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(12) # EUROPEAN PATENT APPLICATION

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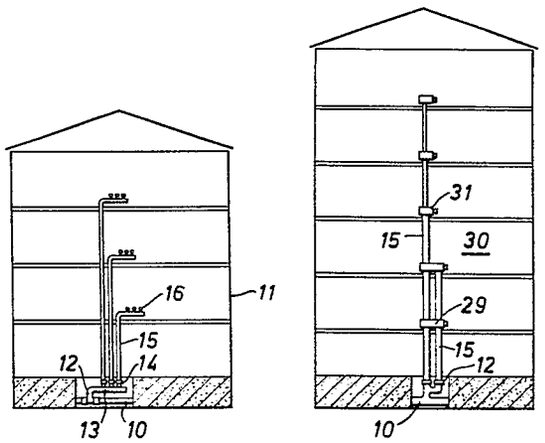
(54) **Improvements in and relating to liquid supply systems.**

(57) The invention for a liquid supply system for a multi-occupied building having a plurality of distribution levels therein and comprises a plurality of riser mains (15) extending from a service main (10) to a multiple outlet distributor (16) disposed in each dwelling, each riser main (15) being formed of cross-linked polyethylenic material and wherein means are included for regulating the liquid flow either to the distributor from the riser main or from each outlet of the riser main thereby providing a substantially constant flow rate of pressure in each of said outlets. Where a dwelling has up to three storeys a separate riser main (15) is employed for each storey and from three to ten storeys a double riser main (15) is employed for the first three storeys whereupon a single riser main (15) extends upwardly from the first storey. The invention provides a economic advantage inasmuch as the system in accordance with the invention may be based on three standardised pipe sizes.



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The present invention relates to liquid supply systems for use, for example, in supplying water to a building.

In most buildings, water is supplied under pressure to a header tank located in a position above the highest point of distribution of liquid in the building and the liquid, usually water, flows by gravity from the header tank to the taps of the system where the water is drawn off as it is required. Such systems require pressure sufficient for supplying water to the header tanks in all buildings in a location supplied by a water authority. In many cases, the pressure supply in the mains to the header tank is in excess of the minimum pressure required to ensure the water supply is adequate for the building. Furthermore, the pipes for supplying the water may vary in diameter depending upon the location of the pipes relative to the water supply source. Such a system is acceptable providing there is sufficient space in the building to accommodate a header tank.

In buildings involving multi-occupancy, such, for example, flats or appartments, the space occupied by a header tank for each individual dwelling is quite large in proportion to the overall space requirements of the dwelling itself, and in consequence, it is desirable to eliminate the use of the individual storage tanks as much as possible.

A common header tank in a multi-occupants dwelling means that dwellings in the upper stories usually have too low a pressure and those on the lower floors tend to have too high pressure and the use of water by dwellings in the lower part of the block will tend to detract still further from the useful pressure obtained at the outlets in the upper dwellings of the block.

To overcome this problem, therefore, it is in many countries now becoming the practice to provide a mains pressure supply direct to each dwelling in a block of flats and to provide pressure reducers to step down the mains pressure to an acceptable level for the supply to a particular consumer unit such as a tap or a washing machine.

According to the present invention there is provided a liquid supply system for multi-occupied buildings having a plurality of distribution levels therein comprising a plurality of riser mains extending from a service main to a multiple outlet distributor disposed in each dwelling, each riser main being formed from a crosslinked polyolefinic material, means for regulating the liquid flow either to the distributor from the riser main or from each outlet of the riser main thereby providing a substantially constant flow rate and pressure in each of said outlets.

Where the dwelling has up to three stories a separate riser main may be employed for each storey. For 3 to 10 storeys a double riser main may be employed for the first few storeys and a single riser extending from the upper end of said multiple riser main to supply the rest. A plurality of distributors may be supplied on each floor, each distributor

serving the consumer units of one dwelling. Thus, a single distributor may be connected to a WC, bath, hand wash basin, shower, kitchen sink and kitchen appliances such as a dish-washer and a washing machine.

