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

(11) **EP 3 421 140 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
20.11.2019 Bulletin 2019/47

(21) Application number: **18175932.5**

(22) Date of filing: **05.06.2018**

(51) Int Cl.:
B05B 12/00 *(2018.01)* ***G01L 19/00*** *(2006.01)*
B05B 15/63 *(2018.01)* ***B05B 7/02*** *(2006.01)*
B05B 7/12 *(2006.01)* ***G01L 9/06*** *(2006.01)*
B05B 7/24 *(2006.01)*

(54) **MANUALLY-OPERATED PAINT SPRAY GUN**

HANDBEDIENTE FARBSPRITZPISTOLE

PISTOLET DE PULVÉRISATION DE PEINTURE À COMMANDE MANUELLE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **28.06.2017 IT 201700072417**

(43) Date of publication of application:
02.01.2019 Bulletin 2019/01

(73) Proprietor: **Anest Iwata Strategic Center S.r.l.**
21010 Cardano al Campo (VA) (IT)

(72) Inventors:
- **NEGRI, Marco**
  22072 Cermenate (CO) (IT)
- **DE GREGORI, Roberto**
  21020 Mornago (VA) (IT)

(74) Representative: **Buzzi, Franco**
Buzzi, Notaro & Antonielli d'Oulx
Corso Vittorio Emanuele II, 6
10123 Torino (IT)

(56) References cited:
EP-A1- 1 247 586
EP-A1- 1 477 232
EP-A1- 1 618 963
EP-A2- 2 427 275
WO-A1-2014/006593
WO-A2-2012/126963
US-A1- 2010 163 649

EP 3 421 140 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the invention

[0001] The present invention generally regards manually operated paint spray guns, comprising a body having a nozzle for atomising paint to be sprayed and a handle forming a handgrip and provided with a connector for the inflow of compressed air to be supplied to the atomiser nozzle. The handle is typically provided with a compressed air regulator associated to which is a pressure gauge or pressure sensor for measuring the set pressure.

[0002] In particular, the invention regards manually-operated paint spray guns thus made, wherein the pressure gauge is of the digital type and has at least one part that can be separated from the gun so as to enable the removal thereof when the latter is subjected to periodical cleaning and washing operations using solvents.

State of the art

[0003] Documents EP-1247586 and WO-2014/006593 describe manually-operated paint spray guns of the aforementioned type in which the entire handle with the pressure gauge, of the analogue or digital type, can be separated from the body of the gun.

[0004] In the case of documents EP-1477232 and EP-2918347, the pressure gauge is applied in a separable manner to the base of the handle, at the connector for the inflow of the compressed air.

[0005] In particular EP-1477232 describes a spray gun provided with a module that can be removed from the handle carrying the digital pressure gauge. This removable module consists of a body which forms the terminal part of the gun handle, i.e. the portion in which there is provided for the inflow connector for connecting the gun to a compressed air supply duct. Furthermore, also the compressed air duct connected to the tubular connector is part of the removable module which, thus, must be further provided with a fitting coupling portion with a gasket relative to the part of the duct provided in the gun handle. This solution does not allow a comfortable and easy removal of the module containing the pressure gauge, and the gun cannot be used without such module.

[0006] Even in the case of document EP-1277519, the pressure gauge is screwed into an enlarged front/lower portion of the handle, and according to document EP-2427275 the pressure gauge is applied in a removable fashion to a rear support plate of the gun body.

[0007] According to document EP-0526525, the pressure gauge is connected in a demountable fashion to the gun body by means of a threaded or bayonet coupling, and in the case of documents EP-1375013 and EP-1715957, the pressure gauge can be applied as a *retrofit* to the gun body or beneath the handle thereof.

[0008] All these prior art solutions are relatively complex and, in some cases, they negatively affect the manual grip on the gun to the detriment of the handling thereof when painting.

Summary of the invention

[0009] The object of the present invention is to provide a manually-operated paint spray gun of the type defined at the introduction in which the pressure gauge, of digital type, is configured in a manner such not to alter the configuration of the handle both from an ergonomic point of view and from an aesthetic point of view, and that is also fully or partly easy and quick to disassemble and reassemble.

[0010] According to the invention, this object is primarily attained due to the fact that the at least one separable part of the pressure gauge is arranged in a removable portion of the handle which forms a substantial part of the dorsal area of the handgrip and is separated from the compressed air inflow connector.

[0011] The term "substantial portion of the dorsal area of the handgrip" is used to indicate, in the description and in the claims that follow, an integral part of the handgrip having shape and dimensions such to adhere, in use, substantially to the entire palm of the hand of the user and whose absence would make it complicated, if not impossible, to grasp the gun in a normal manner for actuation thereof.

[0012] Thanks to this characteristic, the gun according to the invention is capable of enabling a comfortable and easy removal of the pressure gauge to enable the periodical washing of the entire gun, handle included. A further advantageous aspect of the invention lies in the fact that the removal of the removable portion of the handle does not jeopardise the operation of the gun in that, given that the inflow connector is integrally joined to the gun and it is thus independent from the removable portion, the gun could operate even without such portion which could be replaced, for example, by a special insert.

[0013] Such removable portion of the handle preferably consists of a module configured to enable connection and disconnection relative to the handle through an angular motion. A mechanical locking obtained by means of forced coupling surfaces between the module and the handle, as well as possible magnetic locking between the module and the handle, is conveniently associated to this angular motion.

[0014] According to a further distinctive characteristic of the invention, provided for is a safety stop for the aforementioned removable portion of the handle, the stop being activated by the compressed air supplied to the handle through the relative inflow connector. Such stop conveniently consists in at least one sliding pin, displaceable with respect to the aforementioned module between an inoperative retracted position, in the absence of compressed air in the handle, and an operative extracted position, in the presence of compressed air in the handle, in which it is engaged in a seat of such handle so as to lock and thus hinder the angular motion of the module.

[0015] In a first embodiment of the invention, the digital

pressure gauge consists of an electronic transducer with a pressure indicator entirely housed in said removable portion of the handle, and it is thus entirely removable from the gun.

[0016] In a second embodiment of the invention, the digital pressure gauge comprises a pressure sensor conveniently of the piezoresistive type housed in the handle, and a pressure indicator housed in said removable portion of the handle and that can be electrically connected with said pressure sensor when said removable portion is applied to the handle.

Brief description of the drawings

[0017] The invention will now be described in detail with reference to the attached drawings, provided purely by way of non-limiting example, wherein:

- figure 1 is a schematic perspective view of a manually-operated paint spray gun according to an embodiment of the invention, wherein the handle is represented with the relative pressure gauge applied to the handle,
- figure 2 is a lateral elevational view of figure 1,
- figure 3 is a view analogous to figure 1 which shows an intermediate step during the removal of the pressure gauge,
- figure 4 is a view analogous to figures 1 and 3 with the pressure gauge removed from the handle,
- figure 5 shows - in larger scale - the detail indicated by the arrow V in figure 2,
- figure 6 is an exploded perspective view of the module carrying the pressure gauge,
- figure 7 is an exploded perspective view of the module of figure 6, seen from another angle,
- figure 8 is a front elevational and partly sectional view of the module of figure 6,
- figure 9 is a lateral elevational and partly sectional view of the module of figure 6,
- figure 10 is a partly vertical sectional view of a variant of the gun according to the invention,
- figure 11 is a perspective view, analogous to figure 4, of the variant of the gun according to figure 10,
- figure 12 shows an enlarged and exploded detail of figure 11,
- figure 13 is an exploded perspective view of the module of the variant of figure 10, and
- figure 14 is an exploded perspective view of the module of figure 12, seen from another angle.

Detailed description of the invention

[0018] Initially referring to figures 1 and 2, a manually-operated paint spray gun according to the invention essentially comprises a body 1 and a handgrip 2 for handling the gun.

[0019] In an entirely conventional fashion, the body 1 can be provided with an inlet 3 for the removable application of a container, not illustrated, containing the paint to be sprayed which - in the operation - is supplied to an atomiser nozzle 4 to which there are operatively associated, in an equally known manner, a first and a second manual regulator 5, 6 and a trigger 7.

