

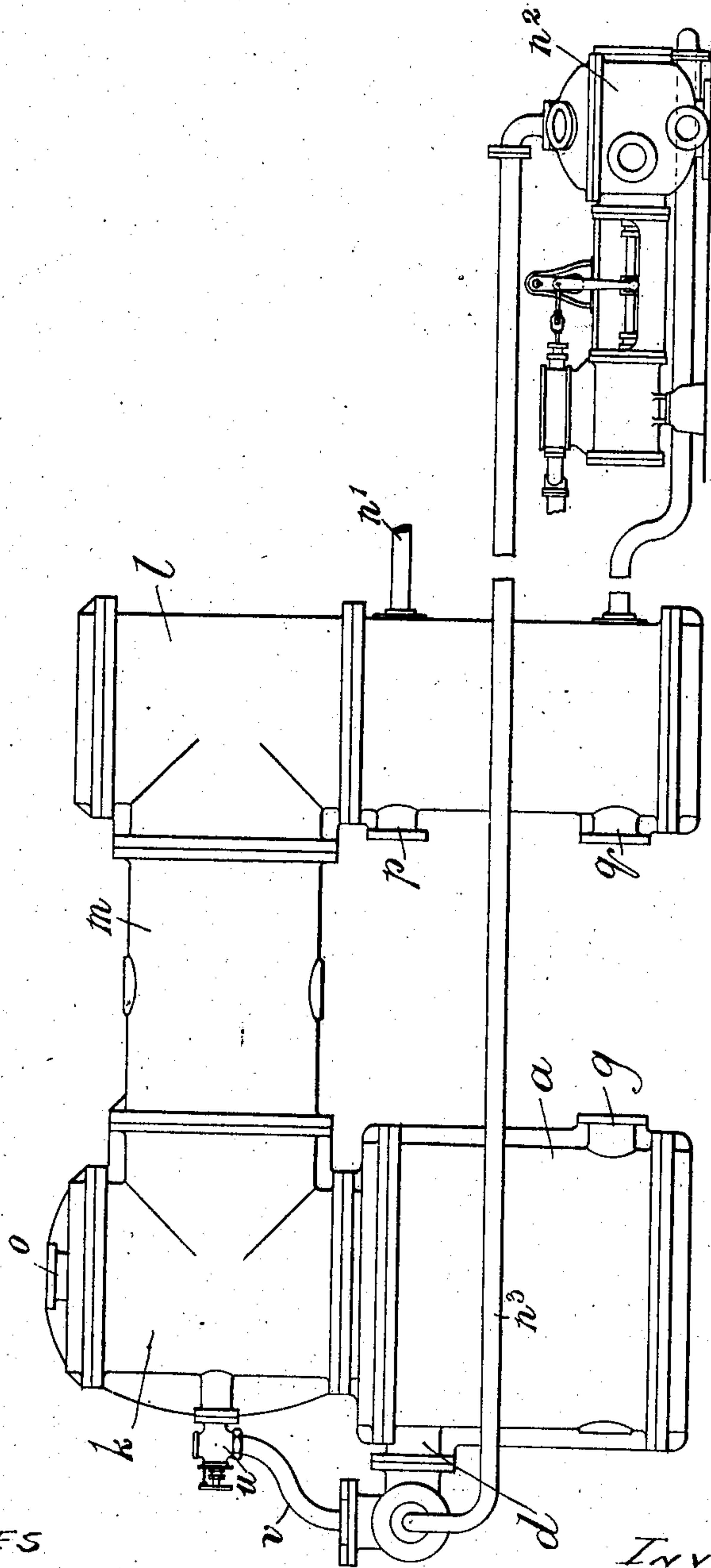
No. 827,173.

PATENTED JULY 31, 1906.

D. M. NESBIT.
STEAM HEATING APPARATUS.

APPLICATION FILED OCT. 16, 1905.

