

(No Model.)

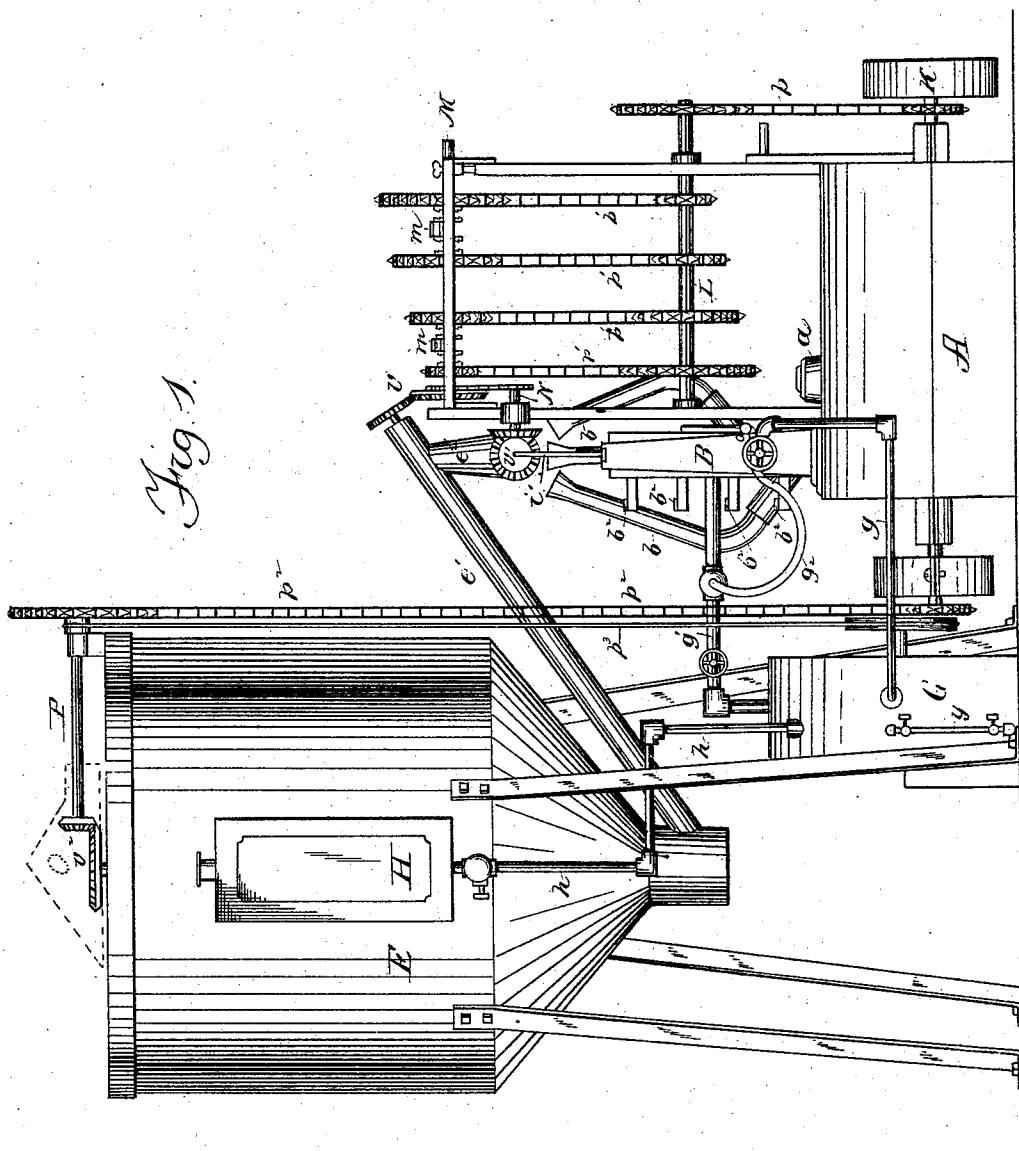
4 Sheets—Sheet 1.

J. LEEDE.

APPARATUS FOR FEEDING AND CONSUMING FINE FUEL.

No. 292,237.

Patented Jan. 22, 1884.



Witnesses:
Wm. A. Rosenbaum,
St. Carroll Downe

Inventor:
Julius Leede
by V. D. Stockbridge
Attorney.

