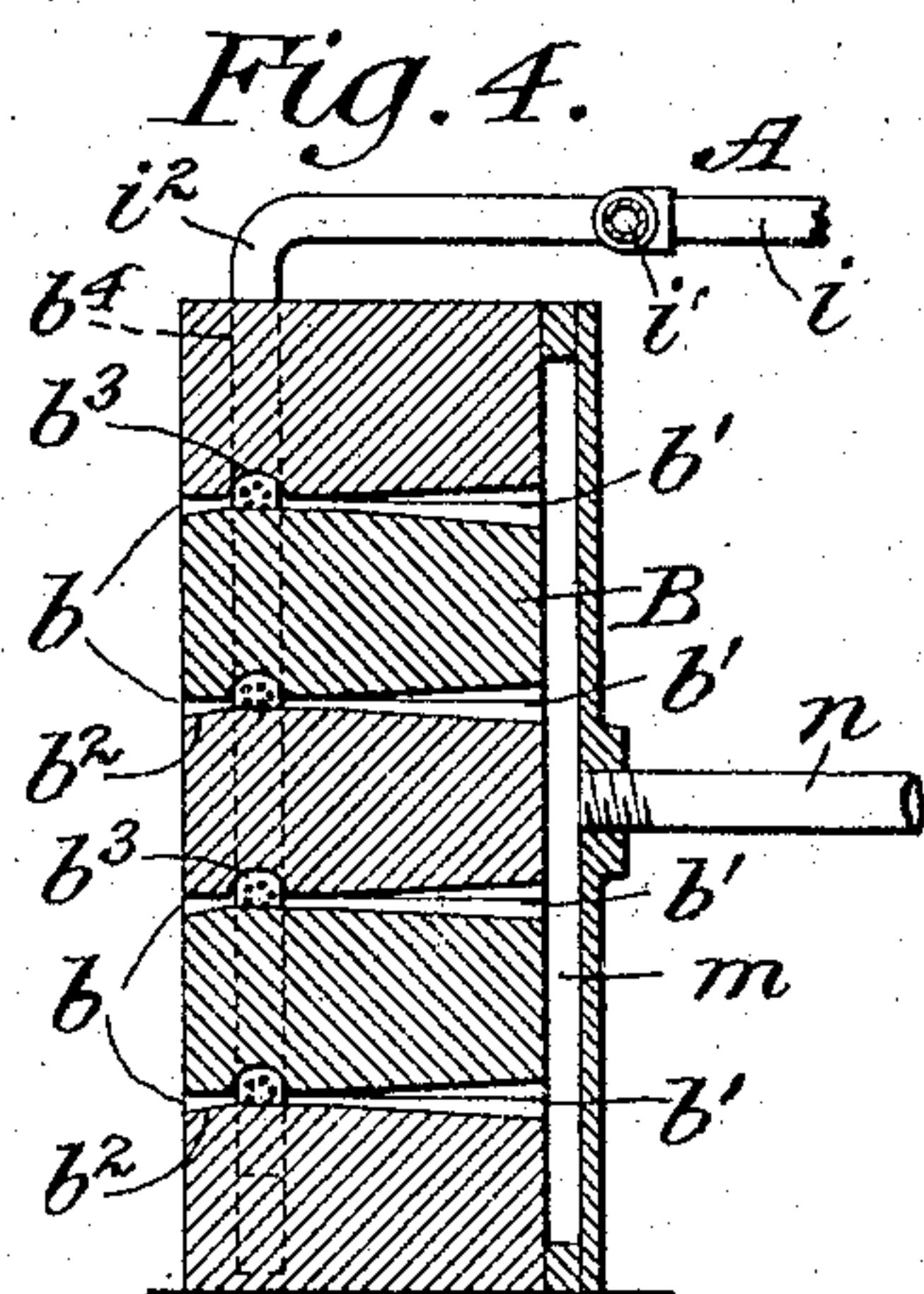
