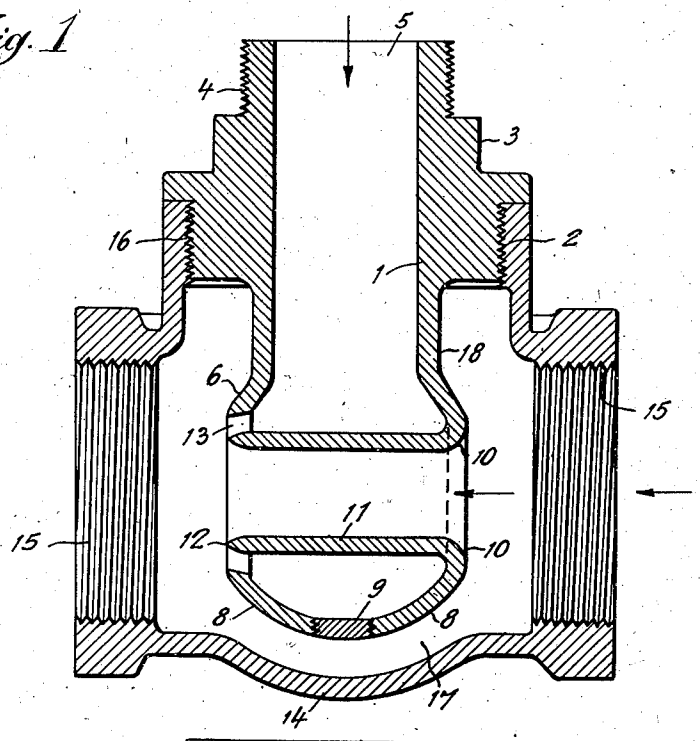
April 23, 1946. J. BERGESEN 2,398,766

STEAM INJECTOR FOR PIPE LINES

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Fig. 1



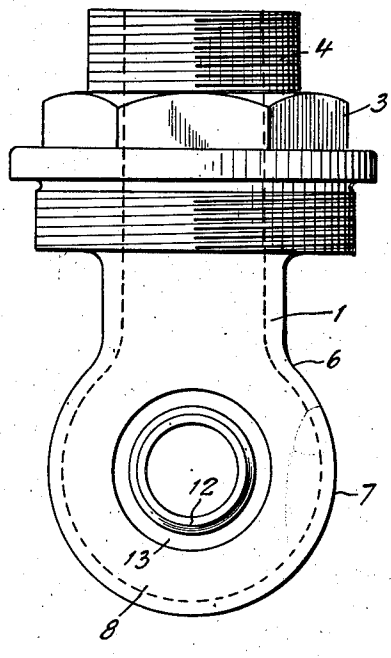


Fig. 2

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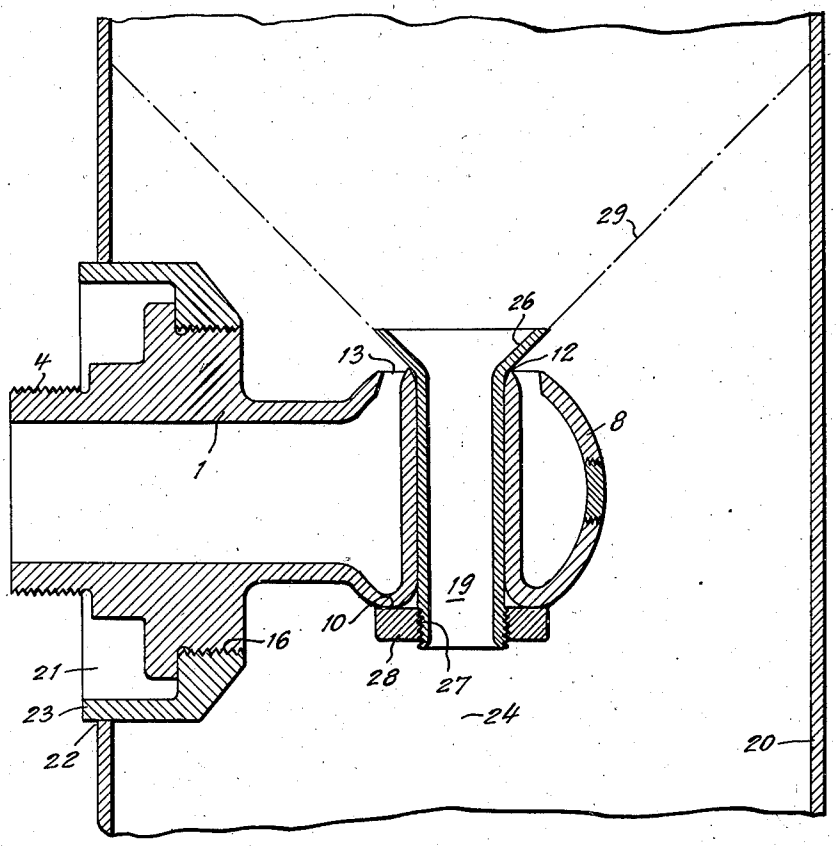
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Fig. 3



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STEAM INJECTOR FOR PIPE LINES

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6 Claims. (Cl. 230—95)

The present invention is directed to steam injectors, particularly to a fitting which may be introduced into a pipe or conduit whereby flowing water may be heated or gases may be flushed from an inclosed space.

