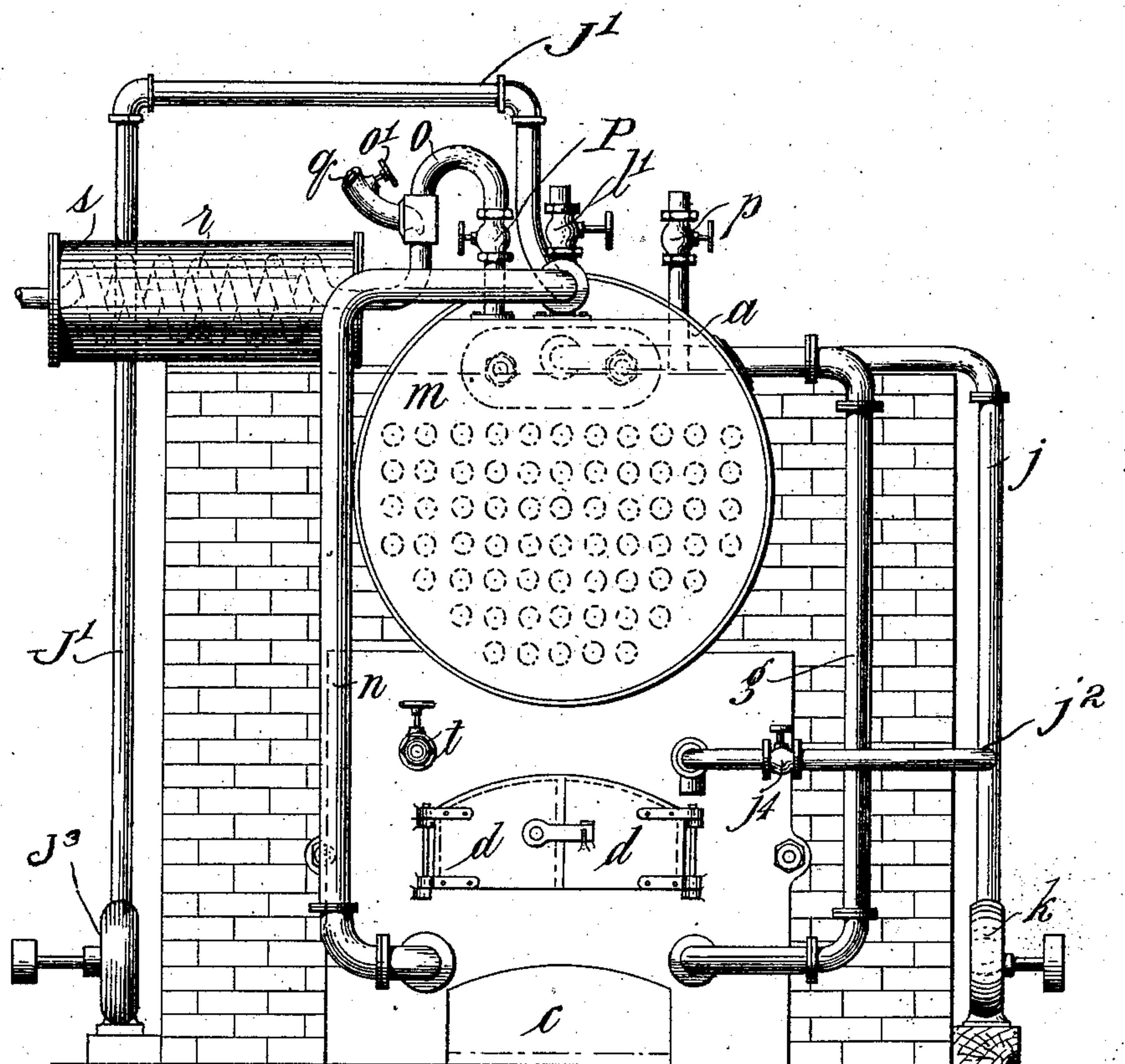


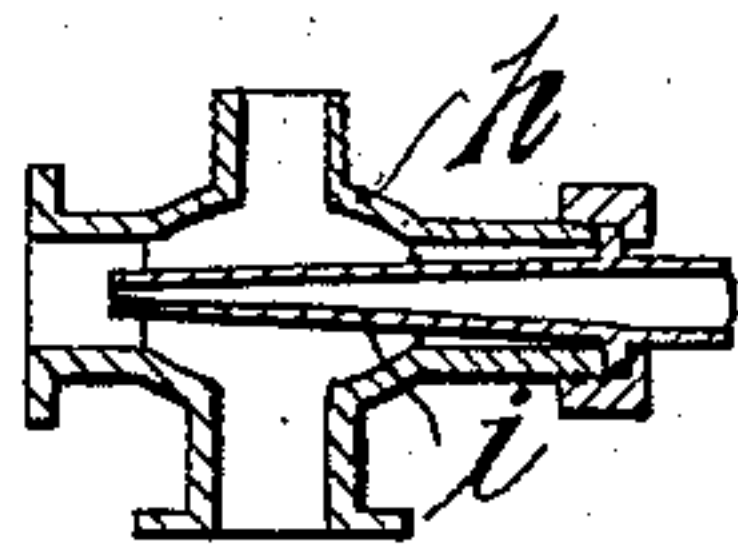
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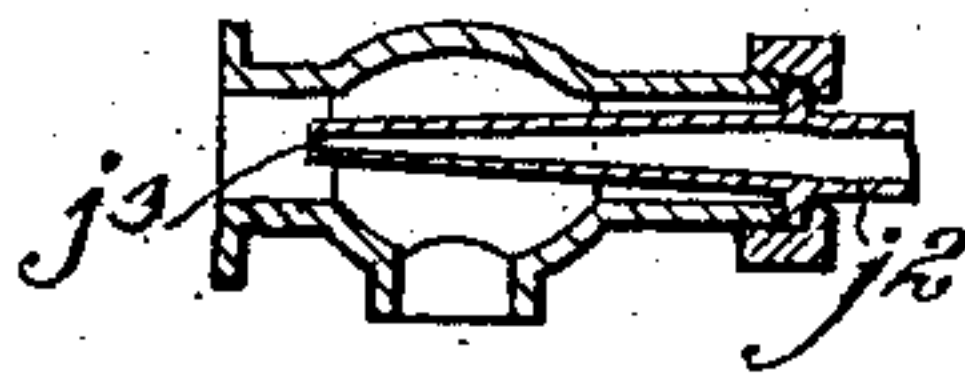
