

- [54] **PREFABRICATED BATHROOM WALLS**
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- [52] **U.S. Cl.**..... **4/191, 4/166, 4/211, 52/34, 52/220, 264/219**
- [51] **Int. Cl.**..... **E03c 1/00**
- [58] **Field of Search**..... **4/166, 191, 211; 52/34, 52/220, 221**

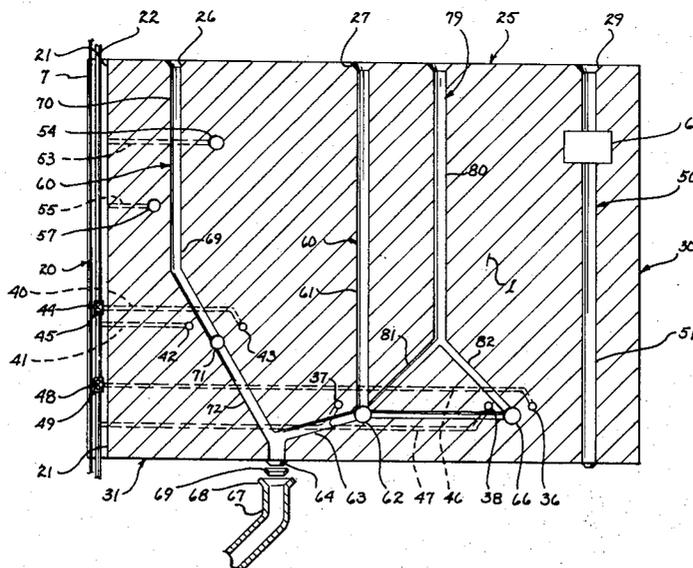
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 Attorney, Agent, or Firm—Cahill, Sutton & Thomas

[57] **ABSTRACT**  
 A unitary building wall, having a plurality of sets of passageways disposed therein and serving as a conduit

for introducing the necessary utilities to a dwelling unit, is disclosed. A plurality of sets of tree-like passageways, which passageways include a trunk and one or more tributaries, are disposed within an otherwise solid building wall. The trunks of the passageways extend into and out of the building wall and communicate with similar trunks disposed in adjacent vertically aligned walls. A plurality of orifices are disposed in the lateral side of the building wall and communicate with one of the trunk or tributaries of one of the sets of passageways. The various fixtures within a dwelling unit, such as a tub, toilet, sink and lights, are connected to the orifices. Thereby, the fixtures are connected to the various utilities disposed within one or another of the sets of passageways. A method is also disclosed for forming the unitary building wall, which method includes the construction of a plurality of disposable or hollow trees, each tree defining one set of passageways. The trees are positioned within a form, which form defines the exterior dimensions of the building wall. A flowable hardenable material is poured within the form and allowed to set and cure. After curing, the trees, if made of ice and therefore disposable, are melted and will leave tree-like passageways within the building wall. If the trees are not disposable but hollow, they form a plurality of tree-like passageways within the building wall.

