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REFRACTORY DAMPER

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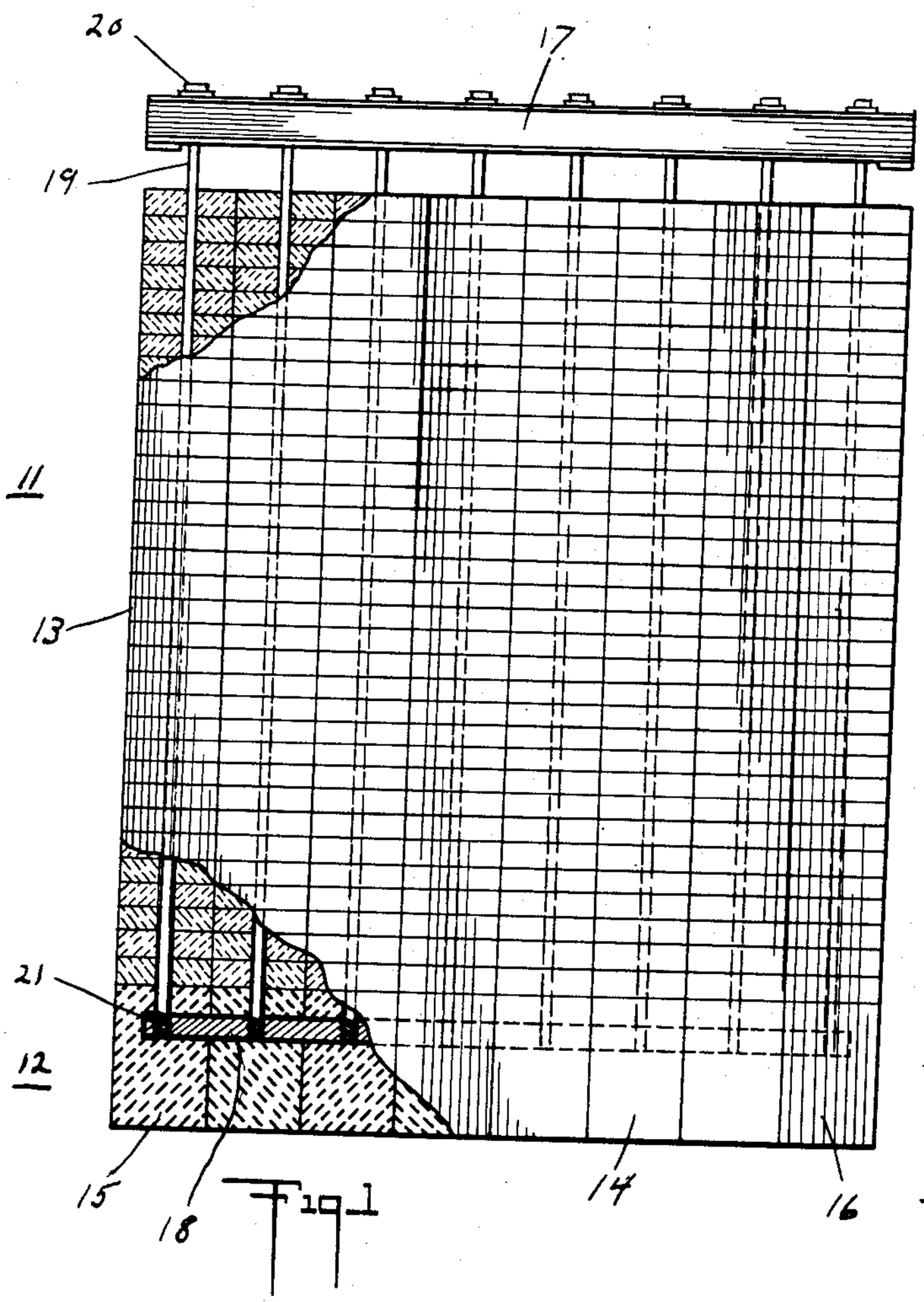

