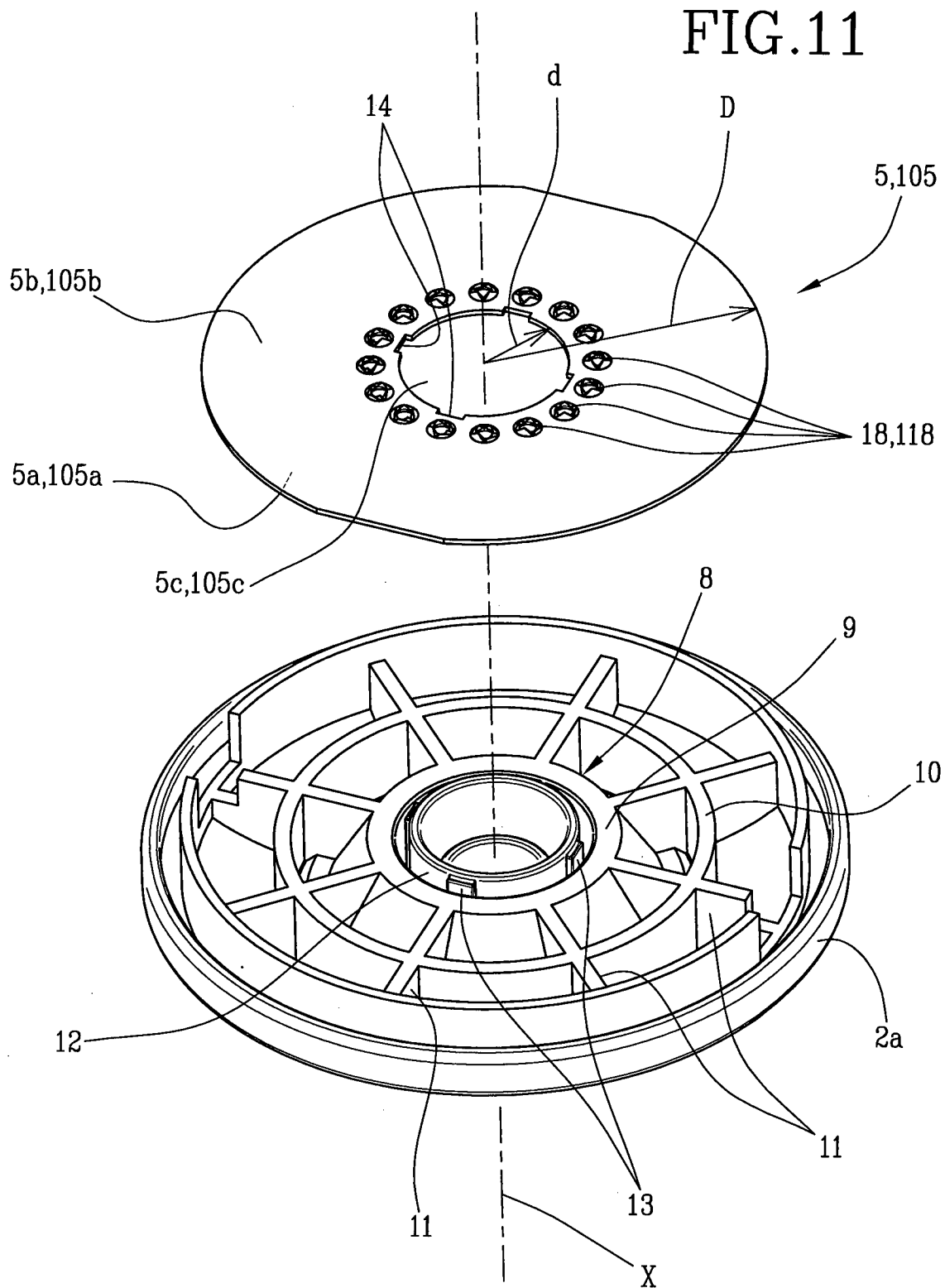


FIG.10

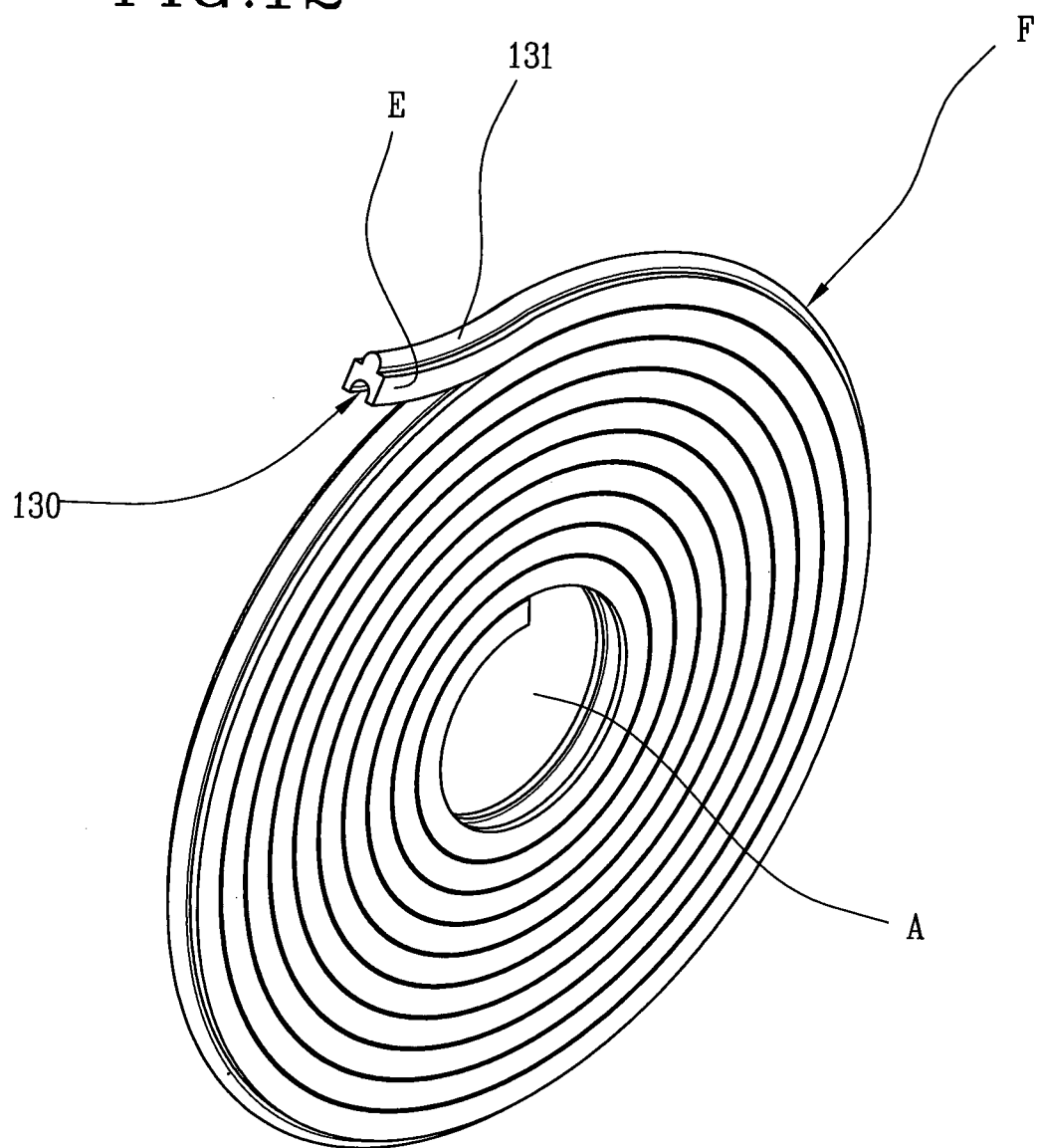
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FIG.11