5 Claims, 5 Drawing Figures



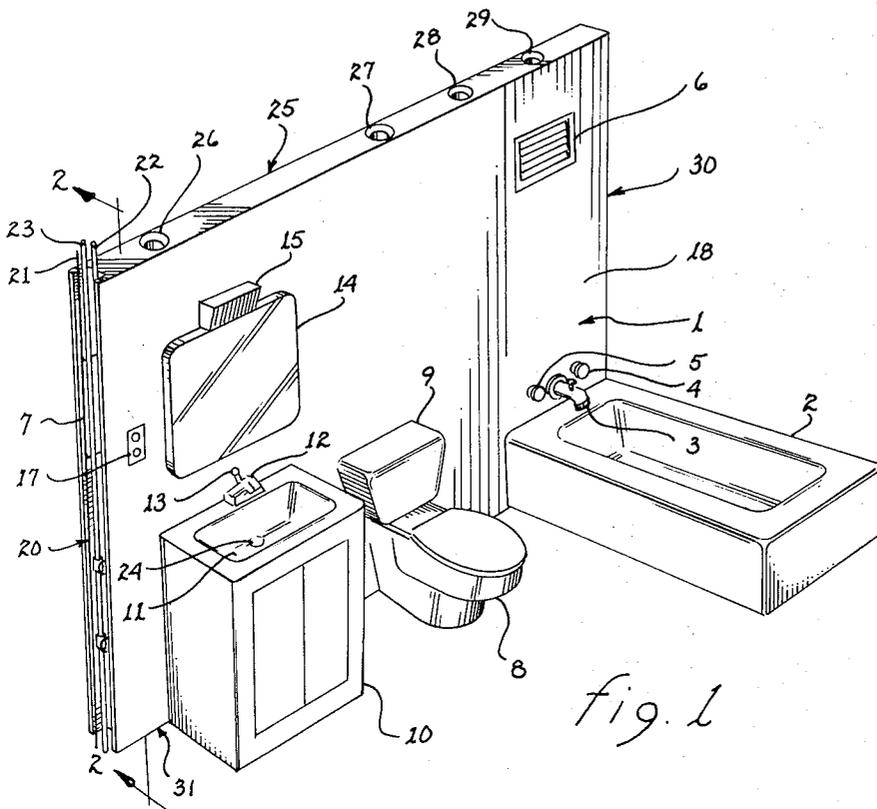


Fig. 1

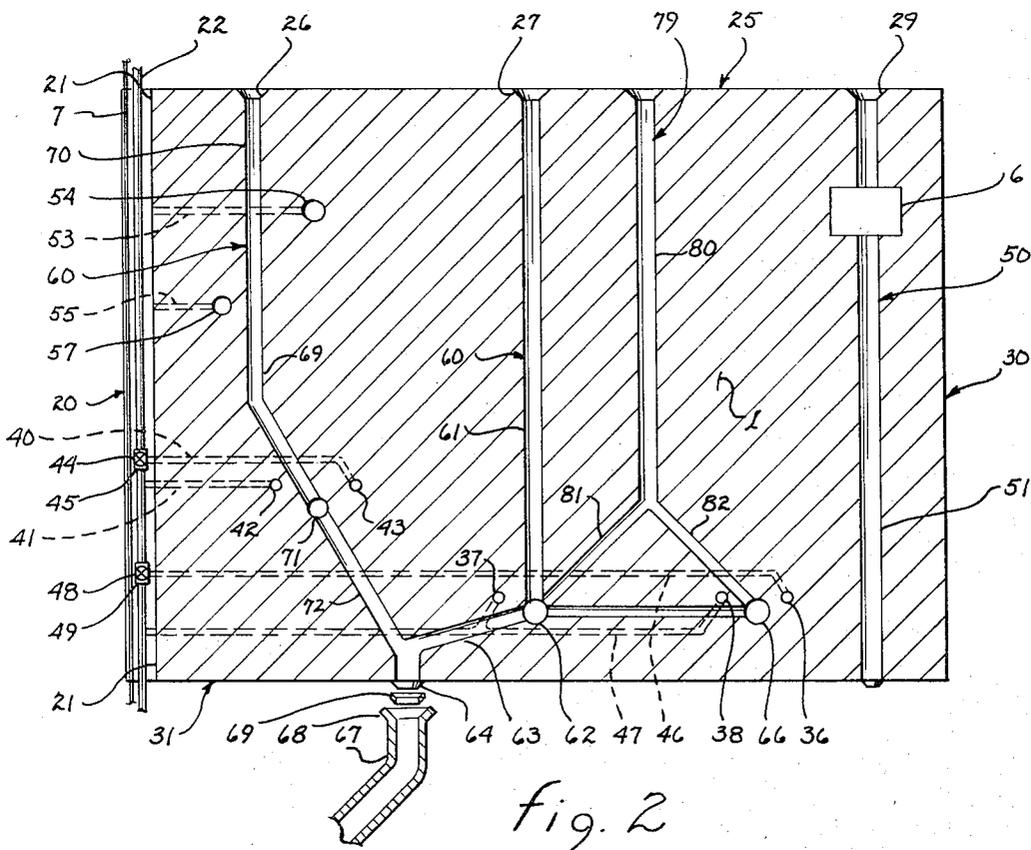


Fig. 2

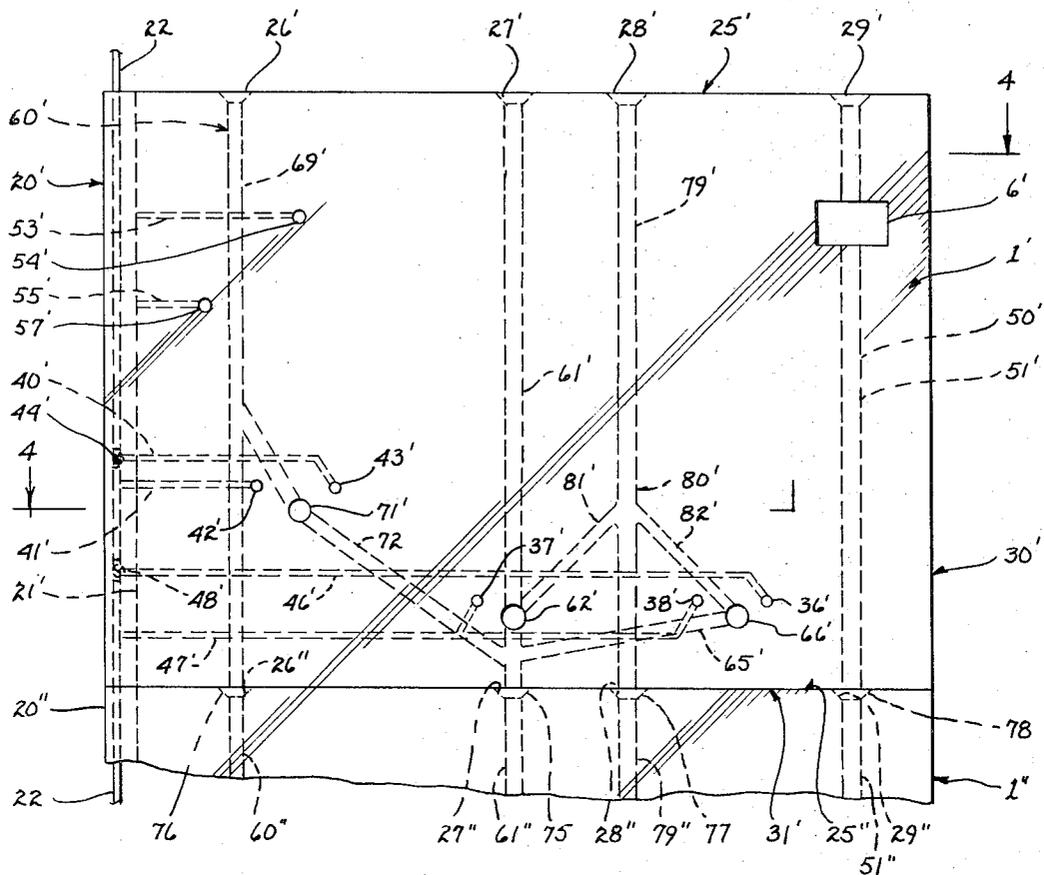


fig. 3

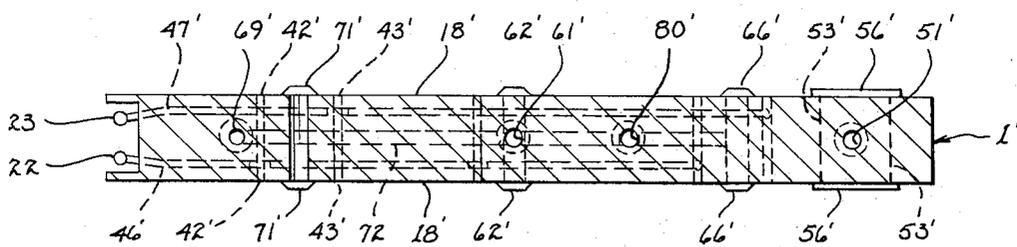
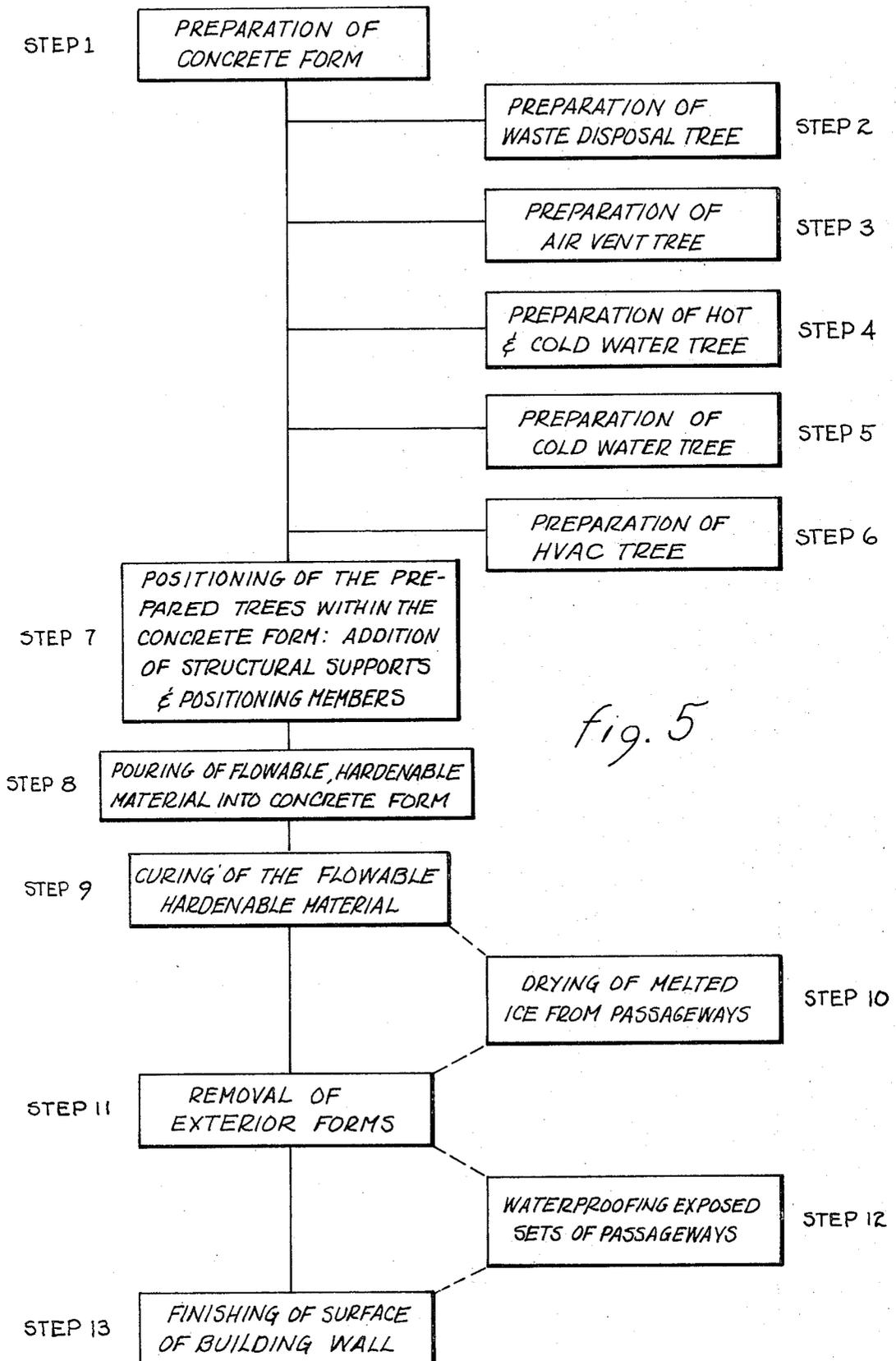


fig. 4



## PREFABRICATED BATHROOM WALLS

The present invention relates to prefabricated walls and, more particularly, to a method for producing and to a structure of prefabricated unitary bathroom walls incorporating passageways for the utilities required in dwellings.

Traditionally, bathroom walls, whether of post and lintel construction or of cement block construction, are built with a large amount of free space disposed therein. After erection of the wall, conduits for the various utilities such as water, heat, ventilation and cooling systems, electrical power, sewage and air vents, are separately fitted within the free space in the wall. The conduits are ultimately connected intermediate a point source for the respective utilities and the fixtures within the bathroom.

In normal practice, specially trained craftsman must install these conduits. As each craftsman is only trained to install a particular one of the conduits, a plurality of craftsman must utilize their skills in turn. Because the craftsmen usually cannot work concurrently, the time required to install and connect the requisite utility conduits in a bathroom is very great and often constitutes a limiting factor in the total time required to erect a building.

