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J. R. BUCK
VALVE ASSEMBLY
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3,012,752

FIG. 1

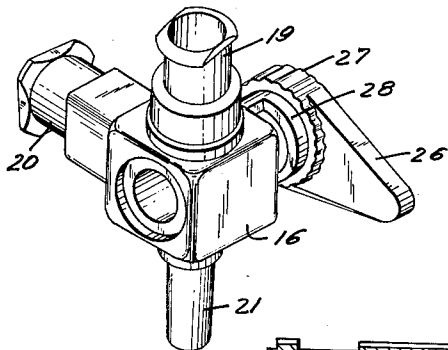


FIG. 3

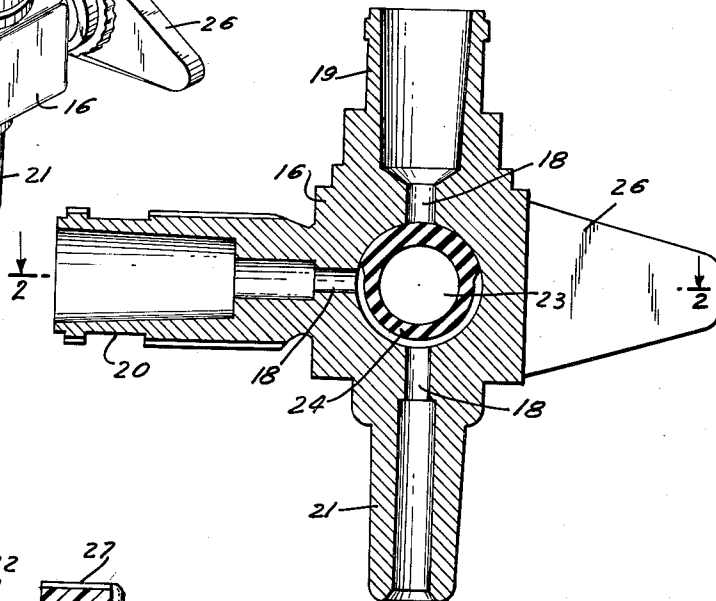


FIG. 2

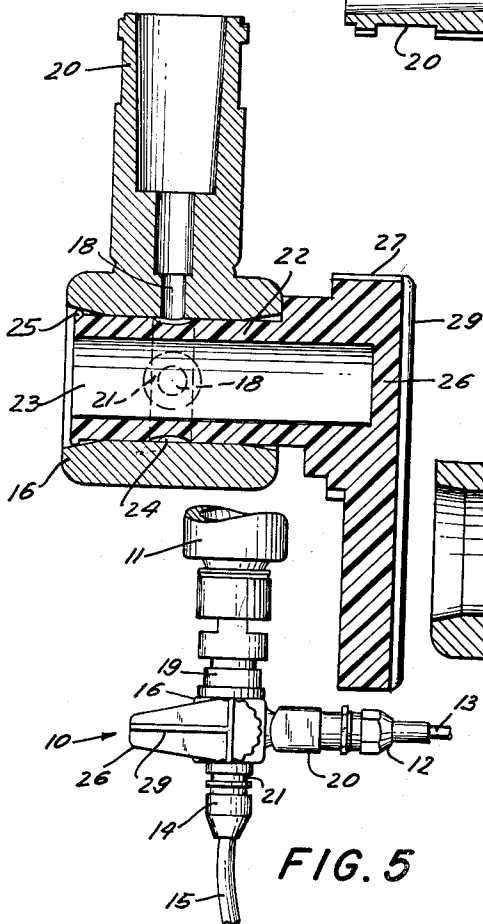


FIG. 4

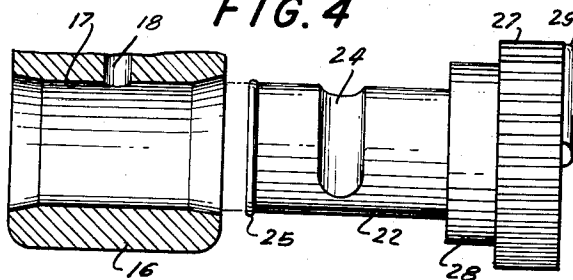
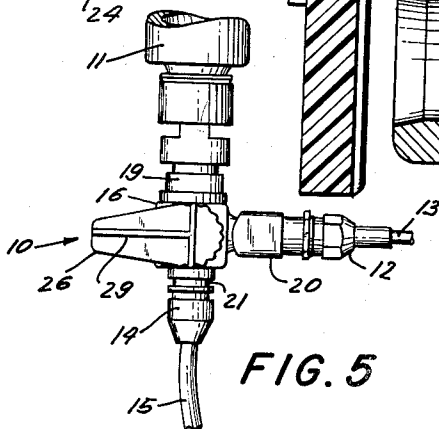


FIG. 5



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VALVE ASSEMBLY

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3 Claims. (Cl. 251-309)

This invention relates to a structurally and functionally improved assembly especially intended for use in the medical field, and by means of which the flow of fluid may be properly controlled.

