

March 20, 1962

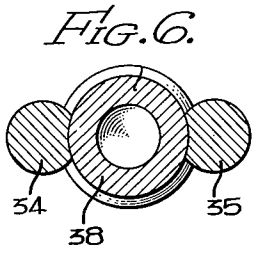
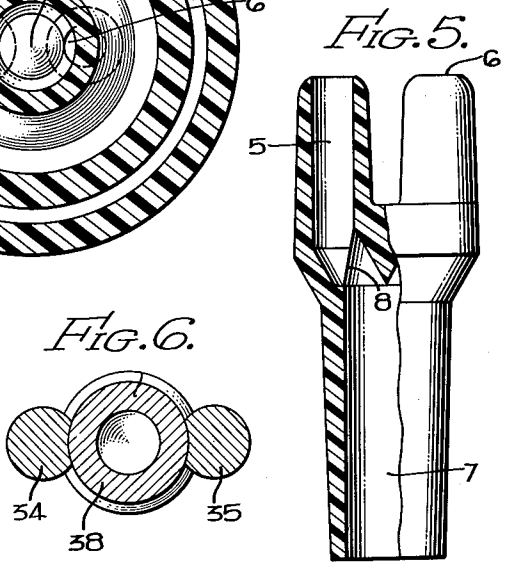
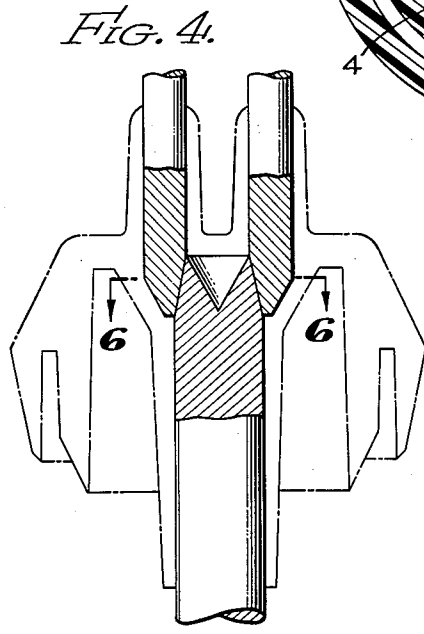
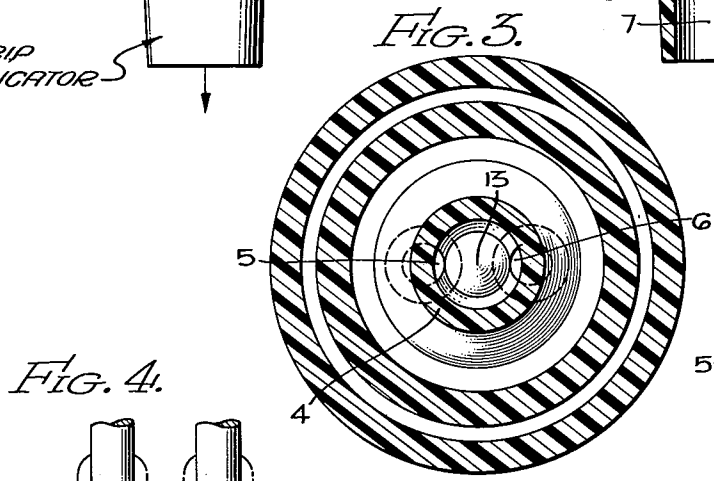
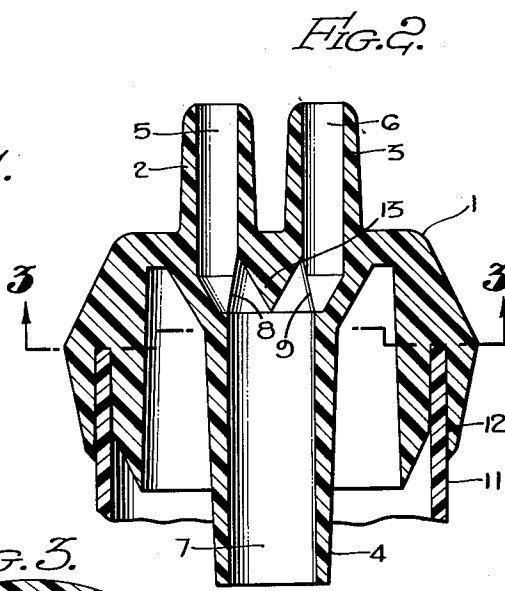
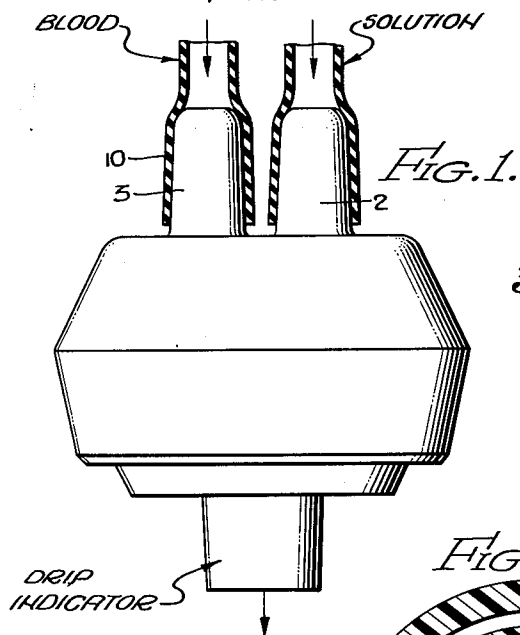
D. A. HAMILTON

