Oct. 18, 1949. A. B. GUISE 2,484,942

NOZZLE CONSTRUCTION

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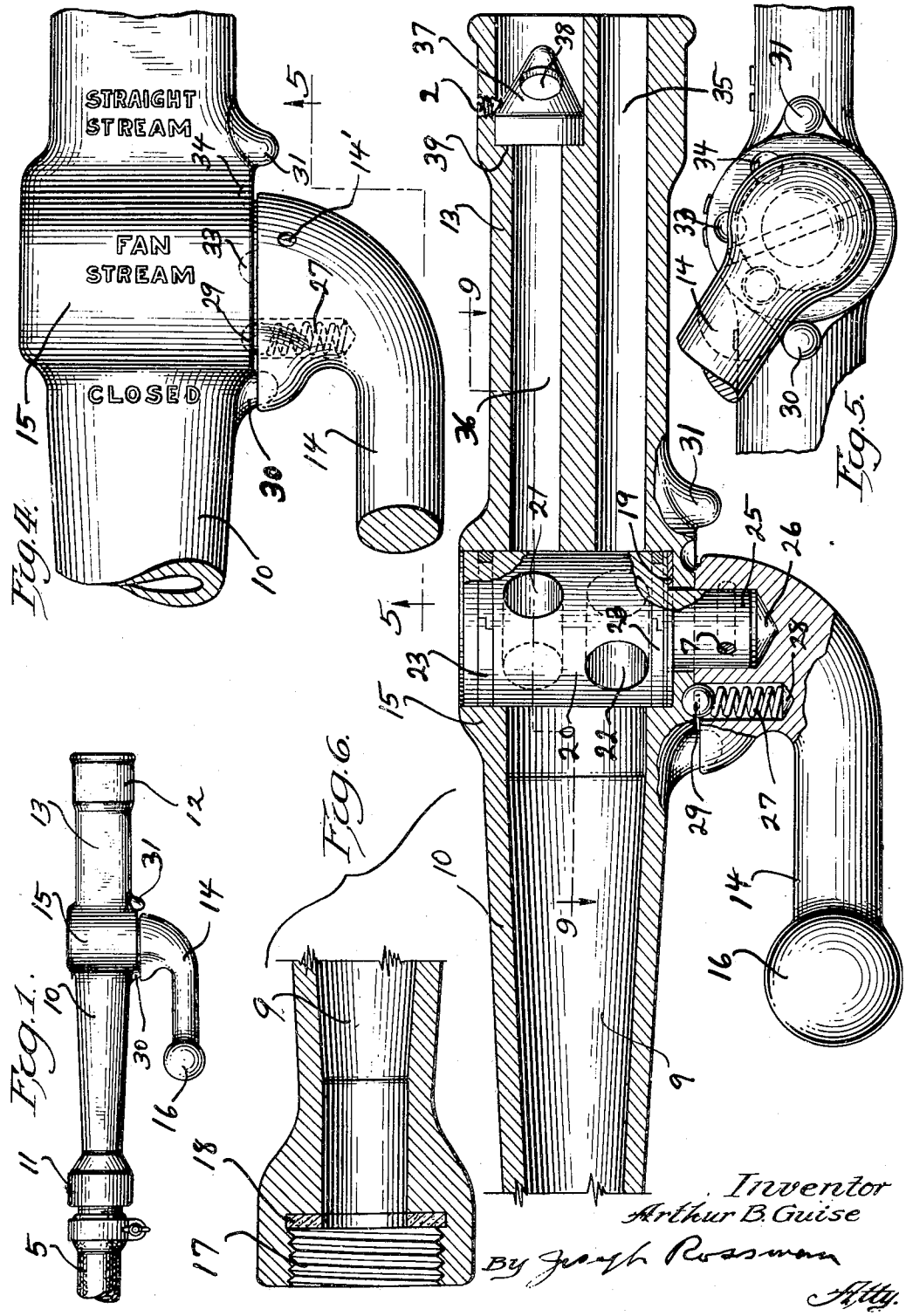


Fig. 4.

Fig. 5.

Fig. 1.

