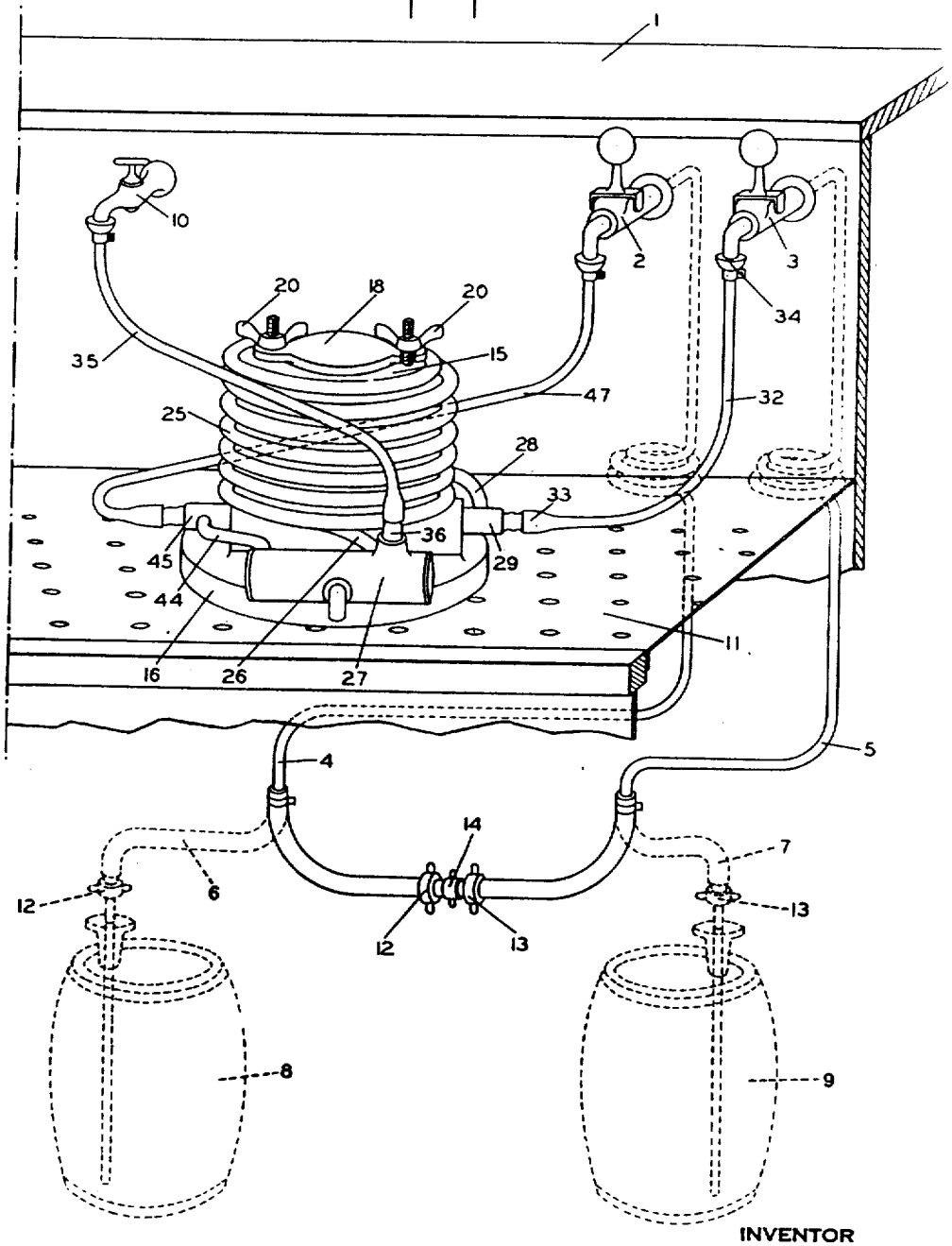
Oct. 29, 1935. H. M. ERDMANN 2,018,952

APPARATUS FOR CLEANING LIQUID CONDUITS

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Fig. 1.



