

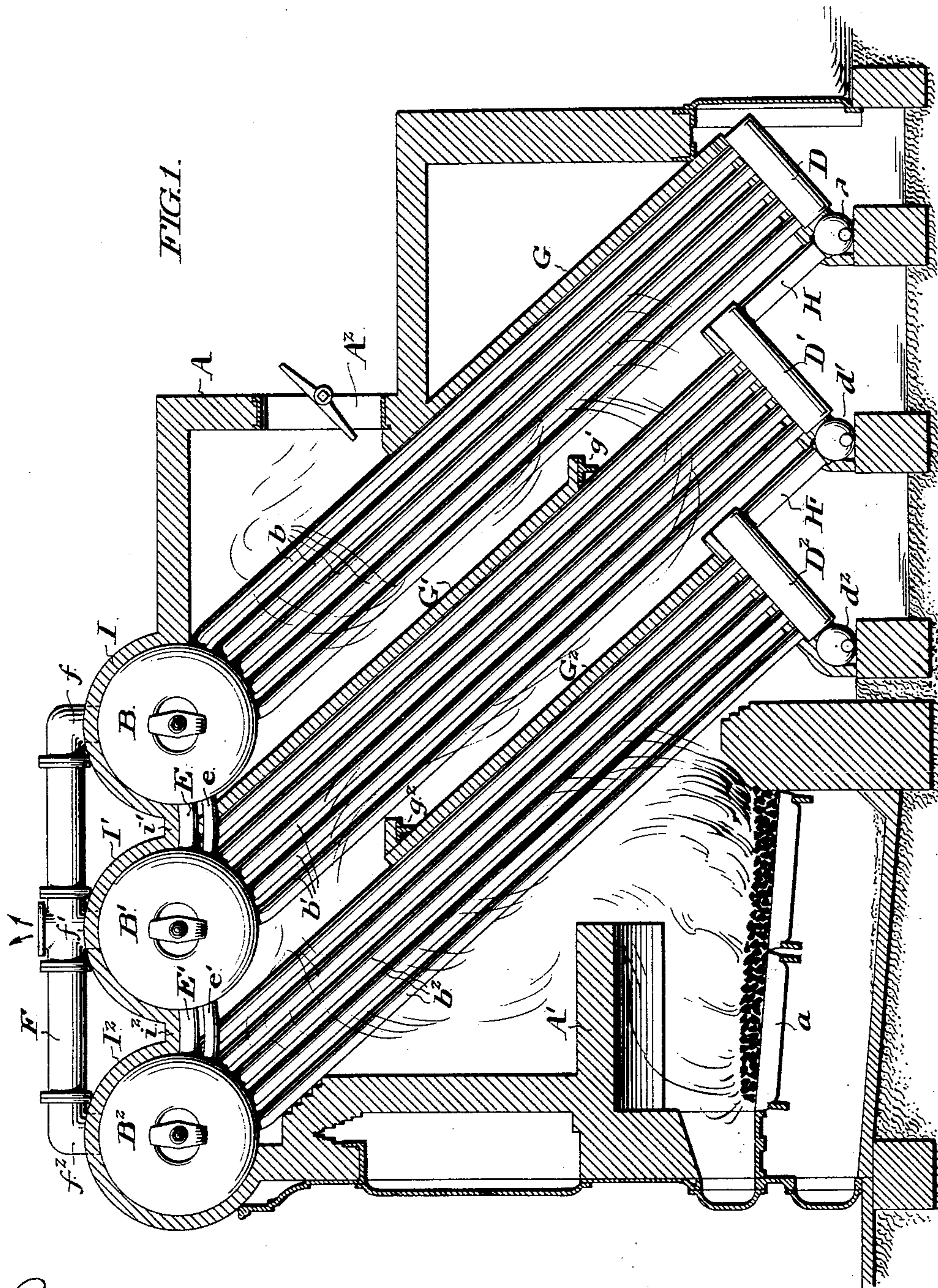
(No Model.)

2 Sheets—Sheet 1.

L. M. MOYES.
WATER TUBE STEAM BOILER.

No. 541,330.

Patented June 18, 1895.