The dimensions of the conduits selected to constitute the riser main and the distributor outlet conduits may be selected from three standardised sizes which may be combined to give the necessary flow rate at the distributors based on the pressure existing in the surface main.

The conduits of the riser main and the distributor outlets may all be formed from cross-linked polyethylenic material for both the hot and cold water supply in each dwelling.

The distributor units may be located in a spaced vertical plane and the feeder pipes may each be disposed below the plane containing the associated distributor unit.

It is preferred that the rising main conduits in flats are protected by sheet steel from the connection to the service main to the distributors for the individual dwellings.

The protecting steel sheet is preferably spirally round sheet tubing available under the Trade Name "Lindabvent" (uninsulated) or "Lindabsol" (insulated).

The conduits themselves are preferably cross-linked polyethylene.

The individual connection lines from the distributor to the consumer unit such as a tap, WC, shower or the like may be run in conduits situated in the floor structure or the walls, the conduit lines eliminating from built-in or surface mounted distributor past to different consumer units. This connection line may be installed in a pipe conducting system which employs wall mounted pipe connectors such as described in our co-pending application No. 7916939.

Following is a description by way of example only and with reference to the accompanying drawings of one method of carrying the invention into effect:-

In the drawings:-

Figure 1 is a diagrammatic representation of one embodiment of a tap water system in accordance with the present invention applied to a three storey building.

Figure 2 is an alternative embodiment of the invention as applied to a six storey building.

Figure 3 is a detail of the system used employed in Figure 1.

Figure 4 is a more detailed representation of the system of Figure 2.

Figure 5 is a detail for a typical connection in a bathroom area.

In Figure 1, the system is connected to a service main 10 which runs adjacent or beneath the building 11 and serves to supply water under pressure from a main water supply, such as a water tower or reservoir via a purification system to a connection point 12 for the building. The connection point 12 may comprise a T-piece junction with a short takeoff pipe 13 terminating in a plurality of pipe junctions 14 each being connected to a rising main pipe 15, there being one rising main pipe for each of the three storeys of the building 11. Each rising main pipe 15 terminates at its upper end in at least one distributor unit 16 for the purpose of interconnection to the service or consumer unit to be connected in the dwelling to which the distributor unit 16 relates. There should be a dwelling distributor unit 16 associated with each dwelling on a given floor so that in the event of there being, say three dwellings on

the first floor, the riser pipe 15 would terminate at its upper end in three of distributor units 16.

Turning now to Figure 3, the distributor connection is shown in more detail. The riser pipe 15 terminates initially at a shut-off cock 17 which is connected upstream of and close to distributor unit 16. The distributor unit 16 is provided with a plurality of distributor outlets 18 each of which have a flow regulator 19 associated therewith to control the flow in feeder pipe 20 to a consumer unit 21, in this case a tap. The flow regulator unit 19 is adjustable to provide a desired flow along each feeder pipe 20 depending upon the flow required at each consumer unit 21.

Figure 5 shows a typical arrangement for a bathroom in which a distributor unit 16 comprises a hot distributor 22 and a cold distributor 23. The hot distributor is provided with a pair of outlets 24 with associated feeder pipes 20 providing a hot supply to the bath/shower 25 and the wash hand basin 26. The cold distributor 23 provides a cold supply via each of feeders 20 connected therewith to the bath/shower unit 25, the wash hand basin 26 and the WC unit 27.

The feeder pipes 20 are all formed of a cross-linked polyethylene pipe commercially available under the Trade Name "WIRSBOPEX" and the rising main pipe 15 feeding each distributor from a hot and cold main may also be formed of WIRSBOPEX pipe and provided with a protective shield 28 which is preferably formed from a spirally wound sheet tube commercially available under the Trade Name "Lindabvent" in the uninsulated form or "Lindabsol" in the insulated form. This shield serves to protect the rising main or rising main pipes 15 from the connection 12 to the surface main 10 throughout its rise through the building 11 to each distributor unit 16.