*Fig.1.*



*Fig. 3.*



*Fig. 4.*



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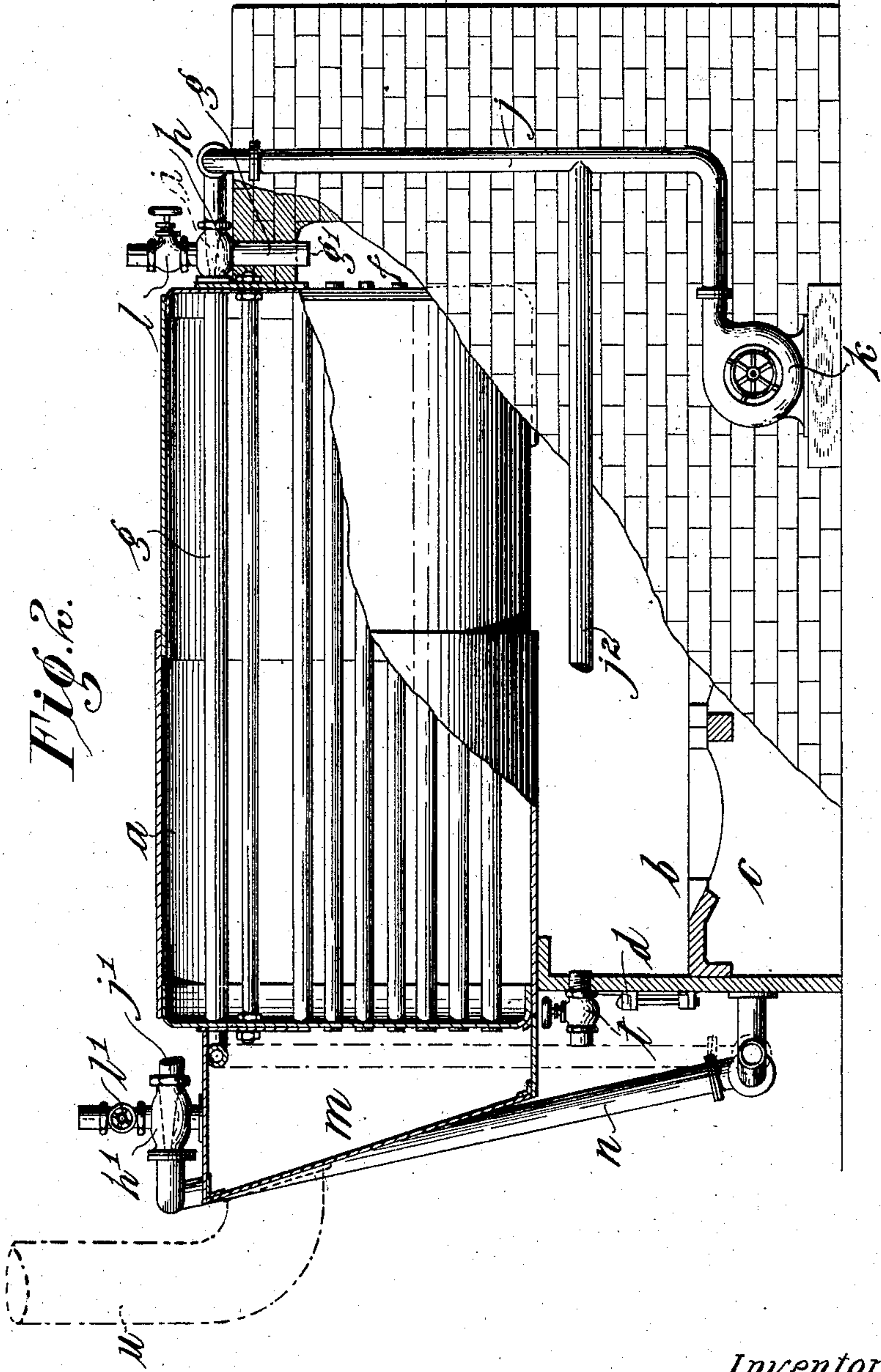
# SMOKE PREVENTING AND FUEL ECONOMIZING APPLIANCE.

