May 4, 1965 F. W. KEPPLER 3,181,484

MANIFOLD CONSTRUCTION

Filed May 3, 1962 3 Sheets-Sheet 1

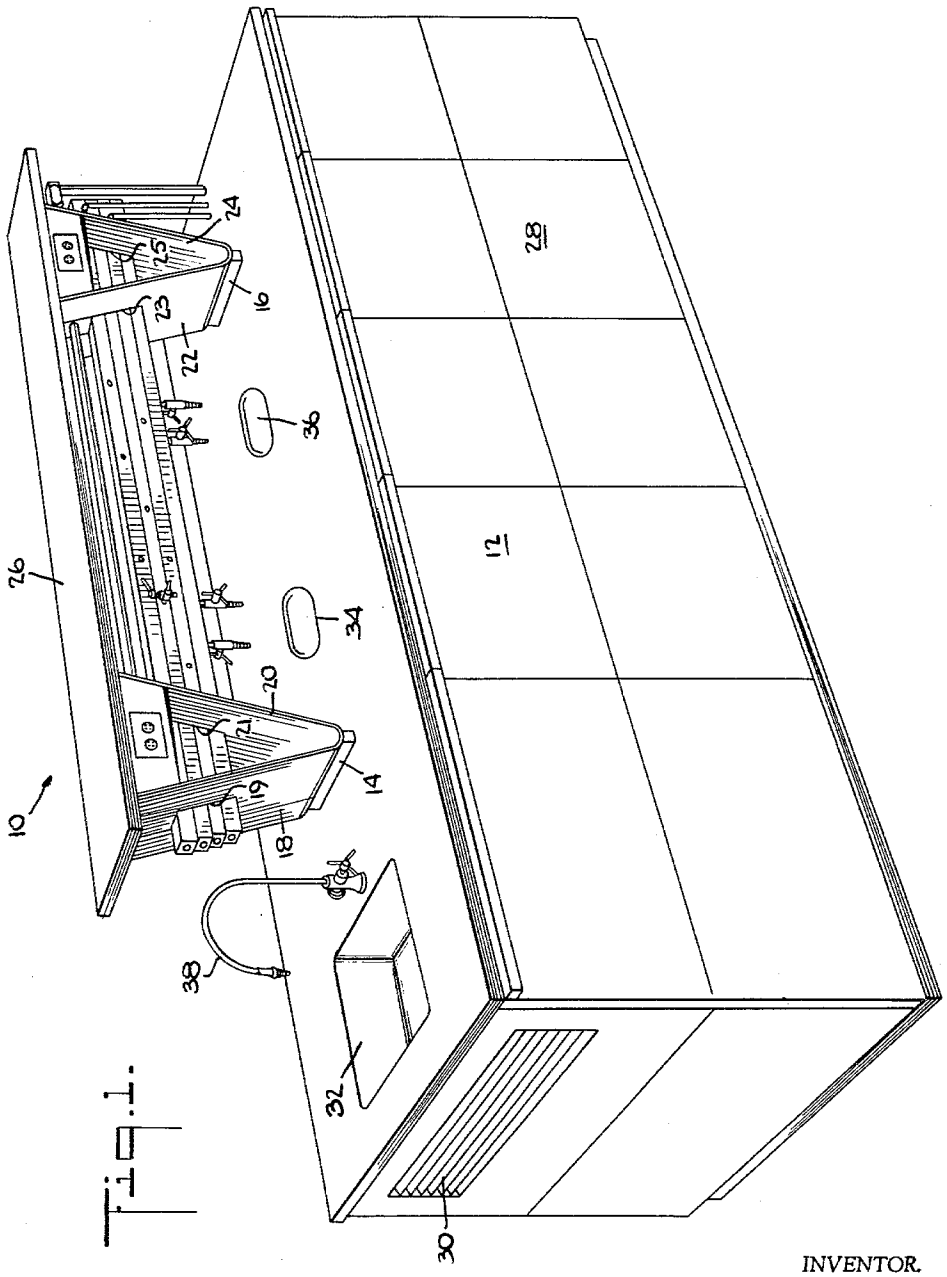


Fig. 1.

