March 23, 1937. W. P. CHANDLER, JR 2,074,576

WATER COOLER FOR FURNACES

Filed Aug. 15, 1936

Fig. 1.

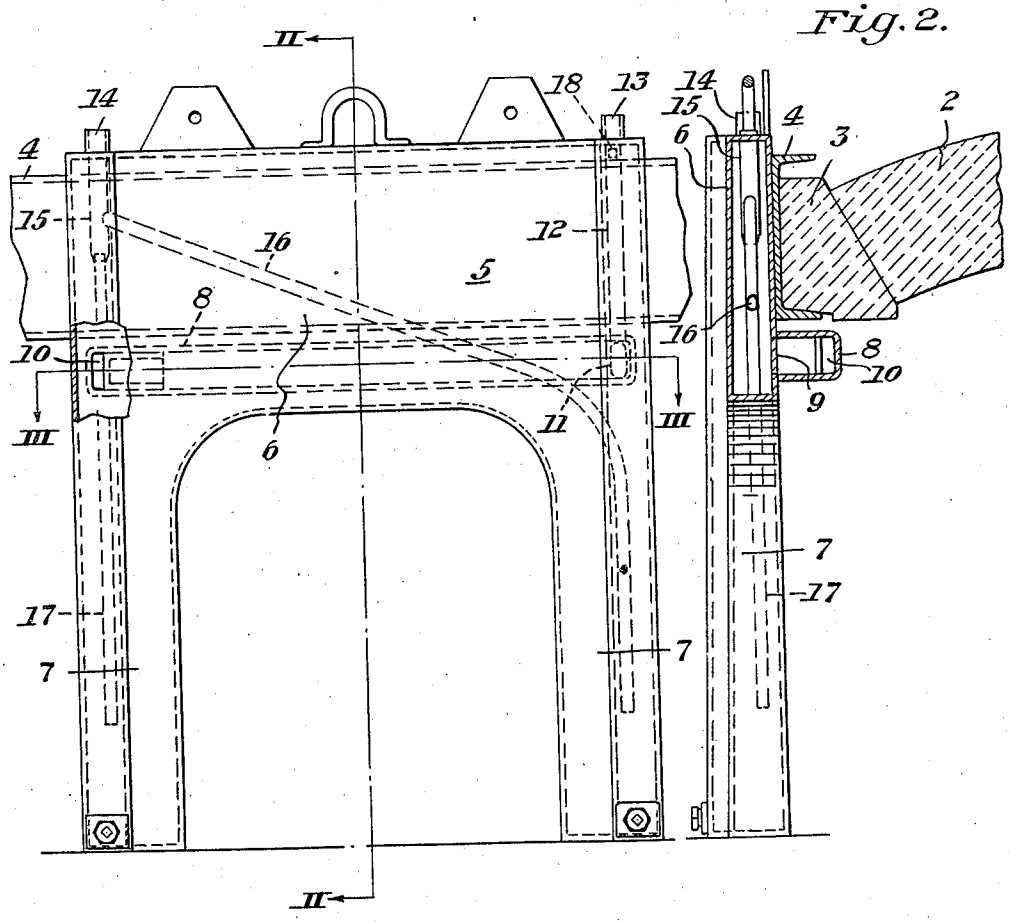
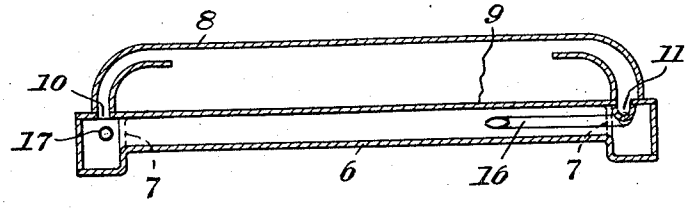


Fig. 2.

Fig. 3.



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WATER COOLER FOR FURNACES

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6 Claims. (Cl. 122—499)

The present invention relates generally to water cooling devices for furnaces, and more particularly to a combined water-cooled furnace door frame and skew-back channel cooler, and provides a structure which obviates difficulties which have been encountered in the presently known constructions.

