

## IMPROVED WATER MAINS BYPASS SYSTEM

### Introduction to the Invention

This invention relates to the maintenance and servicing of mains water supplies and in particular relates to a system and associated equipment for use in  
5 the bypassing of such a mains supply during maintenance or upgrading procedures where the end user can be assured of a constant and virtually uninterrupted supply of mains water notwithstanding the disablement of a section of the mains water system.

### Background of the Invention

10 The provision of water supply to domestic and commercial environments is fundamental to sanitation and the day to day maintenance of domestic and commercial environments. The supply of mains water to both domestic and commercial environments is generally satisfied by the provision of mains water through a series of conduits and piping running parallel with roads and other access  
15 routes. In common with all plumbing systems such mains water supplies require maintenance and upgrading from time to time, and to date such maintenance and replacement of mains water systems has required the closing down of such mains water systems for the duration of maintenance time during which commercial and domestic customers are necessarily deprived of mains water. The vital importance  
20 of water for the previously discussed reasons forces a limitation to the duration of such interruptions and it is generally accepted that an interruption in the order of five hours is the maximum desirable. However, it would clearly be highly desirable if an efficient and reliable system could be developed which would enable ready and quick installation of an alternative bypass to the mains water  
25 supply to allow the water supply to be maintained and/or replaced during periods of work thereby minimizing any interruption to the end user. To date, only very basic systems have been available which have been developed to utilize street fire hydrants, which are of course directly attached to the mains water supply. However such systems are very basic in their application are time consuming and  
30 complex to install and do not provide a comprehensive and reliable bypass system.

### Object and Statement of Invention

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In one aspect the invention provides a system for bypassing a mains water supply to individual properties said system including primary coupling adapted for fitting to and accessing water from a first street fire hydrant said primary coupling being adapted to receive the first end of a supply hose, a length of supply hose adapted to carry said water, and one or a plurality of service ports fitted intermediate along the length of said supply hose adapted to access said water from said supply hose, each service port being fitted either with one or a plurality of service hoses which are in turn adapted for fitting to and integration with the water supply of said individual properties so as to provide a mains bypassed supply of water to said properties.

In another aspect the invention provides a system for bypassing a mains water supply to individual properties said system including a primary coupling adapted for fitting to and accessing water from a first street fire hydrant said primary coupling incorporating an auxiliary take off port adapted for ready access by fire fighting authorities and an outlet adapted to receive the first end of a supply hose, a length of supply hose adapted to carry said water, and one or a plurality of service ports fitted intermediate along the length of said supply hose adapted to access said water from said supply hose, each service port being fitted either with one or a plurality of service hoses which are in turn adapted for fitting to and integration with the water supply of said individual properties so as to provide a mains bypassed supply of water to said properties.

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plurality of service hoses which are in turn adapted for fitting to and integration with the water supply of said individual properties so as to provide a mains bypassed supply of water to said properties.

5 The system may also incorporate a flushing means for replacing the water in said system said flushing means being a pump fitted intermediate said supply hose and adapted to regularly flush the water present in the supply and service hoses by drawing a quantity of water from said system at least equal to the volume of water held by the system.

10 In another aspect the invention provides a method of bypassing a section mains water supply to individual properties including the steps of locating an access point for the mains water supply and fitting the system of the invention to the supply and integrating the system with the water supply of said properties.

15 In another aspect the invention provides a hose dispensing and collecting vehicle for use in the system comprising a powered and mobile driveable land vehicle characterized by having a rotatable spool fitted to one end thereof wherein said spool is adapted to hold said hose and is rotatable at a selection of speeds about its axis of rotation and said spool is fitted to said vehicle via a vertically adjustable mounting means to provide height adjustment for said spool.

20 The spool may be mounted as a projection from the front of said vehicle and said vehicle being provided with any necessary counter weight to said spool when loaded.

In another aspect the invention provides a primary coupling adapted for fitting to a street fire hydrant and/or a valve assembly to access water therefrom and having an outlet for receiving a length of supply hose characterized in having  
25 an auxiliary take off port adapted for ready access by fire fighting authorities.