Where bathrooms are back to back, such as in hotels or in apartment buildings, the outlets of the conduits extend into the adjacent bathrooms diametrically opposite one another. The opposed outlets usually require that the conduits leading thereto include a plurality of right angle bends. The substance flowing through the conduits, whether it be air, water, or sewage, tends to burble or otherwise flow in a turbulent manner through the right angle bends. The turbulent flow creates pressure waves within the audible range. These pressure waves constitute background noise, which noise can be extremely disturbing to adjacent occupants. Previously, a solution for the noise problem has been that of adding sound insulation to the bathroom walls. This solution, though effective to some extent, is undesirable for several reasons. First, the installation of the sound insulation adds a substantial cost factor. Second, yet another craftsman must be employed to install the sound insulation, which installation further extends the time required to erect and finish the bathroom walls.

In modern construction techniques, modular dwelling units of various types have been developed. In particular, stackable self-contained modular units are often incorporated in building complexes such as motels, hotels and apartment buildings. In all of these modular units, a rectangular shell, usually of reinforced concrete, is constructed at an off site location. The completed modular unit is then shipped to the construction site. At the construction site, the modular units are either stacked one upon another within a framework or they include sufficient structural members to permit the units to be stacked adjacent and on top of one another. In this manner, the basic walls, floors and ceilings of the dwelling complex are assembled. After assembly, however, the standard methods are employed to install the various utilities within each of the modular units. Thus, although considerable time saving is effected by the pre-construction of the modular units, no time savings is employed in installing the various utilities in the assembled dwelling complex.

Another recently developed method for constructing multiple unit dwelling complexes has been that using mass production techniques to construct a plurality of walls or wall segments at an off site location. The walls or wall segments are shipped to the site and erected to form the dwelling complex. After erection, the various utilities are installed and connected to the individual dwelling units by standard well-known techniques. A substantial time saving is effected by constructing the walls or wall segments on a mass production basis, but little, if any, time savings is effected during the process of installing and connecting the requisite utilities.

It is therefore a primary object of the present invention to provide a unitary bathroom wall containing passageways for the requisite utilities.

Another object of the present invention is to provide a low cost unitary bathroom wall structure, which structure includes passageways for the requisite utilities.

A yet another object of the present invention is to provide a self-contained bathroom wall structure, which structure may be manufactured by mass production techniques.

Still another object of the present invention is to provide a stackable bathroom wall structure which interconnects with similar vertically stacked bathroom wall structures.

A further object of the present invention is to provide a bathroom wall having a low sound transmission coefficient.

A yet further object of the present invention is to provide a method for constructing bathroom walls, which walls incorporate the requisite passageways for various utilities.

A still further object of the present invention is to provide a method for constructing a unitary bathroom wall incorporating passageways for the requisite utilities by using disposable internal forms.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

The present invention may be described with more specificity and clarity with reference to the following figures, in which:

FIG. 1 illustrates the finished form of a bathroom wall constructed in accordance with the present invention.

FIG. 2 illustrates a cross-section of the present invention taken along lines 2—2 as shown in FIG. 1.

FIG. 3 illustrates a cross-sectional view of a bathroom wall installed on an upper floor.

FIG. 4 illustrates a cross-sectional view of the present invention taken along lines 4—4 as shown in FIG. 3.

FIG. 5 is a flow chart for a method used to construct a bathroom wall in accordance with the present invention.

Referring to FIG. 1, there is shown an environment within which the present invention is well suited. A unitary wall 1 includes a plurality of sets of internal passageways. Each of these sets of passageways conveys one of the following required utilities: hot and cold water; heat ventilation and air conditioning; and waste disposal and associated air vents. Each of these sets of passageways includes one or more orifices (see FIG. 2) disposed on lateral side 18.

Most modern bathrooms incorporate a plurality of structures such as bathtubs, toilets, sinks and mirrors to

accommodate the various bodily needs. With the present invention, these structures may be positioned adjacent wall 1 and connected to the one or more of the sets of passageways within the wall through the orifices disposed within lateral side 18.

Tub 2, adjacent wall 1, has its drain (not shown) connected to an orifice communicating with the waste disposal passageway, which orifice is located in proximity to bottom 31 of the wall. Standard valving means may be incorporated within the tub to control the flow of waste water through the drain. Above and approximately central to one end of tub 2 there is located a hand operated valve mechanism for filling the tub with a mixture of hot and cold water. The valve mechanism includes a hot water valve 4, a cold water valve 5 and a faucet 3. Both the hot and cold water valves 4 and 5, respectively, communicate with the respective hot and cold water passageways through orifices disposed within wall 18.

At another location adjacent lateral side 18 of wall 1, there may be disposed a toilet 8. As is conventional in the industry, toilet 8 includes the water tank 9 for supplying the requisite amount of water to flush the toilet. The water inlet for water tank 9 communicates with the cold water passageway through an orifice disposed in lateral side 18. Conventional valving means may be disposed within water tank 9 to control the flow of water thereto. On flushing of the toilet 8, the waste matter flows into the waste disposal passageway through an orifice on lateral side 18 and in proximity to the bottom 31 of wall 1. Thus, wall 1 supplies water to toilet 8 and conveys the waste matter therefrom through passageways internal to wall 1.

At another location adjacent to wall 1 there may be positioned a cabinet 10, which cabinet supports a sink 11. Sink 11 includes a drain 24. Drain 24 communicates with the waste disposal passageway within wall 1 through an orifice on lateral side 18 and conveys the waste from sink 11 to a sewage system. The water input through faucet 12 to sink 11 is controlled by a hand operated valve mechanism 13. The valve mechanism 13 communicates with the hot and cold water passageways through a pair of orifices disposed in lateral wall 18.

A mirrored cabinet 14 may be located immediately above cabinet 10. A light fixture 15 is disposed above mirrored cabinet 14 to provide a source of light for the bathroom. The wires carrying the electrical power for light 15 are laid within the electrical power passageway and terminate in a junction box within an orifice disposed in lateral side 18 and adjacent light 15. Similarly, electrical power is conveyed through a further electrical power passageway to an orifice in lateral side 18 immediately adjacent electrical plug 17.