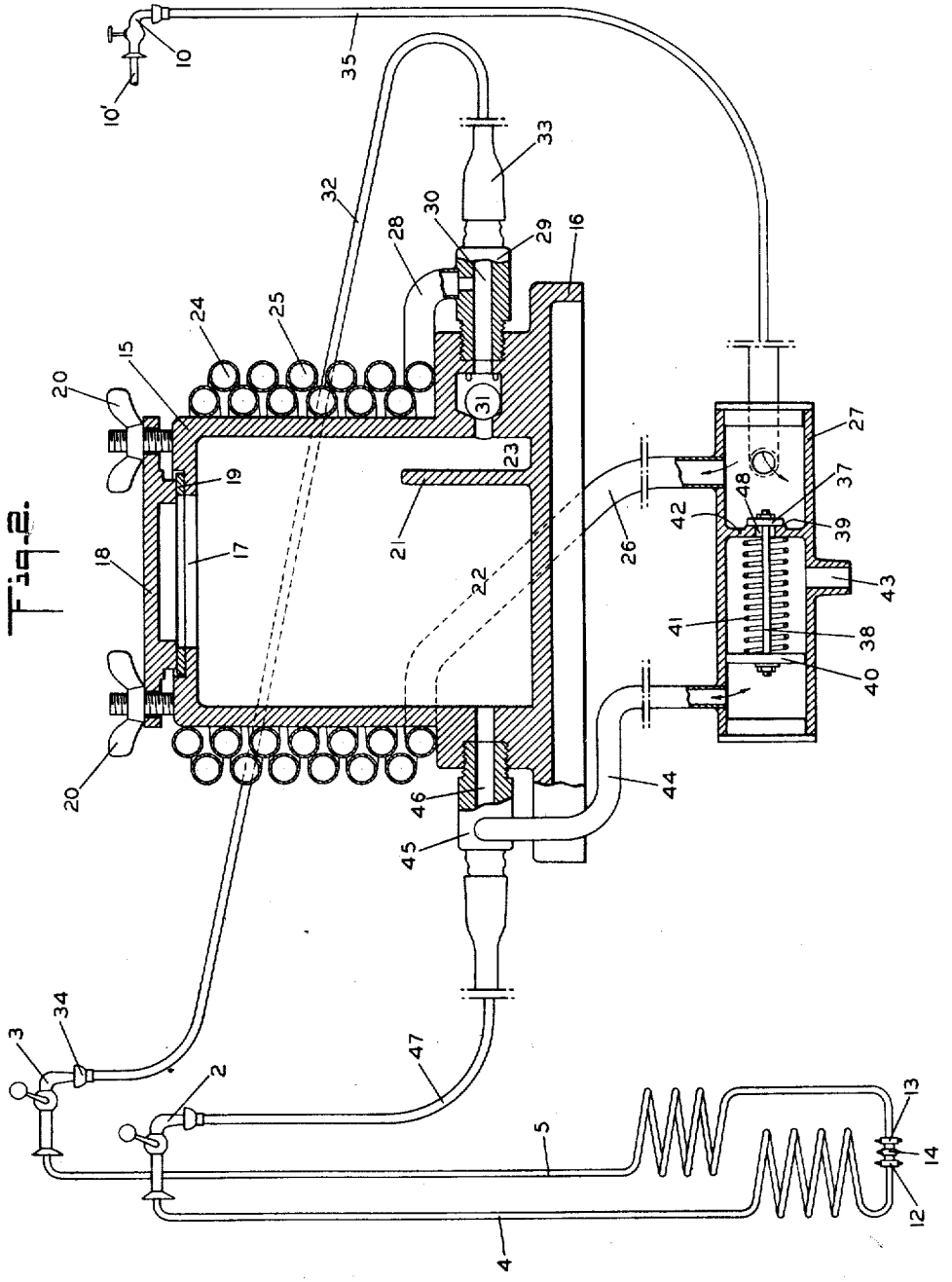
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Filed Jan. 11, 1934 2 Sheets-Sheet 2

Fig. 2.



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Patented Oct. 29, 1935 2,018,952

UNITED STATES PATENT OFFICE

2,018,952

APPARATUS FOR CLEANING LIQUID CONDUITS

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Application January 11, 1934, Serial No. 706,183

17 Claims. (Cl. 225—12)

This invention relates to an apparatus and process for cleaning conduits or pipes through which liquids are conducted and which require periodical cleansing, and is useful particularly for cleaning coils through which beer flows when drawn from a barrel out of a tap. The object of the invention is to provide a substantially automatic, compact device, simple of operation by unskilled help, readily attachable and detachable to conduits, foolproof and capable of performing its operations expeditiously without the loss of any appreciable amount of cleaning material.

This application is in part a continuation of an earlier application filed by me on August 15, 1933, with the same title and bearing Serial No. 685,187.

