

(No Model.)

2 Sheets—Sheet 1.

R. P. AMBLER & H. DEITZ.

APPARATUS FOR MAKING AND BURNING GASEOUS FUEL.

No. 330,190.

Patented Nov. 10, 1885.

Fig. 1.

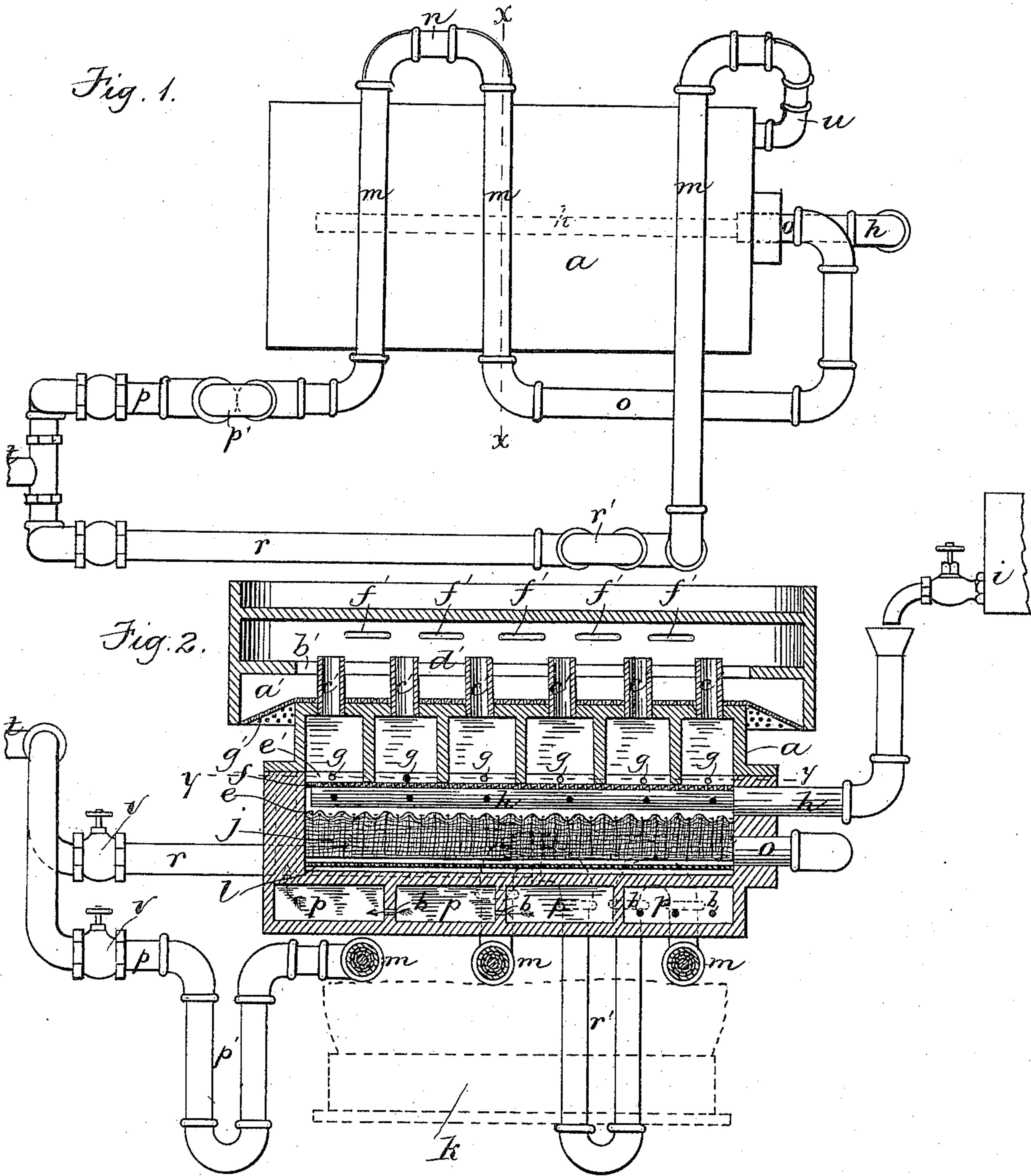
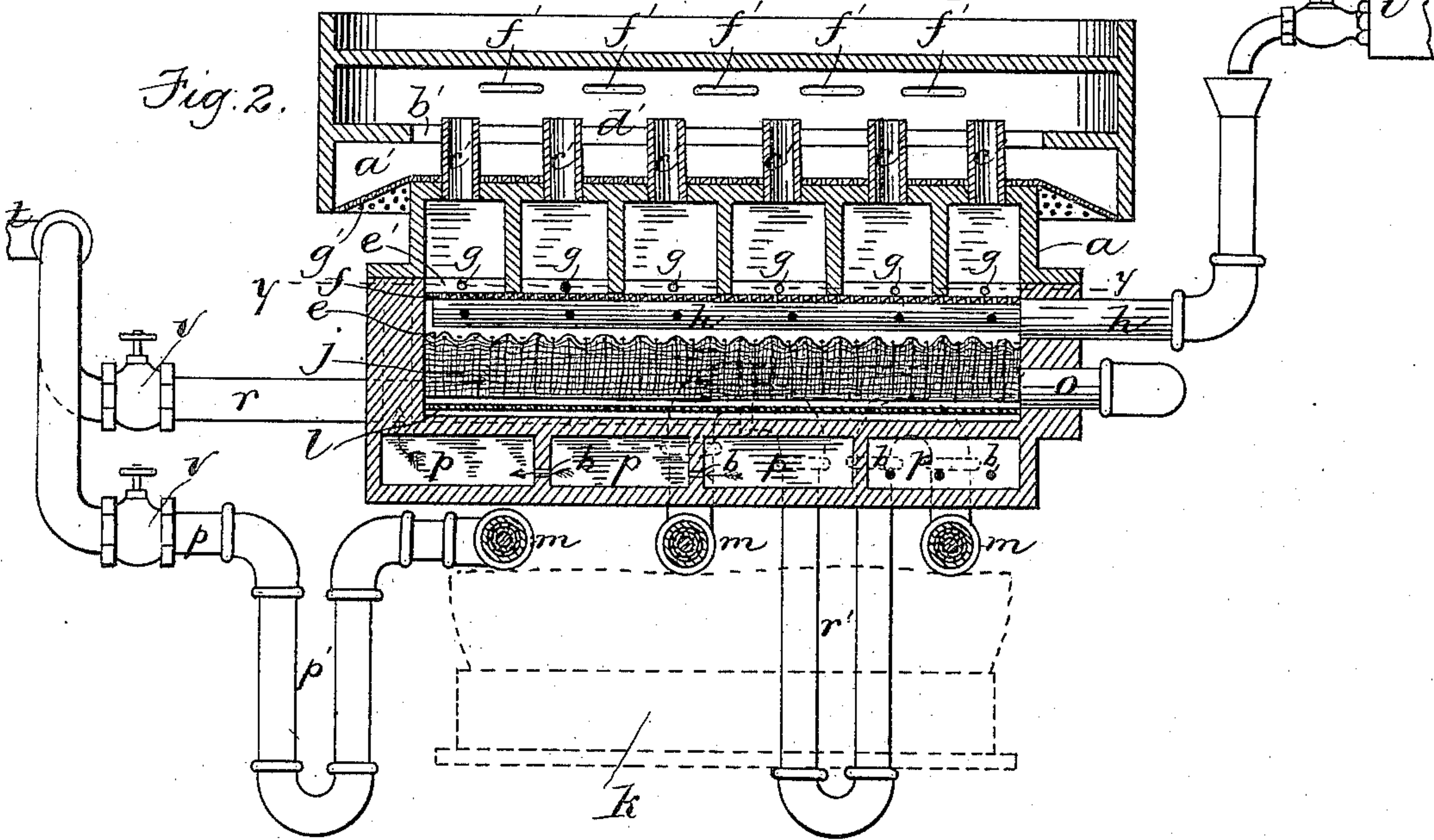


