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(54) **A beverage dispensing assembly**

(57) The present invention relates to a beverage dispensing assembly to be used in combination with a tapping cock including a tapping cock housing and a tap handle operable between a first position and a second position. The first position constitutes a non-beverage dispensing position and the second position constitutes a beverage dispensing position. The beverage dispensing assembly comprises two separate elements, the first element being a dispensing line having a dispensing end and a keg connection end, the dispensing line being sealed at the dispensing end by a sealing closure, and the second element being a valve element to be posi-

tioned and received in the tapping cock housing operated by the tap handle for causing the valve element to be closed in the first position of the tap handle and to be opened in the second position. The dispensing line and the valve element are connected together by operating the tap handle from the first position to the second position causing the sealing closure at the dispensing end of the dispensing line to be opened and at the same time causing the dispensing line to be irreversibly joined to and arrested relative to the valve element.

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## Description

**[0001]** This invention relates to a beverage dispensing assembly to be used in combination with a tapping cock, a beverage dispensing system comprising a tapping cock and the beverage dispensing assembly, a valve element and a dispensing line.

**[0002]** The applicant company produces and sells a professional draught beer system named DraughtMaster™ comprising a beverage dispensing system and a chill chamber in which the keg or pack containing carbonate beer is received. The keg or pack containing carbonated beer comprises a flexible bottle or bag, which is exposed to an elevated pressure from the outside for dispensing the beer. The flexible bottle or bag is connected through a dispensing line to a shut-off valve, which is guided through a channel of the beverage dispensing system and is received within and operated by means of a tap handle of a tapping cock for operating the shut-off valve between an open and a closed position. The above DraughtMaster™ system is among others described in published international patent application WO 2007/019850 to which reference is made. Similar draught beer systems are described in EP 1 555 240, EP 1 284 918 and WO 2006/029626.

**[0003]** Prior to operation, the dispensing line and shut-off valve are to be mounted properly within the tapping cock of the beverage dispensing system. This, however, may be a complicated process since the dispensing line with the shut-off valve are to be pushed through the inside of the tapping cock. The dispensing line and the valve must be correctly and securely connected and fixed to one another and to the tap handle of the tapping cock.

**[0004]** It is therefore an object of the present invention to provide a beverage dispensing assembly comprising two separate elements, namely the dispensing line and a valve element, which make the above described mounting process less complicated and simplifies the mounting of the dispensing line and the valve element to the tapping cock of the beverage dispensing system.

**[0005]** Furthermore, it is an object of the present invention to provide a beverage dispensing assembly by means of which a simple safe and highly reliable sealing of the dispensing line is accomplished prior to the process or assembling the dispensing line and the valve element when mounting the dispensing line and the valve element to the tapping cock of the beverage dispensing system and at the same time provide a sealing of the dispensing line which is easily opened when assembling the dispensing line with the valve element.

**[0006]** Furthermore, it is an object of the present invention to and improve the process of connecting and securely fixating the dispensing line to the valve element.

**[0007]** The beverage dispensing assembly constitutes a component of a draught beer system also including the dispensing line and as is well known in the art, a refrigerator system for cooling the beer contained within the keg or pack and additional components well known in

the art per se. It is to be realised that the beverage dispensing assembly may be used in connection with a draught beer system similar to the commercially available DraughtMaster™ system produced and sold by the applicant company, in which a collapsible keg or bag is used, however, the beverage dispensing assembly according to the present invention may alternatively be used in combination with a conventional draught beer system, in which non-carbonised beer containing metal kegs and carbonising pressurised containers are used.

**[0008]** The separate valve element apart from fulfilling requirements as to compatibility with the tap handle of the DraughtMaster™ system or the top handle of a similar system fulfils specific operational requirements in particular to provide a safe dosing-off and safe opening of the shut-off valve when operated by the tap handle, and, consequently, the shut-off valve must not allow the beer to leak or drip from the dispensing line, and, in addition, the shut-off valve should prevent that the beer is frothing when the shut-off valve is opened by operating the tap handle.

**[0009]** Since the dispensing line is mounted to the valve element, the controlled dispensing of a drink can be obtained. Especially if the drink is a carbonated drink, such as beer, undesired frothing is counteracted.

**[0010]** Furthermore, the flow characteristics through the dispensing line according to the invention can be adjusted by sizing the fluid outlet dimension of the dispensing line and the dimensions of the valve element.

**[0011]** The dispensing line and the valve element according to the present invention are particularly suitable for dispensing beverages, e.g. wine, coffee, milk or carbonated drink, such as beer.

**[0012]** Furthermore, in specific embodiments of the beverage dispensing assembly according to the present invention, the dispensing line is by itself automatically closed when placing the pack containing carbonated drink in the dispenser device, so that leakage of carbonated drink is prevented.

**[0013]** The dispensing line of the beverage dispensing assembly according to the present invention is likewise also automatically closed when the empty pack is removed from the dispenser device and leakage of any beer present in the flexible dispensing line is prevented.

**[0014]** The dispensing line can be of rigid construction, but can also be telescopic or at least partially of a flexible construction. The latter is preferred since this facilitates the positioning and the fixating of the dispensing line and the valve element in the tapping cock.

**[0015]** The dispensing line can be permanently connected to the container containing a carbonated drink. Alternatively, the dispensing line may be a separate component which is provided with a coupling for detachable connection to the keg or pack. Consequently, the dispensing line may constitute a lightweight, simple construction, which can easily be accommodated, stored and transported in or together with the keg or the pack. The dispensing line may be accommodated in a coiled state

on top of or beneath the base of the keg or pack containing the beverage.

**[0016]** An operating element of the tapping cock preferably comprises components or elements to which the dispensing line and the valve element are connected. The valve element may be provided with corresponding coupling components or elements and may be operated by e.g. moving it or by applying a force to it.

**[0017]** The valve element or the dispensing line is opened and closed by operating the handle of the tapping cock.

**[0018]** The above objects, the above advantage, and the above feature together with numerous other objects, advantages, and features, which will be evident from the below detailed description of the present invention, are, in accordance with a first aspect of the present invention, obtained by a beverage dispensing assembly to be used in combination with a tapping cock including a tapping cock housing and a tap handle operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, said beverage dispensing assembly comprising two separate elements:

- i) a dispensing line having a dispensing end and a keg connection end, said dispensing line being sealed at said dispensing end by a sealing closure, and
- ii) a valve element to be positioned and received in said tapping cock housing operated by said tap handle for causing said valve element to be closed in said first position of said tap handle and to be opened in said second position,

said dispensing line and said valve element being connected together by operating said tap handle from said first position to said second position causing said sealing closure at dispensing end of said dispensing line to be opened and at the same time causing said dispensing line to be irreversibly joined to and arrested relative to said valve element.

**[0019]** By providing the valve element as a discrete or separate element which is simply positioned prior to use in the tapping cock housing, several advantages are readily obtained. Firstly, by providing the valve element as a discrete or separate element, the sealing off of the tapping line at the time of introducing the tapping line into the tapping cock is not dependent on the ability of the valve element to be sealed, and secondly, by separating the valve element from the tapping line, the step of introducing the tapping line into the tapping cock is made more easy as the tapping line is more easily manoeuvred through the tapping cock as compared to an integral assembly in which the valve element is pre-mounted at the outer end of the tapping line.

**[0020]** By providing the valve element as an initial open element, the step of assembling the dispensing line and

the valve element is made easily accomplishable since no pressure is accumulated within the valve element at the time of assembling the dispensing line valve element as the two elements, the dispensing line and the valve element are simply joined together at which time the sealing closure is opened whereupon the valve element is closed by operating the tap handle from the second position to the first position.

**[0021]** The sealing closure of the dispensing line may be established in numerous ways by a substantially spherically shaped element, e.g. a balloon or a ball shaped element or as an initially biased membrane which is preferably constituted by a rupturable and initially biased membrane.

**[0022]** Dependent on the actual configuration of the sealing closure, the valve element is to be configured in accordance with the sealing closure, however, in the present and preferred embodiment of the beverage dispensing assembly according to the first aspect of the present invention, the valve element is composed of a bottom nozzle part and a top connector part, said top connector part serving to connect said valve element to said coupling element of said dispensing line.

**[0023]** In order to guarantee that the dispensing line is correctly joined with the valve element at the time of opening the sealing closure and joining the dispensing line and the valve element together, the dispensing line is preferably further provided with a coupling element located at the dispensing end for cooperating with a similar cooperating part of the valve element.

**[0024]** Preferably, the membrane being a rupturable membrane is integrally moulded with the coupling element.

**[0025]** The coupling element of the dispensing line may advantageously comprise a circular skirt circumferentially encircling the dispensing end of the dispensing line.

**[0026]** According to presently preferred embodiment of the beverage dispensing assembly according to the first aspect of the present invention, the coupling element preferably defines an inner cylindrical surface, and the inner cylindrical surface being provided with a circumferential bead allowing said coupling element to co-operate with a corresponding circumferential recess of the valve element, and the nozzle part of the valve element is preferably provided with a closure stem serving to co-operate with a similarly configured inwardly sloping and mating surfaces of the top part of the valve element.

**[0027]** The present invention further relates, according to a second aspect of the invention, to a beverage dispensing system.

**[0028]** The beverage dispensing system according to the second aspect of the present invention comprises a tapping cock including a tapping cock housing and a tap handle operable between a first position and a second position, the first position constituting a non-beverage dispensing position and the second position constituting a beverage dispensing position, and the beverage dis-

dispensing system according to the first aspect of the present invention.

**[0029]** Still further, the present invention according to further aspects relates to the valve element and a dispensing line constituting separate and distinct elements of the beverage dispensing assembly according to the first and the second aspects of the present invention.

