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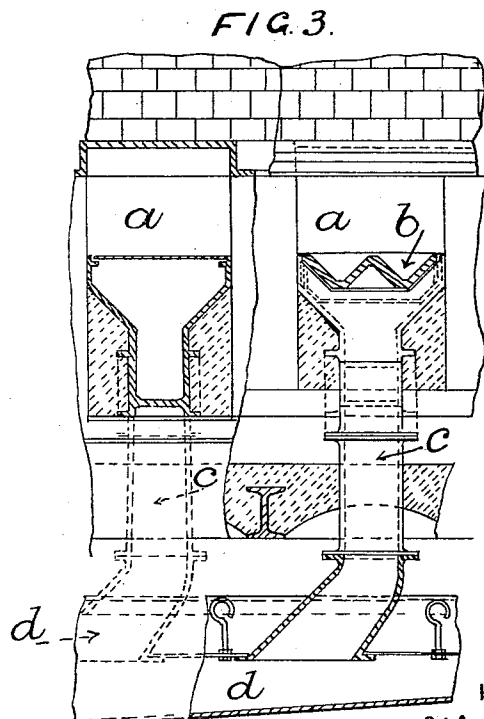
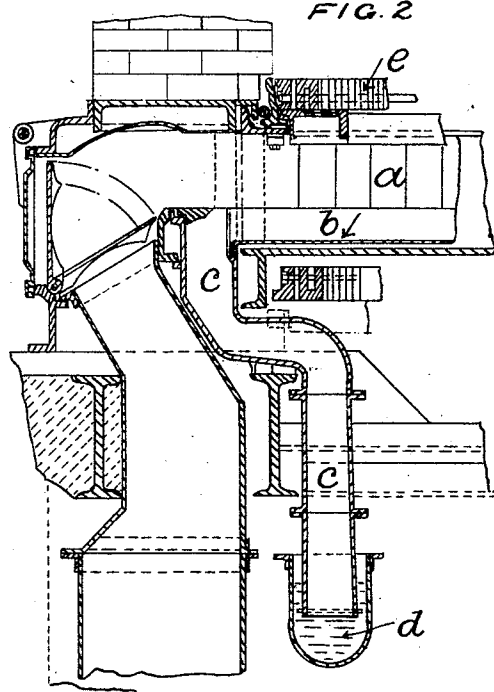
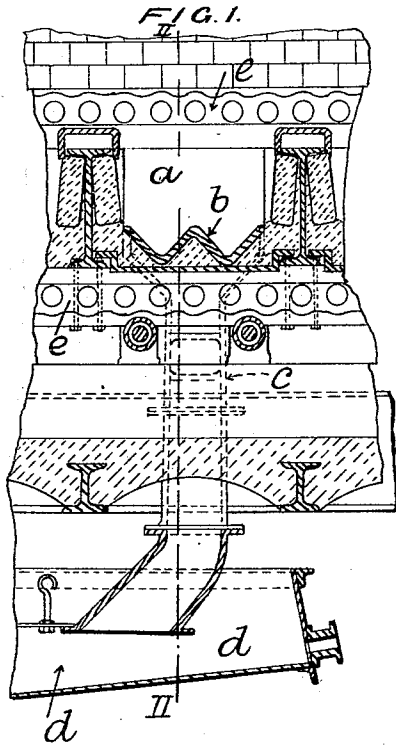
A. W. BENNIS

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MECHANICALLY ACTUATED GRATE FURNACE

