Jan. 29, 1929. 1,700,230

W. J. LUFF

PLUMBING SYSTEM

Filed Jan. 5, 1928 3 Sheets-Sheet 1

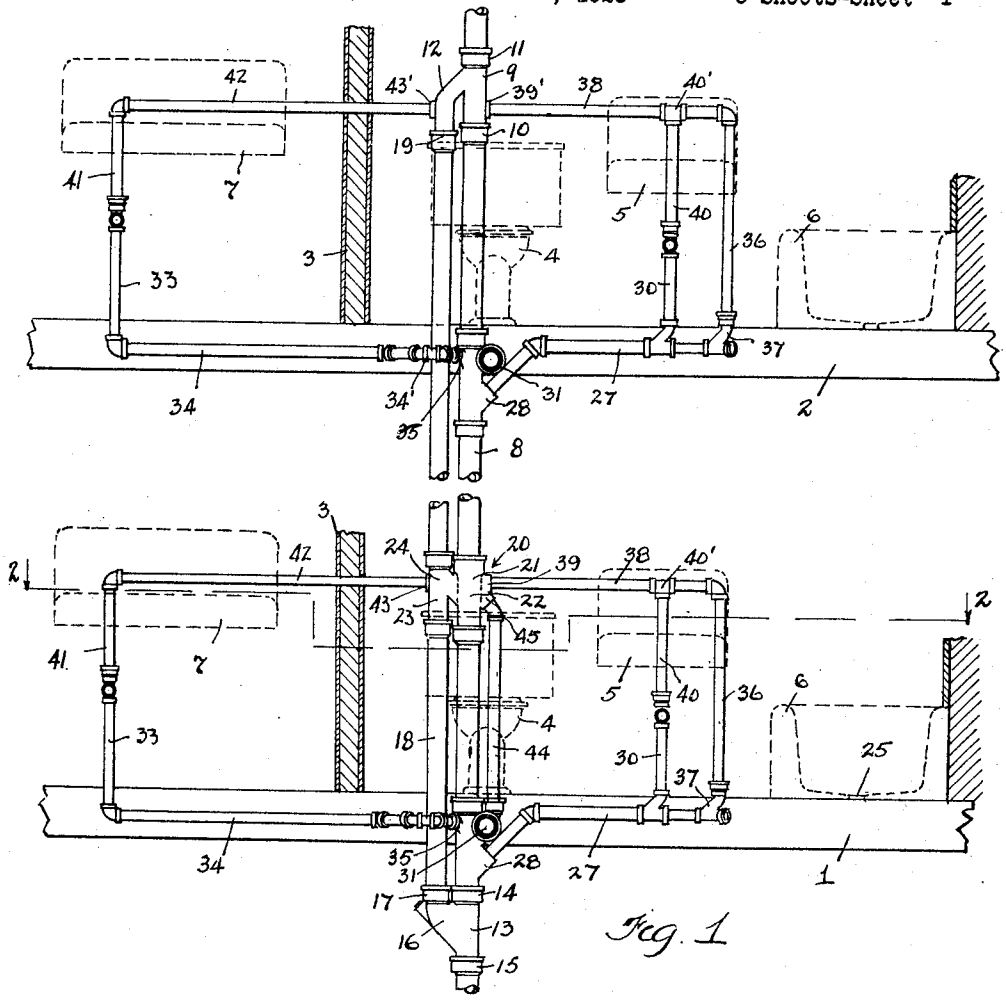


Fig. 1

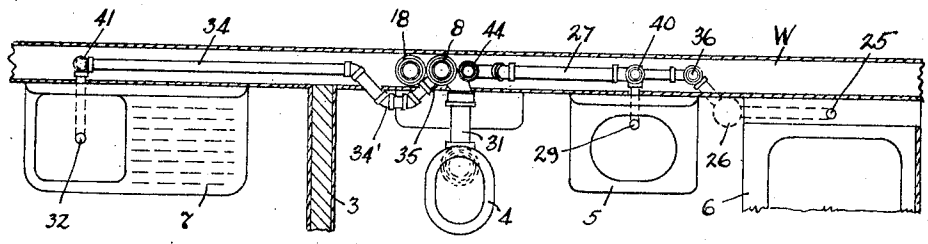


Fig. 2

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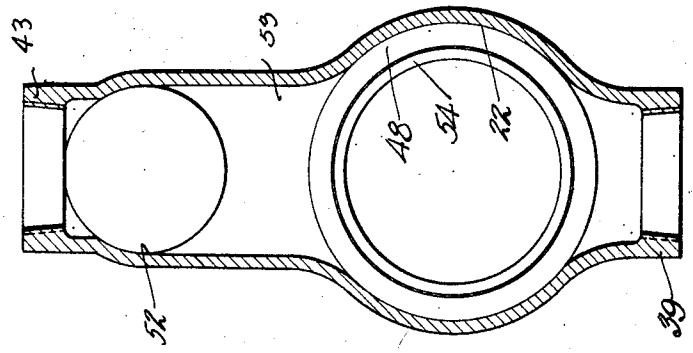