A heating, ventilating and air conditioning louver 6 may be located above tub 2 in wall 1. The louver 6 communicates with the heating, ventilating and air conditioning passageway through an orifice within lateral side 18.

It is to be understood that modifications may be made in the placement of the fixtures within the bathroom. One such modification might be that of placing the sink or toilet adjacent another wall. In such a case, the required passageways would be directed laterally to the junction of the adjoining wall and extend therefrom by conventional plumbing techniques.

A plurality of receptacles 26, 27, 28 and 29 are disposed within the top side 25 of bathroom wall 1. Each

of these receptacles represents an aperture or opening to the trunk of a set of passageways disposed within the bathroom wall 1. In example, receptacle 26 communicates with the trunk of a set of passageways through which the waste material flows; receptacle 27 communicates with the trunk of another set of passageways through which further waste material flows; receptacle 28 communicates with the trunk of a set of passageways for venting the flow of waste material; receptacle 29 communicates with the trunk of a set of passageways for the heating, ventilating and air conditioning system.

Each of the receptacles 26, 27, 28 and 29 is constructed as a female part of a compression fitting cooperating with a corresponding male compression fitting, where the male compression fitting extends downwardly from the bottom side of the next vertically adjacent bathroom wall (see FIG. 3). In this manner, the trunks of the respective passageways are interconnected and form a common trunk for all vertically aligned bathrooms within a dwelling complex.

Vertical side 20 of wall 1 includes a chase 21 disposed therein for housing a pair of pipes 22 and 23. One of these pipes such as pipe 22 is connected to a source of hot water. These pipes are tapped at appropriate points and provide a source of hot and cold water to each of the respective bathrooms. The electrical power cables 7 for supplying electrical power to the bathrooms are also disposed within chase 21. These cables are tapped at appropriate points to convey electrical power to the various lights, switches and sockets.

The internal construction of the present invention is shown in further detail in FIG. 2. Each of the utilities required in a bathroom, that is, a source of hot and cold water, a source of electrical power, waste disposal and heat, ventilation and air conditioning is supplied to the bathroom by a wall 1 constructed in accordance with the present invention. Each of these utilities is available within wall 1 from one of a plurality of sets of passageways. Each of these sets of passageways includes a major portion, or trunk, and a plurality of tributaries. The combination of trunk and tributaries will be referred to hereinafter as a tree.

The hot and cold water source is represented by a pair of pipes 22 and 23, respectively, extending within chase 21. A plurality of generally horizontal passageways 40, 41, 46 and 47 are disposed within wall 1 and communicate with the cavity defined by chase 21. For a better understanding of the following description, reference may also be made to FIG. 4.

Each of passageways 40 and 41 extend from a point within chase 21 to one of orifices 42 and 43. Orifices 42 and 43 are juxtapositioned with valving means 13, wherethrough water is supplied to sink 11. Passageways 40 and 41 may have inserted therein copper piping, plastic tubing or in the alternative, the interior surface of the passageways may be defined by the material of wall 1. Hot water pipe 22 is tapped at point 44 with a valve and elbow 45. The valve and elbow 45 may communicate directly with passageway 40, or an intermediate piece of piping may be disposed between the elbow and the passageway. If copper piping or plastic tubing is disposed within passageway 40, elbow 45 may be directly connected to the piping or tubing. In this manner, hot water from hot water pipe 22 is conveyed through passageway 40 to its respective orifice 43.

The construction of passageway 41 and its valved interconnection with cold water pipe 23 and orifice 43 is similar to the above description of passageway 40. The structure of orifices 42 and 43 may take any one of several forms. They may be simply cylindrical cavities for receiving a male fitting from valving mechanism 13, or they may include a stud extending outwardly from lateral side 18 for subsequent connection to valving mechanism 13.

The construction of passageways 46 and 47 is similar to that of passageways 40 and 41, respectively. In example, passageway 46 extends from a point within chase 21 to orifice 36. Orifice 36 is juxtaposed with the hot water valve 4 of tub 2. Hot water pipe 22 is tapped at point 48 with a valve and elbow 49. The valve and elbow 49 may communicate directly with passageway 46 or it may communicate with piping or tubing disposed within the passageway. Passageway 47 also extends from chase 21 but includes tributaries terminating at each of orifices 37 and 38. Orifice 37 is juxtaposed with the cold water inlet to tank 9 of toilet 8, while orifice 38 is juxtaposed with the cold water valve 5 of tub 2.

All of the bends of passageways 40, 41, 46 and 47 are either formed with a large radius or by small angles. With this arrangement, there is minimum turbulence of the water flow resulting in minimum generation of audible noise.

The electrical power used in the bathroom is supplied by power cables 7 disposed within chase 21. A generally horizontal passageway 53 extends into wall 1 from chase 21 and terminates in an orifice 54, which orifice is juxtaposed with the location of light fixture 15. Electrical wires, tapping power cables 7 in chase 21, are run through passageway 53 and terminate in a junction box within orifice 54. The light fixture 15 is electrically connected to the junction box. A further generally horizontal passageway 55 also extends into wall 1 from chase 21 and terminates in an orifice 57, which orifice is juxtaposed with the location of socket 17. Electrical wires, tapping power cables 7 in chase 21, are run through passageway 55 and terminate in a junction box within orifice 57. The socket 17 is electrically connected to the junction box.

