C. E. SAFFORD.

RADIATOR.

APPLICATION FILED FEB. 10, 1912. RENEWED SEPT. 3, 1915.

1,190,955. Patented July 11, 1916.

3 SHEETS—SHEET 1.

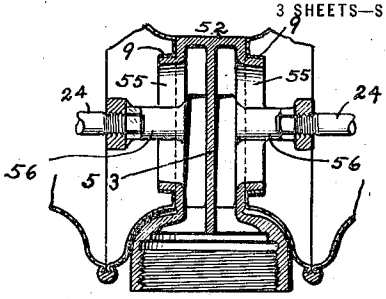


Fig. 12.

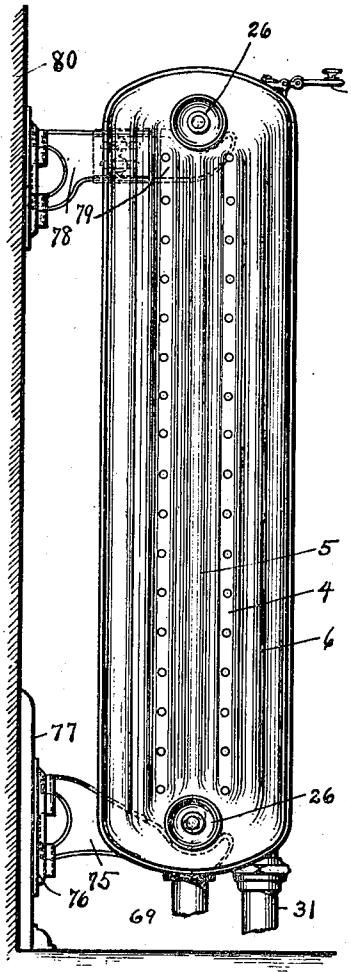


Fig. 1.

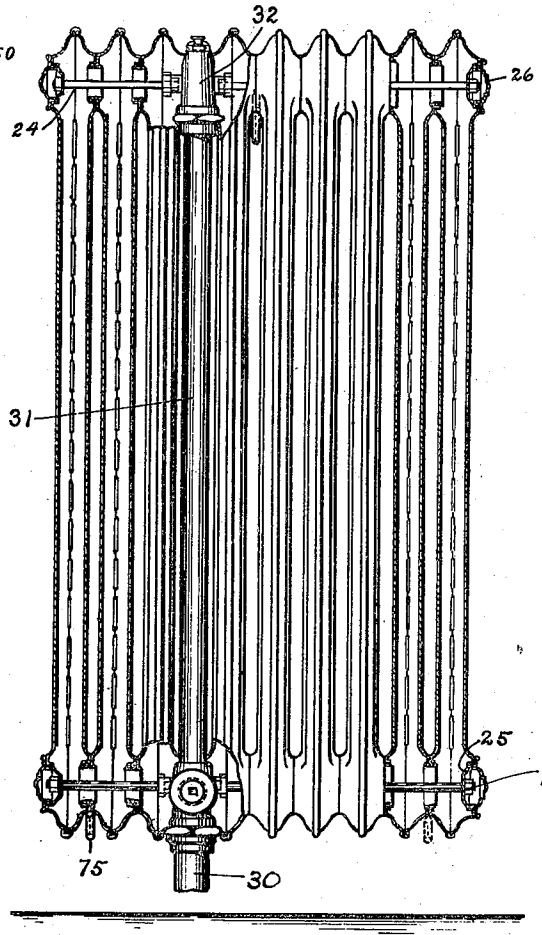


Fig. 2.

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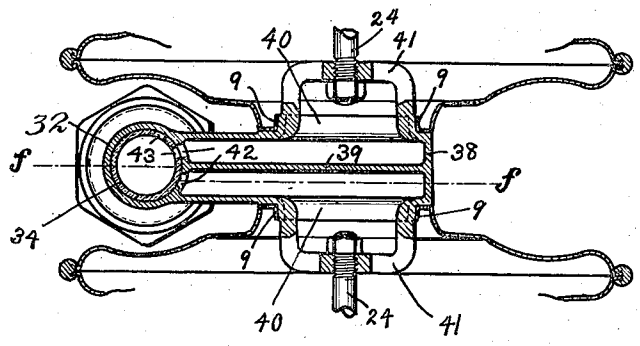


Fig. 3.

