

May 29, 1951

J. BOLSEY
INJECTORS AND INJECTING ARRANGEMENTS
FOR STORAGE CONTAINERS

2,554,658

Filed Feb. 14, 1946

2 Sheets-Sheet 1

Fig. 1.

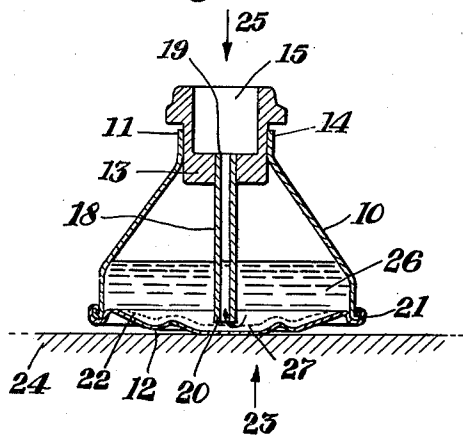


Fig. 2.

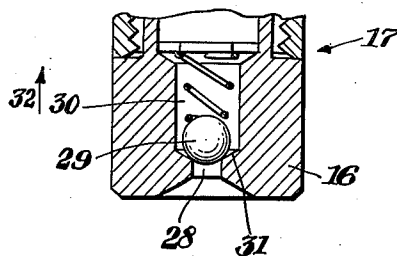


Fig. 3.

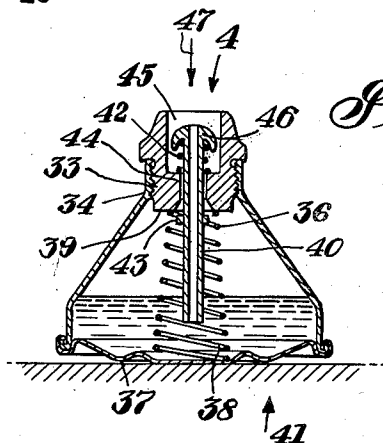


Fig. 4.

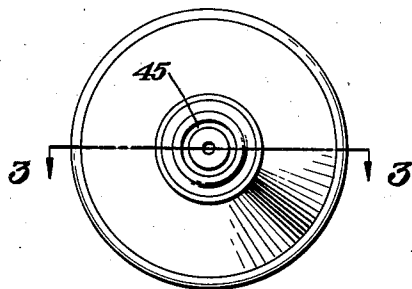
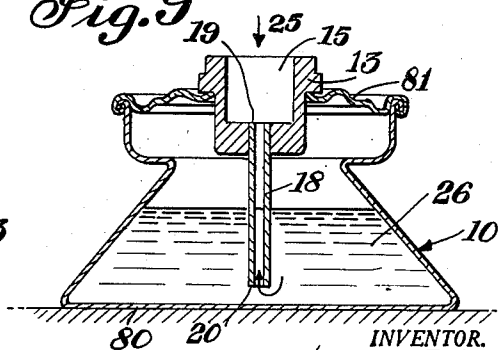


Fig. 9.



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Fig. 5.

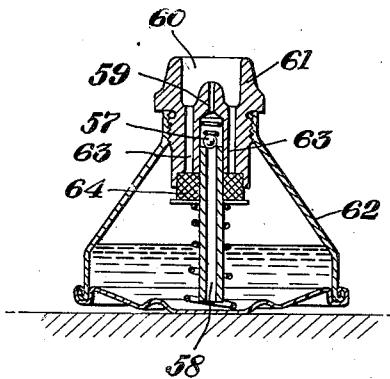


Fig. 6.

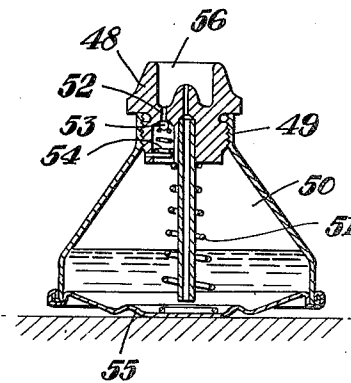


Fig. 7.

