

(No Model.)

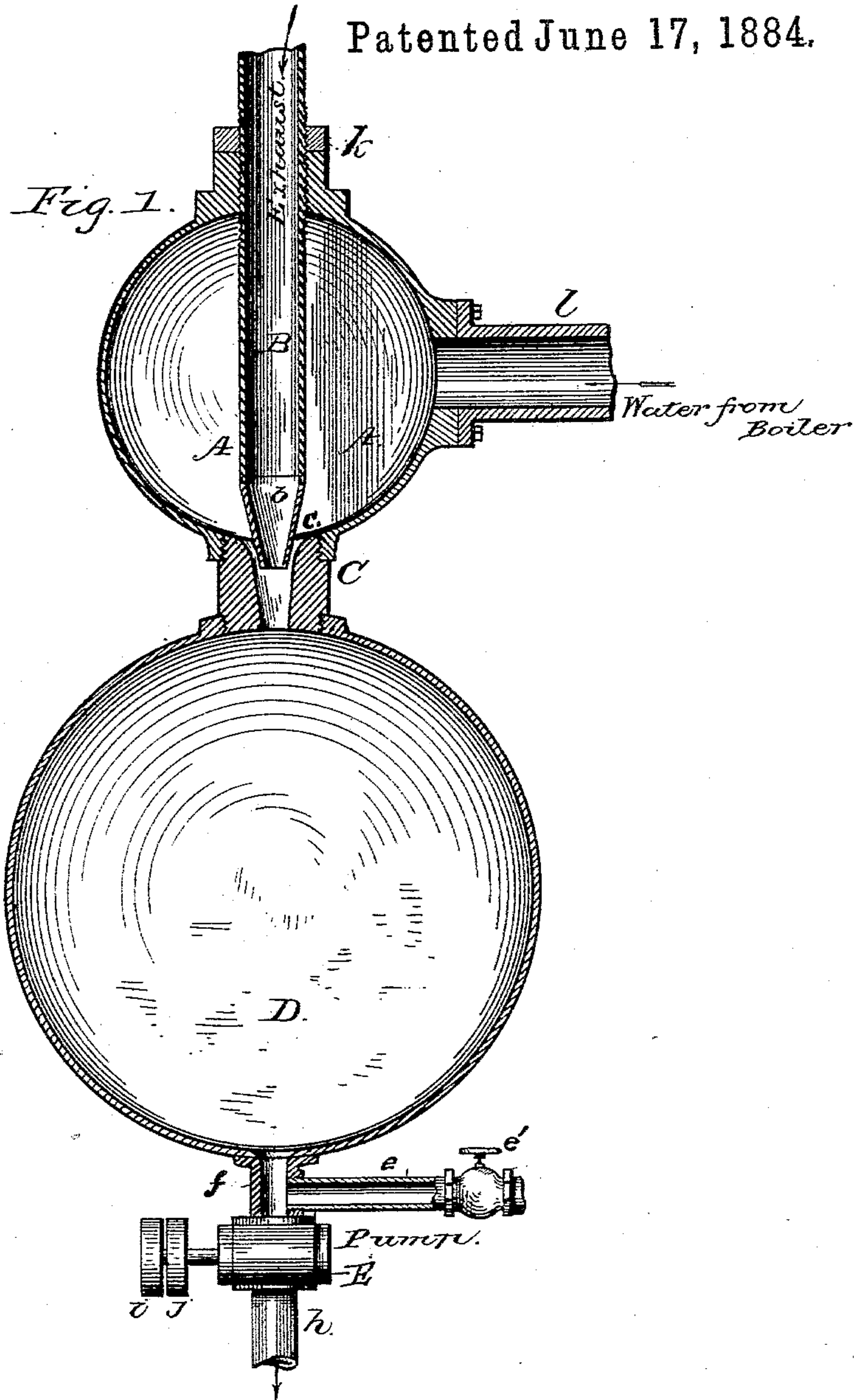
2 Sheets—Sheet 1.

D. RENSHAW.

UTILIZING THE EXHAUST OF ENGINES.

No. 300,505.

Patented June 17, 1884.



Attest
J. M. Reynolds
Edward C. Ellis

Inventor:
David Renshaw
per O. E. Duffy
Atty.