APPLICATION FILED JULY 20, 1908.

**973,991.**

Patented Oct. 25, 1910.

**2 SHEETS—SHEET 2.**



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# UNITED STATES PATENT OFFICE.

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SMOKE-PREVENTING AND FUEL-ECONOMIZING APPLIANCE.

973,991.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed July 20, 1908. Serial No. 444,526.

*To all whom it may concern:*

Be it known that we, WILLIAM JOHN STOREY, engineer, and GILBERT STOREY, boiler-maker, subjects of the King of Great Britain, residing at No. 4 Greig street, Albert Park, near Melbourne, in the State of Victoria, Commonwealth of Australia, and No. 102 Merton road, Albert Park, aforesaid, have invented certain new and useful Improvements in Smoke-Preventing and Fuel-Economizing Appliances, of which the following is a specification.

The improvements constituting this invention have reference to boiler and furnace adjuncts, and they have been devised primarily with the object of providing improved means for the consumption and utilization of all gases arising from the fuel, and being of a combustible nature, which gases in the types of furnaces at present largely in use are permitted to escape by passing upwardly through the chimney into the atmosphere in the form of smoke. Such gases in combustion in the form of flame are by means of our improvements collected in their passage from the furnace and conducted by a pipe or pipes aided by air-pressure through or around the boiler and delivered into the ash-pit for heating purposes, thereby effecting a material saving in the consumption of fuel and minimizing the emission of smoke.

In order that the invention, having in view these and further objects, may be clearly understood reference is now made to the accompanying explanatory drawings, in which:—

Figure 1 is a front elevation of a multi-tubular boiler, and a furnace illustrating the application of the improvements thereto. Fig. 2 is a view in side elevation, partly in vertical section, illustrating a slight modification. Fig. 3 is a sectional view of one of the injectors, and Fig. 4 is a similar view of the other injector.

In these drawings the letter *a* indicates the boiler, which is of the horizontal multi-tubular type, but which may be of any other approved design or type. *b* designates the furnace, and *c* the ash-pit. The doors *d* and *e* of the furnace and ash-pit, respectively, are constructed with any suitable jointing for the purpose of being perfectly air-tight when closed, and also for the bet-

ter retention of heat within their respective chambers.

Positioned in the back flue *f* of the furnace is the open end *g*<sup>1</sup> of a pipe *g* which is bent at right angles or approximately so to pass horizontally through the boiler above the water-line. This pipe *g* projects for some distance from the front of the boiler and then extends downwardly to lead into the ash-pit *c* at a desired position. The said pipe *g* at a point adjacent to the back of the boiler is furnished with a suitable injector *h*, which has a nozzle *i* and is secured as by screw-threading to the end of an air-supply pipe *j*.