Fig. 2.



Witnesses.

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Atty.

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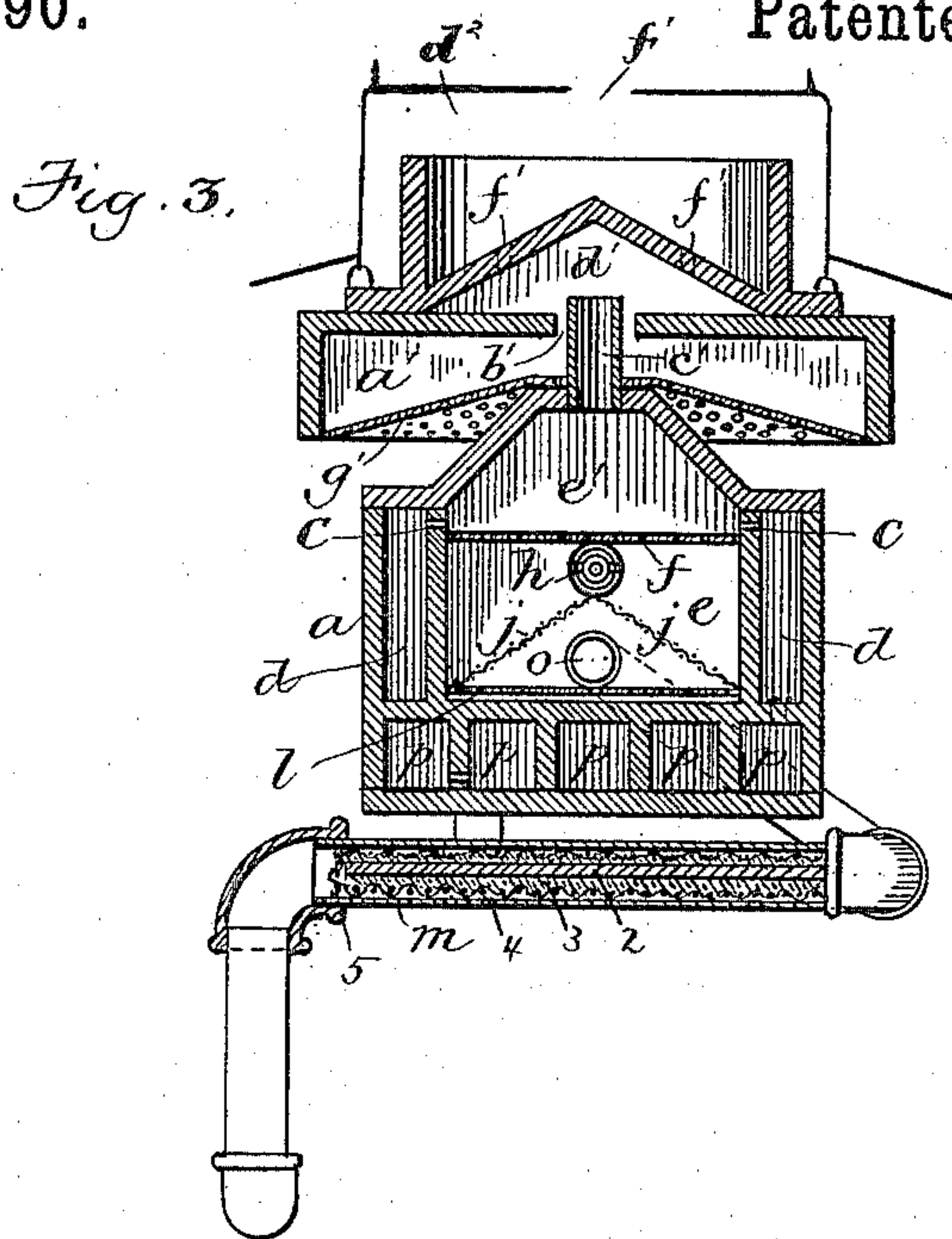


Fig. 4.