#### Detailed Description of Invention

The invention will now be more fully described with reference to some select and particularly preferred embodiments with Figure 1 showing a schematic representation of the water mains bypass system. Figure 2 shows a primary  
30 coupling fitted to pillar ball hydrant, Figure 3 shows a service port fitted intermediate on the supply hose, Figure 4 shows a service port incorporating a tee

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junction, Figure 5 shows two alternatives for plumbing the service hose to an individual property via a garden-tap or a replacement of the meter, Figure 6 shows details of the hose dispensing and collecting vehicle.

Referring firstly to Figure 1 the overall system of the invention comprises a  
5 primary coupling 1 which is threaded and particularly adapted for fitting to a first street fire hydrant 2 and when the fire hydrant is opened the primary coupling can serve as conduit to access mains water via the fire hydrant. The fire hydrant is therefore functioning as a convenient alternative access to the mains water supply. The primary coupling may incorporate an auxiliary take off port 3 which is  
10 suitably valved and set up so as to allow ready access by fire fighting authorities. In particular the take off port is a virtual reproduction of the fitting specifications of the fire hydrant per se such that in the event that the fire authorities need to access water from a fire hydrant being used as a bypass, such access is readily available by way of the auxiliary take off port 3. The primary coupling has an outlet 4 for  
15 directing the water flow from the hydrant through the coupling and the outlet 4 is particularly adapted to receive the first end 5 of a high pressure water supply hose 6, the system then comprises a sufficient length of supply hose which is laid down a street or other access route for the substantial length of the mains water supply that is to be interrupted. In practice, the supply hose 6 is unwound until it reaches a  
20 second street fire hydrant 9, which will generally be the next available fire hydrant. The hose is provided with a secondary coupling 7 which is adapted to receive the second end 8 of the supply hose and adapted for fitting to and accessing water from a second street fire hydrant 9. The linking of the supply hose to two fire hydrants is not essential, but if possible such a connection forms a supply loop which greatly  
25 improves the efficiency and supply potential of the hose. The system then comprises one or a plurality of service ports 10 which are fitted at the requisite points along the length of the supply hose 6 corresponding to the individual properties requiring mains water bypass. The service ports 10 are fitted intermediate to the said supply hose and adapted to access water from the supply  
30 hose and feed the water into the individual properties. Each of the service ports is fitted with one or a plurality of service hoses 11 which can be either dual service

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hoses or single service hoses depending on the individual properties to be serviced.

The service hoses 11 are fitted into the individual properties water supply either by way of a garden tap 14 which then effectively acts in reverse by allowing water to be forced back into the system rather than being an outlet for water in the normal sense of the plumbing configuration or alternatively the service hose can be hard plumbed in place of the normal water metering system 15. In practice the selection of either a garden hose or the water metering system is determined by the requirements or physical layout of an individual property. Similarly the ability of a service hose to provide an adequate water flow and supply to an individual property can be determined in accordance with particular requirements and in the event that an individual property may, for example include a plurality of flats, a large service port can be provided which can be fitted and accommodate a large dimension service hose (of similar dimension to the supply hose) and such a hose can be fitted at or near the meter by way of a direct plumbing coupling 16.

In this manner the system of the invention is able to provide a mains bypass via two fire hydrants and with the provision of suitable couplings and service ports can provide a mains bypass servicing a plurality of individual properties positioned between two fire hydrants.

#### Installation and Operation of System

Once a suitable point in the mains water systems is located that needs attention either in the form of maintenance or improvement or servicing in any way, suitable fire hydrants are located along the length of the mains water system to be closed off. Prior to connection of the system of the invention which will bypass that section the mains water supply, each fire hydrant in question is flushed for five minutes prior to connection of the high pressure water supply hose 6. The high pressure water supply hose 6 is rolled out along either the footpath in a suitable position relative to the individual properties to be supplied with the water which are normally serviced by that part of the mains water system to be closed off. Once the supply hose 6 is unwound, which can be accomplished via the dedicated vehicle shown in Figures 6 and 7, the first and second ends of the supply hose can be connected to the first and second fire hydrants respectively by fitting

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of the primary coupling 1 and secondary coupling 7 to the respective fire hydrants and fitting the supply hose to the respective couplings. The supply hose 6 is then charged with water to allow stretching and filling of the hose. With the supply hose laid out in front of the individual properties to be connected, the nearest take  
5 off points along the supply hose are identified, and the supply hose is discharged and the service ports 10 are then installed at the appropriate positions. The service ports are then closed and the isolating valves thereof opened and the supply hose is recharged. The service ports are then provided with service hoses 11 which are connected to the individual property either by way of fitting to a garden-tap 14 or if  
10 the situation requires the meter 15 can be removed and the service hose 11 plumbed into the meter stub pipe on the property side using any necessary adaptors as would be required.