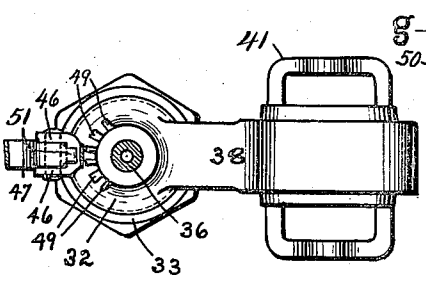


Fig. 5.

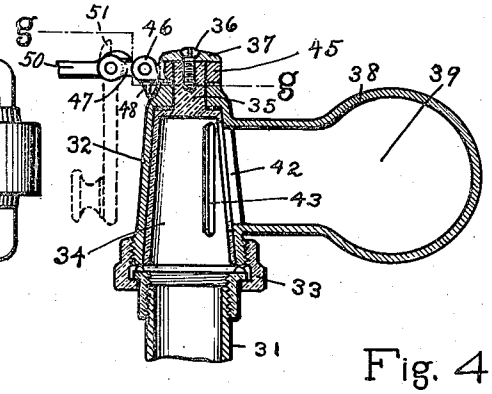


Fig. 4.

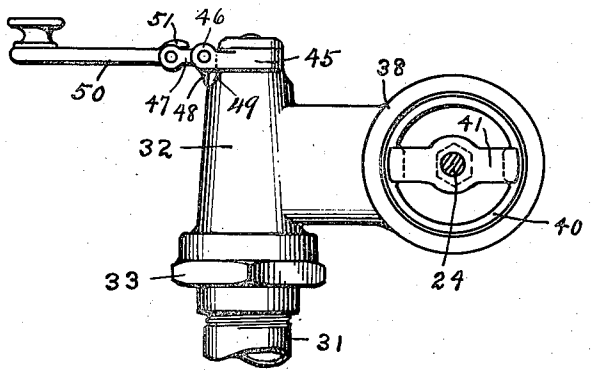


Fig. 6.

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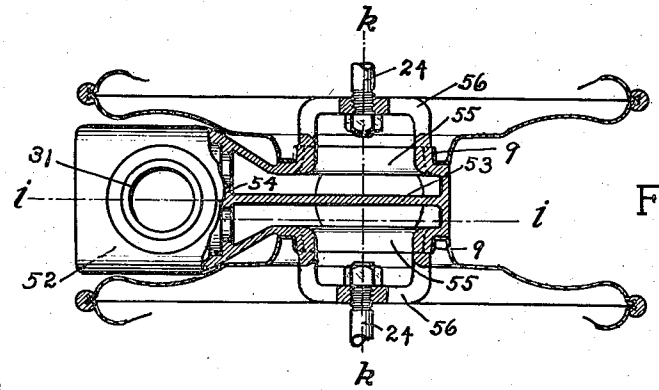


Fig. 7.

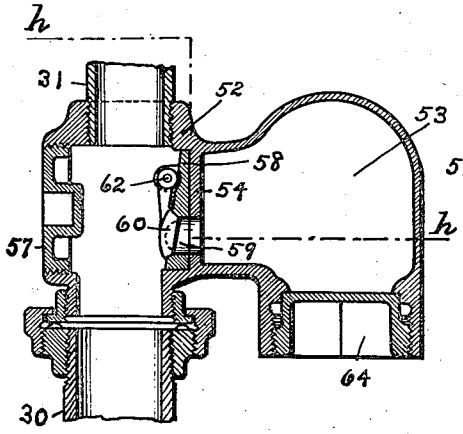


Fig. 8.

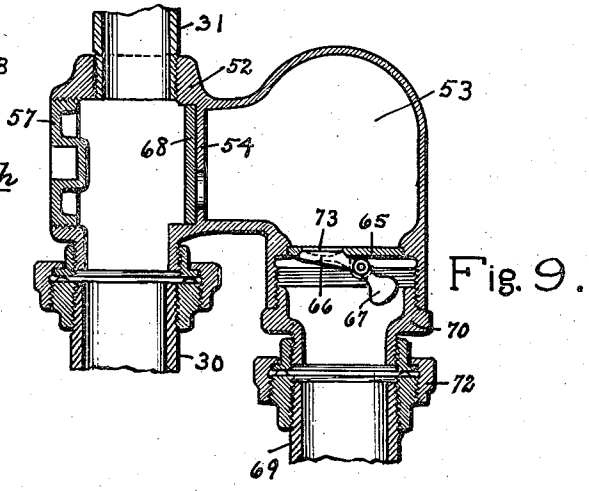


Fig. 9.