3,025,855

MOLDED PART FOR A PARENTERAL DRIP HOUSING

Filed June 6, 1955

2 Sheets-Sheet 1



INVENTOR.
DONALD A. HAMILTON
BY *Lyon & Lyon*
ATTORNEYS

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D. A. HAMILTON

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2 Sheets-Sheet 2

FIG. 7.

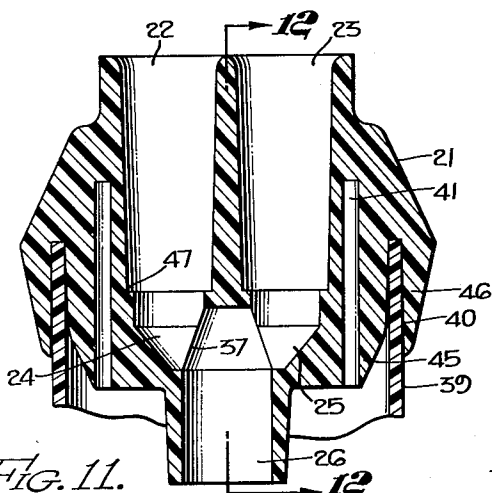


FIG. 8.

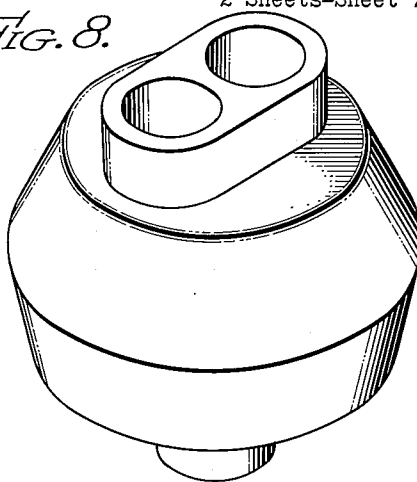


FIG. 11.

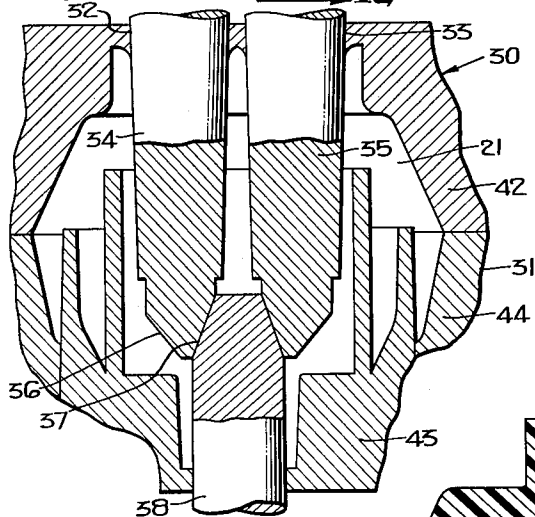


FIG. 9.