The heat, ventilation and air conditioning (HVAC) for the bathroom is supplied by wall 1 through trunk 51 of HVAC tree 50. Trunk 51 is a generally circular passageway extending vertically through wall 1. Trunk 51 includes a female compression fitting 29 disposed within the top of side 25 of wall 1. A corresponding male compression fitting 52 extends from the bottom side 31. When the bathroom walls 1 are stacked one on top another, as might be the case when constructing apartment buildings or hotel units, the male fittings extending downwardly from the bottom side 31 of each of the walls, extends into the corresponding female fittings disposed within the top side of the walls disposed immediately therebelow. Because of the compression fitting between adjacent vertical walls, the respective trunks are interconnected with one another and sealed from outside disturbance. A sealing member (not shown) may be disposed intermediate the male and female fittings to effect a better seal.

Each of the trunks 51 includes one or more tributaries 53 (see FIG. 4) extending to lateral side 18. These tributaries distribute the flow of air from trunk 51 to the bathroom through a fire damper and louver 6.

The tree for effecting the waste disposal from the tub 2, toilet 8, and sink 11 will now be described. The waste disposal tree 60 includes a trunk 61 extending vertically through the major part of wall 1. Trunk 61 includes a female compression fitting 27 disposed within the top side 25 of wall 1. Fitting 27 corresponds to and cooperates with a male compression fitting extending downwardly from an immediately vertically adjacent bathroom wall. Trunk 61 terminates at an orifice 62 disposed in lateral side 18. Orifice 62 positionally corresponds with the waste outlet of toilet 8 such that when the toilet is flushed, the waste material flows through orifice 62 into tree 60. A tributary 63, communicating with trunk 61, extends downwardly and laterally from orifice 62 to an outlet represented by male compression fitting 64, which fitting extends downwardly from bottom side 31.

A second tributary 65, communicating with trunk 61, extends laterally from the termination of trunk 61 and orifice 62 toward orifice 66. Orifice 66 positionally corresponds with the drain of tub 2. In this manner, tub 2 drains into orifice 66 with the water flowing there-through, through tributary 65, into tributary 63 and out of wall 1 through fitting 64.

As the wall 1 shown in FIG. 2 is representative of the bottom-most floor of a multiple unit dwelling complex, the waste material flowing from the wall flows into an external sewage system. The external sewage system is represented by a pipe 67. Pipe 67 includes a female compression fitting 68 which fitting mates with male compression fitting 64. An annular seal 69 may be disposed intermediate fittings 64 and 68 to seal the connection between the fittings.

A second trunk 69 of waste disposal tree 60 extends downwardly from top side 25 of wall 1 and includes an orifice 71 communicating with lateral side 18 of wall 1. Orifice 71 is located approximately coincident with the output of drain 24 from sink 11. Thus, sink 11 drains into trunk 69 through orifice 71. Trunk 69 extends downwardly from orifice 71 and intercepts tributary 63. Thus, the waste from sink 11 flows through orifice 71, the lower part of trunk 69, into tributary 63 and ultimately into pipe 67.

The upper end of trunk 69 terminates in a female compression fitting 26. Fitting 26 is coincident to and mates with a male compression fitting extending downwardly from the bottom side of the immediate vertically adjacent bathroom wall.

Although not shown in the figures, wall 1 may include additional tributaries disposed in proximity to various orifices to permit cleanout of the waste disposal system.

The air vent tree 79 for venting the various waste passageways within wall 1 includes a trunk 80 extending downwardly from top side 25. Trunk 80 splits into two tributaries, 81 and 82. Tributary 81 communicates with and vents the waste passageway at approximately the intersection of trunk 61 and tributaries 63 and 65. Tributary 82 communicates with tributary 65 at the approximate junction of orifice 66 and tributary 65. It is, of course, to be understood that the configuration and interception of the air vent tree tributaries may be modified to satisfy local building codes.

Referring now to FIG. 3, there is shown a bathroom wall constructed in accordance with the present invention where the bathroom wall is to be used on the second or succeeding floors. For the sake of simplicity and

brevery, features common to both FIGS. 2 and 3 will not be discussed in great detail. Rather, the discussion will center upon the features which are different due to the vertical positioning of the respective bathroom walls. Functionally similar features will be identified by using single and double primed members.

One of the primary features of the present invention is that of uniformity in placement of fixtures and various components to permit the widest latitude possible from the benefits associated with mass production techniques. For this reason, the bathroom walls are constructed to be interconnecting and interchangeable for any and all floors above the lowest floor.

The HVAC tree 50 is similar in both walls 1 and 1' and the tributaries 53 extending into lateral sides 18 are the same.

Trunk 61' must extend from bottom side 31' of wall 1' such that it is coincident with trunk 61'' of the immediately below positioned bathroom wall 1''. This is a substantial departure from the configuration shown in FIG. 1. In the configuration shown in FIG. 3, trunk 61' extends in a straight line downwardly from orifice 62' and terminates at the extremity of male compression fitting 75, the latter extending from bottom side 31'. The previously discussed tributary 65 interconnected orifice 66 with trunk 61 at a point lower than the position of orifice 62'. The orientation of tributary 65' serves two purposes. First, the waste water flowing through orifice 66' from tub 1 flows downwardly from orifice 66' to trunk 61' and therefore will not have any tendency to back-up. Secondly, by having the waste water from tub 1 flow into a point beneath aperture 62' there is little if any danger of having the waste water flow into the bowl of toilet 8. Similarly, there is little if any danger of having the waste material from toilet 8 flow through tributary 65', orifice 66' and into tub 2.

In the previously discussed bathroom wall 1, trunk 69 of waste disposal tree 60 was shown as extending vertically downwardly for a limited distance from female compression fitting 26; thence, trunk 69 angled to intercept and communicate with orifice 71 and subsequently intercept and communicate with tributary 63. In the bathroom walls positioned on the second or higher floors, trunk 69' extends vertically through bathroom wall 1' from female compression 26' to a corresponding male compression fitting 76. A tributary 72 connects to and angles away from trunk 69'. Tributary 72 communicates with orifice 71' and further extends from orifice 71' to the lower part of trunk 61'. The interconnection is effected below the position of orifice 62' in order to insure that the waste material flowing through orifice 71' and into tributary 72 will not tend to flow through orifice 62' and into toilet 8.