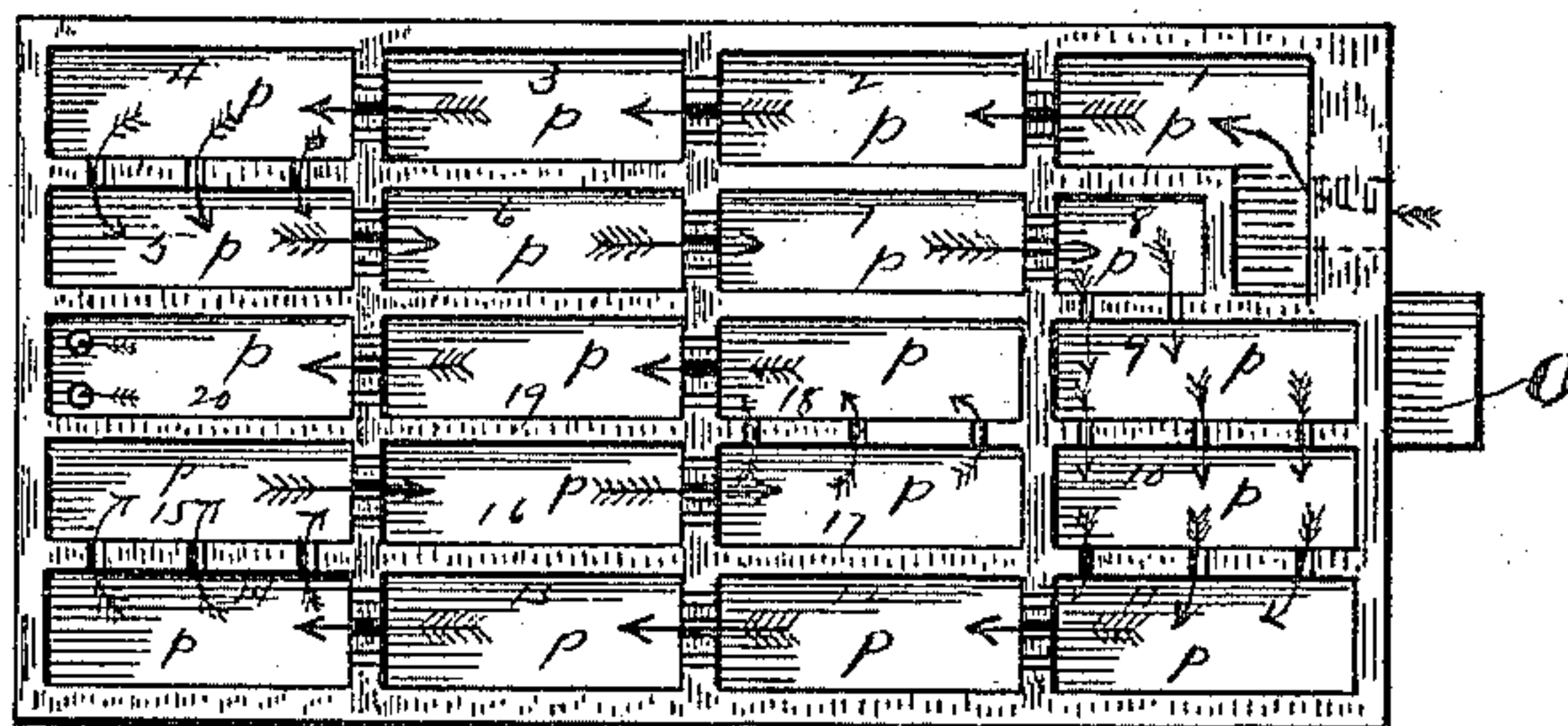
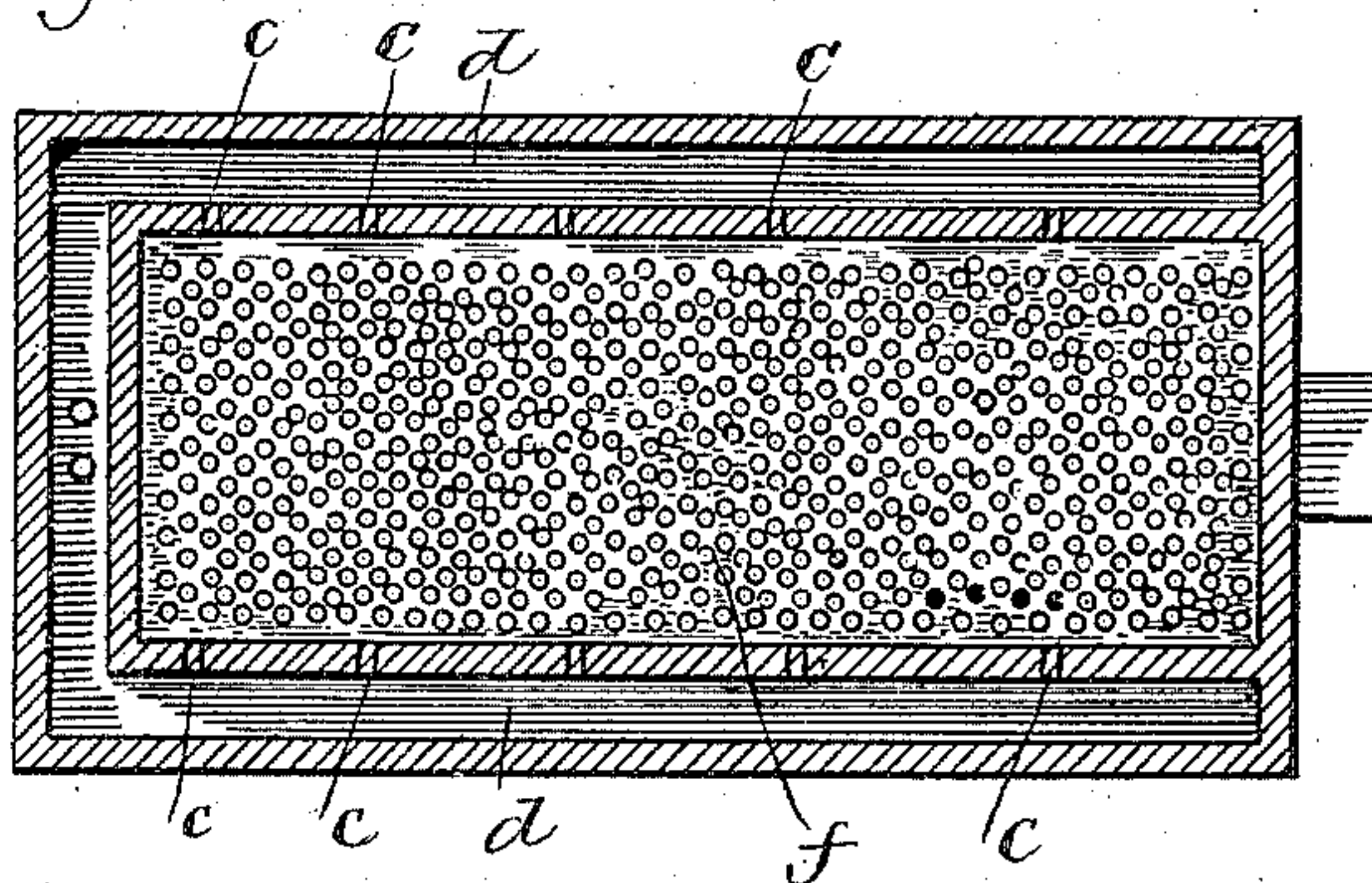