In addition to the number of service ports the supply hose 6 may be provided with a circulation or flushing device 13 which will be located midway  
15 between the first and second hydrants feeding the supply hose 6. The circulating or flushing device takes the form of a pump or valve system which allows the whole volume of the supply hose to be discharged as required either to ensure adequate and continuous flow through the system or in the event that the exposed supply hose becomes too hot and the water increases to an unacceptable  
20 temperature the flushing means can be used as a way of removing the overheated water in the system.

Once the system has been fully installed and tested the individual properties serviced by the system are then provided with an uninterrupted water supply and to all intents and purposes need not be aware of the interruption to the mains water  
25 system in between the first and second fire hydrants. Once the necessary maintenance has been conducted on the mains water pipe removal of the system of the invention is effectively the reverse of the fitting with the disconnection of the service hoses from the individual properties and reinstatement of the taps and/or meters as required when all the individual properties are disconnected the first and  
30 second hydrants are shut down and the supply hose 6 is discharged. The primary and secondary couplings are removed from the first and second fire hydrants and

the mains water system is reconnected for normal operation. The features of the system allow it to be fitted within a matter of minutes and provides domestic and commercial customers with a virtually uninterrupted supply of water. The primary coupling for use in the previously described system is detailed in Figure 2.

5 The primary coupling includes a threaded sleeve 18 which is adapted for fitting to a fire hydrant. The threaded sleeve leads onto an outlet 4 which is particularly adapted to receive the supply hose. The primary coupling incorporates an auxiliary take off port 3 which has an outlet particularly configured so as to be faithful to the outlet provisions of the fire hydrant in order to allow the fire authorities ready  
10 access to the fire hydrant notwithstanding the fitting thereto of the primary coupling. The supply hose is fitted with a plurality of service ports 10 which are shown in Figure 3 with each service port comprising a T coupling adapted for fitting within the supply hose and providing an outlet for the service hose. The service hose can either be a lightweight hose in the case of an individual property  
15 or in the case of a property requiring high pressure water the service hose can be a heavy duty hose which can be adapted for fitting into the meter region of the plumbing by way of a coupling 16 shown in Figure 5. In this embodiment, the meter would be removed and the coupling would be hard plumbed into the existing plumbing system.

20 In another aspect the invention provides a vehicle dedicated for dispensing and handling the supply hose and such a vehicle is described with reference to Figure 6. The vehicle comprises a powered and mobile driveable land vehicle 20. The land vehicle is adapted for driving down roads and footpaths including nature strips and is characterized by having a large rotatable spool 21 fitted at the front  
25 end thereof wherein the spool is rotatable about its axis of rotation 22 via a motorized coupling 23 to the vehicle. The spool is held at a position projecting out from the front of the vehicle 20 by way of extension arms 24. The extension arms are fitted to the vehicle by way of a vertically movable carriage 25 such that the spool can be made to move up and down vertically depending on the terrain or  
30 other requirements while the vehicle is being driven and the spool rotated so as to dispense a length of hose. In order to provide full control over the dispensing of a

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hose the spool is able to be rotated at a variable speed depending on the requirements, for example of the diameter of the spool hose or the speed of dispensing required. The vehicle provides a dedicated means of quickly and accurately laying the supply hose and alternatively for collecting and spooling up  
5 the supply hose when the bypass system is no longer required. The weight of the supply hose when fully loaded requires consideration to be given to the balance of the vehicle so as to ensure any counterweighting is provided for.