**[0030]** Further features and advantages of the present invention will be explained in more detail below in connection with advantageous embodiments of the invention with reference to the drawings, in which

Fig. 1 shows a prior art drink dispenser assembly named DraughtMaster™,

Fig. 2 shows a prior art tap handle and a dispensing line of the prior art drink dispenser assembly named DraughtMaster™,

Fig. 3 shows an inner operating mechanism of the tap handle also shown in Fig. 2,

Figs. 4a, 4b, 4c, 4d, 4e and 4f show schematic views of a first preferred embodiment of a beverage dispensing assembly,

Fig. 4g shows a schematic view of the first preferred embodiment of the beverage dispensing assembly mounted in a tapping cock,

Figs. 5a, 5b, 5c, 5d and 5e show schematic views of a second embodiment of a beverage dispensing assembly,

Figs. 6a, 6b, 6c, 6d, 6e, 6f and 6g show schematic views of a third embodiment of a beverage dispensing assembly,

Figs. 7a, 7b, 7c and 7d show schematic views of a fourth embodiment of a beverage dispensing assembly,

Figs. 8a, 8b, 8c and 8d show schematic views of a valve element of a fifth embodiment of a beverage dispensing assembly.

Figs. 8e, 8f and 8g show a schematic view of the fifth embodiment of the beverage dispensing assembly.

Fig. 9a shows a schematic view of a sixth embodiment of a beverage dispensing assembly mounted in a tapping cock in a closed state,

Fig. 9b shows an enlarged partly schematic view of the sixth embodiment of the beverage dispensing assembly in the closed state,

Fig. 9c shows a schematic view of the sixth embod-

iment of the beverage dispensing assembly mounted in the tapping cock in the open state, and

Fig. 9d shows an enlarged partly schematic view of the sixth embodiment of the beverage dispensing assembly in the open state.

**[0031]** Throughout the below description and in the drawings, identical components or elements present in different figures of the drawings are designated the same reference numerals, and components or elements differing from a previously described component or element, respectively, however serving basically the same functional purpose as the previously described component or element, respectively, are designated the same reference numeral as the previously described component or element, respectively, however added a marking for indicating the geometrical difference from the previously described component or element, respectively.

**[0032]** Fig. 1 illustrates a prior art drink dispenser assembly known from WO 2007/019850. The dispenser device assembly 1 comprises a housing 2 including a chill chamber in which a keg or pack, not shown in the drawings, containing carbonated beer is placed. The keg or pack containing carbonated beer comprises a flexible bottle or bag containing the carbonated beer. The flexible bottle or bag is connected through a dispensing line to a shut-off valve at the dispensing end of the dispensing line. By means of a dispensing head 3 acting as a tapping cock and a tap handle 4, the shut-off valve is operated between an open position and a closed position.

**[0033]** Figs. 2 and 3 illustrate the tap handle 4 and a dispensing line 6 with a shut-off valve 8. The dispensing line 6 is positioned in the interior of the dispensing head of the tapping cock and the shut-off valve 8 is biased by a spring 7 to its closed position. Operation of the tap handle 4 away from the position shown causes compression of the biasing spring 7, which in turn moves the shut-off valve 8 to its open position.

**[0034]** Fig. 4a, 4b, 4c, 4d, 4e and 4f illustrate schematic views of a first preferred embodiment of a beverage dispensing assembly according to the present invention. The beverage dispensing assembly designated the reference numeral 15 in its entirety basically comprises two separate elements: a dispensing line 10 and a valve element 20 as shown in figures 4b - 4g.

**[0035]** Fig. 4a illustrates the dispensing line 10 defining a dispensing end 11 and an opposite keg connection end, not shown in the drawing. At the dispensing end 11, a sealing membrane 12 is provided acting as a prior to use sealing closure which is, as will be described below, opened or ruptured when assembling the dispensing line 10 to the valve element 20. At the dispensing end 11, the dispensing line 10 is provided with a coupling element 14 integrally cast with the sealing membrane and defining at the dispensing end 11 a circumferential protrusion 13. The coupling element 14 constitutes a circular skirt circumferentially encircling the dispensing end 11. The cou-

pling element 14 is at its inner cylindrical surface provided with a circumferential bead designated the reference numeral 17 allowing the coupling element to co-operate with a corresponding circumferential recess of the valve element 20 as will be described below. In addition, the coupling element 14 is provided with an outer circumferential flange 18 serving to co-operate with a sleeve 40 of the tapping cock 30 of the dispensing handle 34 shown in Fig. 4g.

**[0036]** In Fig. 4b, the dispensing line 10 is shown together with the valve element 20 in a position ready for connecting the dispensing line 10 to the valve element 20. The valve element 20 is basically composed of two parts, a bottom nozzle defining part 22 and a top connector part 24 serving to connect the valve element 20 to the coupling element 14 of the dispensing line 10. The top part 24 is at its upper end provided with an outer circumferential recess 26 serving to engage with and arrest with the inwardly protruding bead 17 of the coupling element 14.

**[0037]** In Fig. 4c, the dispensing line 10 and the valve element 20 are in a pre-arresting position as the inwardly protruding bead 17 of the coupling element 14 has not reached its interlocking and arresting co-operation with the circumferential recess 26 of the top part 24 of the valve element 20. Within the top part 24 of the valve element 20, an inwardly sloping surface 28 is defined serving to catch the circumferential protrusion 13 and to rupture the membrane 12 as the coupling element 14 is further advanced towards the top part 24 of the valve element 20. The membrane 12 is initially in a biased configuration allowing the membrane 12, after the membrane has been ruptured, to be retracted from the dispensing end 11 of the dispensing line 10 and to conceal the ruptured membrane 12 between the outer surface of the dispensing line 10 and the inner wall of the top part 24 of the valve element 20, as is illustrated in Fig. 4d.

**[0038]** In the process of interconnecting the coupling element 14 to the valve element 20, the valve element 20 is in a non-sealed or non-closed position as a pressure equalisation channel is provided and established by a through-going passage defined by a wall 29 which passage is eventually blocked as the dispensing line 10 is permanently fixated to the valve element 20, as is illustrated in Fig. 4d.

**[0039]** Within the nozzle part 22 of the valve element 20, a closure stem 23 is provided serving to co-operate with a similarly configured inwardly sloping and mating surface 27 of the top part 24 of the valve element 20. After the joining of the coupling element 14 of the dispensing line 10 to the valve element 20 as shown in Fig. 4d, the valve is closed whereas in Fig. 4e, the valve is open allowing the dispensing of beverage through an inner passage between the surface 27 of the top part 24 and the closure stem 23.

**[0040]** In Fig. 4f, the valve is closed or sealed off as the closure stem 23 is caused to seal against the inner sloping surface and mating surface 27 of the top part 24

of the valve element 20. It is to be realised that the shifting of the valve element 20 between the open position shown in Fig. 4e and the closed position shown in Fig. 4f is established by shifting the top part 24 of the valve element 20 relative to the nozzle part 22 of the valve element 20 between an extracted position shown in Fig. 4e as an inwardly protruding cam surface at the top of the nozzle element 22 and designated the reference numeral 21 is shifted between two alternative catching positions co-operating with two alternative cam surfaces 25a and 25b of the top part 24 of the valve element 20 establishing the closed position and the open position, respectively, of the valve element as is shown in Fig. 4e and 4f, respectively.

**[0041]** In Fig. 4g, the tapping cock 30 is shown comprising a tapping cock housing 32 defining a right angular bend in which the dispensing line 10 is received. The tapping cock 30 further comprises a handle 34 extending upwardly from the tapping cock housing 32 and is biased to two alternative positions by means of a biasing spring 36 to a first position shown in Fig. 4g in which the handle 34 is in an upright position in which the beverage dispensing assembly is closed and a second position in which the handle 34 is turned to the right or lowered as a conventional tap handle of a beverage dispensing system for opening the beverage dispensing assembly for causing the dispensing of beverage from the dispensing line 10. The handle 34 co-operates with a stem 38 acting on a sleeve 40 which catches with the outer circumferential flange 18 of the coupling element 14 for causing the coupling element 14 and the top part 24 of the valve element 20 to be raised to the position shown in Fig. 4e as the handle 34 is lowered from the upward position shown in Fig. 4g to the above described second position turned to the right as the nozzle part 22 of the valve element 20 is arrested relative to the tapping cock house 32 by means of a circumferential flange 42 of the housing 32 catching into a circumferential groove 19 of the nozzle part 22 of the valve element 20. As the handle 34 is raised from the lowered position described above, the sleeve 22 causes the coupling element 14 to push the top part 24 of the valve element 20 into the closed position shown in Fig. 4f.

**[0042]** It is to be realised that the opening and closing operation of the handle 34 is also used for interconnecting the dispensing line 10 and the valve element 20 as initially, the valve element 20 is positioned in the lowermost end of the right angular bend tapping cock house 32 and fixated by the circumferential flange 42 described above, catching in the groove 19 and at the same time, the dispensing line 10 is introduced through the tapping cock housing 32 from the left hand side of the tapping cock housing 32 and positioned in engagement with the sleeve 40 as the sleeve is raised by lowering the handle 34 from the position shown in Fig. 4g to the above described position in which the handle is turned to the right. The dispensing line 10 and the valve element 20 are fitted together as is illustrated in Fig. 4c while the handle 34 is

in the above described lowered position and, the handle 34 is then raised to its upright position shown in Fig. 4g causing the dispensing line 10 to be permanently connected to the valve element 20 as is illustrated in Fig. 4.

**[0043]** In Figs. 5a-5e a second embodiment of a beverage dispensing assembly is shown differing from the above first described and first embodiment in that the coupling element 14' of the dispensing line 10 is of a somewhat simplified structure as the inwardly protruding bead 17 and the outwardly protruding flange 18 are omitted, and similarly, the top part 24' of the valve element 20' fails to include a circumferential recess similar to the recess 26 described above. The valve element 20' basically differs from the above described first embodiment of the valve element 20 shown in Figs. 4a-4f in that the top part 24' of the valve element 20' shown in Figs. 5b-5e is provided with an outwardly protruding flange 18' serving the purpose of the outwardly protruding flange of the connecting element 14 described above, however, constituting an integral part of the top part 24' of the valve element 20' itself. Consequently, in the process of connecting the dispensing line 10 to the valve element 20', the valve element 20' shown in Fig. 5c is initially in its closed position as the cam surface 21 is co-operating with the cam surface 25b of the nozzle part 22 and the connector element 14' of the dispensing line 10 is simply resting on top of the top part 24' of the valve element 20'.