(No Model.)

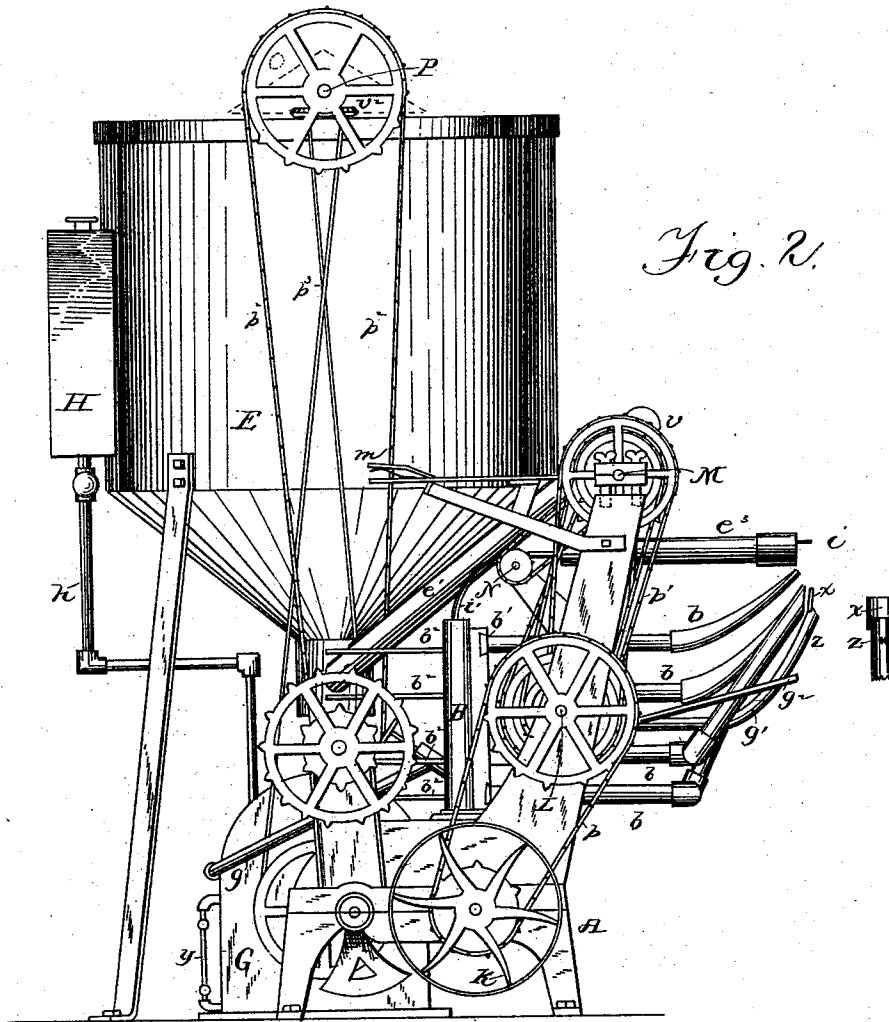
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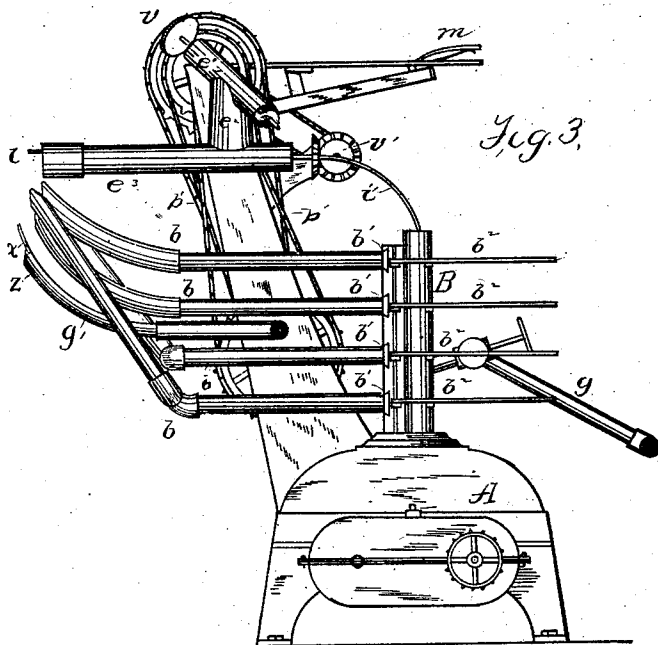


Fig. 3.

