

June 1, 1965

F. S. BUONO

3,186,437

STOPCOCK

Filed March 19, 1962

2 Sheets-Sheet 1

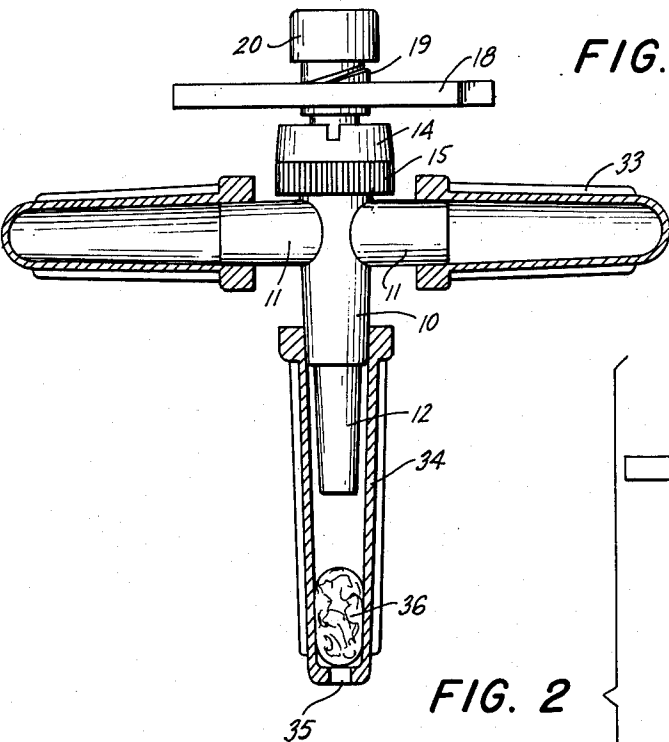


FIG. 1

FIG. 2

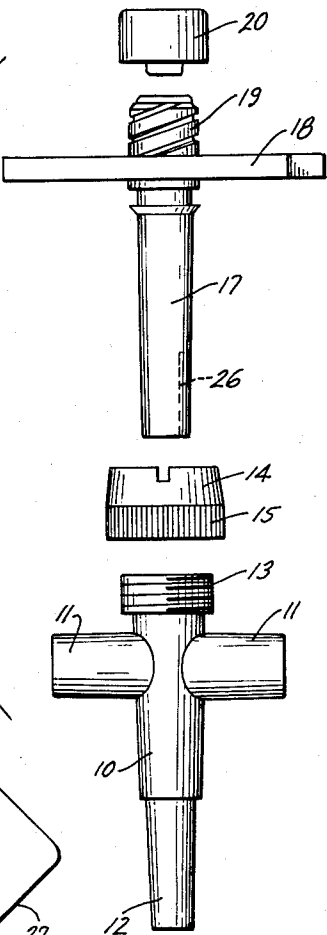


FIG. 3

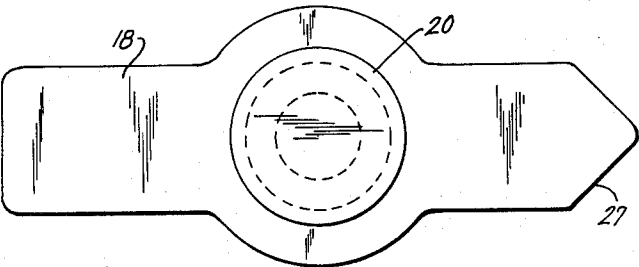
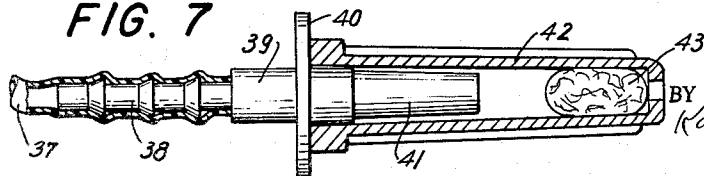