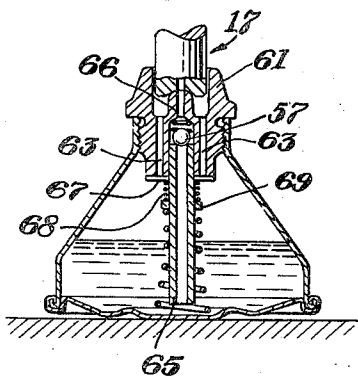
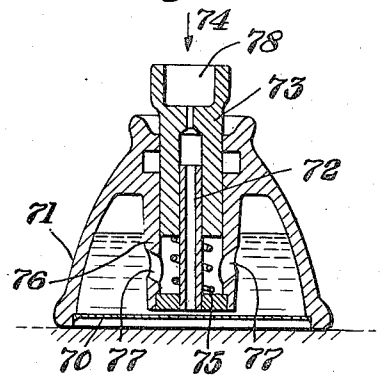


Fig. 8.



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UNITED STATES PATENT OFFICE

2,554,658

INJECTOR AND INJECTING ARRANGEMENT
FOR STORAGE CONTAINERS

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11 Claims. (Cl. 226—65.5)

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The present invention relates to injecting devices for injecting fluids into vials or similar containers, e. g. perfume dispensers, cigarette lighters and fountain pens.

It is an object of my present invention to provide an injecting device which is always ready for operation and can be operated in an extremely simple way.

It is a further object of my present invention to provide an injecting device which can be operated with one hand, without touching the injecting device itself.

Still another object of my present invention consists in an injecting device which injects a fluid into a vial or the like when the same is pressed against the dispensing head of the injector.

Still a further object of my present invention consists in an injecting device without closure means which have to be removed before and replaced after each injecting procedure.

With the above objects in view, my present invention mainly consists of an injecting device comprising in combination an injector container containing the fluid to be injected, an injector head mounted on this container, an injector nozzle arranged in this injector head, and means forcing fluid from the above mentioned injector container through the injector nozzle whenever pressure is exerted against the injector head. As will be explained farther below in detail, this pressure can be exerted by an inlet member forming part of the vial or other container to be filled. Thus, it is possible to fill this vial simply by holding it with one hand and pressing the inlet member forming part thereof against the injector head of the injecting device placed upon a stationary support, e. g. a table.

In accordance with a preferred embodiment of my present invention, I construct the injecting device so that either the injector head mentioned above or the bottom of the injector container are movable into the container itself, so as to decrease the volume of this container; such decrease of volume forces fluid to flow from this container through the injector nozzle and into a vial held against the outer end of this nozzle.

I have found it particularly advantageous to provide my injecting device with an outward projecting membrane serving as the bottom of the container. Bending of this membrane inwards into the container will result in decrease of the volume of the same and force the fluid through the nozzle. It is evident that such bending of the membrane serving as the container

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bottom can be easily attained by placing the entire injecting device on a stationary support in such a manner that the container rests on the outward bent membrane bottom and then pressing the entire device against the support. This will result in inward bending of the membrane bottom and ejection of fluid through the nozzle in the container head.

It is evident that the downward pressure necessary for inward bending of the membrane bottom can be obtained by holding the vial to be filled and pressing it against the injector head at the top of the injector container. This will result in downward movement of the entire injecting device, inward bending of its membrane bottom and ejection of fluid through the nozzle in the container head; this fluid will be directly injected into the vial placed upon the container head.