Fig. 5.



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UNITED STATES PATENT OFFICE.

RUSSELL P. AMBLER, OF MEDFORD, MASSACHUSETTS, AND HENRY DEITZ,
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APPARATUS FOR MAKING AND BURNING GASEOUS FUEL.

SPECIFICATION forming part of Letters Patent No. 330,190, dated November 10, 1885.

Application filed June 6, 1885. Serial No. 167,818. (No model.)

To all whom it may concern:

Be it known that we, RUSSELL P. AMBLER, of Medford, in the county of Middlesex and State of Massachusetts, and HENRY DEITZ, of Albany, in the State of New York, have invented certain new and useful Improvements in Apparatus for Making and Burning Gaseous Fuel, of which the following is a specification.

10 This invention relates to the apparatus for making and burning gaseous fuel shown in the application of R. P. Ambler (one of the present applicants) for Letters Patent of the United States, filed February 16, 1885, Serial
15 No. 156,045. Said apparatus combines steam generating and superheating devices and means for subdividing oil and holding it thinly spread until vaporized by the heat employed to superheat the steam, the super-
20 heated steam and vaporized oil being mingled with a suitable quantity of air and consumed at suitable burners with which the apparatus is provided.

The present invention consists in certain
25 improvements in the means for generating steam, in the means for raising the vaporized oil to the mixing-chamber, and in the means for supplying air to the mingled steam and vaporized oil, as we will now proceed to describe.