In the drawings, Fig. 1 represents an elevation in perspective of a device illustrating this invention attached to the taps and the cooling coils or conduits of a beer drawing system; Fig. 2 shows a vertical section of the device attached to the taps of beer coils.

This invention is illustrated in connection with the taps of a beer system merely for the purpose of illustration and it will be obvious that the invention may be utilized in connection with other forms of apparatus provided with coils, conduits or pipes which require cleansing from time to time by reason of contamination or soiling by the constant passage of liquids or fluids through such apparatus.

The bar 1 has the usual taps 2 and 3 attached thereto with which the coils or conduits 4 and 5 are in communication and the ends 6 and 7 of such conduits are adapted to be attached to the usual beer barrels 8 and 9. The bar is also provided with the usual water faucet 10 connected to the water service line 10' and with the usual perforated drain board 11 which has a suitable sewer connection (not shown).

The device as thus far described, constitutes the usual system for drawing and serving beer and it is this type of system with which this invention is illustrated. It is necessary, when the beer system is to be cleaned, to disconnect the tapping rods which enter the barrels shown in dotted lines in Fig. 1, at the screw threaded connection 12 and 13. The then freed ends 6 and 7 of the beer conduit are connected together by the union 14. The conduits, before the members 6 and 7 are connected together, are permitted to drain and after the connection is made, the system is then ready for connection with the cleaning apparatus of this invention for thorough cleaning of the inside of the coils and the taps for such a period of time as the attendant may consider necessary to thoroughly clean the system. The apparatus, after the connections are made, operates automatically with considerable pressure and rapidity.

The apparatus, which is shown in Fig. 1 connected to a beer drawing system, may be conveniently set upon the drain board of the bar, thereby making the water service line and the beer taps readily accessible.

The receptacle 15 is primarily utilized as a pressure reservoir for storing up pressure, which pressure is utilized for moving the cleaning preparation through the system. The reservoir 15 is provided with a base 16 and an opening 17 which is closed by the cover 18, forced downwardly against the washer 19 by turning the winged nuts 20. This arrangement of securing the cover insures an air-tight seal in order to insure against the loss of pressure within the reservoir. The bottom of the reservoir is provided with a wall 21, thereby dividing the bottom of the reservoir into two compartments 22 and 23 located on each side of the wall 21 and separated thereby. A receptacle 24 preferably in the form of a series of copper coils 25 is connected with the reservoir. The copper coils are preferably wound around the reservoir 15 to insure compactness, whereby the coils are protected somewhat against injury. One end 26 of the receptacle 24 is connected to the control 27 and the other end 28 of the receptacle 24 is connected to the nipple 29. The nipple 29 is provided with a bore 30 which bore also penetrates the wall of the reservoir, thereby establishing communication with the inside of the reservoir 15. A ball valve 31 is positioned in an enlargement in the bore 30 and is arranged to close and open communication between the end of the receptacle 24 where it is connected to the nipple 29 and the inside of the reservoir 15. The end of the nipple 29 is connected with a rubber tube 32 provided with the usual friction connecting member 33 and the other end of the tubing 32 is provided with a friction connecting bulb 34. The end 26 of the receptacle 24 is connected to the control 27, which control is suitably connected by detachable rubber hose 35 to the water faucet 10 of the water service line 10', whereby water under pressure from the water service line 10' is admitted through the hose 35 and through the nipple 36 to the interior of the control 27. The control is provided with a valve 37 carried by a rod 38 and adapted to seat itself upon the valve seat 39. The opposite end of the rod 38 is provided with a valve opening element preferably in the form of a head 40 fitting the

internal bore of the control 27. A coil spring 41 seated on the web 42 and bearing against the head 40 normally urges the head away from the web 42 and thereby normally places the valve 37 tightly against its seat 39. The area of the head 40 should be greater than the area of the valve 37 in order to make possible the operations and functions hereinafter explained. The control 27 is provided with an escape outlet 43 which is placed in communication with the water service line when the valve 37 is open. The control is provided with a short section of copper tubing 44 forming a connection with the nipple 45 provided with a bore 46, which bore 46 extends through the wall of the reservoir 15 to the interior thereof. The nipple 45 like the nipple 29 is provided with rubber tubing 47.

