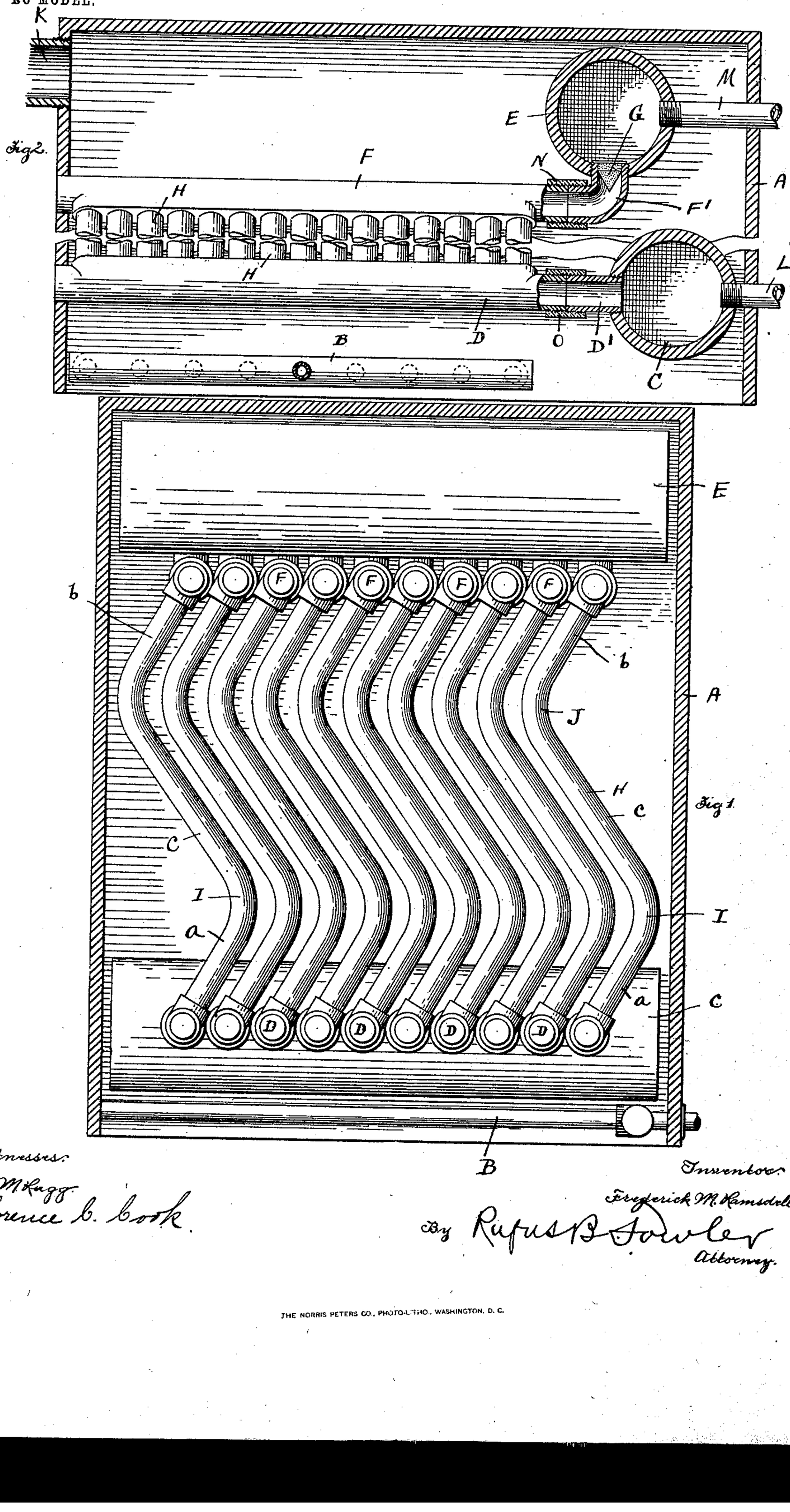
No. 719,140. PATENTED JAN. 27, 1903.

F. M. RAMSDELL.

STEAM BOILER.

APPLICATION FILED MAY 10, 1901.

NO MODEL.



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FREDERICK M. RAMSDELL, OF WORCESTER, MASSACHUSETTS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 719,140, dated January 27, 1903.