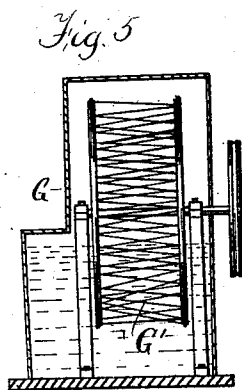


Fig. 5.

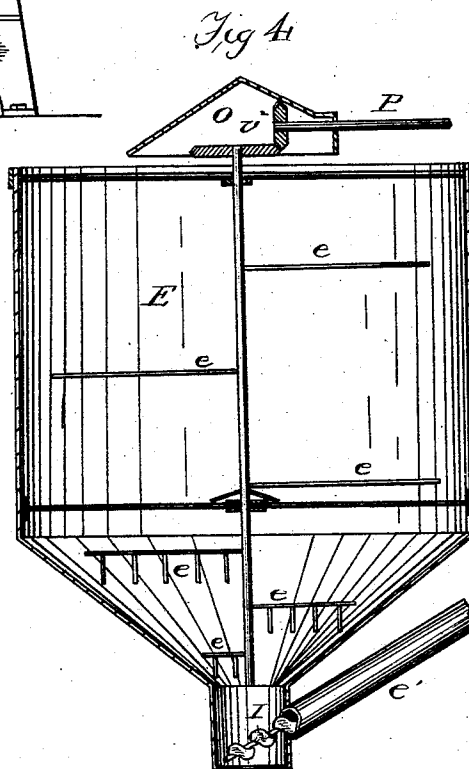


Fig. 4.

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(No Model.)

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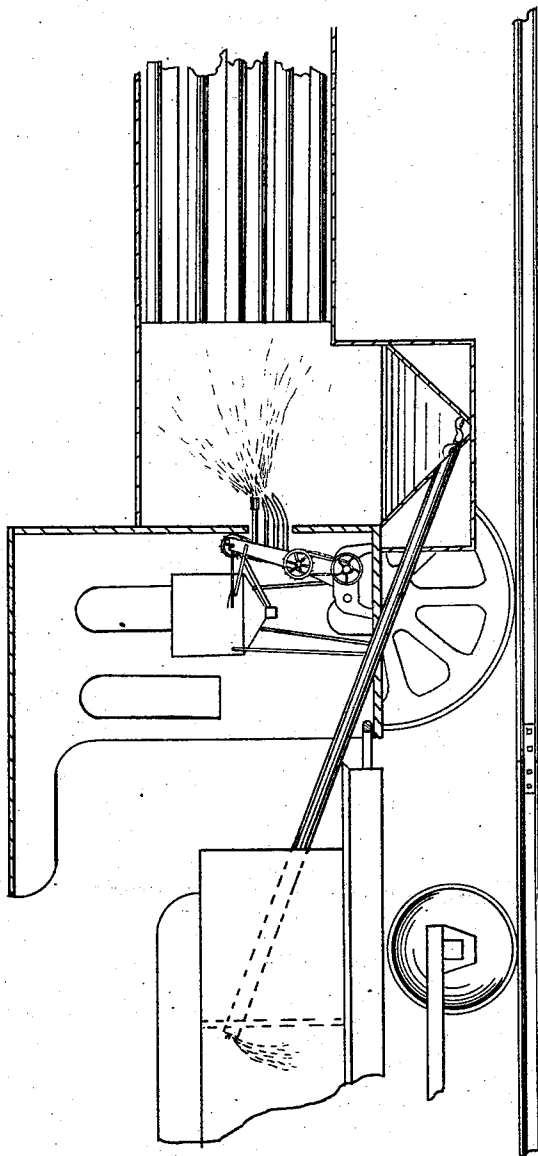
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Fig. 6.



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UNITED STATES PATENT OFFICE.

JULIUS LEEDE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO GRANVILLE H. OURY, OF FLORENCE, ARIZONA TERRITORY.

APPARATUS FOR FEEDING AND CONSUMING FINE FUEL.

SPECIFICATION forming part of Letters Patent No. 292,237, dated January 22, 1884.

