H. P. PARROCK.

WATER COOLED DOOR.

APPLICATION FILED JUNE 6, 1910.

1,050,229.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

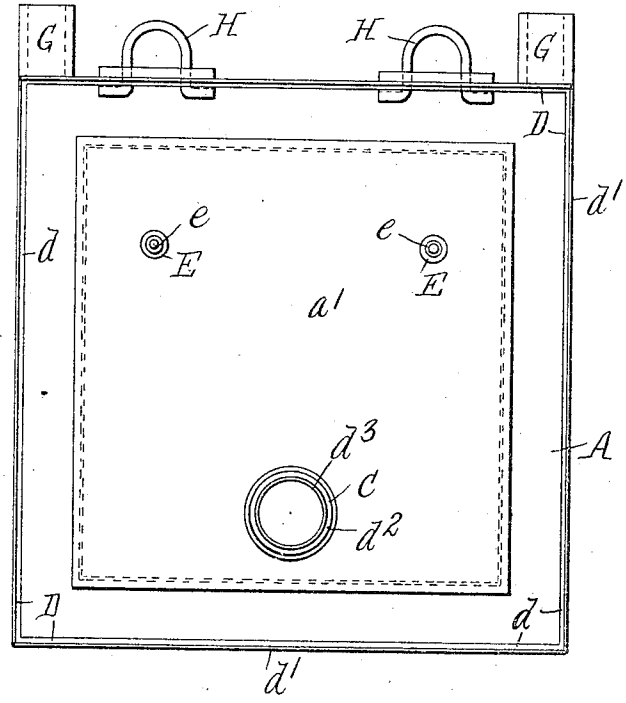


Fig. 2.

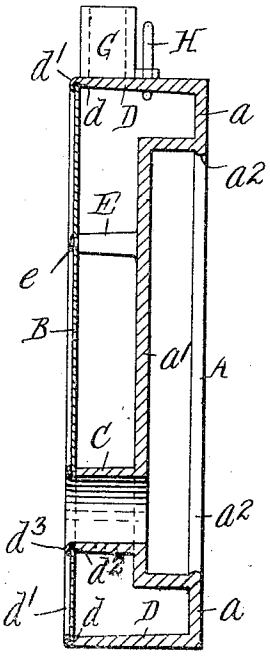


Fig. 3.

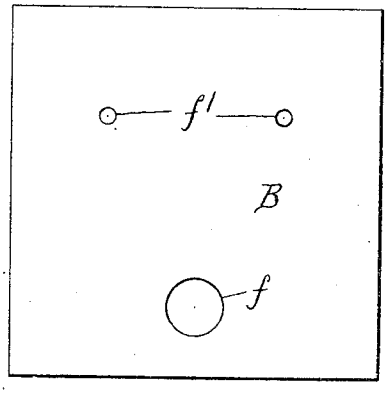


Fig. 4.

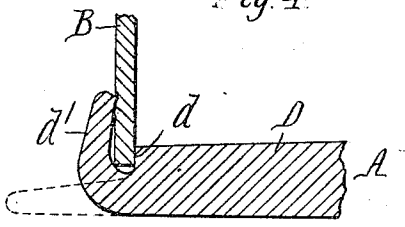
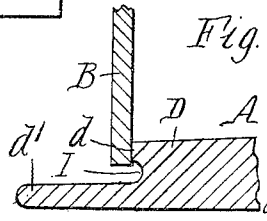


Fig. 5.



Witnesses.

C. H. Bund.

A. G. Simond.

Inventor.

Harry Percival Parrock.

By Wilkinson, Parker & Hard,

Attorneys

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2 SHEETS—SHEET 2.

Fig. 6.

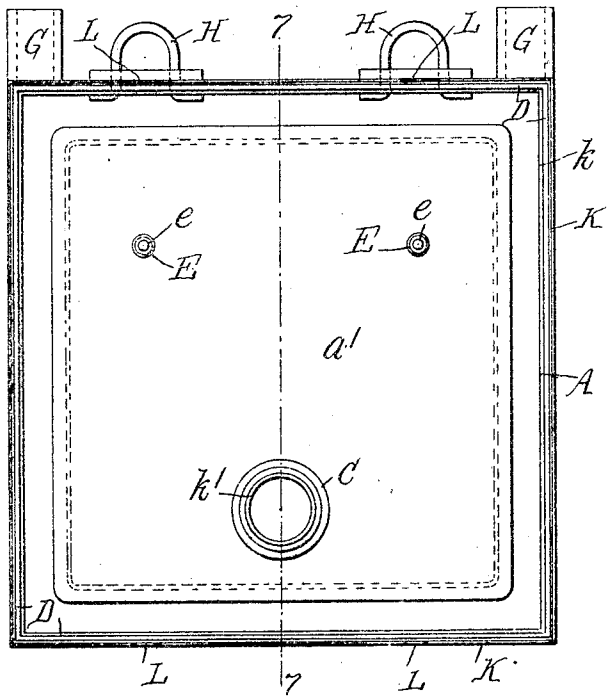


Fig. 7.