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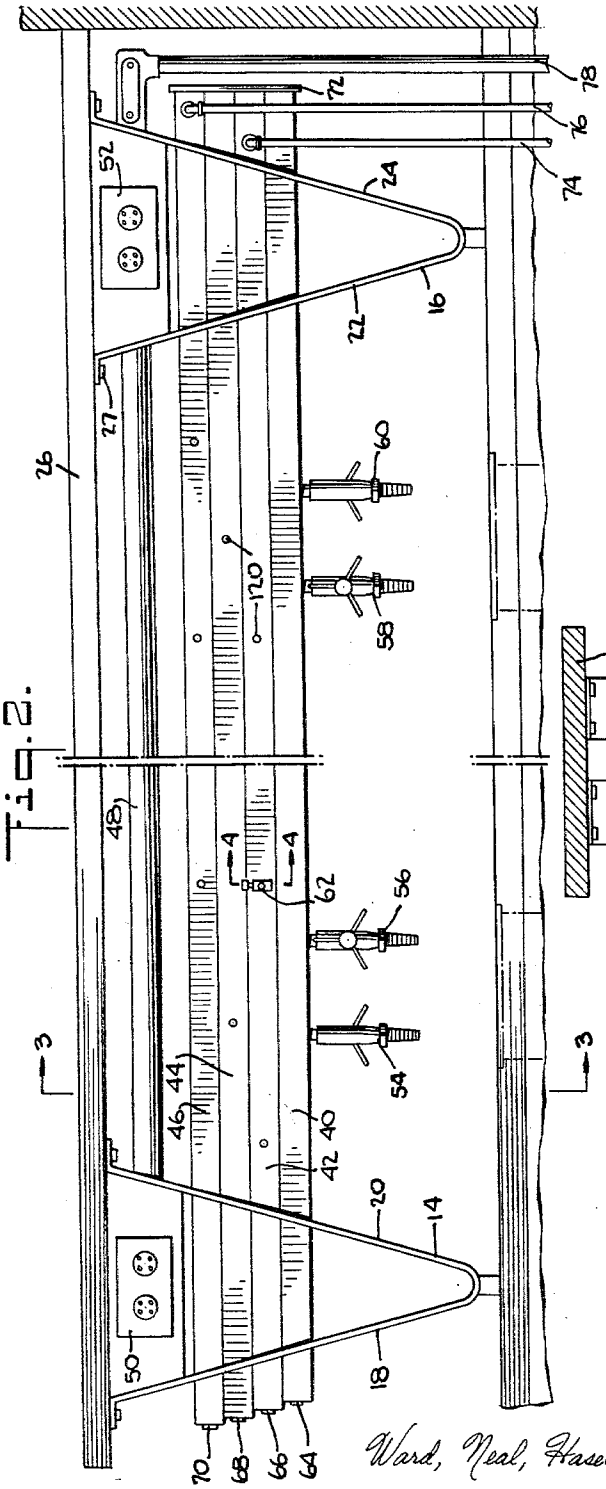


Fig. 2.

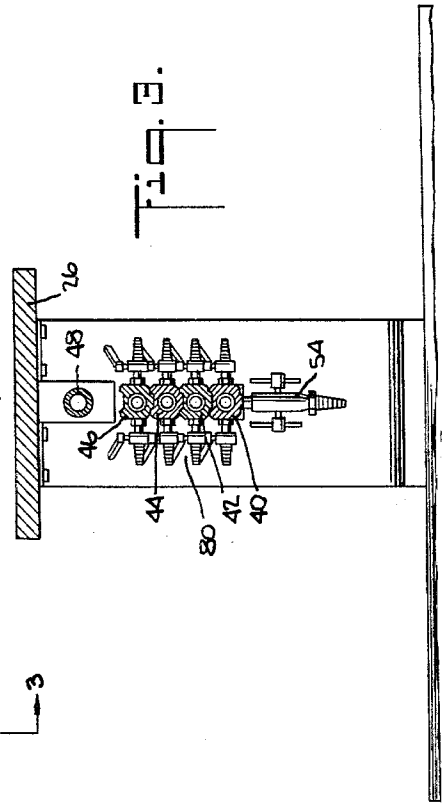


Fig. 3.

