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2,494,634

WATER-COOLED REFRACTORY DAMPER

Filed Nov. 6, 1946

2 Sheets-Sheet 1

Fig. 1.

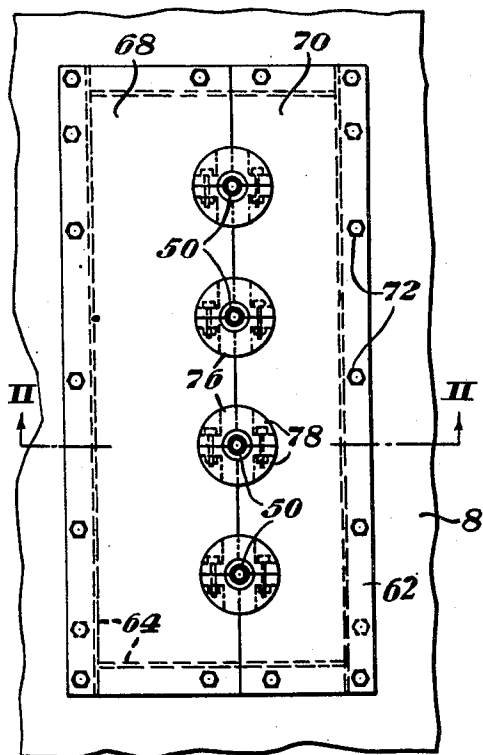


Fig. 6.

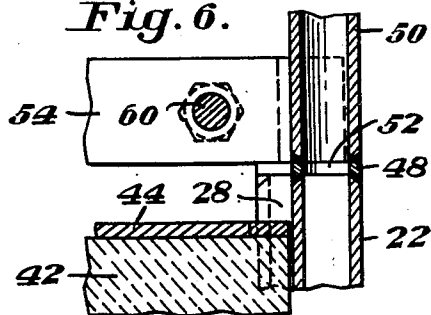
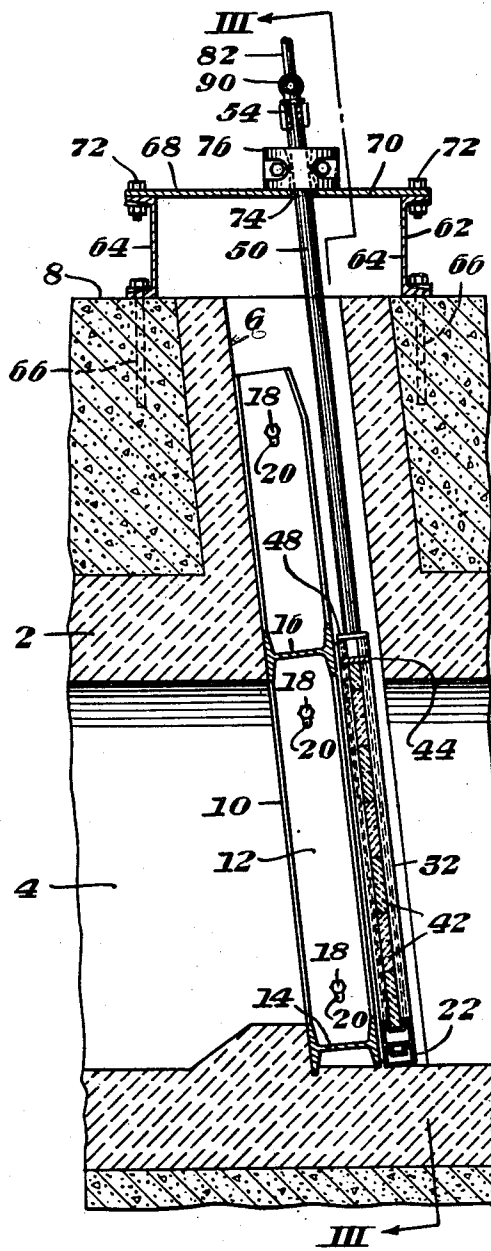


Fig. 5.



Fig. 2.



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Fig. 3.