The novel features which I consider as characteristic for my invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is an elevational section of an injecting device according to my present invention;

Fig. 2 is an elevational section through the bottom portion of a vial to be filled;

Fig. 3 is an elevational section of a modified embodiment of the injecting device shown in Fig. 1, along line 3—3 of Fig. 4;

Fig. 4 is a top view of the injecting device shown in Fig. 3, seen in direction of arrow 4 of Fig. 3;

Fig. 5 is an elevational section of a farther modified embodiment of the injecting device shown in Fig. 1;

Fig. 6 is an elevational section through a further modified embodiment of the injecting device shown in Fig. 1;

Fig. 7 is an elevational cross section of another modified embodiment of the injecting device shown in Fig. 1; and

Fig. 8 is an elevational cross section of still another modified embodiment of the injecting device shown in Fig. 1; and

Fig. 9 is an elevational cross section of still another modified embodiment of the injecting device shown in Fig. 1.

The injecting device shown in Fig. 1 consists of an injector container 10 being open at its top

11, and provided with a flexible membrane bottom 12 which will be described below in detail.

The open top 11 of container 10 is closed by a container head 13 which tightly fits into the cylindrical wall portion 14 of the container 10 so as to prevent escape of air and fluid contained in the container between the container head 13 and the cylindrical wall portion 14 surrounding the same.

The container head 13 is provided with a depression 15 for receiving the inlet member 16 of the vial 17 partly shown in Fig. 2. This depression 15 is connected with the inside of container 10 by the tubular member 18 which reaches at its top indicated by 19 into depression 15. The bottom end 20 of this tubular member 18 is near the membrane bottom 12 of container 10.

The flexible membrane bottom 12 mentioned above is secured to the circular edge 21 of container 10 so as to project downward beyond this edge. This bottom 12 consists of flexible material so as to be adapted to be pressed inward into the position indicated by dotted lines 22 when pressure is exerted against it in direction of arrow 23. It is evident that such pressure can be exerted not only by pressing directly against the bottom, but also by placing the entire container on a stationary support indicated by numeral 24 and pressing in direction of arrow 25 against the container head 13.

It is also evident that compression, i. e. upward bending of the flexible membrane bottom 12 into the position indicated by dotted lines 22 will result in decrease of the volume of container 10 which, in turn, will force fluid 26 contained in this container 10 into the tubular member 18 as indicated by arrow 27 and through this tubular member 18 into depression 15.

The fluid ejected through the tubular member 18 into depression 15 will be injected directly into the inlet opening 28 provided in the bottom of the inlet member 16 forming part of the vial 17 shown in Fig. 2. This inlet opening is closed by a valve ball 29 pressed by valve spring 30 against seat 31. It is evident that if the valve spring 30 is weak enough, the pressure of the fluid 26 ejected through the tubular member 18 will force the valve ball 29 in direction of arrow 32 against action of valve spring 30 and thus free the opening 28 for passage of fluid 26 into vial 17.

It should be stressed that the downward pressure which has to be exerted in direction of arrow 25 so as to bend bottom 12 into its position indicated by dotted lines 22 can be obtained by holding vial 17, inserting its inlet member 16 into depression 15 and pressing the vial downward in direction of arrow 25. This will result in ejection of fluid through the tubular member 18 which will, in turn, be injected directly into the inlet opening 28 of the vial 17 while the same is pressed downward.

The relatively simple embodiment shown in Fig. 1 is satisfactory in many cases, particularly if a small amount of fluid has to be injected and if the bottom end of the vial completely fits into the depression 15 so that the entire fluid ejected through the tubular member 18 is injected into the vial. However, in the event that the container head 13 has to be pressed downward several times and the vial does not fit perfectly into depression 15 in the container head 13, it is advisable to provide separate means enabling the return of the fluid from depression 15 into container 10.

In Fig. 3 I have shown a preferred embodiment of my invention which is equipped with separate means for return of the fluid into the container. In this embodiment, the container head 33 is screwed as indicated by numeral 34 into a screw threaded cylindrical portion 35 of container 36. The membrane bottom 37 of container 36 is pressed downward by means of spring 38 arranged between this membrane bottom and the face 39 of the container head 33.