**[0044]** It is to be realised that the second embodiment of the beverage dispensing assembly shown in Fig. 5a-5e, and further the additional embodiments of the beverage dispensing assembly to be described below, are intended to be used in the same tapping cock 30 as shown in Figs. 4g, and no detailed or separate description of the tapping cock is consequently presented in relation to the second and the additional embodiments of the beverage dispensing assembly.

**[0045]** Initially, the tap handle 34 of the tapping cock 30 is in its upright position shown in Fig. 4g and the connecting element 14 is press-fitted into contact with the upper end of the top part 24' of the valve element 20' as illustrated in Fig. 4d as the handle 34 is turned to the right raising the sleeve 40, and consequently raising the top part 24' of the valve element 20' relative to the nozzle part 22 of the valve element 20'. The process of connecting the dispensing line 10 of the second embodiment to the valve element 20' shown in Figs. 5a-5e is finalised by shifting the handle of the tapping cock 30 to the upright position shown in Fig. 4g, and consequently closing the valve element 20' as is illustrated in Fig. 5e

**[0046]** In Figs. 6a-6g, a third embodiment of the beverage dispensing assembly according to the present invention is shown differing from the above-described first and second embodiments in that the sealing membrane 12 is omitted and substituted by a sealing plug 12" which is positioned in a sealing recess at the outermost end of the coupling element 14" shown in Fig. 6a. Behind the plug 12", a seat 13 is established to which the plug 12" is shifted as the dispensing line 10 is connected to the

valve element 20" for opening the dispensing line as will be described below with reference to Figs. 6b-6g. The dispensing line further differs from the above-described first and second embodiments in that the inwardly protruding bead 17 shown in Figs. 4a-4f is substituted by an outwardly protruding bead 17" serving to co-operate with a similarly configured inner recess 26" of the top part 24" of the valve element 20". Like the above-described second embodiment of the beverage dispensing assembly, the top part 24" of the valve element 20" is provided with an outwardly protruding flange 18" serving to catch with the vertical raisable sleeve 40 of the dispensing cock 30 shown in Fig. 4g.

**[0047]** In Fig. 6b, the dispensing line 10 is to be introduced into co-operating and fitting engagement with the top part 24" of the valve element 20" and in Fig. 6c, the valve element 20" and the dispensing line 10 are received within the tapping cock 30 shown in Fig. 4g and then the handle 34 of the tapping cock 30 is lowered from the position shown in Fig. 4g to the position described above turned to the right forcing the sleeve 42 to be raised and shifting the top part 24" of the valve element 20" from the position shown in Fig. 6c to a position shown in Fig. 6d in which the coupling element 14" is forced into engagement with the top part 24" of the valve element 20" causing the outwardly protruding bead 17" of the coupling element 14" to catch into and arrest within the inner circumferential recess 26" of the top part 24". In Fig. 6d, the plug 12" is still sealing off the outer end of the coupling element 14", and consequently the dispensing line 10.

**[0048]** In Fig. 6e, the handle of the tap cock 30 is raised to its vertical position shown in Fig. 4g causing the top part 24" of the valve element 20" to be forced downwardly causing the cam surface 21 to shift from its engagement with the cam surface 25a of the top part 24" to engagement with the cam surface 25b of the top part 24". At the same time, the uppermost end of the closing stem 23" contacts the sealing plug 12" and shifts the plug from its original position to its retracted position in the above-described seat 13 as the lowermost end of the connecting element 14" are slightly separated due to contact with the conical configuration of the top surface of the stem 23". As the sealing plug 12" has been shifted to its retracted position shown in Fig. 6e, a passage bypassing the plug is established by the seat 13 and, as is illustrated in Fig. 6f, the raising of the top part 24" of the valve element 20" allows the beverage to pass the retracted sealing plug 12" and to be expelled past the sealing stem 23". By a further raising of the tap handle 34 shown in Fig. 4g from the lowered open position to the raised position, the valve element 20" is again shifted to the closed position shown in Fig. 6g in which the lowermost end of the connecting element 14" seals against the conical top surface of the sealing stem 23" closing off the passage through the valve element 20".

**[0049]** In Figs. 7a-7d, a fourth embodiment of the beverage dispensing assembly is shown including like the above-described third embodiment, a sealing plug 12".

As distinct from the sealing plug 12" described above with reference to Figs. 6a-6g which sealing plug is once shifted from a sealing position to a bypassing retracted position, the sealing plug 12" of the fourth embodiment shown in Figs. 7a-7d serve as a sealing plug in the assembled beverage dispensing assembly. Consequently, the connecting element 14" of the fourth embodiment of the beverage dispensing assembly shown in Figs. 7a-7d differs from the above-described third embodiment shown in Figs. 6a-6g in that the retracted positioning seat 13 is omitted. The top part 24" of the valve element 20" includes a simple blunt stem element 23" and a bottom circumferential receptor recess 28" into which the outermost end of the connecting element 14" is to be arrested as is illustrated in Fig. 7c causing the sealing plug 12" to be disengaged from its original sealing engagement at the lowermost end of the dispensing line 10 and allowing the sealing plug 12" to act as a sealing plug to be shifted between a free position shown in Fig. 7c resting on the blunt stem part 23" and into engagement with an inner sealing surface 27" of the connecting element 14" shown in Fig. 7d.

**[0050]** In Fig. 7b, the dispensing line 10 is inserted into the top part 24" of the valve element 20" as the tap handle 34 of the tapping cock 30 shown in Fig. 4g is initially in its upright or closed position. By turning the tap handle 34 from its upright or closed position shown in Fig. 4g to the above-described lowered position constituting an open position of the beverage dispensing assembly, the sleeve 40 catching with the upwardly protruding bead 18" of the top part 24" of the valve element 20" causes the top part 24" to be raised and to press the connecting element 14" into sealing engagement within the top part 24" of the valve element 20" as the outwardly protruding bead 17" of the connecting element 14" is caught and fixated relative to the inner circumferential recess 26" of the top part 24" as is illustrated in Fig. 7c. At the same time, the sealing plug 12" is disengaged from its sealing engagement with the outermost end of the connecting element 14" and is allowed to rest on top of the blunt sealing stem 23" and allowing the beverage to pass freely out from the dispensing line 10 and past the sealing plug 12". By a final raising of the tap handle 34 of the tapping cock 30 shown in Fig. 4g to its elevated and closed position, the cam surface 21 of the nozzle part 22 of the valve element 20" is disengaged from its engagement with the cam surface 25a of the top part 24" of the valve element 20" and forced into engagement with the cam surface 25b and at the same time the blunt stem part 23" forces the sealing plug 12" into sealing engagement with the inner sealing surface 27" of the connecting element 14" sealing off the beverage dispensing line and interrupting the dispensing of beverage through the dispensing line 10.

**[0051]** In Figs. 8a-8g, a fifth embodiment of the beverage dispensing assembly according to the present invention is shown comprising a separate elastomeric valve element 20<sup>iv</sup>. The elastomeric valve element 20<sup>iv</sup> is ini-

tially cast in an elongated cylindrical configuration as is illustrated in Fig. 8a, comprising a bottom valve part 22<sup>iv</sup> and a top valve part 24<sup>iv</sup>. At the centre of the elastomeric body constituting the elastomeric valve element 20<sup>iv</sup>, a central protrusion 50 is provided establishing the recess 19 for cooperating with the flange 42 of the tapping cock 30 shown in Fig. 4g. Below the protrusion 50, a further protrusion 56 is provided serving as the lowermost body part of the final valve element shown in Fig. 8c. The bottom part 22<sup>iv</sup> of the elastomeric valve element 20<sup>iv</sup> is provided with an inwardly protruded flange 52, and at the upper part of the elastomeric valve element 20<sup>iv</sup>, a cylindrical part protrudes from an inwardly extending flange 54. At the outer surface of the top part 24<sup>iv</sup> of the elastomeric valve element 20<sup>iv</sup>, the outwardly protruding bead 18" extends.

**[0052]** In Fig. 8b, a first step of aversion of the elastomeric body shown in Fig. 8a into the final elastomeric valve element shown in Fig. 8c is performed as the upper cylindrical part 24<sup>iv</sup> of the elastomeric valve element 20<sup>iv</sup> is everted into an inwardly sloping conical surface 58.

**[0053]** In a further step, the bottom part 22<sup>iv</sup> of the valve element 20<sup>iv</sup> is everted from its original configuration shown in Figs. 8a and 8b into the configuration shown in Fig. 8c in which the flange 52 is everted and caused to catch behind the inwardly protruding flange 54 arresting the inverted bottom 22<sup>iv</sup> within the interior of the valve element 20<sup>iv</sup>. At the same time, the central part of the elastomeric body located between the protrusion 50 and the inwardly protruding flange 54 is compressed as is illustrated in Fig. 8c providing a bellows-shaped biasing element 60.

**[0054]** The final elastomeric valve element 20<sup>iv</sup> shown in Fig. 8c is, like the above-described first, second, third and fourth embodiments of the beverage dispensing assembly intended to be assembled to and integrally connected to a free of the dispensing line 10 which connection is simply accomplished by introducing the dispensing line 10 into the interior of the valve element 20<sup>iv</sup> as is illustrated in Fig. 8c and by operating the handle 34 of the tapping cock 30 shown in Fig. 4g, as the bellows-shaped biasing element 60 is stretched into the position shown in Fig. 8e, allowing the dispensing line 10 to be fully introduced into the interior of the valve element and at the same time opening the passage through the valve element.

**[0055]** After the introduction of the dispensing line 10 into the interior of the elastomeric valve element 20<sup>iv</sup> as is illustrated in Fig. 8e, the bellows-shaped biasing element 60 of the elastomeric valve element 20<sup>iv</sup> causes the shifting of the valve element 20<sup>iv</sup> between an open position shown in Fig. 8g to a closed position shown in Fig. 8f after the movement of the tap handle 34 from the lower position not shown in Fig. 4g to the raised position shown in Fig. 4g.

**[0056]** In Figs. 9a-9d, a sixth embodiment of the beverage dispensing assembly according to the present invention is shown differing from the above-described assem-

blies in that the assembly is a so-called pinching-off assembly in which the outermost end of the dispensing line 10' constitutes a pinching-off valve element.