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MANIFOLD CONSTRUCTION

Filed May 3, 1962 3 Sheets-Sheet 3

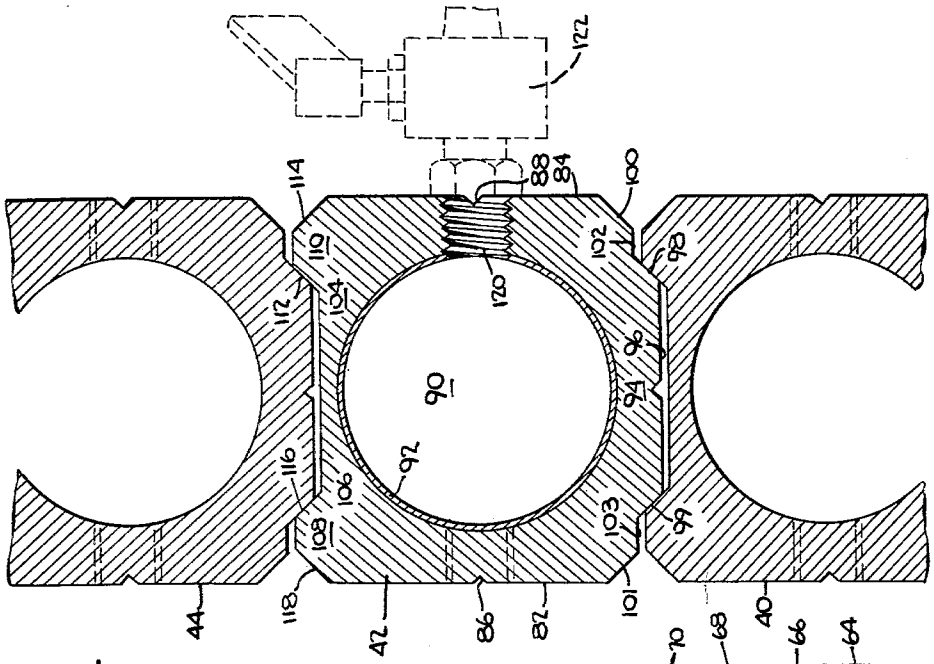


Fig. 4.