A tubular hole is provided in the container head 34 and in this hole a slidable tubular member 40 is arranged. This slidable tubular member 40 is pressed upward in direction of arrow 41 by means of the relatively weak spring 42 arranged as shown in Fig. 3. In order to prevent this tubular member 40 from moving higher than shown in this figure, projecting pins 43 are secured to it; these projecting pins abut in the position shown against the container head 33.

In accordance with my present invention, I provide in the wall of the hole through which tubular member 40 is passing several grooves 44 through which fluid can flow back from the depression 45 into the container 36. In order to prevent fluid from passing through these grooves 44 from container 36 into the depression 45 during operation of the device, I provide at the top of the slidable tubular member 40 a mushroom-shaped head 46 which, when pressed downward, completely closes the upper open ends of the grooves 44.

This injecting device is operated in the same way as the injecting device shown in Fig. 1: The only difference is that when vial 17 is inserted with its inlet member 16 into the depression 45 and pressed downward in direction of arrow 47, the bottom of the vial will first press against the mushroom-shaped head 46 of the tubular member 40 and press the same downward until the upper ends of the grooves 44 are closed and only then will the membrane bottom 37 of the container 36 be compressed in the same way as described above in connection with Fig. 1.

Thus, during the actual injection process the grooves 44 are closed. When the injection process is finished and the vial to be filled is lifted in direction of arrow 41, the spring 42 will move the tubular member 40 and its head 46 into the position shown in Fig. 3, thus freeing the grooves 44 and enabling return of fluid from the depression 45 into the container 36.

The embodiment shown in Fig. 6 is similar to the one shown in Fig. 1. The only difference is that the container head 48 is screwed into the upper cylindrical portion 49 of the container 50, that a spring 51 is provided in the same way as shown in Fig. 3, and that a separate return hole 52 combined with a spring valve 53 is arranged in the container head 48. The spring 54 forming part of the spring valve 53 is so weak that the vacuum created in container 50 during return of the membrane bottom 55 from its compressed into its expanded position is sufficient to open the spring valve 53 and enable return of fluid from the depression 56 in the container head 48 into the container 50.

The modified injecting device shown in Fig. 5 is also similar to the above described injectors. However, it is equipped with a spring valve 57 arranged between the stationary tubular member 58 and the outlet nozzle 59 leading into the depression 60 in container head 61. This spring valve 57 prevents the fluid from flowing back from the vial 17 to be filled into the container

62, if at the end of an injection period the spring operated valve ball 29 does not close immediately the inlet opening 28 at the bottom of vial 17.

Furthermore, the modified injector shown in Fig. 5 is not equipped with any closing means of the type shown in Fig. 3 or valve means of the type shown in Fig. 6 for the conduits 63 provide for return of fluid from depression 60 into container 62; instead of such closing or valve means. A stationary felt ring 64 is arranged as shown in this figure, permanently pressing against the open ends of the mentioned conduits 63. This felt ring on the one hand prevents escape of fluid through the conduits 63 during the injection periods and on the other hand absorbs the fluid returning through these conduits 63 between these injection periods.

The modified injecting device shown in Fig. 7 is similar to the injectors shown in Figs. 5 and 6: it combines a spring valve 57 arranged between the stationary tubular member 65 and the outlet nozzle 66, with valve means for closing the lower ends of the conduits 63 provided in the container head 61. These valve means at the lower ends of the conduit 63 serve the same purpose as the spring valve 53 in the injecting device shown in Fig. 6. The only difference is that these valve means consist of a valve washer 67 pressed by the weak valve spring 68 against the bottom face of container head 61. This valve spring 68 abuts, as shown, against the ring 69 secured to the stationary tubular member 65. In this embodiment, the vial 17 is shown in operative position, pressing against the container head 61.

The injecting device shown in Fig. 8 differs in various respects from the above described embodiments of my present invention: The main difference is that the bottom 70 of the container 71 is not bent outward and is not flexible. It does not have an effect upon the injecting process.

