Sept. 4, 1928. 1,683,372

P. PLANTINGA

CONTROL MEANS FOR GAS APPARATUS

Filed June 4, 1924 2 Sheets-Sheet 1

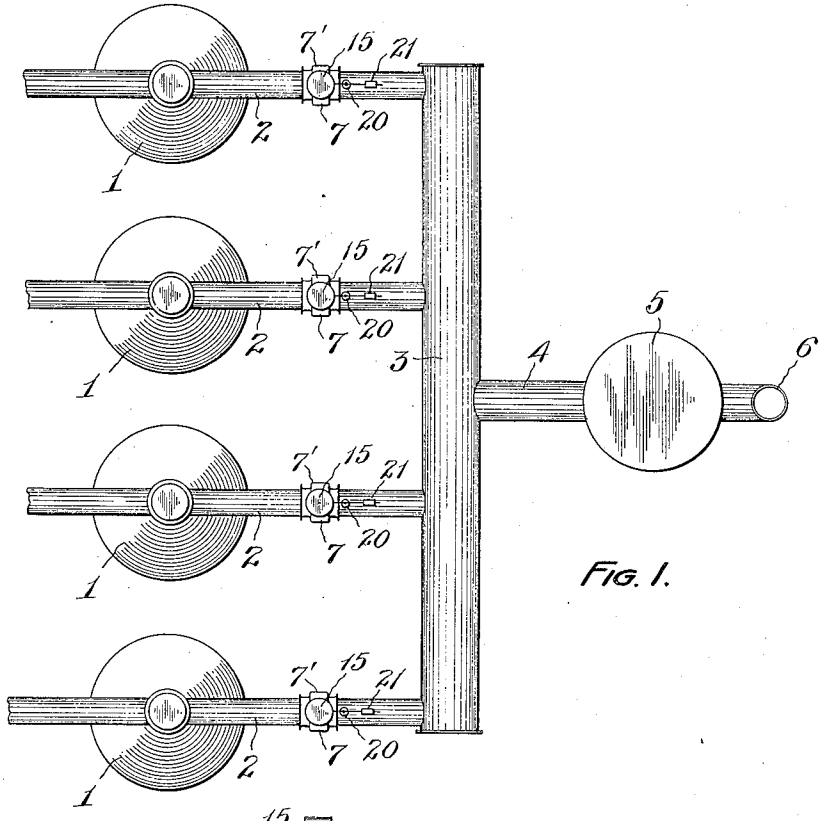


FIG. 1.

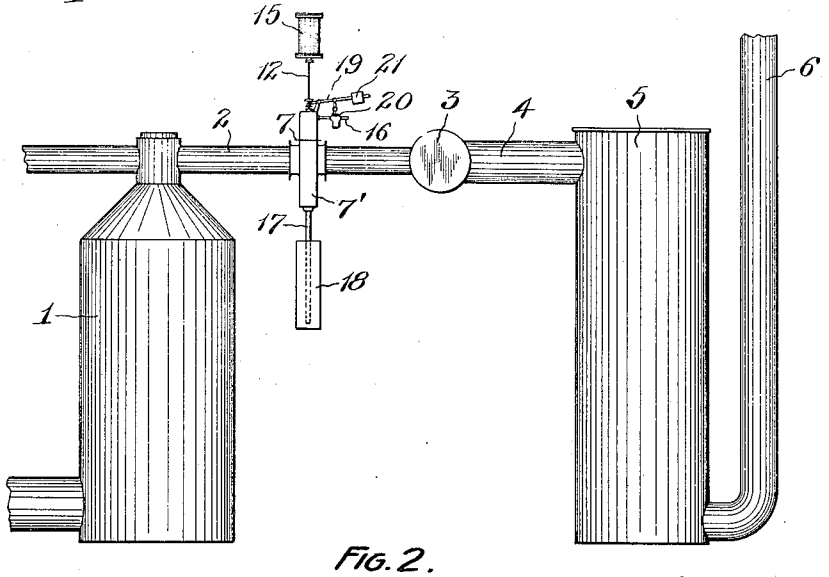


FIG. 2.

