

(No Model.)

J. WILSON & A. MASON.
APPARATUS FOR VAPORIZING AND BURNING PETROLEUM OR OTHER
HYDROCARBONS.

No. 408,644.

Patented Aug. 6, 1889.

fig:1.

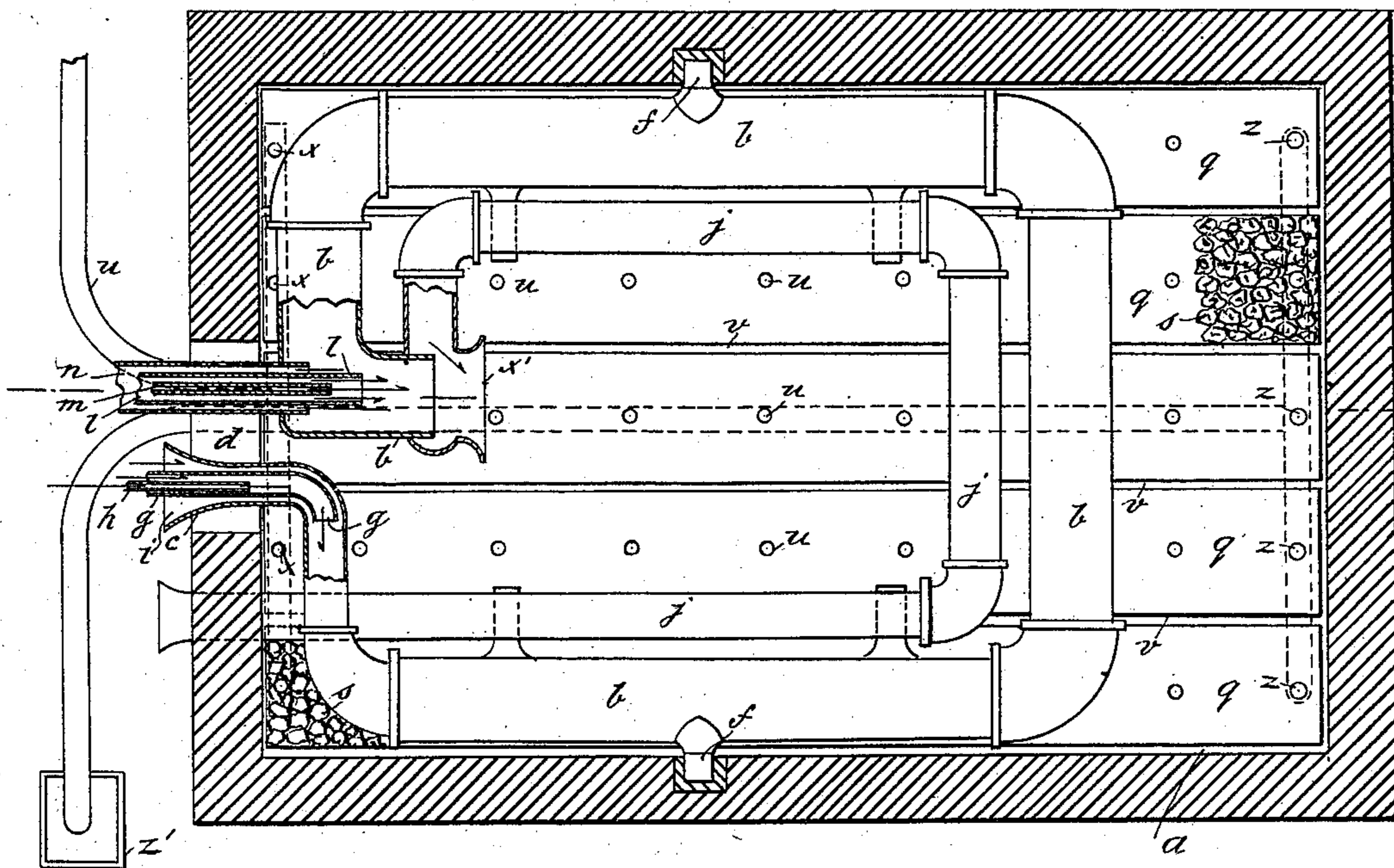
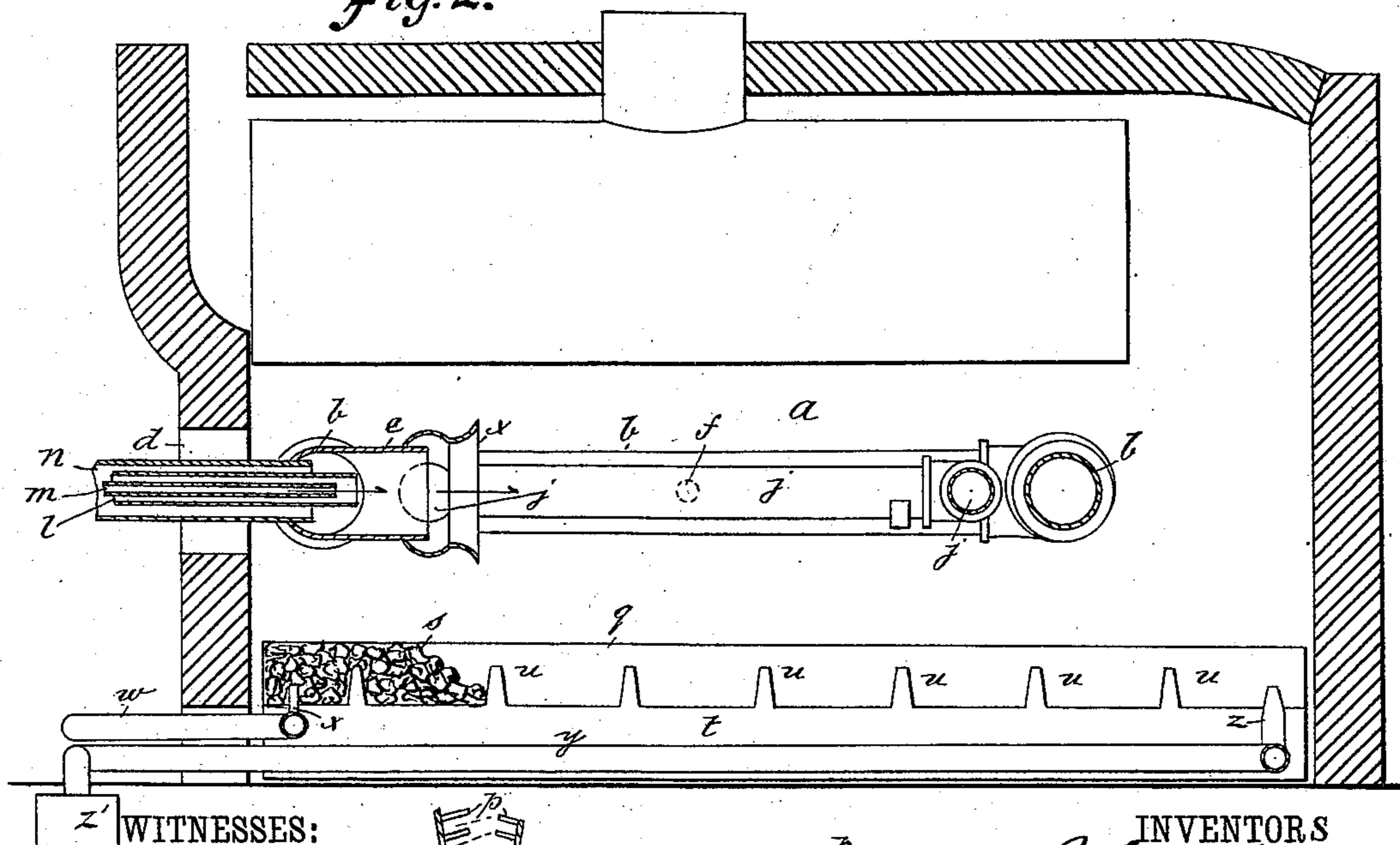


fig:2.