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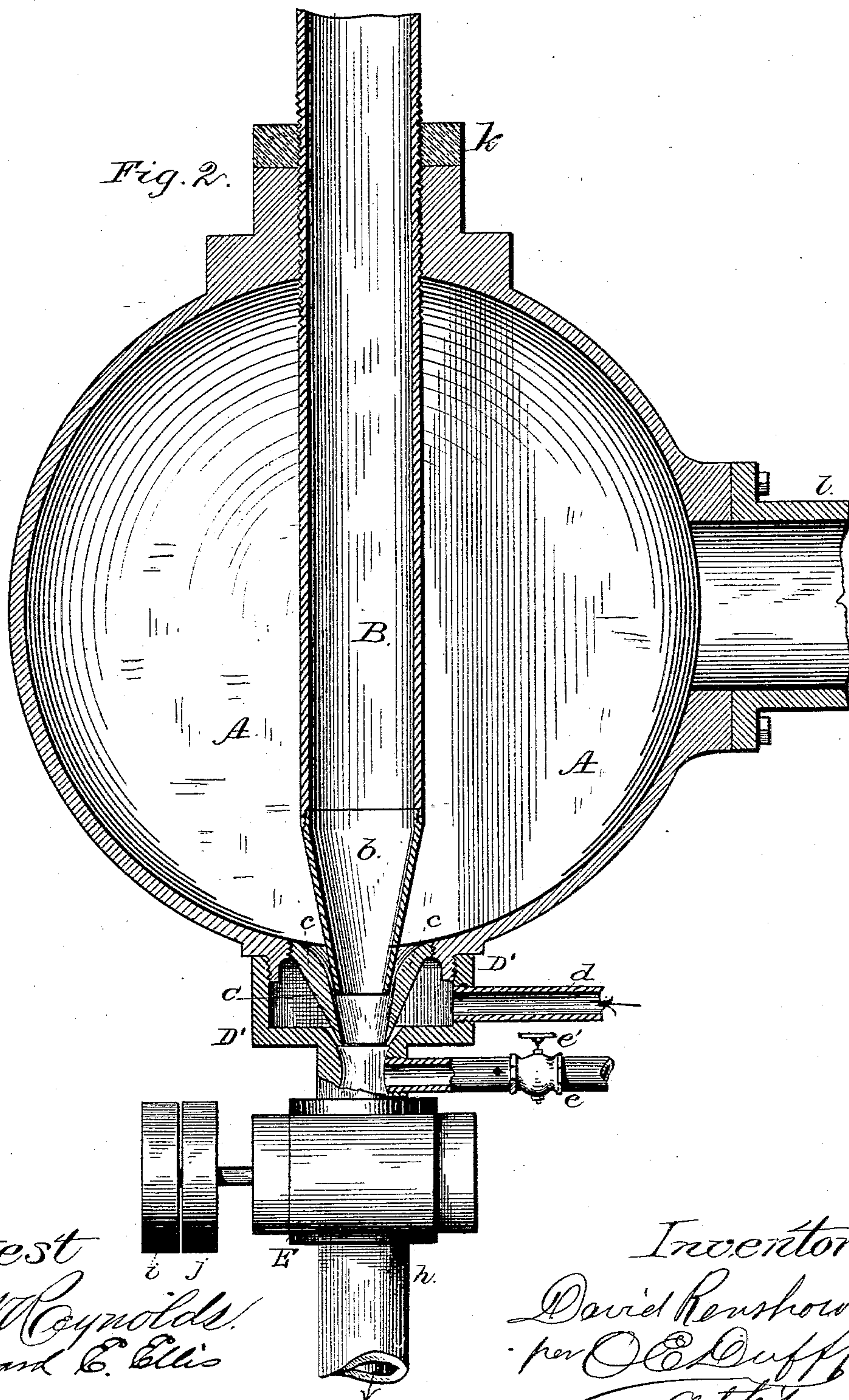
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UNITED STATES PATENT OFFICE.

DAVID RENSHAW, OF BRAINTREE, MASSACHUSETTS.

UTILIZING THE EXHAUST OF ENGINES.

SPECIFICATION forming part of Letters Patent No. 300,505, dated June 17, 1884.

Application filed November 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, DAVID RENSHAW, of Braintree, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Methods of and Apparatus for Utilizing the Exhaust of Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention has for its object the utilization of the exhaust of engines, whereby the heat of said exhaust may be continually utilized in the generation of steam, and also the water necessarily used in the production of said steam is continually used, except that of the ordinary leakages.

A further object of the invention is to produce an instrument detachable and independent for carrying said objects into effect.

To these ends the invention essentially consists in the method of controlling and manipulating the exhaust of the engine, and in means for preventing back-pressure of the exhaust when subjected to atmospheric pressure or to any throttling device common in exhaust mechanism.

I will now proceed to describe one means of carrying my invention into effect. I do not wish to confine myself to any particular construction of tool or instrument or any variation thereof, as the invention is broadly to any means for carrying the same into effect.

Figure 1 shows a longitudinal section of two vessels, preferably spherical, and a plan view of a rotary pump; Fig. 2, a plan sectional view of a single sphere and pump, with a live-steam chamber interposed between the pump and sphere, the objects of which will be more fully hereinafter described.

A is a vessel or reservoir for the reception of water from the boiler at boiler-pressure, preferably of spherical form.

B is a pipe for the reception of the exhaust, and is fitted with a suitably-tapering nozzle, *b*.