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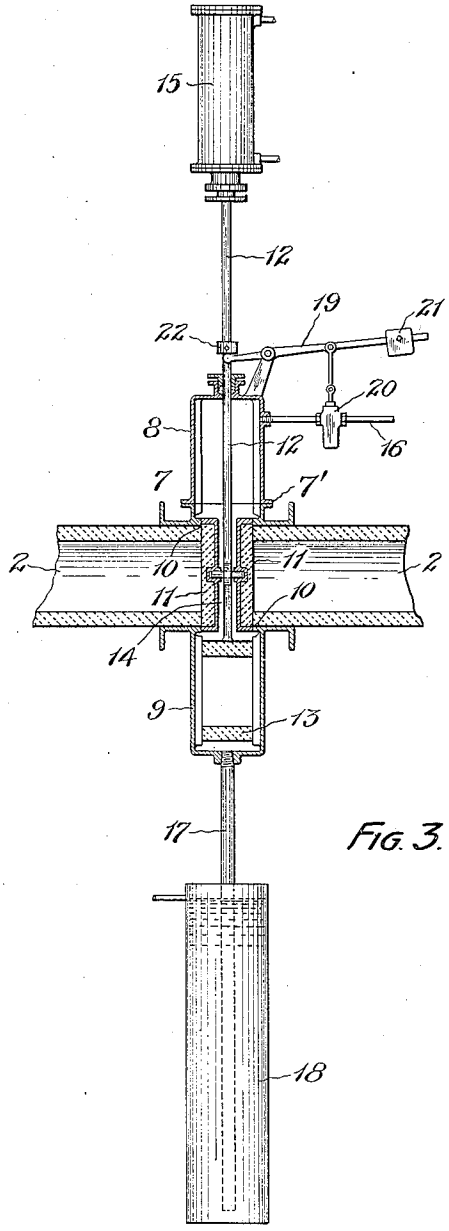


FIG. 3.

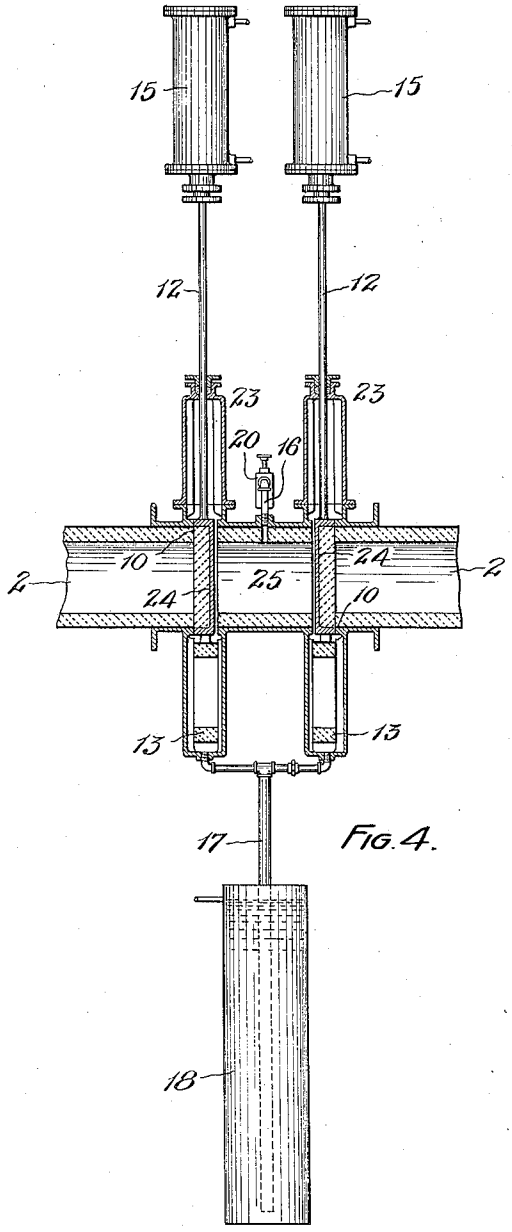


FIG. 4.

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# UNITED STATES PATENT OFFICE.

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## CONTROL MEANS FOR GAS APPARATUS.

Application filed June 4, 1924. Serial No. 717,873.

My invention relates to means for controlling the flow of gas through a duct forming part of a gas-making apparatus and the utilization of the heat of the blast-gases of such apparatus, particularly as applied to carburetted water-gas sets.

It has heretofore been customary to often connect the blast-gas outlet of a carburetted water-gas set with a heat-absorbing device, such as a steam boiler, so that during the "blow" the heat from the blast-gas will be utilized, as for instance by making steam in such boiler. The blast-gas, as is well known, which passes through the duct connecting the superheater with the boiler is very high in temperature.

