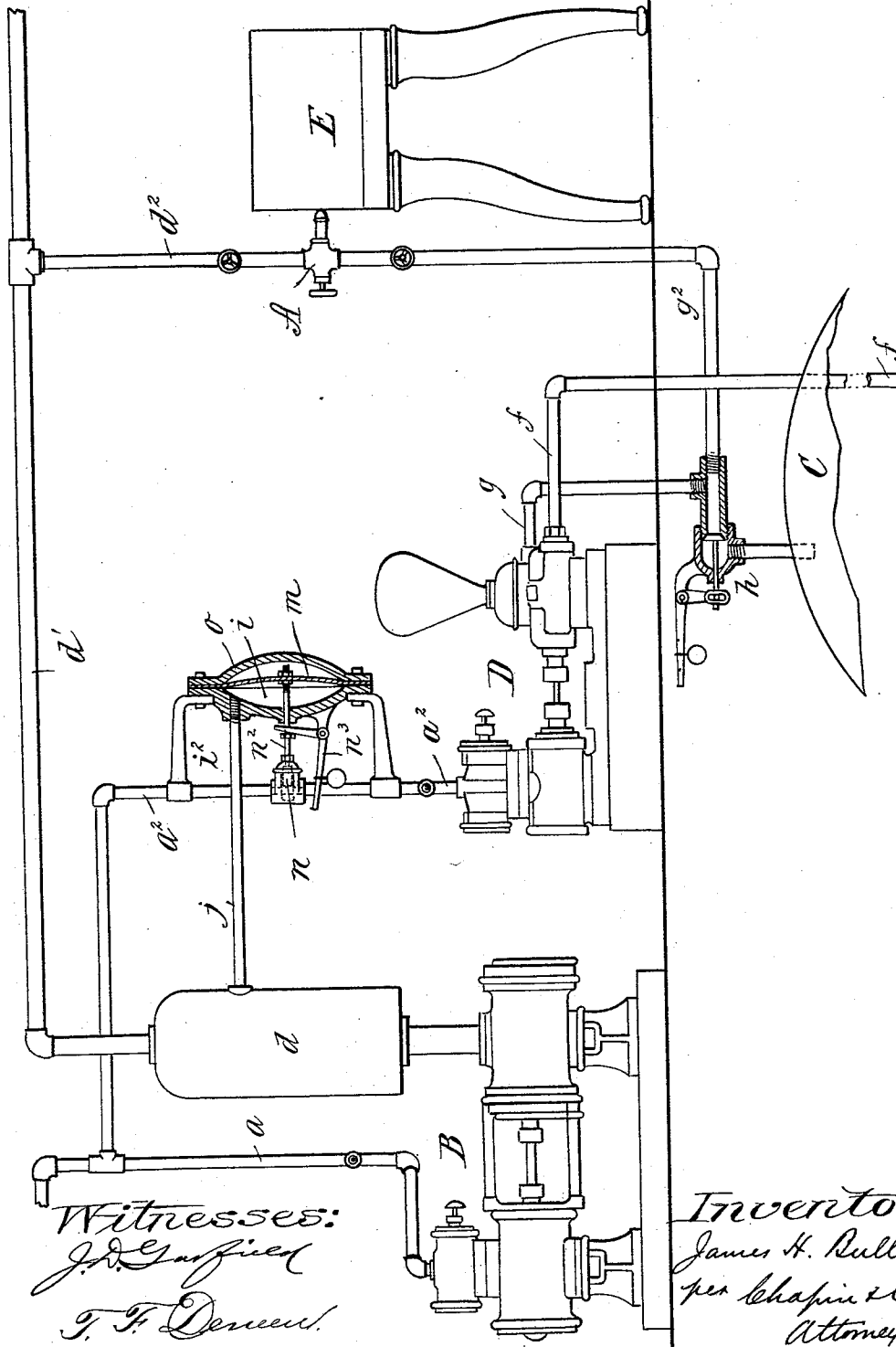


(No Model.)

J. H. BULLARD.
HYDROCARBON BURNING APPARATUS.

No. 483,099.

Patented Sept. 20, 1892.



Witnesses:
J. D. Garfield
J. F. Deneen

Inventor;
James H. Bullard
per Chapin & Co
Attorneys

UNITED STATES PATENT OFFICE.

JAMES H. BULLARD, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO THE
AERATED FUEL COMPANY, OF SAME PLACE.

HYDROCARBON-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 483,099, dated September 20, 1892.

Application filed December 21, 1891. Serial No. 415,752. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BULLARD, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Hydrocarbon-Burning Apparatus, of which the following is a specification.

This invention for improvements in hydrocarbon-burning apparatus is particularly designed for securing in a peculiarly arranged and constituted hydrocarbon plant the automatic delivery of the oil to the burners in conjunction with and only during the time of the delivery of air to the burners under an ample pressure or in the required quantity.