Fig. 4

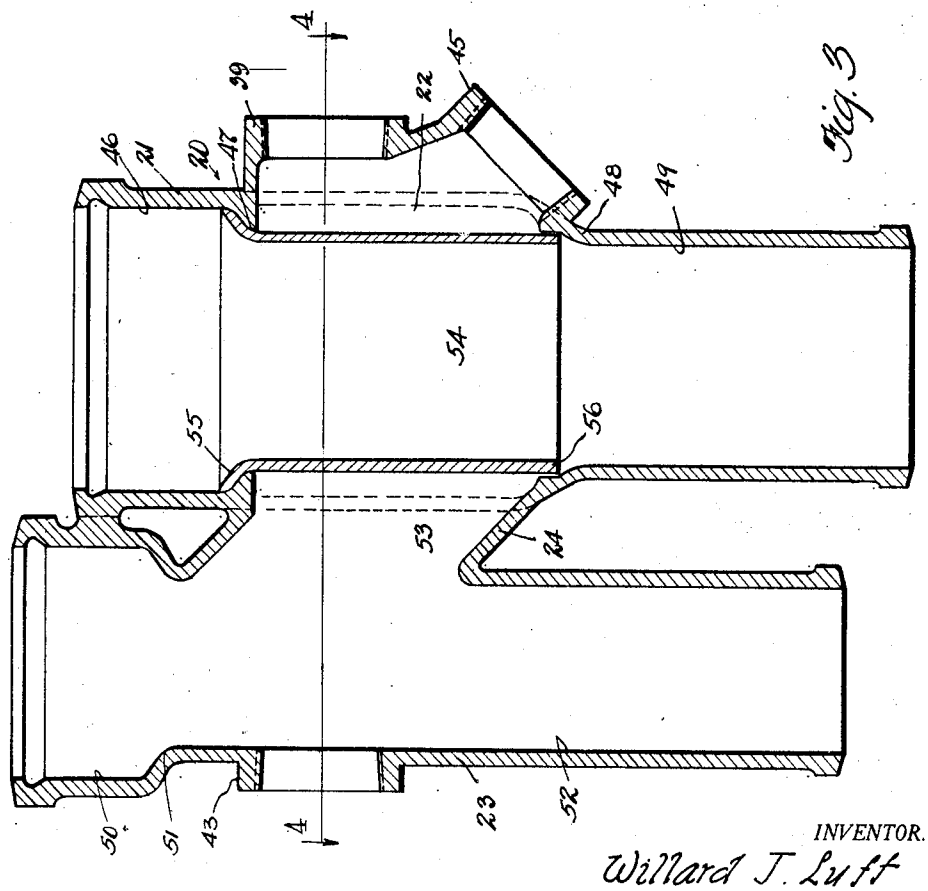


Fig. 3

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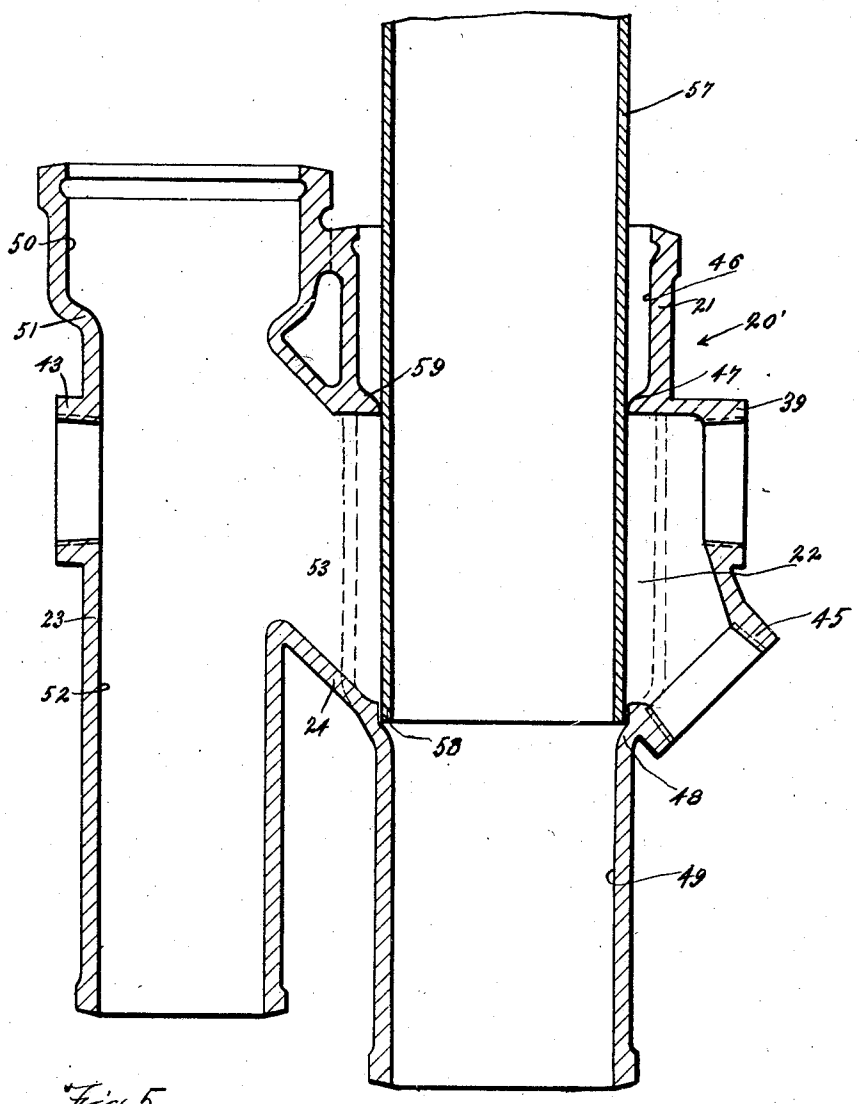


Fig. 5

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UNITED STATES PATENT OFFICE.

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PLUMBING SYSTEM.

Application filed January 5, 1928. Serial No. 244,655.

The present invention relates, as indicated, to plumbing systems, and more particularly to an improved waste and vent stack installation. Plumbing installations are regulated, in most localities, by governmental action, and all installations must be made in accordance with the legislative regulations. One of such regulations is to the effect that no fixture trap shall be placed more than a stated distance from its vent. Obviously, it is desirable to locate the vent and waste stack centrally of any group of fixtures for reasons of economy in material and labor of installation. An arrangement meeting both these requirements is indicated in the drawing forming a part of the present specification.

As will be obvious, such an arrangement, however, gives rise to a problem of connecting those fixtures which are separated from the vent stack by the waste stack to such vent stack. The waste stack is, as indicated, of relatively large diameter and a connection around the waste stack to the vent stack would necessarily be run outside the wall in which the installation is made. Such an arrangement would be unsightly and would not be tolerated in fine buildings.

It is the primary object, then, of the present invention to provide means whereby the fixtures so separated from the vent stack may be connected thereto without running any pipes around the waste stack. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a sectional view of a plumbing system including my improvements, said figure disclosing the arrangement of fixtures and fittings on the lowest and highest floors of a building; Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 of Fig. 1; Fig. 3 is a transverse vertical section through the cross-over fitting; Fig. 4 is a horizontal section taken substantially on the line 4—4 of Fig. 3 and looking in the direction of the arrows; and Fig. 5 is a transverse vertical section through a modified cross-over fitting.

The reference numeral 1 indicates the lowest floor in the building, while 2 indicates the highest floor and 3 indicates a wall dividing the bath-room from the kitchen. The bath-room includes the usual fixtures, a water closet 4, a lavatory 5 and a tub 6, while the kitchen is provided with the sink 7.