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FIG.12



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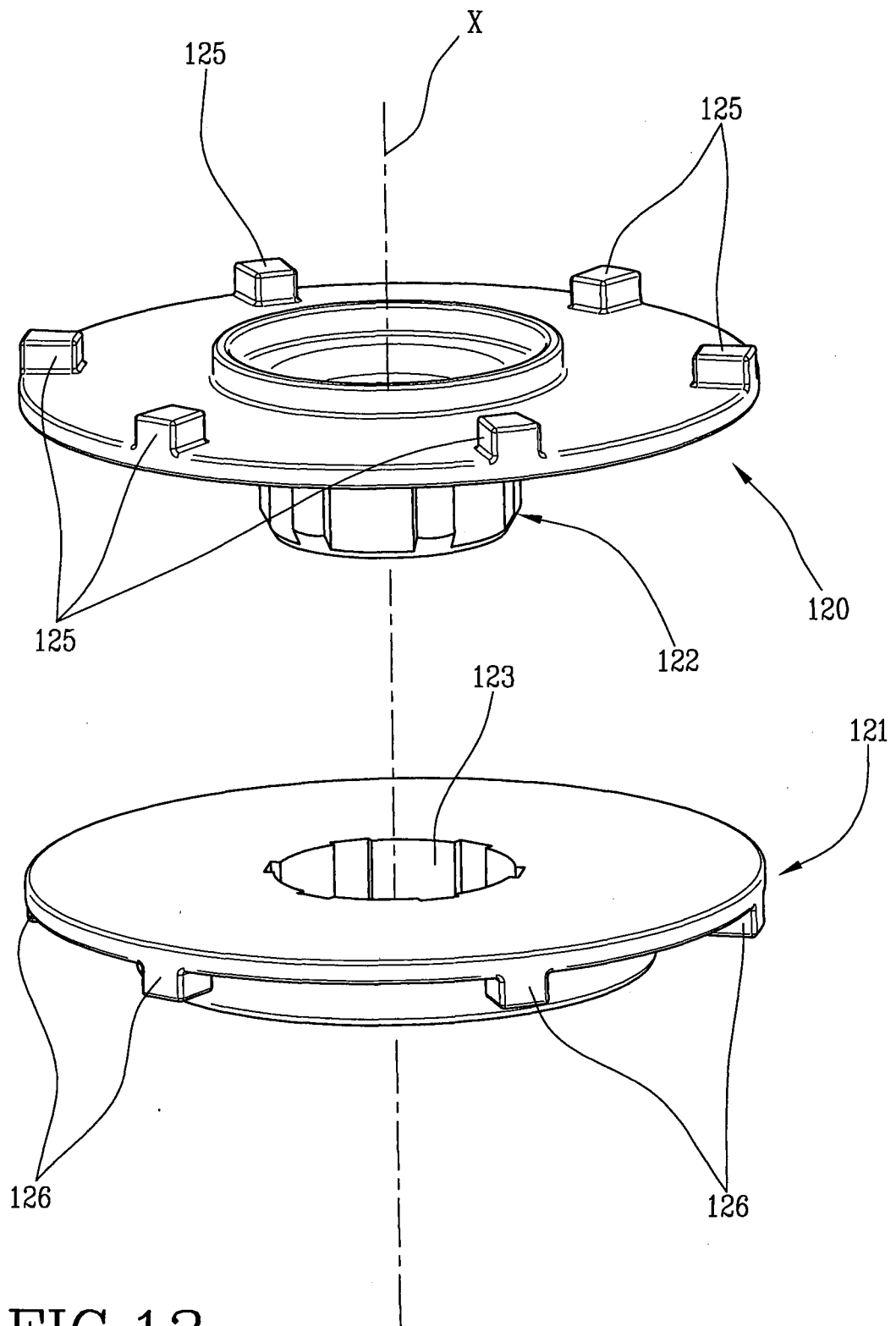


