

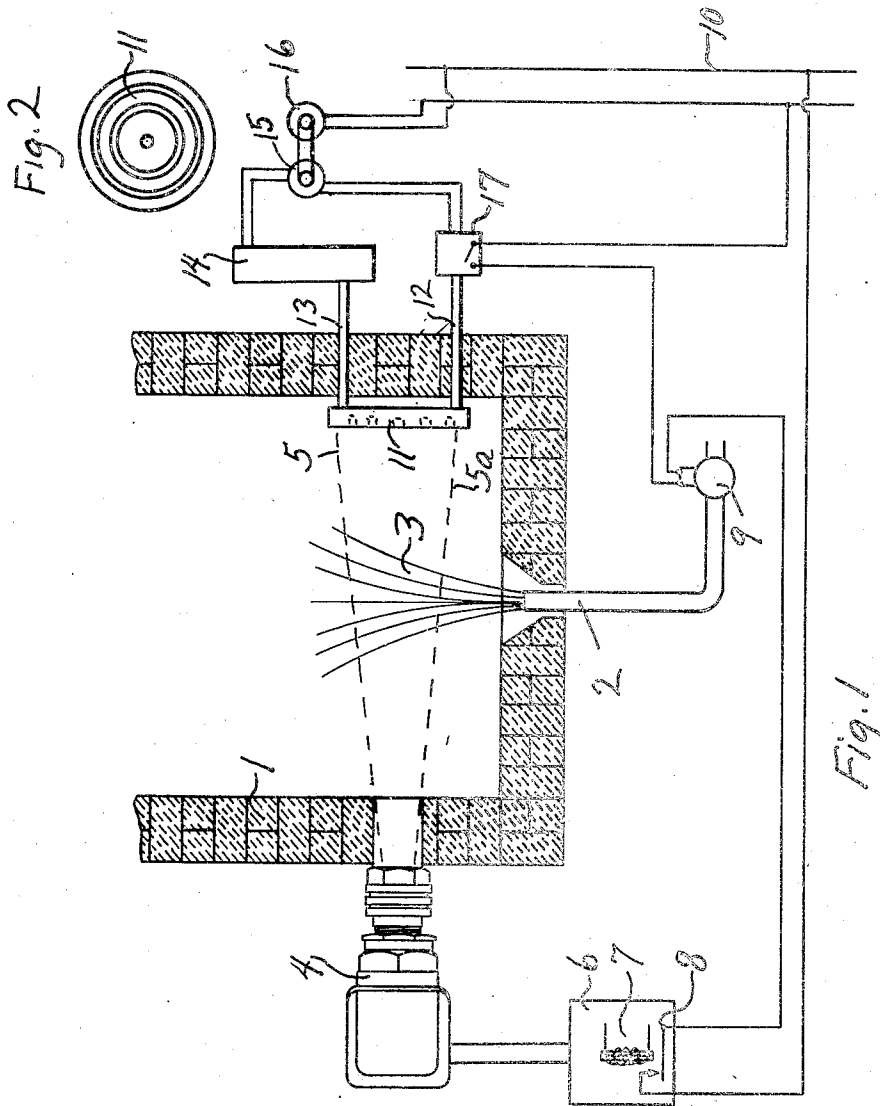
July 30, 1946.

T. A. COHEN

2,404,903

AUTOMATIC BURNER CONTROL APPARATUS

Filed Aug. 23, 1943



Theodore A. Cohen, INVENTOR,

BY Theodore W. Miller,
Attorney

UNITED STATES PATENT OFFICE

2,404,903

AUTOMATIC BURNER CONTROL
APPARATUS

Theodore A. Cohen, Chicago, Ill., assignor to
Wheelco Instruments Company, Chicago, Ill.,
a corporation of Illinois

Application August 23, 1943, Serial No. 499,731

7 Claims. (Cl. 158—28)

1

This invention relates to automatic burner control apparatus of the type wherein a photo-electric cell flame supervisory device is used to observe the presence of a burner flame and control the fuel supply accordingly.

In the use of automatic burner control safety apparatus of the above type one of the great dangers has been that the furnace wall opposite and within the scope of the sight of the photo-electric cell may be heated to such an extent as to give forth light or heat rays, or both, sufficient to maintain fuel supply to the burner after the burner flame has been extinguished. An explosive condition would then result, due to entry of raw fuel into the furnace chamber.

The primary object of this invention is accordingly to provide means, in an automatic burner safety apparatus of the type referred to, for preventing the furnace wall within the scope of the sight of the photo-electric cell flame supervisory device from causing the said device to function as if flame were present at the burner after said burner flame has ceased to exist.

Other and further objects of this invention will become more apparent hereinafter as the same becomes better understood from an examination of the accompanying drawing wherein:

Fig. 1 of the drawing is a schematic and diagrammatic view of an apparatus embodying this invention;

Fig. 2 is a detail elevational view of a part of the apparatus of Fig. 1.