WITNESSES:

Ch. J. Longan,
[Signature]

fig:3.

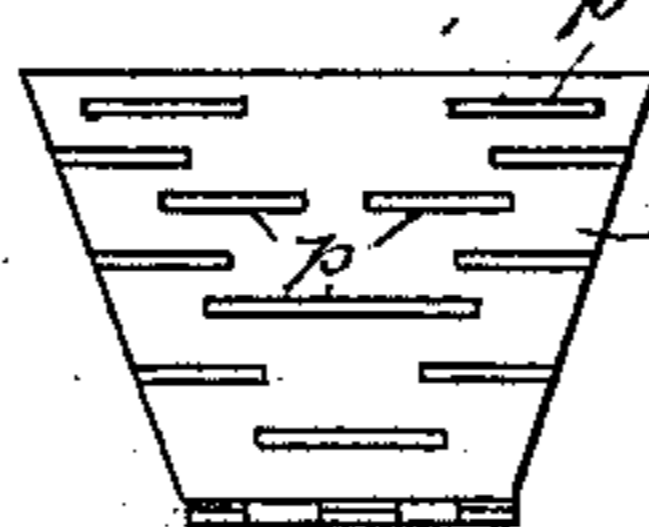
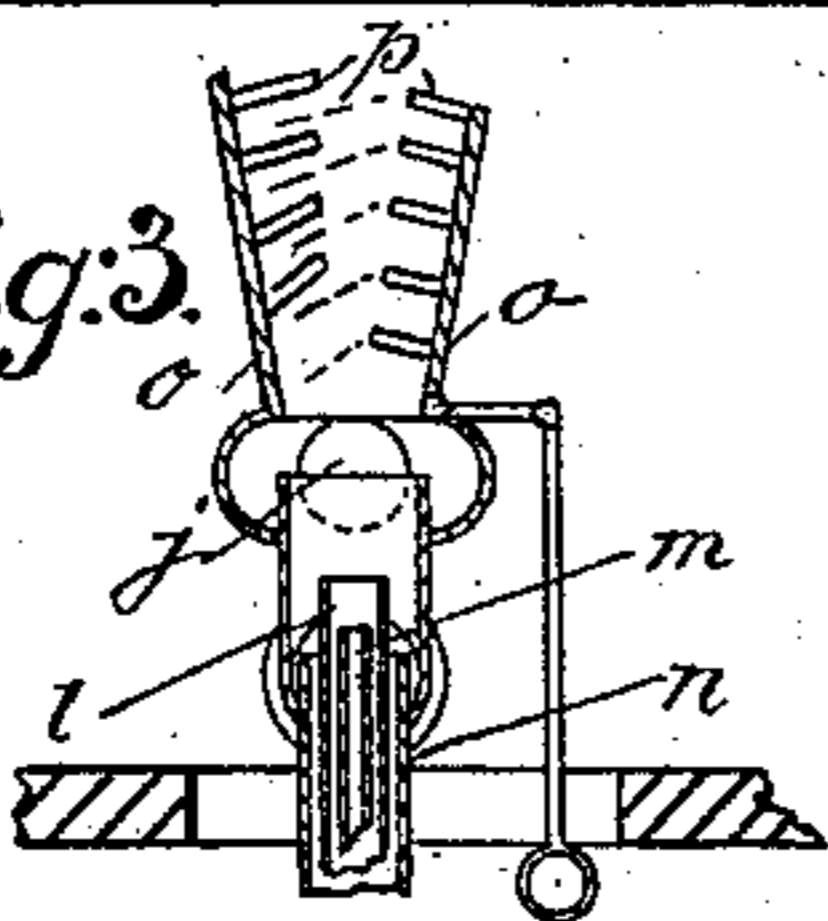


fig:4.

