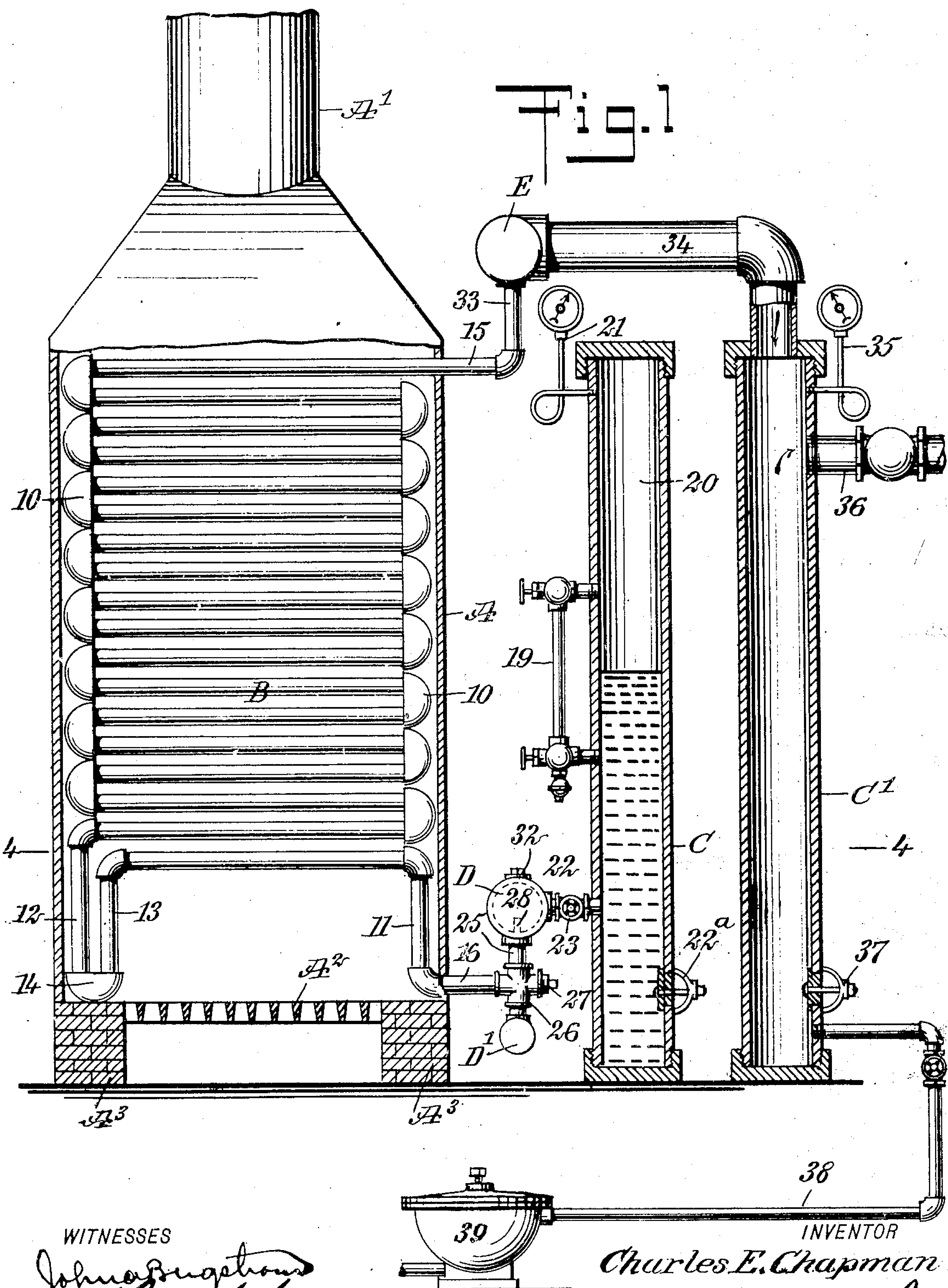
C. E. CHAPMAN.
BOILER.
APPLICATION FILED OCT. 23, 1907.