WITNESSES:
James B. Bell
Alfred J. Jenkins

INVENTOR:
L. M. Moyes
By *W. C. P. P. P.*

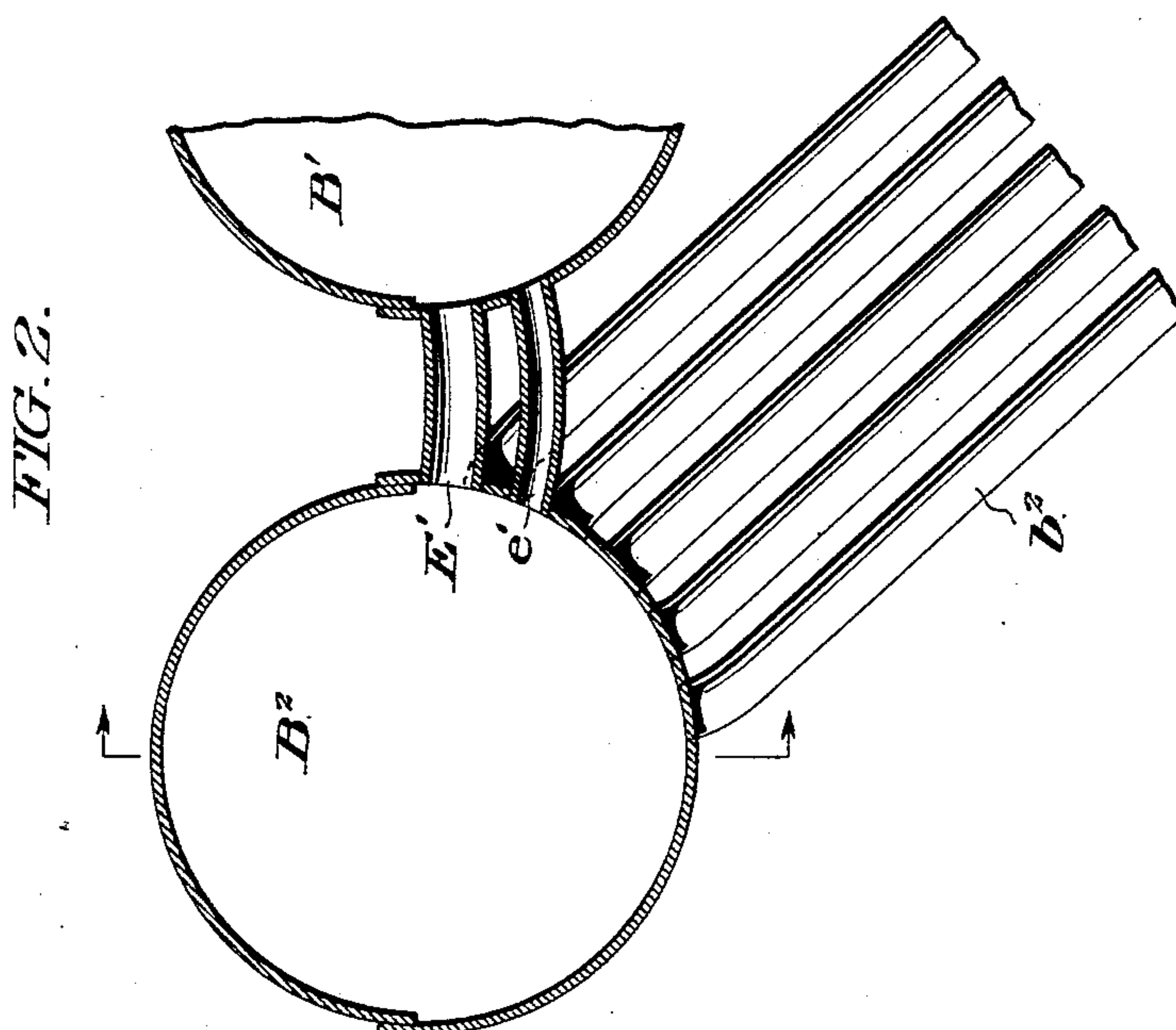