Fig. 1

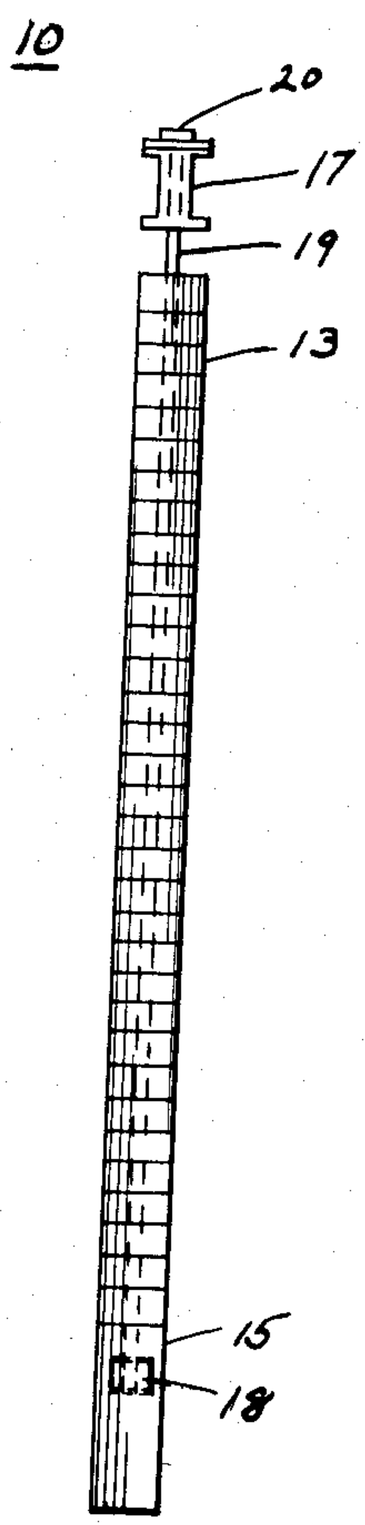

Fig. 2

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REFRACTORY DAMPER

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4 Claims. (Cl. 126—285)

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This invention relates to apparatus for controlling the circulation of gases, and more particularly to a flue damper constructed of refractory material.

One of the objects of the invention is the provision of a refractory damper which is relatively light in weight yet which will resist the erosive effects of high temperature gases.

Another object of the invention is to provide a flue damper fabricated of refractory material reinforced by a metallic framework in which the metallic elements are shielded from direct contact with the gases.

A further object of the invention is to provide a flue damper consisting of a plurality of assembled refractory units of relatively light weight, combined with refractory units having relatively greater resistance to the effects of hot gases disposed so as to increase the useful life of the damper.

Still another object of the invention is to provide an improved apparatus for the assembly of a flue damper made of refractory units supported by a metallic framework in which the replacement of individual units may be accomplished easily and quickly.

Refractory dampers usually comprise a plurality of refractory bricks which are stacked in superposed relation to form a flat wall, which is then encircled with a metallic framework. The metallic framework is thus exposed to the action of the gases and therefore must be of such rugged construction that the replacement of broken refractory materials is difficult, and the total weight of the damper is excessive considering the fact that power must be expended whenever the position of the damper is to be changed.

The present construction obviates the difficulties which have been experienced in the past with refractory dampers. The main body portion of the damper consists of light weight insulating refractory material, while marginal portions of the damper which are principally subject to the erosive effects of the gases flowing through the flue are composed of standard refractory material of relatively greater weight. The resulting reduction of the overall weight of refractory material employed permits the use of a light metallic framework for support and reinforcement. In addition, provision has been made for carrying the supporting framework entirely within the interior of the refractory material, shielded from direct contact with the flue gases; thus the weight of the metallic elements can be reduced to a minimum.

Other objects of the invention will be apparent to those skilled in the art after reading the following description, together with the accompanying drawing which illustrates a preferred

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embodiment of the invention, and in which Fig. 1 is a diagrammatic view showing the damper in front elevation, but with part of the refractory face broken away. Fig. 2 is an end elevation.

Examining the drawing in detail, a refractory damper is shown having a metallic framework, indicated generally by the numeral **10**, which supports the main body portion **11**, and the marginal portion **12**.

The marginal portion of the damper, which normally projects into the path of gases passing through the flue (not shown), is subjected to more of the effects of deterioration than the main body portion. This is due to the fact that the marginal edge serves to constrict the size of the flue passage and the gases passing over this edge will travel at an accelerated rate. Furthermore, a greater volume of gases will come in contact with this edge and its adjacent surfaces than will flow over proportionate surfaces of the rest of the damper.

In order to furnish the greatest resistance to the erosive and abrasive effects of the flue gases the marginal portion **12** is preferably composed of at least one row of formed refractory units **14**, **15** and **16**. The material of which these units consist is a dense standard refractory, relatively heavy in weight, which is well known in this art. For this portion of the damper the primary consideration in choosing the material is to provide the maximum resistance to the effects of flue gases which would tend to deteriorate the refractory.

The body portion **11**, is preferably composed of a plurality of courses of refractory units **13**, the material of which comprises what is known in the art as light weight insulating refractory. The primary consideration in choosing the material for this portion of the damper is the reduction of weight to a minimum consistent with adequate formation of a barrier against the flow of flue gases through the damper. A suitable composition for the units **13** may be somewhat porous in character, as is well known in the art, and by comparison with the material used for the units **14**, **15** and **16** it may weigh only one-sixth as much on a volumetric basis, although this ratio is not to be taken as limiting the scope of the invention but only as an example of a preferred construction.