932,445. Patented Aug. 31, 1909.
3 SHEETS—SHEET 1.

Fig. 1



WITNESSES
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3 SHEETS—SHEET 2.

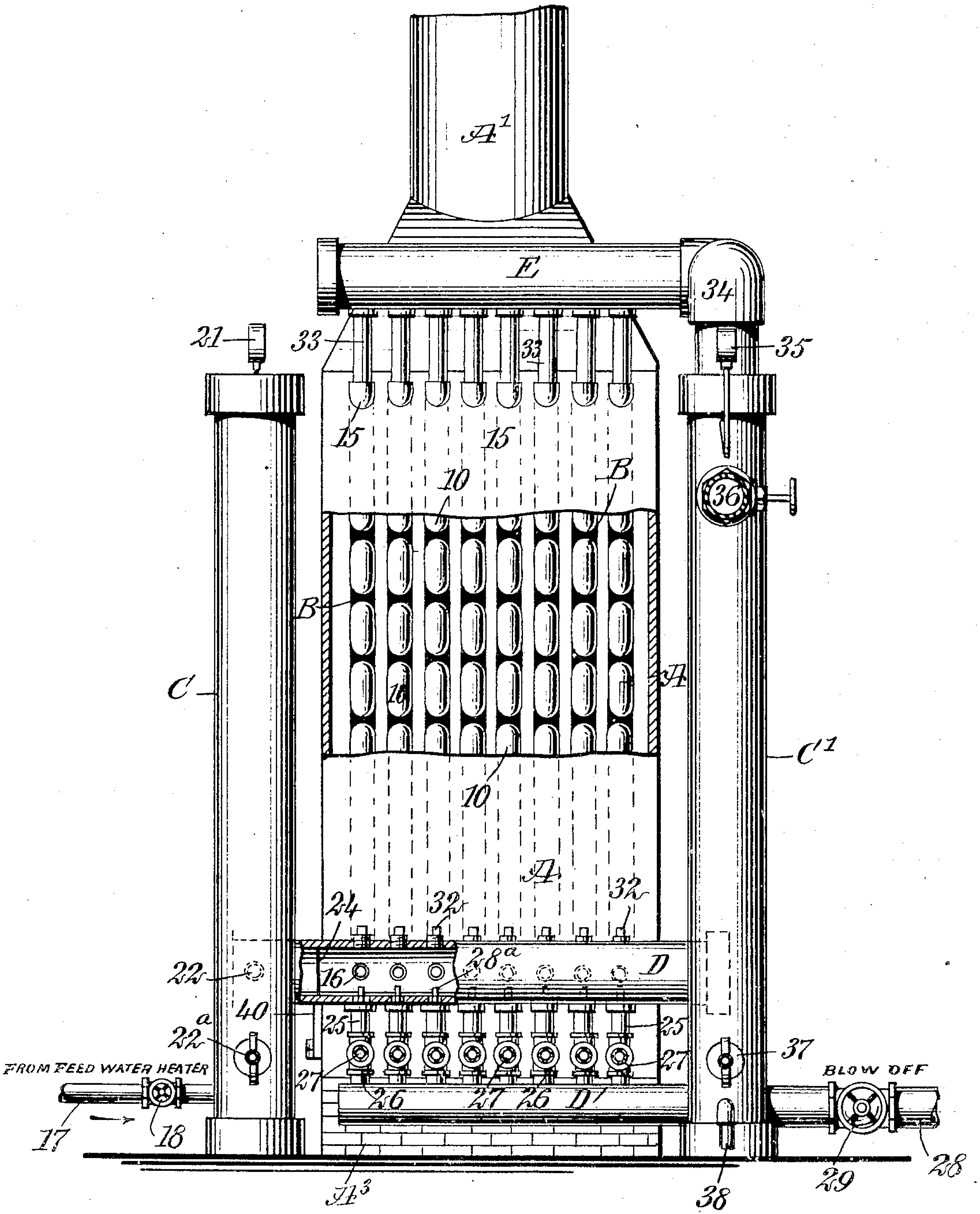

Fig. 2

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3 SHEETS—SHEET 3.

