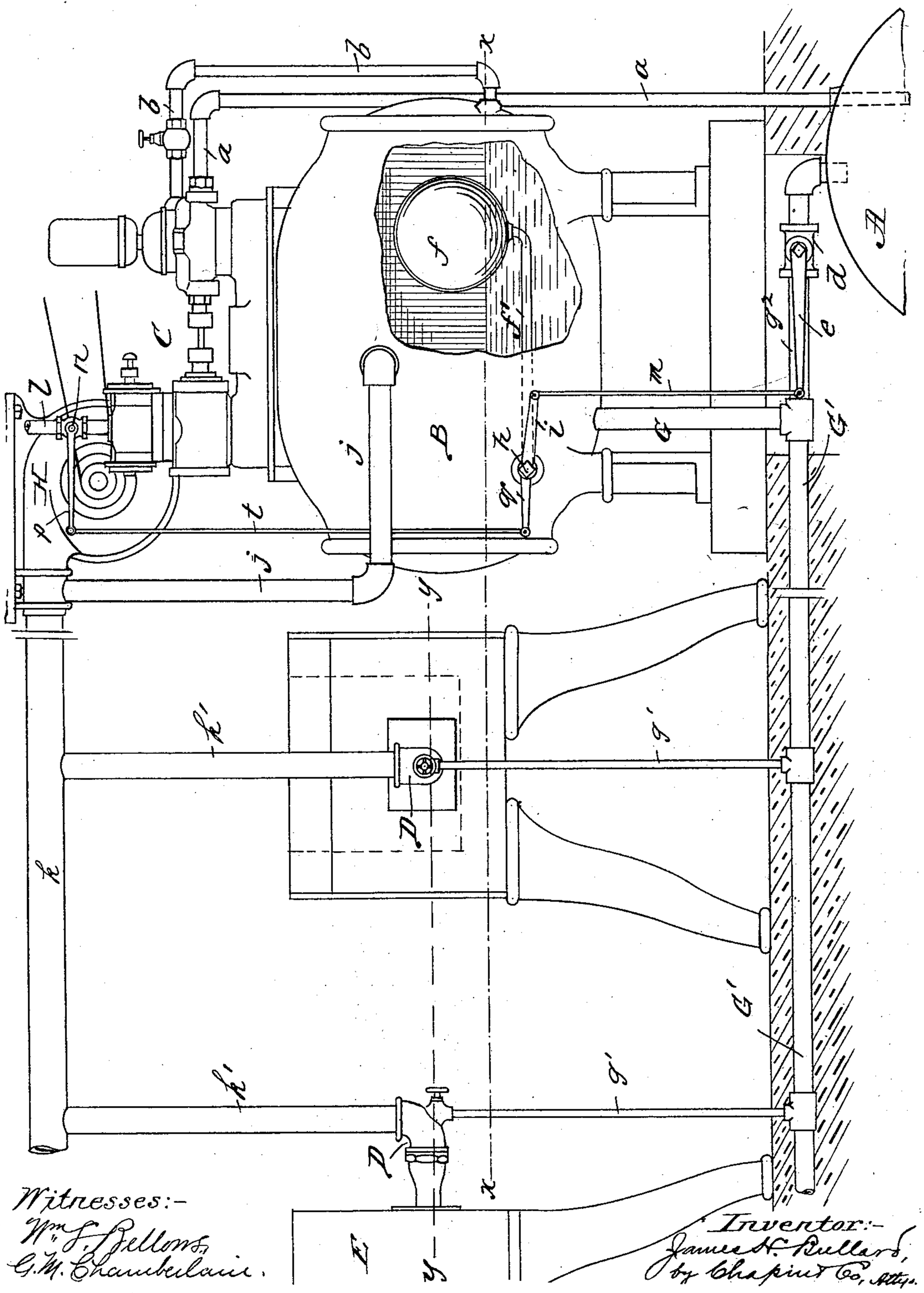
(No Model.)

J. H. BULLARD.

HYDROCARBON BURNING APPARATUS.

No. 435,270. Patented Aug. 26, 1890.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 435,270, dated August 26, 1890.

Application filed November 29, 1889. Serial No. 331,908. (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 relates to an apparatus for burning hydrocarbon in the form of crude petroleum, the same for combustion being commingled with air, said combined oil and air being delivered through a nozzle or injector-burner to the furnace or heating-chamber within which it is to be burned.

The object of the invention is to provide an improved and automatically-operating apparatus for the purpose above indicated, from the use of which entirely practical results are derived, the same being unattended by any danger from an excessive or undue delivery or an overflowage of oil, either while the apparatus is being operated for heating forges or furnaces or while it is in disuse; and the invention consists in the construction and combination of parts or instrumentalities, all substantially as will be hereinafter set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawing, forming part of this specification, in which the figure is a side elevation of the hydrocarbon apparatus constructed under and in accordance with this invention.

A represents a storage-tank having a capacity for holding a quantity of oil sufficient for the running of the oil-burning system for a protracted period, and said storage-tank is placed under ground or at some place considerably lower than the positions occupied by the other parts and appliances comprised in the apparatus. A service-tank B is supported above the ground or floor, and adjacent to said service-tank is a pump C, to the inlet-passage of which an oil-pipe *a* leads from said storage-tank, while from the outlet-passage of said pump another oil-pipe *b* leads to convey the oil pumped from said storage-tank to said service-tank.

The broken line *x x* indicates the normal level or height at which the oil is to be maintained in said service-tank.