Mounted in the wall W is a waste or soil stack 8 open at its top which extends beyond the roof of the building for venting purposes. A Y fitting 9 is connected in the waste stack at a point above the discharge level of any fixture in the building, one end of the straight arm of said fitting being received in a hub 10 of the waste stack while the opposite end of the fitting is provided with a hub 11 to provide a connection for the upper portion of the vent stack. The arm 12 branches from the arm of the fitting which is connected directly in the waste stack at an angle of approximately 45°. A second Y fitting 13 is connected in the waste stack below the discharge level of every fixture in the building by means of a hub 14 on said fitting and a hub 15 on the lower portion of the waste stack. The arm 16 of said fitting leaves the straight arm thereof at an angle of approximately 45° and is provided at its upper end with a hub 17 for the reception of the lowermost end of a vent stack 18, the uppermost end of which is provided with a hub 19 receiving the open end of the branch 12 of the fitting 9.

On each floor except the uppermost floor, there is provided an H fitting 20 which is connected in the waste stack 8 and in the vent stack 18 above the discharge level of any fixture on that particular floor. Such fitting comprises a leg 21, a portion 22 of the passage through said leg 21 being of greater cross sectional area than the passage through the other portions of the waste stack 8, a second leg 23 connected in the vent stack 18, and a connection 24 providing a passage connecting the passages through said legs 21 and 23. The connection 24 forms one side of a 45° angle, the other side of which is formed by the upper portion of the leg 21.

The tub 6 is provided with an outlet 25 which is connected through a trap 26 to the branch pipe 27 which enters the waste stack 8 through a connecting branch 28 provided therein. The lavatory 5 is provided with an outlet 29 connected through a trap (not shown) and a branch 30 to the pipe 27. The water closet 4 provided with the usual built-in trap, is connected through the branch 31

to the waste stack 8. The sink 7 has an outlet 32 connected through a trap (not shown) and a pipe 33 to the branch pipe 34 which, in turn, enters the waste stack 8 through a connection 35 provided therein. The pipe 34 is necessarily provided with a bend 34' to avoid the vent stack 18.

At a point adjacent the trap 26, a vent pipe 36 communicates with the pipe 27 through a fitting 37 and such pipe 36 is connected at its upper end with a vent branch 38 which enters the leg 21 of the fitting 20 through a connection 39 provided therefor. A second vent pipe 40 is connected with the pipe leading from the outlet 29 of the lavatory to the pipe 30 and at its upper end enters a T fitting 40' in the vent pipe 38. A similar pipe 41 connects the trap for the sink 7 with a vent branch 42 entering the leg 23 of the fitting 20 through a connection 43 provided therefor. A pipe 44 connects the pipe 31 with the leg 21 of the fitting 20 through a connection 45 provided on said leg, and serves as a vent for the water closet.

The fitting 9 is provided with connections 39' and 43' for the reception of vent pipes 38 and 42, respectively.

It will be seen that the vent branches from the fixtures which are separated from the vent stack by the waste stack are connected to said vent stack through said waste stack. As has been stated, the passage 22 through the leg 21 of the fitting 20 is of relatively large cross section. As water rushes through said leg, the stream tends to retain the shape and cross sectional area impressed upon it by the upper sections of the waste stack, and therefore it leaves an annular space between the stream and the walls of the passage 22. Air may flow through this space from one side to the other of the waste stack, and thus it will be seen that the fittings to the right in Fig. 1 are effectually vented through the waste stack. It is to be noted that the connection 24 meets the waste stack at an angle of approximately 45° in order to provide for a more effectual and efficient air flow than could be attained if this connection met the waste pipe at an angle of 90°. This fact appears to be perfectly obvious and apparently needs no elaboration.

One form of fitting 20 which may be used in the present system is illustrated in Figs. 3 and 4, and I prefer this form of fitting. As illustrated, the leg 21 of the fitting 20 is provided with a passage therethrough which passage is of relatively large diameter in the upper portion of the leg as indicated at 46. Immediately above the point at which the connection 39 and the connection 24 enter the leg 21, there is provided an internal annular shoulder 47 which reduces the cross sectional area of said passage. Immediately below the point at which the connection 45 and the connection 24 enter the leg 21, there is provided a second shoulder 48 which still further reduces the cross sectional area of the passage, and this reduced area is retained as at 49 throughout the remainder of the length of the leg 21. Intermediate the shoulders 47 and 48, the passage is materially enlarged as indicated at 22. The leg 23 is provided at its upper end with a hub having a relatively large diameter as at 50, and a shoulder 51 reduces the cross sectional area of the passage through said leg 23, the remainder of the passage retaining this reduced diameter as at 52. The connection 24 is formed with a passage 53 therethrough.

