M. SKLOVSKY.

AIR HEATING APPARATUS.

APPLICATION FILED MAY 5, 1919.

1,360,457. Patented Nov. 30, 1920.

Fig. 1.

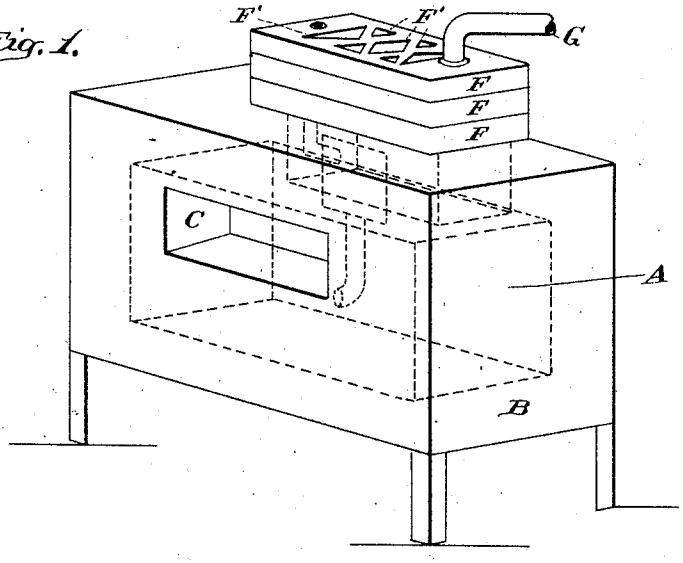


Fig. 2.

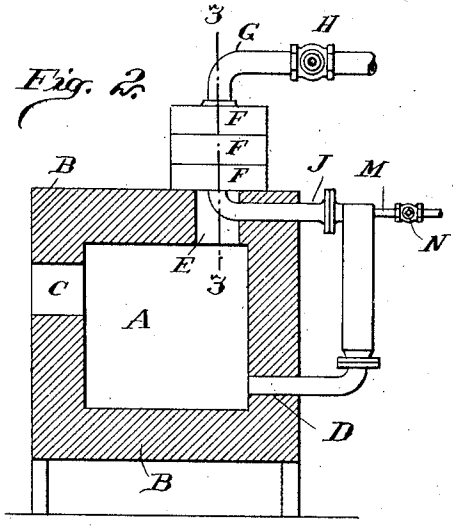
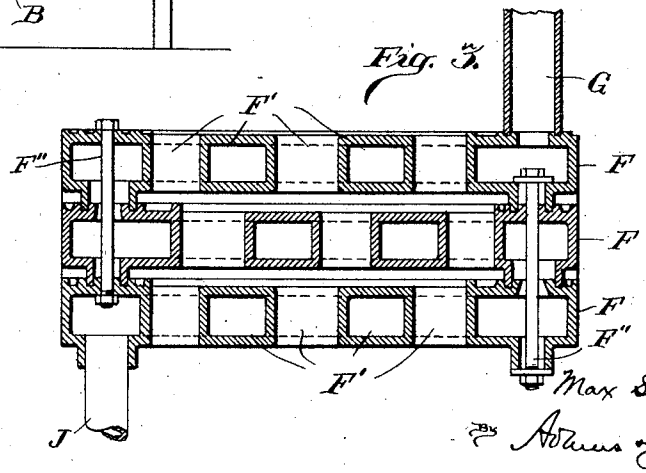


Fig. 3.



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UNITED STATES PATENT OFFICE.

MAX SKLOVSKY, OF MOLINE, ILLINOIS, ASSIGNOR TO DEERE & COMPANY, OF MOLINE, ILLINOIS, A CORPORATION OF ILLINOIS.

AIR-HEATING APPARATUS.

1,360,457. Specification of Letters Patent. Patented Nov. 30, 1920.

Original application filed September 8, 1914, Serial No. 860,709. Divided and application filed March 13, 1917, Serial No. 154,588. Divided and this application filed May 5, 1919. Serial No. 294,815.

To all whom it may concern:

Be it known that I, MAX SKLOVSKY, a citizen of the United States, and a resident of Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Air-Heating Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention has to do with air heating devices and has particularly for its object to provide an improved apparatus suitable for use in connection with liquid fuel burning furnaces to heat the air mixed with the liquid fuel to produce a combustible mixture, although it should be understood that my improved apparatus may be applied to any other use for which it is suitable. My improvement consists in providing a sectional heater the sections of which are provided with internal passages or flues through which the air to be heated is conducted in series while it is exposed to heated gases flowing through tortuous or staggered external passages provided through the several sections. A feature of my invention is that the sections are all alike and are so constructed that a unit composed of a number of sections may be built up by merely turning adjoining sections end for end and securing them together, with the result that the series connection of flues is established. Thus units of any desired size may be built up without the necessity of selecting sections of different design. I accomplish my object as illustrated in the accompanying drawings and as hereinafter more particularly described.