It has been known that it would be desirable to connect the superheaters of several gas sets with a single boiler so that the hot gas from the superheaters might be alternately or successively conducted to such boiler and thereby operate it continously. To do this, however, it would be necessary to provide a duct from each superheater to a header, which latter would be connected with the boiler, and each such duct would have to be supplied with a "hot-valve", so that the gas sets could be cut off from the boiler during the "run" and connected therewith during the "blow".

Owing to the excessive temperature, however, it appears that no one has devised a successful "hot-valve" for this purpose, and which would therefore not deteriorate rapidly and soon leak, thereby permitting the carburetted water-gas to leak back into the heating space of the boiler, which is connected with the stack, and form a dangerously explosive mixture.

It has therefore been the custom, where such waste heat boiler has been used, to connect each superheater with a separate boiler and to provide the stack with a valve. In the course of such previous practice and during the blow, the stack-valve is opened and the "blast-gases" pass therethrough into the atmosphere. During the "run" the stack-valve is closed and steam is turned into the heating space of the boiler for the purpose of preventing shrinkage of the boiler parts, due to the drop in temperature when the flow of blast-gas is shut off, and also to fill up the heating space of the boiler with steam and so prevent the carburetted water-gas from having access thereto and forming an explosive mixture with air which would be admitted when the stack-valve is later opened. For this purpose a considerable amount of steam is used which is therefore not available for conversion into power or other use not connected directly with the gas making process.

The object of my invention is to be able to safely utilize a waste heat boiler in connection with the blast gas of a carburetted water-gas set, avoiding the necessity of using part of the steam generated in such boiler as above described, and permit blast-gases to pass continuously through the boiler, effect the continuous operation of the latter, and permit the use of a single boiler in connection with a plurality of carburetted water-gas sets.

To this end, therefore, I have provided the "hot valve" mechanism which may be used under the aforementioned conditions of high temperature without leakage, so that several superheaters may be connected with a single boiler and the connection between any one or more superheaters and the boiler shut off during the "run" while permitting any one or more of the superheaters to be connected with such boiler during the "blow", as previously described.

This object I accomplish by providing valve mechanism for each blast outlet duct from each superheater of the plurality of water-gas sets, which includes two valve discs forming between them a chamber and connecting this chamber with a source of fluid, such as steam for example, under pressure and of low temperature as compared with that of the blast fluid, and turning on this fluid when the valve discs are in their closing position, the pressure of this fluid being somewhat greater than that of the gas in the controlled duct. As a result, any one of the ducts may be disconnected from the boiler during the run of that set including the corresponding superheater. The steam or similar fluid admitted intermediately of the two valve discs produces a back pressure which prevents leakage past the discs, and the valve mechanism is cooled by its contact with the said steam or other fluid and its life thereby increased.

My said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawings and the following description set forth in detail certain means embodying my invention, the disclosed means, however, constituting but one of the various mechanical forms in which the principle of the invention may be employed.

In said annexed drawings:

Figure 1 represents diagrammatically a plan of a portion of a carburetted water-gas plant to which my invention has been applied.

Fig. 2 represents a side elevation of such portion of said plant.

Fig. 3 represents, on an enlarged scale, an axial section of a portion of one of the blast-gas outlet ducts, with one of which each of the superheaters of the plant is provided, showing also, in diagram, my improved valve mechanism in axial section and associated therewith, parts of such mechanism being shown in elevation.

Fig. 4 represents a view similar to that of Fig. 3, illustrating a modified form of the valve mechanism.

In the illustrated embodiment of my invention the superheaters 1, of a plurality of carburetted water-gas sets, are each provided with the usual blast-gas outlet duct 2. The discharge ends of these ducts are all connected with a transverse header 3 which is provided with a single outlet duct 4 discharging into the steam or heating space of a suitable boiler 5, the latter being connected with a stack 6, Figs. 1 and 2.

Each duct 2 is controlled by a separate valve mechanism 7, Fig. 1.

In the form shown in Fig. 3, such mechanism comprises a valve casing 7′ having an upper enclosed chamber 8 and a lower enclosed chamber 9. The casing encloses a cut-out portion of the duct forming two transverse valve seats 10—10 which are respectively engaged, when the valve is in its closing position, by two valve discs 11—11, which therefore interrupt communication through the said duct 2. Both discs are attached to a common stem 12 to the bottom of which is attached a seat-protecting ring 13.