[0020] The handle 2 is provided - at the bottom part - with a tubular inflow connector 8 for connecting the gun to a flexible compressed air supply pipe, in a known manner too. Such inflow connector is permanently integrally joined to the base of the handle 2.

[0021] A manually actuatable pressure regulator for regulating the pressure of the air which, coming from the connector 8, is supplied to the body 1 and then dispensed, by actuating the trigger 7, to the atomiser nozzle 4, is indicated with 9.

[0022] The amount of air pressure established through the regulator 9 is detected by a digital pressure gauge consisting of an electronic pressure transducer in this case, schematically indicated with 11 in figures 8 and 9 with the relative electronic circuit 12 power-supplied by a battery 13. The value of the detected pressure is shown on a display 10, typically of the liquid crystals type, operatively connected to the transducer 11 and exposed and thus visible on one side of the handle 2.

[0023] The entire pressure gauge is arranged in a removable portion or module (15) of the handle (2) forming an integral part of the handgrip 14. The term "integral part" is used to indicate that the removable portion 15 of the handle 2 in which the pressure gauge is arranged neither modifies nor alters the handgrip 14 from a functional, ergonomic and aesthetic point of view.

[0024] According to the peculiar characteristic of the invention, the removable portion or module 15 forms a substantial part of the dorsal area of the handgrip 14 and it is separated from the compressed air inflow connector 8.

[0025] As previously mentioned, the term "substantial portion of the dorsal area of the handgrip" is used to indicate that the removable portion 15 of the handgrip 2 has shape and dimensions such to entirely adhere to the palm of the hand of the user and whose absence would make it complicated, if not impossible, to grasp the gun in a normal manner for actuation thereof. In the case of the illustrated example, the removable portion 15 extends almost over the entire length of the handle 2 and over most part of the width thereof.

[0026] In detail, such removable portion of the handle 2 consists in a module 15, better exemplified in figures 6 and 7, formed by a metallic outer body 16, typically aluminium, like the body 1 and the handle 2 of the gun, and by an inner body 17, for example made of plastic material, housed in the outer body 16 and containing the transducer 11 with the relative electronic circuit 12, the display 10 and the battery 13 which, as indicated in figure 6, is in turn carried by a removable lid 18.

[0027] As mentioned, the module 15 is a substantial part of the dorsal area of the handgrip 14 and it is inserted

in a manner such to enable rapid connection and disconnection at a recess 20 of the handgrip 2. The application and removal of the module 15 relatively to the recess 20 occur through an angular motion exemplified in figure 3. To this end, the outer body 16 of the module 15 is formed with a pair of end appendages 19 of which at least the lower one has a shaped surface that is complementary to that of an end surface 21 of the recess 20 to obtain a slightly forced coupling between the module 15 and the handle 2. Removing the pressure gauge requires rotating the module 15 by a few degrees as shown in the figure 3, so as to disengage the surfaces 19 and 21 and thus enable the removal of the module 15 from the recess 20, as shown in figure 4.

[0028] In the condition of the module 15 inserted into the handgrip 2, besides the mechanical restraint provided by the forced coupling surfaces 19 and 21, conveniently provided is an additional magnetic locking obtained through permanent magnets 22, 23 (figure 3) respectively carried by the appendages 19 of the outer body 16 and in the recess 20 of the handgrip 2.

[0029] According to the invention, also provided is a safety stop which hinders the removal of the module 15 in the presence of compressed air in the gun. Such safety stop consists in at least one locking pin 24, shown in figures 6 and 9, carried by a plunger 25 (figures 8 and 9) moveable in a chamber 26 (figure 9) of the inner body 17 of the module 15. The chamber 26 is placed in communication, through a passage 27 and an inlet 28 (figures 8 and 9), with an outlet hole 29 (figure 4) of the handle 14 placed in communication with the compressed air inflow connector 8. When the module 15 is applied to the handle 2 (figures 1 and 2) and the gun is supplied with compressed air, the locking pin 24 pushed by the plunger 25 is engaged in a hole 30 of the recess 20, placed in communication with the inflow connector 8. Thus, the rotation of the module 15 is hindered and can be carried out, as described previously, only in the absence of pressurised air in the gun.

[0030] Through the outlet hole 29, the transducer 11 directly measures the compressed air pressure supplied to the gun through the inflow connector 8, and the measured value is shown on the display 10.

[0031] In light of the above, it is clear that the spray painting gun according to the invention enables a comfortable and easy removal of the pressure gauge to enable the periodical washing of the gun using solvents, thus ensuring an equally easy re-installation of the pressure gauge. In the installed condition, the arrangement of the pressure gauge, or the module 15 that contains it, is such that the configuration of the handgrip 14 and the gun is not altered or modified in any manner whatsoever from a functional, ergonomic and aesthetic point of view. The removal of the module 15 from the handle, for example to enable washing the gun using solvents, does not jeopardise the operation thereof in that - as explained - the compressed air inflow connector 8 is integrally joined to the gun and thus independent from the removable portion thereof. Thus, the gun could operate even without such portion which could be replaced, for example, by a special insert.

[0032] In the embodiment described above, as mentioned, the digital pressure gauge 11-10 is entirely contained in the removable portion or module 15. Alternatively, and according to the variant which will be described now with reference to figures 10-14 (in which parts identical or similar to those described previously are indicated using the same reference numbers) the digital pressure gauge can only be partly contained in the module 15.

[0033] More in particular, in this variant the digital pressure gauge consists of a pressure sensor conveniently of the piezoresistive type 30 housed in the handgrip 14 of the handle 2 and operatively associated to a pressure indicator or display 31 housed in the module 15, analogous to the one described with reference to the previous embodiment, and visible from outside the handle 2. The display 31 can be electrically connected with the pressure sensor 30, when the module 15 is applied to the handle 2, through a unit equipped with electrical connectors 32. As observable in figure 10, the pressure sensor 30 is directly faced to a duct 33 formed along the handle 2 and power-supplied by the compressed air inflow connector 8. When the module 15 is detached from the handle 2, the pressure sensor 30 can be in turn removed, if need be.

[0034] Obviously, the construction details and the embodiments may widely vary with respect to what has been described and illustrated, without departing from the scope of protection of the present invention as defined in the claims that follow.

Claims

1. Manually-operated paint spray gun comprising a body (1) having a nozzle (4) for atomising paint to be sprayed and a handle (2) forming a handgrip (14) and provided with a connector (8) for the inflow of compressed air to be supplied to said atomiser nozzle (4), wherein the handle (2) is provided with a compressed air regulator (9) to which a digital pressure gauge is operatively connected, at least one part of which is separable from the gun, wherein said at least one separable part of the pressure gauge is arranged in a removable portion (15) of the handle (2) forming a substantial part of the dorsal area of the handgrip (14), **characterised in that** said at least one separable part of the pressure gauge is separated from said inflow connector (8).

2. Spray gun according to claim 1, **characterised in that** said removable portion consists of a module (15) configured to be connected and disconnected relative to the handle (2) by means of an angular motion.

3. Spray gun according to claim 2, **characterised in**

that associated to said angular motion is a mechanical locking obtained by means of complementary forced-coupling surfaces (19, 21) between said module (15) and said handle (2).

4. Spray gun according to claim 2 or claim 3, **characterised in that** associated to said angular motion is a magnetic locking (22, 23) between said module (15) and said handle (2).

5. Spray gun according to one or more of claims 2 to 4, **characterised in that** it includes a safety stop (24) for said module (15) relative to the handle (2), activated by the compressed air supplied to the gun through said inflow connector (8).

6. Spray gun according to claim 5, **characterised in that** said stop consists of at least one sliding pin (24) displaceable with respect to said module (15) between an inoperative retracted position, in the absence of compressed air in the handle (2), and an operative extracted position, in the presence of compressed air in the handle (2), in which it is engaged into a hole (30) of said handle (2) so as to hinder the angular motion of the module (15).

7. Spray gun according to claim 6, **characterised in that** said at least one sliding pin (24) is carried by a plunger (25) movable in a chamber (26) placed in communication with said connector (8) for the inflow of the compressed air into the applied condition of said module (15) to the gun handle (2).