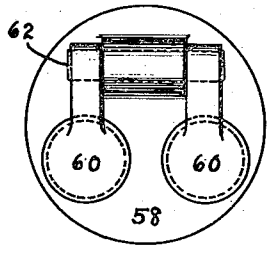


Fig. 10.

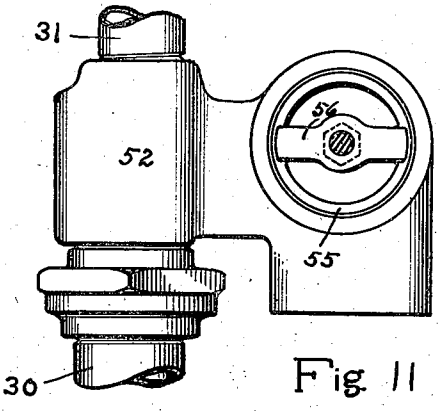


Fig. 11.

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RADIATOR.

1,190,955. Specification of Letters Patent. Patented July 11, 1916.

Application filed February 10, 1912, Serial No. 676,799. Renewed September 3, 1915. Serial No. 48,914.

To all whom it may concern:

Be it known that I, CLARENCE E. SAFFORD, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Radiator, of which the following is a specification.

This invention relates to radiators constructed of pressed sheet-metal parts, and particularly to the means for controlling the flow of the heating fluids through the radiators; and its object is to provide simple and effective means for causing the heating medium to flow through either or both of a plurality of groups of sections at will.

This invention consists in combination with pressed sheet-metal radiator-sections, of novel means whereby the whole or predetermined portions of radiators may be rendered operative.

In the accompanying drawings Figure 1 is an end elevation of a radiator. Fig. 2 is a front elevation of the same, portions being broken away to show the interior construction. Fig. 3 is a horizontal section of a manually-operable controlling valve that may be located near the upper portion of the radiator as shown in Fig. 2. Fig. 4 is a section of the same on the line *f*—*f* of Fig. 3. Fig. 5 is a horizontal section of this valve on the line *g*—*g* of Fig. 4. Fig. 6 is a side elevation of the same. Fig. 7 is a section on the line *h*—*h* of Fig. 8 of the automatic control valve at the bottom of the radiator. Fig. 8 is a section on the line *i*—*i* of Fig. 7 of the connection between the different portions of a radiator when arranged for "one-pipe" steam service. Fig. 9 is a similar section when arranged for two-pipe steam service. Fig. 10 is a view of a check valve of a "one-pipe" steam service radiator. Fig. 11 is a side elevation of this automatic control valve. Fig. 12 is a vertical section on the line *k*—*k* of Fig. 7.

Similar reference characters refer to like parts throughout the several views.

The radiator shown in Figs. 1 and 2 is formed from blanks by shaping the edges in a cutting die, and giving the desired form in a bending die, the result being a half-section such as shown in elevation in Fig. 1 of a radiator, so that, when the halves of a section are assembled, water or steam chambers are formed, consisting of three vertical columns 5 and 6 connecting at their upper and lower ends by transverse chambers. At the upper and lower transverse chambers of the sections are openings surrounded by substantially cylindrical flanges.

It is often desirable to use a portion only of a radiator. In Fig. 2 a radiator construction is illustrated consisting of nine sections, which are separated in two groups of three and six sections respectively. The means which are provided to control the flow of water or steam to either or both of these sections are shown in Figs. 3 to 6 inclusive. The main supply pipe 30 connects to any source and unites to the upright pipe 31, as shown in Fig. 2, which, in turn, connects to the valve body 32 by any desired means, a union 33 being shown in Figs. 4 and 6. This body has a tapering bore and in it is revoluble a hollow plug 34, open at the bottom, and provided with a reduced neck 35 which receives the screw 36 that bears on the washer 37. The body 32 has an extension 38 divided by a wall 39. Hubs 40 on this extension 38 form tight joints with the flanges 9 on the adjacent radiator sections and stirrups 41 receive the ends of the bolts 24, which secure the sections together. The body 32 is provided with ports 42, while the plug 34 has ports 43. When steam or hot-water rises in the pipe 31, it may pass out through one of the ports 43 and through the adjacent port 42 and flow either to the right or left of the vertical pipe 31, according to the position of the plug 34. If the plug is central, that is, is so positioned that both of its ports 43 register with both of the ports 42, the water or steam may flow into both portions of the radiator.

