

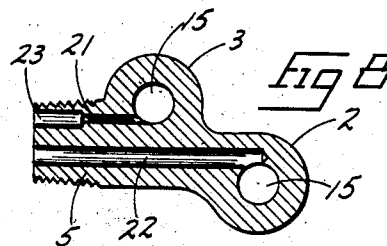
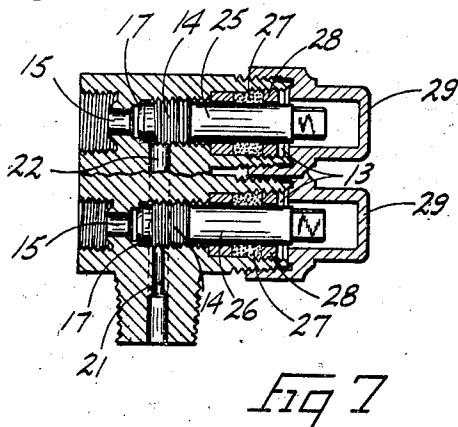
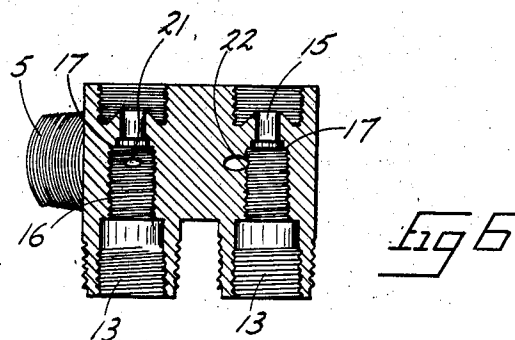
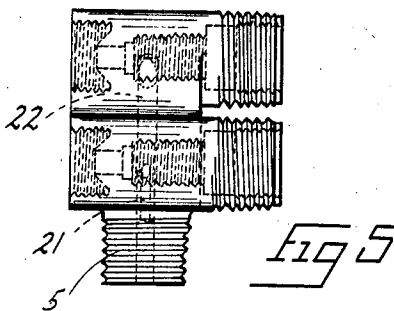
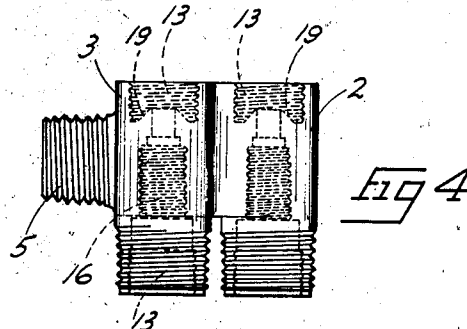
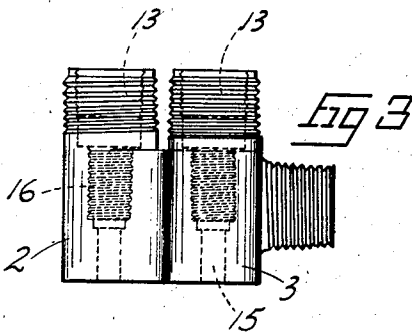
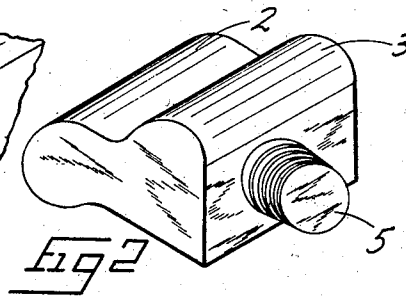
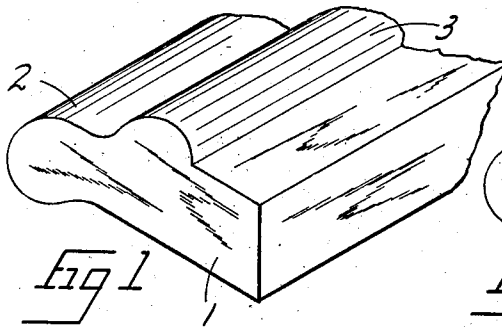
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1,956,554

METHOD OF MAKING VALVE BODIES

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METHOD OF MAKING VALVE BODIES

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9 Claims. (Cl. 29—157.1)

This invention relates to a valve and to a method of making same. More particularly this invention relates to a method of making a dual valve structure from bar stock.