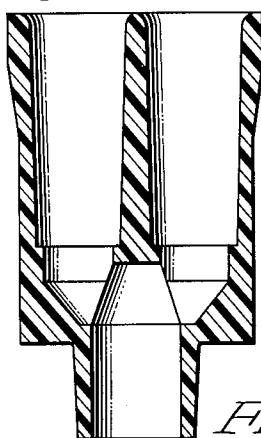
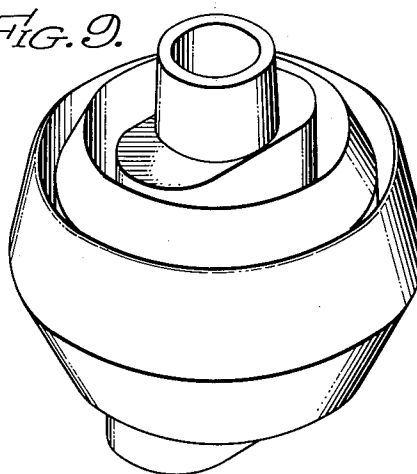


FIG. 10.

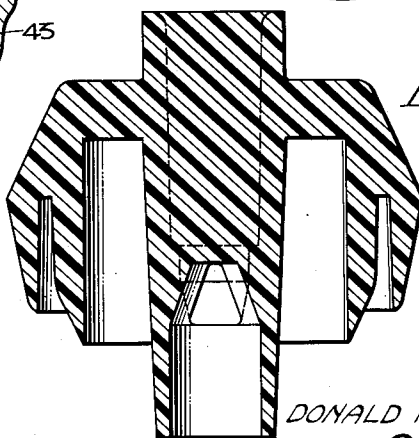


FIG. 12.

INVENTOR.
DONALD A. HAMILTON
BY *Lyon & Lyon*
ATTORNEYS

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3,025,855 MOLDED PART FOR A PARENTERAL DRIP HOUSING

Donald A. Hamilton, Burbank, Calif., assignor to Don Baxter, Inc., Glendale, Calif., a corporation of Nevada
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9 Claims. (Cl. 128—214)

My invention relates to a molded part and the process of making the same and more directly to a connector which is specifically used in the administration of intravenous solutions.

In giving a blood transfusion, it is common practice to start with a suitable sterile solution, such as normal saline or a 5% dextrose solution, in order to be sure the needle is properly situated in a patient's vein and the procedure is going smoothly. After such smooth flow is established, blood is allowed to run in. Finally, the solution is again run to wash the blood out of the tubing into the patient's vein. This practice creates a need for an administration assembly which permits either blood or solution at will to flow through the same needle. For this purpose a variety of assemblies have been used, ordinarily referred to as Y administration sets. In such administration sets, one leg of the Y is connected to a solution bottle, another leg is connected to the blood bottle, and the third leg is connected to the tube leading to the needle.

In recent years there has been a trend toward the use of a disposable administration set, that is, sets which are intended, after use of one administration, to be discarded. This imposes the necessity for having the administration sets and units of which they are composed of the lowest possible cost and the Y assemblies previously employed have been too costly.

My invention consists of a Y connector which can administer two to four solutions to a patient at the same time with the use of only one injection needle. To accomplish this, the solutions enter into my connector and there joined, pass into a common conduit to the needle and into the patient.

Previous to my invention, the Y devices available all had important disadvantages. Glass Y tubes were easily broken. Dipped plastic Y tubes were expensive and made awkward assemblies. Molded Y stoppers had to be made of rubber or other resilient material so as to remove the Y-shaped molding core. Such stoppers were difficult to attach to the plastic drip housings. In emergencies, pressure was sometimes applied to administration sets to increase the rate of a transfusion and the results could be disastrous if the stopper were not permanently attached to the housing. None of these devices could be used to conveniently connect one passageway to three or four other passageways.

It is, therefore, an object of my invention to provide a device which has at least two inlets and a single outlet.

A further object of the invention is to provide a cap for an administration set housing which has two inlets and a single outlet suitable for use as a drip indicator.