8. Spray gun according to claim 1, **characterised in that** the digital pressure gauge consists of a pressure transducer (11, 12) with an indicator (10) entirely housed in said removable portion (15) of the handle (2) associated thereto.

9. Spray gun according to claim 1, **characterised in that** the digital pressure gauge comprises a piezoresistive pressure sensor (30) housed in the handle (2) and a pressure indicator (31) housed in said removable portion (15) of the handle (2) and which can be electrically connected with said pressure sensor (30) when said removable portion (15) is applied to the handle (2).

Patentansprüche

1. Handbediente Farbspritzpistole, umfassend einen Körper (1) mit einer Düse (4) zum Zerstäuben von zu spritzender Farbe, und einem Griff (2), der einen Handgriff (14) bildet und mit einem Anschluss (8) für den Zufluss von der Zerstäuberdüse (4) zuzuführender Druckluft versehen ist, wobei der Griff (2) mit einem Druckluftregler (9) versehen ist, mit dem ein digitaler Druckmesser funktionsfähig verbunden ist, wobei mindestens ein Teil dessen von der Pistole trennbar ist, wobei der mindestens eine trennbare Teil des Druckmessers in einem abnehmbaren Abschnitt (15) des Griffs (2) angeordnet ist, der einen wesentlichen Teil des Dorsalbereiches des Handgriffs (14) bildet, **dadurch gekennzeichnet, dass** der mindestens eine trennbare Teil des Druckmessers von dem Zuflussanschluss (8) getrennt ist.

2. Spritzpistole nach Anspruch 1, **dadurch gekennzeichnet, dass** der abnehmbare Abschnitt aus einem Modul (15) besteht, das dazu ausgestaltet ist, durch eine Winkelbewegung relativ zum Griff (2) verbunden und getrennt zu werden.

3. Spritzpistole nach Anspruch 2, **dadurch gekennzeichnet, dass** die Winkelbewegung einer mechanischen Verriegelung, die durch komplementäre Zwangskupplungsflächen (19, 21) zwischen dem Modul (15) und dem Griff (2) erhalten wird, zugeordnet ist.

4. Spritzpistole nach Anspruch 2 oder Anspruch 3, **dadurch gekennzeichnet, dass** der Winkelbewegung eine magnetische Verriegelung (22, 23) zwischen dem Modul (15) und dem Griff (2) zugeordnet ist.

5. Spritzpistole nach einem oder mehreren der Ansprüche 2 bis 4, **dadurch gekennzeichnet, dass** sie einen Sicherheitsanschlag (24) für das Modul (15) relativ zu dem Griff (2) beinhaltet, der durch die Druckluft aktiviert wird, die der Pistole über den Zuflussanschluss (8) zugeführt wird.

6. Spritzpistole nach Anspruch 5, **dadurch gekennzeichnet, dass** der Anschlag aus mindestens einem Schiebestift (24) besteht, der in Bezug zu dem Modul (15) verschiebbar ist zwischen einer funktionsunfähigen eingefahrenen Position ohne Druckluft im Griff (2) und einer funktionsfähigen ausgefahrenen Position mit Druckluft im Griff (2), in der er in ein Loch (30) des Griffs (2) eingreift, um die Winkelbewegung des Moduls (15) zu behindern.

7. Spritzpistole nach Anspruch 6, **dadurch gekennzeichnet, dass** der mindestens eine Schiebestift (24) von einem Kolben (25) getragen wird, der in einer Kammer (26) beweglich ist, die in Verbindung mit dem Anschluss (8) gesetzt ist zum Zufluss der Druckluft in den Einsatzzustand des Moduls (15) an den Pistolengriff (2).

8. Spritzpistole nach Anspruch 1, **dadurch gekennzeichnet, dass** der digitale Druckmesser aus einem Druckwandler (11, 12) mit einer Anzeige (10), die vollständig in dem ihr zugeordnetem abnehmbaren Abschnitt (15) des Griffs (2) untergebracht ist, be-

steht.

9. Spritzpistole nach Anspruch 1, **dadurch gekennzeichnet, dass** der digitale Druckmesser einen piezoresistiven Drucksensor (30), der in dem Griff (2) untergebracht ist, und eine Druckanzeige (31) umfasst, die in dem abnehmbaren Abschnitt (15) des Griffs (2) untergebracht ist und die mit dem Drucksensor (30) elektrisch verbunden werden kann, wenn der abnehmbare Abschnitt (15) auf den Griff (2) aufgebracht wird.

Revendications

1. Pistolet à peinture actionné à la main comprenant un corps (1) ayant une buse (4) destinée à atomiser de la peinture à pulvériser et un manche (2) formant une poignée (14) et pourvu d'un raccord (8) pour l'arrivée d'air comprimé destiné à être amené à ladite buse (4) d'atomiseur, dans lequel le manche (2) est pourvu d'un régulateur d'air comprimé (9) auquel un manomètre numérique est raccordé de manière fonctionnelle, dont au moins une partie peut être séparée du pistolet, dans lequel ladite au moins une partie séparable du manomètre est agencée dans une partie amovible (15) du manche (2) formant une partie importante de la zone dorsale de la poignée (14), **caractérisé en ce que** ladite au moins une partie séparable du manomètre est séparée dudit raccord d'arrivée (8).

2. Pistolet à peinture selon la revendication 1, **caractérisé en ce que** ladite partie amovible est constituée d'un module (15) configuré pour être raccordé et détaché par rapport au manche (2) au moyen d'un mouvement angulaire.

3. Pistolet à peinture selon la revendication 2, **caractérisé en ce qu'**un verrouillage mécanique obtenu au moyen de surfaces de couplage forcé (19, 21) complémentaires entre ledit module (15) et ledit manche (2) est associé audit mouvement angulaire.

4. Pistolet à peinture selon la revendication 2 ou la revendication 3, **caractérisé en ce qu'**un verrouillage magnétique (22, 23) entre ledit module (15) et ledit manche (2) est associé audit mouvement angulaire.

5. Pistolet à peinture selon l'une ou plusieurs des revendications 2 à 4, **caractérisé en ce qu'**il comprend un arrêt de sécurité (24) pour ledit module (15) par rapport au manche (2), activé par l'air comprimé amené au pistolet par l'intermédiaire dudit raccord d'arrivée (8).

6. Pistolet à peinture selon la revendication 5, **caractérisé en ce que** ledit arrêt est constitué d'au moins une goupille coulissante (24) pouvant être déplacée par rapport audit module (15) entre une position rétractée inactive, en l'absence d'air comprimé dans le manche (2), et une position extraite active, en présence d'air comprimé dans le manche (2), dans lequel elle est engagée à l'intérieur d'un trou (30) dudit manche (2) de manière à empêcher le mouvement angulaire du module (15).

7. Pistolet à peinture selon la revendication 6, **caractérisé en ce que** ladite au moins une goupille coulissante (24) est portée par un piston (25) mobile dans une chambre (26) placée en communication avec ledit raccord (8) pour l'arrivée de l'air comprimé à l'intérieur de l'état appliqué dudit module (15) au pistolet à peinture (2).

8. Pistolet à peinture selon la revendication 1, **caractérisé en ce que** le manomètre numérique est constitué d'un transducteur de pression (11, 12) avec un indicateur (10) entièrement logé dans ladite partie amovible (15) du manche (2) associée à celui-ci.

9. Pistolet à peinture selon la revendication 1, **caractérisé en ce que** le manomètre numérique comprend un capteur de pression (30) piézorésistif logé dans le manche (2) et un indicateur de pression (31) logé dans ladite partie amovible (15) du manche (2) et qui peut être connecté électriquement audit capteur de pression (30) lorsque ladite partie amovible (15) est appliquée au manche (2).