3 SHEETS--SHEET 1.



WITNESSES

W. P. Burke

W. J. Oronoan

INVENTOR

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By *Richard E.*
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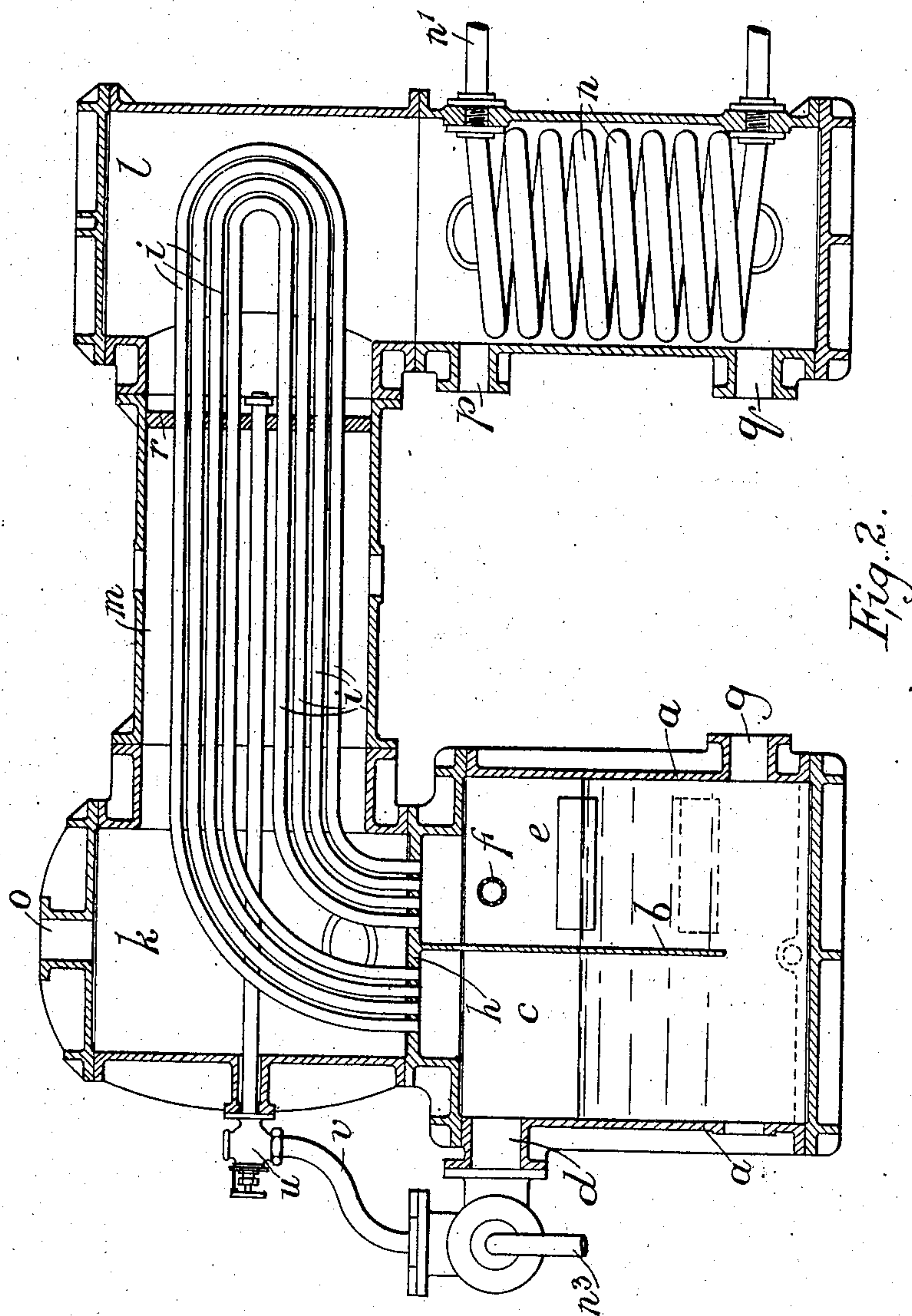


Fig. 2.