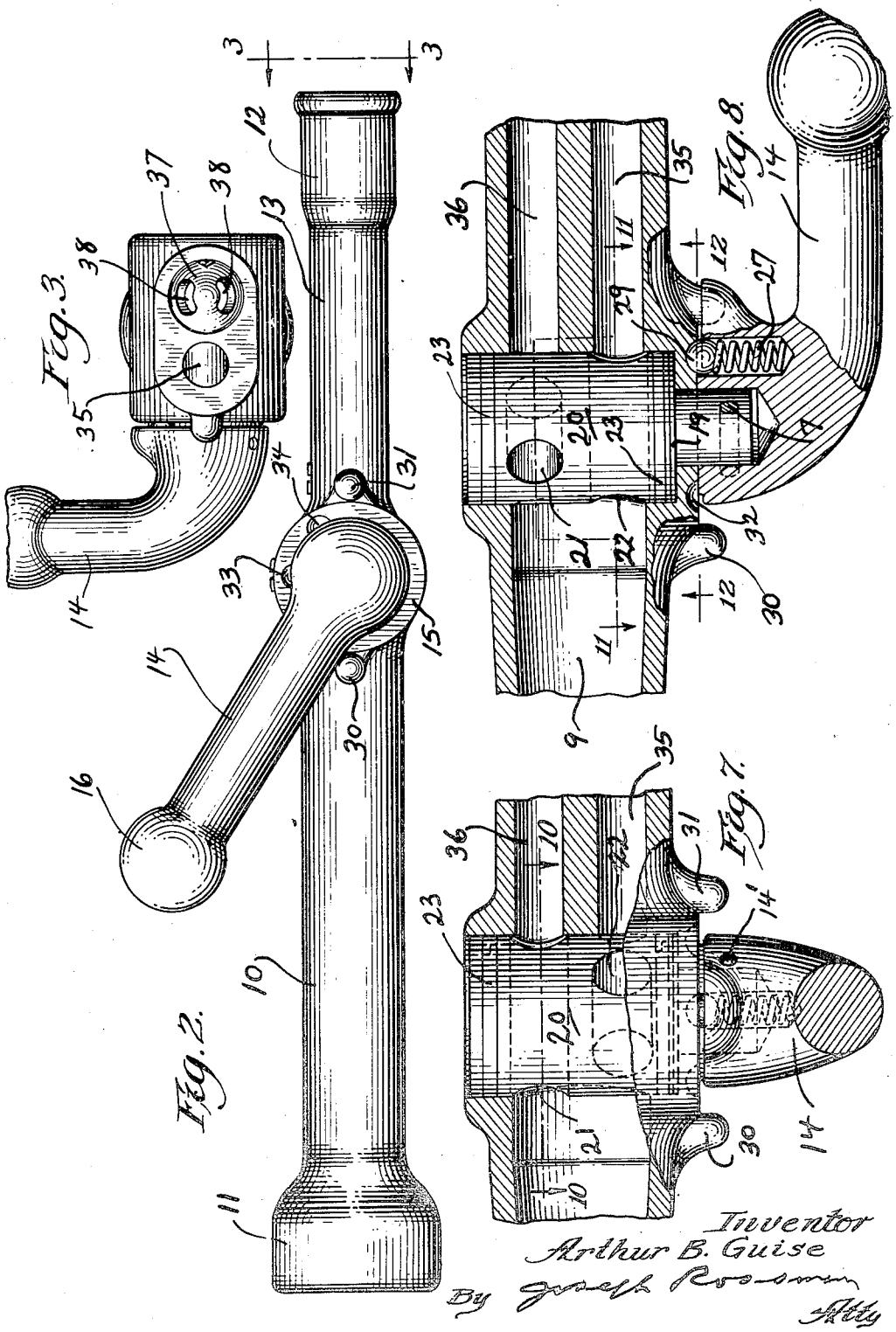
Fig. 6.

