(No Model.)

A., W. & H. WILDMAN.

WATER TUBE BOILER.

No. 582,381. Patented May 11, 1897.

Fig. 1.

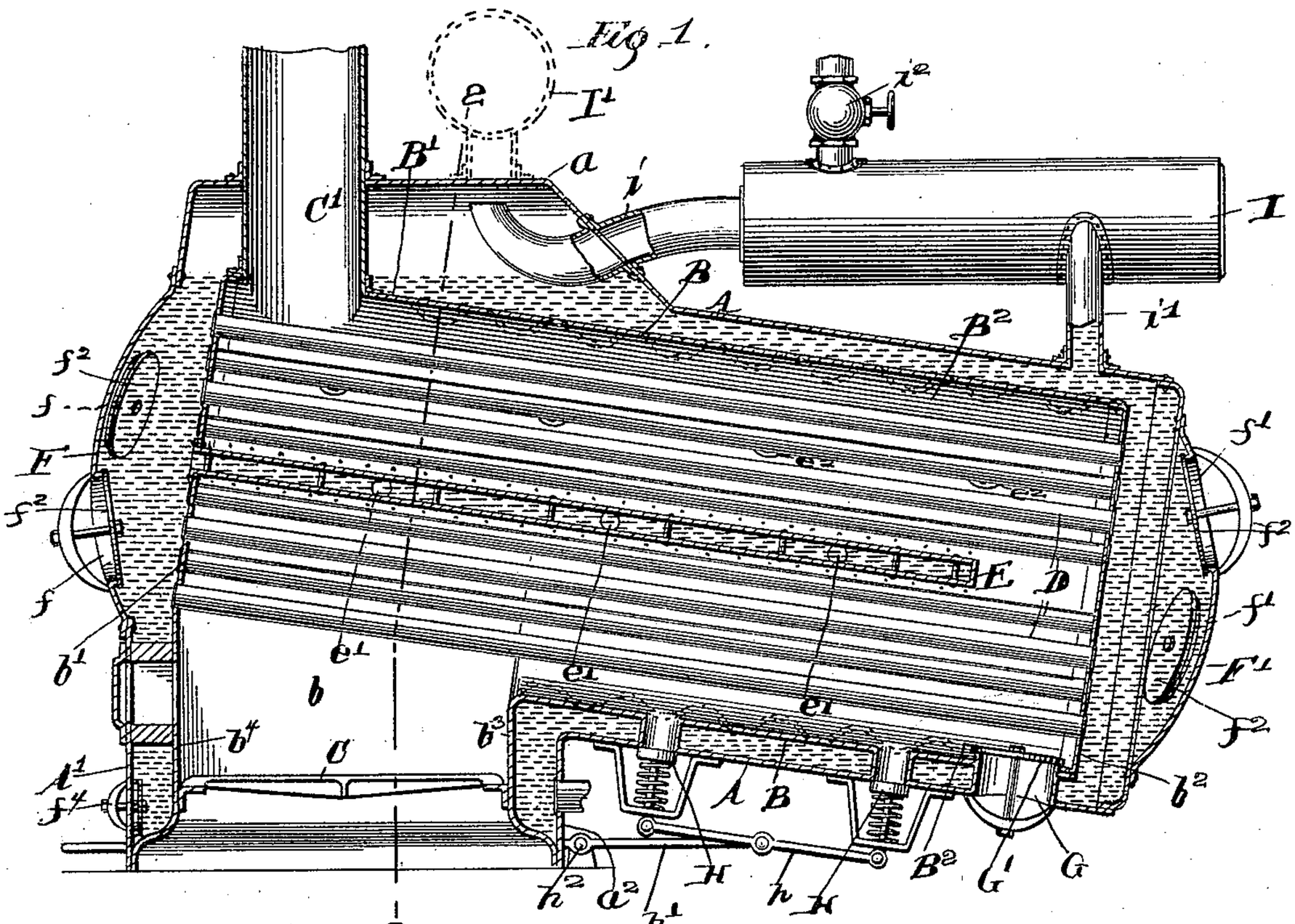


Fig. 2.

