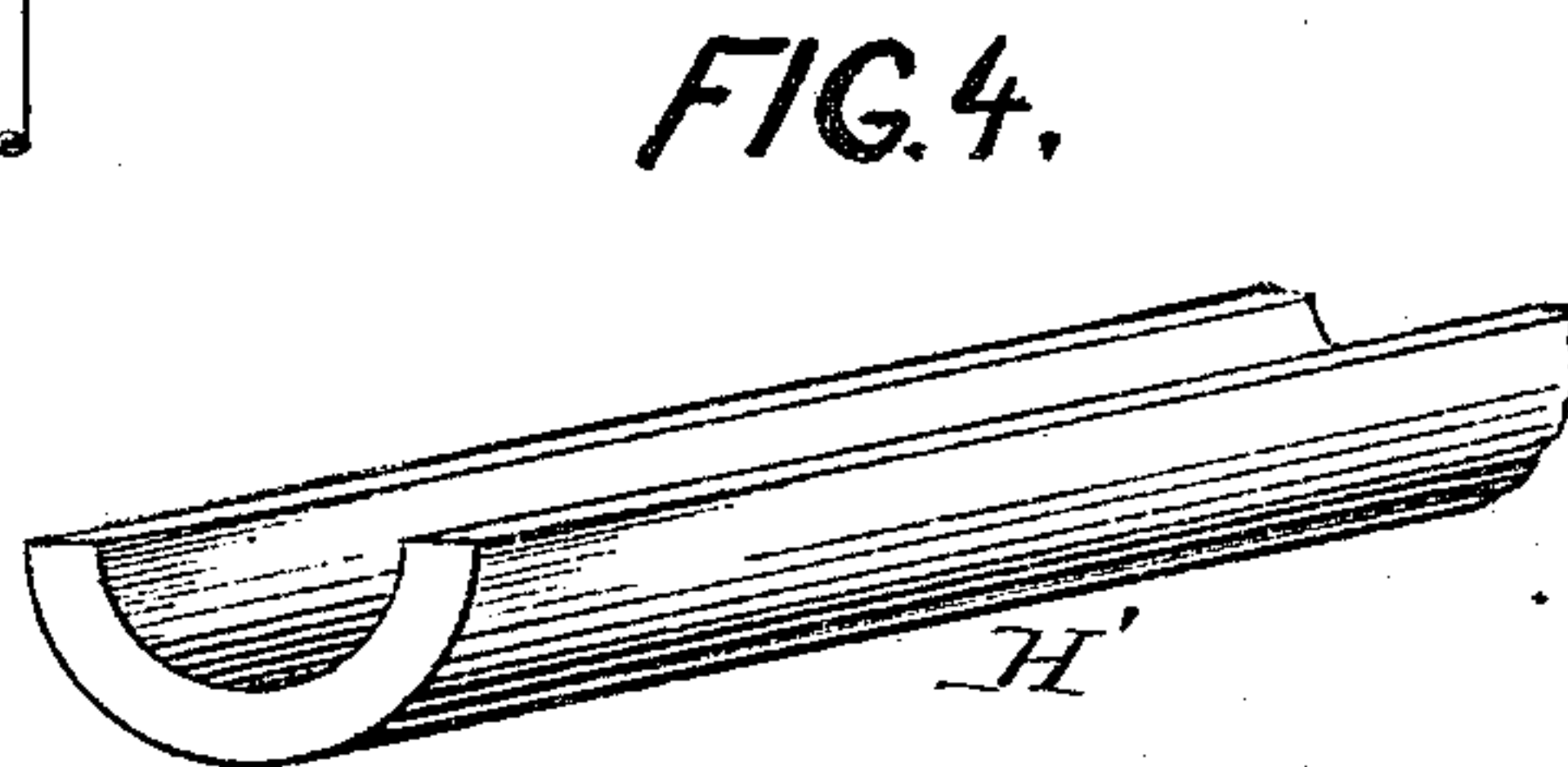