Fig. 3

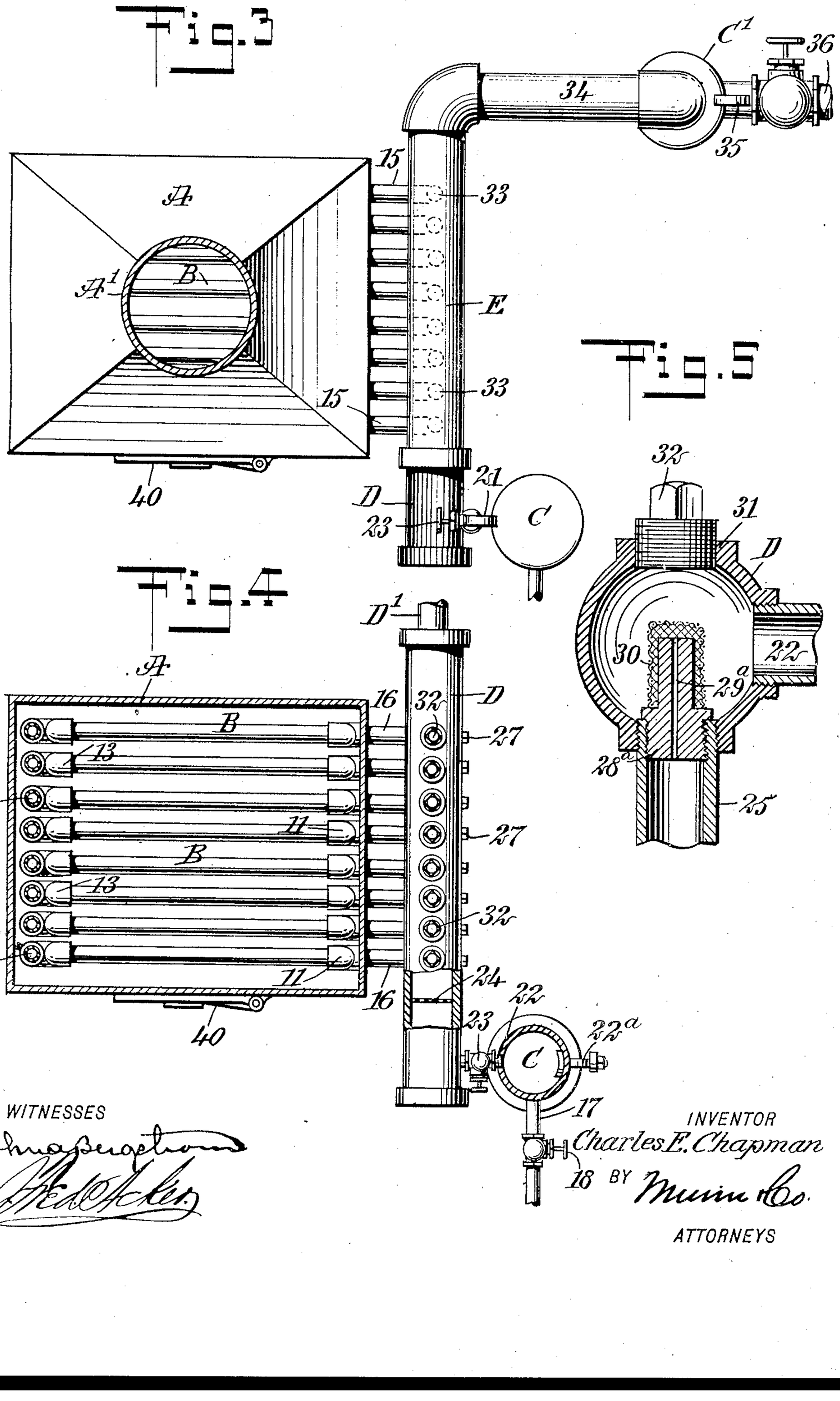

Fig. 4

Fig. 5

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UNITED STATES PATENT OFFICE.