**[0057]** In Fig. 9a, the tapping cock 30' is shown comprising its handle 34' and an eccentric pinching-off body 40' which is journaled on a central axis 42 together with the tap handle 34'. The eccentric body 40' is rotated together with the tap handle 34' and is released from its pinching-off or sealing-off position shown in Fig. 9a to a beverage dispensing position as the tap handle 34' is lowered to a horizontal position by rotating the handle to the left to a position not shown in the drawings.

**[0058]** In Fig. 9b, a detail of the dispensing line 10' is shown together with a detail of a plug removable assembly of the beverage dispensing system. Initially, the dispensing line 10' is closed or sealed off by means of a plug 12<sup>iv</sup> which is removed prior to use by means of a plug removal arm. The plug removal arm is designated the reference numeral 50 and is journaled on a rotational axis 52 allowing the plug removal arm to be pivoted rearwardly as is illustrated in Figs. 9c and 9d. For removing the plug 12<sup>iv</sup> from the dispensing end 11' of the dispensing line 10', the plug removal arm 50 is positioned in contact with the sealing-off plug 12<sup>iv</sup> as is illustrated in Fig. 9a, and a coupling stem 54' is operated manually causing a clutch of the plug removal arm 50 to engage within a recess at the outer free end of the plug 12<sup>iv</sup> and locking the plug removal arm 50 to the plug 12<sup>iv</sup>. Initially, the plug removal arm 50 is arrested relative to the eccentric body 40' by means of a pin 44' which is disengaged from its connection to the plug removal arm 50 as the clutch 54 is operated allowing the pin 44' to be freely disconnected from the plug removal arm 50. The plug removal arm is then pivoted downwardly causing the plug 12<sup>iv</sup> to be disengaged from the dispensing end of the dispensing line 10' and allowing the tap handle 34' to be turned to the left for dispensing beverage from the dispensing end 11' of the dispensing line 10'.

**[0059]** In Fig. 9c, the plug 12<sup>iv</sup> is shown disengaged from the dispensing line 10' and Fig. 9d illustrates a detail of the disengagement of the plug 12<sup>iv</sup> from the dispensing line 10'.

**[0060]** Prior to removal of the dispensing line 10' from the tapping cock 30', the inverse operation is performed.

**[0061]** In Figs. 9b and 9d, the details of the interlocking and catching elements preventing unintentional disengagement of the sealing plug 12<sup>iv</sup> from the dispensing line 10' is also shown.

**[0062]** Although the present invention has above been described with reference to advantageous and presently preferred embodiments of the different aspects of the invention, numerous modifications and changes of the above described presently preferred embodiments may be deduced and all such modifications and changes perceivable by a person having ordinary skill in the art are consequently to be considered part of the present invention, the protective scope of which is to be interpreted in accordance with the below patent claims.

## POINTS

### [0063]

1. A beverage dispensing assembly to be used in combination with a tapping cock including a tapping cock housing and a tap handle operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, said beverage dispensing assembly comprising two separate elements:

- i) a dispensing line having a dispensing end and a keg connection end, said dispensing line being sealed at said dispensing end by a sealing closure, and
- ii) a valve element to be positioned and received in said tapping cock housing operated by said tap handle for causing said valve element to be closed in said first position of said tap handle and to be opened in said second position,

said dispensing line and said valve element being connected together by operating said tap handle from said first position to said second position causing said sealing closure at said dispensing end of said dispensing line to be opened and at the same time causing said dispensing line to be irreversibly joined to and arrested relative to said valve element.

2. The beverage dispensing assembly according to point 1, said sealing closure constituted by a substantially spherically shaped element, e.g. a balloon or a ball shaped element, or constituted by an initially biased membrane.

3. The beverage dispensing assembly according to point 2, said membrane being rupturable.

4. The beverage dispensing assembly according to any of the points 1-3, said valve element being composed of a bottom nozzle part and a top connector part, said top connector part serving to connect said valve element to said coupling element of said dispensing line.

5. The beverage dispensing assembly according to any of the points 1-4, further comprising a coupling element located at the dispensing end of said dispensing line.

6. The beverage dispensing assembly according to point 5, said coupling element comprising a circular skirt circumferentially encircling said dispensing end of said dispensing line.

7. The beverage dispensing assembly according to



points 5 or 6, said coupling element defining an inner cylindrical surface, and said inner cylindrical surface being provided with a circumferential bead allowing said coupling element to co-operate with a corresponding circumferential recess of said valve element. 5

8. The beverage dispensing assembly according to any of the points 4-7, said nozzle part of said valve element being provided with a closure stem serving to co-operate with a similarly configured inwardly sloping and mating surfaces of said top part of said valve element. 10

9. The beverage dispensing assembly according to any of the points 4 - 8, said coupling element being initially closed by said sealing closure. 15

10. A beverage dispensing system comprising a tapping cock including a tapping cock housing and a tap handle operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, and a beverage dispensing assembly according to any of the points 1-9. 20 25

11. The valve element according to any of the points 1 - 9 being made of an elastomeric material. 30

12. A dispensing line having a dispensing end and a keg connection end, said dispensing line being provided at said dispensing with a biased, rupturable sealing closure. 35

13. The dispensing line according to point 12, said sealing closure constituted by a biased membrane. 40

14. The dispensing line according to any of the points 12 or 13, said dispensing line being made of an elastomeric material. 45

## Claims

1. A valve element (20<sup>iv</sup>) of a beverage dispensing assembly (1) to be used in combination with a tapping head including a tapping head housing (3) and a tap handle (4) operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, said beverage dispensing assembly (1) comprising two elements: 50

i) a dispensing line (10) having a dispensing end and a keg connection end, and 55

ii) said valve element (20<sup>iv</sup>) to be positioned and received in said tapping head housing (3) and operated by said tap handle (4) for causing said valve element (20<sup>iv</sup>) to be closed in said first position of said tap handle (4) and to be opened in said second position, said valve element (20<sup>iv</sup>) being constituted by an integrally cast and unitary elastomeric element comprising an outer part and an inner part, said inner part defining a through-going inner passage communicating with said dispensing line (10) for allowing the dispensing of beverage in said second position of said tap handle, said outer part and said inner part defining a space therebetween communicating with said dispensing line (10) and being sealed off by a flexible end wall circumferentially encircling said inner passage and joining said outer part and said inner part together,

said outer part having an elastically deformable wall part allowing said outer part to be elongated when shifting said tap handle between said first position and said second position,

said flexible end wall forcing said inner part to seal off said inner passage in said second position of said tap handle (4), and

said flexible end wall being bent into contact with an inner surface of said outer part in said second position of said tap handle (4) for causing said inner passage to be opened by elongating said outer part and causing said inner volume of said inner space to be substantially reduced as compared to the inner volume of said inner space in said second position of said tap handle (4).

2. The valve elements (20<sup>iv</sup>) according to claim 1, said valve element being joined to said dispensing line (10) prior to positioning said valve element (20<sup>iv</sup>) in said tapping head.

3. The valve element (20<sup>iv</sup>) according to claim 1, said valve element (20<sup>iv</sup>) constituting, prior to positioning said valve element (20<sup>iv</sup>) in said tapping head housing (3), a separate element separated from said dispensing line (10), said dispensing line (10) being sealed at said dispensing end by a sealing closure prior to positioning said valve element (20<sup>iv</sup>) in said tapping head housing (3), and said dispensing line (10) and said valve element (20<sup>iv</sup>), when positioning said valve element (20<sup>iv</sup>) in said tapping head housing (3) being connected together by operating said tap handle (4) from said first position to said second position causing said sealing closure and said dispensing end of said dispensing line (10) to be opened and at the same time causing said dispensing line (10) to be irreversibly joined to and arrested relative to said valve element (20<sup>iv</sup>).

4. The valve element (20<sup>iv</sup>) according to any of the claims 1-3, said outer part and said inner part being initially cast in an elongated configuration in which said outer part and said inner part are joined through said flexible wall and being converted into said valve element (20<sup>iv</sup>) through eversion of said inner part into said outer part. 5
5. The valve element (20<sup>iv</sup>) according to any of the claims 1-4, said elastically deformable wall part of said outer part biasing said valve element to said second position of said tap handle by elastically bending said elastically deformable wall part and being stretched when shifting said tap handle (4) from said first position to said second position. 10
6. The valve element (20<sup>iv</sup>) according to any of the claims 1-4, said elastically deformable wall part of said outer part biasing said valve element (20<sup>iv</sup>) to said first position and being elastically elongated when shifting said tap handle (4) from said first position to said second position. 20
7. The valve element (20<sup>iv</sup>) according to any of the claims 1-4, said elastically deformable wall part of said outer part biasing said valve element (20<sup>iv</sup>) to said first position by elastically bending said elastically deformable wall part and being stretched when shifting said tap handle (4) from said second position to said first position. 25
8. The valve element (20<sup>iv</sup>) according to any of the claims 1-7, said elastically deformable wall part of said outer part biasing said valve element (20<sup>iv</sup>) to said first position and being elastically stretched when shifting said tap handle (4) from said first position to said second position. 30
9. The valve element (20<sup>iv</sup>) according to any of the claims 1-8, said flexible end wall assisting in sealing off said inner passage when said tap handle (4) is in said first position and being bent into contact with an inner surface of said outer part when said tap handle (4) is in said second position causing said inner volume of said inner space to be substantially reduced as compared to said inner volume of said inner space when said tap handle (4) is in said first position. 35
10. The valve element (20<sup>iv</sup>) according to claim 3, said sealing closure constituted by an initially biased membrane. 40
11. The valve element (20<sup>iv</sup>) according to claim 10, said membrane being rupturable 45
12. An elastomeric body constituting a blank for producing an elastomeric valve element (20<sup>iv</sup>) to be used in a beverage dispensing assembly according to 50

claim 1, said elastomeric body being initially cast in an elongated cylindrical configuration and comprising:

a top valve part (24<sup>iv</sup>) having an inwardly extending flange (54) and an outwardly protruding bead (18"), said top valve part (24<sup>iv</sup>) being capable of being everted into an inwardly sloping conical surface (58),  
 a central protrusion (50) establishing a recess (19) for cooperating with a flange (42) of a tapping cock (30),  
 a further protrusion (56) for serving as the lowermost body part of the elastomeric valve element (20<sup>iv</sup>),  
 a bottom valve part (22<sup>iv</sup>) being provided with an inwardly protruded flange (52), said inwardly protruded flange (52) of said bottom valve part (22<sup>iv</sup>) being capable of being reverted to catch behind said inwardly protruding flange (54) of said top valve part (24<sup>iv</sup>) for arresting said bottom valve part (22<sup>iv</sup>) within the interior of said elastomeric valve element (20<sup>iv</sup>), and  
 a central part of said elastomeric body located between said central protrusion (50) and said inwardly protruding flange (54), said central part being capable of being compressed.