Filed Nov. 22, 1927

2 Sheets-Sheet 1



INVENTOR:
Alfred William Bennis
BY: Rugg, Boye & Baker
ATTORNEYS

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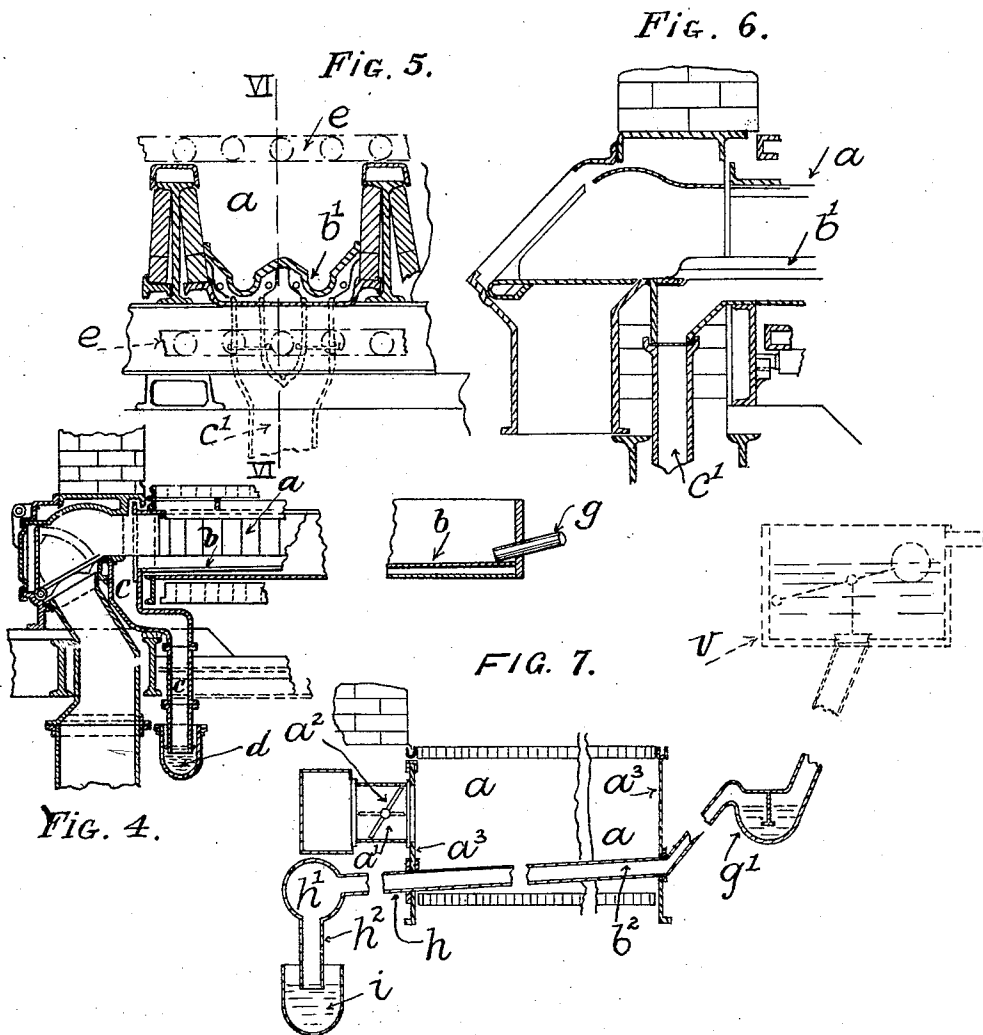
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MECHANICALLY ACTUATED GRATE FURNACE

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INVENTOR:
Alfred William Bennis
BY: *Rugg, Boye & Bakeler*
ATTORNEYS.

UNITED STATES PATENT OFFICE

ALFRED WILLIAM BENNIS, OF LITTLE HULTON, NEAR BOLTON, ENGLAND

MECHANICALLY-ACTUATED GRATE FURNACE

Application filed November 22, 1927, Serial No. 234,958, and in Great Britain November 23, 1926.

This invention relates to improvements in or in connection with chain or traveling grates of the type in which one or more air-cells or compartments situated below the upper run of grate bars or links of a chain grate are employed though it may be applied to other types of grates, as for instance, grates of the single or multiple-plunger retort-type employing air cells situated below the fuel burning structure of the grate. As is well-known, when air cells or compartments are used below moving grate bars or links or below the fuel burning structure of a grate, a certain proportion of the fuel or ash, or riddlings, falls down through the grate into the air-cells below, making it necessary to provide means for the removal of such material. This removal has, in some instances, been accomplished by providing an opening or openings at the bottom of the air cells which can be temporarily opened and closed by means of sliding plates or grids, flaps or the like, intended for the discharge of the material or riddlings that collect in the cells or air compartments. All arrangements of this character are difficult to keep in an airtight condition, and when forced draught is employed, an objectionable amount of air is apt to leak outwardly from the cells.

The object of the present invention is to provide means whereby riddlings can be readily and, automatically removed from the air cells or compartments of a furnace grate, and, when forced draft is employed, the means so provided will prevent undue leakage of air from any cell or compartment, or between any number of such cells or compartments.

