

J. H. BULLARD.

APPARATUS FOR BURNING HYDROCARBON FUEL.

No. 419,410.

Patented Jan. 14, 1890.

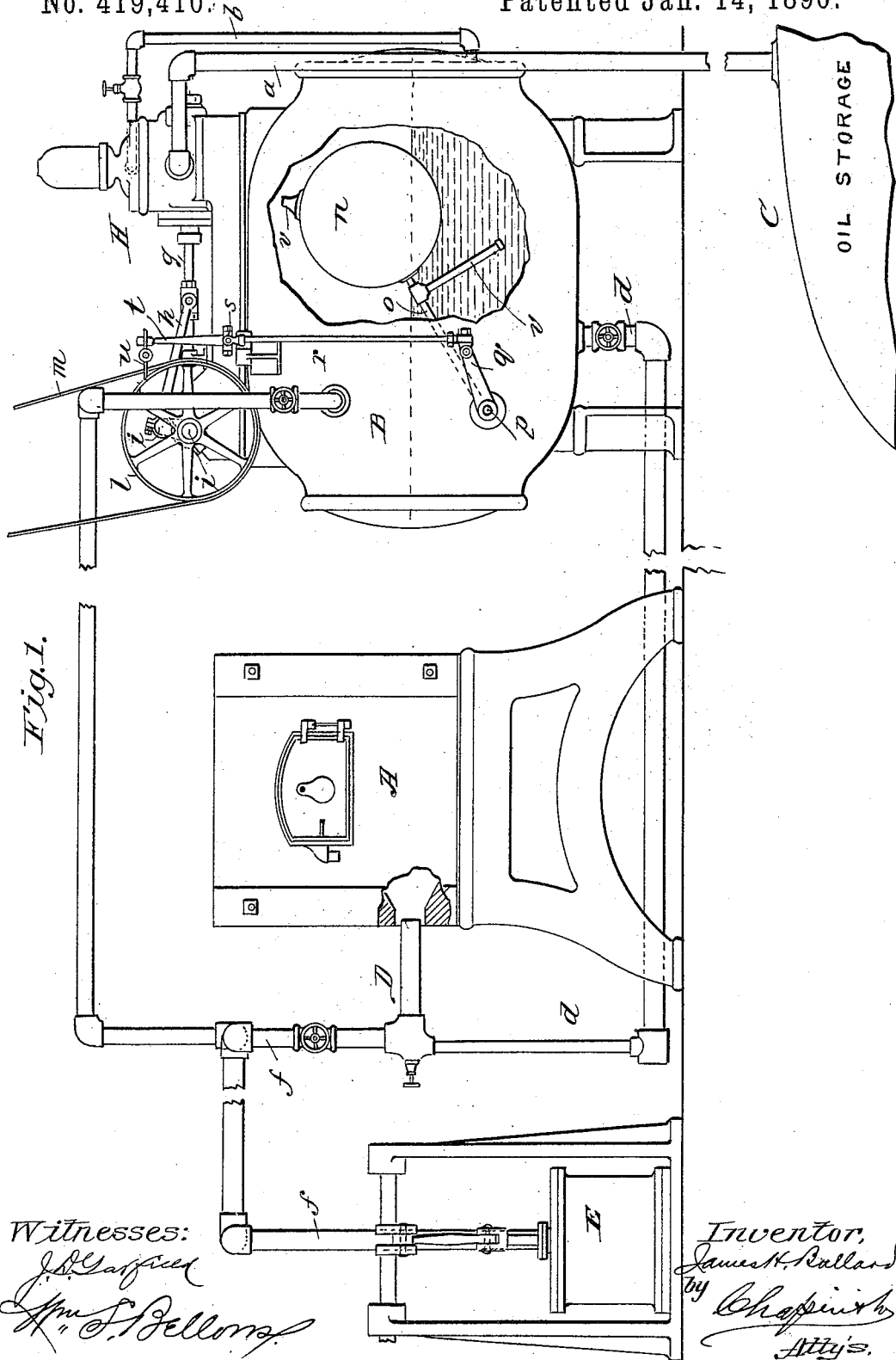


Fig. 1.

Witnesses:  
*J. H. Bullard*  
*Am. S. Bellong*

Inventor,  
*James H. Bullard*  
 by *Chapin & Co.*  
 Attys.

(No Model.)