I can illustrate and describe my invention within the realm of a particular and successful embodiment and practice thereof in its application to a dual valve used advantageously in a refrigeration system. Such a valve has two independent passages leading therethrough, each controlled by a separate closure member, and both passages extending side by side through a common branch which is adapted to be threaded into or otherwise, put in communication with a single vessel. The vessel with which I have advantageously used my valve has been the receiver for a mechanical refrigerator, which those skilled in the art know contains both liquid and gas. In using my valve one of its passages communicates with the liquid in the lower part of the receiver through a tube brazed into the passage and the other passage is in open communication with the upper or gaseous part of the vessel or receiver.

In designing my valve it was my desire to incorporate in a compact valve body valve stems and closure members, each readily accessible, and independently operable to control the flow of fluid into and out of the said vessel or receiver. My effort was also directed to provide in my valve means for joining the separate passages with separate tubes or conduits communicating with other elements in the system.

Thus it is among the objects of my invention to provide a compact and inexpensive dual valve. Another object of my invention is to provide a method for making such a valve. Another object is to arrange the passages, seats, stems and connections in the most compact yet accessible relation, so that a minimum amount of metal need be employed, a minimum waste entailed and a minimum machine work required in the production of my valve, consistent with ample strength, durability, accessibility, good appearance and safety.

Another object of this invention contemplates a method of producing valve bodies from extruded and drawn or rolled bar stock wherein the contour of the stock and its design is such as to facilitate the completion of the unit with a minimum of steps in an economical fashion and one that is adapted to mass production methods. Still another object of this invention is to combine a valve body fashioned from extruded or drawn bar stock that may be produced at a lesser cost than forgings or castings, yet will be pos-

sessed of all the qualities of a forging or casting as regards to strength, durability and efficiency.

Other objects and advantageous features of the invention will be noted in the following detailed description and accompanying drawing, wherein like characters of reference designate corresponding parts and wherein:—

Figure 1 is a perspective view of a bar of extruded and drawn stock from which the blank shown in Fig. 2 is severed, the blank being shown after the machining operation of forming an extension, circular in cross section, extending at an obtuse angle to the main body;

Figure 2 is a view in perspective of the blank illustrated in Fig. 1, after certain operations have been performed thereon.

Figures 3, 4, 5 and 6 are views in elevation and in section illustrating various steps in the making of the valve body;

Figure 7 is a sectional view illustrating the valve body and cooperating parts assembled therewith; and

Figure 8 is a view in section on line 8—8 of Fig. 6.

In carrying out the objects of my invention and referring to the drawing, it will be seen that my novel valve comprises a pair of cylindrical portions merging into a common body having a lateral branch terminating adjacent to but offset from one of the cylindrical portions. I have evolved this design of valve having in mind both the compactness of the valve and the method by which it was to be made. Thus with this design I am able to form bar stock by such means as extruding and drawing or rolling metals, such for example, as brass having the shape illustrated in Fig. 1, which comprises a pair of cylindrical, or partially cylindrical, portions merging into and oppositely offset from a rectangular portion. It will further be seen that the axes of the cylindrical portions are respectively above and below the central plane of the bar and are respectively disposed near and far from the rectangular portion of the bar. It will also be seen in Figs. 1, 2 and 8 that the axes of the cylindrical portions are inclined with relation to the lateral median plane of the body of the bar.

Having formed the bar stock in the shape shown in Fig. 1, as the first step of my process, I next sever the bar in a plane normal to its axis into lengths equal to the height of the valve body, as viewed in Figs. 3 and 4. The blank having been so severed, I remove part of the rectangular portion substantially down to a plane tangent to the centrally located cylindrical portion,

leaving normal to such plane a lateral branch which is externally provided with pipe threads for attachment into the vessel, the flow to and from which is controlled by my valve. In this stage, at the end of the second step of my process, the valve has the appearance shown in Fig. 2.

There remains in producing the finished exterior of the valve, the step of turning away enough stock adjacent the ends of the cylindrical portion to permit of the external threading of these portions for reception of cap nuts 29, see Fig. 7, which enclose the exposed ends of the valve stems and seal these portions of the valve against any chance of leakage along the valve stems. With the completion of the external threading of these ends of the cylindrical portions, shown at the top in Fig. 3 and bottom in Fig. 4, the last step of my process, as to exterior formation, has been taken and the valve body has thereupon assumed its finished exterior appearance.

Those skilled in the art will understand that it is not mandatory nor necessarily expedient to perform the three foregoing steps in the order named, without interrupting the sequence of steps by other operations such as drilling, boring or tapping on the inside of the valve body. I have discussed the three preceding steps to illustrate the correlation of my shape of the finished product to show how vitally and effectively dependent is the shaping of the rod or bar stock related to the contour of the finished product. It is by this cooperative relationship that I save material, time and effort as well as provide a compact and novel finished product as will more fully appear in discussing the subsequent steps of my process and the structure of the finished valve.