The apparatus, after the union 14 has been placed in position, is connected with the water service line 10' which provides a source of pressure to the control 27 and the two sections of hose 32 and 47 are connected to the open beer taps 2 and 3. The bore 30 is shown connected with the beer tap 3 and the bore 46 with the beer tap 2 but the device will function just as thoroughly if these connections are reversed. A cleaning compound, either in the form of tablets, powder or liquid, as desired, is placed in the compartment 22 and the cover 18 of the reservoir secured in air-tight relation to the reservoir 15. At this time, the beer system and the system of the apparatus is not charged with water and the apparatus is in condition for operation. The device is put into operation by opening the water faucet 10 which permits the pressure of the water service line to force water under pressure through the rubber connecting hose 35 into the control 27. At this moment the valve 37 is closed thereby excluding the admission of water beyond the valve 37. The water under pressure therefore flows through the tubing 26 and through the receptacle 24, here shown in the form of a double bank of copper coils 25, and out of the copper coils through the end 28 thereof into the bore 30 of the nipple 29. The pressure of the water will seat the ball valve 31 and close the end of the bore 30 against the admission of water into the reservoir 15. The water thus under pressure will pass through the tubing 32 through the beer tap 3, the beer coils 4 and 5, the tap 2, the tubing 47, the bore 46, into the reservoir 15. The water upon entering the reservoir will come in contact with the cleansing preparation, whether in the form of powder, tablets or liquid, and dilute the same. The water under pressure of the service line will rise in the reservoir 15 and build up air pressure in the reservoir 15 until the built-up pressure is sufficient to overcome the resistance of the spring 41 in the control 27. The spring 41 is specially selected so that it will be compressed when placed under a pressure which is less than the service line pressure. When the pressure in the reservoir 15 reaches a predetermined degree, such built-up pressure acts through the connecting tubing 44 against the top side of the head 40, compressing the spring 41 and unseating the valve 37. Thereupon, the pressure of the service line in the apparatus is relieved and water from the service line will pass through the valve opening 48 and escape out of the escape opening 43. The pressure in the reservoir 15 will also unseat the ball valve 31 and force the cleaning preparation through the bore 30 into the receptacle 24 leaving a pool in the compartment 22. When the pressure in the reservoir 15 has expended its force, the pressure on the head 40 is relieved and the spring 41 will again seat the valve 37 on its seat 39 and thus close the control and interrupt the escape of water from the escape opening 43. The moment the valve 37 closes, water under pressure from the service line will again flow through the tubing 26, forcing the cleaning preparation under pressure out of the receptacle 24 and the pressure thereof will again seat the ball valve 31, closing communication between the bore 30 and the reservoir 15. The cleaning compound must therefore flow through the bore 30, through the tubing 32, into the beer system and ultimately again into the reservoir 15. Pressure is again built up in the tank 15 by the continued pressure of water from the service line 10' until the pressure again is sufficient to force the head 40 against the pressure of the spring 41 toward the opening 48, whereby the pressure is again relieved and water escapes through the escape opening 43 and cleaning preparation is again forced past the unseated ball valve 31 into the receptacle 24. This cycle of operation is automatically repeated and the attendant permits the apparatus to function for such a period of time as he believes to be sufficient to thoroughly clean the entire system. After the apparatus is disconnected, the system may be flushed with water in any suitable manner.

It has been found in practice that the volume of the reservoir, excluding the volume of the compartment 22, should not be more than twice the volume of the receptacle 24 in order that there should be no substantial loss of cleaning preparation. The head 40 of the control 27 preferably has a surface area twice that of the valve 37. It has also been found that twenty pounds pressure from the service line is sufficient to cause the apparatus to properly function. The normal water service pressure in many cities is thirty pounds and beer coil systems are generally built to withstand pressure up to thirty pounds. If the water service pressure is great, in some cities it is as high as one hundred pounds, it is advisable to keep the pressure low by manipulation of the valve of the water faucet 10.

I have found that while the device will work without the compartment 22, there is a definite advantage in utilizing this compartment in that it initially provides a definite pool of cleaning preparation and an air space above it. The excess water entering the pool through the bore 46 spills over the wall 21 filling the compartment 23 and the continued introduction of water, into the compartment 22, under pressure, compresses the air above the water level sufficient ultimately to act upon the head 40 and opening the valve 37 and forcing cleaning preparation into the receptacle 24.

It is obvious that if it is desired to clean a single coil, that this may be done by attaching one of the hose connections 32 or 47 to the beer tap and the other hose connection to the end of the beer coil which enters the barrel.