D D represent hydrocarbon nozzle or injector burners, the same being shown as in proximity to forge-furnaces E E, and one is shown in rear view, while the other is seen from its side, and said burners have therein and through them oil and air passages, the general plan of construction of which burners may be that shown in Letters Patent of the United States granted to me June 11, 1889, No. 404,955. The height or level for the delivery of the oil from the burner-nozzles is indicated by the dotted line *y y'*, which is somewhat above the normal level for the oil in the service-tank. An oil-delivery pipe G leads downwardly from the said service-tank, being continued in a bend or branch G', which is run preferably horizontally, or about horizontally, along and near the positions of the various burners, risers, or individual oil-pipes *g'* of smaller diameter, being led off from said branch G' and connected with the oil-inlet opening of the burners to which said riser-pipes are respectively provided, and the said branch G' by a suitable portion thereof communicates with the storage-tank. As shown, the part g^2 of the branch pipe G', which is connected with the upper portion of the storage-tank, is at the opposite side of the delivery-pipe G from the portion of the branch which is ranged in proximity to the burners, and in said part g^2 is a valve *d*, on the stem of which is fixed a lever-arm *e*.

The ball-float *f* in the service-tank is carried on an arm *f'*, which is affixed to a rock-shaft *h*, horizontally supported in bearings formed in the walls of the service-tank, and on the exteriorly-projected end portion of said rock-shaft is a radial lever-arm *i*, to the extremity of which is attached one end of a connecting-rod *m*, which by its other end has an engagement with the lever-arm *e* for the valve *d*.

H represents a blower or fan, which may be driven in any suitable manner, from which a pipe *j* leads to the air-space above the oil in the service-tank, and also through the pipe *k* and branches *k'* thereof air under a low degree of pressure is supplied to the air-inlet passages of the burners. The oilway in the valve *d*, as will be clearly understood, is to be so adjusted in conjunction with the ad-

justment of the lever-arms *i* and *e* and the ball-float arm that when the ball-float is maintained in its normal position, as shown, by the desired height of the oil, the valve will close the pipe in which it is placed and thereby prevent the oil passing through the delivery-pipe G into the branch G′ from running off to the said storage-tank, and the air-pressure afforded to and within the service-tank above the oil-level therein is intended to be of such an intensity as to exert a force on the oil in the said service-tank sufficiently to raise the oil, which would normally stand from hydrostatic pressure in the riser-pipes *g′* at the height indicated by the line *x x* up to the height indicated by the line *y y*, which is coincident with the oil-delivery passage for the burners.

Assuming in the operation and use of the apparatus that an excessive amount of oil is pumped into the service-tank, whereby an oil-level greater than that indicated is attained, (which undue height of oil in the service-tank would insure a rising of oil in the vertical pipes *g* further than that occasioned by a hydrostatic pressure at the plane *x x*, and which, combined with the regular air-pressure provided, as described, in the service-tank, would result in the issue of a greater quantity of oil at the nozzles than necessary, desirable, or economical,) the ball-float on rising through the connections described operates to move the valve *d* to open the passage in the part g^2 of the branch G′, so that the excessive quantity of oil within the service-tank is returned to the storage-tank.

The apparatus possesses a very considerable degree of efficiency when provided with the automatic discharging means just described, when the same act independently of the operation of the pump; but it will be clear that by also automatically controlling the pump from and in connection with the amount of oil in the service-tank a more regular and steady delivery of oil is insured, and to this end I provide in the pipe *l* of the pumping-engine which supplies the steam or other motor fluid thereto, a valve *n*, on the stem of which is a lever-arm *p*. Another lever-arm *q* besides the one *i* is also fixed on the rock-shaft *h* of the service-tank, which arm is swung as said shaft rocks or rolls, and to one end of said lever-arm *q* is secured a connecting-rod *t*, which by its other end is connected to the end of the valve-lever *p* for the said pumping-engine. Now it will be clear that should the oil be pumped into the service-tank faster than the oil is delivered therefrom to the burners, while without the automatic devices for controlling the motor-fluid a considerable period would elapse before from the discharge of the surplus oil to the storage-tank, the normal level is again established with said automatic contrivance for the controlling of the engine-valve, a very much less time will ensue before the desired lower and normal level has been reached, for of course while the oil is running away from the service to the storage tank the operation of the pump is retarded or stopped and the inflow of oil to the service-tank is momentarily very much decreased or entirely stopped. So it will be apparent that the quickest and most effective regulation of the oil-height in the service-tank is made, preferably, dependent on both the coinciding controlling of the pumping-engine valve and the valve for the drainage portion g^2 of the branch pipe by and from the ball-float and lever *f f′*, which is common to both valves and their connections.

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

1. In a hydrocarbon-burning apparatus, a storage-tank and a service-tank thereabove, a pump for conveying oil from said storage to said service tank, and a pipe leading from said service-tank to the place of delivery of oil for consumption, and a pipe-connection also communicating with and leading from said service to said storage tank which constitutes a drainage-pipe, and is provided with a valve therein adapted normally to be closed, a float in said service-tank, and movable connections between said float and said valve, whereby when an undue oil-height is attained the drainage-pipe valve will be automatically opened, substantially as and for the purpose set forth.

2. In a hydrocarbon-burning apparatus, a storage-tank and a closed service-tank thereabove, a pumping-engine for conveying oil from said storage to said service tank, having a motor-fluid-supply pipe provided with a regulating-valve, a pipe leading from said service-tank to the place of delivery of oil for consumption, and a pipe-connection also communicating with and leading from said service to said storage tank which constitutes a drainage-pipe and is provided with a valve therein adapted normally to be closed, a float in said service-tank and movable connections between said float and both the said engine-valve and said drainage-pipe valve, whereby when an undue oil-height is attained the drainage-pipe valve will be automatically opened and the engine-valve will be turned to be closed, substantially as and for the purpose set forth.

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