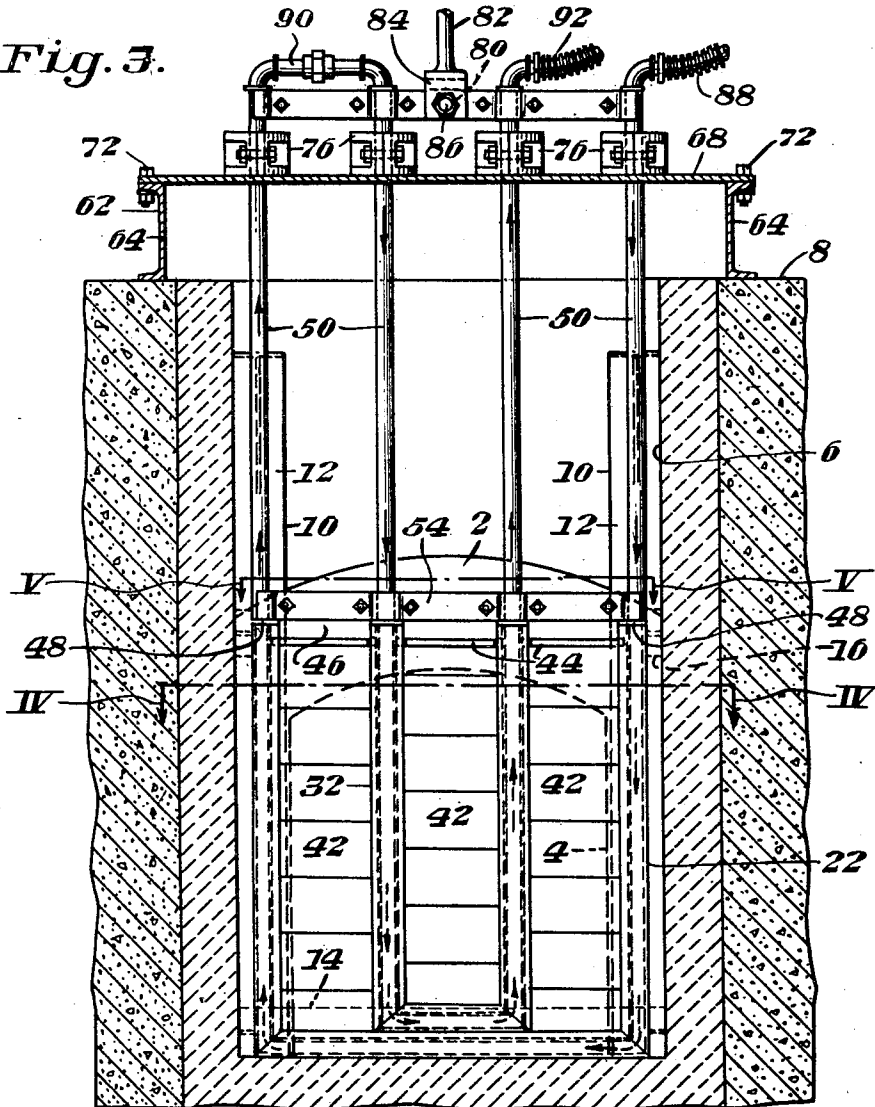
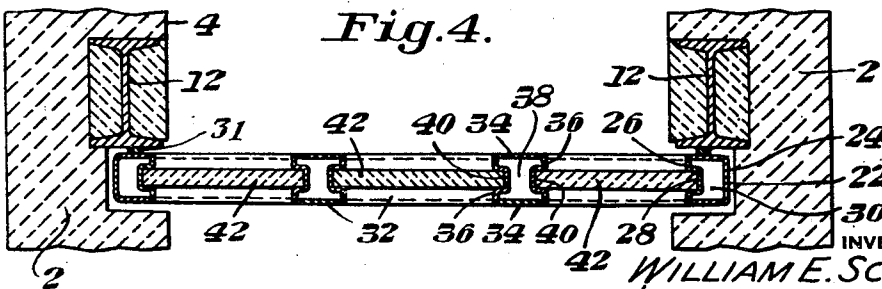


Fig. 4.