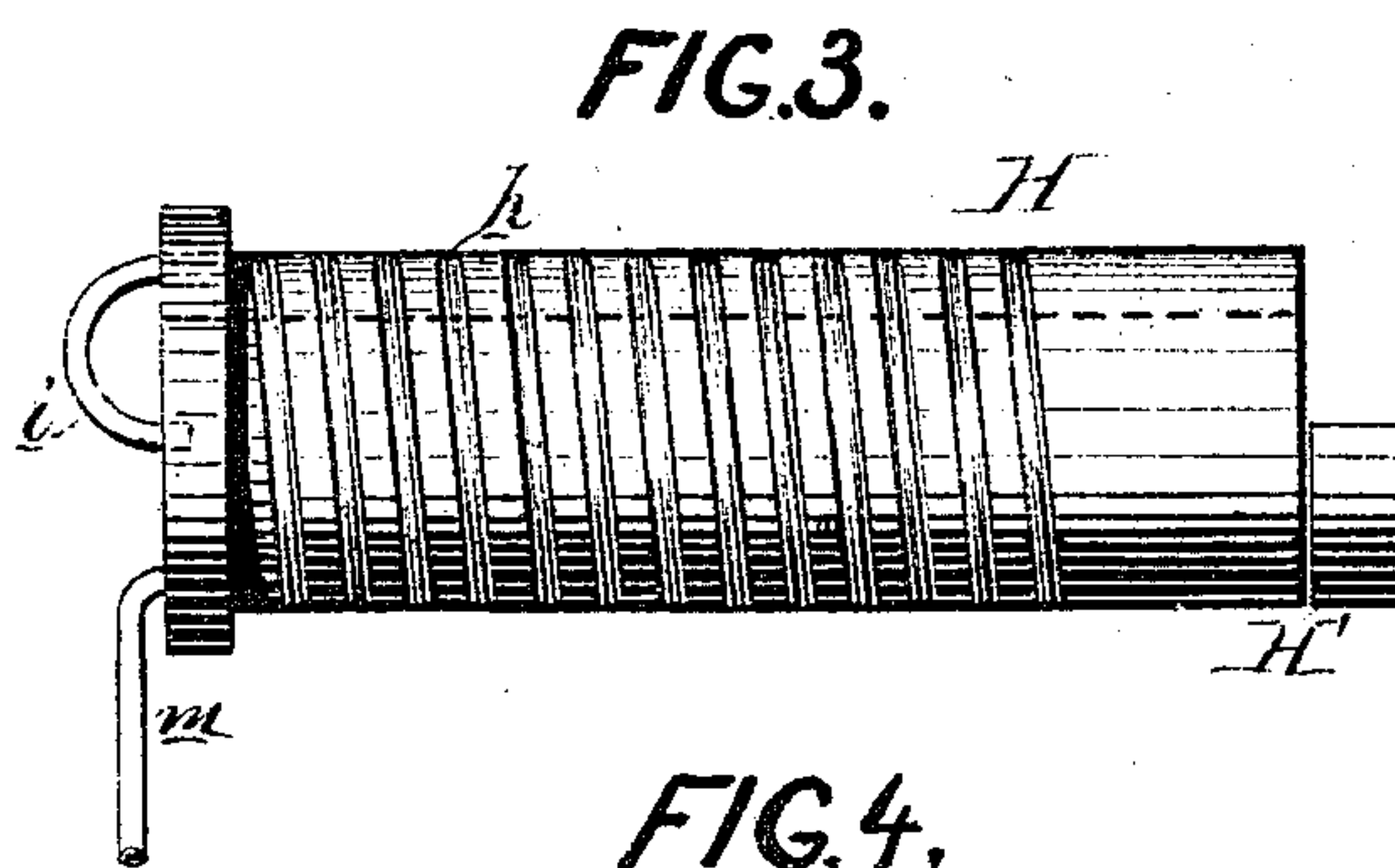