Trunk 80 of air vent tree 79, as shown in FIG. 2, terminated at the junction of tributaries 81 and 82. In the bathroom wall 1', shown in FIG. 3, trunk 80' of the air vent tree 79' continues vertically downwardly from female compression fitting 28' to male compression fitting 77. In this manner, the trunk 80' extends through each one of the vertically positioned bathroom walls and acts as a common vent for all of the bathrooms. The tributaries 81' and 82' extend angularly downwardly from trunk 80' to their respective orifices 61' and 66' as previously discussed.

The hot and cold water pipes 22 and 23 discussed above, extend through interconnecting chases 21', 21''

in each of the bathroom walls. At each of the floors, taps from these pipes interconnect the respective hot and cold water passageways (40', 41', 46' and 47') disposed within each of the bathroom walls. The orientation and method for connecting the hot and cold water passageways are the same as previously discussed.

In FIG. 3 there is also shown the means for interconnecting vertically adjacent bathroom walls constructed in accordance with the present invention. The bottom side 31' of wall 1' dimensionally corresponds with top side 25'' of wall 1''. Thus, the width and breadth of the wall cross-sections are the same. The chases 21' and 22' disposed within vertical sides 20' and 20'' are also dimensionally equivalent. Walls 1' and 1'' are keyed to one another by male compression fittings 76, 75, 77 and 78 mating with female compression fittings 26'', 27'', 28'' and 29'', respectively. In addition to keying one wall with an adjacent vertical wall, the respective male and female compression fittings interconnect the various trunks of the waste disposal trees, the air vent tree and the HVAC tree. To insure a firm seal between the male and female compression fittings, annular rings or seals may be disposed therebetween.

Referring in particular to FIG. 4, there is shown a bathroom wall 1 having two lateral sides 18' each of the lateral sides forming one wall of adjacent bathrooms. The various dimensional relationships between the various trees discussed above are also shown. Each of the trunks 51', 61', 70' and 80' are approximately centrally positioned within wall 1. Similarly, the tributaries of trunks 61', 70' and 80' extend in a plane approximately central to wall 1. FIG. 4 also illustrates the various channels intermediate the orifices disposed on the lateral sides and the trunks or tributaries.

Where a bathroom wall constructed in accordance with the present invention is used for adjacent or back to back bathrooms within a dwelling complex, the orifices 71, 62 and 66 are equally spaced and positioned on either lateral side 18' of wall 1. As shown in FIG. 4, orifices 71', 62' and 66' are disposed within a protrusion extending from the lateral side. The purpose of the protrusion is that of permitting a more simple mechanical interconnection between the orifice and the respective bathroom fixture.

The hot and cold water passageways extend intermediate trunks 51', 70' and 80' and one of the lateral sides 18' of wall 1. Where each of the lateral sides 18' of wall 1' forms one side of adjacent bathrooms, there must of course be a crossing of the flow of hot and cold water to either lateral side. Such cross flow may be accomplished by having each of a plurality of pipes positioned transverse to wall 1' and extending between corresponding orifices. The passageways interconnecting each of the orifices with its respective hot or cold water source (pipe 22 or 23) may feed into the respective transverse pipe between corresponding orifices rather than feeding each corresponding orifice individually.

As illustrated in FIGS. 2 through 4, the paths of the trunks and tributaries are essentially in straight lines. Where a tributary interconnects with a trunk, the point of interconnection is either curved or forms an acute angle, thereby disrupting the flow of fluid (whether it be a liquid or a gas) to a minimum extent. The minimum interruption of flow, creates a minimum of turbulence and hence a minimum of noise generation. Where possible and monetarily feasible, any necessary bends or changes in direction are accomplished by

curving the respective tributary rather than angling it. In this manner, those passageways and tributaries which carry a flow of fluid do so with a minimum disruption of the flow path. With such a minimum disruption of the flow path, the sound level coefficient produced by the flowing fluids is minimized and little if any unpleasant or distracting sound is generated within the wall. All sound cannot of course be fully inhibited and some reliance must be made upon the sound dampening qualities of the material of the wall itself.

One of the primary features of the present invention is that of providing a prefabricated bathroom wall which contains all of the needed passageways for the various utilities required in a bathroom. By using a wall constructed in accordance with the present invention it is no longer necessary to first construct the framework of the wall and then insert therein the various piping, channeling or ducting required for the utilities. Instead, when the present invention is constructed, it already includes therein all of the required passageways for the utilities. All that is required after the wall is erected is that of fitting the various bathroom fixtures to the orifices disposed in the wall and connecting the various inlets and outlets of the utility passageways to the respective sources and terminations.

Referring now to the flow chart shown in FIG. 5, a method for constructing a bathroom wall 1, which wall incorporates the features of the present invention, will be described. The wall may be constructed from any one of a plurality of flowable hardenable materials such as concrete, any one of the many plastics, fiberglass, or some type of extruded or expanded foam. The following to be described method is primarily directed to using concrete. It is, of course, understood that the same method may be used with many other materials.

As shown in the flow chart (FIG. 5) the first step of the method is that of preparing a concrete form defining the top, bottom and sides of the bathroom wall. Prior thereto, concurrently therewith, or subsequent thereto, steps 2,3,5 and 6 are carried out. Steps 2,3,4,5 and 6 involve the preparation of the configuration and layout of each of the above discussed trees. Each of these trees, that is, the waste disposal tree, the air vent tree, the hot water tree, the cold water tree, and the HVAC tree are sized and dimensionally configured to fit within their respective positions within the wall.