Secured to the upper end 35 of the plug 34, is a ring 45 having lugs 46, between which is pivoted a small arm 47 having a finger 48 which is adapted to enter between the teeth 49 on the upper end of the body 32. These teeth are in three pairs, so that the plug 34 may be positioned with either one, both or none of its ports registering with the ports 42 of the body 32. A handle 50 is pivoted in the outer end of the arm 47, and has a stop-lug 51 so that it may be used to lift the arm 47 and swing the finger 48 up from between the teeth 49, so the plug may be turned. When it is desired to entirely cut off the heating element from the radiator, the handle 50 is swung over to the right or left of the central

position indicated in Fig. 5, an angular distance equal to that between the centers of adjacent teeth. The finger 48 will then be permitted to rest between the second and third teeth 49 on the body 32, counting the teeth from the nearer end of the row. The result of such movement of the handle 50 is the turning of the valve-plug 34 to a position where neither of its ports 43 registers with either of the ports 42 in the valve-body.

Between the pipes 30 and 31, and connecting the lower ends of the two portions of the radiator is an automatic check-valve which may be adapted for either hot-water, or for single or two-pipe steam service. The body 52 of this check-valve has an unobstructed passage between the pipes 30 and 31 to permit the heating fluid to pass freely to the control valve. A partition wall 53 extends from a cross wall 54 to the rear of the body, and hubs 55 formed on the body form tight joints with the flanges 9 of the adjacent sheet-metal sections. Stirrups 56 extend from these hubs and receive the ends of the locking bolts 24. A plug 57 screws into the front wall of this body and may be removed to permit the introduction of a stop-plate or a valve-seat.

When this radiator forms part of a "single-pipe" steam heating-system, a plate 58 (Fig. 8) is mounted in the body, and provided with openings 59. Valves 60 are mounted on the pin 62 (Fig. 10) and normally cover these openings and prevent steam entering the lower portion of the radiator. But when the steam condenses in the radiator and water fills the lower part of either portion thereof, the weight of the water will swing out the proper valve and permit that portion of the radiator to drain into the pipe 30.

Where the radiator forms part of a "two-pipe" steam heating-system, the plug 64 of Fig. 8 is removed, and a plate 65, similar to the plate 58, is positioned, as shown in Fig. 9. The valves 66 have counterweights 67 to prevent the return flow of the steam. The plate 58 and its valves are removed and a plain plate 68 substituted. And a pipe 69 is connected to the check-valve body 52, as shown in Fig. 9, the fitting 70 and union 72 being employed if desired.

It will be evident that the main supply pipe may extend at any angle to and any distance from the radiator, and that the connections shown in Figs. 3 to 11 to the radiator may be proportioned accordingly. The supply pipe may be entirely independent of the discharge pipe and the fitting 52 can be easily changed to meet such demand. The steam will flow up the pipe 31 and be distributed by means of the control valve as before stated, and will enter the check-valve body through the hubs 56 and then pass down through the openings 73 in the plate 65 to the pipe 69.

When the radiator is to be used in a hot-water heating-system, the plate 65 and valves 66 are entirely omitted, thus permitting the water to flow unrestricted to the source of supply. The radiator will be entirely controlled by the valve of Fig. 4.

As these radiators will be very light, they may be supported by means of brackets such as shown in Fig. 1. The lower bracket 75 is shown pivoted on a plate 76 attached to the base-board 77, while the upper bracket is shown formed of two pieces 78 and 79 adjustable with reference to each other. The inner portion 78 is also pivoted to a plate 80, attached to the wall 81. By pivoting these brackets, all strains caused by the expansion of the radiator sections and of the feed and return pipes, are avoided, as the swinging brackets permit free expansion in all directions.