FIG.13

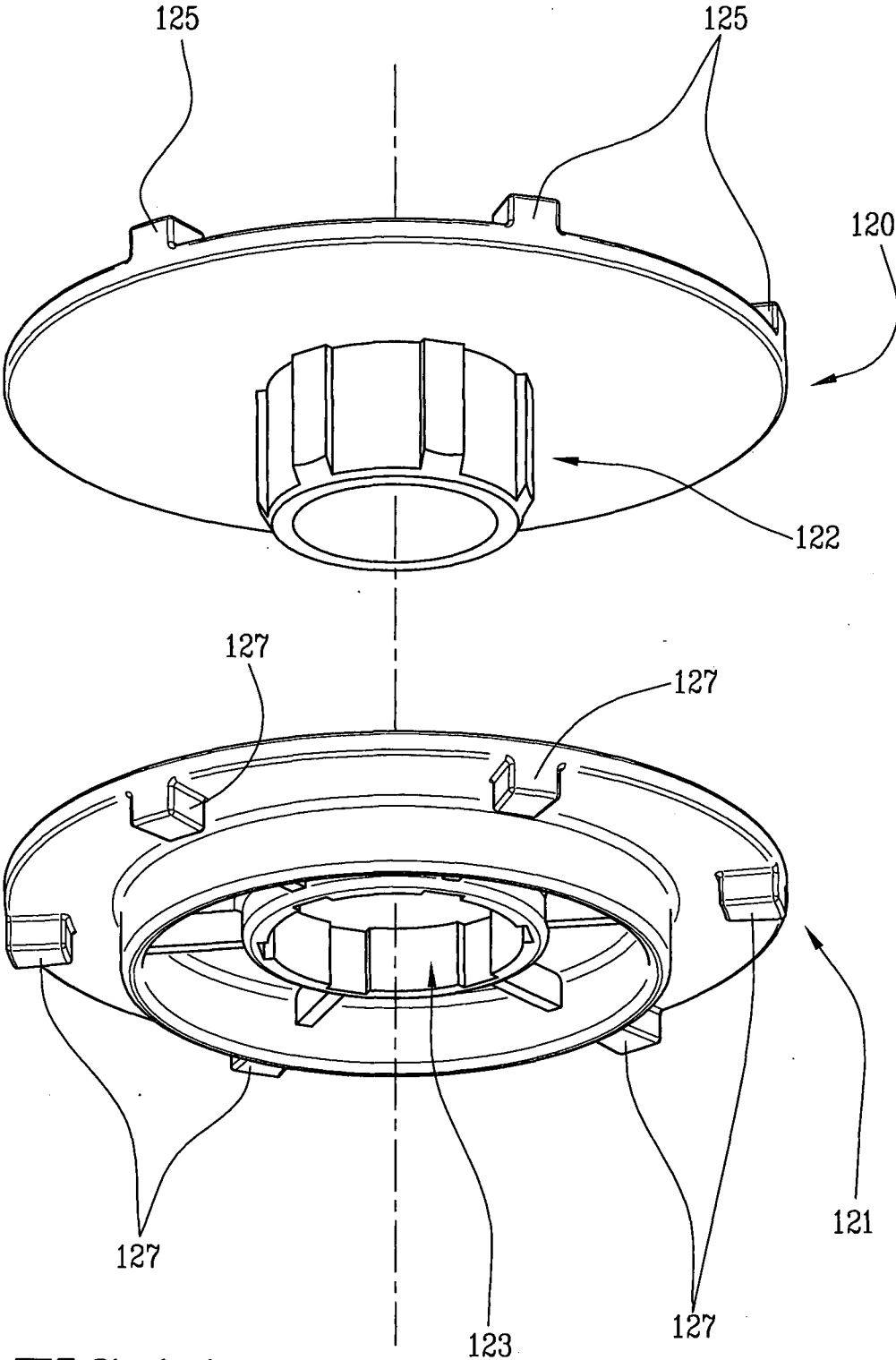


FIG.14

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FIG.15

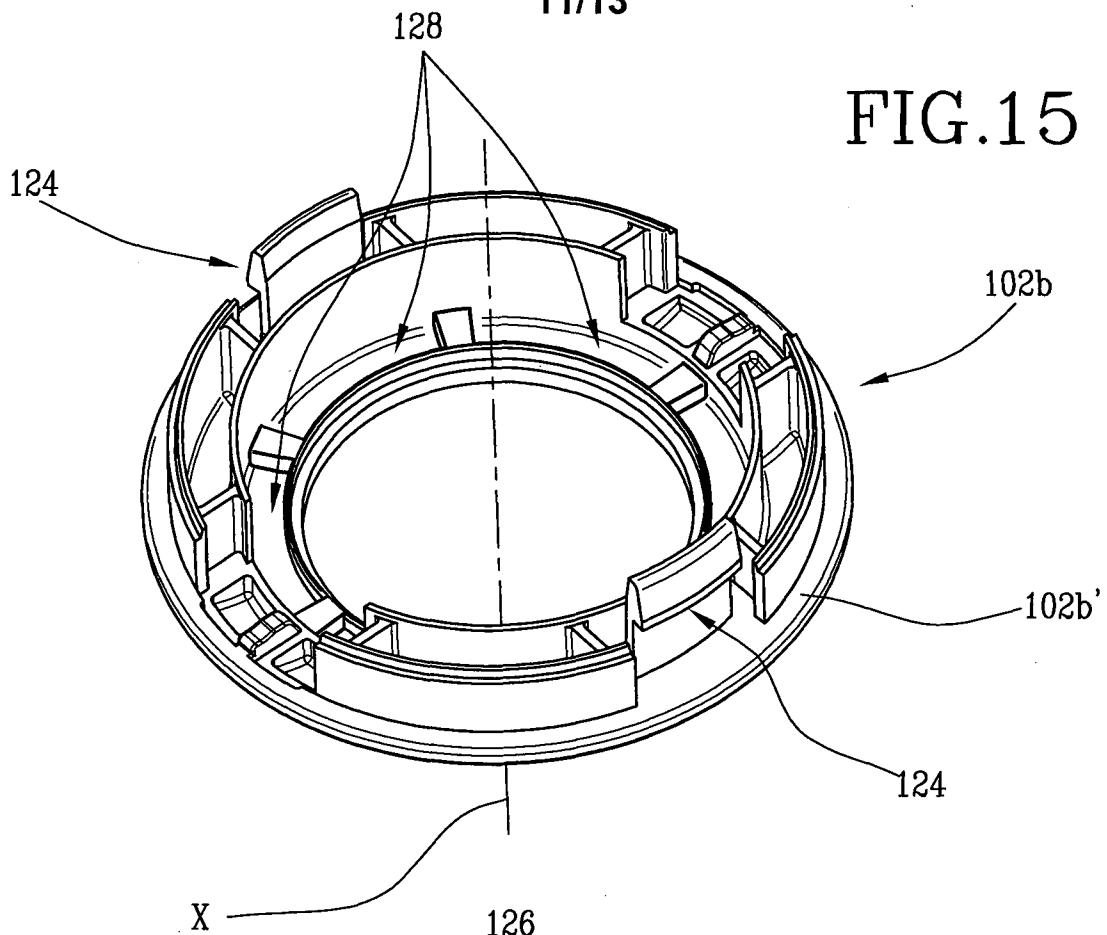


FIG.16

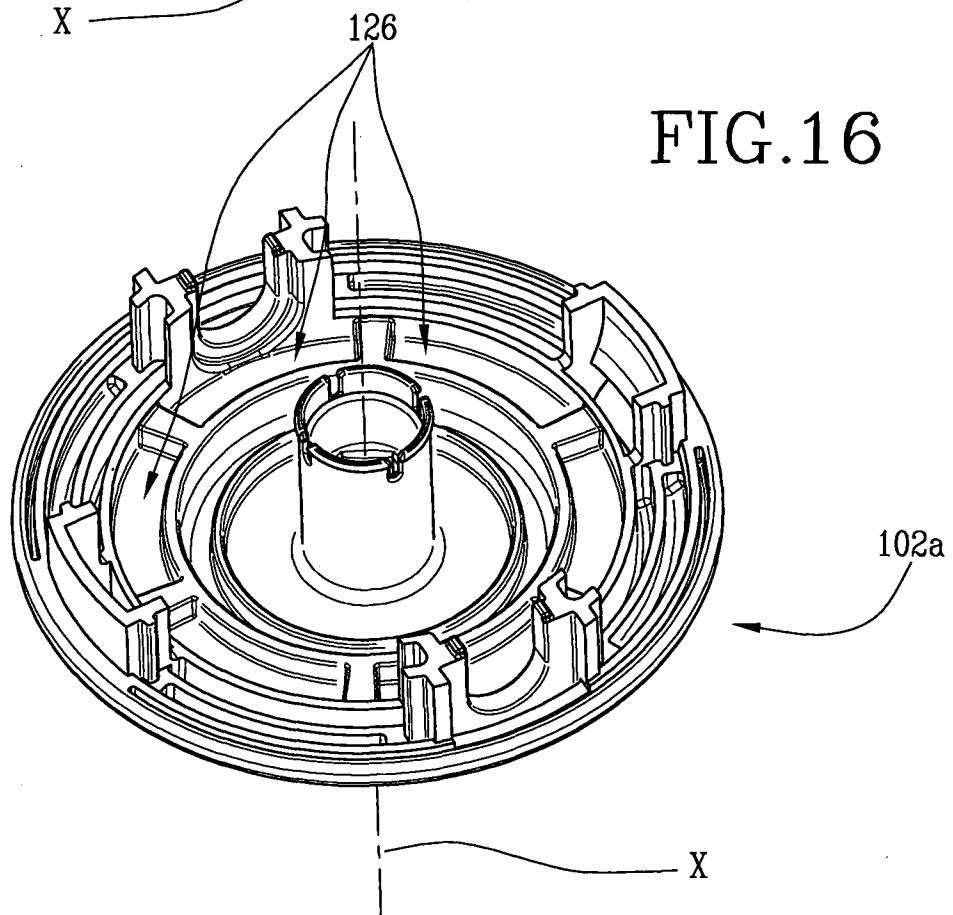


FIG.17

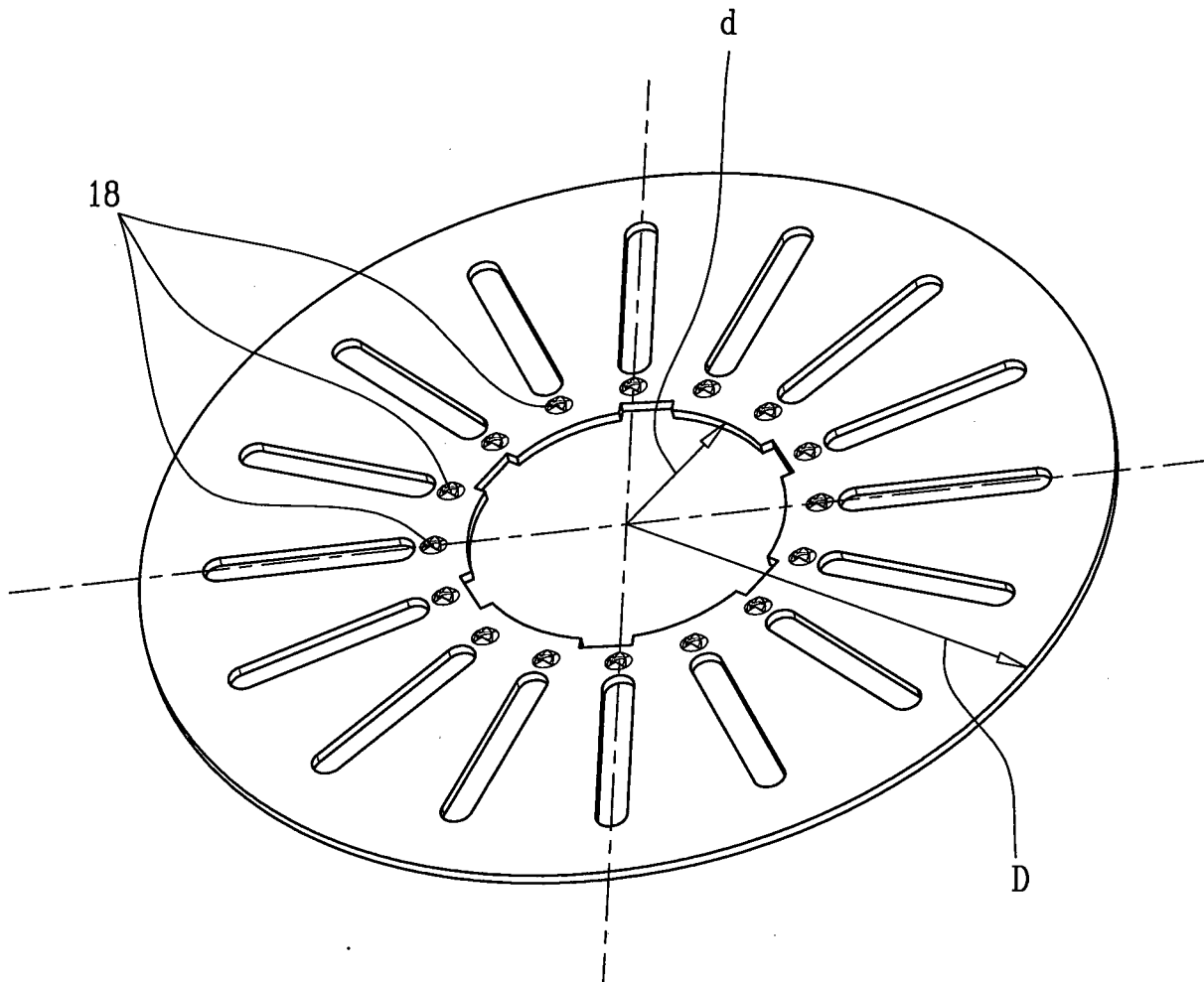
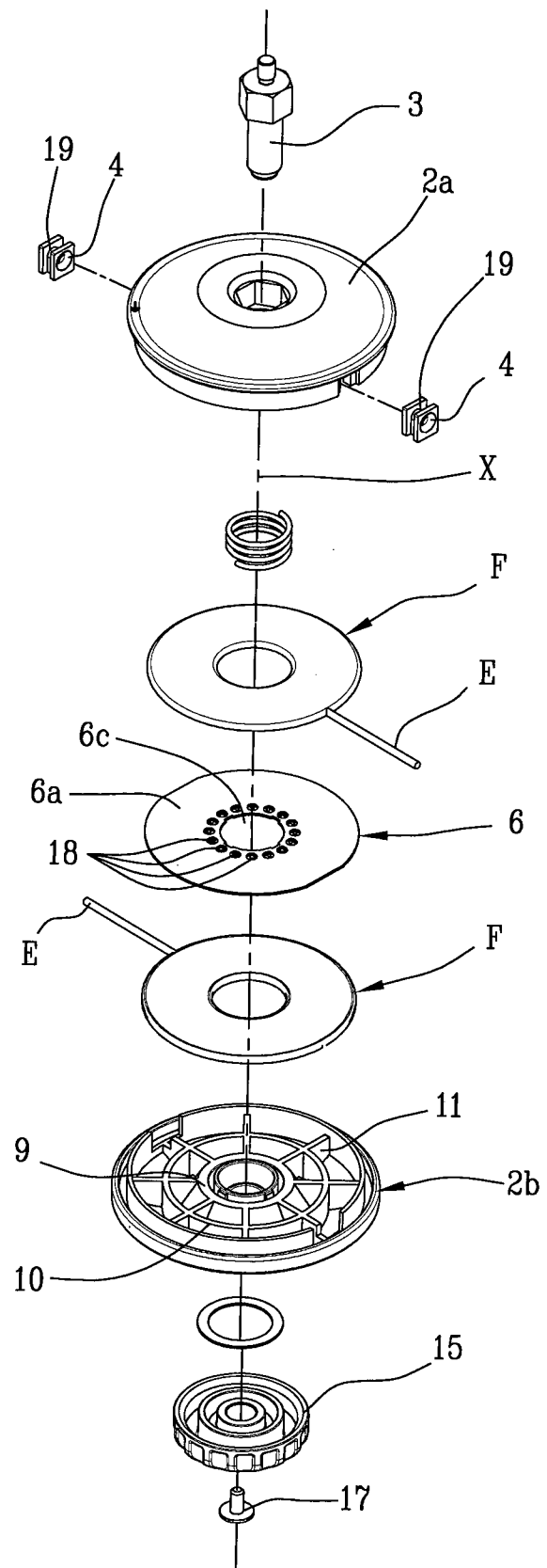