Referring to the drawing more particularly reference character 1 designates a furnace having a burner 2 mounted in one wall thereof for supplying a flame 3. A photo-cell burner flame supervisory device 4 is mounted in a side wall of the furnace with its sight shown in dotted lines at 5 for observing the condition of flame 3. The output of the device 4 is connected to an electronic apparatus 6 which may be of the type shown in patent to W. H. Gille No. 2,231,420 of February 11, 1941, for Burner control apparatus or the type shown in copending application, Ser. No. 451,651 of Theodore A. Cohen, for Burner control apparatus filed July 20, 1942. The output of the electronic apparatus 6 is connected to a relay 7 as in said copending application for closing a switch 8 in the electric fuel valve circuit including electric fuel valve 9. This circuit is supplied from electric line supply 10 and is closed when the burner flame 3 is on to open the valve 9 and permit the burner to operate.

Without the means hereinafter described the heated furnace wall opposite the photo-cell flame

2

supervisory device 4, within the area of the conical scope of sight boundary lines 5 and 5a, if above a certain temperature may emit sufficient light or heat rays, or both, which upon falling into the photo-electric receiver 4 will cause said receiver to maintain the switch 8 closed and the fuel valve 9 open even after the flame 3 may have been extinguished accidentally or diminished below predetermined safe condition at which the safety apparatus is intended to cut off the fuel supply.

By supplying a fluid cooled target 11 suitably fed by a circulatory system, such as hereinafter described, arranged across the area of the conical scope of sight boundary lines 5 and 5a on the wall of the furnace opposite to the receiver 4 beyond the flame 3, said wall is thus blocked off by said target and prevented from causing the afore-said erroneous operation and said target itself being cooled by said system cannot accumulate sufficient heat to emit sufficient light or heat rays to cause erroneous operation of the photo-electric receiver 4.

The target 11 is shown as continuously cooled by suitable means such as a water circulatory system comprising spaced inlet and outlet pipes 12 and 13, the latter connected to a heat exchanger (e. g. condenser) 14 and thence to the inlet of a water circulating pump 15. The delivery side of pump 15 is connected through a water flow switch 17 to inlet 12. The switch 17 is electrically connected in the electric fuel valve circuit whereby when it is opened by absence of water flow in the circulatory system for drum 11 the fuel valve 9 will close and shut down the burner upon any failure of the circulatory cooling system for the target 11 and thus additionally safeguard the apparatus.

The operation and advantages of the afore-described apparatus in safeguarding the burner flame supervisory system to assure safe operation of said system will be apparent without further detail.

I am aware that many changes may be made without departing from the principles of this invention and I therefore do not wish to be limited to the details shown or described.

I claim:

1. In an automatic burner control apparatus comprising a furnace having a refractory lined combustion chamber, a burner mounted in one wall of the furnace with its axis directed between a pair of adjacent side walls thereof, photo-electric supervisory means mounted in one side wall and arranged to observe the condition of the flame from said burner and having a predeter-

3

mined sight, and a device on the other side wall overlying a portion of the refractory lining of said chamber presenting a cooled surface substantially coextensive with the entire cross section of said sight on the side of the axis of the burner and said flame opposite to said supervising means.

2. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner flame supervisory means in one wall of the furnace and provided with a predetermined sight, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, and a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber presenting a cooled surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame.

3. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner flame supervisory means in one wall of the furnace and provided with a predetermined sight, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber presenting a surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame and means for cooling said surface.

4. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner flame supervisory means in one wall of the furnace and provided with a predetermined sight, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber presenting a surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame, means for cooling said surface and means providing supplemental control of the fuel supply means for shutting off the latter in event of failure of said cooling means.

5. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner

4

flame supervisory means in one wall of the furnace and provided with a predetermined sight, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber presenting a surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame, and means for cooling said surface, said last means comprising said member, the same having an extended chamber and means for circulating a cooling fluid through said chamber at sufficient rate to prevent incandescence of its outer surface.

6. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner flame supervisory means in one wall of the furnace and provided with a predetermined sight, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber presenting a surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame, means for cooling said surface, said last means comprising said member, the same having an extended chamber and means for circulating a cooling fluid through said last chamber and means for additionally controlling said fuel supply means by shutting the same off in event of failure of the circulating means.

7. In an apparatus of the character described, the combination of a furnace having a refractory lined combustion chamber, ray sensitive burner flame supervisory means in one wall of the furnace and, a burner in an adjacent wall and having its axis substantially parallel to the first wall and adapted to emit a flame, fuel supply means controlled by said first means in accordance with presence or absence of burner flame, a member on a furnace wall opposite the first wall overlying a portion of the refractory lining of said chamber and presenting a surface arranged substantially coextensive with the entire cross section of the sight of said first means on the other side of the axis of the burner and burner flame and means for cooling said surface, said last means comprising said member, the same having an extended chamber and means for circulating a cooling fluid through said last chamber at sufficient rate to prevent incandescence of its outer surface.

THEODORE A. COHEN.