The cleaning fluid moves through the system which is to be cleaned in a continuous direction in contradistinction to a backward and forward movement. It has been found that there is an advantage in forming the receptacle 24 in a series of coils or in the form of a long tube made of copper or rubber as illustrated at 25, in that the cleaning fluid is retained in a somewhat definite order on its path to and through the coils to be cleaned and is thereby restrained from thoroughly mixing with fresh water.

I claim:

1. In a device for cleaning conduits, in combi-

nation, a source of pressure adapted to deliver a liquid medium under pressure, a pressure reservoir, a control, said source of pressure having communication with said control, said control having communication with said pressure reservoir, said control including a valve member, means to retain said valve member in closed position when the pressure in the reservoir is less than the pressure at said source of pressure whereby pressure in said reservoir is built up and the control is automatically opened to relieve the pressure in said reservoir, said control automatically closing under influence of said means to reestablish pressure in said reservoir.

2. In a cleaning device in combination, a source of pressure adapted to continuously deliver a medium under pressure, a pressure reservoir, said source of pressure and said pressure reservoir being in communication, means between said source of pressure and said pressure reservoir adapted to automatically interrupt communication between the pressure reservoir and said source of pressure, a receptacle, a valve between said pressure reservoir and said receptacle, said valve being adapted to open when pressure is built up in said pressure reservoir and place said pressure reservoir and receptacle in communication.

3. In a device for cleaning conduits, in combination, a pressure reservoir, a source of water pressure, an automatically operated control, a valve adapted to automatically open and close said control having communication with said pressure reservoir and with said source of water pressure, said valve automatically closing as pressure is built up in said pressure reservoir and opening under the influence of said water pressure when said pressure reaches a predetermined amount in the system.

4. In combination, a liquid conducting system, a pressure reservoir, connection between said system and said pressure reservoir, a source of pressure, a control, said control having connection with said pressure reservoir and with said source of pressure, said connection between said source of pressure and said control being adapted to pass a pressure medium, from said source of pressure to said control, and from said control to said pressure reservoir, whereby pressure is built up in said reservoir, a second connection between said pressure reservoir and said control whereby said control is automatically operated to relieve the pressure in said pressure reservoir.

5. In a device for cleaning conduits, in combination, a source of pressure, a pressure reservoir, a control, a receptacle, communicating connections between said parts in the order named, a valve between said pressure reservoir and said receptacle, said control remaining inoperative when a medium, under pressure, from said source of pressure, moves toward said pressure reservoir, said valve closing the connection between said pressure reservoir and said receptacle while said medium is building up pressure in said pressure reservoir, said control operating and tending to relieve the pressure in said pressure reservoir and said valve opening communication between said pressure reservoir and said receptacle when the pressure in the pressure reservoir reaches a predetermined amount.

6. In a device for cleaning conduits, in combination, a source of pressure adapted to deliver a medium under pressure, a control, a pressure reservoir, connections between said source of pressure and said control and between said control and said pressure reservoir, an escape outlet having communication with said control, a valve opening having communication with said escape outlet, a valve adapted to close said opening when said medium from said source of pressure passes toward said pressure reservoir, means connected with said valve and adapted to unseat said valve as pressure is built up in said pressure reservoir.

7. In a cleaning device in combination, a source of pressure, a pressure reservoir, said source of pressure and said pressure reservoir being in communication, means between said source of pressure and said pressure reservoir adapted to automatically interrupt communication between the pressure reservoir and said source of pressure, said means including a valve and separate means to open and close the valve, the valve closing means normally holding the valve in closed position and the valve opening means acting upon said valve closing means, to open the valve, when pressure in said pressure reservoir builds up a force in excess of the valve closing means.

8. In a cleaning device in combination, a source of pressure, a pressure reservoir, said pressure reservoir and said source of pressure being in communication, compartments in said pressure reservoir, one of said compartments being adapted to hold a cleaning preparation, and the other compartment communicating with the first mentioned compartment, a receptacle, said receptacle and said communicating compartment being in communication, a valve between said communicating compartment and said receptacle, said source of pressure being adapted to convey a medium under pressure from said source of pressure towards said reservoir to build up pressure in said reservoir, the valve between said communicating compartment and said receptacle being adapted to open under the pressure built up in said pressure reservoir, and permit the flow of cleaning preparation from said reservoir into said receptacle.