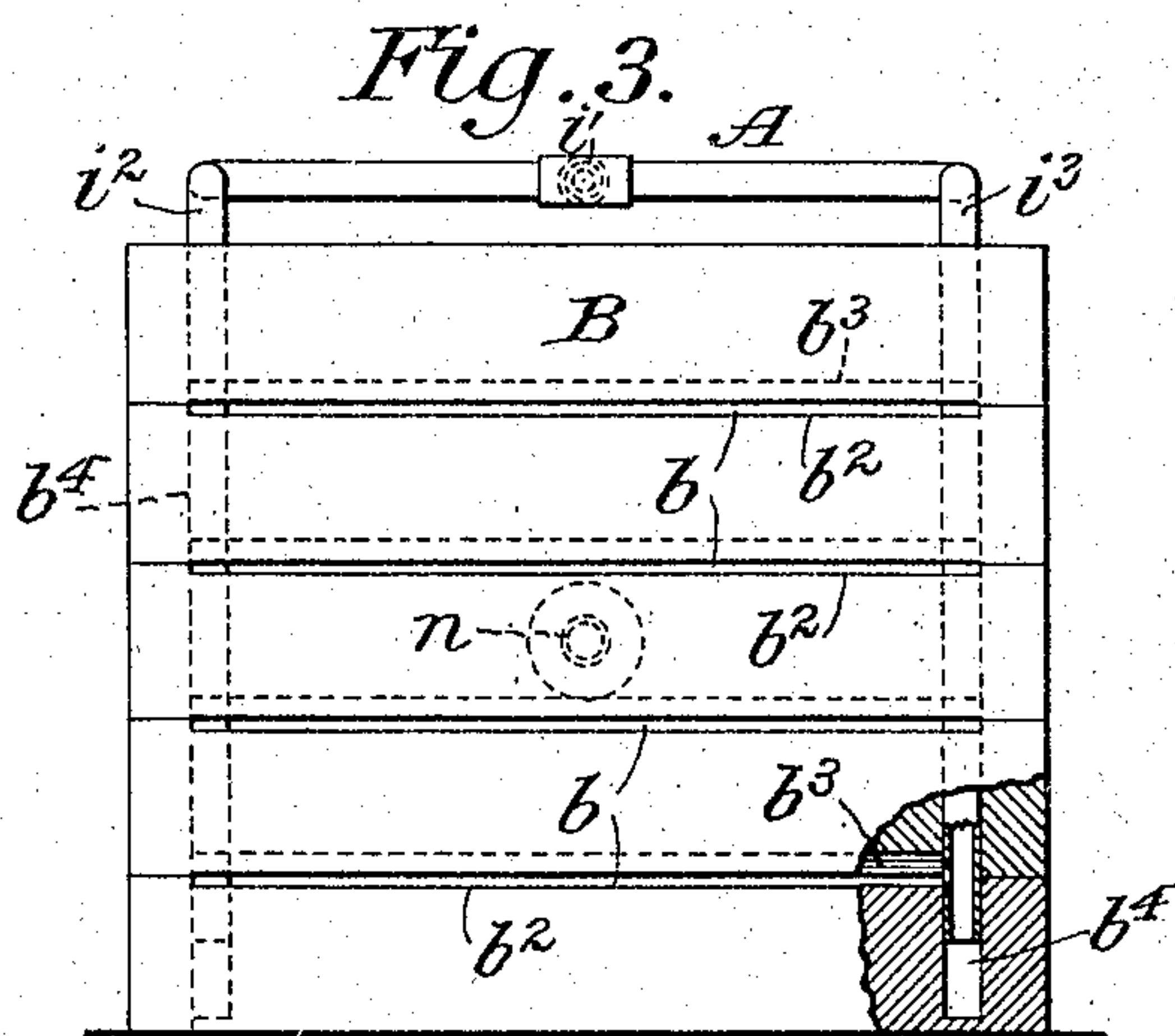
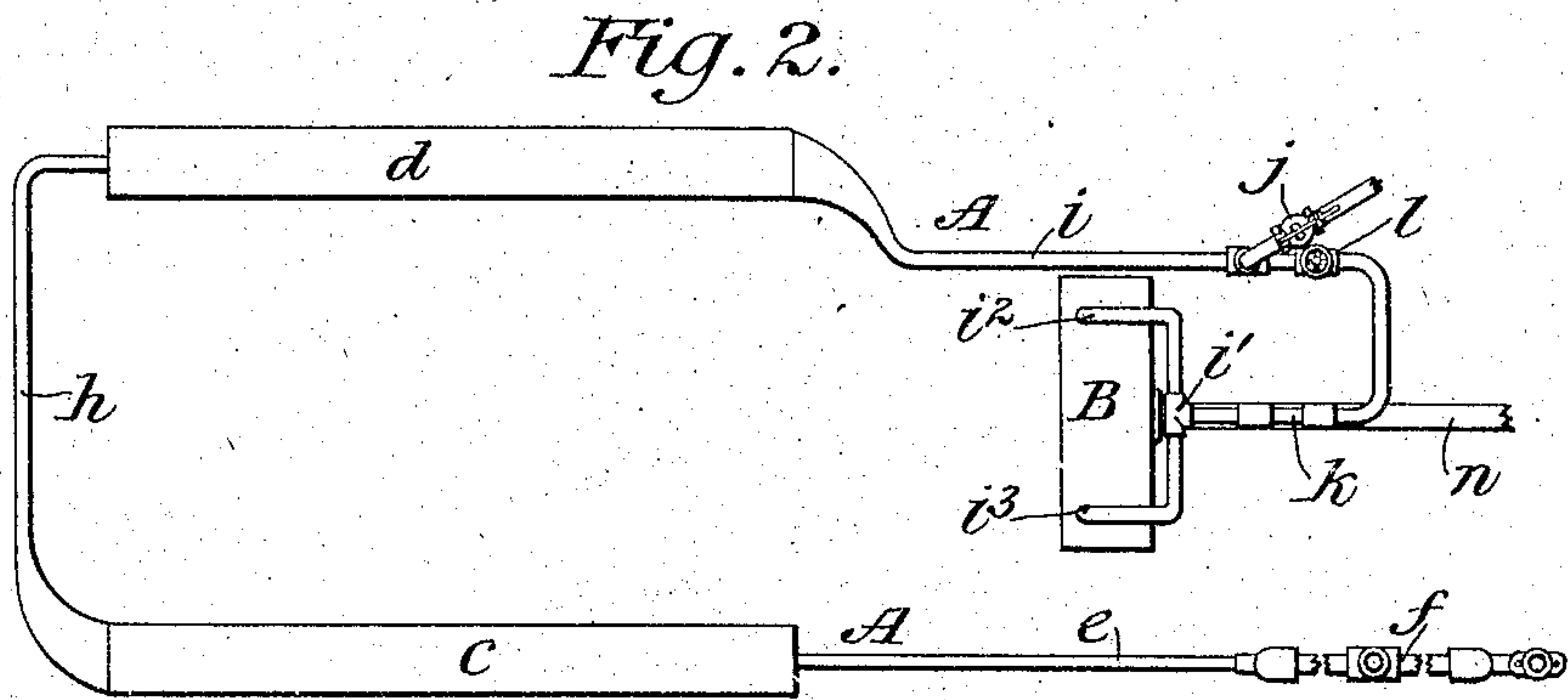