In the accompanying drawings in which I have illustrated my improved air heating apparatus as applied to a metallurgical furnace similar to that shown and described in my pending application for patent for apparatus for producing and consuming gaseous fuel, filed March 13, 1917, Serial No. 154,588, as a division of my application which matured into Letters Patent No. 1,229,338, granted June 12, 1917, for method of producing fuel gas,—

Figure 1 is a view of a heating furnace having my improved air heating apparatus applied thereto;

Fig. 2 is a vertical cross-section through the apparatus shown in Fig. 1; and

Fig. 3 is an enlarged vertical section on line 3—3 of Fig. 2.

Referring to the several figures of the drawings,—A represents the combined combustion and heating chamber of an ordinary heating furnace such as is employed for certain metallurgical operations. B indicates the walls thereof, preferably of brick, as usual. C indicates the usual opening in the front wall of the furnace through which are passed the articles to be heated. D indicates an opening through the rear wall of the furnace into which projects a pipe that supplies gaseous fuel to the chamber A. E indicates an opening in the upper wall for the escape of the burned gases. Mounted over the opening E is my improved air heating device or heating chamber composed of a plurality of chamber sections F, F, F, placed one over another, as shown in Figs. 1, 2 and 3. All of these heating chamber sections are alike in construction, each being provided with a plurality of flues F′ so disposed that by turning adjoining sections end for end in assembling them the flues of adjoining sections will be staggered with relation to each other and the spaces between the flues of the several sections will form open tortuous passages for the escaping gases, thereby better utilizing the waste heat to effectively heat the walls of the several sections F, as clearly shown in Fig. 3. This provides a very convenient construction, as all the chamber sections are made off the same pattern. The several sections F are secured together so as to be readily removable, thereby permitting any desired number to be used, for it will be understood that while three sections are shown in the construction illustrated, the number may be varied to suit different sizes of furnaces. In the construction shown, the several sections are secured together by bolts F″ shown in Fig. 3. The several sections are each provided with an air inlet and an air outlet, as also shown in Fig. 3, the inlet and outlet passages being at the opposite ends of the section, and the sections are connected in series so that the entering air traverses the several sections successively from end to end

and thereby permits all the air that passes through the device to attain a substantially uniform temperature. This is an important consideration as in order that the apparatus may operate to the best advantage, the air must be uniformly heated so that when it comes in contact with the vaporized fuel oil there will be no danger of premature ignition.

G indicates a pipe through which air is admitted to the sections F, it opening, as shown, into the upper one of such series of sections. The air so supplied is forced through the pipe under pressure by any suitable means (not shown), and receives heat by conduction through the walls of the heating chamber, as will be understood. H indicates a valve in the pipe G, by means of which the quantity of air passing through the pipe can be regulated or the supply shut off entirely.

J indicates a pipe connected to and opening into the lower heating chamber section F and passing through a suitable opening in the wall of the furnace where it is so connected to a vaporizing chamber K, as to deliver the heated air from the chamber sections F to the upper part of such vaporizing chamber. Also communicating with such vaporizing chamber K, near the upper end thereof is another pipe, indicated by M, of very considerably less diameter than the air-conducting pipes G and J, which pipe M is for conducting the fuel oil employed to the said vaporizing chamber K. N is a valve for controlling the flow of oil through the pipe. At its lower end the vaporizer K communicates with the combustion chamber A through a pipe connection L that passes through a suitable opening D in the wall of the furnace into the combustion chamber.

When the furnace is in use the burned gases rising from the chamber A through the exit opening E and through the open passages between flues F′ will quickly heat the chamber sections F and the air that is being forced through such chamber sections.

The form of furnace shown is simply illustrative as my improved heating apparatus may be applied to other forms of furnace or may be used for any other purpose for which it is adapted.

What I claim as my invention and desire to secure by Letters Patent, is—

1. An air heating chamber comprising a plurality of similar chamber sections fitted together and having flues communicating with one another, adjoining sections being turned end for end, each section having open passages therethrough, the passages of adjoining sections being staggered with relation to each other, and means for securing the sections together.

2. An air heating device comprising a plurality of chamber sections fitted together, each having a plurality of flues therethrough, and open passages around said flues, the flues of said sections being connected in series, and means detachably securing said sections together.

3. An air heating device comprising a plurality of similar chamber sections, each having a plurality of flues therethrough and open passages around said flues, said flues and passages being arranged so that when said sections are fitted together with adjoining sections turned end for end the flues of adjoining sections will be staggered with relation to each other, providing tortuous passages through the assembled sections, and means for securing the sections together.

4. An air heating device comprising a plurality of chamber sections fitted together, each having a flue therethrough, the end portions of the flues of said sections being connected in series, open passages through said sections around said flues, and means for securing said sections together.

5. An air heating device comprising a plurality of chamber sections fitted together, each having a flue therethrough, the end portions of the flues of said sections being connected in series, open passages through said sections around said flues, the passages of one section being in staggered relation with those of an adjoining section, and means for securing said sections together.

MAX SKLOVSKY.