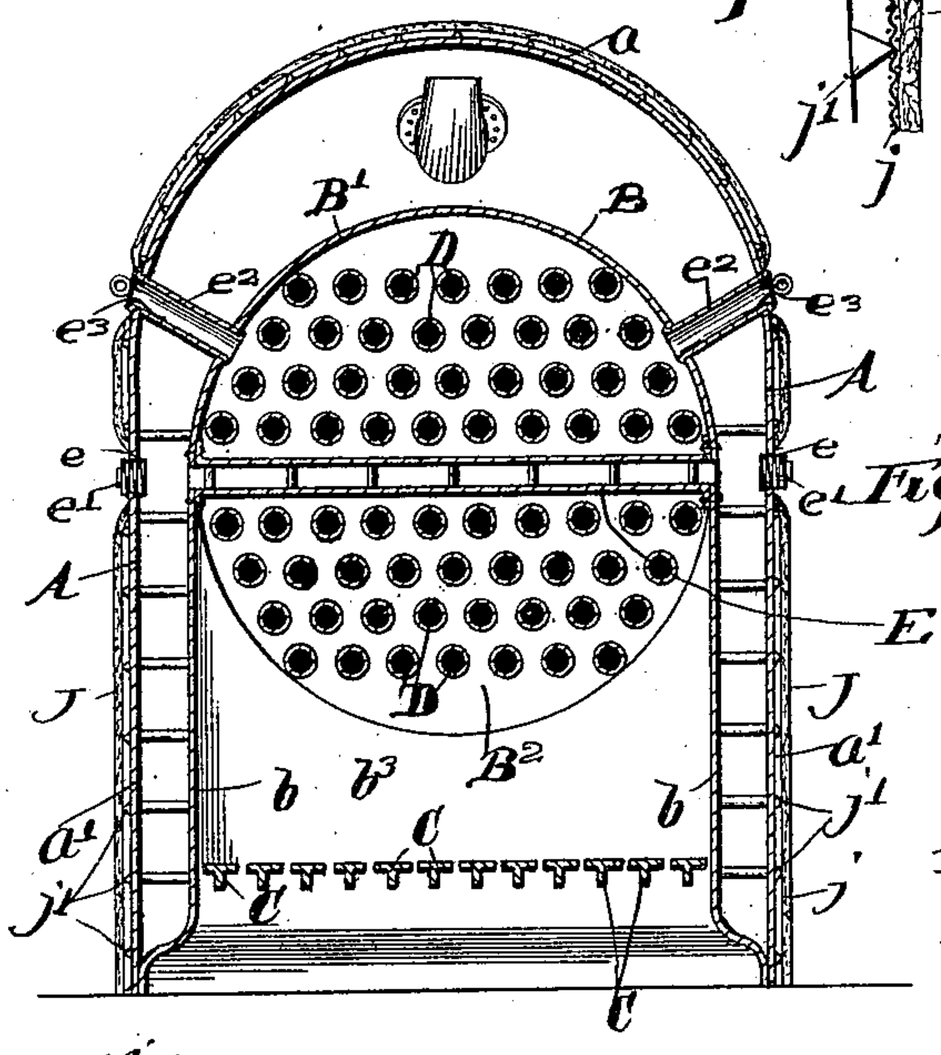


Fig. 5.

Fig. 4.