FIG. 7



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FIG. 4

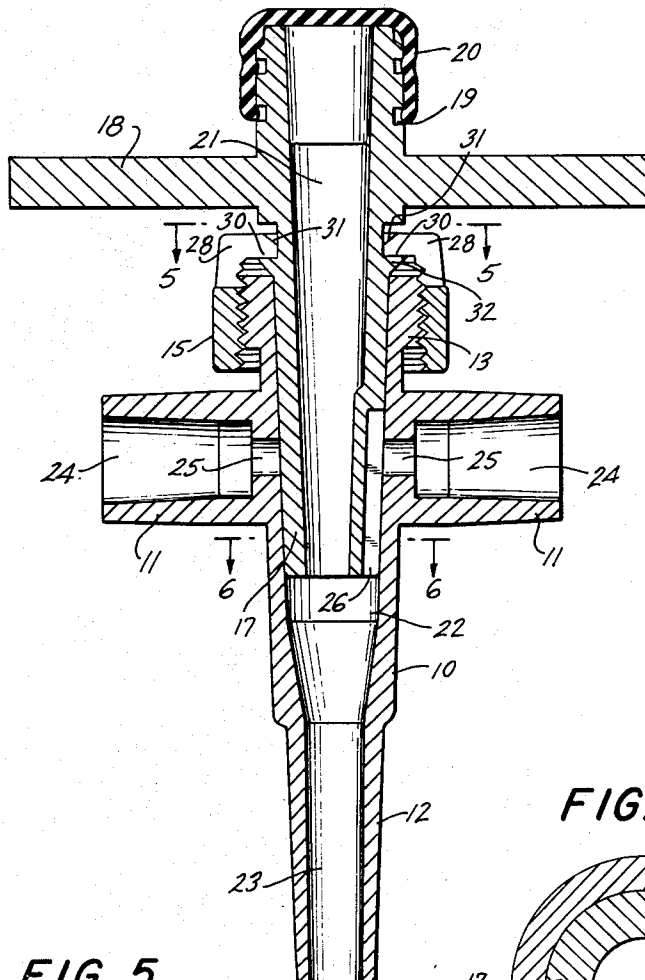


FIG. 5

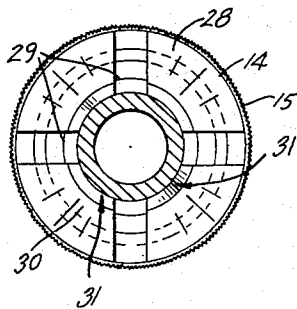
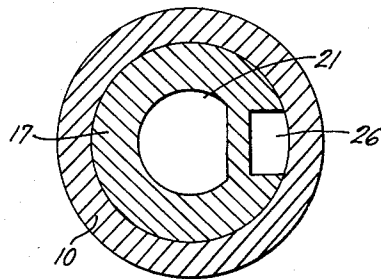


FIG. 6



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3,186,437
STOPCOCK

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2 Claims. (Cl. 137-625.42)

This invention relates to a structurally and functionally improved stopcock all parts of which will preferably be formed of plastic materials by a molding process; a unit being thus produced in an economical manner.

While a valve or stopcock structure embracing the present teachings may be employed in various associations, it will be of especial value when used by the medical profession or laboratory technicians in that the unit can be delivered in sterilized condition and after use may be discarded, so that cleaning and resterilization of the parts is unnecessary.

Among further objects of the invention are those of providing a stopcock assembly involving a key, body and collar part capable of ready and economical assembly to assure retention and proper contact between the key and body, as well—if desired—a locking of the key against movement with respect to the body.

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

FIG. 1 is a sectional side view of a stopcock;

FIG. 2 is an exploded side elevation of the parts providing the stopcock assembly;

FIG. 3 is a plan view of the unit;

FIG. 4 shows in enlarged scale a sectional side view of the unit;

FIGS. 5 and 6 are transverse sectional views taken along the lines 5-5 and 6-6, respectively, in the direction of the arrows as indicated in FIG. 4; and

FIG. 7 is a fragmentary partly-sectional side view of an accessory portion of the unit.

