F. D. POTTER.

MEANS OF COMBUSTION CONTROL.

APPLICATION FILED APR. 16, 1919.

1,393,826. Patented Oct. 18, 1921.

Fig. 1.

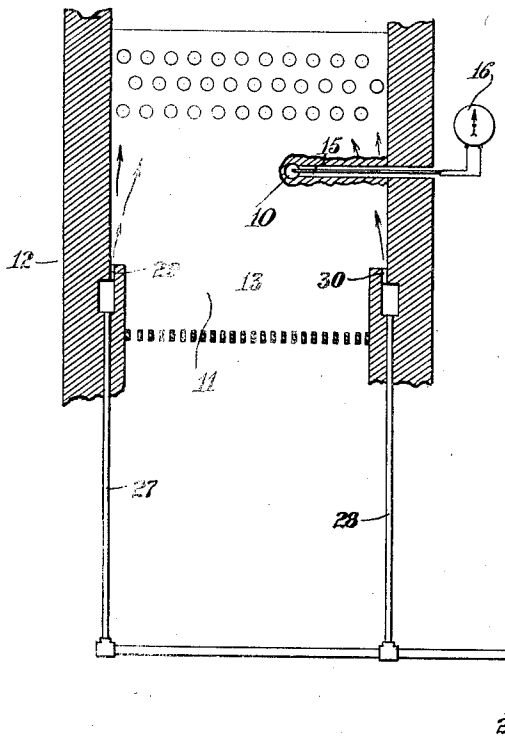


Fig. 3.

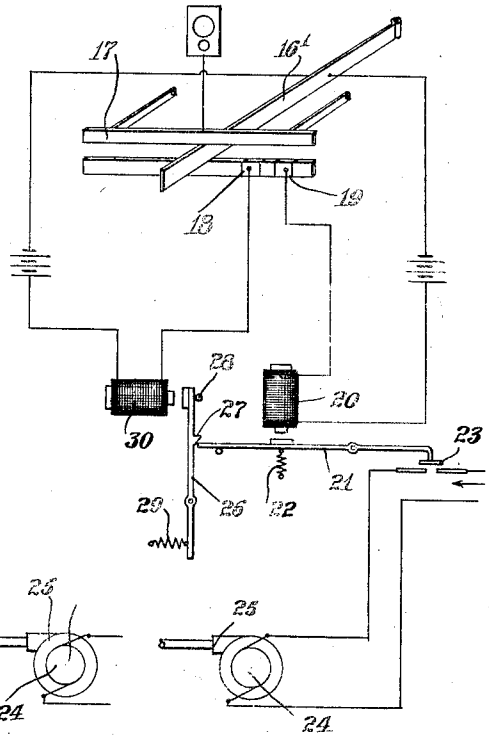


Fig. 2.

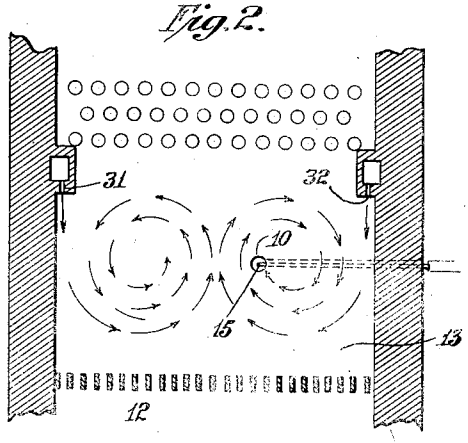
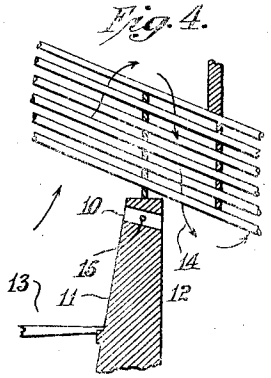


Fig. 4.



WITNESS:

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MEANS OF COMBUSTION CONTROL.

1,393,826. Specification of Letters Patent. Patented Oct. 18, 1921.

Application filed April 16, 1919. Serial No. 290,629.

To all whom it may concern:

Be it known that I, FREDERICK D. POTTER, a citizen of the United States, residing and having a post-office address at Linden, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Means of Combustion Control, of which the following is a specification.

My invention relates to means for securing combustion control by automatically introducing a gaseous cooling medium into a furnace or other combustion apparatus when the temperature gets unduly high. The invention will be described in connection with a boiler furnace, for convenience, but is not limited thereto, having a wide range of applications.

At very high temperatures, boilers, boiler settings and the like exposed to the great heat quickly deteriorate even when made from the best materials now available. The object of the present invention is to provide means for automatically introducing a gaseous cooling agent whenever the heat gets up to about the maximum permissible in good practice thereby preventing the heat from exceeding such predetermined maximum and preventing injury which would otherwise be done by burning out the boiler setting or other parts exposed to such unduly high heat. When the heat is sufficiently reduced the cooling medium is automatically shut off. Various cooling media may be used.

It is impracticable, at least in the present development of the art of heat measuring by means of pyrometers or the like, to get apparatus which will stand up in use when exposed directly to the highest temperatures found in a boiler furnace, for example. By making use of a short circuit passage however, between the combustion chamber and some part of the passages to which the furnace gases pass indirectly, as, for example, by making a small opening through the bridge wall of a boiler furnace, and taking the temperature of the gases passing therethrough, an indication of temperature proportionate to that in the combustion chamber can be practically obtained by available apparatus such as pyrometers and the like. According to the present invention temperature indications so obtained are utilized to automatically introduce cooling fluid, as air and the like, into the region of combustion, when the temperature rises unduly high.