The diagram illustrated with respect to Figure 2 provides for a dual connection 12 to service main 10 and provides at least on the lower floors a duplicated rising main 15 comprising two pipes in parallel with H-connector 29 to provide communication between the riser main pipes 15 for equalisation of pressure therein at each of the floor levels from which a supply via distributor 16 is drawn; the supply being drawn via H-connector 29. Above the third level 30 the riser pipe 15 is formed by a single rising main pipe only having distributor connections 31 connecting with distributor units 16 on each floor in the usual way. This is better illustrated with reference to Figure 4 which shows a service main 10 with the connection 12 feeding the two rising main pipes 15 which are interconnected at each floor level by means of H-connection 29, the dual riser pipes 15 at the third level 30 of building 11 and continuing thereup by means of distributor connection 31 to distributor units 16 in the manner hereinbefore described with a shut-off cock 17 juxtaposed distributor 16 in the manner described with respect to Figure 3.

It will be appreciated that the flow regulators 19 control the flow of water thereby reducing over consumption at high pressures and ensuring that water supplied to consumer units 21 on an upper floor of a building supply water at a maximum rate corresponding to a maximum flow rate of water issuing from consumer units 19 disposed below, the said upper unit and connected to the same riser main pipe 15.

An advantage of a water supply system in accordance with the present invention is that the riser main pipes 15 may be of smaller cross-sectional area than riser pipes used hitherto and that all of the feeder pipes 20 may be of the same cross-sectional area.

In this manner, a reduced number of pipe sizes may be employed in installing a water supply system in accordance with the present invention; this provides for economic manufacture of the pipes and ease of installation since less time will be spent in ensuring that correct pipes have been ordered and delivered to an installation site.

In a typical dwelling flat the water supply to a complete flat should be at a rate of 0.8 litres per second. The supply to a bathroom is defined at a maximum of 0.4 litres per second and if a washing machine is installed an additional 0.2 litres per second is required to give a total of 0.6 litres per second. This gives a coincidence value of 0.48 litres per second while a coincidence value for a flat taken as a whole is 0.52 litres per second. Since the coincidence value for a complete flat and for a bathroom with a washing machine are almost identical, the nominal rate for cold water flow is preferably set at 0.8 litres per second for each and in this manner an additional variable is avoided. Thus, by standizing the flow rate for all flats, the supply system in accordance with the invention may be built up from 3 sizes of pipe. Typically 15 by 2.5 mm, 18 by 2.5 mm and 28 by 4 mm. Pipe formed by crosslinked polethylenic pipe manufactured under the registered Trade Mark WIRSBOPEX by the present applicant. Built-in flow regulators are associated with each distributor unit to ensure the correct water flow to each respective discharging consumer unit.

In a typical flat the nominal rates of flow to a different consumer units is set out as follows:-

Table 1. Nominal rates of flow to different consumer units.

Complete flat and c.w. to bathroom with washing machine	0.8 1/s
Bathroom	0.4 1/s
Kitchen, shower and WC with shower	0.2 1/s
WC	0.1 1/s

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Table 2 below sets out details of maximum pipe length in metres for various pressure drops, while Table 3 enables the selection of sizes and length of rising main.

Table 2. Selecting the sizes of connection lines. WIRSBOPEX pipe 15 x 2.5 mm. A pressure drop of 5, 7.5 or 10 m w.g. is to be selected for the connection lines including the unions to the distributor and to the consumer unit.

Nominal flow	Max. pipe length in metres for various pressure-drops		
l/s	5 m w.g.	7.5 m w.g.	10 m w.g.
0.1	19	27	36
0.2	5	7.6	10.5
0.4	0.8	1.6	2.4

Table 3. Selecting the sizes and lengths of rising mains.