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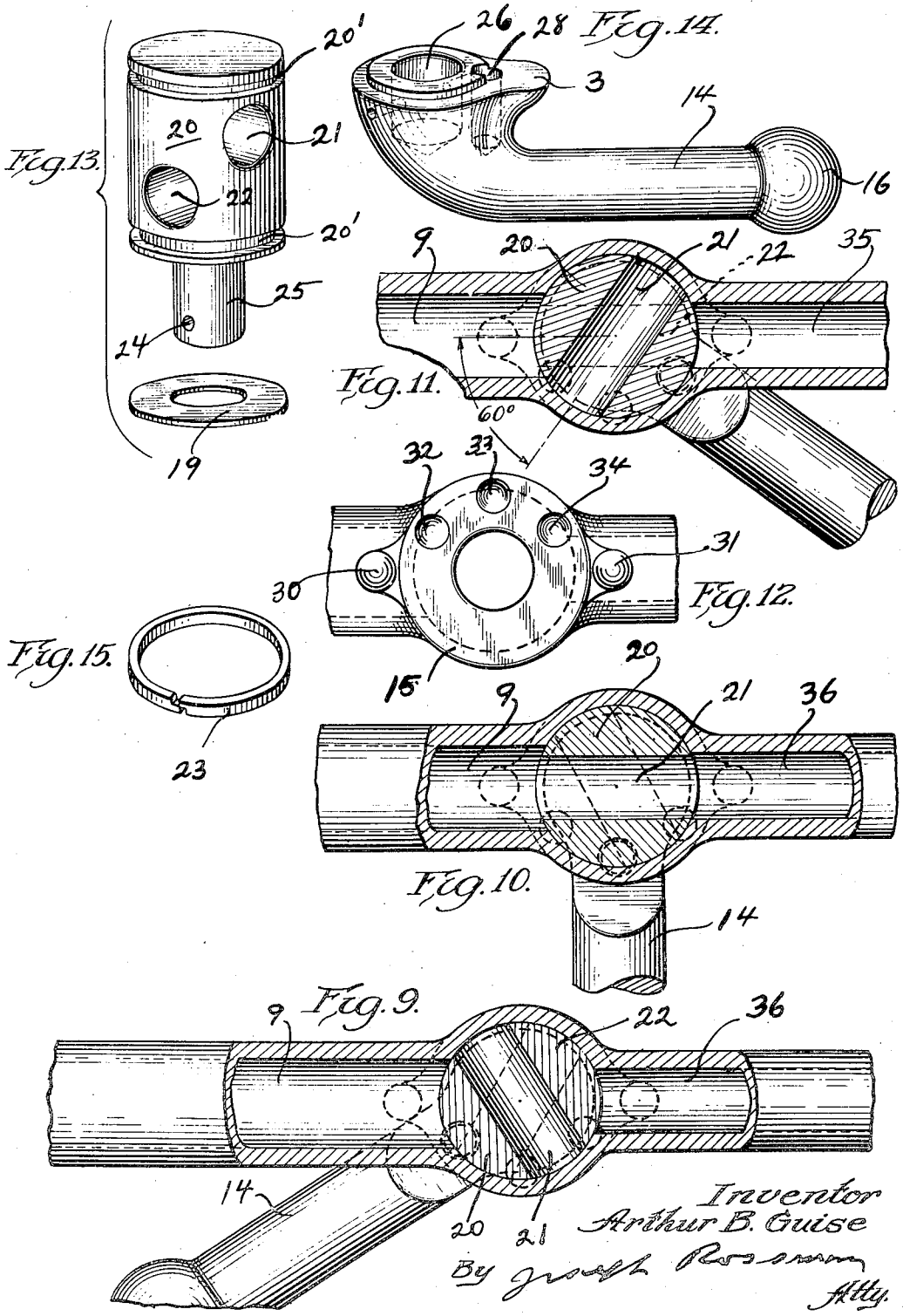
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NOZZLE CONSTRUCTION

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2,484,942

NOZZLE CONSTRUCTION

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3 Claims. (Cl. 169—1)

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This invention relates to a dual-stream nozzle construction. More specifically, this invention relates to a nozzle construction for use with dry chemical fire extinguishers for selectively producing either a straight stream having a long range and relatively high velocity or a fan-shaped stream having a shorter range and a relatively low velocity from a single supply source of dry chemical.

The nozzle construction of the present invention is particularly adapted for producing selected streams of powdered dry chemical having a predetermined velocity and shape adapted for extinguishing gasoline, kerosene and paraffin oil fires and the like, the dry chemical being propelled through the nozzle by an inert gas, such as nitrogen or carbon dioxide under high pressure. The nozzle is provided with a rotatable plug type valve controlled by an exterior handle which permits the dry chemical to discharge either through a smooth bore cylindrical discharge channel for producing a straight stream, or through another discharge channel provided with a special nozzle tip construction for producing a fan-shaped stream.

Further objects and advantages of the invention will be apparent from the following specification and drawings wherein,

Figure 1 is a side view of the nozzle, constructed in accordance with the present invention,

Figure 2 is a plan view of the nozzle,

Figure 3 is an end view of the nozzle at its discharge end,

Figure 4 is an enlarged fragmental view of the nozzle at the valve region,

Figure 5 is a plan view of the nozzle taken along lines 5—5 of Figure 4,

Figure 6 is an enlarged partly broken vertical sectional view of the nozzle showing the valve in closed position.

Figure 7 is an enlarged sectional fragmental view of the nozzle at the valve region showing the valve port communicating with the upper channel for producing a fan-shaped stream of dry chemical,

Figure 8 is an enlarged sectional fragmental view of the nozzle at the valve region showing the valve port communicating with the lower channel for producing a straight high velocity stream,

Figure 9 is a fragmental sectional view taken on lines 9—9 of Figure 6,

Figure 10 is a sectional view taken on lines 10—10 of Figure 7,

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Figure 11 is a sectional view taken on lines 11—11 of Figure 8,

Figure 12 is a fragmental view of the disassembled nozzle body taken along lines 12—12 of Figure 8 illustrating the lock indents,

Figure 13 is a perspective view of the disassembled valve plug and washer,

Figure 14 is a perspective view of the valve handle, and

Figure 15 is a perspective view of a piston-type sealing ring for the valve plug.