The particular device is preferably formed of any of the well-known plastics, rubber or even metal. Such a device has heretofore been impractical to make because in the molding or casting process, it was found very difficult to form the cores for the mold. The reason for this is that ordinarily one pin was inserted in the mold which made the outlet and against this pin, two pins were positioned. These pins could be drawn out after the molding or casting of the connector but fins or flashings were left where the three pins connected to each other, thus obstructing the free flow of liquid through the connector. Being inside the part, this flash was difficult to detect and more difficult to remove.

My invention comprises a method of molding such a

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connector by the use of a novel type of pins in the mold which prevents the formation of fins or flashings on the interior and makes a smooth clean passage therethrough.

Other objects and advantages of my invention will be apparent from the following description of the preferred embodiments thereof:

In the drawings:

FIGURE 1 is an elevation of a connector made in accordance with my invention.

FIGURE 2 is a sectional view of said connector.

FIGURE 3 is a section taken on line 3—3 on FIGURE 2.

FIGURE 4 is a sectional view showing the positions of the aforesaid pins during the molding process.

FIGURE 5 is a partial sectional view of a modification.

FIGURE 6 is a section taken on line 6—6 on FIGURE 4.

FIGURE 7 is a sectional view of a modification.

FIGURE 8 is a top perspective view of the device shown in FIGURE 7.

FIGURE 9 is a bottom perspective view of the device shown in FIGURE 7.

FIGURE 10 is a sectional view of a modification.

FIGURE 11 is a sectional view of the mold used in constructing the connector shown in FIGURE 7.

FIGURE 12 is a section taken on line 12—12 on FIGURE 7.

A connector constructed in accordance with my invention comprises the cap 1 with extending bosses 2 and 3 on the upper side thereof and a downwardly extending boss 4. The bosses 2 and 3 have passages 5 and 6 therethrough and the boss 4 has a passage 7 passing therethrough. The passages 5 and 6 are connected with the passage 7 as shown at 8 and 9, respectively. It should be noted that the juncture between the passages 5 and 7 or 6 and 7 are on a long taper; i.e., the juncture 8 and 9, if extended, would meet the longitudinal axis of the passage 7, at a small angle, thus providing a large meeting area. The cone-shaped extension 13 helps provide smooth laminar flow from passages 5 and 6 into passage 7 and also eliminates any air pocket which might interfere with smooth flow through the passage 7. The bosses 2 and 3 are of such a size as to permit a rubber or plastic tube 10 to be forced thereon to form an airtight seal and these tubings then are connected at their other ends to bottles of intravenous solutions or blood. If desired, the connector may be made of a plastic material similar to the plastic tube 10 and the two may be easily cemented together.

A housing 11 is forced into the annular groove 12. The housing 11 which may contain a filter, is connected to a plastic tube (not shown) leading to a needle which is inserted into the patient. If a clear housing is used, the drip rate of the solution can be seen as it passes out of the boss 4, thus providing a drip meter.

The form of my invention shown in FIGURE 5 is suitable for use in laboratories for dividing the flow of air, gas, water, etc., from one main line into two or more supply lines. In this modification, the skirts for attaching the caps to a housing are unnecessary and the device consists of a body with the passages 5 and 6 meeting the passage 7 as shown at 8 and 9.

In the forms of my invention shown in FIGURES 7, 8, 9 and 10, the housing 21 has enlarged bores 22 and 23 which connect with the passages 24 and 25 and the dispensing passage 26. Again, the junctions of the passages 24 and 25 with the passage 26 are on a long gradual taper. In this type of construction, the tubes from the solution containers or blood containers are forced into the enlarged bores 22 and 23. The shoulder 47 prevents inserting the tubing so far as to occlude the passage 37. Housing 39 is forced into groove 40 between the inner

skirt 45 and the outer skirt 46 and connected to a plastic tube (not shown) leading to the administration needle. Groove 41 facilitates molding by making the wall thickness of the inner skirt 45 uniform, thus allowing cooling. Groove 41 also provides additional area to facilitate removing the part from the upper half 42 of the mold.

FIGURE 10, like FIGURE 5, shows a modification of the invention suitable for use in laboratories for dividing the flow of air, gas, water or other fluids from one main line into two or more supply lines.