The discs are, as shown, separated from each other longitudinally of the duct, forming between them a chamber 14.

The valve usually includes well-known means (not shown) for securely seating the discs on their respective seats. Any well-known type of two-disc valve may be used in which the discs form an intermediate chamber.

The one end of the stem 12 is connected with the piston of a hydraulic cylinder 15 by means of which the discs may be simultaneously raised so as to open the valve and seat the protecting ring 13 against the seats 10—10, all as will be understood by those skilled in the art.

As thus far described, the valve mechanism per se is old and well-known.

However, in addition, I connect the interior of the casing 7′ by means of a pipe 16 with a source of fluid under pressure and independent of the superheater, which may be conveniently steam from the boiler 5, and at a pressure at least as great as but preferably somewhat greater than the pressure of the run-gas of the set. In ordinary practice such pressure would be in the neighborhood of two pounds per square inch. Any other suitable fluid or independent fluid source may be employed for this purpose as will be understood.

The lower part of the casing is provided with an outlet pipe 17 and water seal therefor, for preventing escape of the steam and for receiving the products of condensation.

During the "run" of the gas-set, the valve mechanism is given its closing position as shown in Fig. 3, and the steam or other fluid is permitted to enter the casing 7′ and fill same and chamber 14, thus setting up therein a pressure at least as great as or in excess of that of the "run" gas which may be in the superheater side of the valve mechanism, and preventing leakage thereof past same and into the boiler.

During the "blow" the valve is of course opened and the blast-gases pass through the boiler as heretofore.

Means may also be provided for automatically turning on the steam when the valve is closed and shutting it off when the same is opened. Such means may be of any well-known form, such as a lever 19 fulcrumed on the casing 7′ and connected with the steam valve 20 as shown in Fig. 3, a suitable weight 21 being mounted upon said lever, the latter being engaged at one end by a collar 22 fixed to stem 12. The arrangement is such that when the valve discs are given their opening position, the weight 21 will actuate the valve 20 to close, and when given their closing position, the collar 22 will actuate the lever in the opposite direction and open said valve 20.

It will be noted, therefore, from the above description, that any one or more of the ducts 2 may be closed during the "run" and the others left open, so that a continuous passage of blast-gases may pass through the boiler and the recovery of the heat thereof as by making steam, carried on without interruption. Under these circumstances, the necessity of providing a stack-valve for the stack is eliminated, and only a very small or no amount of steam used for any purpose other than that of conversion into power or other uses dissociated from the gas making process itself.

The valve mechanism may be modified as shown in Fig. 4, wherein I have illustrated diagrammatically a structure comprising two separate valves 23—23 each comprising a single disc 24, and separated from each other longitudinally of the duct 2, so as to form an intermediate chamber 25.

In this case, the steam or other independent gas supply pipe 16 may be caused to pass through the duct and communicate with the chamber 25 directly, as shown. The principles of construction and operation of this last described apparatus are however identical with those of the first disclosed construction as will be readily understood.

What I claim is:

1. The combination of a source of hot gas; a gas duct connected with said source; valve mechanism associated with the latter and including two spaced valve discs each adapted to cut off communication between the inlet and outlet of said gas duct and forming an intermediate chamber; and a second and independent source of fluid communicating with said chamber, said fluid being under pressure greater than that of the gas in said duct.

2. The combination of a gas duct; valve mechanism associated with the latter and including two spaced valve discs forming an intermediate chamber; means for actuating said discs simultaneously to assume their opening and closing positions; an independent source of fluid under pressure communicating with said chamber; and means for automatically shutting off the fluid from said chamber when said discs are actuated to assume their opening position and to turn on such fluid when said discs are actuated to assume their closing position.

3. The combination of a gas duct; valve mechanism associated with the latter and including two spaced valve discs forming an intermediate chamber; means for simultaneously actuating said discs to assume their opening and closing positions; an independent source of fluid under pressure communicating with said chamber; and means for shutting off the fluid from said chamber when said discs are actuated to assume their opening position and to turn on such fluid when said discs are actuated to assume their closing position.

4. The combination of a gas duct; valve mechanism associated therewith and including two spaced valve discs forming an intermediate chamber; means for actuating said discs to assume their opening and closing positions; and a second and independent source of cooling fluid communicating with said chamber, said cooling fluid being under pressure greater than that of the gas in said duct.

Signed by me this eighth day of May, 1924.

PIERRE PLANTINGA.