Referring primarily to FIG. 2, the numeral 10 indicates the body of the unit which may involve any desired exterior configuration and length, and the lower end of which is preferably defined by an extension 12. Projecting from body 10 are extended portions or arms 11. The upper end of the body terminates in a threaded flange 13. The latter mounts a collar having a tapered upper portion 14 and a cylindrical part 15; the surface of which is preferably knurled or serrated to facilitate a gripping and rotating of that collar. As will hereinafter appear, the collar is mounted upon the body and serves to retain in association with the latter the key member of the assembly.

The key member includes a downwardly tapered stem 17 at the upper end of which an actuator 18 is disposed. Above the latter, in turn, is a head 19 which mounts cap 20. While various materials may be employed to provide the parts of the assembly, it is preferred that body 10 be formed of nylon. Similarly, the collar and key are conveniently formed of nylon. The cap or stopper may be formed of natural or synthetic rubber. Thus, all parts will incorporate degrees of flexibility.

Now considering the detailed structure as shown in FIG. 4, it will be noted that cap 20 may preferably embrace a perforable upper portion and a side flange which encircles and grips the adjacent face of head 19. Also, it will be observed that the head 19 and aligned stem 17 are tubular to define a bore 21 extending throughout the length of the stem. Body 10 is formed with a bore 22 tapered in a downward direction to have its face engaged by stem 17. This bore continues through the extension 12 to provide a passage 23 terminating in an outlet open-

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ing. Arms 11 are bored as at 24 to furnish inlet openings or passages; body 10 in line with these passages being formed with openings 25 affording communication with bore 22. The lower end of the key bore 21 is open to afford communication between its interior and bore 22 of the body. Additionally, the key stem is formed adjacent its lower end with an axially extending groove 26 providing a fluid passage.

Referring to FIG. 3, it will be seen that the actuator 18 conveniently has one end tapered, as indicated at 27, to furnish a pointer aligned with passage 26 so that the operator with the parts assembled will at all times know the disposition of that passage within the body of the assembly.

Considering FIG. 5 in conjunction with FIG. 4, it will be noted that the collar is internally threaded to cooperate with the threads of flange 13. Also, that it has an upper portion 28 slotted as at 29 at points spaced, for example, 90° apart to furnish inwardly extending tabs 30. These tabs will have their inner edge zones capable of being flexed and present an upwardly flared top edge surface 31. The under faces of tabs 30 will extend perpendicular to the axis of the collar. Stem 17 is formed with an outwardly extending flange 32 the under face of which is flared or inclined with respect to the axis to a degree corresponding to the inclination of surface 31. The upper surface of the flange is substantially perpendicular to the axis of the stem.

Conveniently, the extension 12 of body 10 may present an exterior surface embodying a taper corresponding to a standard Luer taper. This is also true of the interior surfaces of arms 11. In this manner, tubes are attachable to these parts if provided with fittings which also embody such tapers. Obviously, other forms of coupling structures might be employed.

Considering the manner in which the parts are assembled, it will be apparent that they should be clean and sterile at least insofar as their critical surfaces are concerned. The collar will be shifted axially in an upward direction over the stem 17. The spacing of the inner edges of the tabs 30 will be such that no difficulty will be experienced in thus moving the collar. As its tab portions have their edge zones 31 ride in contact with the lower edge zones of flange 32, those tabs will flex to define a central space adequate for the passage of the flange therethrough. As soon as the upper zone of the collar is disposed above the flange, the tabs will assume the positions shown in FIG. 4, where they overlie the flange. Thereupon, the collar may be threaded over the threads of body flange 13 to draw the stem downwardly within the bore 22 of the body and into sealing engagement with the surface thereof.

Under these circumstances, the stem will be positioned as generally shown in FIG. 4. A tightening of the collar will adjust the contact pressure between the key and body. If this tightening action is continued, the key may be locked against rotation with respect to the body. Under all circumstances, the key will be retained against accidental displacement in that the tabs will have their lower faces bear with sufficient force against the upper face of flange 32 to assure against an overriding of the flange by the tab edges. Thus, it is apparent in the assembly of the parts that this flange and the upper zone of the collar cooperate as a latch structure with the space below the flaps or tabs 30 providing a keeper for the bolt defined by flange 32.

