United States Patent [19]

Trnka

[11] **3,756,516**

[45] **Sept. 4, 1973**

[54] **NOZZLE WITH REPLACEABLE PARTS**

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[22] Filed: **Sept. 15, 1971**

[21] Appl. No.: **180,645**

[52] **U.S. Cl.**..... **239/539,** 239/456, 239/600, 239/DIG. 19

[51] **Int. Cl.**..... **B05b 1/32,** B05b 1/00

[58] **Field of Search**..... 239/451, 453, 456, 239/457, 458, 539, DIG. 19, 569, 600

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[57] **ABSTRACT**

A nozzle, for passing liquids, whose internal portions that are in contact with the liquids are made of extruded metal so as to present a smooth surface to the flow of liquid therethrough and reduce the turbulence factor.

1 Claim, 4 Drawing Figures

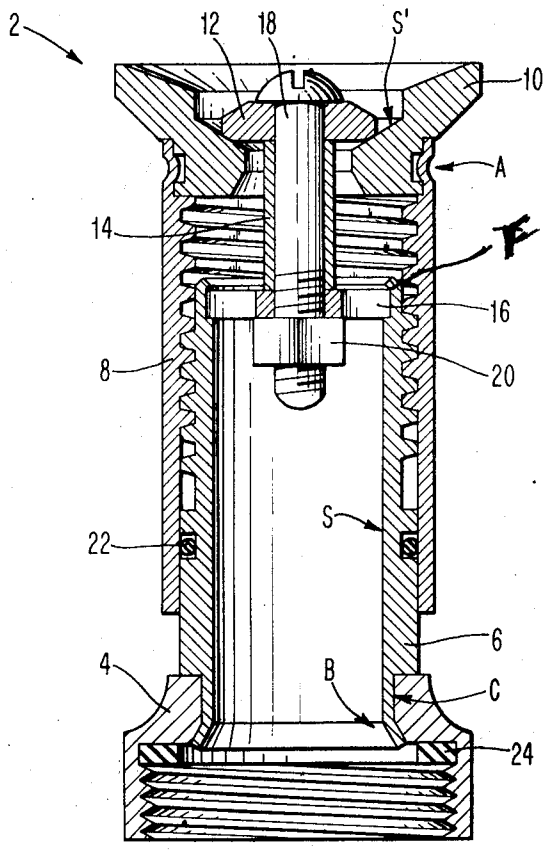
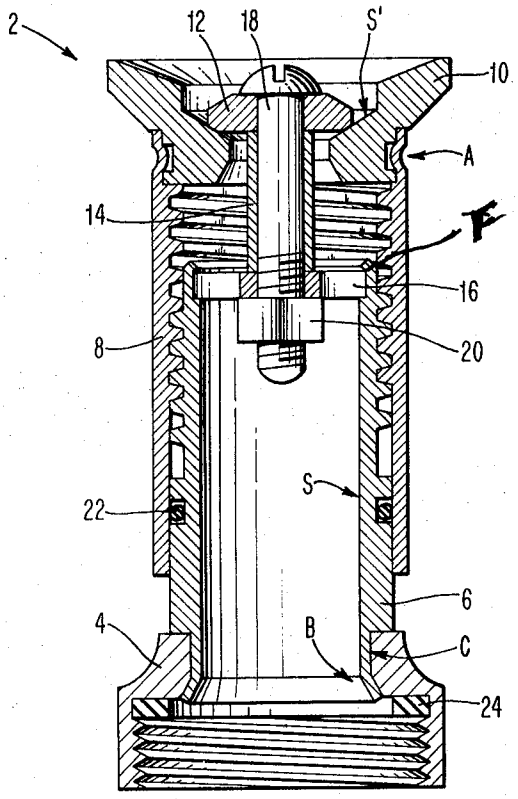