P_t m w.g.	Nominal flow l/s	Max. pipe length in metres		
		15x10	18x13	28x20
5	0.1	18	66	
	0.2	5	19	
	0.4	0.8	4.8	45
	0.8	0.2	2.8	29
10	0.1	38	134	
	0.2	11	40	
	0.4	2.5	11	91
	0.8	1.3	6.7	61
15	0.1	58		
	0.2	17	60	
	0.4	4.2	17	138
	0.8	2.5	11	92
20	0.1	77		
	0.2	22	80	
	0.4	6	23	
	0.8	3.6	15	
25	0.1	97		
	0.2	28	100	
	0.4	7.6	29	
	0.8	4.8	19	

Thus, in determining the structure of a water system in accordance with the present invention it is necessary first to determine the nature of the supply whether to a three storey or a three to ten storey building. When dimensioning installations it is necessary to have consideration first to the supply pressure and to determine the pressure drop for the feeder pipe 20 for individual consumer units 21 from the distributor unit 16 by using the information

set out in table 2. This determines the total length of 15 by 2.5mm pipe required to produce a given resistance at the noted flow rate. Where a pressure regulator is included prior to the distributor unit, the necessary flow rates at various consumer units can be controlled by pipe length, or pipe length in combination with a subsidiary pressure or rate controller 19.

For pipe sizes a distributor unit 16 to a consumer unit 21 select the pressure drop for the feeder pipe 20 and check that the length of line for the selected pressure drop and the nominal rate of flow does not exceed the permissable maximum. Determine the total resistance in the metres water guage of the consumer unit that imposes the highest resistance at the nominal rate of flow and the resistance of any applicable shower or flow regulator, calculate the height in metres between the connection point and the highest position consumer unit and reduce the pressure in B by the sum of the total pressure drops by using the flow regulator 19.

A similar procedure using table 3 applies to the selection for determination of the rising main pipe 15. Enter the table at the appropriate service main pressure P_t and then select the row having the correct nominal flow for respective consumer unit to obtain the total nominal flow rate, then read off the maximum permissable pipe length for different sizes of pipes employed.

When dealing with installations for high rise buildings up to 10 storeys, the same criteria may be applied. By reference to Tables 1, 2 or 3 the size and the number of the riser mains may be determined to obtain the appropriate pressure level of distribution at each level.

Such a system provides a facile method of computing pipe dimension to be employed and enables pipe size to be standardized on three basic sizes.

There is further considerable reduction in water noise in installations formed primarily of plastics material and considerable cost reduction in the installation.

CLAIMS:

1. A liquid supply system for multi-occupied buildings, having a plurality of distribution levels therein, which system comprises a plurality of riser mains extending from a service main to a multiple outlet distributor disposed in each dwelling, each riser main being formed from a cross-linked polyethylenic material and further including means for regulating the liquid flow either to the distributor from the riser main or from each outlet of the distributor to a consumer unit thereby providing a substantially constant flow rate in each of the outlets irrespective of the level in the building at which the said outlet is situated.

2. A system as claimed in claim 1 wherein the system is applied to a dwelling containing up to three storeys and wherein a separate riser main is employed for each storey.

3. A system as claimed in claim 1 wherein the system is applied to a building having more than three and up to ten storeys wherein a double riser main is employed for supplying the first three floors and wherein a single riser main extends to the remaining floors thereabove.

4. A system as claimed in any preceding claim wherein a plurality of distributors may be connected to the riser main on each floor wherein each distributor serves the consumer units of one dwelling.

5. A system as claimed in claim 4 wherein a single distributor unit is connected to a WC, bath, shower, hand wash basin, kitchen sink and kitchen appliances.

6. A system as claimed in any preceding claim wherein the dimensions of the conduits selected to constitute the riser main and the feeder pipes from the distributor unit to the consumer units are selected from three standardized sizes which are combined to give the necessary flow rate at the distributors on the pressure existing in the service main.

7. A system as claimed in any preceding claim wherein the distributor units are disposed in spaced vertical plane wherein the feeder pipes from each distributor unit are disposed below the plane containing the associated distributor unit.

8. A system as claimed in any preceding claim wherein the riser main pipes are protected by steel sheet extending from the connection point with the service main to the distributor units for each individual dwelling.

9. A system in claim 8 wherein the steel sheet is a spirally wound sheet tube.

10. A system as claimed in claim 1 and substantially as herein described with reference to and as illustrated in Figures 1 to 5 of the accompanying drawings.