FIG. 1

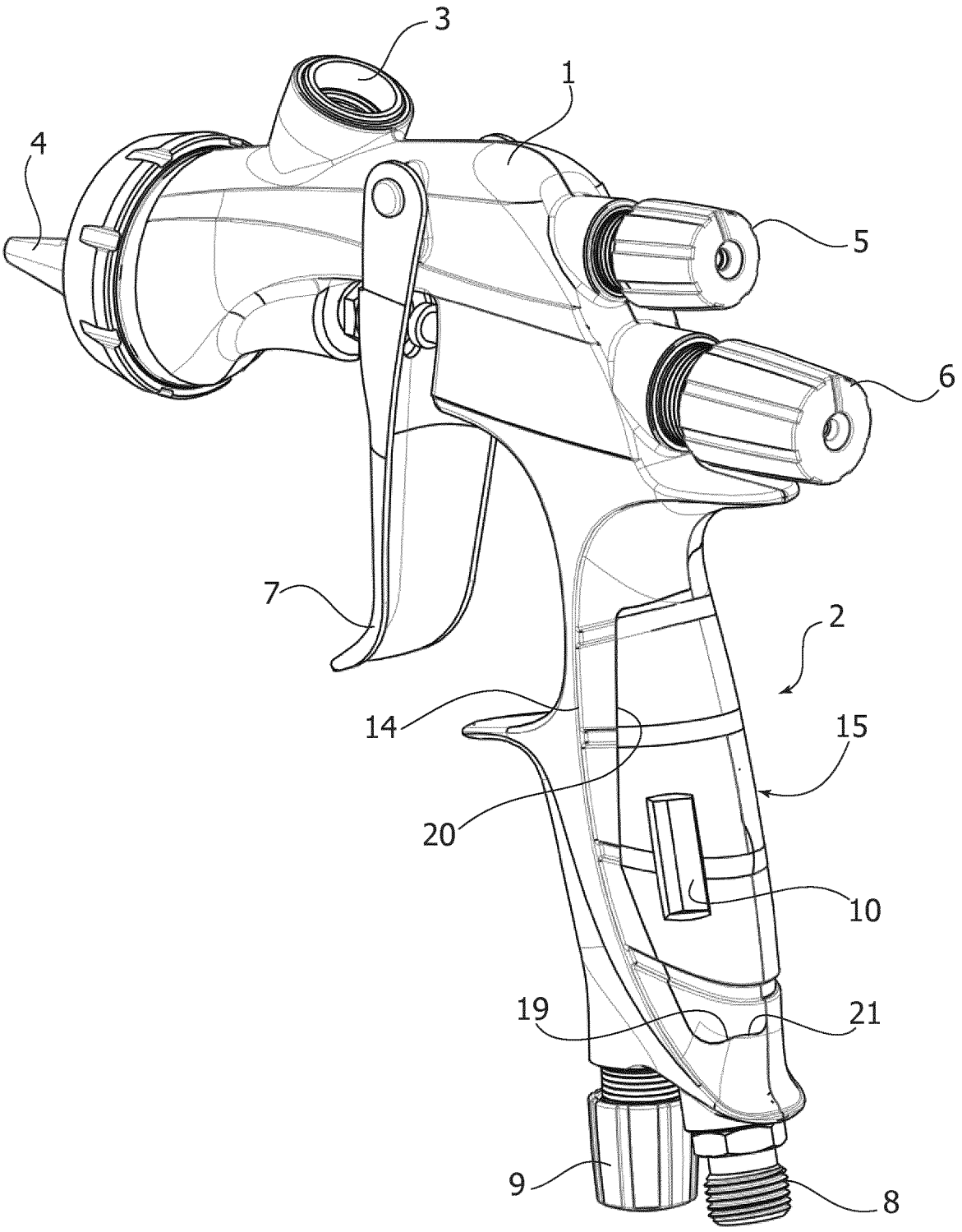


FIG. 2

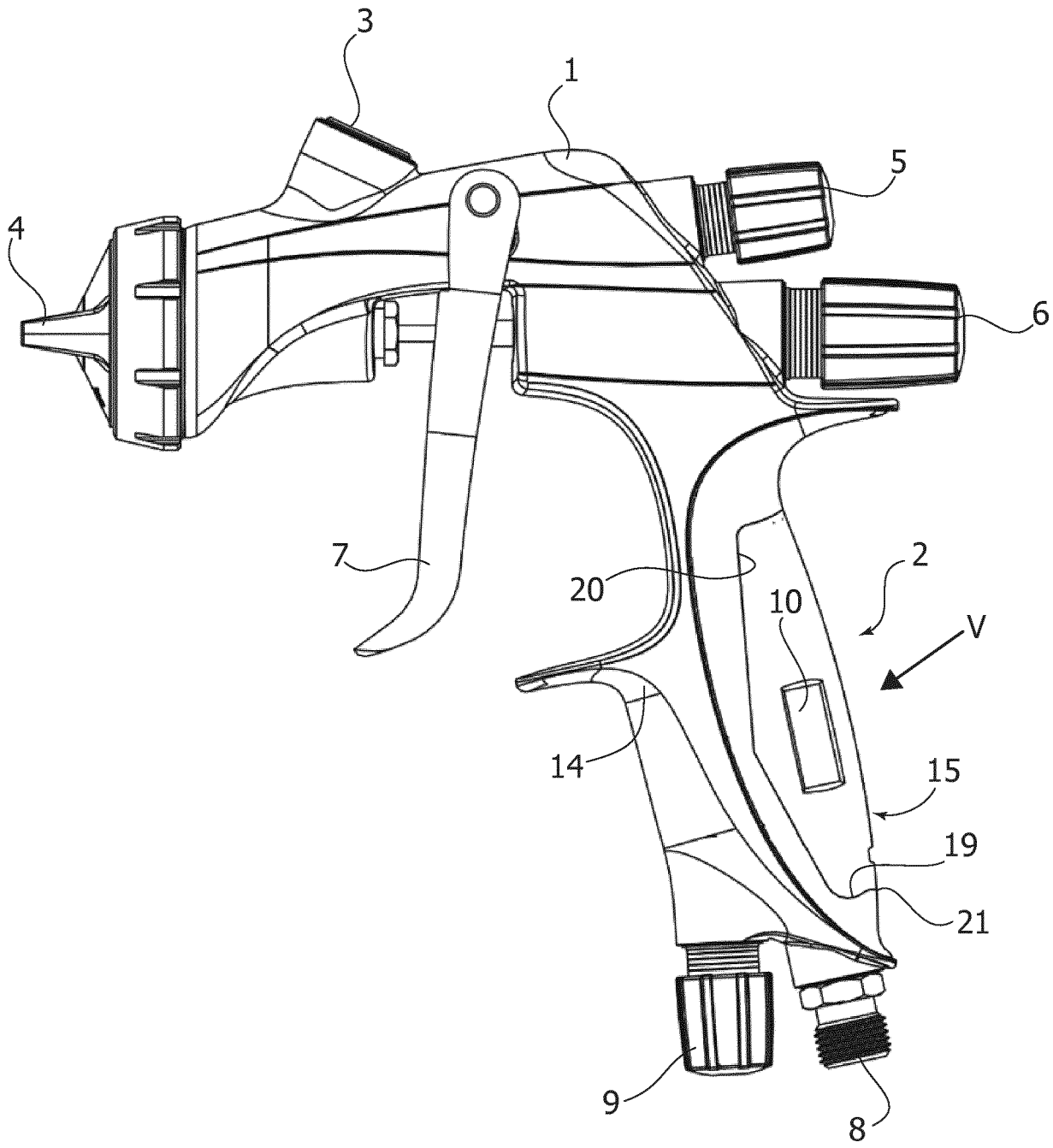


FIG. 3

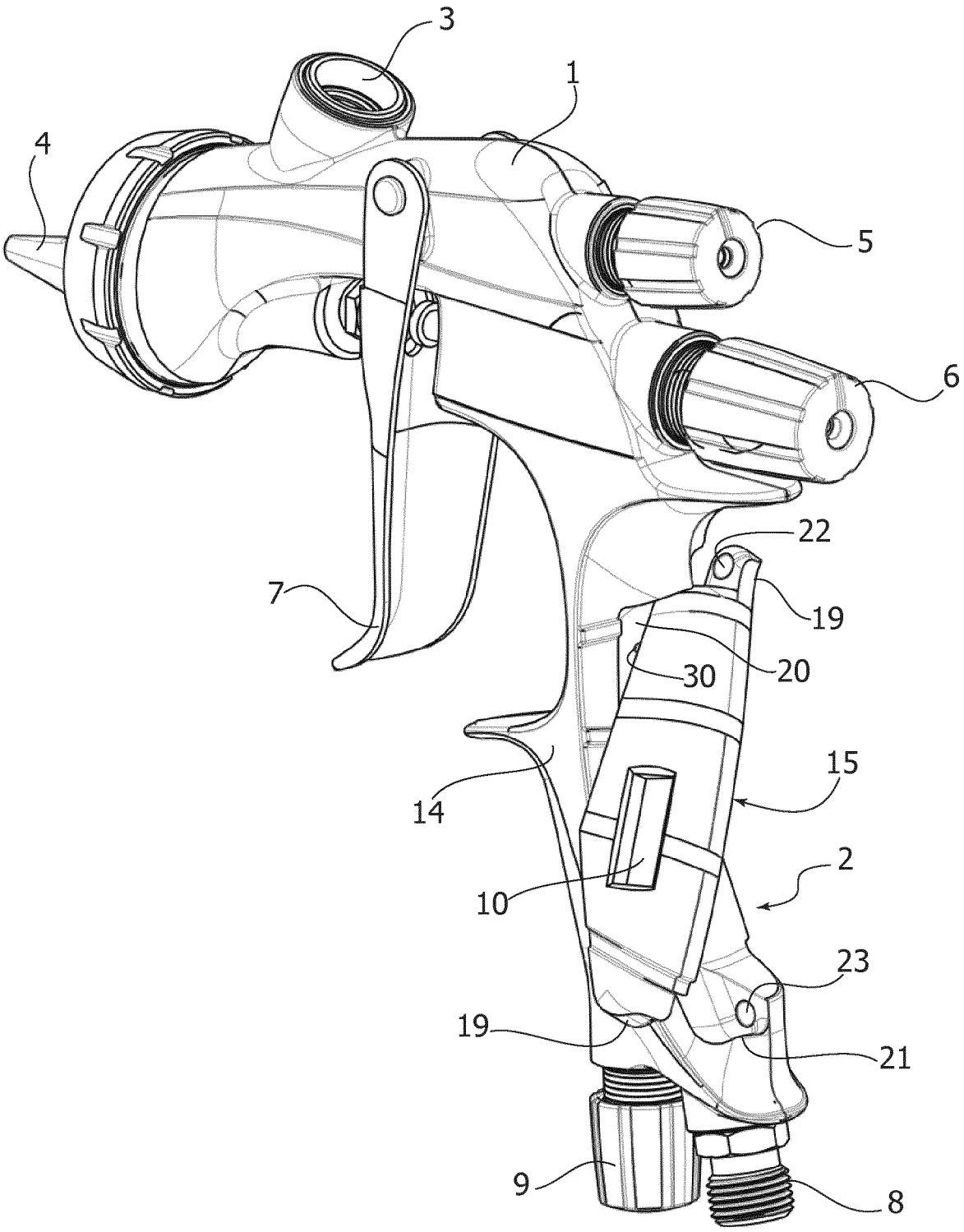


FIG. 4

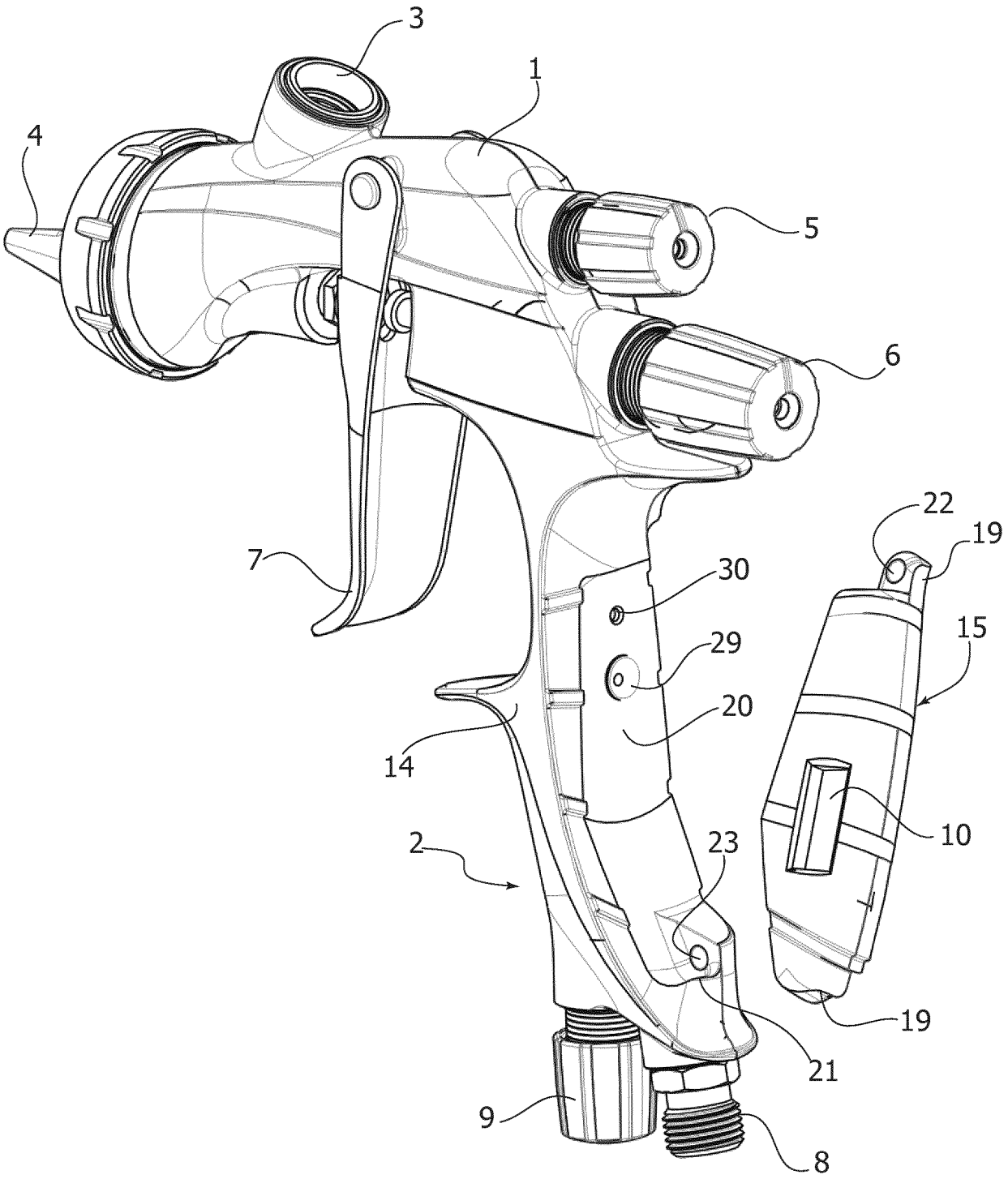