FIG. 1


2
12
18
S'
10
A
14
F
16
8
20
S
22
6
4
B
C
24

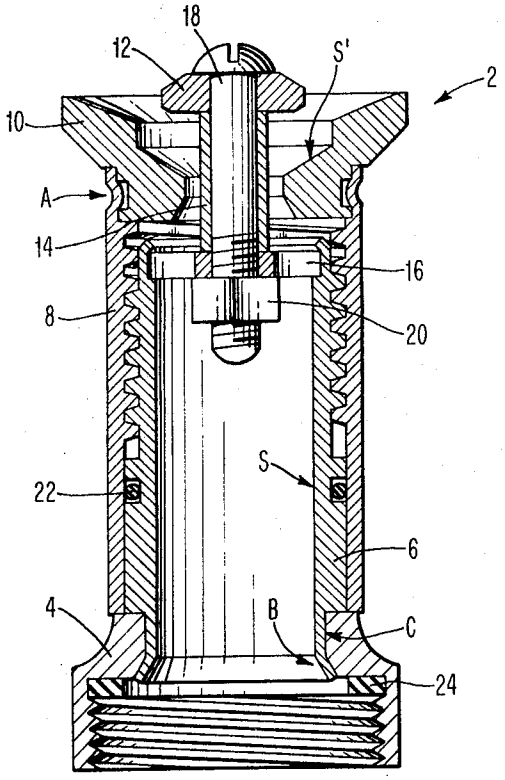

18
12
S'
2
10
A
14
16
8
20
S
22
6
4
B
C
24

FIG. 2

FIG. 3

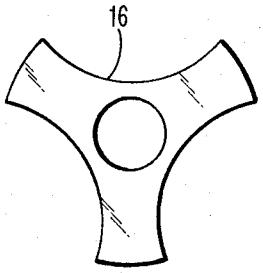
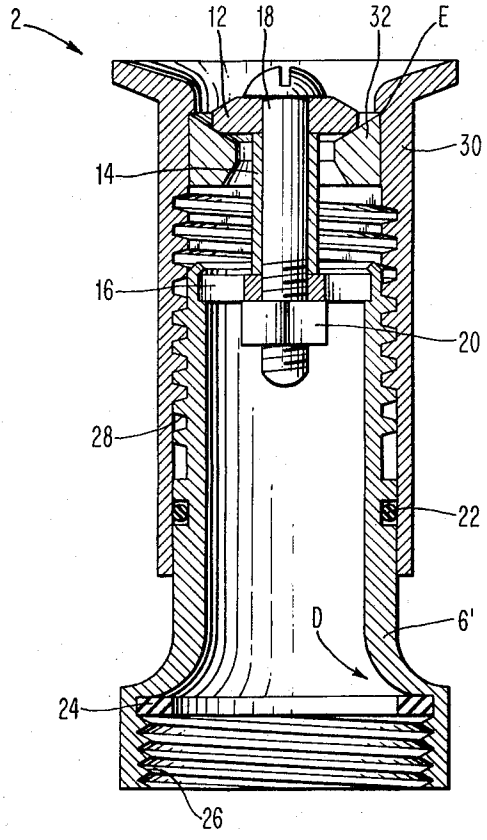


FIG. 4



NOZZLE WITH REPLACEABLE PARTS

BACKGROUND OF THE INVENTION

Nozzles, especially those employed in conjunction with hoses used in fighting fires, are chosen both for their durability and low resistance to water flow therethrough. When fighting fires by the conventional process of forcing water under pressure, through a cylindrical hose, to which is attached a nozzle acting as a control valve for the pressurized water in the hose, it is imperative that all means be provided to decrease friction to water flow through said hose and nozzle.

Most nozzles employed in conjunction with fire hoses are made of metal castings to provide for simplicity of manufacture. However, conventional castings very often contain rough protrusions, bubbles, pits and the like on those surfaces in contact with the water under pressure. At high water pressure, these internal defects add considerably to the resistance and turbulence of water flow, decreasing the force and amount of water that can be played upon the flames of a fire.

This invention is directed towards diminishing the resistance to water flow of a nozzle used in fire-fighting equipment by making those parts of the nozzle that come in contact with the pressurized water pf extruded metal, preferably aluminum. By making these parts of extruded metal, the various components of the nozzle lend themselves to be subsequently turned and processed on high speed automatic screw machines so that the ultimate cost of a nozzle is reduced.

When the components of the nozzle are made from extruded metal, such components can be assembled and swedged into units, which units can be more amenable to repair or replacement, without discarding the entire nozzle.

It is an object of this invention to provide nozzles for hoses used in carrying water under high pressure.

It is another object to provide such smooth internally finished nozzles by employing extrusion techniques in their manufacture.

Further objects of the invention will appear from the following specification taken in connection with the drawing which forms part of this application in which

FIG. 1 is a sectional view of the invention when the nozzle is in its closed position.

FIG. 2 is the same nozzle in its open position.

FIG. 3 is a view of the stem support employed in FIGS. 1 and 2.

FIG. 4 is a sectional view of another embodiment of the invention shown in FIG. 1.

FIG. 1 shows a typical nozzle 2 that is attachable to a hose, not shown, that is employed for controlling the flow of water coursing through the hose. The nozzle 2 contains a coupling 4 that is internally threaded for accommodating a fire hose. Secured to the coupling 4 is a male body portion 6 that is externally threaded in its upper region so that an adjustable female body 8, having internal threads, coacts with male portion 6 to provide relative vertical movement between elements 6 and 8. Head 10 of nozzle 2 is secured to female adjustable body 8 so that such head 10 will follow the vertical movement of body 8. Affixed to male body 6 is a valve head 12 that rests on the seat of the nozzle head 10 when such nozzle 2 is in its closed position, as shown in FIG. 1.

Valve head 12 is affixed to the male body 6 by means of a metal stem or spacer 14, metal spacer or stem support 16, bolt or screw 18 and lock nut 20. An "O" ring seal 22 is interposed between male body 6 and female adjustable body 8 to provide a water seal and coupling gasket 24 provides a similar water seal when nozzle 2 is screwed onto a hose, not shown, via coupling 4.