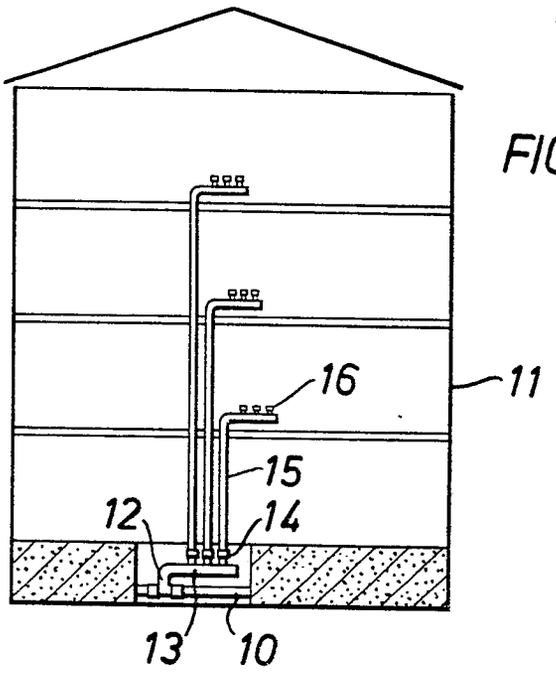
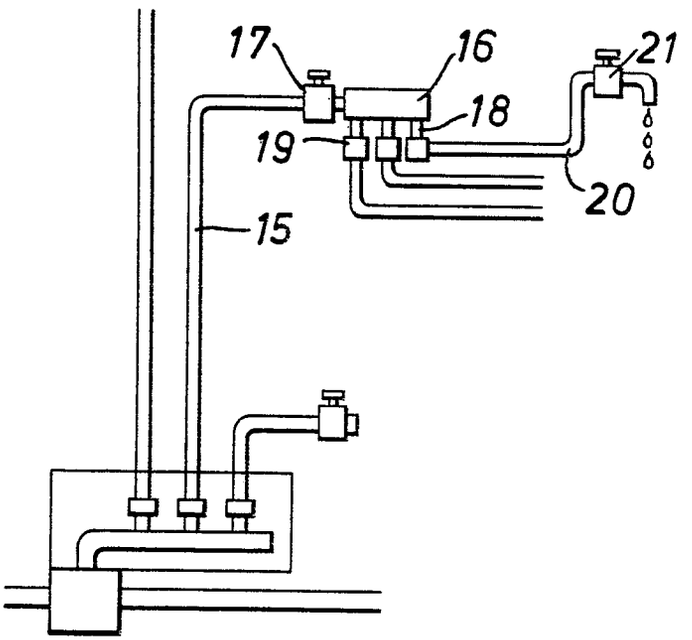


FIG.1.

FIG.3.



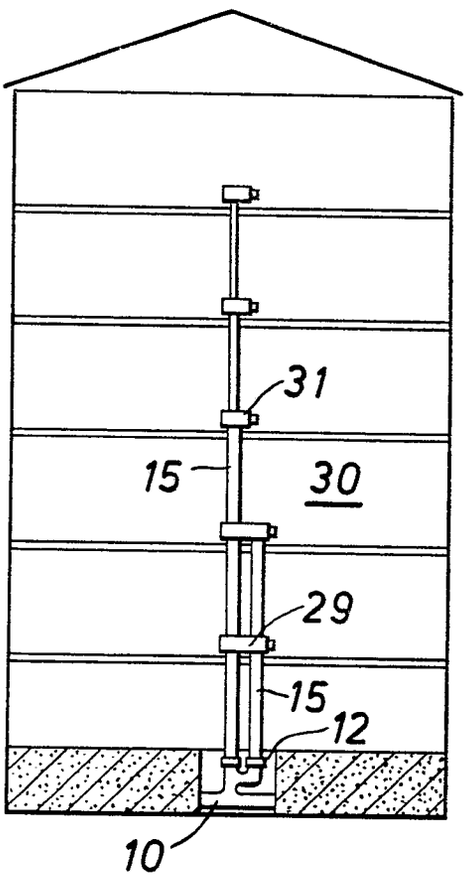


FIG.2.