FIG. 5

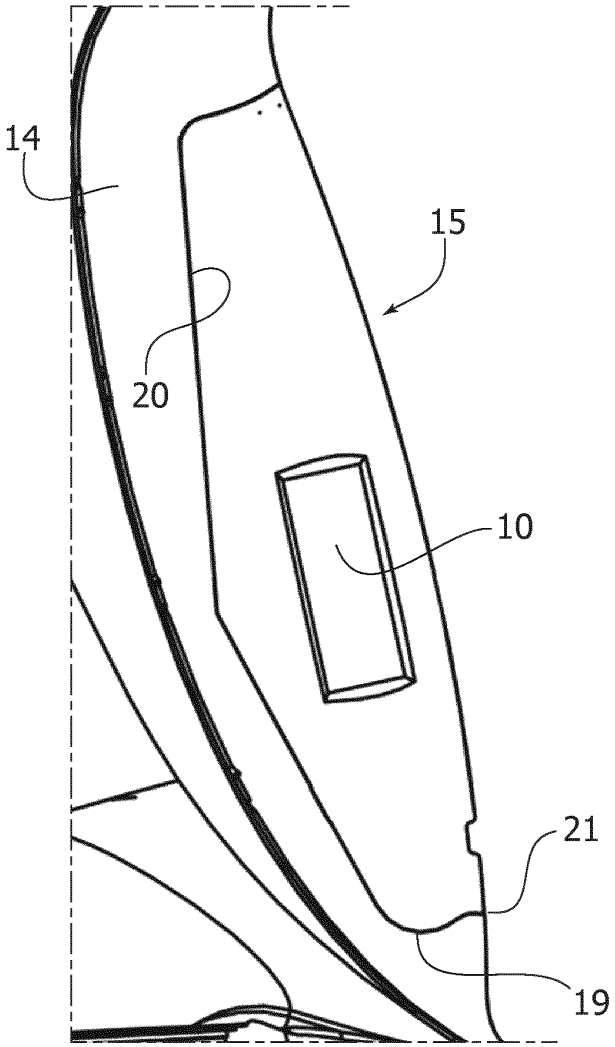


FIG. 6

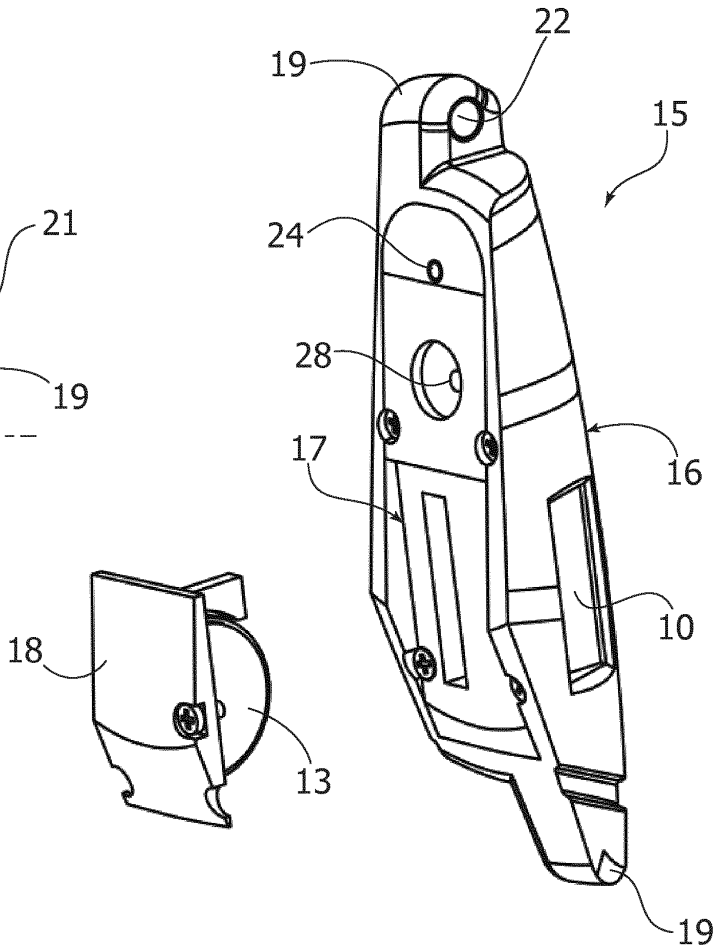


FIG. 7

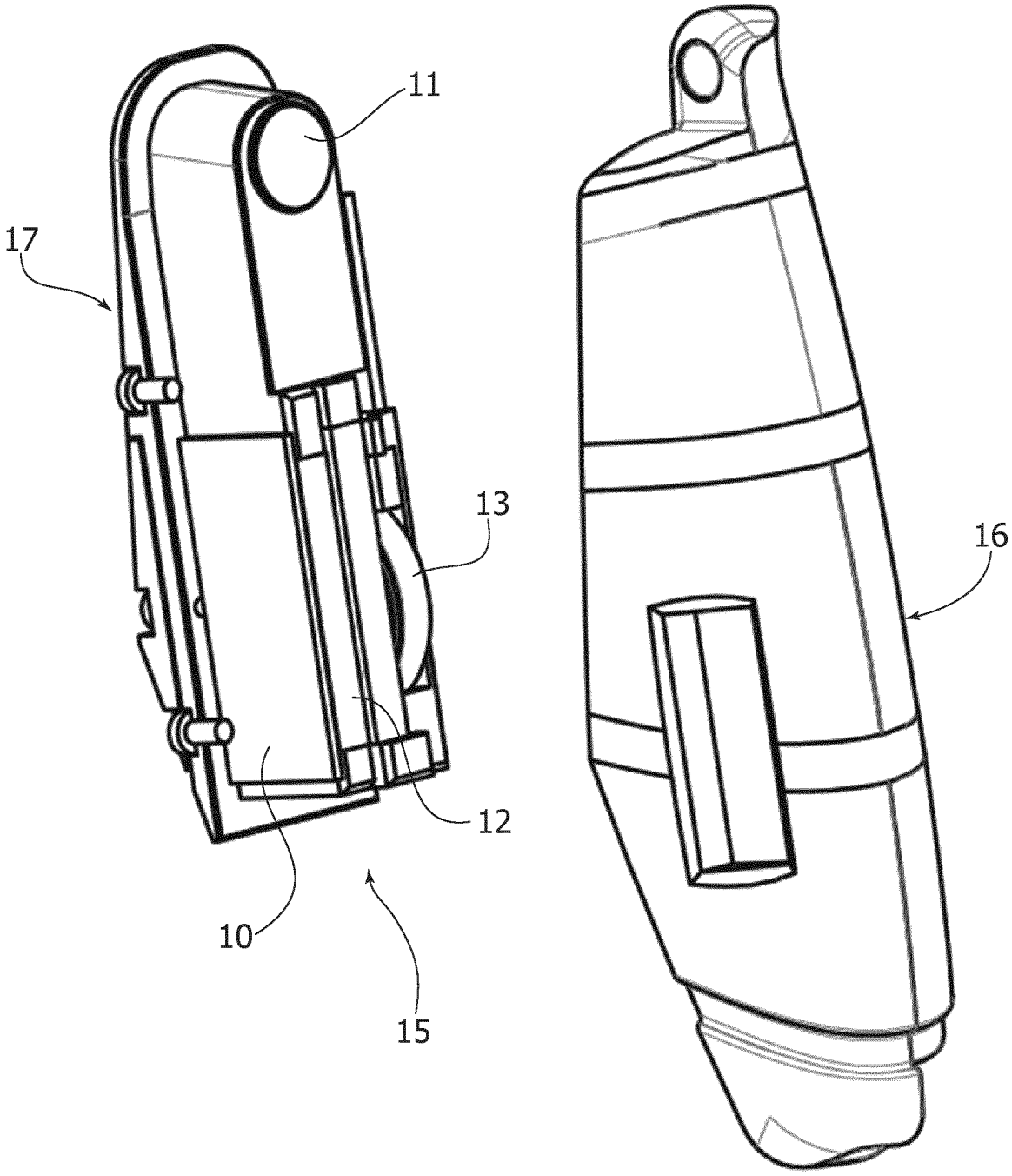


FIG. 8

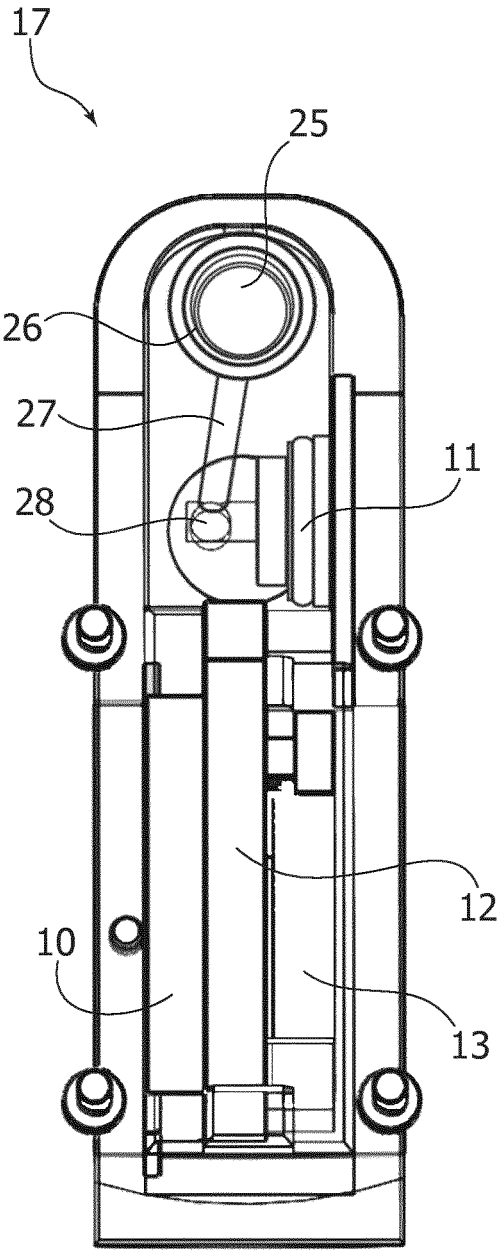