It is desirable to provide means for preventing the liquid flowing through the leg 21 from splashing through the connections 39 and 45 and the passage 53. It is to be understood that a fitting of the type indicated would function even in the absence of such means, but that it is preferable to provide positive means for preventing such splashing. Preferably, therefore, I provide a sleeve or tube 54 having an external annular flange 55 at its upper end adapted to seat on the shoulder 47. The lower end 56 of the sleeve 54 seats on the shoulder 48 to hold such sleeve in the desired position. While it might be possible to cast the fitting with an integral tube similar to the tube 54, such casting would make the fitting almost prohibitively expensive and would subject the fitting to defects such as accidental webs between the tubular member similar to the member 54 and the wall of the enlarged portion 22 of the leg 21. From a practical standpoint, therefore, I prefer to make the sleeve 54 as a separate piece adapted to be inserted in the leg 21.

While the above described type of fitting 20 is preferable for certain installations, I have shown in Fig. 5, a modification of such fitting. According to this modification, the fitting 20' is constructed similarly to the fitting 20, but the sleeve 54 is omitted, and one end of a pipe 57 forming a portion of the waste stack 8 extends into said fitting to perform the function of said sleeve. The lower end 58 of the said pipe is adapted to rest upon the shoulder 48 as does the end 56 of the sleeve 54 in the previously described modification, and the annular space between said pipe 57 and the internal surface of the hub 46 of the leg 21 is adapted to receive packing material to effect a tight joint. In all other respects, the modification disclosed in Fig. 5 is identical with that disclosed in Fig. 3.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a plumbing system, a waste or soil

stack, a vent stack, and fixtures having connections with said waste stack, certain of said connections being connected with said vent stack through means in said waste stack providing continuous open communication between said vent stack and said connections with said waste stack.

2. In a plumbing system, a waste or soil stack, a vent stack, fixtures having connections with said waste stack, and a fitting connected in said waste and vent stacks and providing for continuous open communication between said vent stack and said connections to certain of said fixtures.

3. In a plumbing system, a waste or soil stack open at its top to form a vent, fixtures connected to said waste stack, a fitting connected in said waste stack above the level of any of said fixtures and including a branch, a fitting connected in said waste stack below the level of any of said fixtures and including a branch, a vent stack joining said branches, the vent from the waste connection of each of said fixtures being connected to said vent stack, and certain of said vents being connected thereto through said waste stack.

4. In a plumbing system, a waste or soil stack open at its top to form a vent, fixtures connected to said waste stack, a fitting connected in said waste stack above the level of any of said fixtures and including a branch, a fitting connected in said waste stack below the level of any of said fixtures and including a branch, a vent stack joining said branches, each of said fixtures being connected to said vent stack, a third fitting connected in said waste stack and said vent stack between said first two fittings and forming a passage through said waste stack to said vent stack for providing communication between certain of said fixtures and said vent stack.

5. In a plumbing system, a waste or soil stack and a vent stack, fixtures adapted to be connected to said stacks, means connecting said fixtures to said waste stack, and means providing continuously open communication between certain of said fixtures and said vent stack through said waste stack.

6. In a plumbing system, a waste or soil stack and a vent stack, fixtures adapted to be connected to said stacks, means connecting said fixtures to said waste stack, and means connecting certain of said fixtures to said vent stack through said waste stack, comprising an **H** fitting having one leg connected in said waste stack and the other connected in said vent stack, and having a passage formed in the transverse connection between said legs, said first-mentioned leg being enlarged in cross section adjacent the point of communication therewith of said transverse connection passage.

7. In a plumbing system, a waste or soil stack and a vent stack, fixtures adapted to be connected to said stacks, means connecting said fixtures to said waste stack, and means connecting certain of said fixtures to said vent stack through said waste stack, comprising an **H** fitting having one leg connected in said waste stack and the other connected in said vent stack, and having a passage formed in the transverse connection between said legs, said transverse connection meeting said first-mentioned leg at an angle of approximately 45° and said first-mentioned leg being enlarged in cross section adjacent the point of communication therewith of said transverse connection passage.