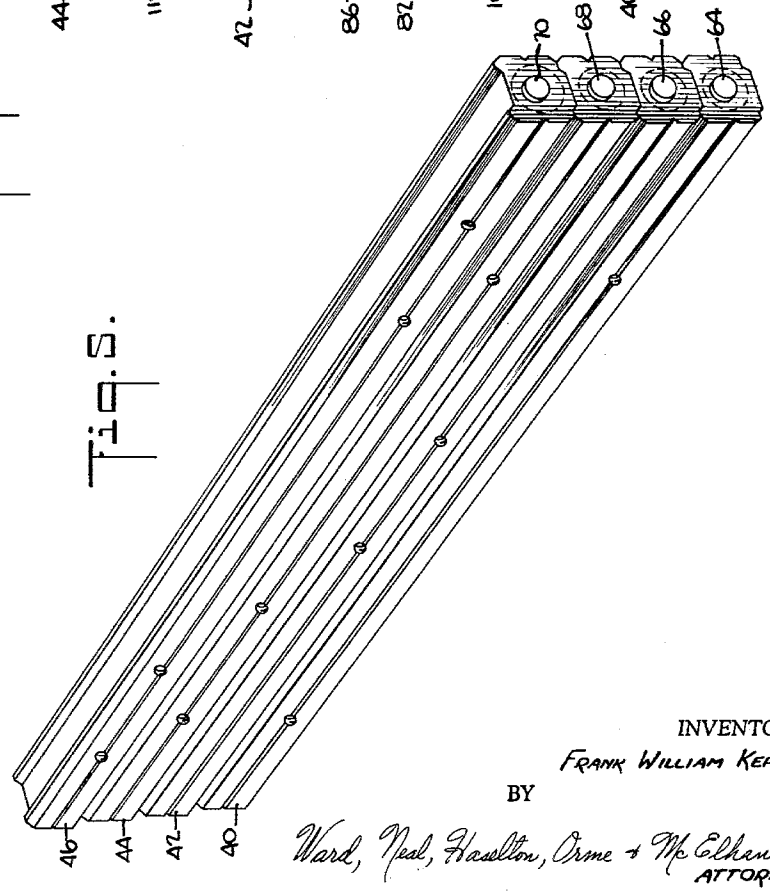


Fig. 5.

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MANIFOLD CONSTRUCTION

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3 Claims. (Cl. 108—50)

This invention relates to functional laboratory equipment and more particularly to compound manifold reagent shelves. Persons skilled in the art will realize the necessity of having readily available service lines for use with laboratory equipment such as center tables, for example. These service lines are intended to handle gas, air, vacuum, water, and the like, which are always required as standard accessories for laboratory equipment.

Heretofore reagent shelves have been known to utilize a series of ordinary circular pipes disposed in vertical spaced relationship to each other. The pipes are held in their relative position by means of various types of supporting structures which may be either secured to the top of the center table or to a wall stanchion, or the like. Of necessity, the supporting structure is required to be relatively rigid and must include a large number of individual pipe supporting cleats and special brackets.

Reagent shelves are normally provided with a multiplicity of valves, fittings, electrical outlets and the like. Heretofore, when a new facility was desired or additional outlets were required it was necessary to disassemble the particular pipe line involved, cut and thread it, add some fittings, a T, and then add the particular outlet or valve desired. This of course required complete disassembly and re-assembly of the particular pipe in the service involved and consumed a considerable amount of time.

One of the principal feartures of my invention resides in the provision of a simple, quick means of altering or rearranging the particular outlets or valves therein. Also, my invention provides means for ready removal or addition of entire new service lines. These features, of course, conserve valuable laboratory down time and labor. Further, change-over or adaptation time may be critical due to a sudden change of events while in the midst of an important laboratory test.

As a further feature of my invention, I have contributed to the art a reagent shelf which brings all of the desired fixture outlets within close proximity to the working area while, at the same time, occupying less space than is normally consumed by such apparatus.

Still another feature is the provision of simple rigid supporting brackets which are utilized in conjunction with my novel pipe manifolds so that a desirable reagent shelf may be readily and economically manufactured.

In order to achieve the aforementioned features and objects, my invention contemplates the provision of a compound manifold reagent shelf which may comprise at least two V-shaped brackets laterally spaced from one another. The arms of the brackets are provided with elongated vertical slots which are arranged in alignment with one another. A plurality of manifolds which are positioned transversely of the V-shaped brackets extend through the aforementioned slots. Means are provided to interconnect the manifolds in a vertical tiered or nest-like relationship so that each directly supports the one above it without the need for pipe supports, cleats or the like.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims

appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do no depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a perspective view illustrating a compound manifold reagent shelf installed upon a center table in accordance with my inventive concept;

FIG. 2 is a side elevation showing one embodiment of my invention;

FIG. 3 is a vertical sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is an enlarged vertical sectional view taken along line 4—4 of FIG. 2; and

FIG. 5 is a perspective view showing the manifold nesting aspect of my invention.

Referring now to the drawings in detail, FIGS. 1 and 2 show a compound manifold reagent shelf generally designated by the numeral 10. The reagent shelf is suitably mounted upon a center table 12 by means of bolts or the like (not shown). Other forms of installations employing my inventive concept might include mounting the reagent shelf upon a side wall table or securing same to the side wall of a room, for example. Two supporting V-shaped brackets 14 and 16 have arms 18, 20 and 22, 24, respectively, supporting the upper shelf 26. Any commercially available fastening means may be employed to secure the upper shelf 26 to the V-shaped brackets 14 and 16, such as bolts 27, for example. Each arm is formed with elongated vertical slots 19, 21 and 23, 25, respectively. These slots are in lateral alignment with each other and are all substantially positioned within the same plane for a purpose which will be more fully discussed hereinafter.