Passing now from the formation of the exterior of the valve, which now comprises parallel cylindrical portions 2 and 3 with their axes spaced apart and lying in a plane inclined to the axis of the branch 5, to the interior of the valve, I form parallel axial passages 15, drilled, bored, counter-bored and tapped as shown in the several figures, particularly Fig. 3. The passages being preferably exactly alike, include at 17 squared shoulders forming seats for the two valves; at 16 internally threaded walls for engaging the threads 14 on the valve stem (see Fig. 7); and in the upper portions of the passages as viewed in Fig. 3, enlarged smooth wall portions disposed inwardly of internally threaded portions 13 for receiving and retaining packing rings and glands 27 and 28 (see Fig. 7) which cooperate with the valve stems 25 and 26 for the usual purpose.

The ends of the cylindrical portions 2 and 3 adjacent the packing glands are beveled and sharpened to form a seal with the cap nuts 29 as a further and ultimate protection against leakage.

Referring particularly to Figs. 4 and 5, and to the upper ends of the cylindrical portions 2 and 3 as shown therein, I form in and at the ends of these passages enlarged internally raised conical seats 19 after the teaching of the Weatherhead Patent No. 1,733,925 which separately constitute the female members of tube couplings and are each adapted to receive the flared end of such as a copper tube along with the male member of such a coupling and form a fluid tight joint with such tubing.

Thus the cylindrical portions 2 and 3 each include (see Fig. 7) a female member of a tube coupling, a fluid passage 15, a valve seat 17, a valve stem 25 or 26, a packing ring and gland 27

and 28 and sealing brim for the separate cap nuts. It remains to consider now to establish fluid communication between the separate passages 15 with separate passages extending through the common branch 5 in the most compact manner and one in which there is no sacrifice of utility or efficiency of manufacture.

Referring particularly to Fig. 8, it will be seen that the additional passages 21 and 22 can be separately encompassed within the small confines of the branch 5 by reason of the offset and inclined relation of the axes of the cylindrical parts 2 and 3. The passages 22 and 23 are each drilled normal to the plane of tangency to the inner cylindrical portion and parallel to the axes of the branch 5. Preferably the passage 21 has one wall substantially tangent to the passage 15 in the inner cylindrical portion 3. Preferably also the passage 22, which in this particular embodiment is larger than the passage 21, has its axis substantially tangent to the wall of the passage 15 in the cylindrical passage 2, whereby the end of the passage 2 is extended slightly beyond the center of the passage 15, as shown in Fig. 8. The passages 21 and 22 have been related to each other in size and disposition within the branch 5 because of the duty imposed upon them in the particular use in which I have employed this valve, that is, the passage 21 was intended to convey liquid, as mentioned above, directly from the bottom of the vessel or receiver into which the branch 5 is threaded in fluid tight connection, while the passage 22 conveys fluid and gas to the top of such receiver. The passage 21 is counter-bored as at 23 to receive the end of a tube or conduit which may be brazed therein or otherwise sealed and lead therefrom to the bottom of the vessel mentioned above.

Referring also to Figs. 5, 6 and 7, the relationship and points of contact between the passages 15, 21 and 22, can be observed from different points of view, it appearing particularly in Fig. 7 that as either of the valve stems 25 or 26 are rotated so as to back the stems away from the seats 17 that fluid communication is established in one instance through one of the passages 15 and the passage 21 and in the other instance through the other of the passages 15 and the passage 22.

From the foregoing, it will appear that I have provided a novel dual or plural valve by a novel process which is most compact, economical as to material cost and economical of machine work and finished operations in its manufacture. It will also appear that my novel design and arrangement of the several valves proper, including the seats and stems disposed as they are, in a plane which is inclined to the axes of the common branch and being severally offset from the axis of the branch and spaced near and far therefrom respectively, provides an arrangement which results in a neat and compact article of manufacture and lends itself to the method of manufacture from extruded and drawn or rolled bar stock and to a highly advantageous correlation between the steps of forming the stock and machining the blanks which are severed from the stock so formed.

While the foregoing has constituted a description of the article and method which constitutes a preferred embodiment of my invention, I appreciate that modifications and changes all within the scope of the major precepts thereof may well occur to those skilled in the art and I do not thus limit myself to the specific embodiment disclosed herein or in any manner other than by

the claims appended hereto, when given that range of equivalents to which the patent issuing hereon may be entitled.

I claim:

1. The method of making valve bodies which includes forming bar stock with a plurality of longitudinally extending cylindrical portions offset from each other and merging into the body of the bar, severing the bar into valve lengths, forming longitudinal passageways in each of said cylindrical portions and forming liquid conducting means in the body of the stock extending laterally thereof from the exterior to and into fluid communication with said longitudinal passageways.

