No. 753,902. PATENTED MAR. 8, 1904.

J. A. MUMFORD.

STEAM BOILER.

APPLICATION FILED APR. 9, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

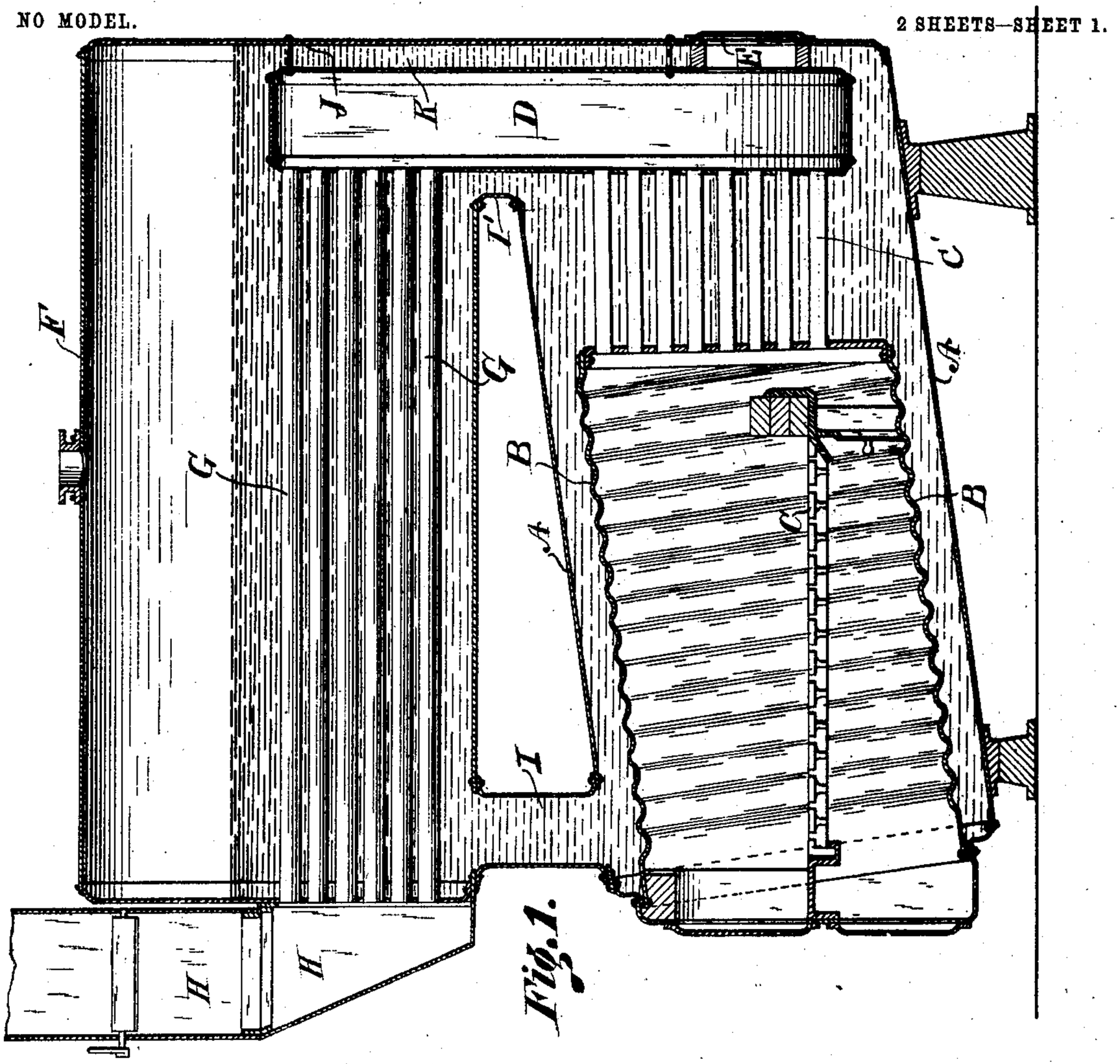

Fig. 1.