The pressure necessary for ejecting fluid through the stationary tube 72 is obtained by provision of a slidable container head 73 which can be pressed downward in direction of arrow 74 against action of spring 75. This slidable container head slides in a cylindrical cylinder 76 arranged inside of the container 71 and provided with openings 77 communicating with the space within the container 71.

This injecting device is operated by placing the lower end of vial 17 shown in Fig. 2 into the depression 78 and pressing it downward, thus moving the entire container head 73 in direction of arrow 74. This results in forcing of fluid from cylinder 76 through the openings 77 into the space within container 71; this, in turn, results in increase of pressure within this container and ejection of fluid through the tubular member 72 into depression 78 and injection of this fluid into the inlet opening 28 of vial 17.

In Fig. 9 I have shown still another embodiment of my new injecting device. The same is very similar to the one shown in Fig. 1. The only difference is that the flexible membrane does not form the bottom of the container 10 but is arranged at the top of the container surrounding the container head 13.

As clearly shown, the bottom 80 of container 10 is absolutely rigid and a separate membrane 81 is secured with its outer edge to the top edge of the side wall of container 10 and with its inner edge to the container head 13. It is evident that pushing down of container head 13 will result in ejection of fluid through the nozzle in the container head.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of injecting devices differing from the types described above.

While I have illustrated and described the invention as embodied in injecting devices for injecting fluids into vials, particularly perfume containers, fountain pens and cigarette lighters, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. Injecting device comprising an injector container containing the fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet portion of the container into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, an injector conduit extending inside said injector container from said injector nozzle to a point near the bottom of said container, and a flexible membrane forming part of the wall of said container and being movable relative to said container in such a manner as to reduce the volume of said container when pressed inward so as to force fluid contained in said container through said injector conduit and said nozzle into said depression in said injector head and said container into which said fluid has to be injected.

2. Injecting device comprising an injector container containing the fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet portion of the container into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, an injector conduit extending inside said injector container from said injector nozzle to a point near the bottom of said container, and a bottom member forming part of the wall of said container and arranged opposite said injector head mounted on top of said injector container, said bottom member of said injector container being movable relative to said container in such a manner as to reduce the volume of said container when it is pressed inward so as to force fluid contained in said container through said injector conduit and said nozzle into said depression in said injector head and said container into which said fluid has to be injected.

3. Injecting device comprising an injector container containing the fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet portion of the container into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, an injector conduit extending inside said injector

container from said injector nozzle to a point near the bottom of said container, and an outward projecting flexible membrane forming the bottom of said injector container and arranged opposite said injector head, said outward projecting flexible membrane being constructed so as to be moved relative to said container into the same decreasing the volume of said container whenever said container is pressed downward by exerting pressure against said injector head, said decrease of volume of said container forcing fluid contained in said container through said injector conduit and said nozzle into said depression in said injector head and said container into which said fluid has to be injected.

4. An injecting device comprising an injector container containing fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet member forming part of a vial into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, means forcing fluid from said injector container through said injector nozzle whenever pressure is exerted against said injector head, and a return opening connecting said depression in said injector head with the inside of said injector container so as to enable return of fluid not injected into said vial from said depression into said injector container.

5. An injecting device comprising an injector container containing fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet member forming part of a vial into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, means forcing fluid from said injector container through said injector nozzle whenever pressure is exerted against said injector head, a return opening connecting said depression in said injector head with the inside of said injector container so as to enable return of fluid not injected into said vial from said depression into said injector container, and valve means combined with said return opening preventing fluid from passing through said opening from said injector container into said depression in said injector head.

6. An injecting device comprising an injector container containing fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet member forming part of a vial into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, means forcing fluid from said injector container through said injector nozzle whenever pressure is exerted against said injector head, a return opening connecting said depression in said injector head with the inside of said injector container so as to enable return of fluid not injected into said vial from said depression into said injector container, and means automatically closing said return opening while said inlet member forming part of said vial is arranged in operative filling position in said depression in said injector head.

