

(No Model.)

R. NEWTON.  
Fuel Economizer.

No. 233,002.

Patented Oct. 5, 1880.

Fig. 1 .

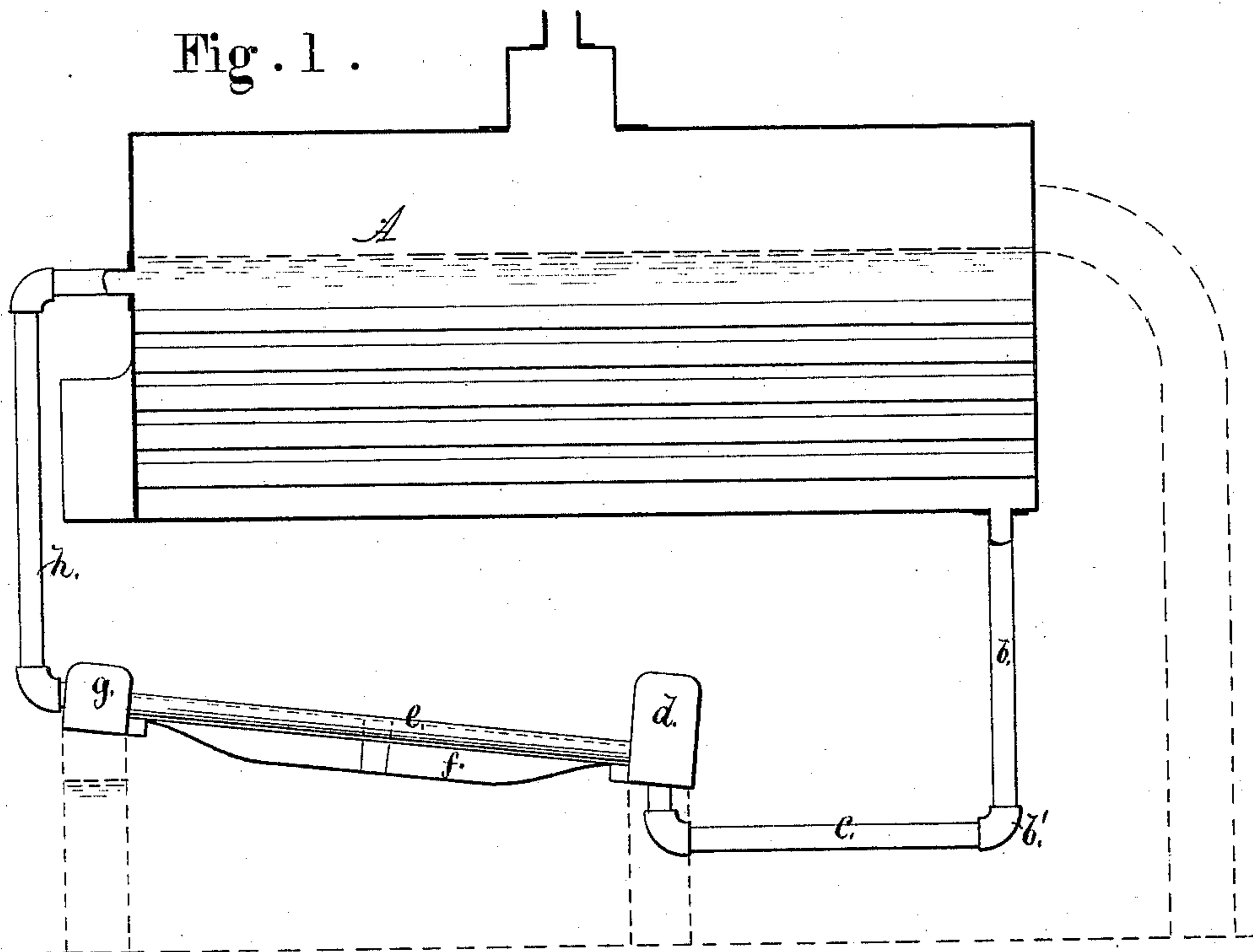


Fig. 2 .