WITNESSES

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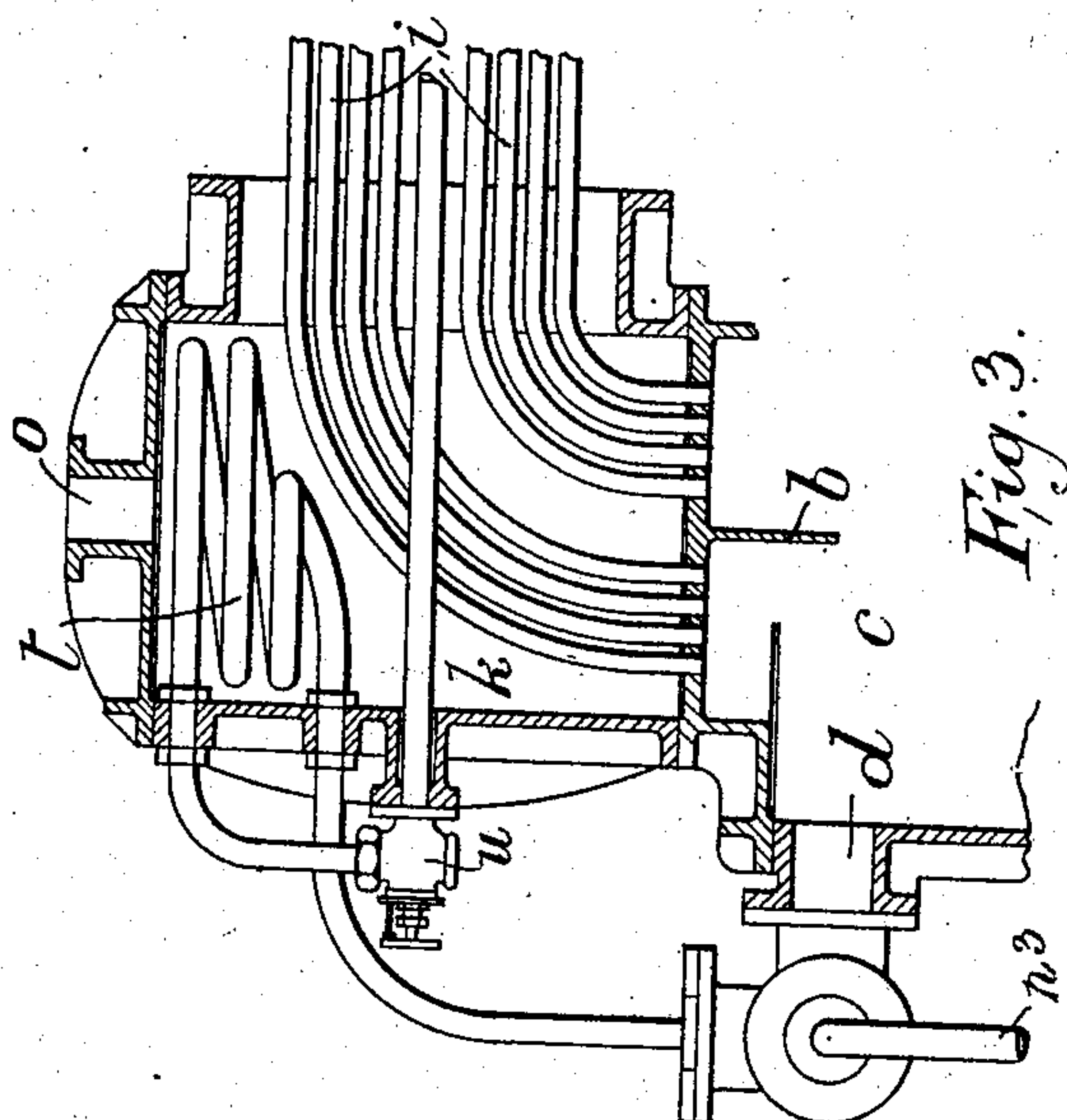
ATTY'S

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3 SHEETS—SHEET 3.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

DAVID MEIN NESBIT, OF LONDON, ENGLAND.

STEAM-HEATING APPARATUS.

No. 827,173.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed October 16, 1905. Serial No. 283,018.

To all whom it may concern:

Be it known that I, DAVID MEIN NESBIT, a subject of the King of Great Britain and Ireland, residing at 12 Great James street, Bedford Row, London, W. C., England, have invented certain new and useful Improvements in Steam-Heating Systems and Apparatus Employed Therewith, of which the following is a specification.