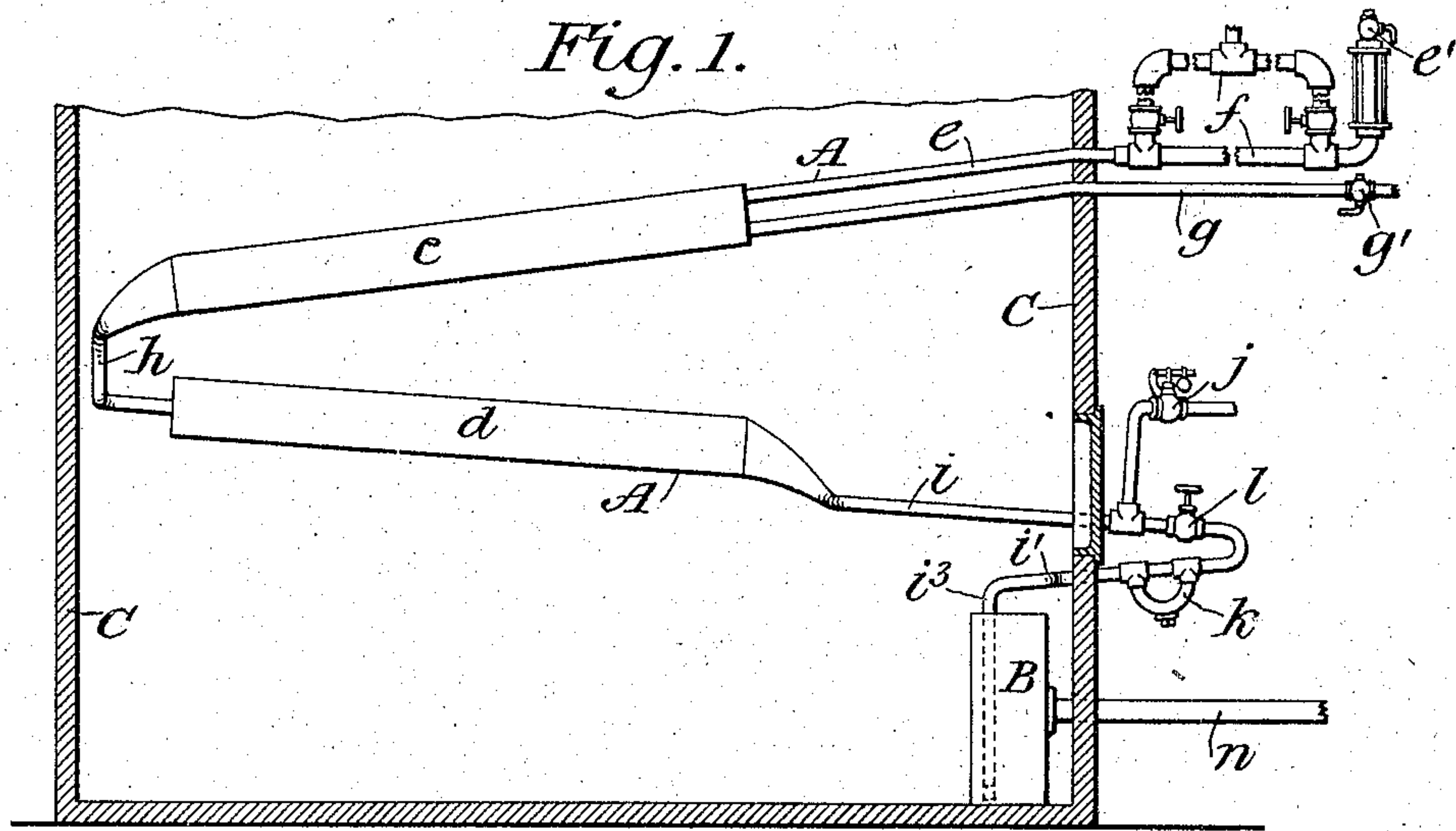