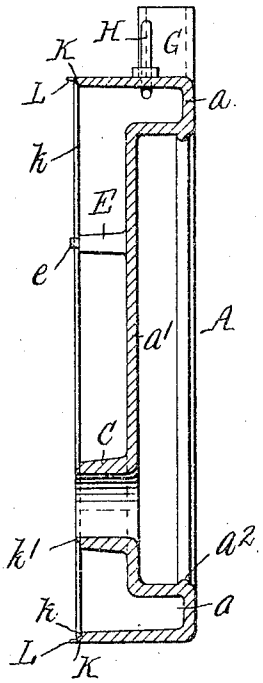


Fig. 8.

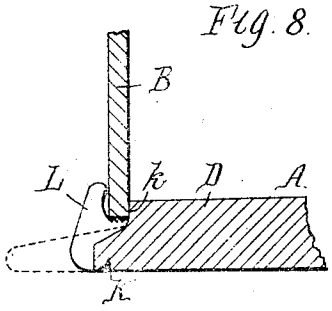
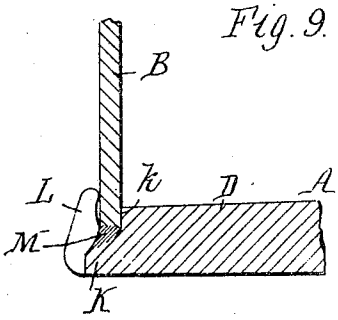


Fig. 9.



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A. G. Dimond.

Inventor.

Harry Percival Parrock,

By Wheeler, Parker & Hand,

Attorneys

UNITED STATES PATENT OFFICE.

HARRY PERCIVAL PARROCK, OF BUFFALO, NEW YORK.

WATER-COOLED DOOR.

1,050,229. Specification of Letters Patent. Patented Jan. 14, 1913.

Application filed June 6, 1910. Serial No. 565,241.

To all whom it may concern:

Be it known that I, HARRY PERCIVAL PARROCK, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Water-Cooled Doors, of which the following is a specification.

This invention relates to that class of furnace doors which are subjected to high temperatures and are made hollow for the circulation of cooling water.

The objects of the invention are to produce a water-cooled furnace door which can be readily and economically manufactured and which will be more durable in service and will withstand the high temperatures to which these doors are subjected for a longer time than furnace doors as heretofore constructed.

It is well known in the art that a cast steel door is better able to withstand high temperatures and is superior in many ways to cast iron or wrought iron doors, but it is not practicable to make hollow steel doors in a single integral casting, since great difficulty is experienced in removing the mold cores, owing to the high temperature at which the steel is poured into the molds.

Doors constructed in accordance with this invention are composed of two parts, a hollow open-sided box-like body portion which is preferably made of cast steel, and a front or cover plate secured to the body portion and closing the open side thereof so that a chamber for the cooling water is formed between these two parts. When in use, the steel body portion of the door is exposed to the heat of the furnace, while the plate merely serves to confine the water within the door.

In the accompanying drawings, consisting of two sheets: Figure 1 is an elevation of the body portion of a door embodying the invention. Fig. 2 is a central vertical section of a complete door. Fig. 3 is an elevation of the front or cover plate on a reduced scale. Fig. 4 is an enlarged section of the joint between the body portion of the door and the cover plate. Fig. 5 is a similar sectional view of a slightly modified form of joint. Fig. 6 is an elevation of the body portion of a door of modified construction. Fig. 7 is a vertical section on line 7—7, Fig. 6, with the cover removed. Fig. 8 is an enlarged sectional view of an unfinished joint between the parts of the door shown in Figs. 6 and 7. Fig. 9 is a sectional view similar to Fig. 8, showing a finished joint.

Like reference characters refer to like parts in the several figures.

The furnace door is composed of a shallow open-sided box-like body or casting A and a front or cover plate B which is secured to the edge or side walls of the body and closes the open side thereof.

Referring first to the construction shown in Figs. 1–4, the body portion A of the door is cast in one piece and is provided with a rearwardly-projecting hollow marginal flange a which serves to hold the fire brick or other lining (not shown) for the door in place against the rear wall a' of the door. The flange may have any suitable form adapted for retaining the lining in place, a bead a^2 being shown on the flange in the drawings. C represents a tubular boss which forms the usual peep-hole which may be located in any convenient part of the door. The top, bottom, and side walls D of the body A are reduced in cross-section at their front edges, forming shoulders d against which the front plate B bears, and marginal flanges d' which surround the front plate and are bent inwardly over the edges thereof to secure the front plate in place. At the corners of the walls, portions of these flanges are omitted to facilitate the bending over of the flanges. A similar shoulder d^2 and flange d^3 are formed at the front end of the walls of the peep-hole. The walls D preferably decrease in thickness or taper toward the front or open side of the body A in order to facilitate the casting of the body, and the boss C forming the peep-hole is made tapering for the same reason. E are standards or posts which project forwardly from the rear wall a' of the body and whose outer ends e are reduced in diameter. The body portion A of the door consists of a single casting of a soft grade of steel since this material is best adapted for the use to which these doors are subjected. The body shaped as described can be readily made of cast steel. The front or cover-plate B of the door may be cut or stamped from a plate of metal and is made of proper size to be placed on the body portion A of the door between the flanges d' and to rest on the shoulders d. A hole f in the cover plate receives the reduced end of the boss C forming the peep-hole, so