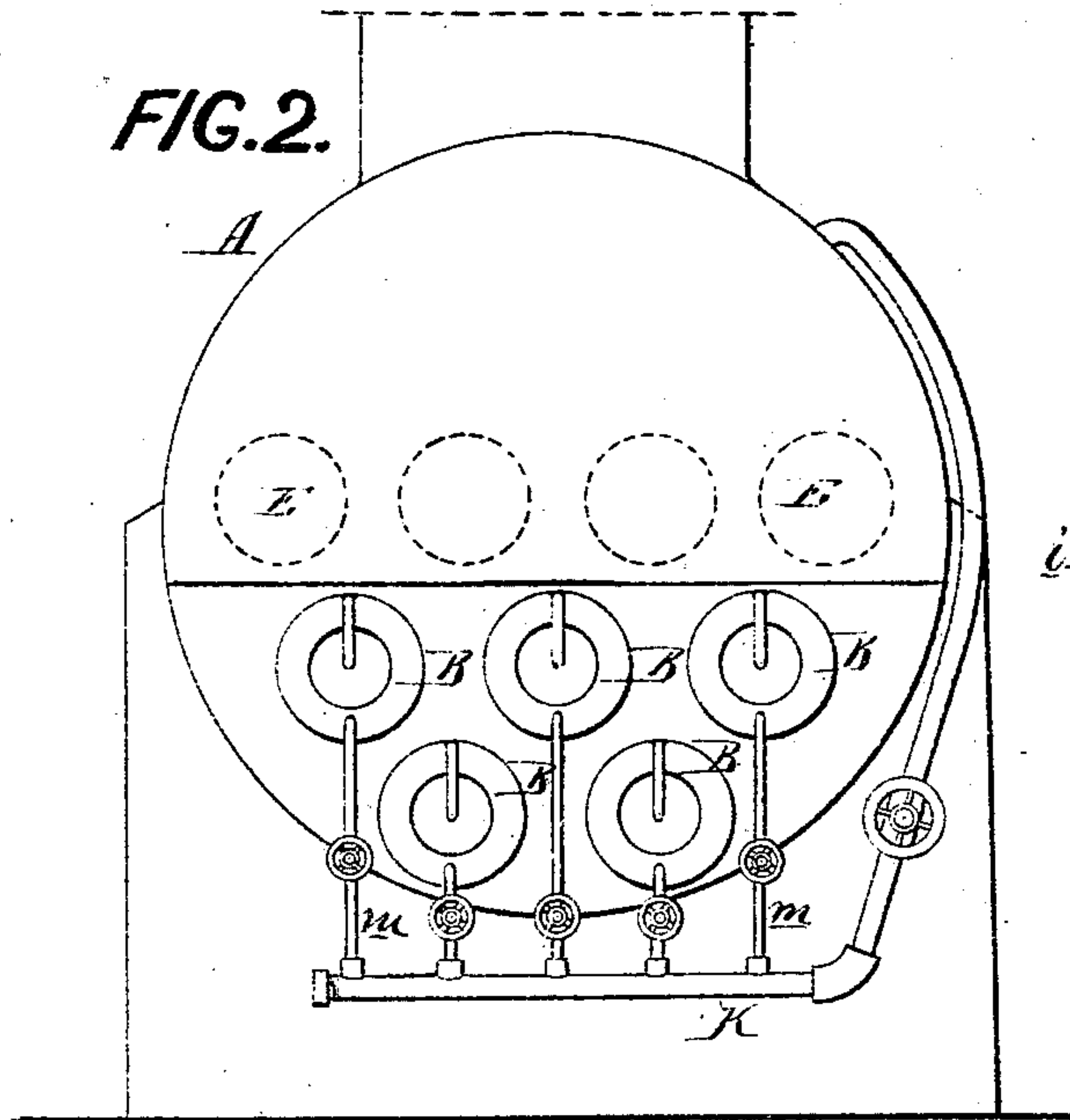