Application filed August 30, 1883. (No model.)

To all whom it may concern:

Be it known that I, JULIUS LEEDE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Apparatus for Feeding and Consuming Fine Fuel; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a process of consuming, and to an apparatus for feeding, igniting, and consuming, compound hydrocarbon fuel consisting of pulverulent earthy substances, coal, or sawdust mixed or saturated with petroleum or other hydrocarbon; and it consists in a process of burning hydrocarbons, which consists in mixing the same with granular or pulverized material, feeding it to a furnace, and scattering, igniting, and consuming it while in suspension; in the combination of an automatic feed and means for producing a blast, and for igniting the fuel as it is projected away from the feed-tube by the blast; in the combination of a blower, a carburetor, and a series of blast-pipes for diffusing the fuel throughout the chamber and suspending it during combustion, as well as for supplying oxygen for combustion; in the combination of a series of blast-pipes and means adjacent thereto for igniting the fuel as it escapes and enters the fire-chamber; the combination of a series of adjustable pipes and gates and valves for controlling the direction, force, and quantity of the blast without changing the speed of the blower; and, further, my invention consists in certain combinations of details, which will be hereinafter more particularly described and claimed.

In the accompanying drawings, making a part of this specification, Figure 1 is a front elevation of my apparatus for feeding and consuming pulverized or compound hydrocarbon fuel. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional end elevation from the side opposite the view in Fig. 2, showing a plurality of blast-pipes and their valve and lever connections. Fig. 4 is a vertical sec-

tion of the fuel hopper or reservoir, specially showing arms projecting from a revolving vertical shaft located in the center thereof, for stirring and agitating the fuel. Fig. 5 is a vertical section of the carburetor forming a part of the apparatus. Fig. 6 shows the application of the apparatus to a locomotive, and illustrates a means of removing the debris from the fire-box thereof.

A is a blower of any suitable construction, a "Root" blower being preferred. This blower is provided with a relief-valve, *a*, so that the blast through the tubes may be partially cut off without changing the speed of the blower.

B is the air-trunk, from which the blast-tubes *b b* lead to the mouth of a fire-box or furnace. These blast-tubes are connected with the trunk by dovetail bases *b' b'*.

b² b² are levers which operate valves in the trunk for regulating the blast through the pipes without changing the speed of the blower.

G is a carburetor, consisting of a vessel having a pair of wheels mounted therein, and having yarn or other fibrous material stretched diagonally across from one to the other. These wheels, interlaced with yarn, constitute an agitator, *G'*, which tends to keep the gasoline in suspension while the air is forced through the vessel.

g is a pipe leading from the air-trunk to the carbureting-vessel, and *g'* is the exit-pipe, leading from the carburetor to the mouth of the furnace or fire-box. This pipe is provided with a gas-cock for shutting off the flow of gas, and thereby extinguishing the fire in the furnace. It is also provided at its extremity with a lip or fender, *x*, to guard against extinguishing the flame by the force of the blast from the blast-tubes, and with perforations *z* just below the mouth or burner, through which the gas escapes and ignites, and thereby operates as priming-jets to relight the main flame in case it may be accidentally extinguished. A flexible branch pipe, *g²*, leads from the pipe *g'*, which I use as a lighter for the gas within the furnace.

K is a driving-pulley, to which power is applied for operating the blower, and from

which motion is imparted to the different moving parts of the machine.

H is a gasoline-tank secured, for convenience, to the side of the hopper E, having a conduit, *h*, leading to a carburetor for replenishing the same whenever required. The amount of gasoline in the carbureting-vessel is conveniently indicated by a gage, *y*.

E is a hopper for containing a quantity of pulverulent compound fuel, or of pulverulent earthy material, saturated with hydrocarbon, and it is provided with rotating mixers or stirrers *e e*, to prevent the fuel from clogging within the hopper. Leading from the base of the hopper is a conduit, *e' e' e'*, through the branch *e'* of which the fuel is fed by a screw-conveyer, I, whence it drops by gravity through the branch *e''*, and is then, by another like screw-conveyer, delivered to the mouth of the furnace. This latter conveyer does not quite reach to the end of its casing, and has attached to its extremity, next to the furnace, an eccentric pin, *i*, to break up any lumps which may have formed in forcing the material forward. The arbor of this conveyer is also made hollow, and has a pipe, *i'*, leading from the air-trunk, or from a source of steam or carbureted air, so that the stream of fuel will be broken and spread as it issues from the conduit *e''*, to be caught by the blasts from the tubes *b b*. Shafting L, M, and N, mounted in suitable frame-work upon or above the blower, carry reciprocally-differential and inversely-graduated series of sprocket-wheels, carrying chain belts, and shaft M has a series of clutches mounted thereon, operated by levers *m m*, for throwing either of the sprocket-wheels and its corresponding chain into operation.