8. In a plumbing system, a waste or soil stack and a vent stack, fixtures adapted to be connected to said stacks, means connecting said fixtures to said waste stack, and means connecting certain of said fixtures to said vent stack through said waste stack, comprising an **H** fitting having one leg connected in said waste stack and the other connected in said vent stack, and having a passage formed in the transverse connection between said legs, said first-mentioned leg being enlarged in cross section adjacent the point of communication therewith of said transverse connection passage, and provided with means supporting a sleeve within said enlarged portion, said sleeve having a diameter substantially equal to that of the smaller portion of said leg.

9. In a plumbing system, a waste or soil stack and a vent stack, fixtures adapted to be connected to said stacks, means connecting said fixtures to said waste stack, and means connecting certain of said fixtures to said vent stack through said waste stack, comprising an **H** fitting having one leg connected in said waste stack and the other connected in said vent stack, and having a passage formed in the transverse connection between said legs, said first-mentioned leg being enlarged in cross section adjacent the point of communication therewith of said transverse connection passage, and provided with means supporting a sleeve within said enlarged portion, said sleeve having a diameter substantially equal to that of the smaller portion of said leg, and cooperating with the wall of the enlarged portion of said leg to form an annular space having communication with the passage through said transverse connection and with an aperture in the side wall of said first-mentioned leg.

10. A pipe fitting comprising a pair of legs having passages therethrough, one of said leg passages being enlarged in cross-section intermediate its ends, a connection joining said legs and having a passage therethrough in communication with said leg passages, said connection passage communicating with said enlarged portion of said one leg passage, and a port in one of said legs adjacent the point of communication therewith of said connection passage.

11. A pipe fitting comprising a pair of legs having passages therethrough, one of said leg passages being enlarged in cross-section intermediate its ends, a connection joining said legs and having a passage therethrough in communication with said leg passages, said connection passage communicating with said enlarged portion of said one leg passage, and a port in each of said legs adjacent the point of communication therewith of said connection passage.

12. A pipe fitting comprising a pair of legs having passages therethrough, one of said leg passages being enlarged in cross-section intermediate its ends, a tube in said enlarged portion providing a passage therethrough and an annular space therearound, a connection joining said legs and having a passage therethrough in communication with said leg passages, said connection passage communicating with said annular space, and a port in each of said legs opposite the point of communication therewith of said connection passage.

13. In a pipe fitting, an elongated pipe provided with opposed ports in its side walls, an annular, internal shoulder formed on one side of said ports, a second shoulder formed on the other side of said ports, the diameter of said pipe being a maximum between said shoulders, and a sleeve mounted in said pipe and resting on said shoulders and providing a continuation of the elongated passage through said pipe and an annular space separated from said passage and communicating with said ports.

14. A pipe fitting comprising a pair of parallel legs joined by a tubular connection, said connection meeting said legs at an angle other than a right angle, each of said legs being provided with a port opposed to the point of communication of said connection with the respective leg, and one of said legs being provided with an annular, internal shoulder formed on one side of said port and of said point, a second shoulder formed on the other side of said port and of said point, the diameter of the passage through said leg being a maximum between said shoulders, and a sleeve mounted in said leg passage and resting on said shoulders and providing a continuation of said leg passage and an annular space separated from said leg passage and communicating with said port and with said connection passage.

15. In a pipe fitting, an elongated pipe provided with opposed ports in its side walls, an annular, internal shoulder formed on one side of said ports, and a second annular, internal shoulder formed on the other side of said ports, the diameter of said pipe being a maximum between said shoulders.

16. The combination with an elongated pipe provided with opposed ports in its side walls, an annular, internal shoulder formed on one side of said ports, the diameter of said pipe being a maximum adjacent said ports, of a second pipe adapted to extend into said first pipe and through said region of maximum diameter, the inner end of said second pipe being adapted to rest on said internal shoulder.

17. The combination with a pipe fitting comprising a pair of substantially parallel tubular legs joined by a tubular connection, each of said legs being provided with a port opposed to the point of communication of said connection with the respective leg, and one of said legs being provided with an annular, internal shoulder formed on one side of said port and of said point, the diameter of the passage through said leg being a maximum adjacent said ports, of a second pipe adapted to extend into said second leg and through said region of maximum diameter, the inner end of said second pipe being adapted to rest on said internal shoulder.

Signed by me this 3rd day of January, 1928.

WILLARD J. LUFF.