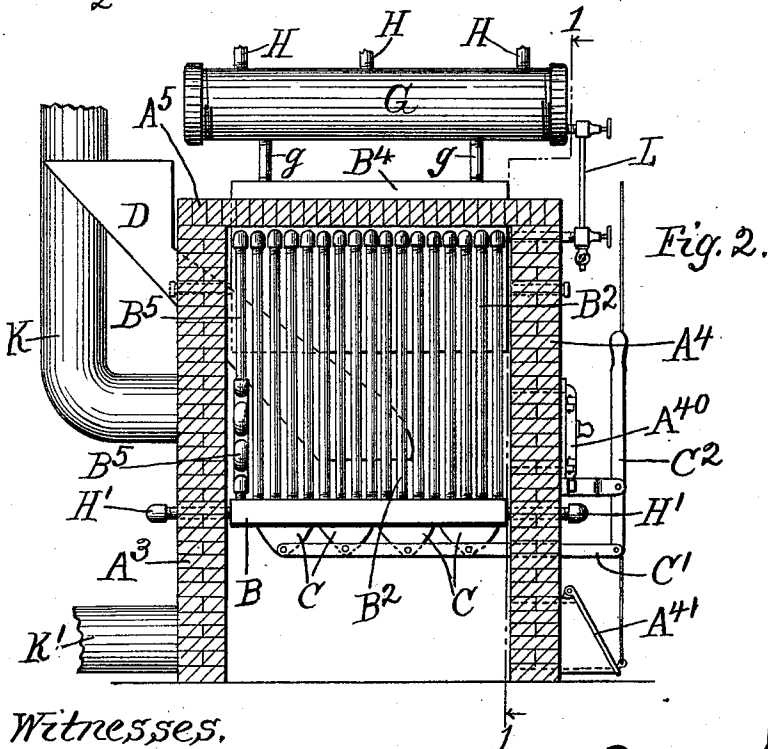
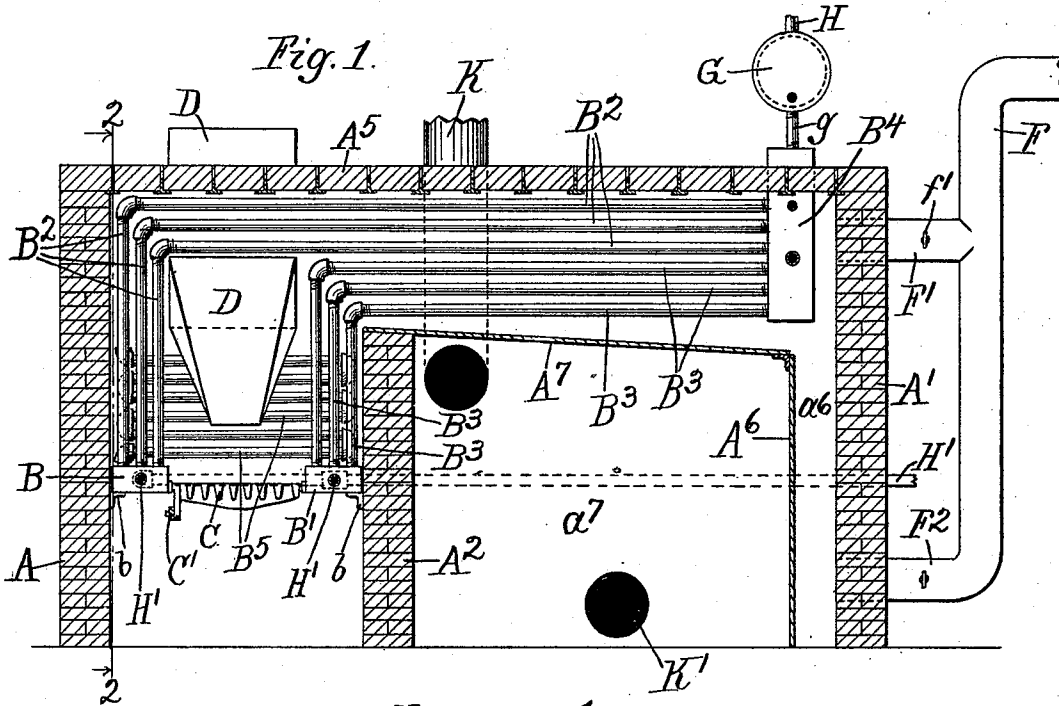


J. F. HARRISON.
HOT WATER HEATER.

Patented Nov. 6, 1894.