Air pressure is supplied to the injector *h* by and through the said pipe *j* from a fan, blower or air-pump *k* of any preferred construction. The purpose of this injector *h* is to direct the air at pressure into the horizontal portion of the pipe *g* thereby setting up a suction action which draws the combustible gases from the back of the furnace *b* through the inlet end *g*<sup>1</sup> of the pipe *g* to be then conducted or forced along with the fresh air from the fan to the bottom of the ash-pit *c* to be consumed and utilized for heating purposes. By this means the fire is relieved of the pressure of accumulating gases, and free combustion of the fuel is insured. The supply of air from the fan or the like *k* can be constant or it may be regulated by the adjustment of a valve (not shown) in the pipe *j*. An auxiliary flue *j*<sup>2</sup> (see Fig. 4) may be employed to deliver fresh air direct to the fire-box *b* from the fan *k*. The said flue is provided with an injector *j*<sup>3</sup> to increase the supply of air being delivered in the fire-box. A valve *j*<sup>4</sup> is preferably provided at a point in the length of said flue for the purpose of regulating the passage of air therethrough.

The injector *h* is furnished with an air-inlet valve *l* which can be operated for the admission of an extra supply of air into the pipe *g* whenever required. Furthermore, an additional injector *h*<sup>1</sup>, to which air-pressure is supplied by a pipe *j*<sup>1</sup> connecting with a suitable fan, blower or pump *J*<sup>3</sup>, is arranged at the top of the smoke-box *m*. This injector *h*<sup>1</sup> is furnished with an air-inlet valve *l*<sup>1</sup> similar in construction and operation to the valve *l* previously described, and the injector connects with a pipe *n* for the



purpose of conducting the smoke, fumes and combustible gases from the smoke-box *m* into the ash-pit *c* in a similar manner to the pipe *g* leading from the back flue *f* of the furnace. Valves *p*—see Fig. 1—suitably operated are fitted to the top of the said smoke-box *m* for the purpose of allowing the escape of gases chiefly of a non-combustible nature, which gases if permitted to enter the ash-pit *c* would have an injurious effect on the fire by causing an accumulation of gases and consequently undue pressure on the top of and above the fire. One of the valves *p* is connected to a pipe *o* furnished with a valve *o*<sup>1</sup> and an air-inlet nozzle *q*, which draws in atmospheric pressure to allow combustion to continue and minimize the emission of smoke from the outlet end of the said pipe *o*. Portion of this pipe *o* is constructed in the form of a coil *r* in order that the gases and smoke in their transit can be utilized for heating the boiler feed-water contained in a tank or receptacle *s*, or for other heating purposes. A relief valve *t* when opened allows the escape into the atmosphere of any air or gases in the furnace *b* when the pressure of such air or gases is too excessive, or when the combustible gases are not to be utilized, as when the furnace is not in action.

If preferred, or when an accumulator is not employed, the gases and smoke may be withdrawn from the smoke-box *m* by means of the flue *u* (shown by broken lines in Figs. 1 and 2) until the boiler is in full working order. Directly sufficient steam has been generated in the boiler, the flue *u* can be cut off by means of any suitable form of valve placed at any point in its length, and the surplus gases treated as before described.

What we do claim is:—

1. The combination with a steam boiler and a furnace therefor including an ash pit, a fire box, and a back flue, of a pipe pass-

ing through the boiler and communicating at its rear end with the back flue and discharging at its front end into the ash pit, an injector communicating with said pipe and with the atmosphere, a pump communicating with the injector to force the products of combustion from the back flue to the ash pit through said pipe and to mix air with the products of combustion, a valve mounted in the injector and providing means by which communication between the atmosphere and the injector may be controlled, another pipe communicating with the pump and discharging into the fire box, and a valve in said last named pipe.

2. The combination with a steam boiler and a furnace therefor including an ash pit, a fire box, a back flue, and a smoke box, of a pipe passing through the boiler and communicating at its rear end with the back flue and discharging at its front end into the ash pit, an injector communicating with said pipe and with the atmosphere, a pump communicating with the injector to force the products of combustion from the back flue to the ash pit through said pipe and to mix air with the products of combustion, a valve mounted in the injector and providing means by which communication between the atmosphere and the injector may be controlled, a pipe communicating at one end with the smoke box and discharging at its other end into the fire box, and a pump communicating with said last named pipe to force the products of combustion from the smoke box to the fire box through said pipe and to mix air with the products of combustion.

In witness whereof we have signed this specification in the presence of two witnesses.

WILLIAM JOHN STOREY.  
GILBERT STOREY.

Witnesses:

A. J. CALLINAN,  
J. O'MEARA.