Referring to the drawings, the dual-stream nozzle is constructed of a suitable metal, preferably of a corrosion-resistant aluminum alloy, in the form of a tubular hollow body 10 of the general contour illustrated in Figures 1 and 2 having a smooth cylindrical internal intake bore 9 terminating in a socket portion 11 which is provided with threads 17 internally thereof for coupling to a hose 5 which is connected to a suitable source of gas pressure for feeding dry powdered chemical to the intake bore 9 of the nozzle. A gasket 18 is seated in the base of the socket to provide a fluid tight connection.

The body 10 of the nozzle increases slightly in taper and enlarges to a substantially cylindrical chamber 15 open at the top and bottom for seating therein a cylindrical rotatable valve plug 20 which fits snugly therein. Plug 20 is provided with a cylindrical stem 25 as shown in Figure 13 which projects outwardly of the nozzle body and is provided with a bore hole 24 for receiving locking pin 7, as shown in Figure 6, for retaining a handle 14. The locking pin also passes through a bore 14' provided in the handle as shown in Figure 4. Handle 14 is also provided with a cylindrical bore 26 for snugly receiving the extension 25 of the plug 20. An enlarged terminal knob 16 is provided on the handle for facilitating grasping and moving same to any desired position. Handle 14 is provided with an integral stop portion 3 which is adapted to contact stop-lugs 30 and 31 respectively at the extreme left position, as shown in Figure 2, or at the extreme right position, as shown in Figure 8.

The lower face of the cylindrical portion 15 is provided with three spaced semi-spherical indents or depressions indicated by numerals 32, 33 and 34 which are adapted to slidably receive a lock indent ball 29 retained in a cylindrical bore 28 provided in the handle 14 which is normally actuated upwardly by a coil spring 27 positioned within the bore 28. The lock indent ball serves to releasably lock the handle 14 at three

different positions as determined by the location of the indents 32, 33 and 34.

Valve plug 20 is circumferentially channeled adjacent its upper and lower ends, as shown by numerals 20' in Figure 13, for receiving cast iron tin-plated piston-type split rings 23, shown in Figure 15, which serve to seal the lateral bearing surfaces of the plug against escape of any dry chemical at this region. The dry chemical retained at the piston rings in turn serves to minimize gas leakage at this region. A stainless steel washer 19 is interposed below the base of the plug 20 and plug seat, as shown in Figure 6, to seal the plug as well as to facilitate its rotation by minimizing any binding action that might otherwise occur between the plug and its seat.

The plug 20 is provided with two drilled passageways or ports of substantially equal cross-sectional area, indicated by numerals 21 and 22, which are positioned so that the longitudinal axes thereof are located at an angle of about 60° to each other, as indicated in Figure 11. The upper port 21 is adapted to be aligned with a discharge stream channel or passage 36 in the forward discharge portion 13 of the nozzle by rotating handle 14 so as to cause plug 20 to assume the intermediate or "fan stream" position shown in Figures 7 and 10, at which position the lock indent ball 29 will be engaged in the intermediate indent 33 opposite the words "fan stream" as shown in Figure 4. By rotating the handle 14 to the extreme right position or "straight stream" position so as to assume the position shown in Figure 8, port 22 will be aligned with the lower smooth bore cylindrical discharge stream channel 35, as shown in Figure 11. At this position the lock indent ball 29 will be engaged in indent 34 and stop portion 3 of the handle will contact stop-lug 31. If it is desired to shut off communication with both the upper and lower stream channels the handle is moved to the extreme left or "closed" position, shown in Figures 2 and 4, at which position stop portion 3 of the handle 14 is in contact with stop-lug 30 and lock indent ball 29 is engaged in indent 32. The valve plug 20 will then assume the position shown in Figures 6 and 9 in which position communication with the intake portion 9 of the nozzle and forward discharge portion 13 is cut off.