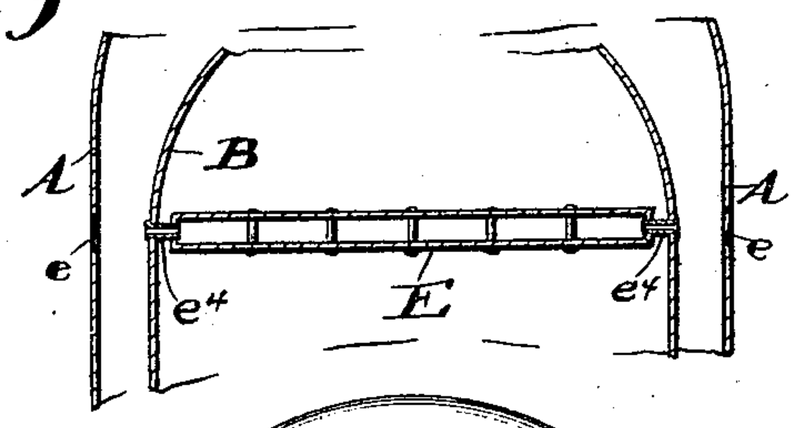
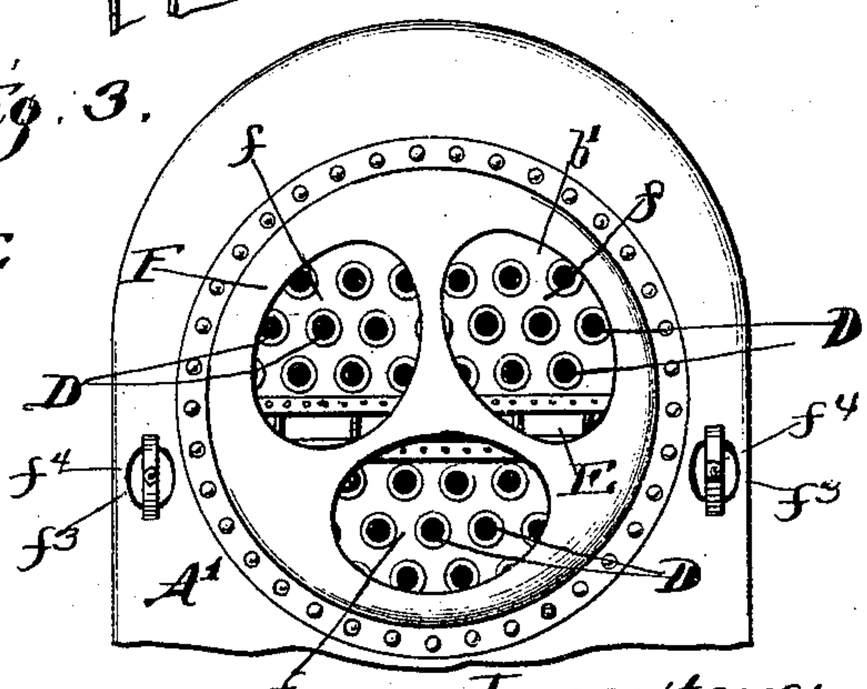


Fig. 3.



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UNITED STATES PATENT OFFICE.

ANDREW WILDMAN, WILLIAM WILDMAN, AND HENRY WILDMAN, OF CHICAGO, ILLINOIS.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 582,381, dated May 11, 1897.

Application filed February 13, 1897. Serial No. 623,273. (No model.)

To all whom it may concern:

Be it known that we, ANDREW WILDMAN, WILLIAM WILDMAN, and HENRY WILDMAN, citizens of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

Our invention relates to certain useful improvements in boilers of that class in which the water to be converted into steam circulates through tubes and other chambers which lie in the path of the products of combustion from the fire.

To such end it consists in providing in a water-tube boiler certain auxiliary chambers arranged in such a manner as to cause the products of combustion to travel farther and at the same time reach more surface than is ordinarily accomplished.

It relates also to means for making the flues and other portions within the boiler easily accessible for the purpose of cleaning or repairing and to other certain minor details of construction which will be fully described in this specification and more definitely pointed out in the claims following.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section through the boiler. Fig. 2 is a vertical cross-section in line 2 2, Fig. 1, showing a jacket not seen in Fig. 1. Fig. 3 is a front elevation of the upper portion of the boiler, the manheads being removed and thereby exposing a number of the flues. Fig. 4 is a section similar to Fig. 2 of a modification, and Fig. 5 is a detail section through a portion of a heat-retaining jacket used in connection with this boiler.

The boiler illustrated in the drawings furnished herewith is of the same general form as the one which we have heretofore patented in Letters Patent No. 544,474, granted August 13, 1895, with our improvements added thereto. It is, however, immaterial what style of boiler is used, as our invention is equally applicable to all water-tube boilers.

In the views, A represents the outer shell of the boiler, and B the inner casing, which is preferably composed of the arched forward portion B′, having the vertical side *b*, extending down beyond the ash-box, and the rearwardly-extending cylindrical portion B^2, lying within the casing and separated therefrom by a considerable space, which forms a water-jacket around the inner casing and which is adapted to contain the water to be converted into steam. Upon the ends of the inner casing are tube-sheets b' b^2, the forward tube-sheet being extended down and connected with the front portion A′ of the outer casing at the bottom, as seen in Fig. 1. A wall b^3 extends across the boiler and connects the portions *b* and forms, together with the front portion b^4, the fire-box, in which are placed suitable grate-bars C. The front portion of the outer casing is shaped approximately similar to the inner casing, the front being slightly enlarged at *a* and having vertically-extending walls *a*′, connected by the transverse wall a^2 and front A′, thereby completely inclosing the inner casing and permitting the water to circulate freely around the same.

