

A. SCHMIDT.

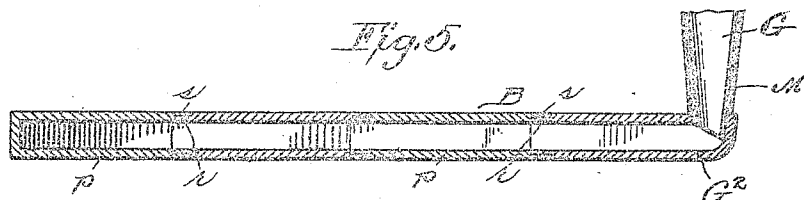
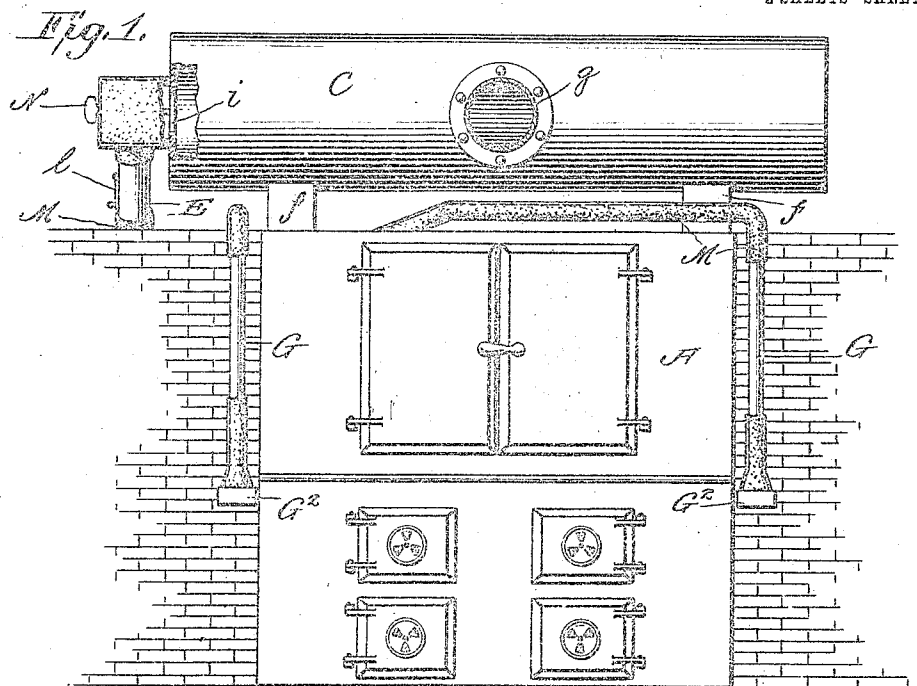
FURNACE.

APPLICATION FILED JUNE 21, 1903.

945,869.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.



WITNESSES

Oliver H. Holmes
J. J. Sheehy Jr.