Upper stream channel 36 is provided with a conical plug or nozzle tip 37 positioned inwardly of the discharge mouth of the nozzle and is retained in seat 39 by a setscrew 2. The nozzle tip 37 has two substantially circular orifices 38 diametrically opposite each other and perpendicular to the tapered portion as shown in Figures 6 and 7. When handle 14 is moved to its intermediate position so as to align port 21 of valve plug 20 only with stream channel 36, dry chemical supplied under pressure from a hose 5 will be expelled through the orifices 38. The discharge of dry chemical through these orifices and impingement of the dry chemical against the internal cylindrical walls adjacent the mouth of the nozzle results in the emission of a low velocity flat fan-shaped stream of dry chemical. The novel features of the conical nozzle tip are fully disclosed and claimed in copending application, Serial No. 657,658 filed concurrently.

The lower stream channel 35 is a straight unobstructed cylinder bore which is adapted to produce a stream of dry chemical of a straight or normal contour, that is, substantially circular in cross-section and is substantially equal to the cross-sectional area of channel 36. This stream has a relatively high velocity and long range as compared with the fan-shaped stream emissible from channel 36 which is of shorter range. When the handle 14 is moved to the extreme right, the port 22 of valve plug 20 will communicate only with the stream channel 35 and no chemical will be fed to the upper channel 36.

It will thus be understood that the valve plug 20 and handle 14 have three positions, namely: closed, fan stream or relatively low velocity, and straight stream or relatively high velocity. The handle 14 is releasably locked by the spring and ball indent and can be released from any one of its three positions by applying manual pressure on the handle to release the indent ball from its locked position so as to permit the handle to be moved to any other desired position.

The nozzle of the present invention is particularly adapted for use with dry chemical fire extinguishing equipment. In fighting a fire, the nozzle is then opened, usually to the high velocity straight stream position at the start to reduce the fire intensity and bring the fire under control, after which the nozzle is changed to the fan stream position and the fire is then approached more closely, sweeping the flames ahead of the operator by a side-to-side motion of the nozzle to complete the extinguishment. The flames are extinguished by the formation of a blanket of inert gas and water vapor resulting from the decomposition of the dry chemical by the heat of the fire which temporarily cuts off the oxygen supply to the zone of combustion. The approximate maximum effective stream range may vary for example from 35 to 45 ft. for the straight stream and approximately 10 to 15 ft. for the fan stream.

The present nozzle construction greatly increases the effectiveness of the use of dry chemical for extinguishing oil, gasoline, kerosene and alcohol fires by providing two types of fire fighting streams to be used in quick succession and in proper sequence as previously explained. The operator can readily shift from one type of stream to the other by merely actuating the valve handle in order to combat most effectively the type of fire to be extinguished with the greatest speed and safety to the operator.

It is to be understood that numerous changes and modifications may be made in the specific embodiment of the invention herein disclosed and it is intended to include such modifications within the scope of the appended claims.

I claim:

1. A dual-stream nozzle for selectively emitting streams of relatively different velocities but having substantially the same rates of flow comprising a nozzle body having a smooth bore intake duct, a rotatable valve plug closing one end of said duct, spaced ports of substantially equal cross-sectional area provided in said valve plug, a discharge nozzle portion communicating with said valve plug, said discharge portion having two separate substantially parallel stream channels of substantially equal cross-sectional area adapted to communicate selectively with said valve plug ports, one of said channels being provided with means adjacent the mouth thereof for substantially reducing the velocity of the emitted stream in relation to the stream velocity within said stream channel and predetermining the shape of the emitted stream.

2. A dual-stream nozzle for selectively emitting streams of relatively different velocities but

having substantially the same rates of flow comprising a nozzle body having a smooth bore intake duct, a rotatable valve plug closing one end of said duct, spaced ports of substantially equal cross-sectional area provided in said valve plug, a discharge nozzle portion communicating with said valve plug, said discharge portion having two separate substantially parallel stream channels of substantially equal cross-sectional area adapted to communicate selectively with said valve plug ports, said valve plug ports being adapted for positioning in direct alignment selectively with said stream channels and said intake duct, one of said channels being provided with means adjacent the mouth thereof for substantially reducing the velocity of the emitted stream in relation to the stream velocity within said stream channel and predetermining the shape of the emitted stream.

3. A dual-stream nozzle for selectively emitting streams of relatively different velocities but having substantially the same rates of flow comprising a nozzle body having a smooth bore intake duct, a rotatable valve plug closing one end of said duct, spaced ports of substantially equal cross-sectional area provided in said valve plug, circumferential channels provided adjacent the ends of said plug, spring piston-type sealing rings positioned in said channels, a discharge nozzle portion communicating with said valve plug, said

discharge portion having two separate substantially parallel stream channels of substantially equal cross-sectional area adapted to communicate selectively with said valve plug ports, one of said ports being provided with means adjacent the mouth thereof for substantially reducing the velocity of the emitted stream in relation to the stream velocity within said stream channel and predetermining the shape of the emitted stream.

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