It is a primary object to furnish an assembly, preferably including reusable and discardable parts. The former may readily be cleaned and sterilized. The latter will be of such economical construction that after a single use they may be discarded or destroyed. Thereupon, with the reusable parts of the assemblies cleaned and sterilized and with the other parts replaced by new and sterile units, complete and operative assemblies are readily provided. Consequently, the danger of infection arising through the reuse of parts which are not easily cleaned and sterilized, is avoided.

In its more specific aspects the present invention provides a medical stopcock assembly capable of use with various units of apparatus for the treatment of patients and for general laboratory work. Such a stopcock assembly will include relatively few parts, capable of ready manufacture, and which parts may be assembled with facility to furnish an improved unit.

Also, the structure of that unit may be modified where necessary, in that it may be advantageously employed in uses outside the medical and laboratory fields. Therefore, except where otherwise limited by the claims, the present teachings may be advantageously employed in the valving and control of fluids and liquids generally.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating one practical embodiment of the invention and in which:

FIG. 1 is a perspective view of an assembly of the medical type and involving a stopcock;

FIG. 2 is a transverse sectional view in enlarged scale, taken along the line 2-2 in the direction of the arrows as indicated in FIG. 3;

FIG. 3 is a sectional plan view of the device;

FIG. 4 is a fragmentary and partly sectional view showing the components of a medical stopcock assembly in separated condition; and

FIG. 5 is a somewhat schematic view of a layout of apparatus including a unit of the type shown in the preceding figures.

Referring primarily to FIG. 5, the stopcock assembly has been generally indicated at 10 and will be hereinafter described in detail. To one side or branch of this assembly there may be connected a unit such as the barrel 11 of a hypodermic syringe. To another side, and by means of a suitable fitting such as 12, a tube 13 is connectible. This tube may conveniently extend from a source of liquid supply (not shown). By means of an additional fitting 14 a tube 15 may be coupled to a third side of the stopcock assembly. This tube can conveniently connect at its outer end with a needle of the hypodermic type. As will be understood by relatively shifting the parts of the stopcock, the flow of liquid may be interrupted or caused to move along elected paths.

Now, referring to the illustrated stopcock embodiment of the invention, it will be seen in FIGS. 1 to 4 that the numeral 16 identifies the casing of the valve, provided with a central bore 17, from which passages 18 extend to terminate in fittings 19, 20 and 21 or equivalent cou-

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pling portions. This bore is preferably flared adjacent its ends. Throughout its entire central zone, and including the area within which passages 18 are disposed, it is truly cylindrical. As shown, fitting 19 is of a type such that the tip end of the syringe 11 may be connected therewith. The bore of fitting 20 conveniently receives and frictionally engages with the surface of element 12. Element 14 will, on the other hand, present a socket the surface of which is engaged by fitting 21 to retain it against accidental detachment and at the same time to assure a leakproof seal between the parts.

It will be noted in the present illustration that the stopcock or valve assembly furnishes three passages. While in many respects a standard assembly may preferably include this number, a lesser or even greater number of passages may be furnished. Accordingly, the valve body 22 has been shown as including a channel or groove 24 for the flow and control of fluid and which is proportioned and arranged to properly govern the passage of the liquid through the three openings or ports 18. Obviously, if a greater or lesser number of these passages exist in a given installation, the valve body and casing may have their construction correspondingly modified. Also, if a valve assembly different from that of a stopcock is employed, both the casing and valve body may be redesigned to meet the requirements of a given installation.

As illustrated, the valve body or key 22 will include a sleeve portion presenting a bore 23; the channel 24 extending throughout slightly more than half its circumference and being isolated from that bore. Throughout the zone with which this body is in contact with the surface of the casing bore 17, it is truly cylindrical. Body 22 is made of a suitable elastic material. Such material may be polyethylene, polyvinyl chloride or nylon. Variations of these plastics may also be employed, as may, additionally, any other plastic with suitable characteristics. At its outer end, body 22 may be expanded to define an outstanding bead 25.