FIG. 9

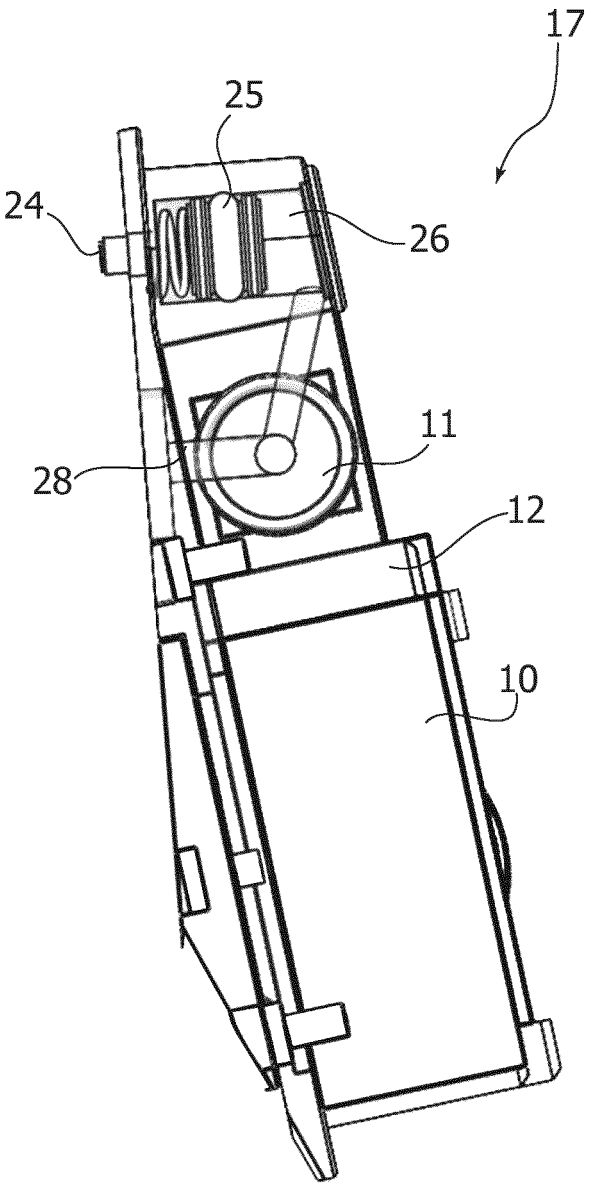


FIG. 10

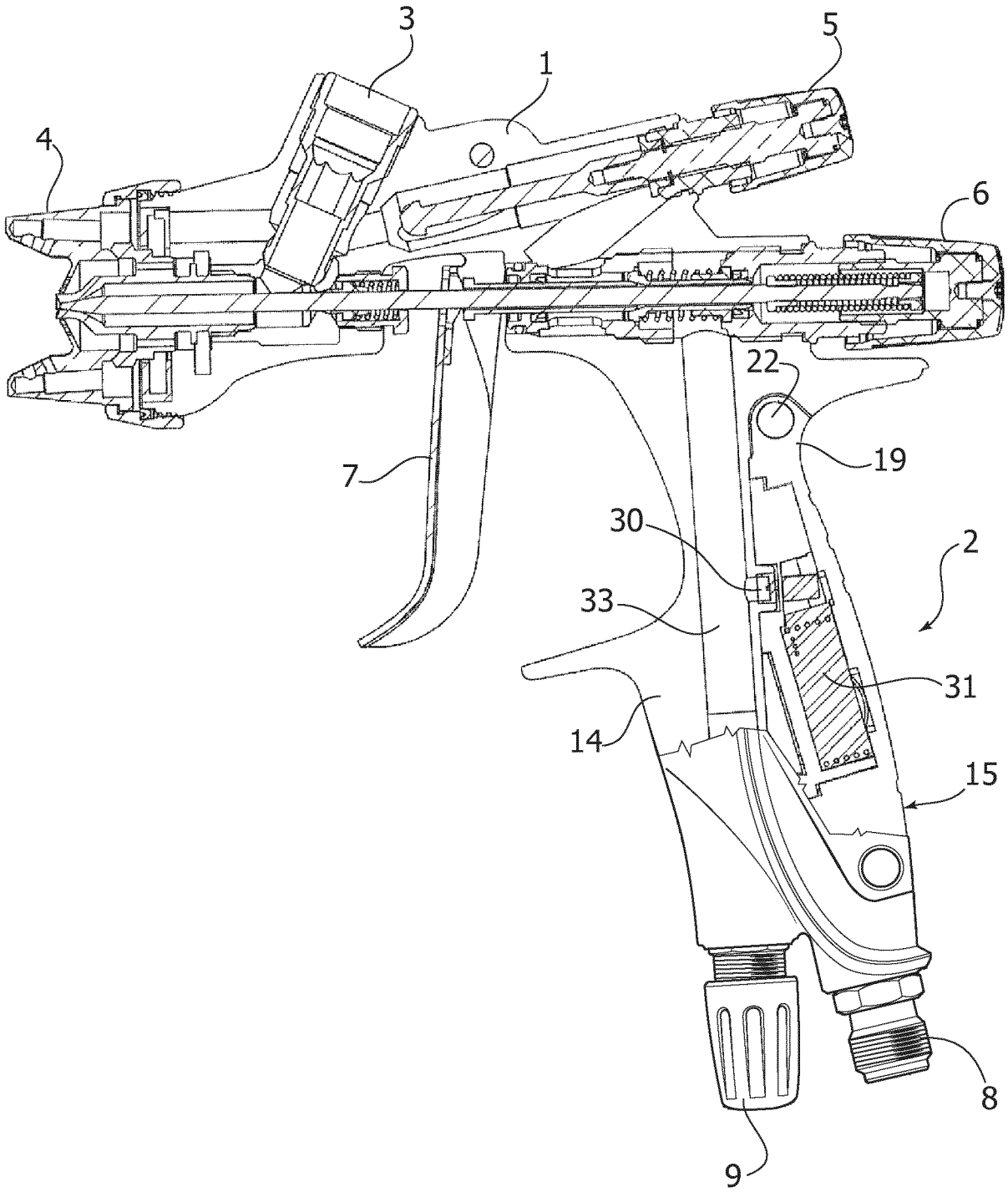


FIG. 11

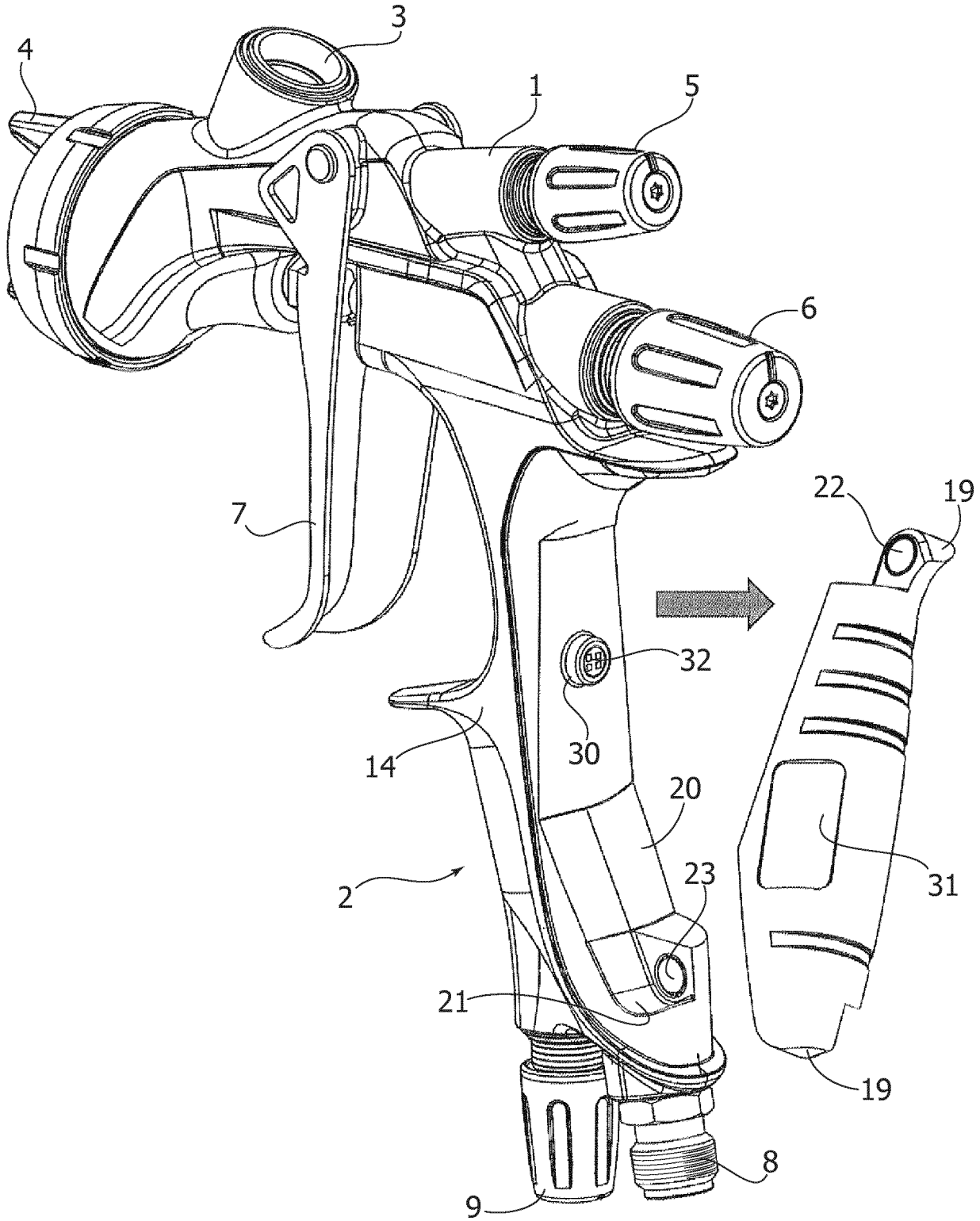


FIG. 12

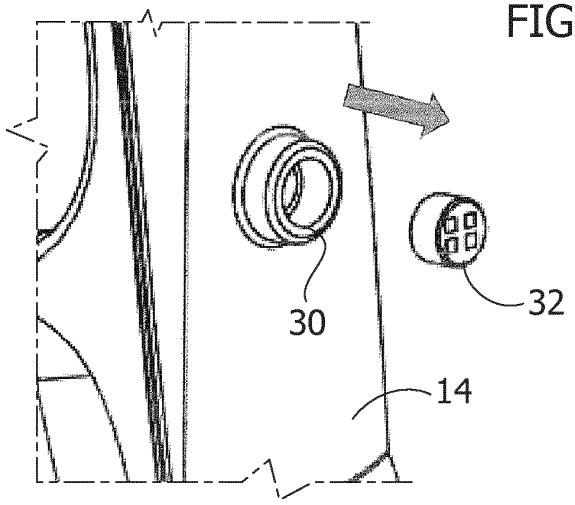