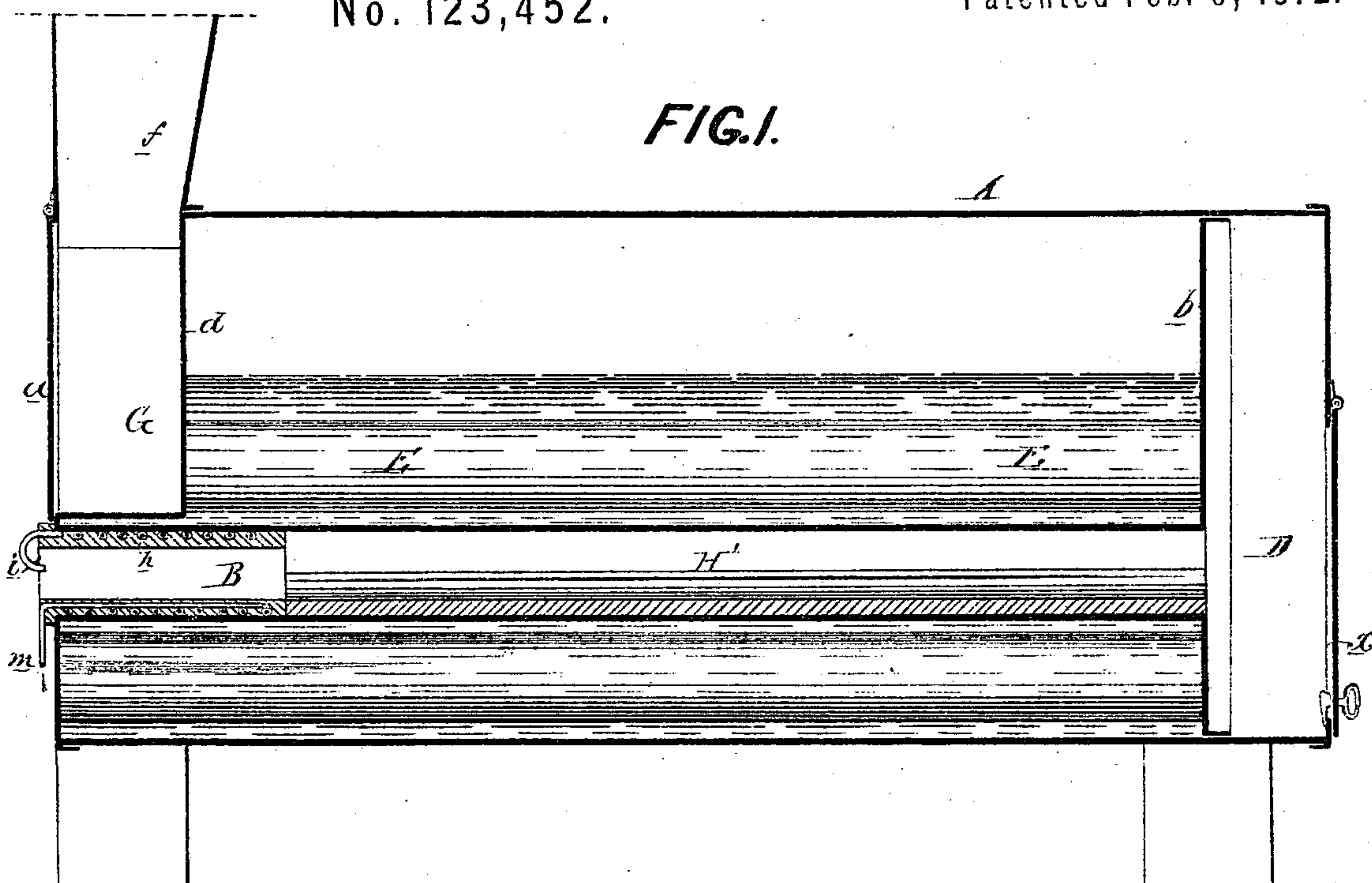