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BOILER.

932,445. Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed October 23, 1907. Serial No. 398,728.

To all whom it may concern:

Be it known that I, CHARLES EDWARD CHAPMAN, a citizen of the United States, and a resident of Fort Edward, in the county of Washington and State of New York, have invented a new and useful Improvement in Boilers, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide a stationary flash boiler in which the steam dome and water column are removed from and are practically independent of, the boiler proper, and wherein the amount of water conducted to the boiler from the water column by excess air pressure in the water column over and above the boiler pressure, is under complete control.

Another purpose of the invention is to provide a series of coils within the body of the boiler, each coil being independent of the other, each receiving water in a highly heated condition from a header connected with the water column and each of said coils being also connected with a steam header connected in its turn with the said steam dome.

It is also a purpose of the invention to provide means for straining the water as it enters the header supplying the coils, and to further strain or filter and practically atomize the water as it leaves said header in its passage to the coils.

The invention consists in the novel construction and combination of the several parts as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional front elevation of the boiler and a vertical section through the water column and steam dome, the connection between the boiler, the water column and steam dome, being in front elevation; Fig. 2 is a sectional side elevation of the complete boiler; Fig. 3 is a sectional plan view of the boiler; Fig. 4 is a horizontal section through the body of the boiler and water column on the line 4—4 of Fig. 1, the steam dome being omitted; and Fig. 5 is an enlarged section through the water header and a portion of a connection for a coil leading therefrom, illustrating the manner in which the water is filtered and practically atomized, before entering the said connection.

A represents the casing of the boiler which may have any cross sectional shape; in the drawings it is shown rectangular, and A′ represents the smoke stack leading therefrom, A^2 represents the grate, which may be of any approved type, and A^3 represents the masonry supporting said grate and the casing.

B represents a series of vertical coils arranged within the casing over the grate. These coils are provided with the customary bends 10, and each coil is provided with a forward leg 11 that extends downward at the front of the fire box and is provided at the rear with two legs 12 and 13, that extend down at the rear of the fire box and are connected by a return bend 14. Each coil B is provided at its upper end with a pipe 15 that extends out through the casing, and each forward leg of each coil is provided also with an outwardly extending pipe 16.

C represents the water column employed, which may be of any suitable diameter or of any desired height, and this water column is removed from the body of the boiler and is substantially independent thereof. The water is supplied in a highly heated state to the bottom portion of the water column C, through the medium of a pipe 17 connected with a feed water heater, the said pipe being provided with a regulating valve 18. The water column C is also provided with the customary gage 19 and the water is usually forced into the said column C until it reaches about centrally between its ends, whereby the upper portion is converted into a chamber 20 containing air under great compression, in excess of the boiler pressure, thus insuring the steady flow of water from the column C into and through the coils B. The water column C is provided with a suitable recording gage 21 at its upper portion indicating the air pressure, and at its lower portion the water column C is provided with a manhole closed by a plug 22^a whereby to facilitate the cleaning of the said column.

A header D extends transversely in front of the boiler adjacent to the lower portion of the water column C, and a pipe 22 provided with a valve 23 extends from the water column C, between the upper portion of the column of water therein and the lower

portion of said column, and the pipe 22 is connected with one end of the said header D, as is shown best in Fig. 4. As the water enters the header D it passes through a screen 24 located adjacent to the end where the water enters, as is indicated in Fig. 2; thus the water is strained before it passes into the body portion of said header. The said header D is provided with a series of pipes 25 that extend down from its under face, and these pipes 25 correspond in number to the number of coils B employed, and each pipe 25 is connected at its lower end with a fitting 26, preferably a cross fitting, and each cross fitting at its forwardly extending member is provided with a removable plug 27, and the bottom member of each fitting 26 is connected with a blow-off header D′, that is smaller than the water header D, and is located beneath the latter. This blow-off header or drum D′, is connected with a suitable pipe 28 provided with a valve 29, which pipe 28 may be led wherever desired; thus it will be observed that by removing the plugs 27, each individual coil may be blown off when necessary.