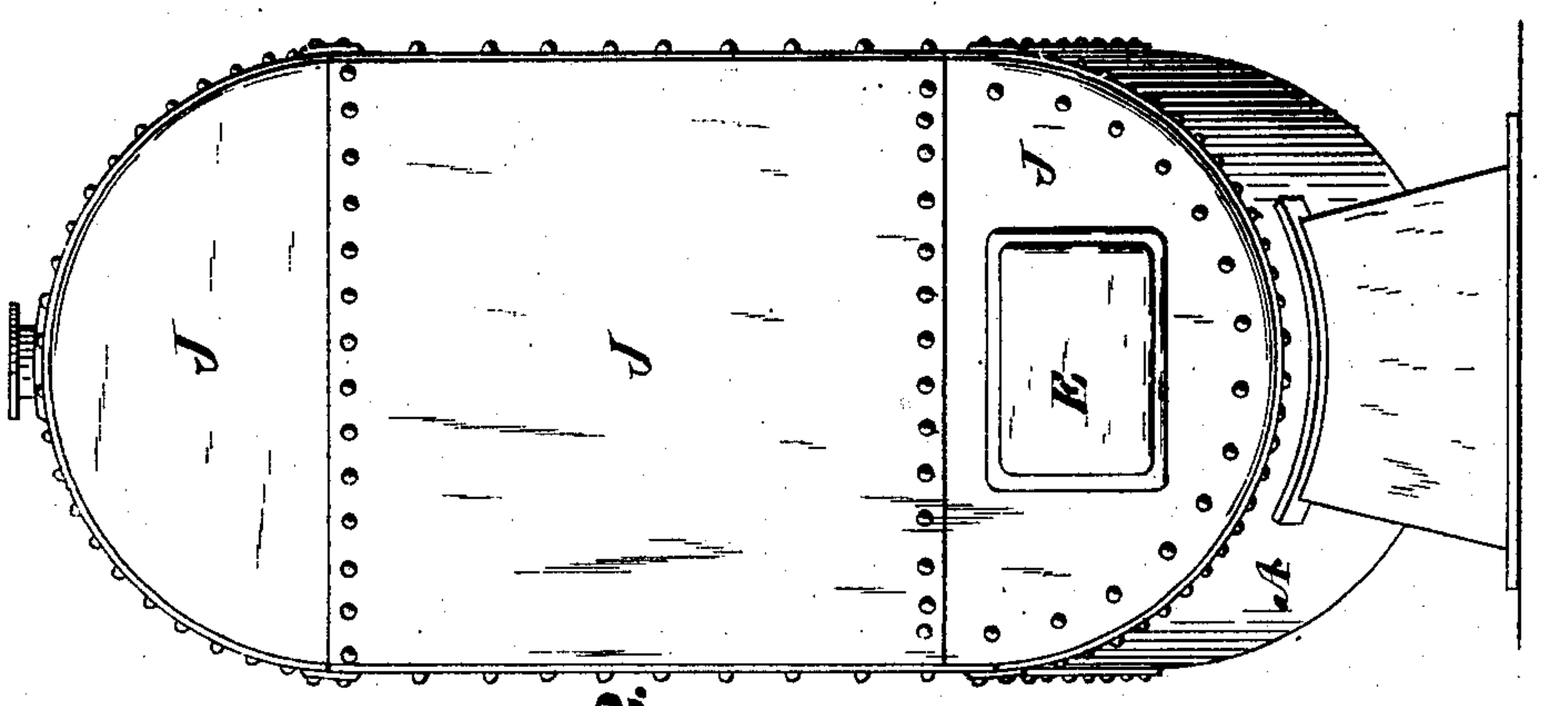

Fig. 2.

Witnesses
F. M. Dombach
Wm. Fox

Inventor
Joseph A. Mumford
By his Attorney
Phillips & Abbott

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NO MODEL. 2 SHEETS—SHEET 2.