INVENTOR

A. Schmidt.
by James Sheehy
Attorney

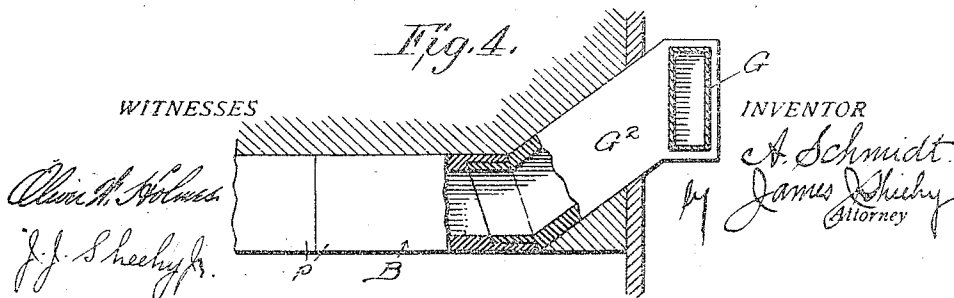
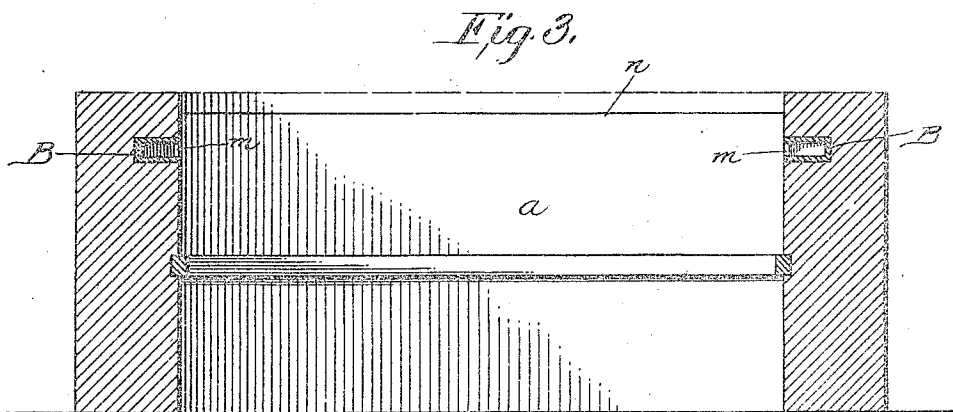
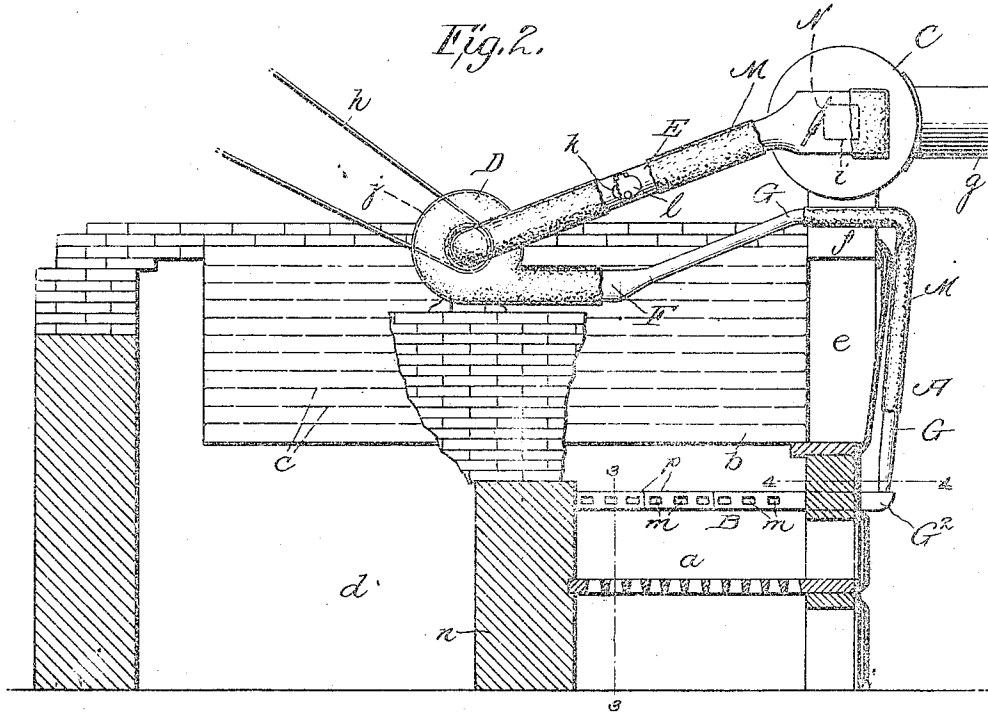
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

ALOIS SCHMIDT, OF ST. PAUL, MINNESOTA.

FURNACE.

945,869.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed June 21, 1909. Serial No. 503,472.

To all whom it may concern:

Be it known that I, ALOIS SCHMIDT, citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented new and useful Improvements in Furnaces, of which the following is a specification.

