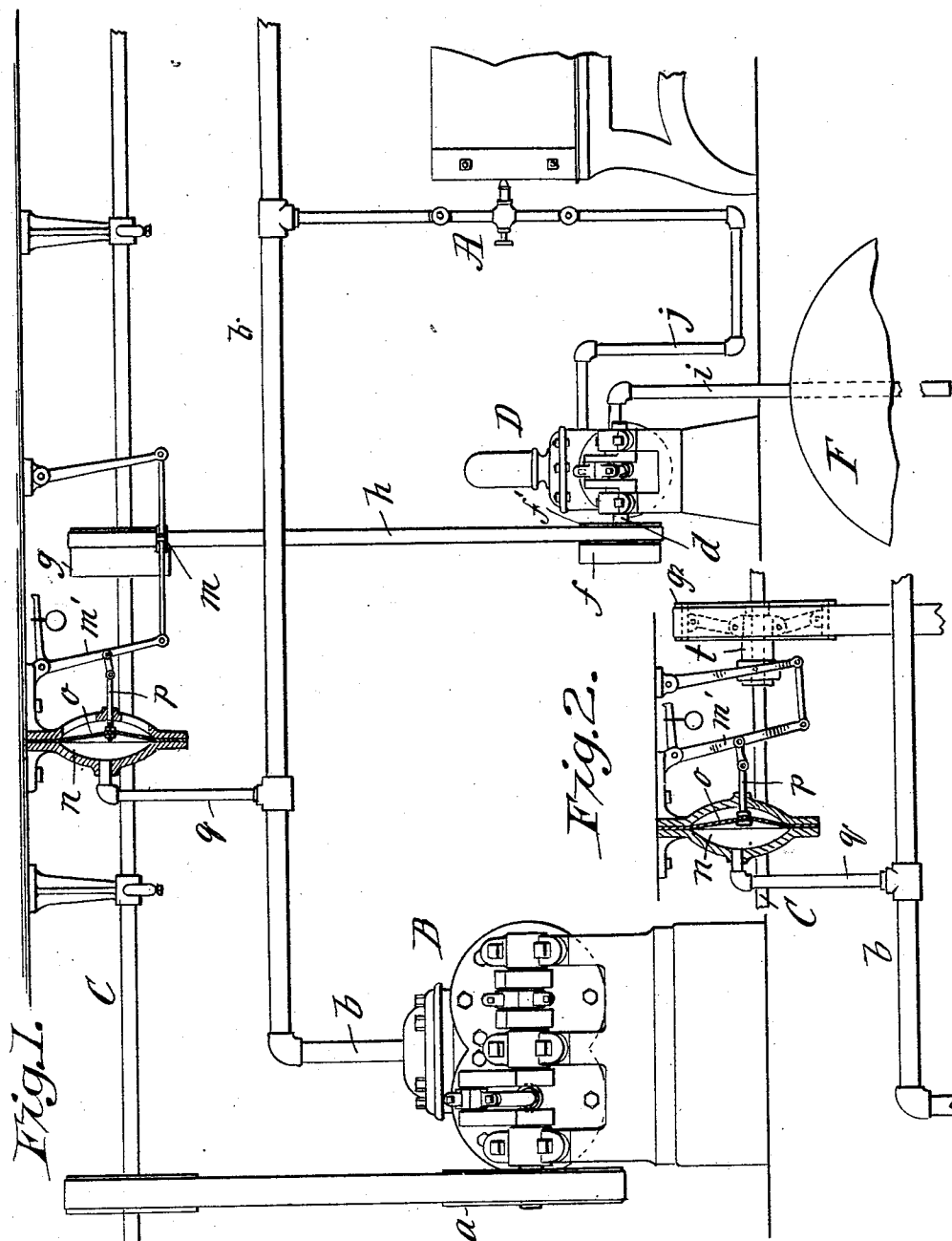


(No Model.)

J. H. BULLARD.
HYDROCARBON BURNING APPARATUS.

No. 483,100.

Patented Sept. 20, 1892.



Witnesses:
J. D. Garfield
T. F. Denny

Inventor,
James H. Bullard,
per Chapin & Co. Attys.

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. 483,100, dated September 20, 1892.

Application filed December 26, 1891, Serial No. 416,256. (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 to secure in a peculiarly arranged and constituted hydrocarbon-burning plant the automatic delivery of the oil to the burner or burners in conjunction with and only during the time of the delivery of a sufficient quantity of air, also, to the burner or burners.

The invention consists, in a hydrocarbon-burning apparatus, in the combination, with an injector-burner and an oil-tank, of an oil-pump having a driving-shaft and having its induction-pipe leading from the oil-tank and its eduction-pipe leading to and serving the burner, a power-driven shaft, and shiftable driving connections between same and the oil-pump shaft, an air-compressor, and a conduit leading therefrom to the burner, and a chamber having air communication with the air-compressor, one wall of such chamber being constituted by a movable diaphragm, which has an engagement with the aforesaid shiftable driving connection, substantially as will appear more fully hereinafter.