I remove the riddlings from the air cells of mechanically operated grates of furnaces hydraulically, that is, by fluid flushing and to this end I apply troughs or gutters in the air cells and intermediate of the upper and lower chain grate stretch, or below the grate surface, such troughs or gutters forming the bottom or substantially the bottom of the air cells or otherwise lining the base of the cell or cells. These troughs or gutters are suitably shaped and are preferably slightly inclined from the higher end to the lower end and they lead to a series of depending pipes

or ducts down which the riddlings are sluiced. These pipes or ducts are preferably sealed in a common conveying pipe or manifold, or in a tank or the like, or they may deliver to means provided for conveying away the riddlings. The riddlings falling into the air cells are got rid of by flushing fluid liberated to the troughs or gutters and discharging down the depending pipes or ducts. Preferably I arrange for a periodical flushing of the troughs or gutters, but this is not essential as the flushing may be continuous.

The attached drawings sufficiently illustrate my system for removing riddlings, in which drawings:

Fig. 1 is a section of a portion of a chain grate furnace showing an air cell provided with a trough or gutter and end discharge pipe or duct dipping and sealing into a longitudinal conveying pipe or manifold.

Fig. 2 is a sectional view taken at right angles to Fig. 1, approximately on the line II—II on said Fig. 1;

Fig. 3 is a sectional view similar to Fig. 1, but showing two contiguous air cells, and illustrating more clearly how the depending pipes or ducts are sealed in the conveying pipe or manifold;

Fig. 4 is a broken away sectional view similar to Fig. 2, on a smaller scale, and illustrating both the water supply and discharge ends of one of the troughs;

Fig. 5 is a vertical sectional view similar to Fig. 1, but illustrating a modified form of grate structure and the use of a discharge breeches pipe serving two adjacent troughs forming the base of an air cell;

Fig. 6 is a sectional view taken approximately on the line VI—VI of Fig. 5; and

Fig. 7 is a broken away sectional view similar to Fig. 4, but showing a grate cell substantially sealed up except as to entrance and exit of the flushing fluid.

In carrying out the invention indicated above, I provide at the bottom of each air cell (marked *a*) one or more troughs, gutters or similar devices, and such troughs or gutters may be of cast-iron laid on concrete, this being the construction illustrated in Figs. 1-4, wherein the troughs or guttering shown

is in the form of a double trough marked *b* and it may be integral or combined with the metal work or other material constituting the sides and bottom of the cell, or be made independent thereof, V or U shaped trough sections laid on concrete as shown being very convenient, the metal of the trough sections being galvanized or otherwise protected. The troughs or guttering may if preferred stand on feet and be bolted in place and water may be supplied to said troughs by a pipe *g*, Fig. 4.

However built-up or introduced, the trough sections constituting the base of the air cells are preferably slightly inclined or sloped downwards in a direction leading to the outlet extremities with which I combine a series of delivery pipes or ducts marked *c*. Thus, the riddlings falling into the cells descend onto the troughs or gutters *b* ready to be sluiced there-along laterally of the furnace and so to enter or pass directly into the pipe or duct marked *c*.

In Figs. 5 and 6, the troughs *b'* are of slightly different configuration and two adjacent troughs are served by a single discharge pipe *c'*.

The travelling chain grate is lettered *e* in certain of the figures.

The delivery pipes or ducts into which the riddlings are sluiced may, if desired, lead to a basement or subterranean space under the grate where the riddlings and water can be dealt with.

With grates employing either forced or natural draft the discharge ends of all the pipes or ducts *c*, *c'* draining the troughs or gutters *b*, *b'* as also the entrance pipes supplying the flushing fluid, are independently liquid-sealed for the purpose of preventing air from being blown out from the cells of the grate, and also for the purpose of preventing air being blown from one cell or compartment to another cell or compartment.

The pipes or ducts *c* are shown, in Figs. 1, 2, 3 and 4, as liquid sealed into a manifold delivery or discharge pipe *d* which may have an inclined bottom or be disposed at a slight angle. As an alternative, the pipes or ducts may depend into a tank or reservoir or more than one of such (not shown). In any case the riddlings deposited or settling therein may be continuously or periodically removed by any suitable means to a point of discharge suitably situated.