10 This invention relates to heating systems and apparatus employed therewith, and more particularly to steam-heating systems wherein the steam from the return main or mains is led to a combined condenser and water-heater, such as described in the specification to Letters Patent No. 614,743. In systems of this type the steam or vapor from the return-mains and any water of condensation therein is led to one side of a divided hot-
20 well, the water falling to the lower part thereof, while the steam or vapor rises to the top and passes through tubes surrounded by a water-jacket. The steam or vapor is thereby partly condensed, and the water of condensation falls into the hot-well; but any un-
25 condensed steam or vapor issuing from the tubes into the other side of the hot-well is condensed by a water-spray. The water in the jacket surrounding the cooling-tubes is utilized as a hot-water supply.

30 The object of the present invention is to augment the supply of hot water or the heat thereof by causing the steam or vapor from the return-mains to give up all or nearly all its latent heat to the water in the water-jacket before entering the sparge-chamber in the hot-well, and thus at the same time reducing the required quantity of sparge-water and in cases where the demand upon the hot-
40 water supply may be so great that (or for any other reason) the exhaust or return steam may be insufficient to provide the necessary heat for the hot-water supply.

45 It is the object of the invention to provide for the automatic supply of live steam to aid the exhaust or return steam in maintaining the hot-water supply.

50 Another object of the invention is to adapt the condensing apparatus so that it may be readily assembled or disassembled in a situation where available head-room is restricted.

The invention briefly consists in passing the steam or vapor from the return main or mains of a heating system or other waste or

exhaust steam through an auxiliary coil or 55 coils within or connected with the water-jacket of the cooling-tubes of an apparatus of the type referred to before said steam passes into and through the tubes of the apparatus.

The invention also consists in providing a 60 live-steam coil in addition to or instead of the auxiliary coil for the exhaust or return steam and in controlling the supply of live steam thereto automatically, according to the temperature prevailing in the water-jacket or hot-
65 water supply.

The invention further consists in the special construction and arrangement of parts forming the combined condenser and water-heater hereinafter referred to.

70 In the accompanying drawings, Figure 1 is an elevation of one form of apparatus according to the invention, Fig. 2 being a longitudinal sectional elevation, and Fig. 3 is a detail section illustrating a modification.

75 In carrying out the invention according to one mode, as shown in Figs. 1 and 2, a hot-well or receiver *a* is used, having a vertical partition *b* dividing it into two chambers which can communicate at the bottom. One
80 chamber *c* near the upper part is provided with an inlet *d* for steam or vapor and any water of condensation returned from the steam-heating system. The other chamber
85 *e* is provided with a float-controlled sparge-pipe *f* and outlet *g* for condensed water, which may be utilized for feed-water or other purposes.

90 The top of the hot-well is in the form of a tube-plate *h*, to which a number of tubes *i* are fitted.

95 When the apparatus is to be installed in a cellar or other place where head room is limited, these tubes are curved over, as shown, and extend horizontally, or approximately so. They are inclosed within a water-jacket which is preferably made up of two vertical end chambers *k* *l* and a horizontal connecting-chamber *m*, all three communicating. The two end chambers preferably have re-
100 movable cover-plates at the top or sides, and the end chamber remote from the hot-well is extended downwardly preferably to the same base-level as the hot-well or receiver. This extension contains an auxiliary coil *n* or coils
105 or set of tubes through which the exhaust steam or vapor from the return-main is passed before it is passed into the primary

chamber *c* of the condenser and thence around the tubes *i* therein. It may be drawn through the auxiliary coil *n* or coils by a pump *n*² and from thence passed into the
 5 condenser, or the partial vacuum maintained in the sparge side *e* of the hot-well may be arranged to create the necessary suction. It will thus be obvious that the steam first passing through the auxiliary coil *n* or coils and
 10 then through the condenser-tubes *i* will impart practically all its latent heat to the water in the water-jacket, and a much greater supply of hot water may be maintained than has been hitherto possible in ap-
 15 paratus of this type.