In the drawings the invention is illustrated by showing embodiments thereof which differ somewhat structurally, but which are to all intents and purposes substantially the same, as the invention is comprehended in and by the foregoing statement of the nature and composition thereof.

Figure 1 is an elevation of the apparatus with parts in section; and Fig. 2 is a sectional elevation of a part of the apparatus, showing the modified construction.

A represents an injector-burner of a well-known type, the same being understood as having oil and air passages therethrough, and B indicates an air-compressor, the same being indicated as driven by belt and pulley at *a* from an overhead shaft C, which is understood to be driven by any suitable motive

power. An air-pipe *b* leads from the air-compressor for conveying air to the oil-burner A.

D indicates an oil-pump, of which *d* is the driving-shaft, having thereon the fixed and loose pulleys *f f'*, and *g* represents a wide fixed pulley on the power-driven shaft C, *h* representing the belt, which is around the fixed pulley of the shaft C and adapted to be around either the fixed or the loose pulleys of the pump-shaft.

F represents an oil-supply tank, leading from which to the induction-passage into the pump is the pipe *i*, while *j* represents a pipe leading from the eduction-passage of the pump to a connection with the burner for the oil-supply thereof.

m represents a belt-shifter in engagement with the belt *h*, and adjacent to the said belt-shifter is an air-chamber *n*, one wall of which is constituted by a movable diaphragm *o*, a spindle *p* extending from a connection with the diaphragm to an engagement with the lever *m'*, which constitutes a part of the belt-shifter. The said lever *m'* is shown as pivotally mounted at its elbow, the horizontally-weighted arm exerting tendency to swing the belt-shifter so as to carry the belt *h* onto the loose pulley *f'*.

q indicates a pipe, which by being connected with the aforesaid pipe *b* has a communication with the air-compressor, the said pipe *q* also leading to a communication with the said air-chamber.

Now it will be apparent from the description of the foregoing contrivances, arranged as described, that so long as there is a running of the air-compressor, and a consequent supply thereby of air to the burner, as is necessary in conjunction with the feed of oil also to the burner for the effective combustion of the latter, there will be an establishment of air-pressure within the said chamber *n*, and consequently such a forcing of the diaphragm as will effect the maintenance of the belt-shifter in such a position as will insure the speeding of the belt, and the consequent running of the oil-pump for supplying the burner. It will be also apparent that if for any reason, accidental or otherwise, the air-pressure in the requisite degree fails, whereby there would

not be delivered at the burner such quantities of air as required for the proper combustion of the also delivered oil thereat, the weighted lever-arm of the belt-shifter will
5 then be permitted to swing to carry the belt onto the loose pulley, as is manifestly permitted to be done, owing to the lack of pressure in the chamber *n*. While in the said Fig. 1 and in the description above given in connection therewith a certain kind of shiftable
10 medium of connection is shown as intervening between the movable diaphragm and the driving-shaft of the oil-pump, comprising the pulley on the driven shaft C, the diaphragm-operated belt-shifter, and the belt *h* in Fig. 2,
15 there is illustrated in lieu of the fixed pulleys *g* on the shaft C a loosely-mounted pulley *g*², which is understood as having belt connection with the pulley of the pump, and a sliding sleeve *t*, which is operated by the movements of the diaphragm through the connection shown, and which will be plainly understood, the said sliding sleeve operating the
20 members of a common form of friction-clutch. In the latter-described contrivance the pulley runs loose and the oil-pump remains inactive at such time as there is not such a pressure of air in the diaphragm-sided chamber as to
25 force the movable part of the friction-clutch into clutching engagement with the said pulley *g*².

Other forms of friction-clutches might be

substituted for the form of clutch above briefly described, and the movable connections intervening between the power-driven
35 shaft C and the driving-shaft of the oil-pump, which are operated by the movements of the air-pressed diaphragm, may be, as I have already devised them, somewhat differently arranged and constituted from either of the
40 structures in the corresponding situation, which have been already described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

45 In a hydrocarbon-burning apparatus, in combination, an injector-burner, an oil-tank, an oil-pump having a driving-shaft and having its induction-pipe leading from the oil-tank and its eduction-pipe leading to and
50 serving the burner, a power-driven shaft and shiftable driving connections between same and the oil-pump shaft, an air-compressor and a conduit leading therefrom to the burner, and a chamber having air communication
55 with the compressor, one wall of said chamber being constituted by a movable diaphragm, which has an engagement with the aforesaid shiftable connections, for the purpose set forth.

JAMES H. BULLARD.

Witnesses:

H. A. CHAPIN,

WM. S. BELLOWES.