Within the inner casing are a series of water-circulating flues D, which form passages for the water between the ends of the water-jacket, and through the combustion-chamber extends a box E, preferably opening at the sides and front into the water-jacket and securely riveted thereto at these points. The upper and lower sheets of the box are preferably connected by a series of stay-bolts to insure solidity and rigidity. The box does not extend the entire length of the inner casing, but stops a short distance from the rear of the same, thereby forming a passage for the products of combustion from the fire-box around the flues below the box and allowing the same to return over the box and out through the smoke-stack C′ at the front of the boiler. By the use of this separating-box it is evident that more heating-surface is attained and the flame is caused to travel through a greater distance within the combustion-chamber, evidently producing more steam as a consequence.

Upon the ends of the outer casing are se-

cured boiler-heads F F′, preferably dished outwardly, as shown, to give more room between the ends of the outer and inner casing and also to give strength to the heads. These heads are formed with a number of manholes $f f'$, preferably elliptical and of such number and size as to cover as nearly as possible all of the flues, the object being to give easy access to the latter for cleaning or repair. They are provided with suitable manheads f^2, which may easily be removed when it is desired to get at the interior of the boiler. In the front of the outer casing are also arranged a series of hand-holes f^3, whereby access to the water-jacket around the fire-box may be had, suitable heads f^4 being provided therefor.

At or near the lowest point of the inner casing is an opening G, leading out through the outer casing and provided with a suitable manhead G′, the object of this manhole being to give access to the interior of the inner casing for the purpose of cleaning or repairing the same. The manhole has been placed at the lowest point at the rear of the inner casing because much of the soot, ashes, &c., will lodge there.

In connection with this boiler we have shown air-valves H, similar to those shown and described in our patent above mentioned, and in order to facilitate the operation of these valves we have connected them by a link h, to which is pivoted a lever h', fulcrumed at h^2, whereby both of the valves may be operated by simply swinging the lever in the proper direction.

We have shown a steam-dome I supported above the boiler and connected therewith by a pipe i and a second pipe i', which is adapted to convey part of the steam generated in the boiler to the dome without compelling the same to travel to the upper end of the boiler before entering the dome. A suitable valve i^2 is provided for allowing the steam to escape from the dome. The position of the dome is immaterial, and we have shown in dotted lines a dome I′ arranged above the forward portion of the boiler and connected therewith by a suitable pipe.

Along the outer casing and in line with the box are a series of openings e, normally closed up by suitable plugs e', which when removed afford access to the box and permit the same to be cleaned or repaired. A series of tubes e^2 connect the inner with the outer casing, whereby the tubes or other portions within the inner casing may be reached for any purpose desired, the tubes e^2 being normally closed by stoppers e^3.

In order to prevent any great radiation of heat from this boiler, we have provided a covering of asbestos J, laid upon a wire-netting j and separated from the boiler by a series of blocks j'. This covering may evidently be placed around all of the exposed portions of the boiler, if desired, or only upon such portions as are apt to radiate more heat than is desirable.

The modification illustrated in Fig. 4 is of a different style of box. In this case it does not extend to the sides of the inner casing, but is connected therewith by a series of tubes e^4, thereby allowing the water to circulate freely between the water-jacket and box.

We claim as new and desire to secure by Letters Patent—

1. In a water-tube boiler, the combination with a flue-chamber for the passage of the products of combustion, water-tubes therein and a water-jacket surrounding said chamber on the sides and ends thereof, of a water-box within said flue-chamber connected with the water-jacket at the sides and front end and having an opening through it near the rear of said chamber; substantially as described.

2. In a water-tube boiler, the combination with a flue-chamber for the passage of the products of combustion, water-tubes therein and a water-jacket substantially surrounding said chamber, of a water-box extending across said flue-chamber, said box having an opening at the sides and front into the water-jacket, and a flue through it near the rear end; substantially as described.

3. In a water-tube boiler, the combination with a flue-chamber for the passage of the products of combustion, water-tubes therein and a water-jacket inclosing said chamber, of a water-box separating the upper from the lower portion of the flue-chamber except at the rear and connected with the water-jacket around the flue-chamber and a series of openings in the outer casing approximately in line with the water-box; substantially as described.

In witness whereof we have hereunto set our hands, at Chicago, Cook county, and State of Illinois, this 6th day of February, A. D. 1897.

ANDREW WILDMAN.
WILLIAM WILDMAN.
HENRY WILDMAN.

Witnesses:
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