The present invention constitutes a substantial improvement over the structure shown and described in the Robinson Patent No. 1,864,762. In the construction shown in said patent, the cooler has a body portion forming the top of the frame and from each end of the body portion there is a downwardly extending leg forming the sides of the frame. Projecting inwardly into the furnace chamber from the bottom of the body portion there is a horizontally extending hollow offset portion forming a nose portion which acts as a cooler for the skew-back channel which is positioned immediately thereabove. In the structure disclosed in said patent, a wall is provided between the nose portion and the main chamber or body portion of the frame, thereby providing means for positively circulating the cooling water through the nose portion. The connections to the cooler are arranged so that the inlet to the frame is connected by means of a pipe to the central part of the nose portion and a connection is provided at each end of the nose portion for discharging the water passing through the nose portion into the leg portions of the frame at a point near the base thereof.

Considerable advantage is derived from a construction of this character as compared with prior art constructions but the construction disclosed in said patent results in difficulties which it is the object of the present invention to overcome.

In the construction disclosed in the Robinson patent the water, which is cold when it enters the frame, is led to the center of the nose piece through the connections described above. The cold water divides and passes in both directions, one-half being discharged through each of the end openings in the nose portion. It has been discovered that serious corrosion is created on the plate of the nose piece directly opposite the inlet and on the vertical front face of the nose piece close to both of the outlets. This corrosion is caused by the free oxygen contained in the water. The water enters the nose portion at a relatively cold temperature and the oxygen is thrown out of solution by the intense heat of the plates forming the nose portion which, as stated above, extends into the furnace and is subjected to intense heat. The oxygen in the cold water is liberated directly on the iron plates forming the nose portion and the corrosion referred to above takes place as a result thereof.

I have found that this corrosive action can be eliminated to a very substantial extent if the water used for cooling purposes is initially heated before coming into contact with the extremely hot surfaces of the nose portion of the cooler. The oxygen or other gases dissolved in the water pass out of solution when this initial heating action takes place and rise as bubbles. These bubbles are small and will pass upwardly within the water in the cooler without coming into direct contact with the iron of the cooler at any place where the temperature is sufficiently hot to cause corrosion. Thus a considerable portion of the oxygen is liberated before the water reaches the place where the temperature is hottest and corrosion most likely.

In accordance with my invention I propose to provide connections in a structure generally of the character disclosed in the above referred to Robinson patent which are so arranged that the cold water will be carried by pipes or other suitable means to a point adjacent the bottom of the leg portions. At this point the temperature is considerably lower than that of the nose portion. The water is then permitted to rise through the frame and an inlet opening is provided near one end of the nose portion so as to permit the rising water to enter the nose portion and flow therethrough. An outlet is provided adjacent the other end of the nose portion so as to permit the escape of water passing into the nose portion. The outlet therefrom is connected by a pipe or other suitable means to the outlet opening for the frame.

In a construction of this character the water may be fed to the cooler at a relatively cold temperature and as it rises upwardly it is heated and oxygen or other gases contained in the water are liberated and pass upwardly through the frame as small bubbles and pass from the frame by way of appropriate vent openings. In this manner the oxygen or other gases are prevented from coming in contact with the hot plates of the nose portion and corrosion very greatly minimized.

In the accompanying drawing I have shown for purposes of illustration only the present preferred embodiment of my invention. In the drawing,

Figure 1 is a front elevation of the cooler which I provide;

Figure 2 is a vertical sectional view taken along the line II—II of Figure 1; and

Figure 3 is a horizontal sectional view taken along the line III—III of Figure 1.

In the drawing there is shown a portion 2 of a furnace roof, and a skew-back 3. The skew-back is supported by a channel 4 according to well-known practice.

A cooler indicated generally by the reference character 5 has a body portion 6 forming the

top of the frame, and from each end of the body portion there is a downwardly extending leg 7, which legs form the sides of the frame. Projecting inwardly into the furnace chamber from the bottom of the body portion 6 is a horizontally extending hollow offset portion 8 forming a nose portion which acts as a cooler for the skew-back channel.

The nose portion 8 is separated from the body portion 6 of the frame by a wall 9 so as to aid in bringing about proper circulation of the water through the nose portion. The nose portion is provided with an inlet opening 10 which is adjacent one end thereof and with an outlet opening 11 adjacent the other end thereof. The outlet opening 11 is connected by means of a pipe 12 with the outlet 13 for the frame.