Steam injectors of various types have been known and used for the purpose principally of creating a suction and causing a flow of water or the like. In all such structures of the prior art, there was provided a conduit into which was placed a nozzle or steam injector member which introduced steam longitudinally of the conduit and created a suction behind the jet of steam to draw the liquid into the steam. In such prior art structures, the steam nozzle or jet was relatively long and it provided a restricted passageway at the point of discharge of the steam. This greatly interfered with the flow of the water and restricted the passageway to such an extent that the amount of water actually flowing was a fraction of the capacity of the system.

The present invention is intended and adapted to overcome the difficulties and disadvantages inherent in prior structures of this type and to provide a steam injector which may be introduced into a pipe or conduit and which will allow complete freedom of flow of the water through and around the same.

It is also among the objects of the present invention to provide a structure of a steam injector which is quite simple, and which may be cast in a unitary piece and which when inserted into a conduit will not obstruct the same.

It is still further among the objects of the present invention to provide a fitting which constitutes a steam injector which may be introduced into various types of conduits and which may be used not only for heating water, but also for flushing gases from a system.

In practicing the present invention, there is provided a fitting in the nature of a block, which constitutes the injector. At the end of the block is a portion which is a section of a sphere, the latter being hollow and communicating with a central opening in the injector block. One of the ends of the globe has an annular passage from which the steam is adapted to flow. Also longitudinally through the globe and transversely of the opening in the block is a cylindrical passage which is approximately in the centerline of the pipe or conduit, and allows a free and unobstructed flow of water therethrough. In addition, the globe portion is spaced from the walls of the conduit or casing or pipe so as to allow free flow of water around the same.

When the steam injector is used as a means for flushing gases from a system, there is provided an additional fitting in the cylindrical passage. This fitting consists essentially of a sleeve, the outer face of which fits closely to the inner walls of the passage and has at the steam ejector end a flared or conical portion which overlies the annular steam exit. At the opposite end of the sleeve is means for clamping the same to the globe portion of the injector block.

In the accompanying drawings, constituting a part hereof and in which like reference characters indicate like parts:

Fig. 1 is a vertical cross-sectional view taken through the injector block and a casing into which it fits;

Fig. 2 is a front elevational view of the ejector fitting separated from the casing and showing the annular steam exit; and

Fig. 3 is a vertical cross-sectional view of the injector block shown in position in a conduit, and having an additional fitting thereon when used as means for flushing out gases.

The block 1 is threaded at its central portion 2, said threads adapted to cooperate with similar threads in a pipe or other member. Above the threads is an angular portion 3, whereby a wrench or other tool may be used to thread the block into its position for use. The upper end 4 is threaded for fitting into a suitable pipe or pipe fitting. A central longitudinal opening 5 for steam extends through block 1.

At the lower end of the block there is a flared portion 6 of a size approximately equal on both sides to the opening 5. Said portions 6 constitute the upper part of a globe portion or surface 7, depending from block 1. The lower curved portion 8 of globe 7 has a plug 9 fitted therein, said plug being inserted for convenience to take the place of the core used in the casting of the hollow globe. The two ends of the globe are truncated or cut off, said planes being transverse of the direction of flow of water through the device.

The end 10 of globe 7 is turned inwardly to form a cylindrical passage 11 of relatively large diameter through the globe from end to end. It terminates along the circle 12 which defines exit opening 13, annular in form. Said opening communicates with the hollow interior of the globe and said interior in turn communicates with steam entrance 5. Thus, steam will enter through passage 5 under pressure, will flow within the globe around passage 11, and will emerge through exit 13.

There is further provided a casing 14 of a type

similar to that used in the ordinary globe valve wherein the body portion is globular in character and the lower end of the casing is approximately parallel to the lower end 8 of globe 7 to provide a passage 16 of uniform width between the same. A threaded opening 15 at the entrance end of the casing is threaded for union with a suitable pipe. A similar threaded exit opening 15' is also threaded for insertion into the remainder of the pipe system. An opening 16 at the upper end of the casing is adapted to have threaded into the same the injector block 1.

In the operation of the device, steam enters opening 5 and passes out through exit 13 with a cone-like motion, while at the same time water enters the casing 14 through end 15, the water passing directly through cylindrical passage 11 and mixing with the steam from exit 13. At the same time, water passes around the outer surface 7 of the globe with the exception of the small portion occupied by neck 18 of block 1. Thus water impinges upon the stream of steam at an angle, causing a turbulence and a ready and rapid mixing of the steam with the water. The steam immediately condenses and gives up its heat to the moving streams of water. As a result, a rapid and efficient heating of the water to a relatively high temperature is obtained.