The base portion of the center table 12 may incorporate portable mobile units 28 which may be rolled about the laboratory as desired. Drawers, shelves, cupboards or the like could be supplied in the alternative. Ventilating louvers 30 may be provided at one end thereof, and a sink which is normally lined with a protective coating for use with chemicals is generally embedded in the table top. Further, several additional cup sinks 34 and 36 are generally employed. A hot-cold water gooseneck fixture 38 is shown affixed to the top of the center table 12.

The compound manifold reagent shelf 10 comprises a series of vertically tiered or stacked manifolds 40, 42, 44 and 46 which assume a nest-like relationship with one another. The nest of manifolds is transversely inserted into the aforementioned vertical slots 19, 21 and 23, 25. The bottom surface of the slot acts as a base for supporting the lowermost manifold. Each subsequent manifold is then supported by its next lower manifold. The width of the slots corresponds to the width of the manifolds so that the vertical edges thereof act as vertical guides, thus, producing a rigid, stable structure which is resistant to transverse forces. It is to be noted that the usual securing fixtures are thereby eliminated. The manifolds 40, 42, 44 and 46 each serve a different purpose, providing access to compressed, air, gas, vacuum, water etc. as desired. Valves or fittings may be affixed to this manifold at any convenient position on the front side or the back side or the bottom thereof as desired. Tapered pet cocks 54, 56, 58, 60 and 62 are illustrated in FIGS. 1 to 3 by way of example. The manifold walls are of sufficient width so that the fittings may be connected

to the manifold by means of drilling and tapping the manifold in a manner which will be more fully discussed presently.

The ends of each manifold are provided with reducer bushings which incorporate linear alignment buttons **64**, **66**, **68** and **70** for extending the manifold linearly. This might be advantageous when several center or wall tables are placed together end to end. One end of the manifolds is illustrated with a cover plate **72** which provides a pressure and vapor-tight joint with the aforementioned manifolds. Inlet conduits **74**, **76**, **78** lead from a supply source (not shown) to their respective manifolds. While the inlets are illustrated close to the ends of their respective manifolds, they may be positioned at any point on the entire length thereof, as convenience may prescribe. Extending parallel to said manifolds is an electrical conduit **48** which supplies electrical power to the duplex outlets **50** and **52**.

Referring now to FIG. 3 it can be readily seen that a multiplicity of fittings or valves **80** may be disposed at a number of different positions around the manifold and installed in close proximity one to the other to suit the operator's specific requirements. It is to be noted that a valve can be connected directly to the manifold, thereby eliminating extra adapter fittings and thus allowing said valves to be spaced close together.

Referring now to FIGS. 4 and 5 where the tiering or nesting arrangement is shown in greater detail, manifold **42** has two substantially flat side surfaces **82**, **84** which have centrally located V-shaped slots **86**, **88** to indicate the center line of the manifold to facilitate drilling and tapping in the field. The manifolds may be manufactured from any suitable material such as aluminum, for example, and they are contoured in such a manner so that they are readily produced by an extrusion process. This is an important element of the present concept and permits economical production.