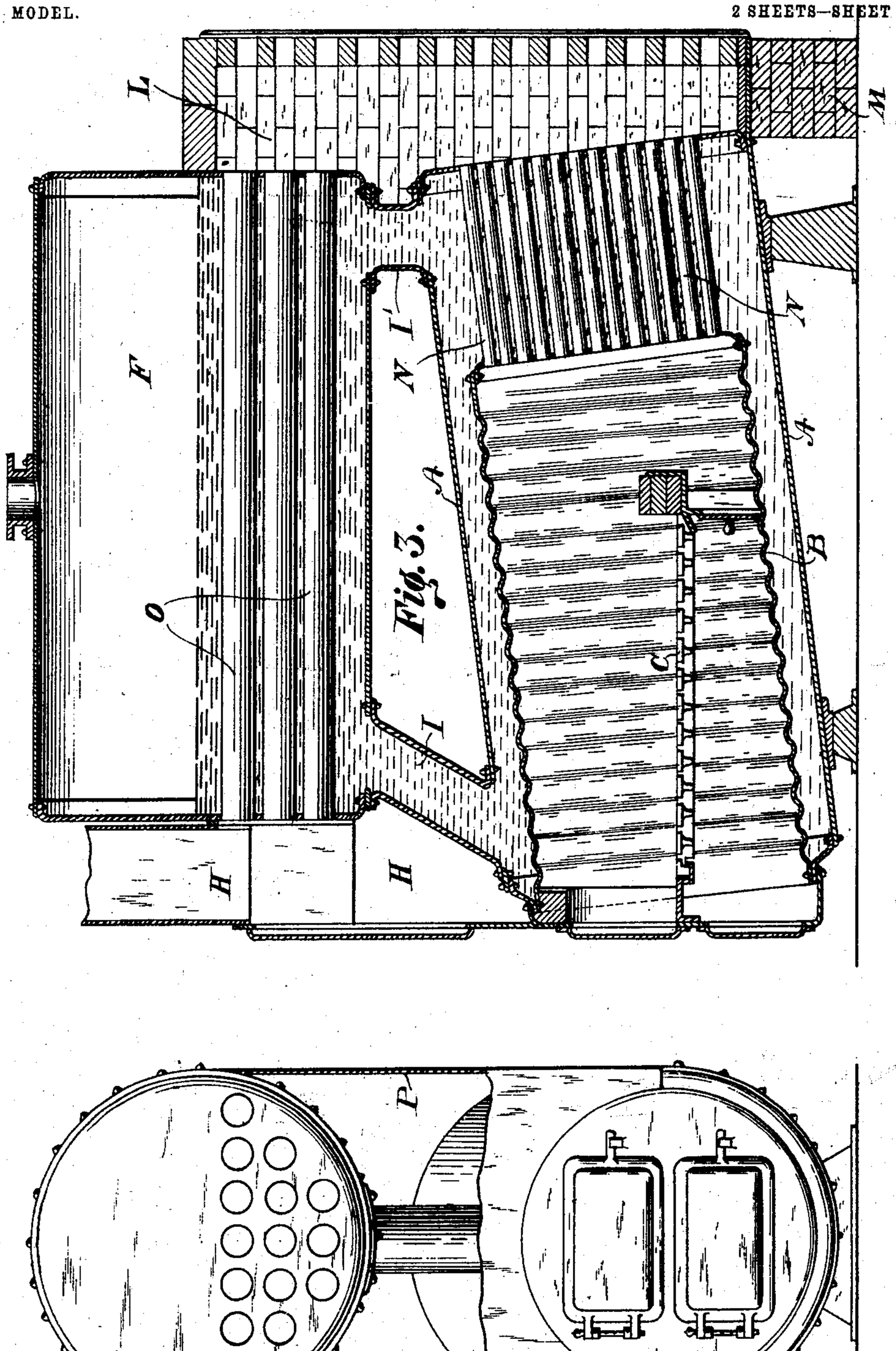

Fig. 3.

Fig. 4.

Witnesses
F. W. Dunbach
Wm. Fox

Inventor
Joseph A. Mumford
By his Attorney
Phillips & Abbott

No. 753,902. Patented March 8, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH A. MUMFORD, OF ROSLYN, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 753,902, dated March 8, 1904.

Application filed April 9, 1903. Serial No. 151,768. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. MUMFORD, a citizen of the Dominion of Canada, and a resident of the village of Roslyn, county of Nassau, State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a longitudinal vertical sectional view of one form of the invention. Fig. 2 illustrates a rear elevation of the invention shown in Fig. 1. Fig. 3 illustrates a longitudinal vertical sectional view of a modified construction of the invention. Fig. 4 illustrates a front elevation, the parts being broken away, of that which is shown in Fig. 3.

This invention is an improvement upon that patented to me in and by United States Letters Patent No. 588,698, dated April 21, 1896; and it has for its object the adaptation of my previously-patented boiler to use in relatively contracted spaces—as, for instance, on vessels and in other places where space is limited.

The special features, therefore, of this present invention are as follows: The internal fire-pot and continuous circulation of water of my said patented invention are retained herein; but instead of having the fire-tubes located solely in a rearwardly-extending part or section of the boiler proper with a hot water and steam drum above the boiler and with water-legs connecting the ends of the drum and boiler, through which the water circulation may be had, in this present construction I remove the major part of the fire-tubes from the boiler proper and locate them in the drum, so that the space required by the extended part of my former boiler, in which the fire-tubes were wholly located, is mostly saved, and under this present invention also the hot gases or products of combustion may be made to pass through a casing on their way to the stack, thus coming in contact with the exterior of the boiler and of the drum, as well as passing through the fire-tubes, or they may be confined to the fire-tubes alone, as shown and described in the accompanying drawings.

Referring now to the drawings, Figs. 1 and 2 show a construction in which the products of combustion pass through the fire-tubes only, and they are located partly in the boiler, but mostly in the water and steam drum. In these figures, A illustrates the shell of the boiler; B, the corrugated lining for the furnace-pot; C, the furnace; C′, the short sections of fire-tubes within the boiler; D, the metallic flue which extends clear across the rear end of the boiler; E, a manhole; F, the superposed water and steam drum; G, the fire-tubes in the drum; H, the stack; I and I′, the water-legs connecting the boiler and the drum. J is the shell or casing, which extends throughout the rear ends of the boiler and drum, respectively, separated somewhat from the flue D, whereby a water-jacket K is afforded. In this construction it will be seen that an exceedingly compact and effective boiler is provided. The lower member or boiler proper is practically all devoted to the furnace or fire-pot section; yet without increasing its length beyond the desirable length the water and steam drum is made to contain short sections of fire-tubes by means of which the most excessive heat of the fire is immediately and most effectively used for generating the steam. The fire-flue D is surrounded with a water-jacket and connects with the fire-tubes G, which pass through the water and steam drum and connect with the stack at their forward ends. The water circulation is maintained through the water-legs I and I′ and also through the water-jacket K, as well understood.