No. 791,515.

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T. A. TYAS.
HYDROCARBON FURNACE.
APPLICATION FILED JAN. 24, 1903.



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HYDROCARBON-FURNACE.

SPECIFICATION forming part of Letters Patent No. 791,515, dated June 6, 1905.

Application filed January 24, 1903. Serial No. 140,352.

To all whom it may concern:

Be it known that I, THEODORE A. TYAS, a citizen of the United States, residing in Hoboken, county of Hudson, in the State of New Jersey, have invented certain new and useful Improvements in Hydrocarbon-Furnaces, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to hydrocarbon-furnaces, and primarily to those parts of such furnaces as receive, vaporize, and deliver fuel into the burner-body and in which parts the fuel is treated to put the same in a condition for perfect combustion.

The invention is also concerned with the construction of the burner-body, which is designed to cooperate with the aforesaid parts to carry completely the vaporized fuel and any settlings therefrom or unvaporized portions thereof to the edges of the burner-slits, where it is consumed. In furnaces of this class the liquid fuel is not always completely vaporized before it reaches the burner or burners proper, and there is also frequently a sediment deposited thereby or a thickened mass which condenses therefrom, due, possibly, to impurities therein or, perhaps better, to the presence of some of the higher and denser hydrocarbons. This mass if allowed to remain within the furnace parts, where it collects, as is generally the case, gradually clogs the smaller openings therein, such as the burner-slits, and finally obstructs the furnace to such an extent as to render a complete overhauling of the same necessary before further use.