FIG. 13

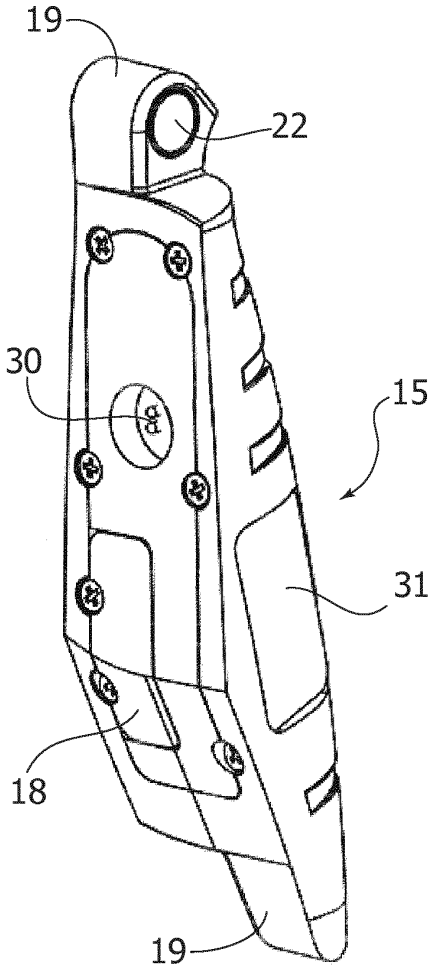
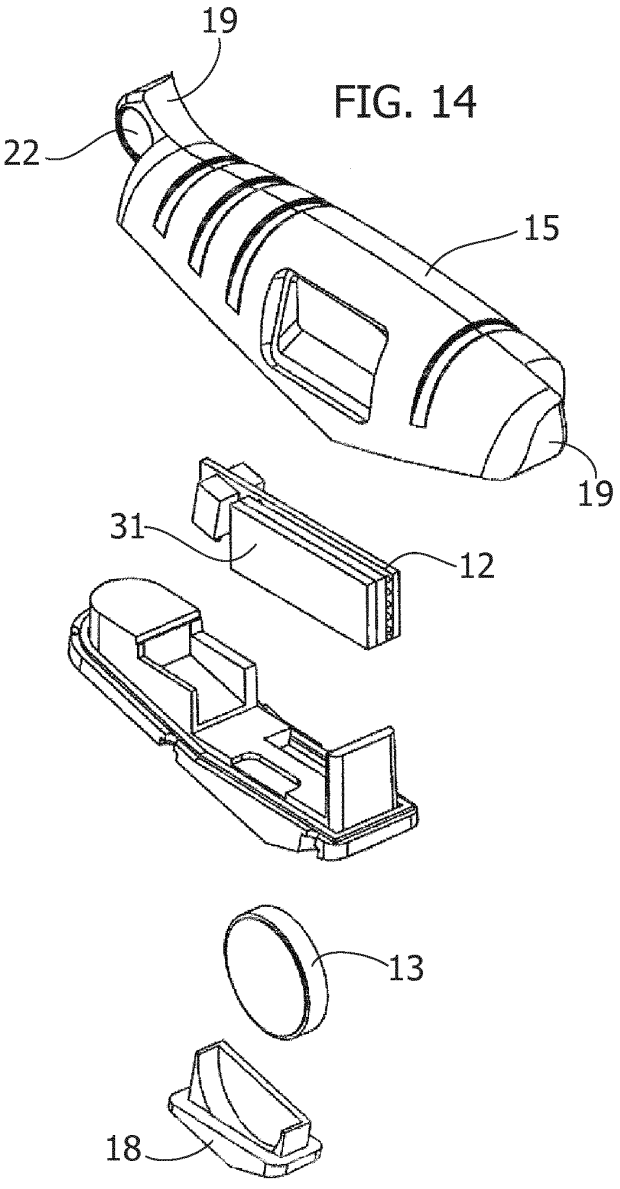


FIG. 14



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1247586 A **[0003]**
- WO 2014006593 A **[0003]**
- EP 1477232 A **[0004] [0005]**
- EP 2918347 A **[0004]**
- EP 1277519 A **[0006]**
- EP 2427275 A **[0006]**
- EP 0526525 A **[0007]**
- EP 1375013 A **[0007]**
- EP 1715957 A **[0007]**