Referring now to Figs. 3 and 4, the same general construction is present, modified in certain details, as follows: The boiler-shell proper is indicated by A, the corrugated lining for the furnace-pot B, the furnace C, the water and steam drum F, and the stack H, as before; but in this present construction instead of there being the water-jacketed metallic flue D the flue is a dry flue L, which may be made of brick, supported upon any suitable foundation M. N represents the short sections of fire-tubes located in the end of the boiler, and they are preferably made relatively small in size and many in number, as compared with the fire-tubes O in the drum.

In this construction the products of combustion pass from the furnace to the stack substantially as before—*i. e.*, first through the tubes in the boiler, then upwardly through the flue L, and then forwardly to the stack through the tubes in the water and steam drum; but sometimes I prefer to so construct the dry flue L that there shall be no partition or closure between it and the space between the drum and the boiler, and I then provide side casings or plates P P, which preferably will extend from about the point of greatest horizontal diameter of the drum to about the point of greatest diameter of the boiler, being securely bolted to both. In this modified construction the products of combustion after passing through the lower fire-tubes N and into the dry flue L will pass thence to the stack H, partly through the irregularly-shaped space between the drum and the boiler, being confined by the side casings or plates P P, in their transit coming in contact with the water-legs I and I′ and also with the exterior surfaces of the boiler and the drum, and a portion of them will pass through the fire-tubes in the drum, and in order that a considerable portion, at least, of the products of combustion may pass through these tubes, and thus act more beneficially as heating agencies, I enlarge these tubes quite decidedly as compared with the tubes N in the boiler, as clearly illustrated in Fig. 3.

It will be seen that the essential characteristics of the invention are present in both forms of boiler—that is to say, that the length of the structure as a whole is reduced by shortening the fire-tubes in the boiler proper, thus greatly reducing its length, compensating for this by locating other fire-tubes in the water and steam drum; yet the efficiency is as great if not superior to my former construction.

It will be obvious to those who are familiar with this art that modifications may be made in the details of construction without departing from the essentials of the invention—as, for example, the combination of a considerable number of relatively small and relatively short fire-tubes in the boiler-section with longer and larger tubes in the drum-section may be employed whether the products of combustion on their way to the stack pass in contact with the exterior shells of these two parts or not; also, that a dry flue may be constructed of metal instead of brick. Indeed, the illustrations and description presented are suggestions merely of a variety of ways in which the essence of the invention may be employed.

I claim—

1. In an internally-fired boiler provided with means for continuous water circulation, the combination of a furnace located within the boiler, a water-space surrounding the furnace, a superposed water and steam drum, relatively short fire-tubes in the boiler, other fire-tubes in the drum, the tubes in the drum being larger than those in the boiler, a flue connecting the two series of fire-tubes, and a stack connecting with the front end of the fire-tubes which are located in the drum.

2. In an internally-fired boiler provided with means for continuous water circulation, the combination of a furnace located within the boiler, a water-space surrounding the furnace, a superposed water and steam drum, fire-tubes in the boiler and in the drum, a casing or side plates inclosing the space between the boiler and the drum and a flue or conduit for the products of combustion connecting the boiler-tubes with the tubes in the drum and with the space inclosed by said casing and a stack connecting with said space and with the tubes in the drum.

3. In an internally-fired boiler provided with means for continuous water circulation, the combination of a furnace located within the boiler, a water space or jacket surrounding the furnace, a superposed water and steam drum, fire-tubes in said drum, a casing or side plates inclosing the space between the drum and the boiler, a fire-flue connecting the furnace with the space between the boiler and the drum, and also with the fire-tubes in the drum, and a stack connecting directly with said space and said fire-tubes.

4. In an internally-fired boiler provided with means for continuous water circulation, the combination of a furnace located within the boiler, a water-space surrounding the furnace, a superposed water and steam drum, fire-tubes in the boiler and in the drum, a casing or side plates inclosing the space between the boiler and the drum, a flue or conduit for the products of combustion connecting the boiler-tubes with the tubes in the drum and with the space inclosed by said casing and a stack connecting with said space and with the tubes in the drum, the tubes in the drum being larger than those in the boiler.

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

JOSEPH A. MUMFORD.

Witnesses:

PHILLIPS ABBOTT,

FLORA M. DONSBACH.