The casing 16 is formed of a metal such as aluminum, stainless steel or chromium-plated brass. Otherwise, it is formed of a suitable plastic material, such as nylon, polystyrene, etc. The diameter of the bore 17 of this part is preferably exactly equal to the diameter of the key or body 22, as indicated in FIG. 4. Under certain circumstances the valve body may even have a diameter slightly in excess of that of bore 17. Both this body and bore 17, throughout at least the major zones of their operative lengths, are truly cylindrical. As a practical matter the diameter of the valve body may be .250"-0+.002". The diameter of the bore may be .250"-.0005"+0. The diameter of the bead 25 would approximate .253".

In the case of an all-metal assembly as heretofore constructed, the body 22 would not, of course, have a diameter equal to that of bore 17. However, according to the present teaching, by forming the body 22 of, for example, thermoplastic material having flexibility and/or elasticity, the key may be inserted into the bore without difficulty.

So inserted, it will remain in position. No screws, clips or other holding elements or expedients need be employed, in that the body 22 will be retained by friction contact at its end zones. The valve body 22 may be inserted through either end of bore 17 to a position at which its groove or other controlling passage is in line with the zone of passages or ports 18. It is to be noted that this is feasible because these ports are located centrally of the casing bore ends and that channel 24 is disposed an equal distance from the flange 28 or equivalent end portion of the valve body to limit the projec-

tion of the latter into said bore. By providing the bore 23, the flexibility of the valve is increased, so that it will properly coat with the surfaces of bore 17.

One valve body will fit different types of casings. In other words, casing 16 may be provided in various classifications involving different combinations of outlets, fittings and adaptors. However, valve body may be of a single uniform type. It is apparent that the bore 17 of the casing may be straight drilled and reamed. The plastic key may be molded, without other finishing operations.

In the interests of economy, a handle may form an integral part of the valve body. This has been shown at 26. The handle portion is continued to close the adjacent end of bore 23. A head assembly including a portion 27 is conveniently included as an integral part of body 22, and may be serrated, as illustrated. Also, it is in many instances desirable to include a flange 28 as part of the head assembly at a point intermediate the zone of portion 27 and valve body 22. This will bear against the edge surface of casing 16 and function as a stop to limit the insertion of body 22 into the bore.

This flange 28 is conveniently interrupted throughout a desired arcuate length and may cooperate with a portion of casing 16 or an extension thereof, in order to furnish a stop limiting the rotation of the valve body within bore 17. The latter, together with the valve body, could be tapered to a very slight extent, if it were permissible and desirable to furnish a structure in which the key or body was not intended to be optionally inserted into either end of the bore. Indicia in the form of ribs 29, or any other convenient markings, may be exposed on the outer face of the handle 26 and head portion 27. These will serve to indicate the direction in which the passage or groove 24 of the valve body extends. It is apparent that if a reversal of the parts is resorted to, i.e., if the valve body is introduced into the opposite end of bore 17 a different flow characteristic through the valve assembly will be achieved.

Obviously, no difficulty will be experienced in sterilizing the parts of the assembly. During use, the direction of flow of the liquid may be accurately controlled. Also, this flow may be interrupted when desired. After use, the valve body may simply be withdrawn from the bore 17 and discarded. It will be quite simple to effect a thorough cleansing and sterilization of the more expensive parts of the assembly involving the casing 16 should the latter involve a reusable structure. Thereafter, a new and sterilized valve body may be suitably inserted into the bore 17, so that the assembly will be instantly ready for further use.

As afore brought out, in addition to a valve assembly of the stopcock type, various other forms of flow-control-

ling structures may be provided within the scope of the teachings of the present invention.

Thus, among others, the several objects of the invention as specifically aforementioned are achieved. Obviously, numerous changes in construction and rearrangements of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A stopcock type valve including in combination: a rigid casing formed with an axially extended bore having outwardly flared end zones, said casing also formed with a plurality of fluid conducting passages extending radially of its axis and affording communication between said bore in its intermediate zone and the exterior of said casing; and a rotatable valve body extending through said casing in said bore and formed of a compressible elastic material, said valve body being under compression along that portion of its surface in contact with the bore surface of said casing in said intermediate zone with the end portions of said body being expanded in said outwardly flared end zones whereby said valve body is maintained within said casing, said valve body being further formed with a channel extending partially around its circumference and disposed in the plane of said fluid conducting passages and said channel being arranged upon a selective rotation of said body to establish communication between a plurality of said passages.

2. In a valve as defined in claim 1, the bore of the casing extending throughout the entire length of the latter, the passages being disposed in an area midway between the end zones of said bore, said body being optionally insertable into the body through either end of the bore, an end assembly mounted by said body and engaging a surface of the casing to limit projection of the body into the bore and said channel aligning with the passages with said body so inserted.

3. In a valve as defined in claim 1 and a circumferential bead forming a part of said body at one of the expanded ends thereof.

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