13. A method of producing an elastomeric valve element (20<sup>iv</sup>) to be used in a beverage dispensing assembly according to claim 1, said method comprising providing an elastomeric body being initially cast in an elongated cylindrical configuration and comprising:

a top valve part (24<sup>iv</sup>) having an inwardly extending flange (54) and an outwardly protruding bead (18"),  
 a central protrusion (50) establishing a recess (19) for cooperating with a flange (42) of a tapping cock (30),  
 a further protrusion (56) for serving as the lowermost body part of the elastomeric valve element (20<sup>iv</sup>),  
 a bottom valve part (22<sup>iv</sup>) being provided with an inwardly protruded flange (52), and  
 a central part of said elastomeric body located between said central protrusion (50) and said inwardly protruding flange (54),  
 said method further comprising performing the steps of:

everting said top valve part (24<sup>iv</sup>) into an inwardly sloping conical surface (58),  
 everting and causing said inwardly protruded flange (52) of said bottom valve part (22<sup>iv</sup>) to catch behind said inwardly protruding flange (54) of said top valve part (24<sup>iv</sup>) thereby arresting said bottom valve part

(22<sup>iv</sup>) within the interior of said elastomeric valve element (20<sup>iv</sup>) and at the same time compressing said central part of said elastomeric body to provide a bellows-shaped biasing element (60),

14. A method of operating a beverage dispensing assembly (1) and a tapping cock including a tapping cock housing (3) and a tap handle (4), said tap handle (4) being operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, said beverage dispensing assembly comprising two separate elements:

i) a dispensing line (10) having a dispensing end and a keg connection end, and  
 ii) an elastomeric valve element (20<sup>iv</sup>) to be positioned and received in said tapping cock housing (3) operated by said tap handle (4) for causing said elastomeric valve element (20<sup>iv</sup>) to be closed in said first position of said tap handle and to be opened in said second position, said elastomeric valve element (20<sup>iv</sup>) being initially cast in an elongated cylindrical configuration and comprising:

a top valve part (24<sup>iv</sup>) having an inwardly extending flange (54) and an outwardly protruding bead (18"), said top valve part (24<sup>iv</sup>) being everted into an inwardly sloping conical surface (58),  
 a central protrusion (50) establishing a recess (19) for cooperating with a flange (42) of said tapping cock (30),  
 a further protrusion (56) serving as the lowermost body part of the elastomeric valve element (20<sup>iv</sup>),  
 a bottom valve part (22<sup>iv</sup>) being provided with a flange (52), said flange (52) of said bottom valve part (22<sup>iv</sup>) being everted and caused to catch behind said inwardly protruding flange (54) of said top valve part (24<sup>iv</sup>) arresting said bottom valve part (22<sup>iv</sup>) within the interior of said elastomeric valve element (20<sup>iv</sup>), and  
 a bellows-shaped biasing element (60) located between said central protrusion (50) and said inwardly protruding flange (54), said bellows-shaped biasing element (60) being compressed,  
 said method comprising the steps of:

operating said handle (34) of said tapping cock (30) from said first position to said second position thereby stretching

said bellows-shaped biasing element (60), allowing said dispensing line (10) to be fully introduced into the interior of said elastomeric valve element (20<sup>iv</sup>) and at the same time opening a passage through said elastomeric valve element (20<sup>iv</sup>), and  
 operating said tap handle (34) from said second position to said first position, thereby causing a shifting of said elastomeric valve element (20<sup>iv</sup>) from said beverage dispensing position to said non-beverage dispensing position.

15. A beverage dispensing assembly (1) to be used in combination with a tapping cock including a tapping cock housing (3) and a tap handle (4) operable between a first position and a second position, said first position constituting a non-beverage dispensing position and said second position constituting a beverage dispensing position, said beverage dispensing assembly comprising two separate elements:

i) a dispensing line (10) having a dispensing end and a keg connection end, and  
 ii) an elastomeric valve element (20<sup>iv</sup>) to be positioned and received in said tapping cock housing (3) operated by said tap handle (4) for causing said elastomeric valve element (20<sup>iv</sup>) to be closed in said first position of said tap handle and to be opened in second position, said elastomeric valve element (20<sup>iv</sup>) being initially cast in an elongated cylindrical configuration and comprising:

a top valve part (24<sup>iv</sup>) having an inwardly extending flange (54) and an outwardly protruding bead (18"), said top valve part (24<sup>iv</sup>) being reverted into an inwardly sloping conical surface (58),  
 a central protrusion (50) establishing a recess (19) for cooperating with a flange (42) of said tapping cock (30),  
 a further protrusion (56) serving as the lowermost body part of the elastomeric valve element (20<sup>iv</sup>),  
 a bottom valve part (22<sup>iv</sup>) being provided with a flange (52), said flange (52) of said bottom valve part (22<sup>iv</sup>) being everted and caused to catch behind said inwardly protruding flange (54) of said top valve part (24<sup>iv</sup>) arresting said bottom valve part (22<sup>iv</sup>) within the interior of said elastomeric valve element (20<sup>iv</sup>), and  
 a bellows-shaped biasing element (60) located between said central protrusion (50) and said inwardly protruding flange (54),

said bellows-shaped biasing element (60)  
being compressed,

said dispensing line (10) being introduced into  
the interior of said elastomeric valve element 5  
(20<sup>iv</sup>) via said top valve part (24<sup>iv</sup>), said bellows-  
shaped biasing element (60) being stretchable  
for opening a through said elastomeric valve el-  
ement(20<sup>iv</sup>)

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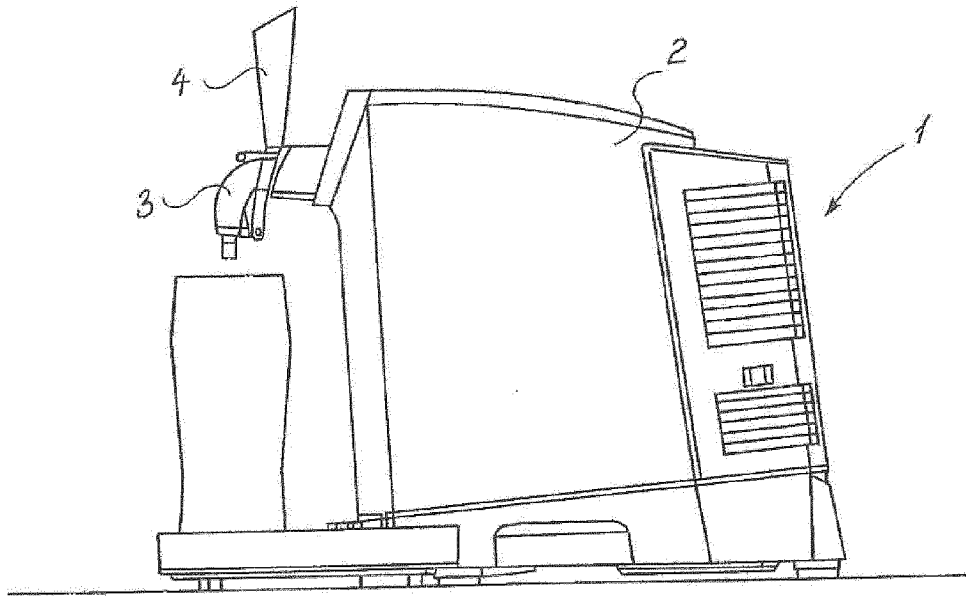