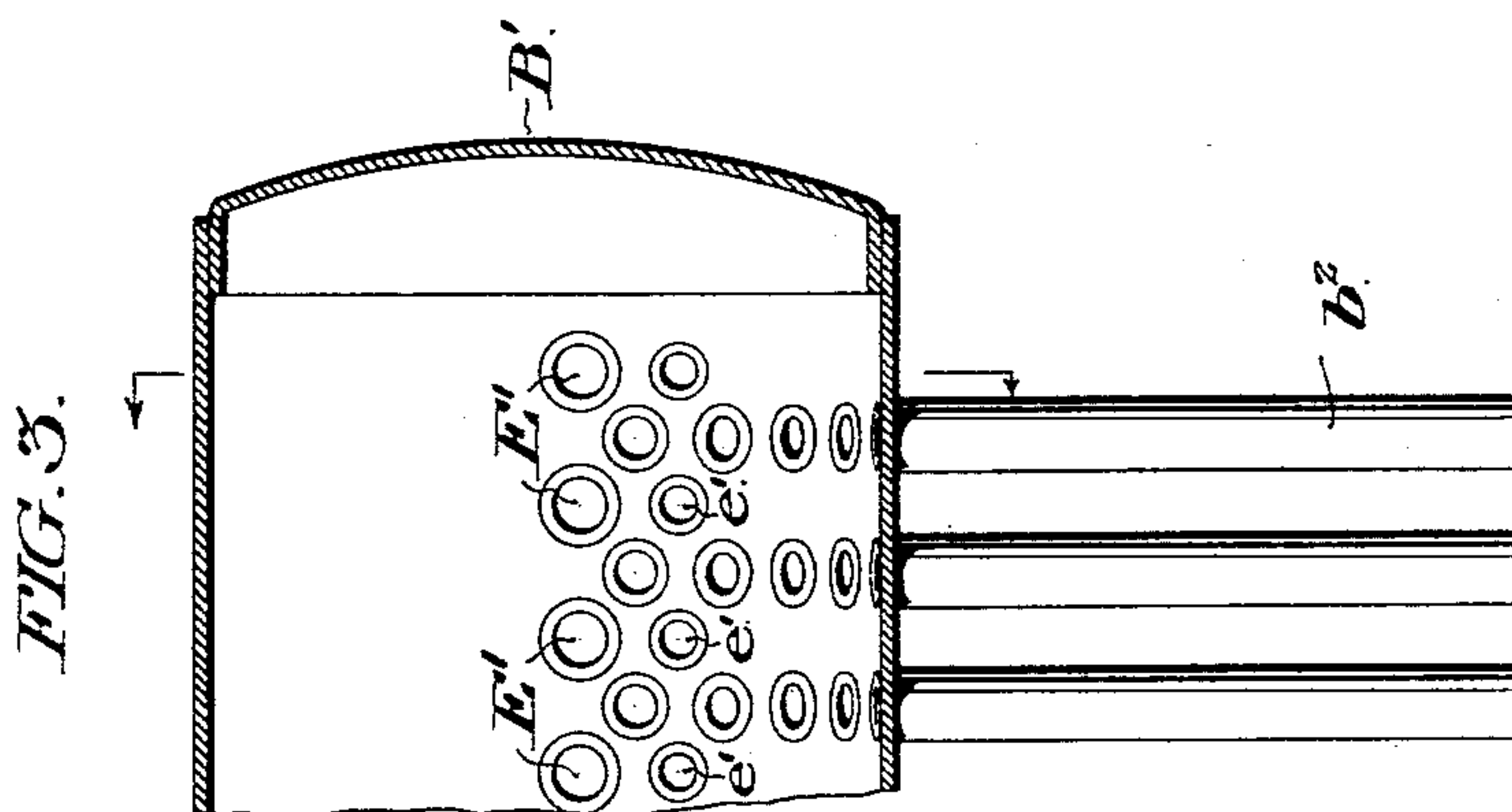
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WATER TUBE STEAM BOILER.