To this end the invention consists in the combination, with the hydrocarbon-burner, of an oil-supply tank, a steam-driven pump having an induction-conduit leading thereto from the tank and an eduction-conduit leading therefrom for conveying oil to the burner, an air-compressor and a conduit for leading the air therefrom to the burner, a steam-pipe for supplying the working pressure to the oil-pump, having an automatic normally-closed valve therein, an air-chamber, one wall of which is constituted by a movable diaphragm, a medium of connection between the diaphragm and valve, and a pipe in communication with the air-compressor and the said chamber, all whereby under the proper establishment of air-pressure by the air-compressor for the requisite burner-supply the steamway to the pumping-engine will be open for insuring the pumping of the oil to the burner, but also whereby on the cessation of the air pressure and supply the steam will be automatically shut off from the pump to secure the discontinuance of the oil-supply.

The apparatus is illustrated in the accompanying drawing, the figure being an elevation and partial vertical section thereof.

In the drawing, A indicates an injector-burner having, as is well known in this type of oil-burner, oil and air passages there-through, entering at different points and terminating at a common nozzle, the burner being shown as in operative relation to a forge-furnace E.

B represents a steam-driven air-compressor

engine, for which a is the steam-supply pipe, and d is the air receiver or reservoir, which is connected to and is in a sense to be regarded as a part of the air-conduit which leads away from the air-compressor, said conduit being continued, as shown, in the pipe d' and branch d'' to connection at the air-inlet of the burner A.

C represents an oil-supply tank, the same being usually and preferably underground, and D represents a steam-driven pumping-engine located above the tank, with the induction-opening of which is connected the conduit f , which leads thereto from a low point within the oil-supply tank C.

g represents a conduit which leads from its connection at the eduction-opening of the steam pumping-engine, being continued in the conduit section or branch g^2 to the oil-inlet passage of the burner A.

a^2 represents the pipe which conveys the steam to the pumping-engine D to insure the working thereof, said pipe leading from any source of steam-supply, it, as shown, being a branch of the steam-pipe which supplies the air-compressing engine. The said steam-pipe which leads to the oil-pumping engine has therein a valve n , which has capabilities for automatically closing the steamway in the pipe a^2 . Said valve n is mounted to slide in the coupling-body fitted between sections of the said pipe a^2 , having a suitably-extended valve-stem n^2 , engaged with which is one arm of a pivotally-mounted elbow-lever n^3 , the other arm of which lever has a weight thereon, which secures its down-swinging and the forcing of the valve closed. (In the drawing the valve is indicated as open, as is always the case during the operation of the apparatus under proper conditions.)

i represents an air-chamber adjacent the valve n , one side of which is constituted by the casting i^2 and the other by the diaphragm m , the one shown being understood as a flexible diaphragm, and the same is preferably protected by the concavo-convex guard-casting o . The valve-stem n^2 forms the medium of connection between the valve and diaphragm. Generally speaking, this form of diaphragm and its engagement with a valve or regulator is well known.

j represents the pipe which leads from com-

munication with the air-compressor to the interior of the air-chamber *i*. It is therefore manifest that the air-supplying operation of the air-compressing engine will automatically maintain the valve *n* open and permit the passage of the steam to the pumping-engine for the running of the latter to supply oil to the burner, and it will also be seen that on the cessation of the air-supply under the proper pressure to the burner the same will be automatically shut off from the pump by reason of the capability of the valve for closing when the air-pressure upon the diaphragm is relieved.

The described devices constitute automatic safeguards against overflowing of oil at the burners and possible conflagration at such times as there is for any reason, accidental or otherwise, a failure to supply such quantities of air also to the burner as to insure the complete burning of the oil.

There are indicated at *h* with relation to the pipe for carrying oil from the pump to the burner appliances for insuring on an excessive oil-pressure through the oil-supplying pipe a relief of such pressure and the carrying of the surplus of oil back to the storage-tank; but these appliances constitute no part of this

invention, the same being embodied as an essential part of the subject-matter of another application for Letters Patent of the United States for improvement in apparatus for burning hydrocarbon, filed by me simultaneously with this application.

I claim—

In an apparatus for burning hydrocarbon, in combination, a hydrocarbon-burner, a supply-tank, a steam-driven pump having an induction-conduit leading thereto from the tank and an eduction-conduit leading therefrom for conveying oil to the burner, an air-compressor and a conduit for supplying air therefrom to the burner, a steam-pipe for supplying the working pressure to the oil-pump, having an automatic normally-closed valve therein, an air-chamber, one wall of which is constituted by a movable diaphragm, a medium of connection between the diaphragm and valve, and a pipe in communication with the air-compressor and the said chamber, and all arranged for conjoint action, substantially as set forth.

JAMES H. BULLARD.

Witnesses:

H. A. CHAPIN,
WM. S. BELLOWS.