The invention provides for the first time a comprehensive system and series of fittings which can be readily incorporated in the plumbing provisions of  
10 domestic or commercial environments to allow the mains water supply of such environments to be rapidly bypassed so as to cause minimum inconvenience to the customers and individual properties involved when the mains plumbing requires attention. In use a section of mains water supply requiring attention would be identified and prior to cutting off the mains water, the system of the invention  
15 would be laid out to all the individual properties and would be connected either by way of garden taps or hard plumbing into the metering systems. The system would then be connected to the fire hydrants and simultaneously the mains water supply would be disconnected so as to allow an interruption time in order of only five to ten minutes. Once the system is connected the mains can be worked on to any  
20 extent including continuous maintenance without fear of any undue interruption to the water supply. In this manner the invention provides for the first time a system which would allow highly efficient maintenance of mains water supplies without the necessity of reconnection of the water supply every five or so hours. The use of the system of the invention thereby minimizes down time and maximizes  
25 maintenance and construction man hours for all aspects of mains water maintenance and replacement situations and improves overall level of service to consumers.

The system of the invention can be used for single customer supplies (typically a commercial property, eg. factory and/or motel) and multiple customer  
30 supply (typically from 15 to 180 properties). Upper and lower limits are evaluated

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on economic, practical, or the "burst" frequency of a particular main, together with the systems availability.

The system of the invention offers many advantages that are currently not available. Being a temporary reticulation system and above ground, the system is  
5 portable and modular and can be utilised under many circumstances – there are few limitations. The system has no minimum or maximum length requirements due to its modular features.

With its obvious efficiency, the system of the invention also offers economical relief, potentially saving anywhere between 10-40% on current  
10 maintenance or renewal costs, representing considerable capital and maintenance savings.

The system of the invention opens a window of opportunity for the introduction of new technology to the replacement and rehabilitation of the existing infrastructure without compromising the performance and level of service  
15 the existing infrastructure offers.

In addition the system of the invention can be applied to many other situations in addition to maintenance of existing mains water systems. For example the system of the invention could be applied for the temporary installation of a water system to disaster struck areas or large entertainment events.



### Claims

1. A system for bypassing a mains water supply to individual properties said system including a primary coupling adapted for fitting to and accessing water from a first street fire hydrant said primary coupling being adapted to receive the  
5 first end of a supply hose, a length of supply hose adapted to carry said water, and one or a plurality of service ports fitted intermediate along the length of said supply hose adapted to access said water from said supply hose, each service port being fitted either with one or a plurality of service hoses which are in turn adapted for fitting to and integration with the water supply of said individual properties so as to  
10 provide a mains bypassed supply of water to said properties.
2. A system according to claim 1 wherein said primary coupling incorporates an auxiliary take off port adapted for ready access by fire fighting authorities.
3. A system according to claim 1 or 2 further including a secondary coupling adapted to secure the second end of said supply hose and adapted for fitting to and  
15 accessing water for a second street fire hydrant.
4. A system according to claim 3 wherein said secondary coupling incorporates an auxiliary take off point adapted for ready access for fire fighting authorities.
5. A system according to any one of claims 1 to 4 wherein said fire hydrant  
20 can take the form of any alternative access to said mains water supply including above ground pillar hydrants, above ground 'L Type' hydrants, below ground hydrants and temporary tapping access means.
6. A system according to any one of claims 1 to 5 wherein a flushing means is incorporated intermediate of said supply hose to allow the water contents of said  
25 supply and service hoses by drawing a quantity of water from said system at least equal to the volume of water held by said system.
7. A system according to claim 6 wherein said flushing means is a pump.
8. A method for bypassing a mains water supply to individual properties including the steps of locating an access point for said mains water supply, fitting  
30 the system according to any one of claims 1 to 7 to said mains water supply and integrating said system with the water supply of said individual properties.



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9. A method according to claim 8 wherein the supply hose of said system is of sufficient length for fitting at a first end to a first fire hydrant and fitting at a second end to a second fire hydrant.
10. A method according to claim 8 or 9 wherein said service hoses are  
5 integrated with the water supply of said individual properties by fitting to the meter of said properties or fitting to a convenient tap of said properties.
11. A system according to any one of claims 1 to 7 substantially as hereinbefore described.
12. A method according to any one of claims 8 to 10 substantially as  
10 hereinbefore described.