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FIG.4.

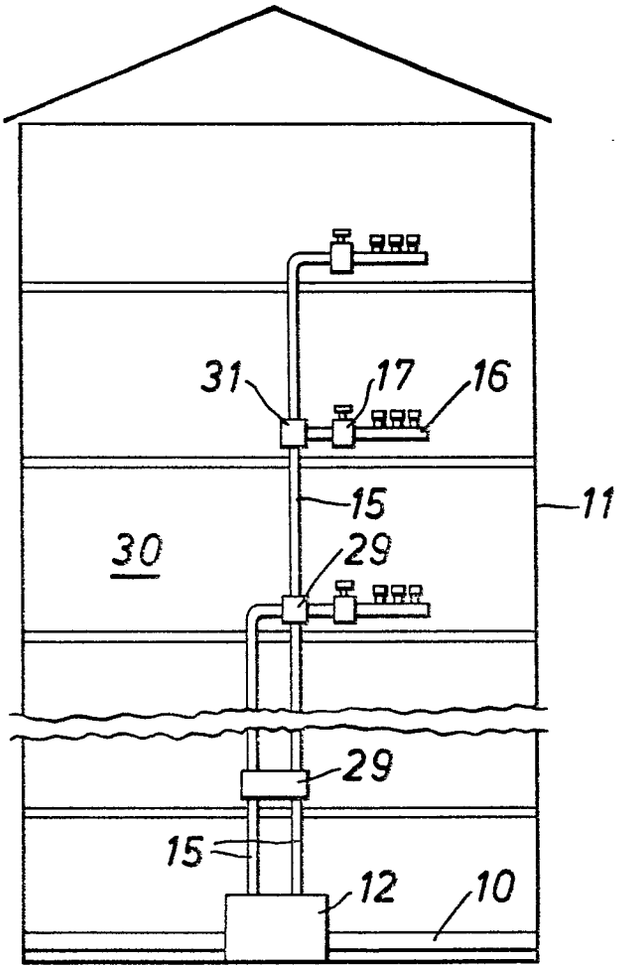
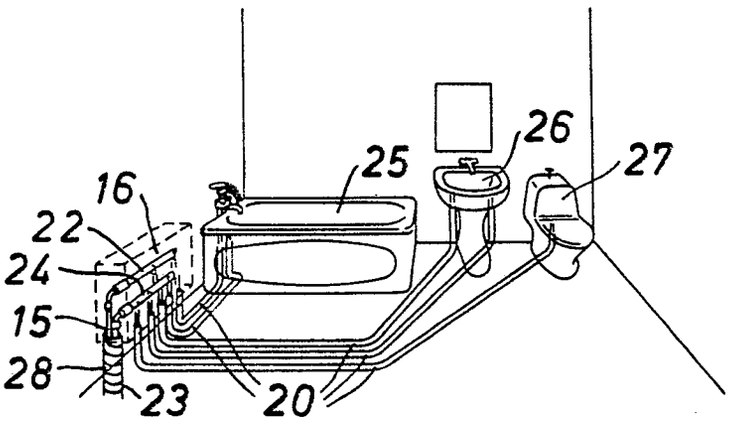


FIG.5.



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EUROPEAN SEARCH REPORT

0009375
Application number

EP 79 301 886.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - C - 822 377 (W. MESSERSCHMITT) * whole document * --	1,2
	DE - A - 2 124 720 (BPA BYGGPRODUKTION AB) * page 1, paragraph 2 * --	1,2
	FR - A - 1 559 187 (A. GIACOMINI) * fig. 1, 4 * --	1
	US - A - 3 028 966 (J.W. WIESMANN) * fig. 4, 5 * --	1
P	TECHNISCHE RUNDSCHAU, Vol. 71, No. 7, February 1979, Bern H. HAURI "Korrosionsfeste Hauswasserleitungen - Ein neues Sanitärsystem" * page 5 * ----	1

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

E 03 C 1/02

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

E 03 B 1/00
E 03 B 7/00
E 03 C 1/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	22-11-1979	PAETZEL

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