

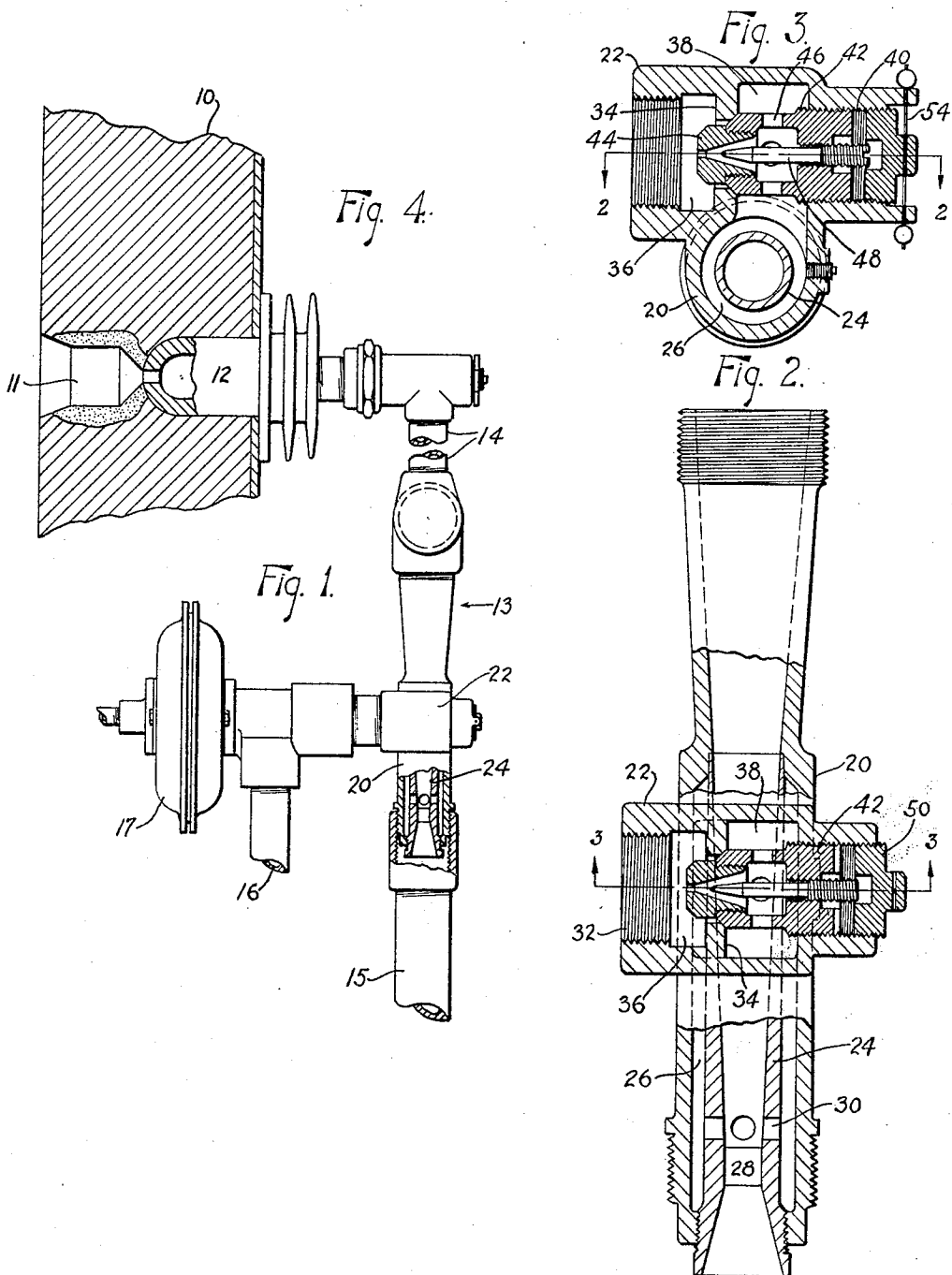
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VALVE STRUCTURE FOR INSPIRATORS

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VALVE STRUCTURE FOR INSPIRATORS

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This invention relates to improvements in valve structure for inspirators and more particularly to inspirators for forming and supplying a mixture of air and gas in constant proportion to burners having a restricted orifice from which the mixture is discharged for burning as into an expansion combustion chamber and has for its object to provide, in combination with the inspirator body, an improved valve structure for controlling the flow of the induced medium to the inspirator tube.

