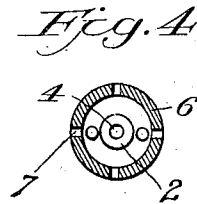
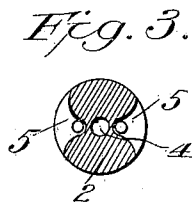
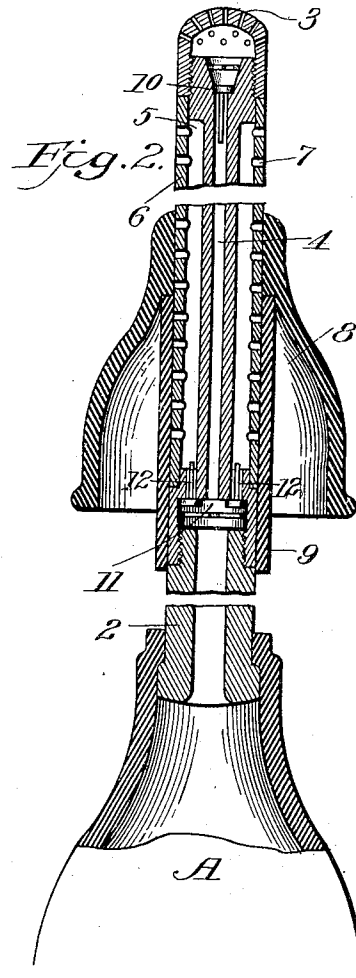
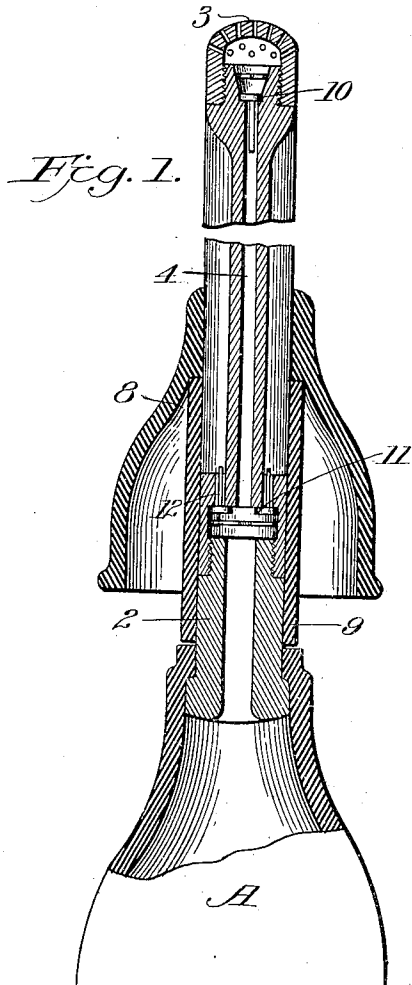


No. 890,990.

PATENTED JUNE 16, 1908.

A. E. MACDONALD.  
SYRINGE.

APPLICATION FILED MAR. 4, 1907.



Inventor

Witnesses  
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his Attorney

# UNITED STATES PATENT OFFICE.

ALBERT E. MACDONALD, OF SAN FRANCISCO, CALIFORNIA.

## SYRINGE.

No. 890,990.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed March 4, 1907. Serial No. 360,457.

*To all whom it may concern:*

Be it known that I, ALBERT E. MACDONALD, citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Syringes, of which the following is a specification.

My invention relates to improvements in syringes.

10 It consists in the combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

15 Figure 1 is a longitudinal section of one form of my device. Fig. 2 is a similar section showing a modified form. Fig. 3 is a cross-section of the tubular shank 2 of Fig. 1. Fig. 4 is a cross-section of the shank of Fig. 2.

20 It is the object of my invention to provide a compression bulb syringe, with means for circulating the fluid therethrough, and means for adjusting which will be more fully described hereafter.