The metallic framework **10** which supports the refractory material, includes an upper beam member **17** which may be secured to appropriate apparatus (not shown) for raising and lowering the damper into the flue. Depending from the beam are a series of supporting rods **19**, connected at their lower ends to a frame element **18**.

Various methods of assembling the damper may be employed, but a preferred method, which insures that the metallic framework will be shielded

from the direct action of the flue gases, is to place the framework within the refractory material. For this purpose, the units comprising the lower marginal edge are provided with suitable horizontal openings to receive the member 18, and vertical openings to receive the rods 19. It will be observed that in the endmost units 15 and 16 the opening provided for the element 18 extends only partially through the unit so that when the damper is assembled the element 18 will be completely surrounded by refractory material. The refractory units 13 are provided with vertically extending openings to receive the rods 19. After the units 14, 15 and 16 have been assembled, together with the lower frame element 18, the units 13 may be stacked upon them in as many courses as desired. The upper beam 17 may then be laid across the topmost course and the rods 19 lowered through openings provided in the beam 17 in alignment with the openings in the units 13 until the threaded lower ends 21 of the rods are engaged with suitably threaded openings in the element 18. The upper ends 20 of the rods are preferably enlarged to limit downward movement of the rods when the beam 17 is raised. Preferably the length of the rods is such that when the entire assembly is supported from the beam there will be a space between the bottom of the beam and the topmost course of refractory material, to allow for expansion of the materials when heated.

It will be evident to one skilled in the art that the metallic framework may be joined together in other ways. For example, threaded openings may be provided in the beam 17, and both ends of the rods 19 may be threaded, each end being of opposite hand, so that by turning the rods the beam and the lower frame member may be engaged simultaneously. Furthermore, if the upper ends of the rods are threaded, and the openings through the beam are smooth, suitable threaded caps, or nuts, may be attached to the rods to limit downward movement. In addition, while the rods 19 are shown passing through the beam 17, it will be obvious that they could pass through brackets attached to the beam, or be secured to the beam by other means.

Under certain conditions, depending upon the shape of the flue within which the damper is to be used, and other considerations, it may be desirable to employ dense refractory material in the units which form the side margins of the damper. For this purpose, one or more of the units 13 which are stacked upon the units 15 or 16 may also be made of the same material, or its equivalent, as that used in the units forming the lower marginal portion. Similarly, it may be found desirable to this heavier material for some of the refractory units 13 which are placed in the lower courses adjacent the bottom of the damper. The consideration for using the denser, heavier, material being that it is placed where the greatest amount of deterioration will occur, always bearing in mind that relatively greater weight will be added to the entire assembly than when the lighter material is used.

I claim:

1. A suspended flue damper comprising a plurality of superposed courses of refractory units, an upper hanger member, a horizontally disposed lower frame element, and vertically disposed supporting elements, each of the refractory units of the lowermost of said courses being provided with an interiorly positioned opening to form a horizontal interior passage to receive said lower frame element therein to support said units in said

superposed courses, said horizontal passage terminating within the endmost of the units of said lowermost course, said refractory units of the several courses being provided with vertically disposed aligned openings to provide passages to receive said supporting elements therein, said vertical passages terminating within the units of said lowermost course, said supporting elements depending from said upper hanger member and being threaded at their lower ends for threaded engagement with suitably threaded openings provided in said lower frame element when disposed in said horizontal passage.

2. A suspended flue damper composed of a plurality of types of refractory block material including, a plurality of superposed courses of refractory units, an upper hanger member, a horizontally disposed lower frame element, and vertically disposed rods supported by said hanger member, the lowermost of said superposed courses including units of dense relatively heavy wear-resistant refractory material, the endmost of said lowermost units being provided with inwardly exposed exteriorly closed cavities to receive the ends of the lower frame element, the other of said lowermost units being provided with aligned interior passages through which said lower frame element extends, the lower ends of said rods being received in upwardly exposed exteriorly closed cavities provided in the units of said lowermost course for rotational connecting engagement with said lower frame element, other of said superposed courses including units of relatively light weight insulating refractory material provided with vertically disposed passages through which said rods extend.

3. A flue damper comprising a plurality of courses of refractory units provided with an interiorly disposed metallic framework for positioning and supporting the units for vertical movement, the lowermost of said courses comprising units composed of a homogeneous composition of dense wear-resistant refractory recessed to receive a load-bearing member of the metallic framework, and other courses including units composed of a homogeneous composition of light-weight insulating refractory, said other courses being supported in superposed relation on said lowermost course, the abutting faces of all of the units being complementary and separable from each other to permit replacement of individual units.

4. A flue damper as defined in claim 3, wherein the endmost units of said other courses are composed of a homogeneous composition of dense wear-resistant refractory.

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