A. G. BUZBY.

Improvement in Hydrocarbon-burning Steam Boilers.

No. 123,452.

Patented Feb. 6, 1872.



WITNESSES,

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UNITED STATES PATENT OFFICE.

ALBERT G. BUZBY, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDROCARBON-BURNING STEAM-BOILERS.

Specification forming part of Letters Patent No. 123,452, dated February 6, 1872.

Specification describing Improvements in Steam-Boilers and mode of applying heat to steam-boilers, invented by ALBERT G. BUZBY, of city and county of Philadelphia and State of Pennsylvania.

Improvement in Steam-Boilers and Mode of Applying Heat to Steam-Boilers.

My invention consists in applying heat to a tubular boiler by injecting directly into the tubes hydrocarbon, hydrocarbon-vapor or ignitable gas, and superheated steam, so as to dispense with the usual furnaces or fire-places. My invention further consists of certain appliances, too fully explained hereafter to need preliminary description, to facilitate my mode of applying heat directly to the tubes of the boiler.

Figure 1 is a vertical section of a steam-boiler illustrating my invention; Fig. 2, a front view of the same; and Figs. 3 and 4, detached views representing parts of my invention drawn to an enlarged scale.

The body or shell A of the boiler, is in the present instance, cylindrical; but its shape may be varied without departing from the main features of my invention. A series of tubes, B B, extend from the front plate *a* of the boiler to the rear plate *b*, behind which is situated the chamber D; and from the plate *b* to the plate *d* extend a series of upper tubes, E, forming a communication between the said chamber D and a chamber, G, situated between the plate *d* and the front plate *a* of the boiler, and communicating with the chimney through the take-up *f*. Into each of the lower tubes B is inserted a cylinder, H, of baked fire-clay or other refractory material, round which is coiled a tube, *h*, the coil being so bent that its orifice is directed into the cylinder H. The other end *m* of each coil communicates with a pipe, K, for conveying steam from the steam-space of the boiler to the whole of the coil. A cylinder, H, of refractory material may extend the entire length of each tube B; but I prefer that it should be limited in length, as shown in Fig. 1, each tube B from the cylinder rearward being lined at the bottom only with refractory material formed by a half cylinder, H', of baked fire-clay. The fuel to be used in my improved boiler is petroleum or other hydrocarbon, or vapors of the same, or any inflammable

gas, a jet of any of which may be injected into each tube H, when, owing to the superheated steam, a flame of such intense heat is created as to render the cylinders H red hot, the semi-cylindrical lining H' being rendered nearly as hot, and the tube B being consequently so heated as to rapidly generate steam within the boiler. Although I prefer to obtain the superheated steam by passing ordinary steam through a coil, *h*, surrounding the cylinder, as described, it may be derived from other sources. This steam has the effect of driving the flame rearward through the tubes B into the chamber D whenever the products of combustion pass through the upper tubes E to the chamber G, and thence to the chimney. The coil *h* may be applied to the cylinder H while the latter is in a plastic or semi-plastic state, the tube sinking into the clay, and the latter being subsequently baked with the coil attached. When the fire-clay cylinders or coils, or both, become deteriorated by the action of the flame, they can be readily replaced with new ones. The lining H' for the bottom of the tubes may also be readily withdrawn through a door-way, *x*, at the rear of the boiler. The main steam-pipe K and also the branch-pipes *m* should be furnished with suitable cocks to regulate the volume of superheated steam admitted to the tubes.

I do not desire to restrict myself to any specific shape of boiler, all that is essential in carrying out my invention being the presence of tubes, within which the desired heat is generated, in the manner described, so as to dispense entirely with the usual fire-place or furnace.

I claim as my invention—

1. Applying heat to a tubular boiler by injecting directly into the tubes hydrocarbon, hydrocarbon-vapor or inflammable gases, and superheated steam, as set forth.

2. The combination, with the refractory lining of a boiler-tube, of a coil of tubing, substantially as and for the purpose described.

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

ALBERT G. BUZBY.

Witnesses:

WM. A. STEEL,

JOHN K. RUPERTUS.