30 Of the accompanying drawings forming a part of this specification, Figure 1 represents a bottom view of our improved apparatus. Fig. 2 represents a longitudinal section of the same. Fig. 3 represents a section on line *xx*,
35 Fig. 1. Fig. 4 represents a bottom view of the steam-superheating compartments. Fig. 5 represents a section on line *yy*, Fig. 2.

The same letters of reference indicate the
40 same parts in all the figures.

In the drawings, *a* represents the generator, which consists of an oblong metal casing having in its lower portion the series of steam-superheating compartments, *p*, communicating with each other by minute perforations *b*,
45 through which steam passes until it has passed through each compartment in succession. The steam enters the compartment *p* from the steam-generating device hereinafter described,
50 and after passing through all the compart-

ments passes out through apertures *c* into spaces *d d*, extending partly around the chamber *e*, which contains the oil supplying and vaporizing devices, and the combining-chamber *e'*, which is separated from the chamber *e* 55 by a perforated partition, *f*, the steam passing into the said chamber *e'* through orifices *g*.

h represents the pipe which receives oil from a reservoir, *i*, conducts it into the chamber *e*, and discharges it through a number of small 60 perforations upon inclined diaphragms *j j*, of wire-gauze or other suitable material, which hold the oil thinly spread until it is vaporized by the heat applied by an external heater, *k*, below the steam-superheating compart- 65 ments. The diaphragms *j j* are preferably inclined, as shown in Fig. 3, so as to permit the oil to flow downwardly from the pipe *h*, supplemental diaphragms *l l* being provided below the diaphragms *j j* to receive and spread 70 the surplus oil dropping from the latter.

The construction thus far described is substantially the same as shown in the above-mentioned application, and it therefore of itself forms no part of the present improve- 75 ment.

In carrying out our invention we provide means for supplying steam independently to the oil-vaporizing apparatus, to lift the carbon of the vaporized oil more or less rapidly, and 80 regulate the amount of carbon supplied to the flame resulting from the combustion of the mingled elements. The carbon, being heavier than air, naturally settles, and therefore has to be raised. We also provide improved de- 85 vices for generating the steam supplied both to the superheating-compartments and the oil-vaporizing apparatus.

Instead of holding the water which is to be converted into steam in tubes which are com- 90 pletely filled by the water, as in the apparatus above referred to, we pass it into generators composed of tubes or cylinders *m*, extending horizontally across the bottom of the casing *a* and over the heater *k*, so as to be heated there- 95 by. Each cylinder contains, first, a central metal rod, 2; secondly, a roll, 3, of asbestos cloth wound closely around said rod; thirdly, a covering of fine wire-gauze 4, surrounding the asbestos, said parts about filling the interior 100

of the cylinder *m*; and, fourthly, a disk, 5, of wire-gauze or other like material, placed across the delivery end of the cylinder. The central rod compels the water to circulate outwardly toward the surface of the cylinder, where the heat is greatest. The asbestos cloth serves to hold the water in check, so that it shall not pass through the cylinder too rapidly, and at the same time it spreads and divides the water drops into minute parts, so that it may be more readily acted upon by the heat and more easily converted into steam, the wire-gauze serving to convey the heat to the saturated asbestos cloth, and also to receive into its interstices the generated steam and convey the same to the conducting-pipes, and the disk in the end serves to keep the steam under a slight pressure, giving evenness to the flow and exerting a backward force on the water, so as to prevent it from entering the cylinder too rapidly. In these "cylinders" or "steam-generators," as we prefer to call them, the steam is formed as fast as the water is supplied, and a great advantage is realized in the spreading and dividing of the water, whereby a larger surface is presented to the heat than could be if the water were in an undivided body.

Any desirable number of generators *m* may be used, three being shown in the present instance, two of which are connected by a pipe, *n*, and receive water from a reservoir or pipe, *t*, through a pipe, *p*, entering one generator, and deliver steam to the chamber *e* under the oil-pipe *h* through a pipe, *o*, connected to the other generator. The third generator is connected by a pipe, *r*, with the reservoir, and supplies steam to the steam-superheating apparatus through a pipe, *u*, which enters the first compartment, *p*. The steam supplied to the chamber *e* by the pipe *o* carries the vaporized oil upwardly to the combining-chamber *e'*, the quantity of vapor raised depending on the quantity of steam supplied, so that by increasing or diminishing the quantity of steam the height and intensity of the flame can be increased or diminished. The pipes *r* and *p* are provided with cocks *v*, whereby the amount of water supplied to the generators and the quantity of steam generated may be regulated.