The manifolds are provided with a substantially circular longitudinal interior cavity **90** which contains the gas, air, vacuum, water, or whatever other vapors or liquids are desired. The cavity has a substantially circular cross sectional configuration in order to provide structural strength when handling the aforementioned elements and when the same are subjected to pressure. Further, the interior cavity may be provided with a suitable liner **92** for use with special corrosive chemicals or in cases where the manifold is subjected to high temperature. The manifold **42** is provided with a lower male side portion **94** which comprises a flat elongated central zone **96**. One corner of said male portion has a stepped contour consisting of risers **98** and **100** with an intermediate step **102**. Likewise, the second corner includes two risers **99** and **101** with an intermediate step **103**. Risers **98** and **100** are inclined outwardly at an angle of 45°, however, any angle of the order of from 20 to 80° would be within my inventive concept. The step portion **102** is relatively narrow and substantially parallel to the flat central zone **96**. The manifold **42** has an upper female side portion **104** and a recessed central zone **106** which is parallel to and substantially the same length as the central zone **96** of the male side portion **94**. Two trapezoid shaped corner zones **108**, **110** whose non-parallel sides, **112**, **114** and **116**, **118**, respectively, assume an angle substantially equal to the angle of the aforementioned risers **98**. Thus, it will be seen that when the manifolds are stacked together in a nest-like assembly as shown in FIG. 5, the non-parallel sides **112**, **116** of the trapezoid shaped corner zones will engage with corresponding risers **98** and **99**. It is to be noted that when the manifolds are stacked together there is an intervening space between the central zone **96** and its respective recessed zone **106**. Also, there are intervening spaces between the step portions **102** and **103** and the top of their respective trapezoids **108** and **110**. This feature of the present construction provides space for expansion and contraction between nested manifolds when high temperature chemicals are carried in adjacent manifolds, and also facilitates the disengagement of the two manifolds which might otherwise prove difficult due to surface cohesion, while at the same time contributing stability against transverse forces or motions.

The side wall portion of the manifold **42** is of sufficient thickness so that it may be bored and tapped to form a threaded aperture **120** which provides for the insertion of a valve **122**. Since the side walls are uniformly the same thickness throughout their entire length, they may be bored and tapped at precisely the desired position thereon. Other suitable pipe fittings such as nipples, elbows and the like may be utilized, as desired. Of course, when valve **122** is not used for a second setup or experiment a suitable plug (not shown) may be inserted in said threaded aperture **120**. Pipe thread or machine screw thread are both equally suitable so that any style valve or fitting can be readily utilized.

Although a particular embodiment of the invention is herein disclosed for purposes of explanation, further modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had to the appended claims in determining the scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. In a compound manifold reagent shelf of the class described, the combination comprising at least two brackets each provided with elongated vertical slots arranged in alignment with one another; a plurality of elongated manifolds positioned transversely of said brackets and extending through said slots in vertical nested relationship with one another; each of said manifolds comprising a male side portion having a flat elongated central zone and contoured corner zones, a female side portion having a recessed flat central zone, one of said side portions being formed with stepped corner zones, the other of said side portions being formed with trapezoidal corner zones complementary to said stepped corner zones, whereby said male and female sides of adjacent manifolds are nestable relatively to one another, said manifolds being provided with longitudinal through bores, the wall thickness of said conduits being sufficient for drilling and tapping whereby fittings may be connected thereto for communication with respective bores therein, and each of said manifolds having a substantially circular longitudinal interior cavity.

2. In a compound manifold reagent shelf having a supporting table, an upper shelf, inlet conduits, the combination comprising a plurality of elongated manifolds, each manifold having two substantially parallel side faces with a plurality of outlets, a lower male side portion, an upper female side portion; said manifolds being stacked in a vertical nest-like relationship with one another with said male side portion being in frictional engagement with its corresponding adjacent said female portion; two V-shaped brackets each being provided with two inclined arms, said arms having elongated vertical slots which are arranged in alignment with one another, said manifolds being carried within such slots, and means connecting said inlet conduits to said manifolds.

3. In a compound manifold reagent shelf having a supporting table, an upper shelf, inlet conduits, electrical conduits, electrical outlets being connected to said conduits, a plurality of elongated manifolds, each of said manifolds comprising two side surfaces having means therein for receiving pipe fittings, a lower male side portion, an upper female side portion, means for frictionally interlocking said male portion within its corresponding adjacent said female portion in a vertical tier-like relationship with one another, said manifolds having a substantially circular longitudinal interior cavity, two brackets provided with elongated vertical slots, said manifolds

being supported in said slots, end portions of said manifolds having a reduced circumference and being provided with linear alignment means.

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