O is a hood arranged to protect the gearing for the stirrers *e e*.

The operation of my apparatus is as follows: The hopper being charged with fuel, and the carburetor with gasoline, power is applied to the pulley K, the blower is put in operation, and through the chain belt *p* the shaft L is revolved, and through one of the chains *p' p'* the shaft M, through gearing *v*, causes the conveyer I to force the fuel from the hopper E, and the shaft N, through gearing *v'*, drives a screw-conveyer in the conduit *e'*, and delivers the fuel to the mouth of a fire-box or furnace. The shafts carrying the fans of the blowers are geared together, and a sprocket-wheel mounted on one of these shafts operates chain belt *p''*, and, through shaft P and gearing *v''*, rotates the stirrers *e e*. The shaft P, through belt *p''*, drives the agitator G in the carburetor. At the same time blasts of air are driven through the pipes *b b b b* to the furnace, for scattering and supplying oxygen to the fuel, and through pipe *g* into the carburetor, whence it issues by pipe *g'* to supply gas for the jet-flame, and by the pipe *i'* through the arbor of the conveyer in conduit *e'*, to break up and separate the column of material fed forward by the conveyer.

Fig. 6 shows the application of my invention to locomotive-boilers. This figure shows a machine located in the cab, with the blast-pipes projecting into the furnace. The use of this apparatus renders grate-bars unnecessary.

In the furnace shown, a concave or hopper bottom is made for receiving and concentrating the unconsumed infusorial earth. This unconsumed portion or vehicle for the fuel may be removed from the furnace by means of a suitable conveyer, as shown, to a receiving-bin on the tender.

It is obvious that the particles of earth saturated or surrounded by the hydrocarbon, upon being separated by a blast, will divide the same into minute parts, so that the oxygen has access to and entirely consumes it.

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

1. The method herein described of burning hydrocarbons, consisting in mixing the same with granular or pulverized material, feeding it to a furnace, and then simultaneously scattering and igniting the same, and thereby consuming it while in suspension, as set forth.

2. The combination, substantially as described, of a carburetor and a blower having a blast through the carburetor to the furnace, to provide gas and pressure for a jet-flame, and a separate blast to the furnace, substantially as and for the purpose described.

3. The combination of the automatic fuel-feeding conveyers working the fuel through conduits into the furnace, the separate blast-pipe for projecting the fuel through the furnace, and the jet-flame adjacent to the nozzle of the conduit and blast, substantially as specified.

4. In a furnace for burning pulverulent fuel, the combination of a series of blast-pipes and means for producing a jet-flame adjacent thereto for igniting the fuel as it issues from the feed-pipe into the fire-chamber, substantially as specified.

5. The combination of a series of adjustable blast-pipes and a series of gates or valves and levers for controlling the direction, quantity, and force of the blast without changing the speed of the blower, substantially as specified.

6. The combination, in a fuel-feeding apparatus, of the inversely-graduated gearing and their connecting chain belts, the serrated clutches, and their operating-levers, whereby the speed of the conveyers and the feed are adjusted with relation to the blower, substantially as specified.

7. The combination of means for changing and regulating the speed of the conveyers with means for regulating the force of the blast without changing the speed of the blower, substantially as specified.

8. The apparatus constructed and operating substantially as described, consisting of

the combination of automatic fuel-feeding conveyer, the separate blast-pipes, means for producing a jet-flame, a locomotive having a concaved fire-box, and an automatic conveyer for
5 removing the residuum of the fuel to a reservoir-bin, substantially as specified.

In testimony that I claim the foregoing I

hereunto affix my signature in the presence of two witnesses.

JULIUS LEEDE.

Witnesses:

V. D. STOCKBRIDGE,

WM. A. ROSENBAUM.