It is to be understood that any desired connections, such as *o p q*, may be made to the water-jacket for leading cold water thereto and withdrawing warm water therefrom. It
 20 is preferred to arrange the inlet for cold water near the tubes of the condenser and the outlet for warm water near the auxiliary coil or coils; but this arrangement may be varied. It is also to be understood that the form of
 25 water-jacket may be varied to suit the position where the apparatus is to be installed and that the auxiliary coil *n* or coils may be arranged in any suitable part of or extension of the main water-jacket, or it or they may be
 30 in an entirely separate casing connected thereto by piping or otherwise.

The condenser-tubes *i* when horizontal or inclined may be supported by a perforated plate *r*.

35 In cases where the demand upon the hot-water supply is likely to be so great that the heat of the return or exhaust steam is insufficient to maintain the water at the required temperature it is preferred to utilize live
 40 steam to make up the deficit. For example, live-steam connection *v* may be made to the inlet *d* and be controlled by a thermostatic valve *u*, so that when the temperature of the water drops below a predetermined degree
 45 live steam is admitted, but cut off when the temperature of the water rises to the required amount. In another example another coil *t* in Fig. 2 in addition to or instead of the auxiliary coil *n*, Fig. 1, hereinbefore referred
 50 to, may be fitted in any suitable part of the water-jacket or in a chamber in connection therewith and live steam, preferably of low pressure, be supplied thereto, the supply being regulated according to the rise or fall of
 55 temperature in the hot-water supply and preferably automatically regulated, as by a thermostatic device *u*, so that when the temperature drops below a predetermined degree live steam is supplied, but when the
 60 temperature rises the live steam is reduced or entirely cut off. The live-steam coil *t* may conveniently be arranged near or about the auxiliary coil.

Having now particularly described and as-
 65 certain the nature of my said invention

and in what manner the same is to be performed, I declare that what I claim is—

1. A combined water heater and condenser for use in a steam-heating system, comprising an inlet-chamber for the exhaust-steam, tubes
 70 connecting the same with a hot-well, a water-jacket surrounding said tubes, and an auxiliary coil in contact with the water of the jacket and through which the exhaust-steam is passed on its way to the inlet-chamber. 75

2. A combined water heater and condenser, comprising an inlet-chamber for exhaust-steam, a hot-well, tubes connecting the two, a water-jacket surrounding said tubes, an
 80 auxiliary coil in contact with the water of the jacket and through which the exhaust-steam passes on its way to the inlet-chamber, a live-steam connection to the inlet-chamber and a thermostatic valve influenced by the preva-
 85 lent heat of the water-jacket for controlling the supply of live steam.

3. A combined water heater and condenser for use in a steam-heating system, comprising an inlet-chamber for the exhaust-steam, tubes
 90 connecting the same with a hot-well, a water-jacket surrounding said tubes, an extension from said jacket, an auxiliary coil in said extension through which the exhaust-steam is passed on its way to the inlet-chamber, a live-
 95 steam coil in the jacket and a thermostatic valve for controlling the supply of the live steam.

4. A combined water heater and condenser for use in a steam-heating system, comprising
 100 a vertical casing divided into an inlet-chamber for the exhaust-steam and a hot-well, a horizontal water-jacket mounted on said casing and containing cooling-tubes connecting the two chambers, a second vertical casing forming an extension of the water-jacket, and
 105 a coil in said extension, substantially as and for the purpose described.

5. A combined water heater and condenser comprising a vertical casing divided into an
 110 inlet-chamber for exhaust-steam and a hot-well, a horizontal water-jacket mounted thereon and containing cooling-tubes connecting the two chambers, a second vertical casing forming an extension of the water-jacket, a coil in said extension through which
 115 the exhaust-steam passes on its way to the inlet-chamber, a live-steam coil in the water-jacket and connected to the inlet-chamber, and a thermostatic valve influenced by the heat of the water in the jacket for controlling
 120 the supply of live steam, substantially as and for the purpose hereinbefore set forth.

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

DAVID MEIN NESBIT.

Witnesses:

ALBERT E. PARKER,
 FRANCIS J. BIGNELL.