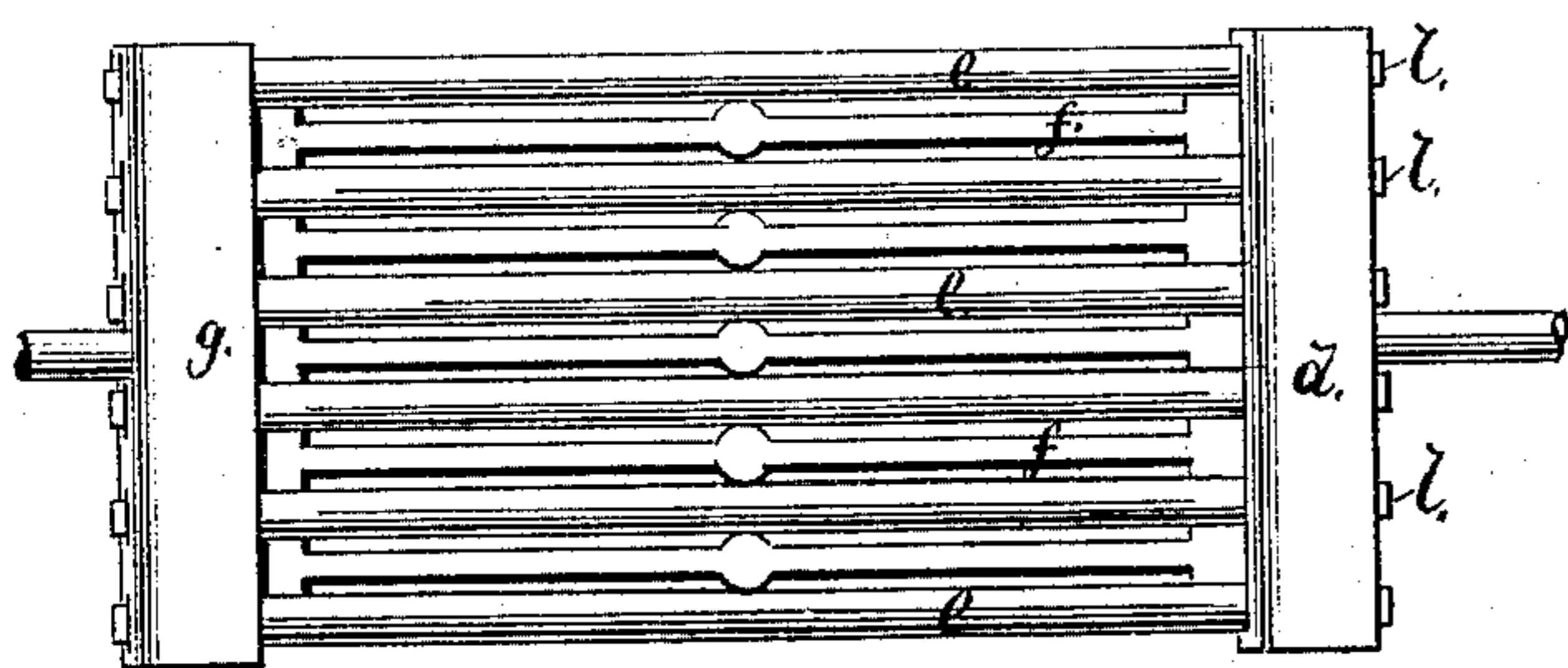


Fig. 3 .

