

No. 885,224.

PATENTED APR. 21, 1908.

L. BUEHLER.

AUTOMATIC INJECTOR.

APPLICATION FILED JULY 17, 1903. RENEWED JULY 11, 1907.

Fig. 2.

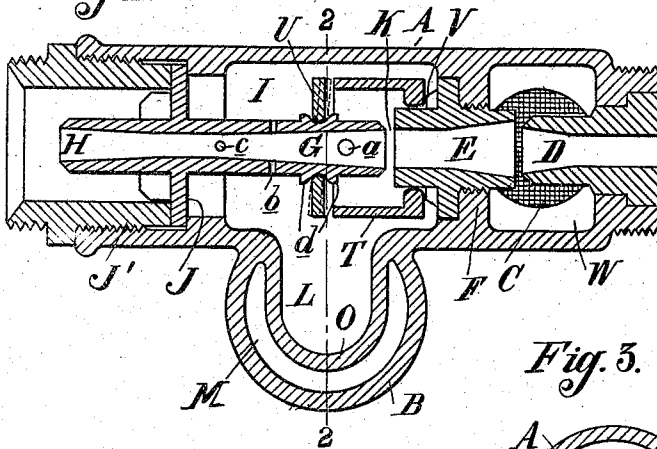


Fig. 3.

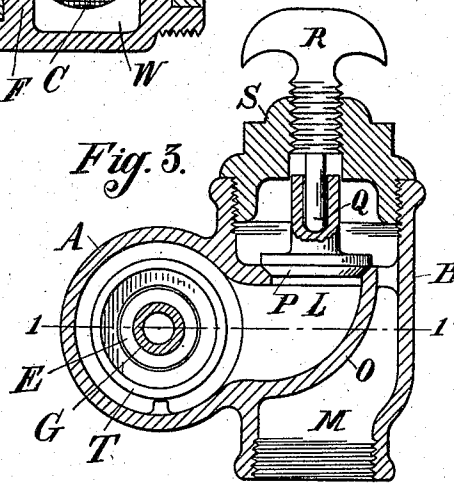
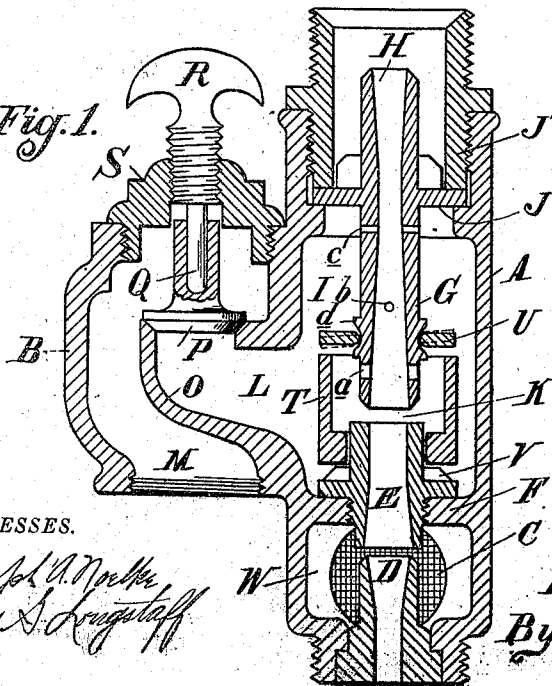


Fig. 1.



WITNESSES.

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LOUIS BUEHLER, OF DETROIT, MICHIGAN.

AUTOMATIC INJECTOR.

No. 885,224.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed July 17, 1903, Serial No. 165,902. Renewed July 11, 1907. Serial No. 383,318.

To all whom it may concern:

Be it known that I, LOUIS BUEHLER, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Injectors, of which the following is a specification, reference being had therein to the accompanying drawings.

10 My invention relates to that class of automatic injectors which are self-starting and re-starting. The distinguishing feature of this class is that in addition to the ordinary overflow check valve into the atmosphere they are provided with an interior check valve adapted to control the overflow from the mouth of the combining tube.

15 My invention consists in the novel construction and arrangement of this valve whereby it performs a new and novel function which improves the starting and re-starting quality of the injector, and also adds to the lifting power thereof, all as more fully hereinafter described and shown in the accompanying drawings, in which;

20 Figure 1, is a vertical central section through an injector of the vertical type embodying my invention; Fig. 2, a section on the line 1—1 of Fig. 3, through an injector of the horizontal type embodying my invention; Fig. 3, a section on the line 2—2 of Fig. 2, looking to the right.

30 A is the casing which is substantially of tubular form inclosing the jets and provided with a branch B for the overflow.

C is the inlet port for the water.

D is the steam jet, E is the lifting tube, F a partition in which the lifting tube is secured.

40 G is the combining tube and H the delivery tube, the two latter being preferably made in one piece and secured in the casing by means of an annular flange J and screw threaded nipple J' or in any well known manner.

45 The combining tube is preferably provided near its mouth with spill holes *a* and about half way of its length with like spill holes *b* and at about the junction between the combining and delivery cones the usual overflow openings *c* are formed.