Application filed May 10, 1901. Serial No. 59,700. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK M. RAMSDELL, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a side elevation of a boiler embodying my invention, the shell or case being shown in sectional view. Fig. 2 is a sectional view of the shell or case and also of the water and steam drums.

Similar reference-letters refer to similar parts in the different views.

The object of my invention is to provide a steam-boiler having great steam-producing capacity and occupying a comparatively small space, by which it is adapted for small engines where the space is limited—such, for example, as the engines used to propel automobiles and for similar purposes; and my invention consists in the construction and arrangement of parts, as hereinafter described, and set forth in the annexed claims.

Referring to the drawings, A denotes a shell or case inclosing the water and steam receptacles. The case A is open at the bottom and is preferably provided with a burner B, by which gas, gasolene, or other suitable fuel may be burned. Near the bottom of the case A is a water-drum C, having a series of pipes or "headers" D communicating therewith. In the upper portion of the shell or case A is a steam-drum E, having a series of pipes or headers F, communicating therewith by means of upturned elbows F′, thereby bringing the plane of the steam-drum above the plane of the headers F. The opening of each of the elbows F′ into the steam-drum E is provided with a conical perforated plate or strainer G, one of which is shown in Fig. 2, to serve as a baffle-plate to check the entrance of water into the steam-drum. The headers D, communicating with the water-drum C, and the headers F, communicating with the steam-drum E, are connected in pairs with a series of pipes H, each pipe being bent in opposite directions at I and J, approaching the form of the letter S, the series of pipes between each of the headers D and F lying in parallel planes. In the accompanying drawings ten headers are shown in Fig. 1 communicating with each of the drums C and E, and a series of fifteen pipes are shown in Fig. 2 as connecting each pair of headers, whereby the boiler, as shown, will comprise a total of one hundred and fifty bent pipes H.

The burner B is placed immediately beneath the headers D and the cluster of pipes H, so that the ascending current of heated air passes through the spaces beneath the bent pipes H and escapes from the top of the shell or case A through an escape-flue K, Fig. 2. A feed-pipe L, communicating with a pump, serves to feed water to the water-drum C and maintain it in the boiler at any desired water-line. As steam forms in the tubes H it rises in the headers F and passes through the elbows F′ into the steam-drum C, from which it is taken to the engine through the steam-pipe M.

By my method of construction the pipes H through their entire length, with the exception of a small portion at the bends I and J, lie in oblique planes or are inclined to a vertical line, whereby the steam-forming capacity of the pipe is increased by means of the heat impinging against the under sides of the oblique sections of pipe. Free circulation of the water within the pipes is also secured by the bent form of pipes, as shown, in which the particles of water in contact with the under or most heated sides of the pipe rise until they strike the opposite or upper sides of the bent sections of pipe, along which they move toward the headers F. By bending each of the pipes H in two places and in opposite directions I secure three inclined sections—viz., the section *a* below the bend I, the section *b* above the bend J, and the inclined section *c* between the bends I and J—the obliquity or inclination of each section being substantially the same. Each pair of connected heaters D and F is placed in the same vertical plane or with each of the headers F placed directly over its connected header D. The upper headers F are conveniently connected with the elbows F′ by means

of screw-threaded couplings N, and the lower headers D are likewise connected by screw-threaded couplings O with the nipples D'.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of an inclosing case, a water-drum near the bottom of the case, a series of pipes or headers communicating therewith, a steam-drum near the upper part of said case, a series of pipes or headers communicating with said steam-drum by means of upturned elbows, a series of bent pipes connecting said headers, said pipes being bent in opposite directions and lying in parallel planes, substantially as described.

2. The combination with a water and a steam drum, of pipes or headers communicating at one end with said water-drum, a series of pipes or headers communicating with said steam-drum above the plane of said headers, a series of pipes connecting said headers, each of said connecting-pipes being bent in opposite directions approximating a letter **S**, a case inclosing said drums and said pipes, substantially as described.

3. The combination of a water-drum, a steam-drum placed at a higher level than said water-drum, headers communicating with said water-drum, headers communicating with said steam-drum by means of upturned elbows, said headers being placed vertically over each other, bent pipes connecting said headers, a case inclosing said pipes and a series of perforated baffle-plates between said steam-drum and each of the headers communicating therewith, substantially as described.

Dated this 30th day of April, 1901.

FREDERICK M. RAMSDELL.

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