Where each pipe 25 enters the water header D, a nozzle 28^a is located, and these nozzles extend within the said header D, as is illustrated in Fig. 5, and each nozzle is provided with a bore 29^a of exceedingly small diameter, so that the water in passing over the header D to the coils B is delivered in the form of a spray, or is practically atomized, and also each nozzle 28^a is provided with a covering or a jacket of a wire mesh 30 so that the water is further filtered or strained before it reaches the bores 29^a in the said nozzles. Thus it will be observed that as the water is supplied to the water column C in a highly heated condition, and is delivered to the coils in the form of a spray, as soon as the water reaches the said coils steam is immediately generated, affording a rapid and a reliable steamer.

In order that the various nozzles 28^a may be readily cleaned, an aperture 31 is made in the header D above each nozzle, and each of said apertures is closed by a plug 32.

Adjacent to the upper portion of the boiler proper, a steam header E is provided, shown best in Fig. 3, and each outwardly extending pipe 15 at the upper portion of each coil B is connected by a pipe 33, or its equivalent, with the aforesaid steam header E, so that each individual coil has an independent connection with the water header D, and said steam header E. The steam header E, preferably at one end, is connected by any suitable form of pipe 34, or its equivalent, with the upper portion of a steam dome C′. This steam dome C′ is also independent of the boiler proper, and stands practically alone, and in the preferred arrangement of the water column C and steam dome C′, they are arranged at opposite sides of the body of the boiler, as is indicated in Fig. 2. The steam dome C′ is provided at its upper portion with the customary gage 35, and steam is supplied from the said dome C′ to the engine through the medium of a valved pipe 36. A manhole is provided for the lower portion of the steam dome C′, closed by a plug 37 of any approved type, and the lower portion of the steam dome C′ is connected by a valved pipe 38 provided with the customary trap 39.

It will be observed from the foregoing description that the boiler is of exceedingly simple type, that each coil employed is independent in its action throughout, and that all parts of the boiler may be readily reached for repairs, and as stated it is evident that the boiler is an exceptionally rapid steamer. The fire box is provided with any approved form of door 40.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a tubular boiler composed of a plurality of coils, a water column removed from the body of the boiler, a water drum between the water column and the boiler, a connection leading from the bottom of the column to the drum, connections leading from the drum to the coils of the boiler, the water column having a closed top, and an opening at its bottom for feed water, whereby when the feed water is admitted the air in the column will be compressed at the top thereof to assist in forcing the feed water into the boiler, and an atomizer in each of the connections between the drum and the coils.

2. In a tubular boiler composed of a plurality of coils, a water column and a steam dome removed from the body of the boiler, a steam drum interposed between the dome and the boiler, a water column removed from the boiler, a water drum interposed between the water column and the boiler, said drum having a connection with each of the coils of the boiler, said water column having a communication with the water drum leading from the bottom of the column and having a closed top and an opening for feed water near its bottom, whereby when the feed water is admitted to the water column the air in the upper part thereof will be compressed to assist in feeding the feed water to the boiler.

3. In a tubular boiler composed of a plurality of coils, a water column removed from the body of the boiler, a water drum between the column and the boiler and communicating with each of the coils thereof, a connection between the bottom of the column and the drum, said column having a closed top and an opening at its bottom for feed water, whereby when the feed water is admitted the air in the column will be com-

pressed in the top thereof to assist in forcing the feed water into the boiler.

4. In a tubular boiler, the combination with the body of the boiler and a plurality of independent coils therein, of a water column and a steam dome removed from the body of the boiler, an independent connection between each of the coils, and the steam dome, a water header, a connection between the water header and the water column, means for supplying heated water under air pressure in excess of the boiler pressure to said water column, an independent connection between the water header and each of the coils, and an atomizing device incorporated in the said water connection.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES EDWARD CHAPMAN.

Witnesses:
JOSEPH GOODFELLOW,
J. H. CHEESMAN.