Witnesses,

E. T. Wray.
Jean Elliott.

Inventor:

James F. Harrison
by Burton^W Burton
ex atty.

UNITED STATES PATENT OFFICE.

JAMES F. HARRISON, OF CHICAGO, ILLINOIS.

HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 528,720, dated November 6, 1894.

Application filed March 10, 1894. Serial No. 503,173. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. HARRISON, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Hot-Water Heaters, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to appliances for heating by hot water circulation, and consists in the construction and arrangement of the furnace and boiler, in respects which are specified in the claims.

In the drawings:—Figure 1 is a side elevation of the furnace and boiler with the brick side wall removed, showing the interior construction as at a section at the line 1—1 on Fig. 2. Fig. 2 is a section at the line 2—2 on Fig. 1.

The entire furnace and boiler are represented as inclosed with brick walls; A, being the front end wall; A', the rear end wall; A², the bridge wall; A³, the front side wall; A⁴, the rear side wall; and A⁵, the top.

BB' are headers for steam pipe. They are supported upon the angle-iron ledges *bb*, secured to the inner sides of the front end wall A, and the bridge wall A², respectively; and C is the grate which is supported upon the headers and extends between them. I have shown a familiar form of interlocking and rocking grate, whose several members are operated by the rocking bar C', operated by the lever C². This forms no part of my invention. Any suitable grate may be employed in the same situation relatively to the other parts.

From the header B, steam pipes B² B³ B⁴ extend up along the front end wall, and then turn away from that wall and extend longitudinally with respect to the entire furnace at a sufficient distance above the grate for a fire-box. From the header B' steam pipes B³ extend up along the bridge wall A², and turn toward the farther end of the furnace, extending parallel with the longitudinal portions of the pipes B² B³, all said pipes B² and B³ entering the header B⁴ at the remote end of the furnace. From one of the headers B B', the pipe B⁵ leads with return bends back and forth across one side of the firebox space be-

tween the upright portions of the pipes B² and B³, along the side-wall A³, to any desired height, and thence extends up directly to the same height as the outermost of the pipes B², and then longitudinally alongside that row of pipes to the header B⁴. The fuel door A⁴⁰ and ash door A⁴¹ are mounted upon the side wall A⁴, and if the furnace is to be made self-feeding, the fuel chute or magazine D penetrates the side wall A³, and overhangs the grate; and when such chute is employed, it limits the height to which the courses of the pipe B⁵ can be carried to bound the firebox at the rear.

F is the smoke flue, which is reached either by the direct pipe F', which communicates through the rear end wall A', just beyond the header B⁴, or through the pipe F², which communicates through the same wall near the lower end; and in-order to bound the flue in the furnace, or passage for the products of combustion, I erect, a few inches inward from the end wall A', a partition A⁶, preferably of metal plate, and connect it at the upper end by the partition A⁷, which extends longitudinally to the top of the bridge wall A². When the damper *f'* in the pipe F' is closed, the products of combustion are compelled to pass down between the bridge wall A' and the partition A⁶ in the flue *a*⁶, to enter the pipe F² and pass thence to the chimney.

G is a drum which communicates through the pipes *g* with the top of the header B⁴, and affords connection for the supply pipes H H of the circulatory system, H' H' being the return pipes which enter the headers B B' at the ends.