that the edges of the hole f rest on the shoulder d^2 of the walls of the peep-hole. Holes f' f' are also provided in the cover so located and are of such size as to fit over the reduced ends of the standards E. In assembling the parts of this door, the edge portions of the walls D of the body A of the door are first heated to a temperature at which the flanged portions can be bent over. The cover plate B is then placed into position on the shoulders d of the body portion of the door and the reduced ends of the standards E, which pass through the holes f' in the cover plate, are preferably first riveted down to hold the plate in place. The flanges d' on the walls D and the flange d^3 on the walls of the peep-hole are then bent over, by a press or by hammering, into a position to press the plate firmly against the shoulders d and d^2, as shown in the full lines in Fig. 4. In this manner the cover plate is securely attached to the hollow body portion of the door, forming a closed water chamber, since the flanged parts will contract on cooling and thus hold the plate very firmly in place. To make the water chamber absolutely water-tight, the joints between the cover plate and the outer edges of the turned-over flanges may be calked in the ordinary manner practiced in boiler making. G represents nipples or connections for the water circulating pipes, which may be located at any suitable part of the body A, and H represents the usual lifting lugs for raising the door.

In Fig. 5, a slightly modified construction is shown in which a groove I is formed between the flange d' and the shoulder d of the body portion A of the door. Before placing the cover plate B in position on the body portion of the door, this groove is filled with a suitable cement, for example, a cast steel cement, which will make the joint between the cover plate and the body portion of the door water-tight.

In the construction shown in Figs. 6, 7 and 8, a short flange K is formed on the outer edges of the walls D of the body. The width of this flange beyond the shoulders k may be only slightly greater than the thickness of the cover plate. A similar flange k' surrounds the outer portions of the walls of the peep-hole. L represents lugs or lips which project from the flanges on the upper and lower walls D of the door. In assembling a door of this modified construction, the cover plate is placed in position on the body portion of the door, after which the ends of the standards E are riveted down and the lips L are bent over to hold the plate temporarily in position. The plate is then welded to the body portion of the door by some suitable welding flame or by electric welding, the space between the plate and the flanges being preferably filled with metal, indicated at M in Fig. 9. This produces a very secure and water-tight joint.

A door constructed as hereinbefore described possesses all the strength, durability, and wearing qualities of a door cast in one integral casting, and in addition has the advantage that it consists of parts that can be easily made and assembled. The body portion of the door can be made of cast steel, which metal is particularly well adapted for this use, and the usual difficulty of removing the core from a hollow cast steel door is not experienced in the manufacture of this door, the hollow part of which is free from any obstructions which would tend to bring an unequal heating of the door and thus very materially reduce its life. The cover plate, which forms the outside portion of the door, is subjected to very little wear or heat and consequently can be made of thin material, which decreases the weight of the door.

I claim as my invention:

1. A water-cooled door comprising an integral cast steel body portion having a rear wall and forwardly-extending top, bottom and side walls provided with a marginal flange at the outer edges of said walls and forming a shoulder therewith, a cover plate which rests against said shoulder within said flange to form with said body portion a chamber for the circulation of water, and means for holding said plate against said shoulder, substantially as set forth.

2. A water-cooled door comprising an integral cast steel body portion having a rear wall, a rearwardly-projecting hollow marginal flange, and top, bottom and side walls which extend forwardly from said flange beyond said rear wall and are provided with a marginal flange at the outer edges of said walls and forming a shoulder therewith, and a cover plate which is secured to said body portion against said shoulder within said flange, substantially as set forth.

3. A water-cooled door comprising an integral cast steel body portion having a rear wall and forwardly extending top, bottom and side walls provided with a marginal flange at the outer edges of said walls and forming a shoulder therewith, said body portion having connections for water circulating pipes and an integral tubular boss extending forwardly from said rear wall and provided with a marginal flange and a shoulder, and a cover plate which receives the flange of said boss and which rests against said shoulders on said walls and boss to form with said body portion a chamber for the circulation of water, and means for holding said plate against said shoulders, substantially as set forth.

4. A water-cooled door comprising an integral body portion having a rear wall and forwardly extending top, bottom and side

walls provided with a marginal flange at the outer edges of said walls and forming a shoulder therewith, a cover plate which rests against said shoulders within said flange to form with said walls a chamber for the circulation of water, the outer portion of said flange being adapted to be bent over the edges of the cover plate to retain said cover plate in position against said shoulders, substantially as set forth.

Witness my hand, this 1st day of June, 1910.

HARRY PERCIVAL PARROCK.

Witnesses:

F. E. PROCHNOW,

A. L. MCGEE.