2. The method of making valve bodies which includes forming bar stock with a plurality of longitudinally extending cylindrical portions offset from each other and merging into the body of the bar, severing the bar into valve lengths, forming longitudinal passageways in each of said cylindrical portions, and drilling lateral passages through the body of said severed stock each separately communicating with said longitudinal passageways.

3. The method of making valve bodies which includes forming bar stock with a pair of longitudinally extending cylindrical portions offset from each other and merging into the body of the bar, severing the bar into valve lengths, forming a projecting branch out of one side of the severed stock with its axis inclined to the plane of the axes of said cylindrical portions, forming longitudinal passageways in said cylindrical portions, and drilling lateral passages through said projecting branch communicating with said longitudinal passageways.

4. The method of making valve bodies which includes forming bar stock in such shape to have a pair of longitudinally extending cylindrical portions transversely offset from each other and merging into the body of the bar, severing the rod into lengths of size to accommodate the finished valve, removing part of the body of the severed length and forming a projecting branch with its axis intersecting the plane of the axes of said cylindrical portions, forming longitudinal passageways in each of said cylindrical portions, and drilling lateral passages through said projecting branch communicating with the passageways in said cylindrical portions.

5. The method of making valve bodies which includes forming bar stock with a pair of longitudinally extending cylindrical portions laterally and transversely offset from each other and merging into the body of the bar, severing the rod into lengths equal to the height of the finished valve, removing part of the body of the severed length and forming a projecting branch with its axis intersecting the plane of the axes of said cylindrical portions at a point between said axes, forming separate passageways in each of said cylindrical portions, and drilling passages through said projecting branch each communicating with one of the passageways in one of said cylindrical portions.

6. The method of making valve bodies which includes forming bar stock to have a pair of longitudinally extending cylindrical portions oppositely offset from and merging into the body of the bar and to have a substantially rectangular portion lying alongside and offset from one of said cylindrical portions, severing the rod into lengths consistent with the finished valve, removing part of said rectangular portion and

forming a projecting branch with its axis intersecting the plane of the axes of said cylindrical portions, forming separate passageways in each of said cylindrical portions, and drilling passages through said projecting branch each separately communicating with one of the passageways in one of said cylindrical portions.

7. The method of making valve bodies which includes forming bar stock with a pair of longitudinally extending cylindrical portions merging into the body of the bar with their axes defining a plane inclined to the plane of the transverse center of the bar and with the body of the bar having a substantially rectangular portion lying alongside part of one of said cylindrical portions, severing the rod into lengths equal to the height of the finished valve, removing part of said rectangular portion and forming a projecting branch with its axes substantially in the plane of transverse center of the bar and intersecting the plane of the axes of said cylindrical portions at an oblique angle thereto, forming separate passageways in each of said cylindrical portions for receiving valve stems and closure members, and drilling passages through said projecting branch parallel to its axis each separately communicating with one of the passageways in one of said cylindrical portions.

8. The method of forming a valve body which comprises shaping metal into bars having a cylindrical portion mainly on one side of the transverse central line of the bar and a second cylindrical portion mainly on the other side of said center line, said centerline bisecting a rectangular portion lying alongside said first named cylindrical portion and on the side opposite said second named cylindrical portion, dividing said bar into blanks by severing along lines perpendicular to the axis thereof, drilling a passage in each of said cylindrical portions, forming valve seats in said passages for cooperating with a valve closure means, reducing the rectangular portion to circular cross-section, drilling an elongated passage in said last named portion below the transverse centerline of the body at right angles to the passage in the cylindrical portion below said centerline and intersecting the passage in the other of said cylindrical portions.

9. The method of forming a valve body which comprises shaping metal into a bar having a cylindrical portion mainly on one side of the transverse center line of the bar and a second cylindrical portion mainly on the other side of said centerline, said centerline bisecting a rectangular portion lying alongside said first named cylindrical portion and on the side opposite said second named cylindrical portion, dividing said bar into blanks by severing along line perpendicular to the axis thereof, drilling a passage in each of said cylindrical portions, forming a seat in each of said passages for receiving one end of a copper tube, forming valve seats in said passages for cooperating with a valve closure means, reducing the rectangular portion to circular cross-section, drilling an elongated passage in said last named portion below the transverse centerline of the body at right angles to the passage in the cylindrical portion below said centerline and intersecting said passage and drilling a second passage in said portion and above the transverse centerline and intercepting the passage in the other of said cylindrical portions.