25 The bulb A is of the compression type, and may represent any forcing device which can be used in this connection. Connected with the end of the bulb is the tubular structure 2 of sufficient length, and having the upper or outer end provided with perforations 3, which  
30 serve as a spray device through which the fluid is forced by compression of the bulb. This tubular shank 2 is so constructed that the fluid is forced through it through a central passage 4 of smaller diameter than the  
35 exterior of the tube, and exterior to this central passage, spaces 5 are provided for the return of the fluid. These spaces may either be in the form of grooves or channels upon opposite sides of the tubular portion 4, as shown  
40 in Fig. 1, or the main exterior inclosing tube 6 may be continued in its cylindrical form around the central tube 4, and this exterior tube has perforations made in it as at 7, through which the fluid which has been expelled  
45 through the spray perforations 3, will be drawn back into the return passages 5, and thence returned into the bulb by the following means: Exterior to the return portion of the device is a bell-shaped shell 8, the  
50 upper part of which fits snugly around the exterior tube, and the lower part diverges so that where injections are to be made into any cavity, the discharge end or nozzle being introduced, this flaring or bell-shaped part  
55 forms a closure for the outer portion of the cavity, and thus prevents any of the fluid

which has been discharged from the spray passages from returning outside of the tubular shank.

In the device as shown in Fig. 1, a preferably flexible tube 9 is fitted around the outside of the nozzle, and may extend down so as to meet the end of the bulb into which the nozzle tube or its extension is fitted. This forms a closure of the open passages 5, as  
60 shown in Fig. 1, and of the perforations 7 as shown in Fig. 2, which are within the bell-shaped device.

In order to provide for the alternate ejection and return of the fluid, I have shown  
65 valves as follows: In the outer end of the central discharge passage 4, and just within the spray openings is an outwardly opening valve 10. This valve closes inwardly so that after fluid has been ejected by the compression of the bulb A, or the operation of any  
70 equivalent forcing device, this valve will close when the bulb expands, and prevent any return of fluid in that direction. The fluid which has been ejected into the cavity  
75 will flow down around the outside of the exterior tube, and will be prevented from leaking out, or discharging from the cavity by the bell-shaped hood 8, previously described. The expansion of the bulb produces a vacuum  
80 which draws the fluid into the open channels 5, as shown in Fig. 1, or through the openings 7 of the cylindrical portion, as shown in Fig. 2.

11 are valves which open from the lower  
85 end of this tubular portion, and into that part of the passage leading into the bulb A, so that the expansion of the bulb producing the vacuum as before described, will draw the fluid in through these valves 11, and return it to the bulb. Another compression  
90 of the bulb again ejects the liquid through the spray openings 3, and its expansion again returns the liquid which can be circulated as many times as may be found desirable.

100 The hood 8 is slidable upon the outside of the main tube, and may be moved as near to or far from the discharge end as may be found necessary to fit and close the cavity which is being treated, and the inclosing tubes 9 are  
105 slidable in unison with the hood; these tubes having a sufficient length below the return passages 5 and connected openings to close that portion of the main tube. These parts may be made of hard rubber, or other suitable material; the spray cap may be screw-  
110 threaded to fit upon the outer end of the cen-

tral tube which is expanded in diameter for that purpose.

The perforated or channeled exterior portion, or tube, in a similar manner has its 5 outer end registering and flush with the exterior of this cap, and its inner end internally screw-threaded to fit the part 12 which carries the valves 11; and this in turn may be screw-threaded to fit a shoulder upon the 10 base 2 of the central tube, and to be flush therewith; this central tube being secured within the end of the bulb A by enlargement in the usual manner, or by other suitable means.

15 Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a syringe, the combination of fluid-forcing means, a tube connecting therewith 20 and having spray openings in its outer end, a valve in the outer end of the tube beneath said spray openings, said tube having a longitudinally-extending return passage upon each side, and means forming a closure for 25 said return passages and adapted to vary the inlet thereto, said means comprising a hood

inclosing the tube and passages and slidably mounted on said tube, and valve-controlled passages connecting the inner end of said return passages with the interior of the fluid 30 forcing means.

2. In a syringe, the combination of fluid-forcing means, a tube connecting therewith and having passages extending along its opposite sides exterior to the main passage and 35 opening through said sides for substantially the entire length thereof, said tube having spray openings in its outer end and having an inwardly closing valve beneath said openings, a closure for said side passages said clo- 40 sure slidable on the tube and adapted to vary the inlet to said side passages, and valve-controlled passages connecting the inner end of the side passages with the interior of the fluid forcing means. 45

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALBERT E. MACDONALD.

Witnesses:

S. H. NOURSE,

FREDERICK E. MAYNARD.