One object of this invention is to overcome this difficulty in hydrocarbon-furnaces and to provide a furnace of this sort in which very little trouble will be met with from this source. This object is effected by constructing the burner-body and its associated parts so that the fuel shall always be fed downwardly to the point of consumption, the entire fuel-conduit being free from pockets or similar obstructions in which the denser portions of the fuel might collect, and by pro-

visions for the treatment of the fuel before its delivery into the burner-slits, all of which will more fully appear hereinafter.

A further object of the invention is to improve generally the construction of hydrocarbon-furnaces with a view to produce a furnace which shall require very little attention while in use and which will not be liable to become clogged or obstructed, so as to render a frequent overhauling necessary.

In the drawings, in which one form of apparatus embodying the invention is shown and which is capable of effecting the desired results just outlined, Figure 1 is a longitudinal sectional view of a fire-box in which the furnace has been set up, the burner and its associated parts being shown in elevation. Fig. 2 is a plan view of the burner and its associated parts removed from the fire-box. Fig. 3 is a view in front elevation of the burner-body, on a larger scale; and Fig. 4 is a detail view, in vertical section, on the plane indicated by the line 4 4 in Fig. 3.

In accordance with the invention the fuel-supply conduit A, broadly speaking, which connects the source of fuel-supply (not shown) with the burner-body B, has a slight downward pitch from the source of supply to the burner-body, said conduit being continued down through the burner-body to the several burner-slits *b*. Aside from this general pitch and from certain other features of construction to be referred to presently the form or shape of the conduit A may be such as will most conveniently meet the requirements of any particular case. Said fuel-supply conduit is installed within a fire-box C, Fig. 1, where it will receive sufficient heat to carry on the vaporization of the fuel, and the regulating-cock thereof and other controlling devices are preferably located near the furnace-door or at some such point where they are conveniently accessible.

In tube A, which for convenience has been called a "fuel-supply conduit," but which, as will presently appear, performs other functions than that of merely conducting the fuel from the source of supply to the burner, are

formed relatively large chambers *c* and *d*, wherein the gaseous mixture is thoroughly commingled with air and heated and vaporized and whereby a steady flow of fuel to the burner-body is effected. Into the chamber *c* leads the fuel-supply pipe *e*, in which, if desired, a carbureter *f* may be placed, and below said pipe *e* an air-supply pipe *g*, communicating with a compressor-pump or any other convenient source of air-supply and opening into chamber *c* in the direction of its length or in the same direction in which the fuel travels, both pipes *e* and *g* having valves *e'* and *g'* provided therein respectively. The chamber *c* communicates with the chamber *d* through a narrow pipe *h*, of which the end adjoining chamber *c* is made flaring, so as to fit evenly upon chamber *c*, and thereby prevent the formation of any pockets in which any liquid portion of the fuel might collect. The chamber *d* likewise tapers off into a narrow pipe *i*, which is provided with a safety-valve *j*, a trap *k*, and a controlling or fuel-supply-regulating valve *l*. The safety-valve is provided to relieve the pressure upon the apparatus when the force of the expansion of the gaseous fuel increases beyond a certain point, and said valve may be of any approved construction. The trap *k* may also be of any approved construction and is preferably located near the door of the fire-box and just in advance of the regulating-valve *l*, where it may be examined from time to time to remove any condensed fuel or other matter which it may contain. The regulating-valve *l* is provided to control the supply of fuel to the burner.

The burner-body *B* is preferably formed of a plurality of solid castings, each being slightly tapered to form when assembled wedge-shaped slits *b'*, communicating with an air-chamber *m*, to which air is supplied through a pipe *n*. Each casting is also chamfered upon one of its front edges to form an inclined lower surface *b''* in each burner-slit *b*. The several castings are provided with longitudinal grooves *b'''* and at each end with vertical channels *b''''*, communicating therewith, through which fuel is fed into the burner-slits. For this purpose when the burner is set up by the assembling of the several castings each portion *i''* and *i'''* of the pipe *i*, which is divided at *i''*, extends down through the corresponding series of channels *b''''*. At each point in the pipes *i''* and *i'''* where they cross the passages formed by the grooves *b'''* a plurality of small openings are formed to permit the fuel to escape from said pipes into said passages, and the end portions of the pipes *i''* and *i'''* are extended into the lower casting of the burner-body, where said portions terminate.