In the accompanying drawing,

Fig. 1 is an elevation of the inspirator and the governor which is usually associated therewith, a portion of the inspirator being in section;

Fig. 2 shows the inspirator body in longitudinal section, the section through the valve structure being taken on line 2—2 of Fig. 3;

Fig. 3 is a transverse section on line 3—3 of Fig. 2; and

Fig. 4 is a section through a furnace wall provided with the type of burner to which the mixture formed by the inspirator will usually be delivered.

Referring to Figs. 1 and 4, 10 indicates a furnace wall wherein is formed an expansion combustion chamber 11 whereinto combustible mixture is introduced by any suitable nozzleed burner means 12 receiving a supply of mixture from the inspirator 13 through appropriate piping 14.

In the type of inspirator shown, air under relatively low pressure, say about one and one-half pounds, will be used for entraining the gas which will be supplied to the inspirator at approximately atmospheric pressure. 15 indicates the air supply pipe, 16 the gas supply pipe and 17 a governor for reducing the gas pressure to atmospheric pressure before delivery to the inspirator.

Turning now to Figs. 2 and 3, it will be noted that the inspirator comprises an elongated open-ended tubular body 20 at one side of which intermediate its ends is a chambered casing 22. Extending into the body and supported at its opposite ends thereby is an entraining tube 24, the space about the tube constituting a gas-supply chamber 26,

the tube slightly beyond its point 28 of minimum cross section being ported as indicated at 30 for the admission of gas into the tube under the inducing action of the air flowing through the tube from pipe 15 as will be readily understood.

The present invention is primarily concerned with the means for controlling the flow of gas from the governor to the chamber 26 surrounding the entraining tube 24 and will now be described. Gas passed by the governor enters the casing 22 at inlet 32. Within the casing is an apertured partition 34 which divides the casing into a receiving compartment 36 and a discharge compartment 38 which latter is in direct communication with the chamber 26. It will be noted that the casing has a bore 40 in axial alignment with the aperture in the partition 34. Screwed into the bore 40 and extending across the discharge chamber 38 for seating against a valve seat around the rim of the aperture in the partition 34 is a chambered member 42 constituting a nozzle support and valve body. The nozzle is indicated at 44 and as will be noted is of less external diameter than the aperture in the partition thereby affording an annular passage about the nozzle through which gas from the compartment 36 may enter the compartment 38 when the valve body is backed off its seat against the partition valve seat. It will also be noted that the valve body is provided with radial ports 46 of sufficient size to permit gas passed by the nozzle orifice to flow without restriction into the chamber 26 about the entraining tube 24. The valve body 42 is also shown as carrying a needle valve 48 for restricting the effective size of the nozzle orifice. Ordinarily the needle valve would be backed away from the nozzle orifice a sufficient distance to be of no effect and perhaps in most cases could be omitted. However, it has utility where unusually close regulation of the gas flow is desired as will be readily understood. The outer end of the bore 40 is preferably closed by a screw plug 50 which may be sealed against unauthorized removal by any suitable sealing means 54.

The valve body 42 is readily removable

from the casing 22 by backing it out through the bore 40. It is, therefore, a simple matter to change the nozzle 44 to change the size of the orifice therein. Ordinarily the valve body would be seated against the partition valve seat and hence the gas would have to flow through the nozzle orifice to reach the chamber 26. However, in case a mixture relatively richer in gas is momentarily or temporarily desired it is merely necessary to back the member 42 off its seat an appropriate distance which can, of course, be done without shutting down the apparatus.