Whilst a continuous stream of water may flush the troughs or gutters *b*, *b'* it is preferred to provide and employ an intermittent stream or streams of fluid. This can be controlled by manual appliances as by turning the water on and off as desired by means of a valve or valves. The preferred method of operation, however, is to have the flushing fluid turned on and off automatically from all the cells of the grate as a unit, or on

and off from each cell or a group of cells at desired intervals of time, by means of the employment of suitable self-operating mechanism.

I may substantially seal up the grate cells *a* except as to entrance and exit of the flushing fluid, and Fig. 7 is intended to make this conception clear. Here the air cell *a* has an air duct *a'* with controlling damper *a²* or such like together with provided partitions or walls *a³*, *a³*, and a gutter contrivance *b²* similar to that already described which is hydraulically flushed, preferably intermittently, as by the release of flushing water from an automatic supply cistern. The flushing water provides the seal to the air cell, by a water sealing arrangement *g'*—through which the flushing head of water is discharged to flush the gutter *b²*, the outlet pipe *h* for the flushing water and riddlings, which pipe communicates with gutter *b²*, passing to a conduit *h'* with depending outlet *h²* dipping into a duct *i* containing water to seal the outlet. There may be separate flushing and discharge provision for each cell, or for a series, to keep the cells substantially sealed, the idea being that when forced draught is used and the cells *a* are under air pressure, then although the gutters can be flushed, the air cannot be blown out through the flushing device because of the water seal provision. As a consequence I am able to provide simple and efficient means for sealing the flushing water inlets and outlets to and from the air cells without interfering with the ready and automatic discharge of riddlings without undue loss of air pressure and without having to make use of mechanical contrivances in the grate.

In some cases certain of the grate cells—say the rear cells, are used to reduce the amount of air supplied to that part of a grate lying immediately over same, so that there is no augmentation of air in that locality, or in balanced draught arrangements there may be differences in air pressure plus or minus as and where required, but, in all such arrangements, by the provision indicated, air cannot pass through the sealed flushing devices, that is to be blown out or drawn through in any substantial amount.

I declare that what I claim is:

1. In an apparatus of the character described, the combination of an endless chain grate having an upper and a lower stretch, air cells between said upper and lower stretches, troughs disposed in said cells in position to receive material dropped from the upper stretch of chain grate, means for delivering water to said troughs for sluicing the same, and drainage outlets communicating with said troughs.

2. In an apparatus of the character described, the combination of an endless chain grate having an upper and a lower stretch,

air cells between said upper and lower stretches, troughs disposed in said cells in position to receive material dropped from the upper stretch of chain grate, means for delivering water to said troughs for sluicing the same, drainage outlets communicating with said troughs, and a receiving channel adapted to seal the delivery ends of said drainage outlets.

10 3. In an apparatus of the character described, the combination of an endless traveling grate surface having an upper and a lower stretch, air cells between said upper and lower stretches of grate surface, troughs
15 disposed in said air cells in position to receive material dropped from the upper stretch, drainage pipes in communication with said troughs, an inclined receiving channel adapted to hydraulically seal the delivery
20 ends of said pipes, and hydraulically sealed means for sluicing said troughs.

4. In an apparatus of the character described, the combination of an endless traveling grate surface having an upper and a
25 lower stretch, air cells between said upper and lower stretches of grate surface, each of said air cells being closed at its ends, an air duct communicating with one end of said air cells, troughs disposed in said air cells
30 in position to receive material dropped from the upper stretch of grate surface, depending pipes communicating with said troughs, a conveying duct adapted to hydraulically seal all of said pipes, and a hydraulically sealed
35 pipe for delivering fluid to said troughs.

5. In an apparatus of the character described, the combination of an endless traveling grate surface having an upper and a
40 lower stretch, air cells between said upper and lower stretches of grate surface, each of said air cells being closed at its ends, an air duct communicating with one end of said air cells, means for controlling the supply of air through said duct, troughs disposed in
45 said air cells in position to receive material dropped from the upper stretch of grate surface, depending pipes communicating with said troughs, a conveying duct adapted to hydraulically seal all of said pipes, and a
50 hydraulically sealed pipe for delivering fluid to said troughs.

In testimony whereof I have signed my name to this specification.

ALFRED WILLIAM BENNIS.

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