After the parts are properly assembled and sterilized, they may be packaged in any desired manner to maintain this condition until the unit is ready for use. The assembly may be further protected from contamination, as shown in FIG. 1, by applying sheaths 33 having closed

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outer end portions one to each of the arms 11. The bore of extension 12 may be protected by an adapter cover in the form of a sheath 34 as shown in this figure. That sheath conveniently has an open outer end, as indicated at 35, and contains a body of suitable material such as non-absorbent cotton in the form of a bat indicated at 36. It will be apparent that by resorting to such an arrangement the critical parts of the assembly will be maintained in proper condition.

In certain instances it may be desired to include in the assembly an extension tube preferably formed of suitable plastic material. Such a tube has been shown in FIG. 7 at 37. The inner end of the tube will be ensleeved over extension 12. Its outer end will be similarly disposed over a tube 38 extending from one end of an adapter. The adapter will conveniently include a hub 39 having a flange 40 and a tapered body 41. Again, the latter conveniently embraces a Luer taper. The portion of the hub beyond flange 40 mounts a cap or sheath 42 containing a body 43 of suitable material and having its other end formed with an opening as corresponding generally to the unit 36 heretofore described in connection with FIG. 1. With the removal of these covers or sheaths, it is apparent that the apparatus is ready for use, subject to coupling tubes or other units with the members defining the inlet and/or outlet openings.

It is obvious in operation that with the inlet and outlet openings so coupled by tubes or otherwise with receptacles containing or receiving fluids, or to a patient to receive fluids, that with the indicating end of actuator 18 extending in a position 90° spaced from the directions in which arms 11 extend, no fluid will pass through the assembly, because the fluid passage 25 of the stem or key is not in communication with the inner ends of bore 24. Rotation of the key to align its passage with one of the openings 25 will permit fluid to flow inwardly through that opening and through passage 26 into the bore 22 of the body 10 and so out of the continuing bore 23 of extension 12. By rotating the key 180° a source connected with the second arm 11 of body 10 will cause fluid to flow from that source through bore 22 in a manner such as aforescribed.

Should an extraneous further source of fluid be dispensed through bore 23, either by itself or in conjunction with fluid from one or the other of the aforementioned sources, this may readily be done. For example, by having the additional source of fluid suitably connected to one end of a cannula, the opposite end of that cannula may be caused to pierce cap 20. Therefore, the lumen of the cannula will be in communication with bores 21, 22 and 23. Accordingly, fluid passing through the lumen and beyond the cannula will be discharged from the outlet opening of the assembly as defined by bore 23.

Thus, among others, the several objects of the inven-

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tion as specifically aforesaid are achieved. It is obvious that various changes in structure and rearrangement 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, all parts of which are formed of plastic materials by a molding process and for use in the administration of fluids including in combination a body provided with a tapered bore and an opening communicating therewith, a key member, a tapered stem forming a lower part of said member and having a passage on its outer face, said stem extending into said body bore, an adjustable collar encircling and axially shiftable along said stem towards the upper end of said member, latch parts integral with said stem carried by said stem and collar and cooperating upon such shifting occurring to positively couple said collar to said stem and prevent a return movement of said collar along the latter, a body mounting to adjustably retain said collar and thus maintain said stem within said bore and in sealing contact with the face of the latter, said body mounting including mating threads on the body and the collar whereby the frictional engagement between the key member and body is adapted to be varied and the key member is adapted to be locked against rotation with respect to the body and handle actuator means integral with said key member which projects laterally and circumferentially about said key member at the upper portion thereof, said handle means serving as an indicator and being adapted for rotating said key member with respect to said body for establishing and interrupting communication between the opening of the latter and the passage on the outer face of said key member and bore of the body.

2. In a stopcock as defined in claim 1, said key member being formed with a bore extending from the upper end thereof through to the lower end of said stem and a closure normally sealing the upper end of said key-member bore.

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