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WATER-COOLED REFRACTORY DAMPER

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5 Claims. (Cl. 251—51)

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This invention relates to a water-cooled refractory damper and more particularly to such dampers that are exposed to relatively high temperatures.

Dampers of various kinds have been used, but none have proved entirely satisfactory. Many warp and/or are quite expensive. Some are made of metal in whole or in part and the metal is burned by the heat and corroded by the acid fumes in the flue gases. Others are made of alloy metals, but these are expensive and also warp. Combined water-cooled refractory dampers have proved most satisfactory, but they have some of the metal in the frame exposed to the flame. They are also of rather complicated construction requiring refractory tiles of special shape which greatly increases the cost of the damper.

It is therefore an object of my invention to provide a water-cooled refractory damper in which all of the metal in the damper exposed to the hot gases is water cooled.

Another object is to provide a damper in which the refractory tiles used are of standard shape.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a plan view of the damper hood frame;

Figure 2 is a sectional view taken on the line II—II of Figure 1;

Figure 3 is an elevation partly in section taken on the line III—III of Figure 2;

Figure 4 is a sectional view taken on the line IV—IV of Figure 3;

Figure 5 is a sectional view taken on the line V—V of Figure 3; and

Figure 6 is an enlarged detail.

Referring more particularly to the drawings, the reference numeral 2 indicates the refractory lining of the flue 4. The top of the flue is provided with an opening 6 extending to the floor 8. A damper seat 10 extends from the bottom of the flue 4 up into the opening 6 and, as shown, is made of spaced-apart I-beams 12 connected at the bottom by an I-beam 14 and at the top of the flue 4 by an I-beam 16. The I-beams 12 are anchored to the walls by means of anchor bolts 18 which pass through slotted holes 20 in the beams.

The frame of the damper is made of two members, the outer member 22 extending along two sides and the bottom of the damper as best shown in Figure 3. This member is made of a U-shaped outer metallic plate 24 welded to an inner

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plate 26 which is provided with a recess 28. These spaced-apart plates 24 and 26 form a U-shaped water chamber 30 with the legs of the U extending inwardly. A wearing plate 31 of hard metal is welded to each leg of the member 22.

The inner frame member 32 also has two legs parallel to the sides of the damper and a connecting bottom leg. The side legs of member 32 are made of two spaced-apart plates 34 welded to spaced-apart channel members 36 to form an H-shaped water chamber 38 with the legs of the H extending toward the frame member 22. There are recesses 40 on each side of each leg which are similar to recesses 28. The connecting leg is made in the same manner as frame member 22.

The damper is provided with three rows of refractory tiles 42. The tiles in the outer rows extend between and are received in opposed recesses 28 and 40 as shown in Figures 3 and 4. The tiles in the center row extend between and are received in opposed recesses 40. The bottom tile in each row is received in the bottom recess. A sealing plate 44, which is as wide as the damper is thick and has a reduced portion shaped to extend into the recesses 28 and 40, is loosely placed on top of each row of tiles. A space 46 is provided between the sealing plate 44 and the top of the frame members 22 and 32 to permit expansion.

As best shown in Figure 6, a plate 48 is welded to the top of each of the vertical legs of the frame. A pipe 50 is welded to the plate 48 which is provided with an opening 52 to permit flow of water between the pipes 50 and water chambers 30 and 38. Resting on the plates 48 is a clamp 54 consisting of two plates 56 which have spaced-apart curved portions 58 for receiving pipes 50 and which are clamped together by means of bolts 60. The pipes 50 pass upwardly through a damper hood 62 which is made of channel irons 64 anchored to the floor 8 by means of bolts 66. The top of the damper hood 62 is made of two plates 68 and 70 fastened to the channel 64 by means of bolts 72. The plates 68 and 70 are provided with holes 74 to permit passage of the pipes 50.

Above each of the holes 74 is a floating seal 76 which is of standard construction and as shown consists of two portions 78 bolted together. The seal prevents an excessive amount of air from being drawn into the waste gas flue 4. Above the seals 76 the pipes 50 are fastened together by means of a second clamp 54 which is provided with a hole 80 in the center thereof. A lifting rod 82 has its bifurcated lower end 84 passing over the clamp 54 to which it is fastened by means

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of a bolt 86 passing through holes in the rod and hole 80.