My present invention has to do with means for promoting the consumption of smoke and other products of combustion in steam boiler and other furnaces with a view of practically eliminating the emission of smoke and economizing in the use of fuel; and its novelty, utility and practical advantages will be fully understood from the following description and claim when the same are read in connection with the drawings, accompanying and forming part of this specification, in which:

Figure 1 is a front elevation of a steam boiler furnace equipped with my improvements and showing some of the elements partly broken away. Fig. 2 is a longitudinal vertical section, with some of the parts in elevation and others partly broken away. Fig. 3 is a transverse section taken in the plane indicated by the line 3—3 of Fig. 2, and illustrating the arrangement of the side, longitudinally disposed conduits for ejecting the hot returned gases and other products of combustion and the air added to and commingled therewith into the box over the fire bed therein. Fig. 4 is an enlarged detail section taken on line 4—4 of Fig. 2 and showing a portion of the header partly broken away and also showing part of one of the ejecting conduits in plan. Fig. 5 is a detail view illustrative of the manner of connecting the contiguous ends of the sections comprised in each of the said conduits.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which:

A is a steam boiler furnace comprising the usual fire-box *a*, a boiler *b* having flues *c* adapted to receive smoke and other products of combustion from the combustion chamber *d*, and a smoke box *e*, communicating with and adapted to receive smoke and other products of combustion from the forward ends of the flues of the boiler. I would, however, have it here understood that without affecting my invention one or more smoke boxes may be arranged to receive smoke and other products of combustion

from the forward ends of the flues comprised in a single boiler or a multiplicity of boilers.

In installing my invention I provide two conduits *B* arranged in the side walls of the fire-box *a* and flush with the inner sides of said walls. I also provide a transverse receiver *C* arranged above and connected through one or more ducts *f* with the smoke box *e*, and having an eduction duct *g* at its middle, designed to lead to a smoke stack or uptake, not shown; a fan blower *D* located at one side of the furnace and designed to be driven by a suitable motor, not shown, through the medium of a belt *h*, a duct *E* communicating with an opening *i* in one end of the receiver *C* and leading to the casing *j* of the blower *D*, and having, at an intermediate point of its length, an opening *k* and a hand-operated valve or door *l* for controlling said opening; and a duct *F* leading from the blower casing and merging into branch ducts *G*, one of which leads to the forward end of one conduit *B* and the other to the forward end of the other conduit *B*.

As best shown in Figs. 2 and 3, the conduits *B* are provided in their inner walls and at intervals of their length with orifices *m*, and consequently when the fan blower *D* is in action and the furnace is in operation, the course of the smoke, hot gases and other products of combustion is as follows: From the fire bed in the fire-box *a* said products of combustion pass over the bridge wall *n*, through the combustion chamber *d*, and then through the boiler flues *c*, the smoke box *e*, the ducts *f*, the receiver *C*, the duct *E*, the blower casing *j*, the duct *F*, the branch ducts *G*, headers *G*² and the conduits *B*, in the order named, and are discharged through the orifices *m* of the conduits *B* into the fire-box *a* above the fire bed therein. From this it follows that the smoke and other products of combustion are repeatedly subjected to the action of the fire and consumption thereof is materially promoted; also, that the injection of said products of combustion in a heated state above the fire bed accelerates the combustion of the fuel and the products last given off by the same, with the result that all of the heat value of the fuel is utilized.

It will further be manifest from the foregoing that the fan blower *D* serves to exhaust the products of combustion from the

receiver C, and to force said products under pressure to the conduits B, and through said conduits into the fire-box *a*, and consequently there is ample draft through the bed of fire; the said draft being increased in a measure by the connection of the duct *g* with the smoke stack or uptake through which a certain portion of the products of combustion escape.

10 The opening *k* controlled by the valve or door *l* serves to enable the attendant in charge of the apparatus to admit such atmospheric air into the current of products of combustion as is necessary during the operation of the apparatus; it being understood that the atmospheric air admitted as stated, will be commingled with and heated by the hot gases and other products of combustion and will materially promote the combustion in the fire-box *a* and combustion chamber *d*.

By reference to Figs. 2, 4 and 5, it will be observed that each of the conduits B comprises a plurality of, say three, sections *p*. These sections are preferably of iron, and are joined together in the manner best shown in Fig. 5—that is to say, by arranging a reduced rear end *r* of one in a complementary socket *s* in the forward end of the next section toward the rear. The headers *G*² are similarly connected with the foremost sections *p*, and from this it follows that the sections *p* and the headers *G*² may be expeditiously and easily positioned from the forward end of the furnace and may as readily be removed when necessity demands. It will also be observed by reference to Fig. 2 that each section *p* is provided in its inner side wall *i*, *e.*, its wall nearest the fire-box with a series of discharge apertures or orifices *m*, there being, by preference, three apertures to each section *p*, and the apertures being three inches apart and respectively three inches long by one and one-half inches high. These apertures or orifices *m* are for the purpose of assuring an equal or uniform discharge of the hot gases or gases and air commingled therewith from the conduits B throughout the length of the conduits and the length of the fire bed, so as to cause the fuel to burn evenly or uniformly over the whole of the fire bed.