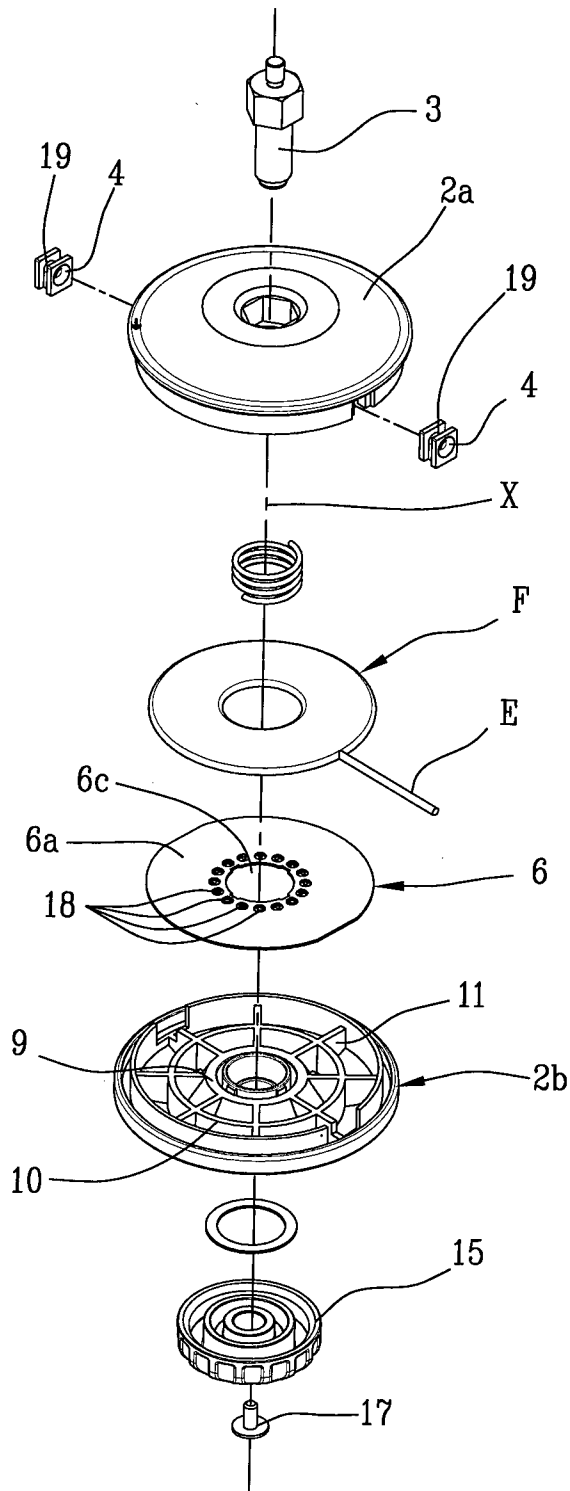


FIG.19

FIG.18



INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2012/000161

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01D34/416
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	EP 2 517 547 A1 (STARTING IND [JP]) 31 October 2012 (2012-10-31) column 5, line 15 - column 6, line 30; figures	1-7, 18-20, 24-27
X	US 4 024 635 A (MIZUNO HITOSHI ET AL) 24 May 1977 (1977-05-24) column 1, line 40 - column 2, line 46 column 3, line 18 - column 4, line 10 column 5, lines 3-30; figures 1,2,3,4,9,10	1-5, 18-20, 24-26 21-23 6-17,27
X	US 4 137 694 A (HOPPER GENE A) 6 February 1979 (1979-02-06) column 4, line 6 - column 5, line 65; figures 2,3	1-5, 18-20, 24-26 21-23 6-17,27
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

14 February 2013

Date of mailing of the international search report

22/02/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Schlichting, N

INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2012/000161

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2012/000161

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			EP	2454929 A1		23-05-2012
			FR	2967548 A1		25-05-2012
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