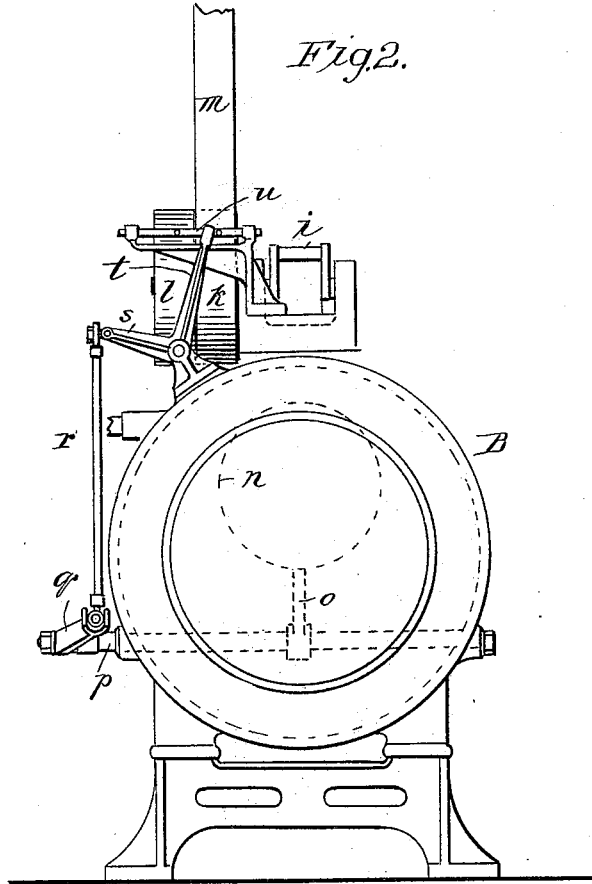
2 Sheets—Sheet 2.

J. H. BULLARD.

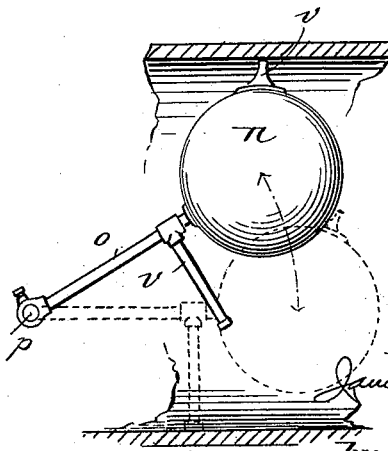
APPARATUS FOR BURNING HYDROCARBON FUEL.

No. 419,410.

Patented Jan. 14, 1890.



*Fig. 3.*



Witnesses:

*J. B. Garfield*  
*Wm. F. Bellows*

Inventor,  
*James H. Bullard,*  
 by *Chapin & Co.*  
 Attys.

# UNITED STATES PATENT OFFICE.

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

## APPARATUS FOR BURNING HYDROCARBON FUEL.

SPECIFICATION forming part of Letters Patent No. 419,410, dated January 14, 1890.

Application filed July 1, 1889. Serial No. 316,261. (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 Apparatus for Burning Hydrocarbon Fuel, of which the following is a specification.

This invention relates to improvements in apparatus for the combustion of hydrocarbon fuel, and particularly pertains to automatic machinery comprised in the hydrocarbon-burning system for pumping the liquid fuel into a service-tank to secure the proper height of the oil-level therein, the said pumping machinery becoming inoperative when such level has been attained, but again becoming operative to pump when the liquid in the tank falls below the proper level; and the invention consists in the combination of various contrivances and their arrangement in relation to each other, all substantially as will be hereinafter more fully described, and set forth in the claims.

Reference is to be had to the accompanying drawings, in which Figure 1 is a view in side elevation, with some parts broken away for clearer illustration, of a forge-furnace to which aerated hydrocarbon is supplied for combustion therein through the burner, which is shown adjacent to said furnace, an oil-storage tank and an oil-service tank, and a pump, conduits between and connecting said tanks and pump, automatic mechanism for controlling the action of the pump, an air-compressor, and conduits leading from the same to the burner, connected to which burner a conduit is also shown which leads thereto from the said service-tank. Fig. 2 is an end elevation of the service-tank and the pump and operating parts between said tank and pump; and Fig. 3 is a view in sectional elevation, illustrative of details of construction, to be hereinafter mentioned.

In the drawings, A represents a forge or other furnace in which the hydrocarbon is to be burned.

B represents a supply or service tank, which in practice is usually not far from the furnace, while the storage-tank (represented at

C) is usually placed for the purposes of safety at a considerable distance from the furnace.

H represents a pump, to a suitable portion of which is connected a suction-pipe *a*, which leads thereto from the said oil-storage tank. From the egress-passage of the pump a pipe *b* leads to the interior of the service-tank.