7. An injecting device comprising an injector container containing fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet member forming part of a vial

into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, means forcing fluid from said injector container through said injector nozzle whenever pressure is exerted against said injector head, a return opening connecting said depression in said injector head with the inside of said injector container so as to enable return of fluid not injected into said vial into said injector container, and valve means arranged in said container head and automatically closing said return opening while said inlet member forming part of said vial is arranged in operative filling position in said depression in said injector head exerting pressure against the same.

8. Injecting device comprising an injector container containing the fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits an inlet portion of the container into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, an outward projecting flexible membrane forming the bottom of said injector container and arranged opposite said injector head, and spring means tending to force said outward projecting flexible membrane outward in direction away from said injector head, said outward projecting flexible membrane being constructed so as to move against action of said spring means into said container decreasing the volume of the same, whenever said container is pressed downward by exerting pressure against said injector head, said decrease of volume of said container forcing fluid into said depression in said injector head and said container into which said fluid has to be injected.

9. An injecting arrangement comprising in combination a vial to be filled, an inlet member forming part of said vial, an inlet opening in said inlet member, an inlet valve in said inlet member combined with said inlet opening, an injector container containing the fluid to be injected, an injector head mounted on top of said injector container, a depression in said injector head into which fits said inlet member forming part of said vial into which said fluid has to be injected, an injector nozzle connecting the inside of said injector container with said depression in said injector head, an injector conduit extending inside said injector container from said injector nozzle to a point near the bottom of said container, an outward projecting flexible membrane forming the bottom of said injector container and arranged opposite said injector head, said outward projecting flexible membrane constructed so as to move relative to said container into the same decreasing its volume whenever said container is forced downward by pressure exerted against said injector head by means of said inlet member of said vial inserted into said depression in said injector head, said decrease of volume of said injector container forcing fluid contained in said container to flow through said injector conduit and said injector nozzle into said depression in said injector head and into said inlet opening in said inlet member of said vial.

10. An injecting arrangement comprising in combination a storage container to be filled; an inlet member forming part of said storage container; an inlet opening in said inlet member; an injector container containing the fluid to be

injected; an injector head mounted on top of said injector container and adapted to be placed into contact and cooperate with said inlet member of said storage container to be filled; an injector conduit extending inside said injector container from a point near the bottom of said injector container into said injector head and being open at its upper end so that said upper open end of said injector conduit communicates with said inlet opening in said inlet member when said injector head is in contact and cooperates with said inlet member; an outward projecting flexible membrane forming the bottom of said injector container and arranged opposite said injector head, said outward projecting flexible membrane constructed so as to move relative to said injector container into the same decreasing its volume whenever said injector container is forced downward by pressure exerted against said injector head by means of said inlet member of said storage container placed into contact and cooperating with said injector head, said decrease of volume of said injector container forcing fluid contained in said injector container to be injected and flow through said injector conduit into said inlet opening in said inlet member of said storage container.

11. An injecting arrangement comprising in combination a storage container to be filled; an inlet member forming part of said storage container; an inlet opening in said inlet member; an injector container containing the fluid to be injected; an injector head mounted on top of said injector container and adapted to be placed into contact and cooperate with said inlet member of said storage container to be filled; an injector conduit extending inside said injector container from a point near the bottom of said injector container into said injector head and being open at its upper end so that said upper open end of

said injector conduit communicates with said inlet opening in said inlet member when said injector head is in contact and cooperates with said inlet member forming part of said storage container; and a flexible wall portion forming part of the wall of said injector container constructed so as to be adapted to move relative to said injector container into the same, decreasing its volume whenever said injector container is forced downward by pressure exerted against said injector head by means of said inlet member of said storage container placed into contact and cooperating with said injector head, said decrease of volume of said injector container forcing fluid contained in said injector container to be injected and flow through said injector conduit into said inlet opening in said inlet member of said storage container.

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