When the apparatus is in use, oil will be delivered to chamber *c* above a stream of air

which is entering chamber *c* through the air-supply pipe. In this manner the oil is not permitted to drop upon and run down the sides or bottom of the chamber *c*, but is to a large extent carried along by the force of the air-current which issues from the air-supply pipe, and while being thus carried along is vaporized and mixed with air before it strikes the chamber-walls. If a carbureter *f* be employed, although it will be understood that such is not a necessity, the oil will first be delivered to the carbureter, where it will be mixed with a quantity of air and thence delivered in the form of fine spray to chamber *c*. The chamber *c*, being of considerable capacity, permits the fuel to be heated and vaporized to expand freely and to be thoroughly mingled with air. The reduction of the diameter of the conduit beyond the chamber *c* prevents the escape of the gaseous mixture before it is much heated and expanded and causes sufficient pressure to be developed to cause the gas to rush with some force through the narrow tube *h* and to be discharged into chamber *d*, where it is further heated and expanded, heat being continually supplied to both the chambers *c* and *d* from the fire-box in which the conduit is placed. From the chamber *d* the fuel is discharged into the pipe *i*, where any portion of the same which has not been vaporized or any sediment which has been deposited therefrom may be collected in the trap *k*, the vaporized fuel passing along into the full passages of the burner-body. The air from the air-chamber *m* which is supplied to the wedge-shaped slits *b* then mingles with the gaseous fuel and directs it in a blowpipe fashion from the full passages into the burner-slits, where it is consumed. The inclined lower surfaces of the burner-slits permit any solid or liquid matter borne by the fuel to be readily carried by the air-currents to the edges of the burner-slits, where it will be consumed. Finally, the solid or thickened portions of the fuel, which are carried beyond the trap and into the burner-body, are in a large part collected in the ends of the pipes *i''* and *i'''* in the lower casting of the burner and from time to time the burner may be overhauled to remove such matter therefrom.

The relatively large chambers in the fuel-supply conduit assist in the vaporization, heating, and carbureting of the fuel to the extent that there is not only a better gas supplied to the burner-slits, but there is less fuel left unvaporized than is ordinarily the case. The elimination of all pocket-forming obstructions in the fuel-supply conduit and the continuous downward feeding of the fuel to the burner permit all the liquid matter which may condense from the fuel in the fuel-supply tube to be carried along into the burner-body and consumed. Finally, the

construction of the burner-slits prevents their clogging in case any liquid or solid portions of the fuel should escape the traps in the fuel-supply conduit and in the lower casting 5 of the burner-body.

I claim as my invention—

1. In a hydrocarbon-furnace, the combination with a burner-body, of a fuel receiving and vaporizing conduit arranged on a 10 continuous incline toward the burner-body and comprising an expansion-chamber having a tapered downwardly-inclined lower end, and a pipe leading from the lowest point thereof, a second expansion-chamber 15 into which said pipe leads also having a tapered downwardly-inclined lower end and a pipe leading from the lowest point thereof, to the burner and means for supplying oil and air under pressure to the first expansion- 20 chamber, substantially as described.

2. In a hydrocarbon-furnace, the combi-

nation with a burner-body of a fuel and vaporizing conduit arranged on a continuous incline toward the burner-body and comprising an expansion-chamber having a tapered 25 downwardly-inclined lower end and a pipe leading from the lowest point thereof, a second expansion-chamber into which said pipe leads also having a tapered downwardly-inclined lower end and a pipe leading from the 30 lowest point thereof, to the burner, a fuel-supply nozzle opening into the first expansion-chamber and an air-supply nozzle also opening into said expansion-chamber at a point directly below the fuel-supply nozzle, 35 substantially as described.

This specification signed and witnessed this 19th day of January, A. D. 1903.

THEODORE A. TYAS.

Witnesses:

ANTHONY N. JESBERA,
LUCIUS VARNEY.