Fig. 1

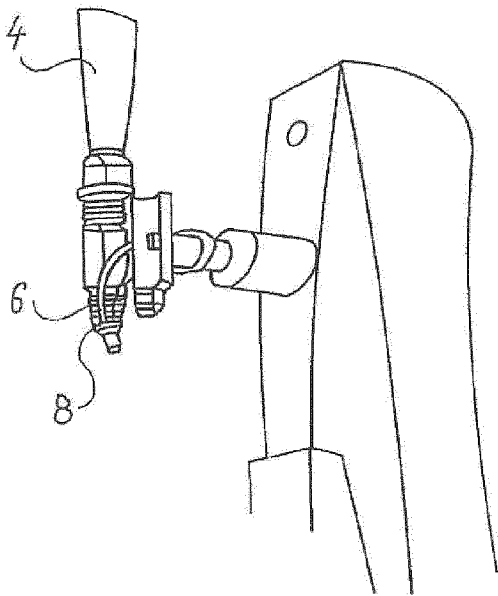


Fig. 2

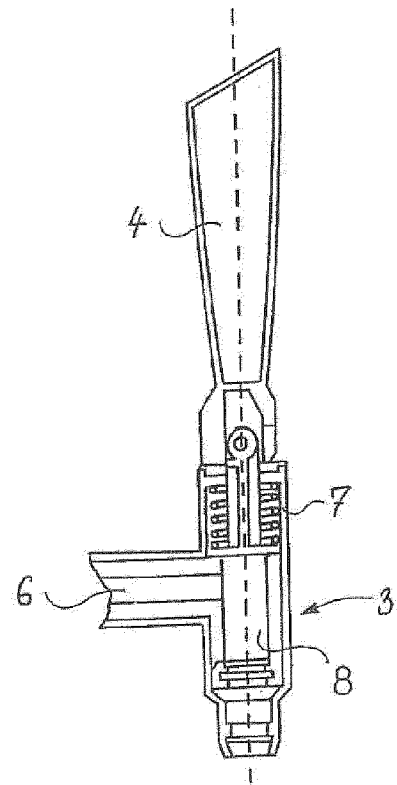


Fig. 3

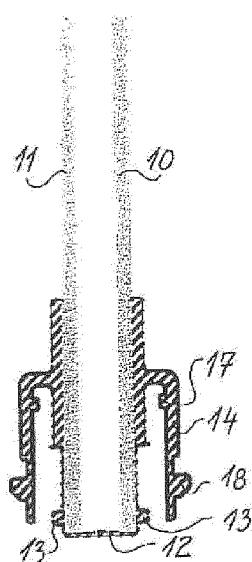


Fig. 4a

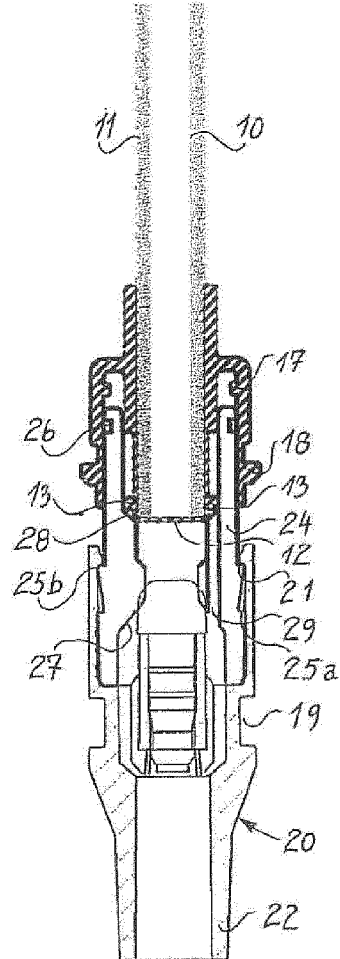
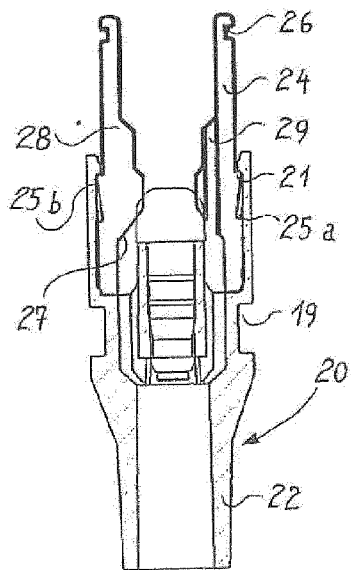
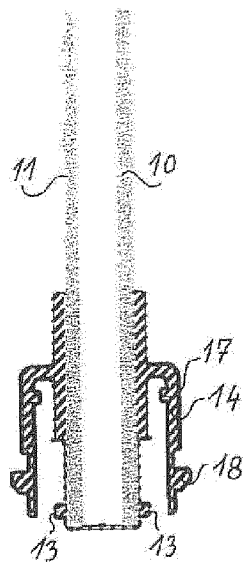


Fig. 4c

Fig. 4b

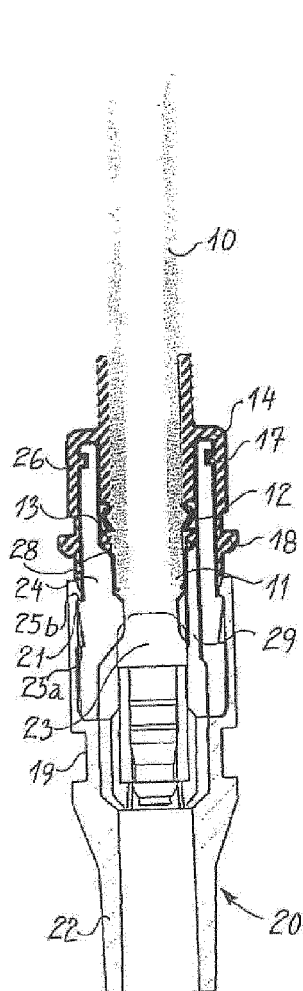


Fig. 4d

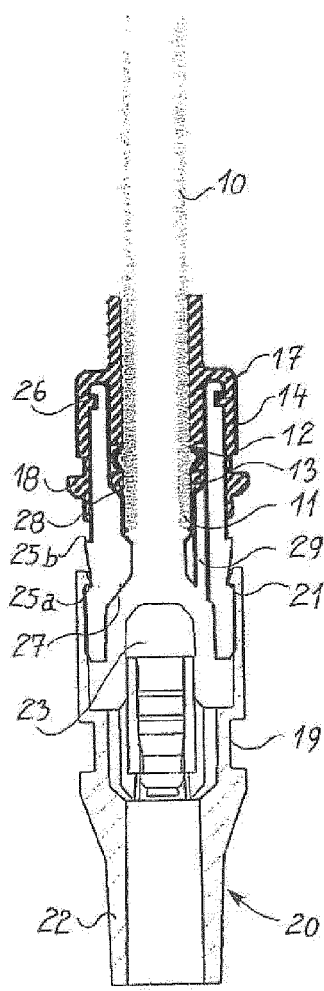


Fig. 4e

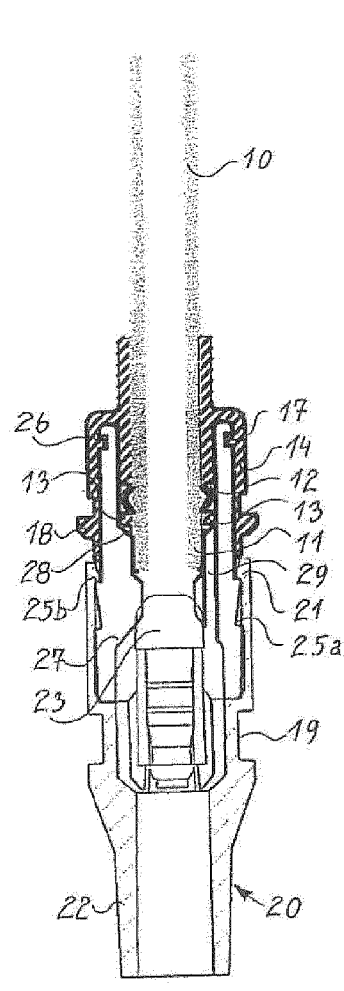


Fig. 4f

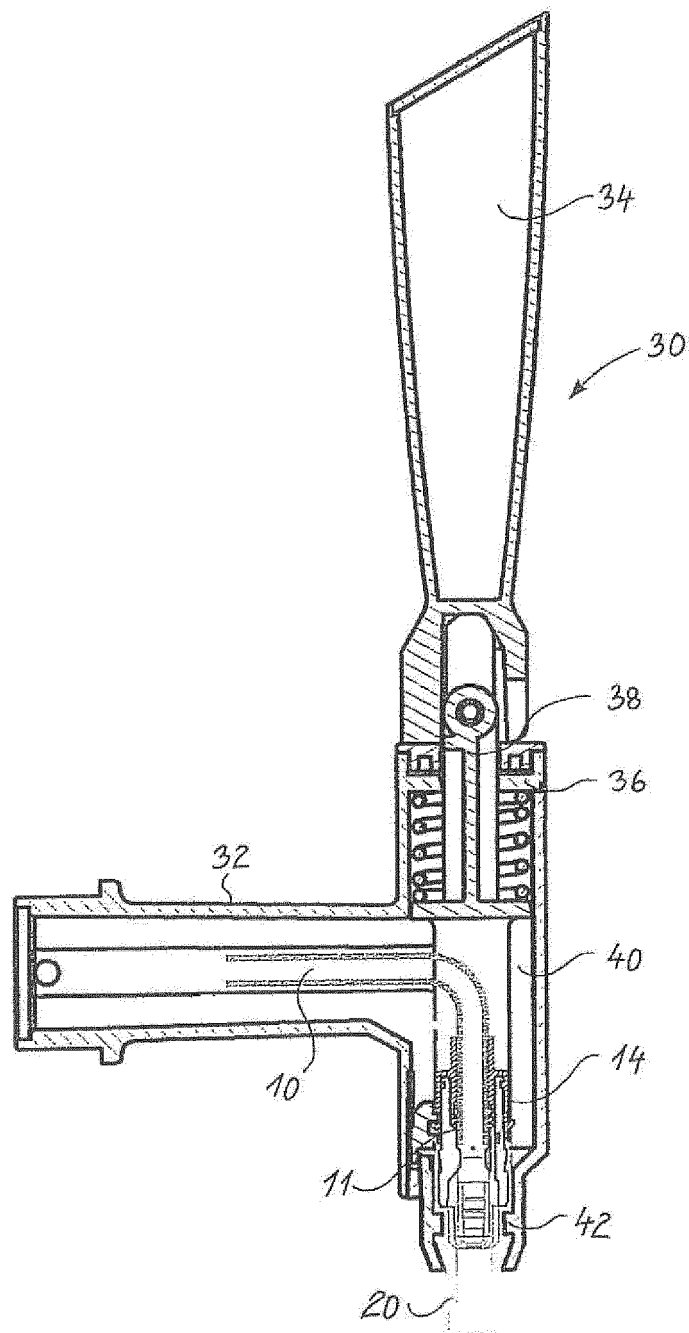


Fig. 4g



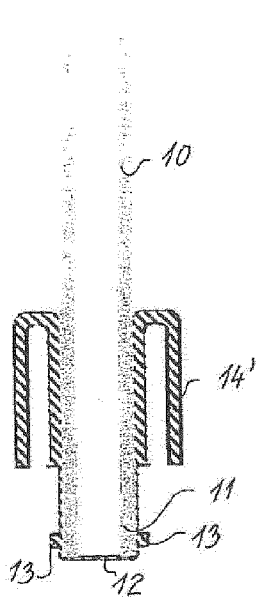


Fig. 5a

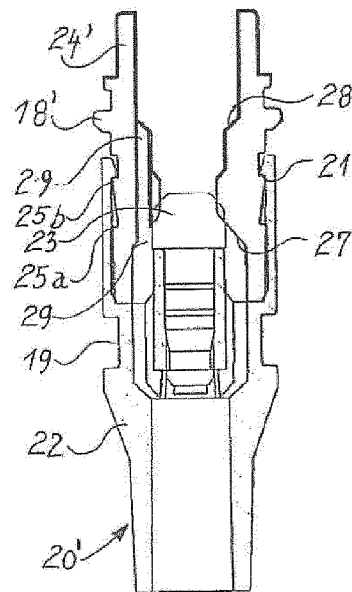
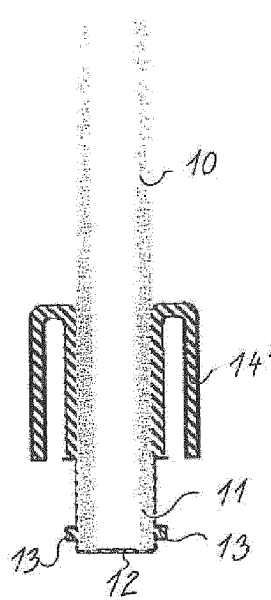