We do not limit ourselves to the use of steam as the means for raising the vaporized oil. If desired, the pipe *o* may be connected to a blower or other air-forcing device, so as to introduce air into the chamber *e*, the air (which should be heated) serving the same purpose as the steam.

Our improvement in the means for mingling air with the steam and vaporized oil is as follows: We provide a series of delivery-tubes, *c'*, in the top of the combining-chamber, through which the steam and vaporized oil escape. Over the casing *a* we place a chamber, *a'*, which is wider than the casing, and is open at its under side, so that it will receive the heated air rising from the external heater, *k*. Said chamber has in its top an opening,

through which pass tubes *c'* from the combining-chamber *e'*, said opening being wider than the tubes *c'*, so as to permit the upward passage of air around said tubes into a chamber, *d'*, above the chamber *a'*. The top of the chamber *d'* is pointed or of an inverted-V shape, and has in each of its inclined sides a series of burners or openings, *f'*. The heated currents of air ascending by the sides of the casing pass through a perforated partition, *g'*, in the chamber *a'*, and through the opening *b'* into the chamber *d'*, where they come into contact with the mixed gases which issue from the delivery-tubes *c'*. The mingled gases and air rising to the pointed roof of the chamber are thence spread in opposite directions toward the side openings, *f'*. In this manner the air introduced into the chamber beneath is compelled to rise with the gases previously generated, having an escape only by the same openings through which those gases must pass; and as the oxygen thus supplied enters into chemical combination with the hydrogen and carbon generated in the main machine they rise together through the openings referred to into the open chamber, and when once ignited appear in continuous flame. The advantage of this device for introducing air is that it changes the character of the flame, takes away the smoke, and adds greatly to the heat. It can be used either with or without a chimney. The latter, however, serves to increase the force of the air-draft and adds proportionately to the heat of the flame.

The pipes *r*, which conduct water to the generators *m*, are preferably provided with bends *p' r'*, which conduct the water first downwardly and then upwardly before it enters the generators, thereby securing a uniform pressure of water in the generators, and subjecting the water to the action of the heater before it enters the generators, the bends being close to the heater.

We are aware that a steam-chamber surrounding the mixing-chamber is not new. We are also aware that a central core in a water-pipe to spread the water in a film about such core, and thus hold it near the pipe, has been known.

We claim—

1. In an apparatus for making gaseous fuel, a generating-chamber having oil-spreading devices therein, an oil-pipe above the spreader, and a pipe (for air or steam) entering the chamber below the spreader, and a mixing-chamber above said generating-chamber having apertures communicating with and for the ingress of external air, all combined substantially as stated.

2. In an apparatus for making and burning gaseous fuel, the combination, with the vaporizing-chamber having the oil-spreading devices, the steam-superheating devices, and the mixing-compartment for the steam and vaporized oil; of means, substantially as described, for supplying steam independently to the su-

perheating devices and to the chamber below the oil-spreading devices, and a chamber in which air is mixed with the steam and vaporized oil, as set forth.

5 3. The steam-generating cylinder or casing having a central metallic core and surrounding layers of material pervious to water or steam, substantially as described.

10 4. The steam-generating cylinder or casing having a central metal core, and water-subdividing layers of asbestos cloth and wire-gauze around said core and within the water-containing space, as set forth.

15 5. The combination of the casing in which vaporized oil and steam are mingled, said casing having delivery-tubes *c'*, an external heater below said casing, a chamber over

said casing formed to receive heated air which is caused to ascend by the heater, and having an opening for receiving the de- 20 livery-tubes, but larger than the latter, so as to permit air to pass around them, and a mixing-chamber which receives the gases, vapors, and air, and is provided with burners or openings in its top, as set forth. 25

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 1st day of June, 1885.

RUSSELL P. AMBLER.
HENRY DEITZ.

Witnesses:

C. F. BROWN,
H. BROWN.