C is the outlet from the sphere A, into which the tapering nozzle *b* enters in such manner

as to deliver the exhaust steam into contact with the boiler-water at the point of its greatest speed.

D is a sphere of longer diameter than A, for the reception of the commingled exhaust and boiler-water, the object of which is to more fully utilize the combined force of the exhaust and boiler-water pressure, also to steady the flow or delivery of such commingled steam and water to the rotary pump or other suitable device; otherwise the flow might be intermittent and somewhat objectionable.

E is a rotary pump, or may be other suitable device, for taking from and receiving from the spheres the commingled boiler-water and exhaust, relieving them of back-pressure, and forcing the same into the boiler from which they were taken.

f is a connection between spherical reservoir D and pump E.

e is an overflow-pipe for creating a current through the spheres; *e'*, a valve or pipe.

h is a delivery-pipe leading from pump to boiler.

i and *j* are fast and loose pulleys for operating rotary pump.

k is a lock-nut, by which the exit-nozzle or delivery of the exhaust to the boiler-water is controlled in the connection C, and also the quantity or delivery of boiler-water to vessel or reservoir D.

l is the boiler-water delivery-pipe.

c is the boiler-water outlet from the vessel A, into which the adjustable tapering nozzle enters in such manner as to deliver the exhaust into contact with the boiler-water at the point of its greatest speed.

D', Fig. 2, is a chamber surrounding the mingled water and exhaust outlet, for the reception of live steam and its delivery in the form of an outer annular jet to the commingled stream of exhaust and boiler-water while passing through, thus increasing the force of the volume to the pump.

z is a supply-pipe for live steam from boiler to chamber D'.

It will be seen that in this construction the location of the pump or forcing device is an important feature, as the combined effect of suction caused by the pump and force exerted by the boiler-water pressure is such as to pre-

vent all back-pressure of the boiler-water on the exhaust-delivery. This is a matter of moment, and greatly simplifies the attaining of the object in view. It will also be seen that this constant current of steam and water can be maintained without any back-pressure on the exhaust-outlet, while flowing onto the pump with force equal to if not greater than that due to the boiler-pressure only; hence by thus locating the pump the primary power necessary to cause it to give steadiness and certainty to the action of this process is reduced to a minimum.

The operation is as follows: The engine being started, the overflow-pipe is opened to the atmosphere, water from the boiler being in full communication with the sphere or reservoir. When the current is complete and steady, the rotary pump is put in motion and the overflow shut off. The pump now carries the commingled steam and water from the sphere or reservoir faster than the exhaust is delivered, and thereby relieves the engine of back-pressure, and in fact causes a suction by which the action of the engine is enhanced. When a full current is under headway, the pump will have but little to do as the force of the boiler-water and the exhaust will greatly assist the pump, and thus but little power is exerted to run it. However, when an increased velocity is required I may admit live steam into chamber D, which passes into and with the mixture into the pump.

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

1. The method herein described of utilizing the exhaust of engines by returning it into the boiler from which it was taken by first uniting it in a reservoir with a body of water from the boiler under boiler-pressure, then pumping the combined mixture into the said boiler.

2. The method herein described of utilizing the exhaust of engines by uniting water from the boiler under boiler-pressure with the exhaust, and then pumping them from the suction end of the vessel, whereby increased velocity

is imparted to them, and returning them into the boiler from which they were taken.

3. The combination, in an apparatus for returning the exhaust of the engine to the boiler from which it was taken, consisting of the receiving-vessel for boiler-water under boiler-pressure, the exhaust-pipe and the pump located at the suction end of said apparatus, substantially as described.

4. The combination, in an apparatus for utilizing the exhaust of engines, consisting of the vessel or reservoir A, adapted to be connected with the boiler and under boiler-pressure, the exhaust-pipe, the nozzle of which is located within the out-neck of said vessel, and the pump arranged at the suction end of the vessel, as described.

5. The combination, in a device for returning the exhaust of engines by returning it into a boiler under pressure equal to the source of supply, consisting of the vessels A and D, united by a neck, into which the exhaust-nozzle enters, a pump arranged at the outlet end of the device, all arranged for combined action, for the purpose set forth.

6. The combination, in an apparatus for utilizing the exhaust of engines, consisting of the vessel or reservoir A, exhaust pipe and nozzle B b, live-steam chamber D', and the pump E, arranged at the outlet or suction end of said apparatus, for the purpose set forth.

7. The combination, in apparatus for returning the exhaust of engines into boilers under pressure, of the vessel A, exhaust pipe and nozzle B b, entering the outlet of said reservoir, and the live-steam chamber D' and its nozzle, with the overflow-pipe, all arranged for joint operation in the manner and for the purpose set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

DAVID RENSHAW.

Witnesses:

B. F. MORSELL,
EUGENE D. CARUSI.