The burner D, which may be, for instance, of the form described and shown in Letters Patent of the United States granted to me June 11, 1889, numbered 404,955, has through it two passages—one for oil and a larger one for air—and a pipe *d*, leading from the service-tank B below the oil-level therein, connects with the oil-passage of said burner, while to the air-passage of the said burner is connected a pipe *f*, which leads thereto from an air-pump or air-compressor E, which is to be continuously driven by any desirable form of motor. The said oil-pump H, for conveying oil from the storage to the service tank is driven through the attachment with the piston-rod *g* of the said pump of a connecting-rod *h*, which is reciprocated by a cranked shaft *i*, on which shaft is a fixed pulley *k* and also a loose pulley *l*. The said driving-shaft *i* for the pump is rotated by means of a belt *m*, which is to be driven by any means, whether water, steam, or other motive power, as may best be adaptable to the circumstances attendant upon the works in which the hydrocarbon system is employed.

A ball-float *n* is provided inside of the service-tank, which is carried on a lever-arm *o*, which by its one end is fixed on a rocker-shaft or arbor *p*, having suitable bearings in the wall of the tank, and at one side is projected through the tank-wall beyond the outer surface thereof, and a crank arm or lever *q* is secured to such outwardly-projecting portion of the rocker-shaft, to the outer end of which lever one end of a connecting-rod *r* is secured, which rod by its other end is attached to one arm *s* of a bell-crank lever, there being secured on the other arm *t* of said bell-crank lever a belt-engaging hook or yoke *u*, which embraces said belt.

In fitting up the hydrocarbon system the service-tank is preferably placed so that the desired oil-level therein will be about the

same as that of the burner, and therefore, in order that the proper feeding or discharge of the oil may be had to and through the burner, the air-pipe which leads from the air-com-  
 5 pressor to the burner by a branch thereof also leads to and has communication with the interior of said service-tank, so that a pressure will be maintained in the tank corresponding to that supplied at the burner, and  
 10 whereby the discharge of oil from the service-tank to the burner may be insured.

The ball-float and its carrying-arm are provided with horns or extensions *v v*, whereby the movements of said ball-float in each direc-  
 15 tion of its swing are properly limited, so that no undue straining action will be brought upon any of the parts between said ball-float and belt-shifter consequent upon excessive movements of the ball-float, as might occur  
 20 in the absence of said extensions.

In the operation of the apparatus, and assuming that the oil in the service-tank is below the desired oil-level, having been expelled therefrom by the air-pressure in the space in  
 25 said tank above the oil, the ball-float in its depression operates the belt-shifter to start up the pump, which will continue to act to convey oil into said service-tank until the desired height of the oil-level has been  
 30 reached, when the belt is automatically shifted to cause the cessation of the pumping action. The air which is supplied to the burner and also to the air-space in the service-tank under  
 35 a pressure which is to be regulated according to the use of or demands on the burner, according to such pressure regulates the supply of oil to the burners, for with a maximum  
 40 degree of air-pressure supplied at the burner a corresponding and maximum degree of air-pressure is present in the air-space in the service-tank and a maximum amount of oil is caused to flow from said service-tank to the burner; and it will thus be apparent that the regulation of the air-pressure also regulates

the consumption of the oil and governs the 45 action of the automatic pumping mechanism.

What I claim as my invention is—

1. An apparatus for securing the supply and combustion of liquid fuel, comprising a hydrocarbon-burner having oil and air pas- 50 sages, a storage-tank, a service-tank, an oil-pump provided with a fixed and a loose pulley on its driving-shaft, and a driving-belt around one of said pulleys, an inlet-conduit for said oil-pump leading thereto from the 55 said storage-tank and an outlet-conduit for said pump leading therefrom to said service-tank, a float in said service-tank, and movable connections between said float and said belt, whereby on the rise or fall of said float 60 in the service-tank said belt may be shifted from one to the other of said pulleys, an air-compressor, and a conduit leading therefrom to said burner, substantially as described.

2. An apparatus for securing the supply 65 and combustion of liquid fuel, comprising a hydrocarbon-burner having oil and air passages, a storage-tank, a service-tank so located that the normal oil-level therein will be the same as the level of the burner, an oil-pump 70 provided with a fixed and a loose pulley on its driving-shaft, and a driving-belt around one of said pulleys, an inlet-conduit for said oil-pump leading thereto from the said storage-tank, a float in said service-tank, and mova- 75 ble connections between said float and said belt, whereby on the rise or fall of the float in the service-tank said belt may be shifted from one to the other of said pulleys, an air-compressor, and a conduit leading therefrom 80 to said burner, and also a conduit leading from said air-compressor to the service-tank above the oil therein, substantially as described.

JAMES H. BULLARD.

Witnesses:

WM. S. BELLOWS,  
 J. D. GARFIELD.