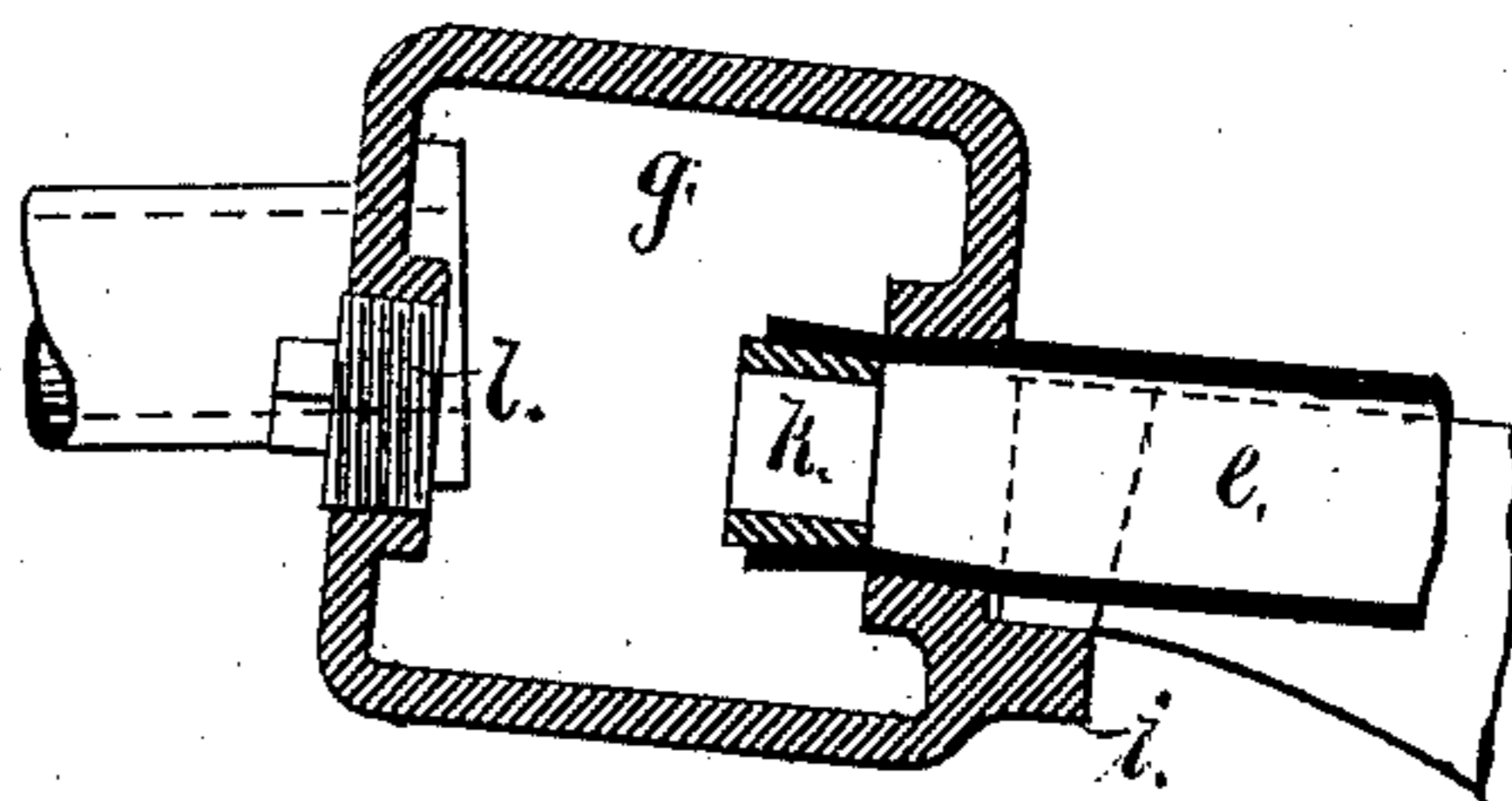


Fig. 4 .



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT NEWTON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO BARNARD COLLINGHAM, OF SAME PLACE.

## FUEL-ECONOMIZER.

SPECIFICATION forming part of Letters Patent No. 233,002, dated October 5, 1880.

Application filed May 12, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT NEWTON, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Fuel-Economizers; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improvement in the construction of water-grates or fuel-economizers for steam-generators.

The invention consists in the peculiar and novel construction of the water-grate and the bars placed between the water-bars, as also in the bridge-wall, as will be more fully set forth hereinafter.

Figure 1 is a view showing the economizer or water-grate secured under a steam-generator and connected with the same. Fig. 2 is a top view of the economizer. Fig. 3 is an enlarged sectional view of the end piece or multiple, and shows the manner in which the tubes are secured, as also the bearer for the grate-bars. Fig. 4 is a cross-section, showing the alternate water-tubes and grate-bars.

In the drawings, A is a steam-generator. b is a pipe descending preferably from the lower part of the steam-generator. c is a pipe leading to the bridge at the intersection of b and c at b'.

The blow-off pipe ought to be connected so that all the water may be drawn from the generator and the water-grate.

d is the bridge, and e e are a number of tubes secured to the bridge and also to the box g at the front of the grate. The box g is again connected with the steam-generator, and preferably at a point near to but below the water-line. By this arrangement the water from the lower part of the steam-generator passes into the hollow bridge through the tubes e and up the pipe h into the steam-generator, thus adding heat to the water as it passes through the tubes, increasing the cir-

ulation in the generator, and preventing the accumulation of impurities in the boxes or tubes. Not only does the water-grate add to the steam-generating power of the boiler, but the rapid circulation of the water improves the steaming capacity of the whole generator.

The bridge-wall d, forming a hollow box, secures additional heating-surface, and prevents the formation of clinkers. Both the bridge-wall d and the box g are provided with the rib i, on which the grate-bars f f rest. These grate-bars fit between the tubes e e at both ends, and also near the center, but allow free access of air to the fuel from the ash-pit.

The tubes e e are secured in the box g and bridge-wall d by slightly tapering the ends of the tubes, forcing them into slightly-tapering holes in the box and bridge, and driving the ring k into the tube end, as is shown in Fig. 3.

To reach the tubes, for driving the ring k as well as for cleaning and inspection, the screw-plugs l l are placed one opposite the ends of each tube. The whole forms a simple and durable grate, which by the absorption of heat directly from the fire adds greatly to the capacity of a steam-generator, and by inducing a circulation of water becomes an efficient economizer of fuel, readily adapted to any kind of steam-generators.

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

The combination, with the hollow bridge-wall d and the box g, both connected with the steam-generator, and both provided with the plugs l, of the tubes e e and the grate-bars f, provided with projections at their ends and near the center to fit between the tubes, the whole connected with the generator, as and for the purpose described.

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Witnesses:

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