It will be observed by reference to Fig. 4 that the header *G*² of each conduit B extends forwardly and obliquely outward from the forward section of the conduit at an angle of about 45 degrees; also, that the forward portion of the header receives in its upper wall and is thereby connected to the enlarged lower end of one of the branch ducts *G*. This also contributes materially to the facility with which the conduits B may be connected with the ducts *G*. It will also be here noted that the headers *G*² extending at an oblique angle to the imper-

forate forward portions of the forward sections *p* are advantageous since when so disposed the headers change the direction of movement of the blast of hot gases or hot gases commingled with air before the same pass through the orifices *m*, and in that way aid materially in attaining an even distribution of the gases and air under pressure over the fire bed. In other words, the obliquely disposed headers *G*² discharge the blast of hot gases or hot gases and air against the imperforate forward portions of the forward sections *p*, whereupon the blast is caused to move in the direction of the length of the conduits B, for the purpose before stated, and yet the progress or force of the blast is not materially checked, with the result that the gases or gases and air are forcibly discharged through the orifices *m* as is desirable.

The drawing of the products of combustion through a furnace in the manner described maintains a strong draft which prevents in great measure the lodging of soot in the flues *c* of the boiler, and hence said flues do not have to be cleared or cleaned at frequent intervals.

At this point I would have it definitely understood that while I prefer to employ a fan blower D of conventional or any other suitable construction for the purpose ascribed to it, I do not desire to be understood as confining myself to any specific means whatsoever for drawing hot gases from the smoke box *e*, and returning the said gases with or without air to the fire box, inasmuch as any means consonant with the purpose of my invention may be employed for the said purpose, without involving departure from the scope of my invention as defined in the claim appended.

With a view of preventing the radiation of heat from the products of combustion while *en route* from the smoke box *e* back to the fire box *a*, I prefer to cover the means through which the products of combustion are conducted in whole or part with asbestos, plastic non-heat conducting material, or any other non-heat conducting covering, indicated by M and shown in Figs. 1 and 2. This provision obviously prevents the dissipation of heat from the products of combustion and at the same time prevents undue heating of the atmosphere adjacent the furnace.

The duct E may be and preferably is provided at N with a suitable damper by which said duct may be closed when desirable or necessary, and it will also be here noted that the valve or gate *l* may be closed when it is not desired to mix air with the products of combustion, and that said valve or gate may be opened to a greater or less extent according to the proportion of air that it is desirable to add to the products of combustion.

While my novel apparatus is designed more particularly for use in combination with steam boiler furnaces, I would have it understood that the apparatus may be used to advantage as an air blast for furnaces in brass and iron foundries.

In addition to the practical advantages hereinbefore ascribed to my novel apparatus, it will be noted that the said apparatus is simple and inexpensive in construction and susceptible of being readily applied to steam boiler furnaces such as at present in use, and that the apparatus requires but little attention while in operation, and is calculated to last quite as long as the other appurtenances of a steam boiler furnace.

The construction herein illustrated and described constitutes the best practical embodiment of my invention of which I am cognizant, but it is obvious that in the future practice of the invention such changes or modifications may be made as do not involve departure from the scope of my invention as defined in the claim appended.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

The combination of a fire-box having side walls, downwardly extending ducts disposed

in front of the said walls, means intermediate the fire-box and the upper ends of the ducts for conducting products of combustion from the former to the latter, conduits arranged in the said walls of the fire-box and having orifices in their walls that are opposed to the fire-box and also having the forward portions of the said walls imperforate; said conduits being each made up of a plurality of sections having reduced rear ends let into sockets in the forward ends of the adjacent sections, and headers having reduced rear ends let into sockets in the forward ends of the forward sections and extending through and projecting forwardly from the first-named walls and obliquely outward from and opposite the said imperforate portions of the conduit walls and having openings in their upper walls receiving the lower ends of the said ducts; the said headers being closed at their forward ends.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALOIS SCHMIDT.

Witnesses:

GEORGE N. GERLACH,
ALICE J. LOBBELL.