The above described nozzle becomes a much more efficient carrier of water, especially under the high pressures used during the fighting of fires, if the internal portions or surfaces, S and S', of the nozzle 2 that are in contact with the pressurized water presents a smooth surface. To achieve this smoothness, elements 6, 10, and 16, in particular, are made of extruded metal, with aluminum being one of the preferred metals in that it can be readily extruded in the form of sheets, bars or tubings. In the practice of this invention, conventional extrusion processes accepted and employed by the metal industry are used. The male body 6 is manufactured from extruded tubular material, after which appropriate machining and threading are carried out. For example, a groove is cut for accepting "O" ring 22 and the bottom portion C of such body 6 is machined to accommodate end coupling 4, without affecting the smooth internal finish of surface S produced by the extrusion process. Additionally the top of the male body portion 6 is counterbored to provide a support for spacer or stem support 16.

FIG. 2 shows the nozzle 2 in its open position, when female adjustable body 8 is rotated with respect to male portion 6, with all the elements that lie in the mainstream of the water flowing under high pressure being made of extruded metal, so as to diminish considerably the turbulence experienced when nozzles are made of cast metal.

By making all of the significant individual elements of the nozzle 2, such as parts 6, 10, 12, 14 and 16, that contact water flowing through, of metal formed by an extrusion process, friction to water flow is diminished. However, part 8 is also made of extruded metal, such as aluminum, for nozzle manufacture compatibility so that it is ductile and can be joined, when desired, by swedging, crimping or the like to nozzle head 10. In effect, all metallic elements of nozzle 2, save the bolt 18 and lock nut 20, are made of extruded metal. An incidental advantage of making nozzle 2 as described hereinabove is that parts 12 and 14, which are held together by means of support 16, are separately constructed so that the cost of materials and labor is reduced. That is, tubing 14 need only be cut to size and valve head 12 need only be bevelled and cut. For example, in FIG. 1, one component of nozzle 2 consists of the elements 8 and 10 crimped at location A. A second component of nozzle 2 consists of end coupling 4, swedged at location B to male body 6, and stem support 16 swedged to the upper region of body 6. In this manner, the entire nozzle 2 is effectively a two component device. Valve head 12, spacer 14, bolt 18 and lock nut 20 are assembled onto support 16 to become part of the second, or male, component.

It should be noted that stem support 16 has three legs (FIG. 3) whose ends are affixed to the counterbore in male body 6 by crimping the upper portion of male body 6 over such stem legs near the region F. When the stem support 16 is made of three legs, it has been found that it has much greater strength than the usual two-legged support employed in the nozzles made of cast metals.

An alternate manner of making a nozzle is illustrated in FIG. 4. In this embodiment, the male body 6 and end coupling 4 of FIGS. 1 and 2 are made from one piece of extruded tubing labeled 6', wherein the widening of end coupling 4 is achieved by spreading and swedging. Then internal threads 26 and external threads 28 are formed, a groove for the "O" ring 22 is cut and the tops of element 6' is counterbored to accept stem support 16 before the latter is crimped to the upper region of male body 6.

In a similar manner, nozzle head 10 of FIG. 1 is made continuous with female adjustable body 8 of FIG. 1 from a single piece of extruded tubing labeled 30, and the head is widened by means of spreading and swedging. An insert or bushing 32, which serves as a seat for valve head 12, is press fitted into place in the modified nozzle head 10 to form the throat on which valve head 12 rests when the nozzle 2 is in its closed position. It is to be noted that bushing or throat insert 32 is inserted from the bottom opening of female element 30 prior to being press fit into the top end of female element near shoulder E. Thus nozzle 2 is effectively a two piece unit, save for the smaller items as the bolt 18, nut 20 and its accompanying spacer 14, such latter items being put together during the final assembly of the nozzle 2.

From the foregoing description it will be seen that an improved nozzle is made of extruded metal, preferably though not limited to aluminum, so that whenever water, under high pressure, passes through such nozzle, a smooth surface is presented to the flow of water so as to considerably reduce turbulence and consequent resistance to such flow. As an added advantage, in making the nozzle elements of extruded metal, such elements can be swedged so that multiple elements become a single component, allowing for the manufacture of the completed nozzles into as few as two components. Each element can then be repaired or replaced without discarding or scrapping the entire nozzle.

I claim:

1. A nozzle for attachment to a hose comprising a first cylindrical body of metal of the type that can be worked to provide a smooth inner surface, which first cylindrical body comprises the male portion of said nozzle,

external threads on a portion of said male body,

a second cylindrical body of metal comprising the female portion of said nozzle and of the type that can be worked to provide a smooth inner surface, said second cylindrical body having internal threads thereon that coact with said external threads of said male body to provide relative vertical motion between said bodies,

a closure valve concentrically located with, and at one end of, said male body,

a head providing a seat for said valve, said head having its outer portion crimpedly attached to an end of said female body, and a coupling for attachment to a hose, said coupling being detachably secured to said male portion at that end remote from said valve supporting end.

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