The process of construction of my connector is illustrated in FIGURES 4 and 11. A mold 30 consists of an upper half 42 and a lower half 31. The upper half 42 is provided with openings 32 and 33 into which are fastened the cavity pins 34 and 35. The cavity pins have tapered lower extremities 36 which are ground out as shown in FIGURE 6 so as to fit snugly around the conical surface 37 of the core pin 38. The lower half 31 of the mold is provided with a stripper bushing 44, a core body 43 and a core pin 38. The core pin 38 is attached to the core body 43 and is free to rotate. Core pin 38 is also adjustable lengthwise so as to compensate for wear and is spring-loaded so as to always engage cavity pins 34 and 35 with the same tension.

As can be seen, the pins 34 and 35 thus make a sliding fit with the conical surface 37 of the pin 38. With this type of pin construction and juncture, no flash or fins are left to block the passage between the bores 24 and 25 and the outlet passage 26.

Any type of sprue hole can be used to permit the pouring of plastic into the cavity 31. After filling the cavity with plastic and allowing the same to set, the mold is opened, automatically disengaging the pins 34 and 35. The core body and the attached pin 38 are then pulled back in relation to the stripper bushing 44 and the finished connector is allowed to drop free.

I have found that the best results are obtained when the surface 37, if extended, would meet the longitudinal axis of the core pin at an angle of 1° to 20°. If the angle is less than 1°, flash or fins tend to form. If the angle is more than 20°, the pin 38 wears excessively and must be adjusted more often. If the angle is greater than 20°, the connecting area 8 and 9 of the passages is also decreased. The connecting area may be increased by using a larger passage 7, but in many cases the larger passage may be undesirable.

The connectors of this invention can also be made with 3 or 4 passageways by providing additional cavity pins nesting onto the core pin 38.

I claim:

1. A connector comprising: a single tubular member, the walls of which taper inwardly at one end to form a conical end section; two tubular members parallel to and on opposite sides of the single tubular member, and extending from said conical end section; and openings from the conical end section into the end sections of each of two tubular members, the longitudinal side walls of said openings defining a plane oblique to the axes of the tubular members and the transverse end wall of the opening lying in an arc on the conical end section.

2. A connector comprising: a one-piece integral, molded body member, the walls of which define a single port; an inner end section on said port formed by wall surfaces tapering inwardly on at least two opposed sides; two parallel ports extending into the body from the side opposite the single port; a single, thin wall between said two ports; an end section on each of the two ports formed

by an extension of the inner end of the thin wall tapering toward the respective axis of each port; and openings from the single port into each of the two ports, said openings being defined by and passing through said extensions.

3. A connector as set forth in claim 2 wherein the diameter of the single port is approximately the same as the diameter of the two ports.

4. A connector as set forth in claim 2 wherein the diameter of the single port is no greater than the distance between the center lines of the two ports.

5. A connector comprising: a body; two parallel ports entering one side of said body and defined by walls thereof; a single port defined by the body walls and entering the body from the side opposite the two ports; an inner end section on said single port formed by the walls of said port tapering inwardly on at least two opposing sides; a thin web between said end section and the inner end of each of the two ports; and an opening in each of said webs.

6. A connector comprising: a body; two parallel ports entering one side of said body and defined by the walls thereof; inner tip sections on each of said parallel ports defined by inwardly tapering walls on at least two opposing sides; a single port entering the body from the side opposite the two ports, lying between said two ports and parallel thereto; an inner tip section on said single port formed by walls tapering inwardly on at least two opposing sides; and openings from the single port into each of the two ports, said openings being defined by the walls of the respective tip sections.

7. A connector as set forth in claim 6 wherein there are straight passages through the connector, each such passage comprising a portion of a parallel tubular member, an opening, and a portion of the single tubular member.

8. A connector as set forth in claim 6 wherein each of the inner tip sections is conical in shape.

9. A cap for a drip housing comprising: a body adapted to be set in a cylindrical neck; two parallel inlet passages entering one side of said body and defined by the walls thereof; closed inner ends on side inlet passages formed by the walls of each passage tapering axially inwardly from opposite sides; a single passage defined by the body walls and entering said body from the side opposite the inlet passages; a tube extending said single passage beyond the body, adapted for use as a drip indicator and having a diameter no greater than the distance between the axes of the two parallel passages; a closed inner end formed by the walls of the single passage tapering axially inwardly on opposite sides; and openings from the closed inner end of the single passage into each of the closed inner ends of the two parallel passages.

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