Because of the nuts on the ends of the rods 24 on the outside of the closures 25, the stress or pull of these tie-rods can be predetermined. To extend a radiator already in place, the caps 26, closures 25 and nuts 27 at one end are removed and extensions connected to the tie-rods. The additional sections are then positioned and drawn into place by the nuts 27 on these extensions. It is therefore desirable to form the tie-rods 24 and nuts 27 with standard pipe threads so that such additions may be made by any steam fitter.

It will be understood that these radiators may be employed in connection with cooling systems and that the word "heating" is not to be taken as limiting the scope of the claims wherein it is used. The designs of the sections and the proportions of the parts, the thickness of the metal and the material employed, may all be varied by heating engineers to suit the different requirements, without departing from the spirit of my invention as set forth in the claims.

I claim—

1. A radiator comprising a series of sections connected into two groups, a supply pipe for the radiator, a valve-body at the upper end of the pipe and having discharge hubs connecting to the upper ends of said sections and a dividing plate between said hubs, a valve-plug mounted within the body and provided with ports to permit the heating element to pass from said pipe into said body on either side or both sides of said plate at will, means to position said valve-plug and an outlet fitting connecting the lower ends of the groups.

2. A radiator comprising a series of sheet-metal sections connected together to form two groups, an inlet valve between the upper portions of said groups and an outlet valve between the lower portions of said

groups, and tie-rods extending from both of said valves to the outer walls of both end sections of the radiator.

3. A radiator comprising a series of sheet-metal sections connected together into two groups, the outer walls of the end sections of both groups having openings at their tops and bottoms and flanges surrounding said openings, an inlet valve between the upper portions of said groups and having projections fitting into adjacent flanges, an outlet valve between the lower portions of said groups and having projections fitting adjacent flanges, closures for the openings in the outer walls of the end sections of the radiator, and tie-rods extending between the closures and valves.

4. A radiator comprising a series of sections forming two groups, an inlet fitting between the upper ends of the groups and an outlet fitting between the lower ends of the groups, each of said fittings having a dividing wall, and a valve mounted in the inlet fitting to control the flow of fluids to said group of sections.

5. A radiator comprising a series of sections forming two groups, inlet and outlet fittings between said groups, each of said fittings having a dividing wall, a valve mounted in the inlet fitting to control the flow of fluids to said groups of sections, and connecting members extending from said fittings to the outer sections of the groups.

6. A radiator comprising a series of sections forming two groups, an inlet fitting between the upper ends of the groups and having a wall dividing the same, a tapering valve-chamber adjacent said fitting and having a port on each side of said wall, a hollow tapering valve in said chamber and having two ports, a pipe connecting to said valve chamber, means to position said valve to connect the ports therein with either or both of the ports in said valve-chamber at will, an outlet fitting connecting the lower ends of the groups, and check valves mounted in said fitting to prevent a return flow of fluid into said groups.

7. In a radiator, the combination of two groups of radiator sections, a fitting connecting the upper ends of the groups and having outlet openings in line with each other, a wall dividing said fitting into two chambers, a valve body connected to said fitting having a tapering bore and a port opening into each chamber, a tapering valve mounted in said chamber and having ports spaced to register with those of the valve chamber, a stem extending upward from the valve, and a handle to position the valve, said chamber having lugs to hold the handle in predetermined position, an outlet fitting connecting the lower ends of the groups and having inlet openings in line with each other, a wall dividing the fitting into two chambers, one for each group, and an outlet valve for each chamber.

8. A radiator comprising a series of sections forming two groups in line with each other, inlet and outlet fittings between said groups and separating the same, a valve mounted in the inlet fitting to control the flow of fluids to said groups of sections.

9. A radiator comprising a series of sections in line with each other and formed in two separate groups, an inlet fitting interposed between and connecting the groups near the upper portion thereof, said fitting having formed therein an inlet passage for heating fluid and other passages leading respectively to the two groups, means for opening and closing one of the last mentioned passages independently of the other of the last mentioned passages, an outlet fitting interposed between and connecting the groups near the lower portion thereof, said outlet fitting having formed therein outlet passages leading respectively to the two groups and to a discharge passage formed in the fitting.