The cooling water enters the cooler through an inlet 14 and by appropriate pipes or conduits 15, 16 and 17 is delivered to the legs of the frame and adjacent the bottom thereof. The water then passes upwardly through the legs of the frame and through the inlet opening 10 of the nose portion, horizontally through the nose portion, and is discharged from the nose portion through the outlet 11 and from the frame by the outlet 13 which, as stated above, is connected to the nose portion outlet 11 by means of an appropriate conduit.

A vent opening 18 is provided in the pipe 12 adjacent the top of the cooler for permitting the oxygen or other gases accumulating in the body portion 6 as a result of the heating of the water to escape with the heated water

As stated above, in a construction of this character, the water may be fed to the frame at a low temperature and corrosion resulting from the bringing of relatively cold water into contact with metal is eliminated by the provision of connections which are so arranged as to discharge the water into the frame at points where the temperature is considerably below the temperature of the nose portion. By so doing, a heating of the water as it rises in the frame liberates the oxygen and gases so that when the water comes into contact with the hot plates forming the nose portion of the frame, corrosion will not take place. Although the water is fed to the nose portion at a somewhat higher temperature than would be the case in a construction such as that disclosed in the Robinson patent above referred to, corrosion incident upon the use of a construction wherein the cold water is immediately coming in contact with the hottest part of the furnace cooler is eliminated.

While I have shown and described a preferred embodiment of my invention, it will be understood that my invention is not limited to the construction shown in the drawing and described above as it may be otherwise embodied within the scope of the appended claims.

I claim:

1. A hollow water-cooled furnace door frame and skew-back channel cooler, comprising a body portion forming the top of the frame, legs forming the sides of the frame, a hollow horizontal offset separated from the main body of the frame by a wall and adapted to project into the furnace chamber beneath the skew-back channel and forming a nose portion, and connections for causing flow of water initially through the legs of the frame and thereafter through the nose thereof and for discharging the water from the frame directly from the nose portion.

2. A hollow water-cooled furnace door frame and skew-back channel cooler having inlet and outlet openings, comprising a body portion forming the top of the frame, legs forming the sides of the frame, a hollow horizontal offset separated from the main body of the frame by a wall and adapted to project into the furnace chamber beneath the skew-back channel and forming a nose portion, and connections for causing flow of water initially through the legs of the frame and thereafter through the nose portion, the nose portion having an inlet opening adjacent one end thereof and an outlet opening adjacent the other end thereof, the outlet opening in the nose portion being connected directly to the frame outlet.

3. A hollow water-cooled furnace door frame and skew-back channel cooler, comprising a body portion forming the top of the frame, legs forming the sides of the frame, a hollow horizontal offset adapted to project into the furnace chamber beneath the skew-back channel and forming a nose portion, the body portion and the nose portion being separated by a wall, the frame and nose portion each having an inlet and an outlet, and a conduit directly connecting the nose portion outlet and the frame outlet.

4. A hollow water-cooled furnace door frame and skew-back channel cooler, comprising a body portion forming the top of the frame, legs forming the sides of the frame, a hollow horizontal offset adapted to project into the furnace chamber beneath the skew-back channel to form a nose portion, the body portion and the nose portion being separated by a wall, the frame having inlet connections for supplying water to a point near the bottom of at least one of the legs, the nose portion having an inlet opening communicating with the frame and an outlet opening, and a conduit connected with the outlet opening of the nose portion for discharging water directly from the frame.

5. A hollow water-cooled furnace door frame and skew-back channel cooler, comprising a body portion forming the top of the frame, legs forming the sides of the frame, a hollow horizontal offset adapted to project into the furnace chamber beneath the skew-back cooler and forming the nose portion, the body portion and the nose portion being separated by a wall, the frame having an inlet for supplying water to a point near the bottom of at least one of the legs, the nose portion having an inlet opening communicating with the frame adjacent one end thereof and an outlet opening adjacent the other end thereof, and means connected with the outlet opening of the nose portion for discharging water directly from the frame.

6. A hollow water cooled furnace door frame and skew-back channel cooler, comprising a body portion forming the top of the frame and provided with a vent near the cooler outlet, legs forming the sides of the frame, a hollow horizontal offset adapted to project beneath the skew-back channel of the furnace forming a nose portion, and connections for causing flow of water upwardly through the legs of the frame, thereafter horizontally through the nose portion thereof, and thereafter directly from the frame.

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