9. In combination, a liquid conducting system adapted to be arranged for cleaning, a source of pressure adapted to deliver a liquid under pressure, a cleaning apparatus, said cleaning apparatus including a pressure reservoir, a receptacle, a control, one portion of said liquid conducting system being connected with said receptacle and another portion of said liquid conducting system being connected with said reservoir, said source of pressure having communication with said control and with said receptacle through said control, said control comprising normally closed valve means, said valve means having connection with said reservoir, whereby through said combination a liquid under pressure from said source of pressure builds up air pressure in said pressure reservoir, which built up pressure when in excessive atmospheric pressure opens said valve means and by-passes said liquid under pressure, said valve means when the pressure in said pressure reservoir has expended its force closing and re-establishing communication between said source of pressure and said receptacle.

10. A device according to claim 2 in which the receptacle is in the form of a substantially narrow, continuous hollow body.

11. A device according to claim 2 in which the receptacle is in the form of a coil wound outside of the reservoir.

12. A device for cleaning conduits comprising a source of pressure adapted to deliver a liquid medium under pressure, a control connected with said source of pressure, said control including a

movable member and an escape valve, means to urge said movable member to close said escape valve, a receptacle adapted to hold cleaning medium, the conduit to be cleaned having communication with said receptacle, said control, receptacle and the conduit to be cleaned being normally closed against the escape of air from the system, said movable member and said escape valve moving automatically when pressure in excess of atmospheric pressure is built up in the system, thereby opening said escape valve and relieving the pressure therein, said movable member and said escape valve moving to closed position when the pressure in said reservoir is relieved.

13. A device for cleaning conduits comprising a source of pressure adapted to deliver a liquid medium under pressure, a control connected with said source of pressure, said control including a movable member and an escape valve, means to urge said movable member to close said escape valve, a receptacle adapted to hold cleaning medium, the conduit to be cleaned having communication with said receptacle, said escape valve being initially closed and thereby closing the system against the escape of air and permitting the medium from said source of pressure to build up pressure in said system, said escape valve automatically opening under the force of pressure built up in said system and relieving the pressure therein, said escape valve automatically moving to closed position when pressure in said reservoir is relieved.

14. A device for cleaning conduits comprising a system normally closed against the escape of air therefrom, said system consisting of a source of pressure adapted to deliver a liquid medium under pressure, a control having communication with the source of pressure, said control including a movable member and an escape valve, means to urge said movable member to close said escape valve, a receptacle, said conduits having communication with said receptacle, said receptacle being adapted to hold cleaning medium, said cleaning medium, while the escape valve is closed, being adapted to move in said system under the influence of the source of pressure, said source of pressure building up pressure within the system, said escape valve automatically opening under influence of the built-up pressure in the system and relieving the pressure therein, said escape valve automatically moving to closed position when pressure in said reservoir is relieved.

15. A device for cleaning conduits comprising a source of pressure adapted to deliver a liquid medium under continuous pressure, a reservoir adapted to receive a cleaning medium, a control having connection with said source of pressure and said reservoir, said control having an escape valve movable to open and closed positions, a spring adapted to urge said valve member to closed position, said liquid medium, under continuous pressure, being adapted to automatically build up pressure in said reservoir when the valve member is in closed position, said valve member automatically moving to open position under the force of the built-up pressure of said liquid medium, said valve member being automatically urged to closed position under the influence of said spring after the pressure in said reservoir has been relieved.

16. In a device for cleaning conduits, a reservoir adapted to hold a cleaning medium, a source of pressure adapted to deliver a liquid medium under continuous pressure, means connected with said reservoir and adapted to be connected with the conduits to be cleaned, a control, means connected with said control and adapted to be connected with said source of pressure, a valve member associated with said control, said valve member being adapted to automatically move to open and closed positions, an outlet on one side of said valve member having connection with said reservoir and adapted to permit said medium under pressure to pass to said reservoir, an inlet on the opposite side of said valve member, said valve member being retained in closed position while pressure is being built up in said reservoir, and means connected to said valve member and exposed through said inlet to the pressure of said liquid medium to move said valve to open position when the pressure in the system reaches a predetermined degree.

17. In a device for cleaning conduits, a reservoir adapted to hold a cleaning medium, a source of pressure adapted to deliver a liquid medium under pressure, means connected with said reservoir and adapted to be connected with said conduits to be cleaned, a control, said control having a chamber, a valve member, movable to open and closed position, and a valve seat, said chamber having communication with said reservoir and with said source of pressure, said valve having communication with the outer atmosphere, said valve being in closed position while pressure is building up in said reservoir, means associated with the valve and under the influence of said pressure medium, said means moving said valve to open position as pressure is built up in the system.

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