10. A radiator comprising a series of sections in line with each other and formed in two separate groups, an inlet fitting interposed between and connecting the adjacent sections of the two groups near the upper portion thereof, said fitting having formed therein an inlet passage for heating fluid and other passages leading respectively to the two groups, means for opening and closing one of the last mentioned passages independently of the other of the last mentioned passages, an outlet fitting interposed between and connecting the adjacent sections of the groups near the lower portion thereof, said outlet fitting having formed therein outlet passages leading respectively to the adjacent sections of the two groups, and to a discharge passage formed in the fitting.

11. A radiator comprising a series of sections formed in two separate groups, an inlet fitting interposed between and connecting the groups near the upper portion thereof, said fitting having formed therein an inlet passage for heating fluid, and other passages leading respectively to the two groups, means for opening and closing both of the other passages independently of each other, an outlet fitting interposed between and connecting the groups near the lower portion thereof, said outlet fitting having formed therein outlet passages leading respectively to the two groups.

12. A radiator comprising a series of sections formed in two separate groups, an inlet fitting interposed between and connecting the adjacent sections of the two groups near the upper portion thereof, said fitting having formed therein passages leading respectively to the two groups, means for

opening and closing both of said passages independently of each other, an outlet fitting interposed between and connecting the adjacent sections of the groups near the lower portion thereof, said outlet fitting having formed therein outlet passages leading respectively to the adjacent sections of the two groups.

13. A radiator comprising a series of sections formed in two separate groups, an inlet fitting interposed between and connecting the groups near the upper portion thereof, said fitting having formed therein two passages each of which leads to a common supply passage formed in the fitting and to one of the groups of sections, means to close at will one of the passages between the common supply passage and the corresponding group of sections without affecting the other passage, an outlet fitting interposed between and connecting the groups near the lower portion thereof, said outlet fitting having formed therein a passage that leads to each of the groups of sections and to a common discharge opening.

14. A radiator comprising a series of sections formed in two separate groups, an inlet fitting interposed between and connecting the groups near the upper portion thereof, said fitting having formed therein two passages each of which leads to a common supply passage formed in the fitting and to one of the groups of sections, means to close at will one of the passages between the common supply passage and the corresponding group of sections, an outlet fitting interposed between and connecting the groups near the lower portion thereof, said outlet fitting having formed therein two passages each of which leads to a common discharge opening and to one of the groups of sections, and check valves for closing the passage to the respective groups of sections.

15. A radiator comprising a plurality of sections, an inlet fitting interposed between and connecting adjacent sections at one level, said inlet fitting having formed therein passages that lead respectively to each of the sections and to a common feed passage, means for closing one of the first mentioned passages at will without affecting the other of the first mentioned passages, an outlet fitting interposed between and connecting the adjacent sections at another level considerably removed from the first and having formed therein outlet passages that lead respectively to the adjacent sections.

16. A radiator comprising a series of sections in line with each other and formed in two separate groups, an inlet fitting interposed between and connecting the adjacent sections of the two groups at one level thereof, said fitting having formed therein passages that lead respectively to each of the sections and to a common feed passage, means for closing one of the first mentioned passages at will without affecting the other of the first mentioned passages, an outlet fitting interposed between and connecting the adjacent sections at another level considerably removed from the first and having formed therein outlet passages that lead respectively to the adjacent sections.

17. A radiator comprising a series of sections formed in two separate groups, an inlet fitting interposed between and connecting the groups near the upper portion thereof, said fitting having formed therein two passages each of which leads to a common supply passage formed in the fitting and to one of the groups of sections, means to close at will one of the passages between the common supply passage and the corresponding group of sections independently of the other, an outlet fitting interposed between and connecting the groups near the lower portion thereof, said outlet fitting having formed therein two passages each of which leads to a common discharge opening and to one of the groups of sections, and check valves for closing the passage to the respective groups of sections.

18. A radiator comprising a series of sections in line with each other and formed in two separate groups, an inlet fitting interposed between and connecting the adjacent sections of the two groups at one level thereof, said fitting having formed therein passages that lead respectively to each of the sections and to a common feed passage, means for closing one of the first mentioned passages at will without affecting the other of the first mentioned passages, an outlet fitting interposed between and connecting the adjacent sections at another level considerably removed from the first and having formed therein outlet passages that lead respectively to the adjacent sections, and check valves for independently closing the outlet passages.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLARENCE E. SAFFORD.

Witnesses:

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