Jan. 10, 1933. C. SCHÄFER 1,893,657

DEVICE FOR SIMULTANEOUSLY OPENING A PLURALITY OF VALVES

Filed Dec. 16, 1931

Fig. 1

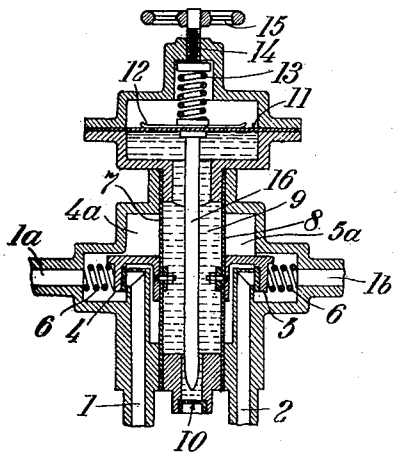
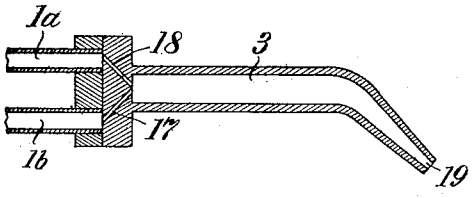


Fig. 2



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by [signature]

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UNITED STATES PATENT OFFICE

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DEVICE FOR SIMULTANEOUSLY OPENING A PLURALITY OF VALVES

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This invention relates to a device for simultaneously opening a plurality of spring-loaded valves with the aid of a like number of diaphragms forming the end walls of a common compartment and of a device for changing the pressure in this space, partly limited by the diaphragm.

Such devices are employed for mixing combustible gases in a proper mutual proportion. The gases, as they flow through flexible conduits to the mixing chamber, have still a certain pressure. If unexpectedly a large leakage occurs in one of the conduits, it is evident that the pressure in this conduit will drop with the result that the valve, through which the gas passes into the conduit, will no longer be opened by its diaphragm.

The other gas can however pass to the mixing chamber through the damaged conduit and consequently the back firing of the flame due to the drop in pressure, can cause a large explosion. This objection is overcome according to the invention.

It is known, to produce the increase of pressure, necessary for opening the valves in the space partly shut in from the outer side by diaphragms, by screwing down a hollow plunger containing air in its upper portion. This plunger retains its position, even if a sudden strong leakage occurs in one of the feed conduits of the gases, whereas the air contained in the piston expands according to the reduction of the counter pressure and consequently causes a greater opening of the valve of the damaged conduit.

According to the invention a spring-loaded diaphragm is employed for establishing the pressure necessary for opening the valves, on which diaphragm a ram is mounted, the upwardly directed point of which is normally situated a short distance above the closing plate or the valve cone of a discharge port. If in one of the discharge or supply conduits for the gases an unforseen leakage occurs which results in a considerable yielding of one of the diaphragms, the spring-loaded diaphragm descends correspondingly, and the point of its ram pierces the small closing plate or lifts the corresponding closing cone of a valve from its seat. The space shut off from the outer side by the diaphragm thus immediately becomes pressureless, and the spring of the gas regulating valves press these valves onto their seats. Consequently, no more gas can pass out and no explosion can occur.

An embodiment of the invention is illustrated by way of example in the accompanying drawing in which:

Fig. 1 shows the device in central longitudinal section.

Fig. 2 is a longitudinal section through the mixing chamber of a burner.

Oxygen and the gas to be burned are supplied in known manner through conduits 1 and 2. The gases pass into the conduits 1*a* and 1*b* through the valves 4 and 5, normally pressed on their seats by springs 6, and arrives through these conduits 1*a* and 1*b* in the mixing chamber 3. These valves are fixed on diaphragms 7 and 8, which serve for partly shutting off a compartment 9 in which, in the example chosen, a drip liquid is situated. The compartment 9 is closed at the bottom by a thin, easily replaceable metal plate 10 and at the top by a diaphragm 11. The compartment 9 is completely filled with the liquid, that is right up to the diaphragm 11. A plate 12 rests on the diaphragm 11 and is acted upon by a spring 13, the tension of which can be regulated with the aid of a screw 14 and a hand wheel 15.

If the hand wheel 15 is turned so that the diaphragm tends to reduce the size of the compartment 9, the two diaphragms 7 and 8 yield accordingly in known manner and open the valves 4 and 5.

According to the invention an arrangement is provided, which effects the automatic closing of the valves, if, owing to a sudden large leakage or an interruption of the supply, an excessively large drop in pressure occurs in one of the conduits 1, 2, 1*a* or 1*b*. This arrangement consists of a ram 16 connected to the diaphragm 11, and the lower end of which, when the valves 4 and 5 are open, is situated a short distance above the metal plate 10, which is fitted easily exchangeable at the bottom of the compartment 9.

If for example a heavy fall in pressure occurs in the conduits, this is mostly due to the supply conduits, because, as is known, a certain pressure must always be present in these supply conduits.

If in one of the supply conduits 1 or 2 a sudden drop in pressure of one of the gases takes place, either owing to leakage or interruption of the supply, the latter caused by failure of the compressor or of the oxygen supply, the counter pressure of its diaphragm 7 or 8 will be removed from the space 4*a* or 5*a* with the result that the diaphragm 7 or 8 will buckle more towards the space 4*a* or 5*a*, owing to the pressure in the space 9, so that the pressure in this space 9 is reduced and consequently the spring 13 must expand. Owing to this expansion the diaphragm 11, to which the pin 16 is connected, is pressed downwards so that the pin 16 pierces the metal plate 10 or opens a spring-loaded valve and the liquid flows out, thereby removing the pressure from the compartment 1 and closing the two valves 4 and 5 by means of the springs 6 so that a flowing in or through of the gases is prevented.

Even, if the pressure suddenly drops in one of the two valve chambers 4*a*, 5*a*, the corresponding diaphragm 7 or 8, as its outer side is partly relieved from the gas pressure, will compress the valve spring in question more strongly with the result that also the diaphragm 11 will be forced down by the spring 13 and the metal plate 10 at the same time pierced.

The metal plate 10 may be replaced by a tight closing spring-loaded valve.

The short channels 17, 18, which connect the conduits 1*a* and 1*b* to the mixing chamber 3, have a much smaller cross sectional area than these conduits, so that the discharge speed in these channels is higher than the ignition speed, even in the case of medium or low pressures in the conduits 1*a* and 1*b*, and consequently the welding flame cannot strike back into the conduits 1*a* and 1*b*.

I claim:—

A device for simultaneously opening a plurality of valves comprising in combination with the valves, a plurality of diaphragms corresponding to the number of valves, a common compartment formed by said diaphragms, a spring-loaded diaphragm for regulating the pressure in said compartment, a ram on said diaphragm, and means in said compartment for closing said compartment adapted to be opened by said ram in the event of unforeseen yielding of said valve diaphragms enclosing said space.

In testimony whereof I affix my signature.

CARL SCHÄFER.