A flexible inlet hose 88 is fastened to the right hand pipe 50 to deliver water thereto. As shown by the arrows in Figure 3, the water passes downwardly through the pipe 50 to the water chamber 30, through the water chamber 30 and upwardly through the left hand pipe 50. The tops of the two left hand pipes 50 are connected by means of piping 90 and the water passes downwardly through the pipe second from the left in Figure 3 into the water chamber 38 and upwardly through the pipe second from the right through an outlet hose 92. This arrangement is such that the cooling water in the damper has a constant velocity through the entire damper frame and keeps the sediment in suspension in the water during the circulation. The velocity of the water may be regulated to suit the cooling requirements of the damper. In case sediment should gather in low parts of the damper, it may be forced out by turning on full water pressure for a short period of time.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A water-cooled refractory damper having two sides and two ends, which damper comprises a hollow metallic frame extending along two sides and one end of the damper, said frame having spaced-apart inner and outer walls forming a water chamber, the water chamber along each side of the damper being U-shaped in cross-section with the legs of the U extending inwardly toward the opposite side of the damper and providing a recess between the legs, and refractory tiles received in said recesses and extending from side to side of the damper, each of said refractory tiles having a thickness throughout its length equal to the width of the recess.

2. A water-cooled refractory damper having two sides and two ends, which damper comprises a hollow outer metallic frame member extending along two sides and one end of the damper, said frame member having spaced-apart inner and outer walls forming a water chamber, the water chamber along each side of the damper being U-shaped in cross-section with the legs of the U extending inwardly toward the opposite side of the damper and providing a recess between the legs, an inner metallic frame having two hollow legs parallel to the sides of the damper connected adjacent the end of the outer member, said inner frame having spaced-apart walls forming a water chamber, the water chamber being H-shaped in cross-section with the legs of the H extending toward the U on each side to provide a recess therebetween, and three rows of refractory tiles, the tiles in each row being received in opposed recesses and extending therebetween.

3. A water-cooled refractory damper having two sides and a bottom, which damper comprises a hollow metallic frame extending along two sides and the bottom of the damper, said

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frame having spaced-apart inner and outer walls forming a water chamber, the water chamber along each side of the damper being U-shaped in cross-section with the legs of the U extending inwardly toward the opposite side of the damper and providing a recess between the legs, refractory tiles received in said recesses and extending from side to side of the damper, and a sealing plate loosely mounted on top of said tiles, said plate having a portion thereof extending into said recesses.

4. A water-cooled refractory damper having two sides and a bottom, which damper comprises a hollow outer metallic frame member extending along two sides and the bottom of the damper, said frame member having spaced-apart inner and outer walls forming a water chamber, the water chamber along each side of the damper being U-shaped in cross-section with the legs of the U extending inwardly toward the opposite side of the damper and providing a recess between the legs, an inner metallic frame having two hollow legs parallel to the sides of the damper connected at their lower end, said inner frame having spaced-apart walls forming a water chamber, the water chamber being H-shaped in cross section with the legs of the H extending toward the U on each side to provide a recess therebetween, three rows of refractory tiles, the tiles in each row being received in opposed recesses and extending therebetween, and a sealing plate loosely mounted on top of each row of said tiles, said plate having a portion thereof extending into said recesses.

5. A water-cooled refractory damper having two sides and two ends, which damper comprises a hollow outer metallic frame member extending along two sides and one end of the damper, said frame member having spaced-apart inner and outer walls forming a water chamber, the water chamber along each side of the damper being U-shaped in cross-section with the legs of the U extending inwardly toward the opposite side of the damper and providing a recess between the legs, an inner metallic frame having a plurality of hollow legs parallel to the sides of the damper, each of the legs of said inner frame having spaced-apart walls forming a water chamber, the water chamber being H-shaped in cross-section with the legs of the H extending toward the U on each side to form a recess therebetween, and a plurality of rows of refractory tiles, the tiles in each row being received in opposed recesses and extending therebetween.

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