In the accompanying drawings, Figure 1 is a transverse cross-sectional view of one form of apparatus for carrying out my invention, the air or other fluid introduced for cooling being discharged upwardly. Fig. 2 is a transverse cross sectional view of a modified form in which the cooling fluid is discharged downwardly from above. Fig. 3 is a diagrammatical view of the control circuit and Fig. 4 is a longitudinal sectional view showing the short circuit passage in the bridge wall of a boiler furnace.

Reference character 10 designates a short circuit passage in the bridge wall 11 of a boiler furnace 12 leading from the combustion chamber 13 to the gas passage 14 behind the bridge wall. The small quantity of gases passing through the passage 10 by reason of the difference in pressure gives a substantially true criterion or a representative sample at all times of the gases in the combustion chamber. A pyrometer couple 15 is provided adjacent to and in a space in direct communication with passage 10 and serves as a means of measuring the temperature of the gases passing therethrough.

The couple 15 is included in a circuit which actuates a movable device as a bar, needle, or the like. The well known "Taylor" instrument is preferably made use of. For convenience of illustration, a galvanometer 16 is shown symbolically in Fig. 1.

In the showing of Fig. 3, 16′ represents the horizontally movable bar or needle operated by the electric current and responsive to temperature changes. A striker 17 operated in the usual way by clockwork (not shown) intermittently depresses the needle bar as is usual in recording instruments. In the path of movement of needle bar 16′ which is of electrically conductive material, are a pair of contact pieces 18 and 19. These are arranged toward the end of the path of movement of bar 16′ corresponding to high temperatures and when the needle 16′ is over either of these contacts it is intermittently depressed by striker 17 into momentary contact therewith. The circuit closed through contact 19 includes a magnet 20 which operates a bar 21 against the pull of spring 22 to close a switch 23 in the actuating circuit of a motor 24 of a blower 25. The bar 21 is held up to keep the switch closed

by a trigger bar 26 having a trigger 27. Bar 26 is held resiliently against a stop 28 by the spring 29. A magnet 30 in circuit with contact piece 18 serves, when current is passed therethrough, to pull the bar 26 and trigger 27 away from the bar 21 and permit switch 23 to be opened by spring 22. When the switch 23 closes the motor circuit, the motor pump 25 is set into operation and air is driven through the pipes 27, 28 and discharged within the combustion zone or chamber. This is continued until the needle bar 16′, moving to the left as the temperature falls, comes into contact with contact piece 18 when the trigger bar is retracted and the switch 23 opens shutting off the supply of cooling fluid.

In the form shown in Fig. 1 the air outlets 29, 30 are located low down on each side of the combustion chamber (a boiler furnace, in the form shown) and the air is discharged upwardly along the walls and toward the water tubes (if a water tube boiler is used) as indicated by arrows. In the form shown in Fig. 2 the air outlets 31, 32 are located at the upper part of the combustion chamber and the air is discharged downwardly along the walls as indicated by arrows in this figure. These are merely illustrative modes of discharge, however, and both may be used in one furnace or other combustion chamber and they may be variously modified, if desired.

The excess of air supplied within the region of combustion serves to lower the temperature to a safe point. As the temperature goes down the bar 16′ moves to the left and the blower is automatically shut off, in the manner described above. The blower is shown only for purposes of illustration, as any convenient source of air under pressure may be utilized, so long as the air supply is turned on and shut off by the temperature controlled apparatus, with the result of automatically keeping the temperature within safe limits.

It is to be understood that the apparatus shown is for purposes of illustration and for affording an understanding of my invention only, and that the means utilized may embody various forms, and may be applied to control of combustion in furnaces, kilns and the like of many kinds, so long as same are included within the scope of my claims, by which the invention is defined.

I claim:

1. The combination with a combustion chamber of means for supplying cooling fluid to the combustion chamber and adjacent the inside walls thereof, and means controlled by the temperature of the combustion chamber for turning on the fluid when the temperature rises unduly high, whereby injury to the wall from excessive heat is prevented.

2. The combination with a furnace of air inlets arranged to admit air within the combustion chamber of the furnace and adjacent the inside walls thereof, and means controlled by the temperature of the combustion chamber for turning on the air when the temperature rises unduly high, whereby injury to the furnace wall from excessive heat is avoided.

3. In a furnace a fluid passage formed in the furnace wall, outlets therefrom within the combustion chamber of the furnace and arranged close up to and substantially parallel to the inside walls thereof, and means controlled by the temperature of the furnace for supplying fluid to said passage and outlets when the furnace temperature rises unduly high, whereby the walls are protected from burning out.

4. The combination with a combustion chamber of a short circuit passage leading directly to an exit gas conduit to which the bulk of the furnace gases pass indirectly, of means actuated by temperature changes in such short circuit passage for introducing cooling fluid into the combustion chamber and adjacent the inside walls thereof when the temperature thereof becomes unduly high and for shutting off the cooling fluid when the temperature has been lowered.

In testimony that I claim the foregoing I hereto set my hand, this 15th day of April, 1919.

FREDERICK D. POTTER.