On the other hand, if it be desired to produce a mixture less rich in gas, it is merely necessary to restrict the size of the nozzle orifice by adjusting the needle valve. Adjustment of the member 42 and the needle valve would, however, be merely temporary expedients since for the production of a predetermined mixture, it will, of course, be understood that gases of different B.t.u. value will require nozzles of different size orifice.

The apparatus has special utility in connection with firing equipment for heat-treating furnaces where the control of the furnace atmosphere is of great importance. Ordinarily the size of the nozzle orifice would be such that a mixture containing air and gas in proper proportions for complete combustion would be produced, such mixture resulting in the production of a neutral atmosphere. Since the size of the nozzle orifice bears a predetermined relation with respect to the entraining tube and, it may be added, with respect to the discharge orifice in the burner 12, it follows that any adjustment of the needle valve and member 42 must always be on one side or the other of the predetermined and normal condition of the apparatus. This is of great practical importance in furnace operation as will be readily appreciated.

What I claim is:

1. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having an intake for gas, a gas chamber in communication with said intake and having an inlet for gas, means for controlling the flow of gas through said inlet comprising a body one portion of which projects into said inlet in a manner to form with the walls thereof an annular passage for the flow of the gas, a shoulder on said body adapted to cooperate with the rim of said passage for controlling the flow of gas through said passage, and means associated with said body for permitting gas to flow into said chamber independently of said passage.

2. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having an intake for gas, a gas chamber in communication with said intake and having an inlet for gas, means for controlling the flow of gas through said inlet comprising a tubular member one end of which is adapt-

ed to seat against the rim of said inlet, and a nozzle projecting from said end into said inlet in a manner to form with the walls thereof an annular passage for the flow of gas into said chamber.

3. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having a gas intake intermediate its ends, walls forming a gas chamber in communication with said intake, one of said walls having a tubular extension and another of said walls having a gas inlet in axial alignment with said extension, a body adjustably mounted within said extension and being of a length to extend to said inlet, the extended part of said body forming a valve for controlling the flow of gas into said chamber, and means associated with the extended part of said body for independently controlling the flow of gas into said chamber.

4. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having an intake for gas, a gas chamber in communication with said intake and having an inlet for gas, means for controlling the flow of gas through said inlet comprising a valve adapted to seat against the rim of said inlet, and a detachable extension of said valve projecting into said inlet and forming with the walls thereof an annular passage for the flow of gas into said chamber, said extension being apertured for the flow of gas into said chamber.

5. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having a gas intake intermediate its ends, a gas chamber wherethrough said tube extends, a valve housing at one side of and forming part of said chamber and having a gas intake portion, a member of substantial length having a bore threaded internally and forming part of said housing, a wall dividing said portion and said member and having a port in axial alignment with the bore of said member, a valve body having a threaded portion adjustably supported in the bore of said member and having an annular seat adapted to coact with said port to vary the effective area of the latter and having a restricted passage for establishing independent communication between said gas intake portion and the gas chamber, and a needle valve carried by said body for controlling the effective area of said passage.

6. In an inspirator for mixing and proportioning gases, the combination of a mixing tube having a gas intake intermediate its ends, a gas chamber wherethrough said tube extends, a valve housing at one side of and forming part of said chamber and having a gas intake portion, a member of substantial length having a bore threaded internally and forming part of said housing, a wall dividing said portion and said member and having a port in axial alignment with the bore of said

member, and a valve body having a threaded
portion adjustably supported in the bore of
said member and having an annular seat
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5 effective size of the latter and having a re-
stricted passage for establishing independent
communication between said gas intake por-
tion and the gas chamber.

In testimony whereof I affix my signature.

HUGH B. BARBER.

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