It will be observed that this construction gives a firebox of which all the walls except the front wall having the door are of pipes pertaining to the water circulatory system, so that the heat of the fire is communicated directly to the pipes without any intervening walls to absorb or conduct away the same; also, that the products of combustion from the bed of coals in the fire-box pass through a compactly arranged group of longitudinal pipes pertaining to the water circulatory system, and against and around the header B⁴, before reaching the outlet to the chimney; also, that when the indirect draft through the pipe F² is employed, the products of com-

bustion pass over the top and down on one side of an air chamber from which circulation of hot air may be obtained to assist in heating; and for this purpose I provide from
 5 such air chamber a^7 , the hot air pipe K, and, leading into it, a cold air duct K', so that all the heat which can be obtained from the smoke and hot gases on their way to the chimney may be utilized. Ordinarily, when this
 10 appliance is used in house-heating, the lower floor of a house or the halls and vestibules may be heated with hot air from this chamber a^7 , the hot water circulatory system being used for more distant heating, or under some circumstances, when it is possible to carry hot
 15 air pipes in positions where they will be thoroughly protected from loss by radiation, the highest rooms in the house may be most economically heated by hot air, and the difficulty which is sometimes experienced by carrying hot water circulation to great heights may be avoided. This device is equally adapted to steam heating, because the drum G will become a steam drum when the fire
 20 and circulation are so managed as to generate steam, and in that case, the water gage glass, L, which connects the lower part of the drum at one end with the upper part of the header B⁴ will enable the operator to manage
 25 the circulation so that the pipes exposed to the flame and fire will at all times be full of water.

When the apparatus is designed for steam, the pipes within the furnace should be made
 35 of greater diameter than when it is designed for hot water circulation, and it will be prudent, in any case, to give the longitudinal portion of the pipes in the furnace a little inclination to facilitate the escape of any
 40 steam that may be generated when the mode of use is intended to produce hot water circulation, and in like manner to permit the accumulation of the steam in the drum when it is operated with the purpose of generating
 45 steam.

I do not desire to be limited to the specific details of construction as to manner of mounting and supporting the pipes and headers, &c., nor as to the detail arrangement of the
 50 pipes, except in so far as to cause them to bound the fire-box, and to occupy compactly the smoke flues leading to the chimney; but I consider the arrangement shown, which involves feeding at the side rather than at the
 55 end, and permits the self-feeding chute or

magazine D to enter through the opposite side, a desirable one; and I also consider the arrangement which results in the hot air chamber a^7 , quite desirable, both because of the opportunity it affords of utilizing heat
 60 which would otherwise to a large extent be wasted; and also because there is thereby afforded in the same apparatus means for heating by hot air and by hot water circulation, each of which has advantages for certain situations and portions of the house.

I claim—

1. In combination with the furnace walls, the horizontal headers B B' mounted thereon, and the grate supported between them; the
 70 pipes leading up from such headers respectively, to constitute two sides of the firebox, the pipes from both sides being thence extended in the same direction transverse to the length of the headers, whereby the pipes
 75 from one side are extended across the space between the two sides to form the top of the firebox and all extend thence together, and the final header B⁴ into which all said pipes lead, the supply pipes of the system leading
 80 from said header B⁴, and the return pipes leading into the headers B B': substantially as set forth.

2. In combination the headers B and B', located at the level of the grate at opposite
 85 sides thereof, pipes extending up first upward from the headers to form the opposite sides of the fire-box, and thence extending approximately horizontally in the same direction from the fire-box, and the header B⁴, into which
 90 all said pipes lead; the supply pipes of said system leading from said headers B⁴ and the return pipes leading into the headers B and B': substantially as set forth.

3. In combination with the firebox whose
 95 walls consist of pipes of a water circulatory system, a fuel chute or magazine for self-feeding introduced through one side of the fire-box, and the door located at the opposite side, whereby said fuel chute and door cause the
 100 least possible reduction or interruption of the water circulatory pipes around the fire.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at
 105 Chicago, Illinois, this 5th day of March, 1894.

JAMES F. HARRISON.

Witnesses:

CHAS. S. BURTON,
 JEAN ELLIOTT.