No. 541,330.

Patented June 18, 1895.



WITNESSES:
James O. Bell
Arthur J. J. J.

INVENTOR:
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UNITED STATES PATENT OFFICE.

LAURIE M. MOYES, OF PHILADELPHIA, PENNSYLVANIA.

WATER-TUBE STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 541,330, dated June 18, 1895.

Application filed May 11, 1895. Serial No. 548,905. (No model.)

To all whom it may concern:

Be it known that I, LAURIE M. MOYES, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Water-Tube Steam-Boilers, whereof the following is a specification, reference being had to the accompanying drawings.

In said drawings, Figure 1 represents a vertical central section through the boiler-furnace on a plane perpendicular to the axes of the drums. Fig. 2 is a partial vertical section on a different plane from that of Fig. 1, but parallel thereto, the plane of the section being indicated in Fig. 3 by the line 2 2. Fig. 3 is a partial vertical section on the plane of the axis of one of the drums, as indicated by the line 3 3 of Fig. 2.

My invention relates to the same general type of boilers as that set forth in my Letters Patent of the United States No. 524,724, dated August 21, 1894, and the feature of improvement consists in combining with a boiler having the general characteristics there described, certain adjunctive devices to guard against what otherwise might be the serious consequences of too great a fall in the water level within the drums.

Referring to the drawings, A represents the wall of the furnace and A' the bridge wall extending, as shown, across over the grate bars, a, the chimney flue at the rear of the furnace being indicated by A². Three parallel drums, B, B', B², are arranged transversely across the top of the furnace, from which depend respectively the groups of inclined water circulating tubes, b, b', b². The members of each group of tubes lie in a series of planes which are parallel, both longitudinally and transversely, so that where they enter the drums they are symmetrically disposed, with uniform and maximum interspaces, to avoid any irregular weakening of the metal of the drums. At their lower ends, each vertical row of tubes connects with a manifold, as indicated at D, D', D², respectively, which manifolds in turn communicate with the transverse distributing chambers, d, d', d², respectively, intercommunication of the groups being obtained by the tubes, H, and H', substantially as set forth in my said patent.

Inclined deflector plates, G, G', G², (the two

latter supported respectively upon the transverse bars, g', g²,) serve to direct the flame of the furnace in the proper prolonged course through the several groups of tubes.

The drum, B, is the feed water drum, the other two drums being steam drums, and also receiving of course the water of circulation. As set forth in my said patent, these drums all communicate at points above the normal water level by means of the transverse pipe, F, and individual pipes, f, f', f², leading thereto from the respective drums, B, B', B². The feed water drum, B, also communicates with the adjacent drum, B', below the normal water level by means of the series of pipes, E, which enter the wall of the drum, B', at a level just above that of the highest transverse row of the water tubes, b', as indicated particularly in Figs. 2 and 3. These pipes, E, I term the primary overflow pipes. Below said pipes, and preferably entering the drum, B', at central points in the several squares whose corners are formed by each four members of the uppermost and second transverse rows of tubes, I provide the secondary overflow pipes, e, arranged in a single transverse row along the drum, said secondary overflow pipes being of course well below the normal water level in the drums. Similar sets of primary overflow pipes, E', and secondary overflow pipes, e', are arranged between the drum, B', and drum, B². A protecting covering disposed in a series of arches, I, I', I², with intermediate connecting parts, i', i², is arranged above the drums and the primary overflow pipes, as shown.

The operation of the device is as follows: The drums, B, B', B², are supplied with water to a level above that of the primary overflow pipes, E, E', and the water circulation occurs as described in my said former patent. The hottest products of combustion strike against the tubes, b², the next hottest against the tubes, b', and the least hot upon the initial group of tubes, b, which leads downward from the feed water drum. Thus the most desirable and efficient circulation is insured and the maximum heating effect obtained.

Intercommunication for the overflow of water from drum to drum is secured under all circumstances by the devices above set forth, the primary overflow pipes, E and E', being

of relatively large diameter and therefore efficient with the maximum amount of water in the boiler, and their location being such that the insertion of these large tubes does not
5 unduly weaken the metal of the drums, although they are at the lowest point consistent with this result.

The secondary overflow pipes, *e* and *e'*, are preferably of less diameter than the primary
10 ones, to avoid reduction of strength in the wall of the drum at that end of the pipes which must be located in among the ends of the downwardly depending water tubes. Hence said secondary overflow pipes might
15 alone be sufficient in capacity and by reason of location, to insure the regular distribution and overflow of water when the boiler was filled to the maximum extent, but they are able to take care of such overflow, when,
20 through carelessness or otherwise, the water level falls below the normal. In the absence of such secondary intercommunication this fall of the water level would have serious results, as a most irregular circulation would
25 occur and undue overheating take place at one or more points. Hence the secondary

group of overflow pipes becomes a most valuable adjunct at such times, while of course aiding in maintaining the general overflow and circulation at all times.

I recognize the prior state of the art as set forth in my former patent referred to, and hence do not deem it necessary to reiterate the limitations which it imposes upon the scope of my invention.

I claim—

The combination, with the feed water drum, B, and the steam drums, B' and B², severally provided with downwardly depending groups of water tubes, having manifolds and communicating at their lower ends, said drums being also provided with intercommunicating pipes above the normal water level, of the primary overflow pipes arranged below the normal water level, but above the level of the water tubes, and the subjacent secondary overflow pipes, substantially as set forth.

LAURIE M. MOYES.

Witnesses:

G. HERBERT JENKINS,
JAMES H. BELL.