Fig. 5b

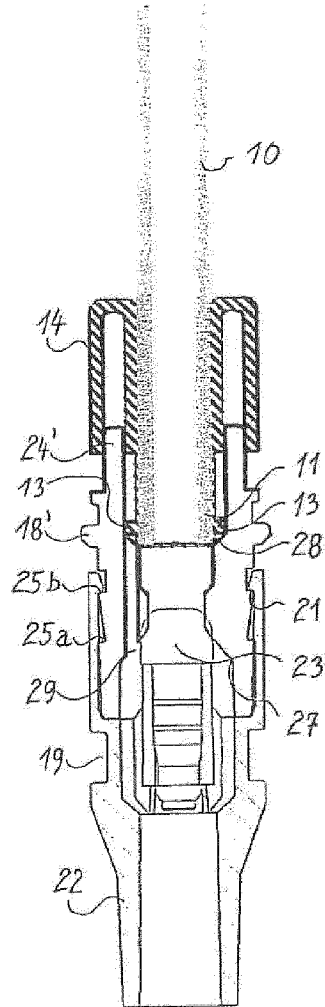


Fig. 5c

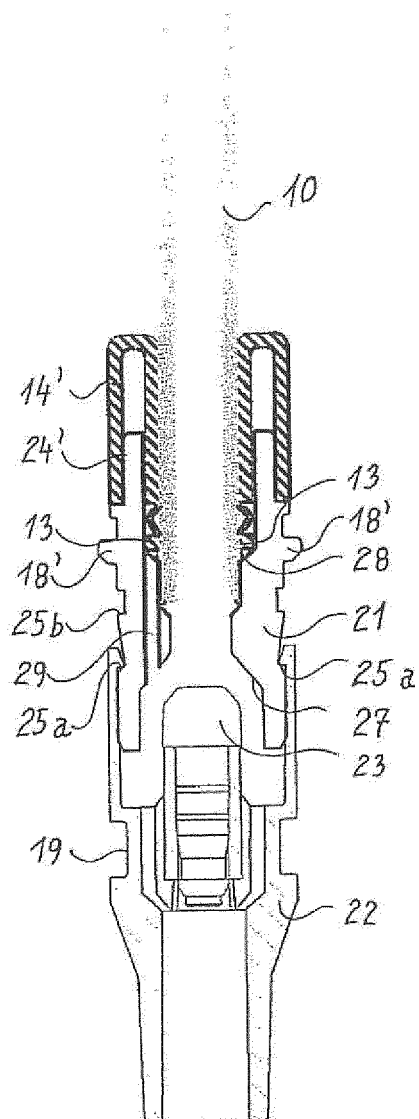


Fig. 5d

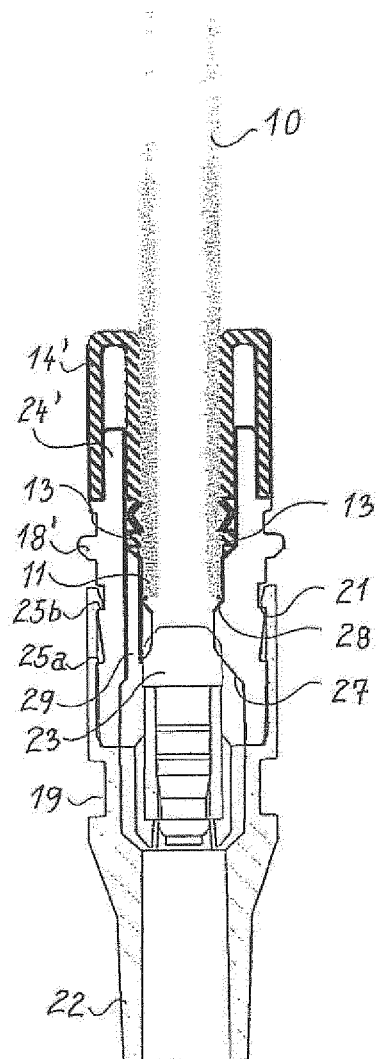
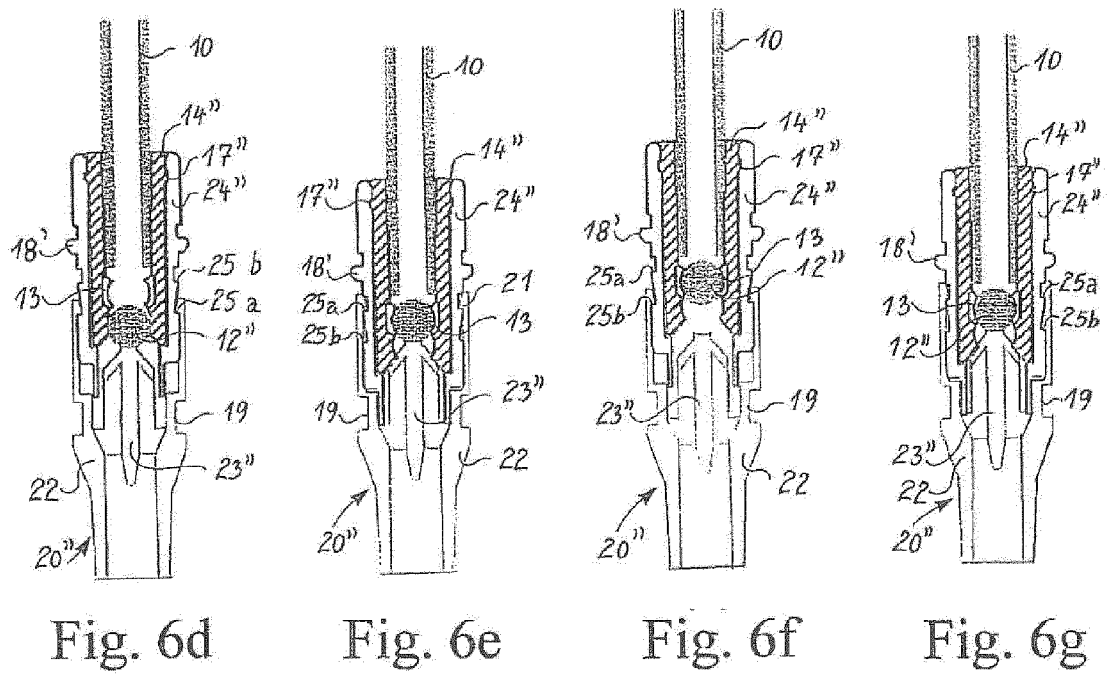
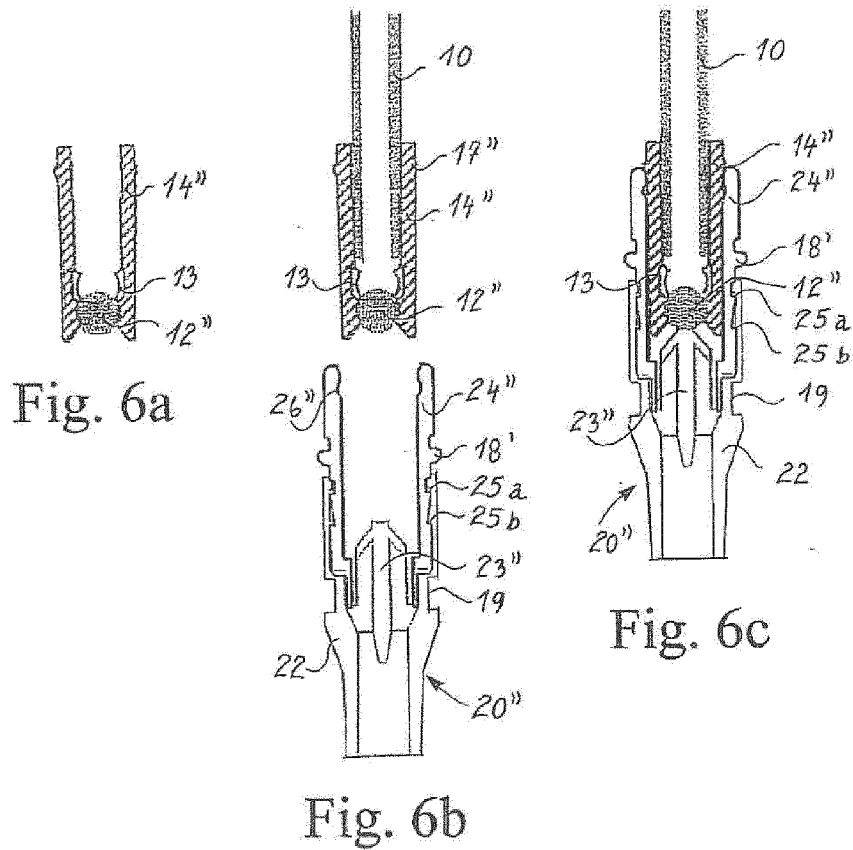