50 The combining and delivery cones communicate with the surrounding overflow chamber I which communicates into the atmosphere through the passages L and M which are separated by a diaphragm O. The passage L is controlled by a check valve P which has a hollow stem sliding on a pin Q formed

on the lower end of a thumb screw R, which passes through the cap S for limiting the opening movement of the overflow valve or screwing the same shut. The discharge end of the lifting tube and the mouth of the combining tube are the usual distance apart to form an overflow opening K between them which communicates with the overflow chamber under control of a valve T. This valve is cup shaped and of a diameter larger than the combining tube which slidably engages upon a cylindrical portion of the lifting tube and is adapted to rest upon lugs V which prevent it from making any extended surface contact which might cause the valve to stick and become fast in position. In order to permit this valve T to rock or tilt to accommodate itself to its seat or any inequalities or imperfections in manufacture the corners where it slides upon the lifting tube may be rounded off as shown. U is a disk loosely sleeved upon the combining tube between the shoulders *d* formed thereon adapted to form a tilting seat for the cup T to rest against and it will further be seen that the relative position of the parts is such that the mouth of the combining cone and the openings *a* are within the cup. The inner edge of the disk U and the shoulders *d* being correspondingly rounded to permit the disk to have a limited tilting movement as indicated by the dotted lines thereby insuring a perfect seating of the cup at all times.

90 In practice the injector being connected in the usual manner to the steam and water supply and to the delivery pipe into the boiler, the check valve T is kept open and the check valve P is closed when the injector is not working. If the injector is put in operation by turning on the steam the latter will first drive out the air and escape freely through the overflow K, and the openings *a*, *b* and *c* into the overflow chamber and thence into the atmosphere by lifting the valve P.

100 The free flow of steam through the lifting tube will therefore create a suction and lift the water into the chamber W and thence into the lifting tube. At first the water will freely escape through the overflow opening K into the cup T and into the overflow chamber I. However as the overflow outlet from this chamber is above the overflow K the latter will in consequence become quickly sealed. A progressive sealing of the different overflow openings will therefore take place along the combining tube until the overflow

entirely ceases, as soon as the stream is formed and forces its way into the boiler, which causes the closing of the valve P. Before this valve however closes the suction created at the mouth of the combining tube will cause the cup T to be lifted and become seated against the flange U and remain seated as long as the injector is working. This seating of the cup prevents the water in the overflow chamber from circulating, which after it becomes hot would defeat the proper starting of the injector.

The ample provisions made for a free overflow which in starting can take place nearly the whole length of the combining tube, insures a prompt lift and the gradual sealing of the overflow openings which while it confines the steam holds it in contact with the water and quickly builds up the stream.

The sealing of the overflow valve T by the water in the overflow is a great advantage, as in all constructions in which this is not the case, the steam escaping at the overflow K always causes a certain reaction which causes this valve to flutter from and towards its seat, which interferes with the free escape of the steam in starting and this action explains why injectors of this description lift the water at most, only to a height of about twenty feet, while I obtain a lift of several feet more. Furthermore in my construction the valve being below the top of the overflow chamber and having necessarily a loose play on the lifting tube it allows constantly a little water to be sucked in when the injector is in operation. Thus if any water accumulates in the overflow chamber which is especially the case when an injector is supplied with hot feed water or when it is working with steam near the limits of pressures for which it is adapted, it will constantly absorb such water, thus causing the injector to keep in operation when otherwise it would cease working.

Having thus fully described my invention, what I claim is:—

1. In an automatic injector, the combination with the casing and overflow chamber formed therein, of lifting and combining tubes arranged in alinement with each other in said chamber and forming an overflow opening between the same, a cup valve sliding on the lifting tube and extending beyond and inclosing the mouth of the combining tube, a disk loose on the combining tube adapted to form a seat for the cup valve and an overflow outlet from the overflow chamber arranged at a point above the cup valve.

2. In an automatic injector the combination with the casing and overflow chamber formed therein, of the lifting tube entering one side of the overflow chamber and the combining tube entering the opposite side in alinement with each other, an overflow opening between said tubes, spill openings in the combining tube at different points beyond its mouth, lugs on the lifting tube, a cup valve sliding on the lifting tube adapted to engage said lugs, a disk on the combining tube adapted to form a seat for said cup valve and a valve controlled overflow outlet from the overflow chamber located above the bottom of said chamber and adapted to form a water seal in said chamber for the overflow from the lifting and combining tubes.

3. In an automatic injector, the combination with the casing and overflow chamber formed therein, of lifting and combining tubes arranged in alinement with each other in said chamber and forming an overflow opening between the same, a cup valve sliding on the lifting tube and extending beyond and inclosing the mouth of the combining tube, a disk loose on the combining tube adapted to form a tilting seat for the cup valve and an overflow outlet from the overflow chamber at a point above the mouth of the combining tube.

4. In an automatic injector, the combination with the casing and overflow chamber formed therein, of lifting and combining tubes in said chamber and forming an overflow opening between them, an automatic overflow valve having a tilting seat controlling said overflow opening and a valve controlled overflow outlet from the chamber at a point above the mouth of the combining tube.

5. In an automatic injector, the combination with the casing and overflow chamber formed therein of lifting and combining tubes projecting into said chamber from opposite sides and forming an overflow opening between them, a cup valve sliding on the lifting tube and inclosing the mouth of the combining tube, a disk loose on the combining tube adapted to form a tilting seat for the cup valve and a valve controlled overflow outlet from the overflow chamber at a point above the cup valve.

In testimony whereof I affix my signature, in presence of two witnesses.

LOUIS BUEHLER.

Witnesses:

OTTO F. BARTHEL,
THOMAS G. LONGSTAFF.