In the modification shown in Fig. 3, the injector block 1 is placed in conduit 20, with the passage 11 centrally of the conduit. An opening 21 therein has welded at 22 a threaded fitting 23. The threads thereof are adapted to cooperate with threads 2 of block 1 to hold the same in position. The centerline 24 of conduit 20 coincides with the centerline of passage 11.

A sleeve 27 having a relatively thin wall is closely fitted to the walls of passage 11. The end 26 thereof is conical in shape and extends beyond exit 13 a substantial distance. The flare of cone 26 is sufficient so that it completely covers the annular exit 13. Opposite end 27 of sleeve 25 is threaded and a nut 28 is placed thereon and rotated so as to cause firm contact of cone 26 with ring 12 and a firm bearing of nut 28 on surface 10 of globe 7.

This modification is particularly adapted for use as a means of clearing foul or explosive vapors or gases from a system. For instance, in tankers there are a number of tanks with pipe fittings whereby oil, for example, may be loaded and unloaded. After the unloading, it is essential that the vapors which remain be removed. In order to accomplish this, block 1 is placed in a suitable conduit 20 of the tank system, an entrance for air is provided by opening suitable valves at the far end of the system and steam is introduced into opening 5. In its passage through exit 13, it impinges upon the underside of cone 26 and is projected diagonally outward along the line 29 to the walls of conduit 20. This creates a substantial suction on the entire system and the gases or vapors present therein are drawn into the steam and fresh air replaces the same.

Although I have described the invention setting forth two specific embodiments thereof, it will be apparent to those skilled in the art that various changes in the form of construction of the device and its application to various situations may be made at will. For instance, the sleeve 11 may be replaced by a different form of member, it being essential that there be a conical end to deflect the same, but the exact means for retaining the same and clamping it on the injector block may be changed. Also, the globular portion 7 may be changed in form so that it is not a true section of a globe, but may vary therefrom as circumstances dictate. The cone-shaped portion may be made integral with the block itself if desired. The device, although shown as a single cast unit, may be made in several parts which are afterwards assembled, or it may be made by other methods than casting.

These and other changes may be made in the details of the invention without departing from the spirit thereof, and the scope of the invention is not to be limited except by the character of the claims appended hereto.

What I claim is:

1. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit including a casing having alined entrance and exit holes into which pipes are adapted to be placed, a threaded top hole, said block being threaded into said top hole, a depending portion integral with said block having the form of a globe with the ends cut off, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, said passage being in axial alinement with said entrance and exit holes, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, the transverse cross-sectional area between said globe and conduit being substantially uniform throughout the extent of said passage.

2. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit including a casing having alined entrance and exit holes into which pipes are adapted to be placed, a threaded top hole, said block being threaded into said top hole, a depending portion integral with said block having the form of a globe with the ends cut off, said globe portion being symmetrical with respect to said opening, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, said passage being in axial alinement with said entrance and exit holes, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, the transverse cross-sectional area between said globe and conduit being substantially uniform throughout the extent of said passage.

3. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit including a casing having alined entrance and exit holes into which pipes are adapted to be placed, a threaded top hole, said block being threaded into said top hole, said conduit having a globular casing secured thereto, a depending portion integral with said block having the form of a globe with the ends cut off, said globe being concentric with said casing, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of

said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, said passage being in axial alinement with said entrance and exit holes, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, said globe portion being concentric with said casing, the transverse cross-sectional area between said globe and conduit being substantially uniform throughout the extent of said passage.

4. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit, a depending portion integral with said block having the form of a globe with the ends cut off, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, a sleeve in said passage and contacting with the walls thereof, the end of said sleeve adjacent to said exit being flared outwardly to deflect steam issuing therefrom outwardly to the walls of said conduit.

5. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit, a depending portion integral with said block having the form of a globe with the ends cut off, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, a sleeve in said passage and contacting with the walls thereof, the end of said sleeve adjacent to said exit being flared outwardly to deflect steam issuing therefrom outwardly to the walls of said conduit, and means on the opposite end of said sleeve contacting with said globe portion to clamp said sleeve in position.

6. A steam injector comprising an injector block having a longitudinal central opening for the introduction of steam, means for removably securing said block in a conduit, a depending portion integral with said block having the form of a globe with the ends cut off, a cylindrical passage of uniform cross-section through said globe transversely of said opening and extending from end to end of said globe, the walls of said passage being integral with said globe, said globe being hollow and communicating with said opening, an annular steam exit at one of said ends around said passage and communicating with said hollow portion of said globe, a deflector of frustro conical shape adjacent to said exit with the small end of said deflector contacting the end of said passage adjacent to said exit, the interior of said deflector being hollow to allow liquid to pass therethrough, said deflector being adapted to deflect steam issuing therefrom outwardly to the walls of said conduit.

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