Each of the above discussed trees may be prepared by simply forming the tree from plastic piping. Where otherwise feasible, the trees may be formed from collapsible air bags. When used, the bags are removed after the flowable, hardenable material has cured. In the alternative, and where cost is of particular importance, each of the trees may be formed by freezing water in the desired shape and size. When the latter method is used, there must of course first be constructed a suitable vessel for retaining the water until it has frozen. Once the water has frozen its vessel may be removed. The advantages of using ice as a form for establishing the passageways will be described in more detail below.

After the various trees have been formed, step 7 of the method includes the positioning of various trees within the previously constructed form; and the addition of appropriate structural supports and positioning members within the form. The latter elements orient the various trees with respect to the vertical and hori-

zontal sides of the wall and provide structural support. Where the wall of the present invention is to be used as a load bearing member, further structural bracing may be required.

After the form has been completed, step 8 may be effected. Step 8 includes the pouring of a flowable hardenable material, such as concrete, into the form. As is well known, flowable hardenable material will flow in and about the form and occupy all of the space not otherwise occupied by the tree forms and structural supports. The flowable hardenable material will also act as a bonding agent in permanently positioning the various structural supports and trees with respect to one another and the sides of the form.

If the trees are formed from plastic piping, the piping will, of course, be firmly imbedded within the flowable hardenable material. Where building codes so require, the trees can be formed of copper tubing, which tubing is permanently imbedded in the wall.

If ice is used as the tree forms for one or more of the above discussed trees, the setting or curing process will generate sufficient amounts of heat to melt the ice. By appropriate control of the environment, the setting or curing time and the heat generation, the iced trees will not melt until after the flowable hardenable material has taken a set. Subsequent to the setting and final curing of the flowable hardenable material, all of the ice will have melted and the water may be poured out of the cured material, leaving a plurality of passageways within the wall. In order to preserve the ice tree until the flowable hardenable material has set, it may be necessary to insert cooling coils within the water prior to freezing the water. The coils can then be used to initially freeze the water and maintain the ice trees at a freezing temperature while the flowable hardenable material is curing. Or, the coils can be energized subsequent to the freezing of the water when the trees are disposed within the flowable hardenable material. When the flowable hardenable material has cured, the coils can be de-energized to permit the ice trees to melt.

Step 9 of the method of the present invention is that of permitting the flowable hardenable material to cure.

Step 10 includes the removal of water if iced trees are utilized.

After the hardenable material has completely cured, the exterior forms may be removed, this is step 11.

If iced trees were used for one or more of the various sets of passageways, the inner surfaces of these passageways should be lined with some type of water proofing compound to prevent any fluids flowing there-through from permeating the wall material. The water proofing may be accomplished by the simple process of filling the exposed passages with water proofing compound; permitting it to set for a brief period; and draining the compound. The residue left after draining will form a film upon the interior surfaces of the passageways. If desired, the above procedure may be repeated until a desired thickness film is established. This process is shown as step 12 in FIG. 5. In the alternative, the wall material may be made of water impervious material.

The cured and waterproofed wall is now ready for surface finishing (step 13) in accordance with the texture and color scheme of the bathroom wherein it is to be installed. In the alternative, the cured and water-

proofed wall may be installed within the dwelling complex and finished on location.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

I claim:

- 1. Apparatus for conveying utilities to and from utility inlets and outlets of fixtures within a dwelling unit, said apparatus comprising:
  - a. a unitary wall member defining a boundary of the dwelling unit;
  - b. said unitary wall member including a chase disposed along one vertical side of said unitary wall member, said chase being adapted to receive a plurality of conduits serving as a source for the water and electrical utilities supplied to the dwelling unit;
  - c. a first plurality of passageways extending into said unitary wall member from said chase and out of said unitary wall member through an orifice in at least one lateral side of said unitary wall member, said first plurality of passageways conveying a utility to said unitary wall member;
  - d. a second plurality of passageways extending into and out of said unitary wall member from opposed horizontal sides of said unitary wall member, each of said second plurality of passageways including at least one orifice disposed in one face of said unitary wall member for receiving exhaust products from within the dwelling unit;
  - e. pipe means disposed within said chase for interconnecting the source of utilities with respective ones of said first plurality of passageways;
  - f. further pipe means secured within each of the ori-

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lices in each lateral side of said unitary wall member for interconnecting said first and second plurality of passageways with the respective inlets and outlets of the fixtures; and

g. each of said first and second plurality of passageways being essentially devoid of pipe means for channeling the utilities and exhaust products, respectively; whereby, utilities are conveyed into the dwelling unit through said first plurality of passageways and exhaust products are conveyed out of the dwelling unit through said second plurality of passageways.

2. The apparatus as set forth in claim 1 wherein each said second plurality of passageways includes a trunk extending from the top horizontal side of said unitary wall member to the bottom horizontal side of said unitary wall member.

3. The apparatus as set forth in claim 2 wherein said unitary wall member includes a female compression fitting disposed in the top horizontal side of said unitary wall member and communicating with said trunk and a male compression fitting extending from the bottom horizontal side of said unitary wall member and communicating with said trunk; whereby, a plurality of said unitary wall members may be stacked on top of one another while retaining a continuous vertical cavity through said stacked wall members.

4. The apparatus as set forth in claim 1 wherein said second plurality of passageways includes a first set of passageways for waste disposal, a second set of passageways for venting said first set of passageways, and a third set of passageways for heat, ventilation and air conditioning.

5. The apparatus as set forth in claim 4 wherein said first plurality of passageways includes a fourth set of passageways for hot water, a fifth set of passageways for cold water and a sixth set of passageways for electrical power.

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