Fig. 5e



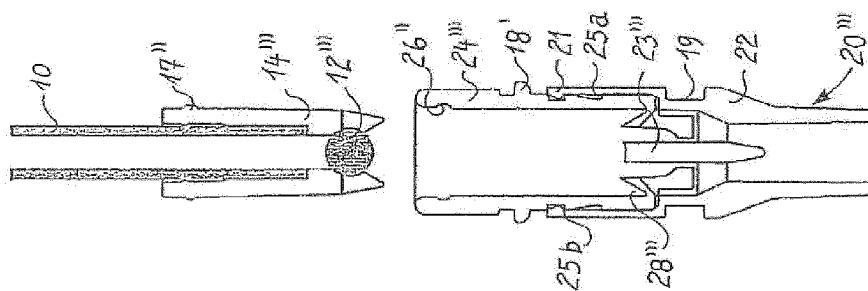


Fig. 7a

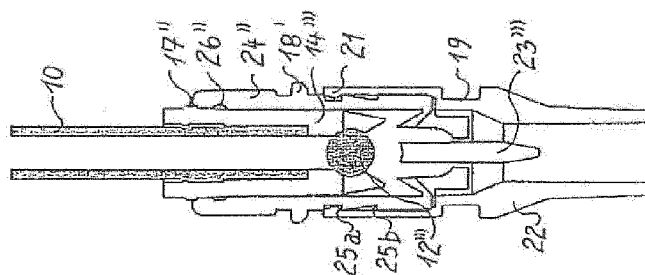


Fig. 7b

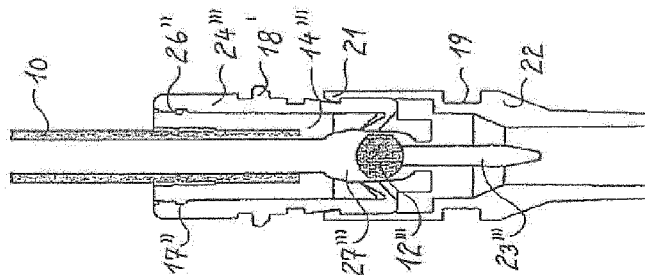


Fig. 7c

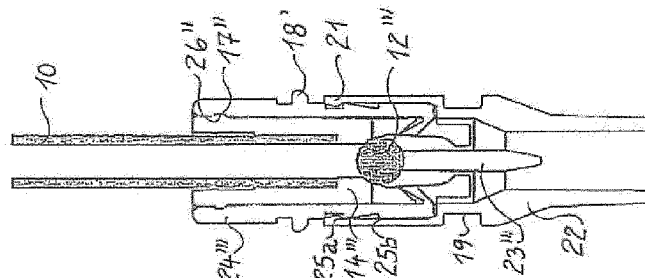


Fig. 7d

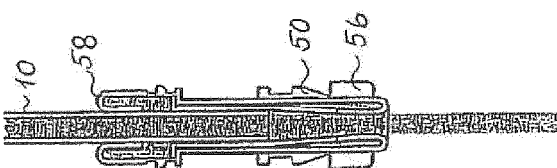


Fig. 8g

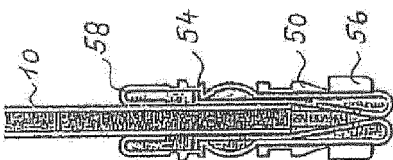


Fig. 8f

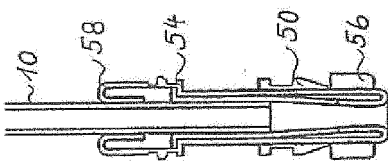


Fig. 8e

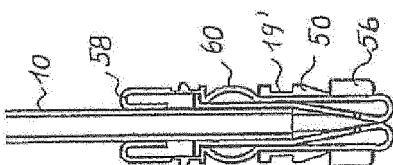


Fig. 8d

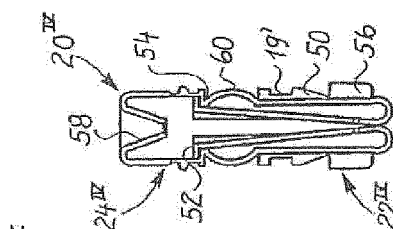


Fig. 8c

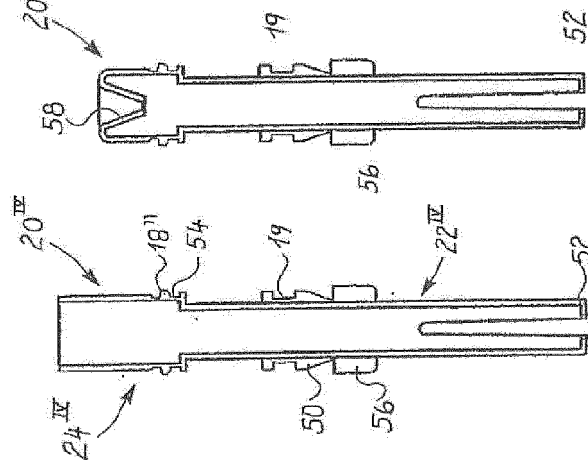
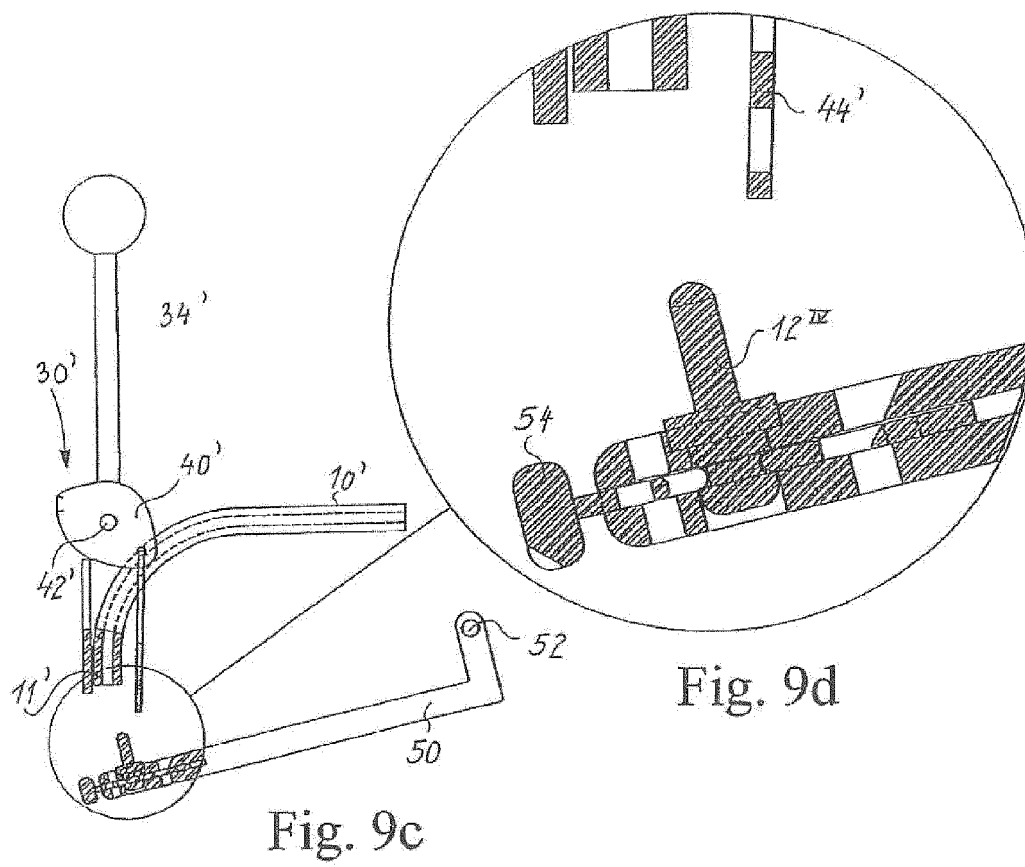
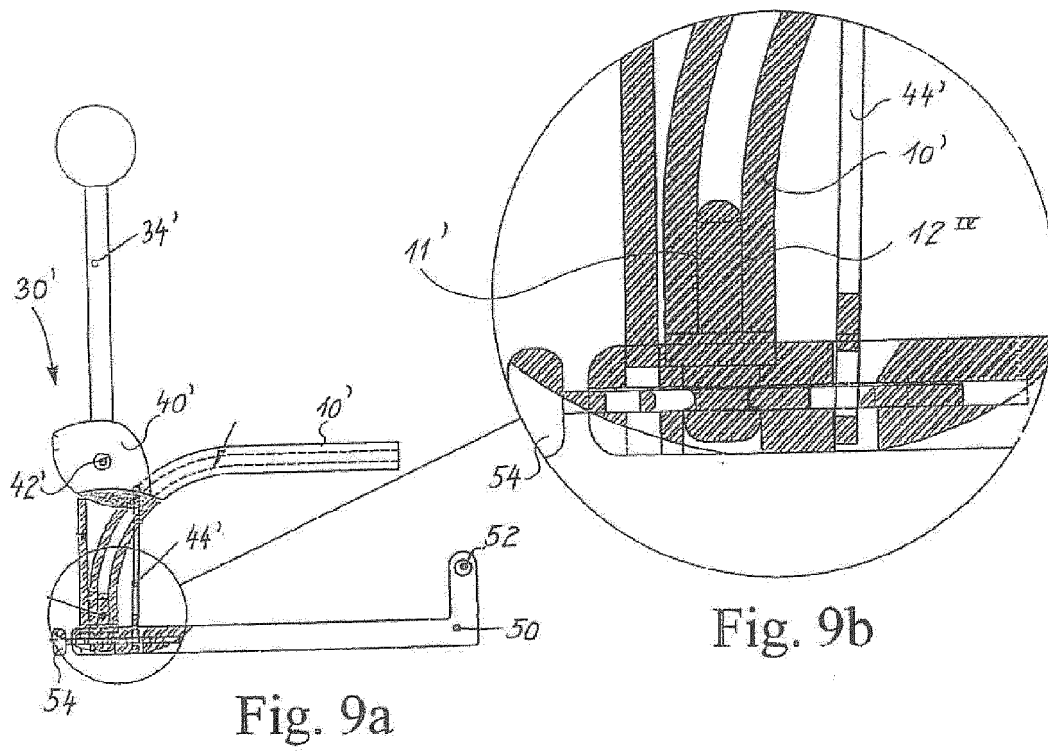


Fig. 8a Fig. 8b



**REFERENCES CITED IN THE DESCRIPTION**

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