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JOHN WILSON, OF NEW YORK, AND ALLAN MASON, OF BROOKLYN, ASSIGNORS
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APPARATUS FOR VAPORIZING AND BURNING PETROLEUM AND OTHER HYDROCARBONS.

SPECIFICATION forming part of Letters Patent No. 408,644, dated August 6, 1889.

Application filed March 8, 1888. Serial No. 266,565. (No model.)

To all whom it may concern:

Be it known that we, JOHN WILSON and ALLAN MASON, citizens of the United States, residing at New York city, in the county and State of New York, and Brooklyn, Kings county, New York, respectively, have invented certain new and useful Improvements in Apparatus for Vaporizing and Burning Petroleum and other Hydrocarbons; and we do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention consists of the improvements in apparatus for burning petroleum and other hydrocarbons, as hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a horizontal section of a furnace, and partly a plan view and partly a sectional view of some of the apparatus. Fig. 2 is a longitudinal sectional elevation of the furnace and apparatus. Figs. 3 and 4 are details of the expanding burner we prefer to use.

In any boiler or other furnace-chamber *a* we arrange a pipe-retort *b* with an inlet branch *c* entering the fire-door *d*, the general arrangement of the said pipe-retort being a circuit of the combustion-chamber along the inner walls, with a terminal issue *e* of its inner extremity for the discharge of the gases and vapors projected inward from the fire-door alongside of the inlet branch *c*, and being successively larger in diameter along the different sections; but the form and arrangement may be varied at will, as it may be coiled several turns, either vertically or horizontally, along the rear transverse part, or along the side walls of the furnace, if desired, and said transverse part may be located at the rear wall of the furnace instead of in the advance position of the same, as here shown. We also prefer to arrange said pipe-retort *b* on trunion-pivots *f*, or in any other approved way, whereby the front and rear may be respectively elevated or depressed to shift its pitch

or inclination as varying conditions may require, as to change the application of the heat and to vary the flow of the matters passing through it. In such case the injector-pipes will be suitably jointed for turning or shifting to allow of such adjustment, and with the inlet *c* we arrange an oil-feeder *g* and a steam-jet nozzle *h*, for introducing the oil and steam and spraying the oil to be mixed, vaporized, and gasified and introduced into the furnace through the issue *e*, and with the oil and steam thus introduced we also provide for the introduction of air through the inlet *c* at *i* along with them, and also other air through another pipe-retort *j*, traversing the furnace substantially like retort *b*, and connected to issue *e* by the annular injector *k*, so that both inlets may be used or not, as preferred, any suitable stopper being provided to exclude the air from retort *b* when desired. We may, however, dispense with the air-retort *j* and supply all the air through retort *b*, although we prefer to use it alone for air, believing that we obtain the best results by using retort *b* for oil and steam only, by which more effective decomposition of the steam results than when atmospheric oxygen is present.

With the highly-combustible elements thus produced and calculated to burn with great intensity, and corresponding limit of projection of the flame at the issue *e*, we take advantage of the facility afforded by the bend where the retort *b* terminates in the issue *e* for introducing additional measures of oil, steam, and air, or either of them, either under pressure or not, or heated or not, by providing the respective inlets *l*, *m*, and *n* therefor, which, like the others *h*, *g*, and *c*, are to have the suitable connections for feeding or injecting the respective elements as required. With these additional inlets the longer flame of the less volatile elements thus directly admitted to the burner may be had in combination with the shorter but more intense flame of the more volatile and inflammable gases generated in the retorts.

The issue nozzle or burner *e* may have the flaring mouth *x'*, (represented in Figs. 1 and 2,) together with or without the curled extremity there shown for the expansion and

distribution of the escaping vapors, which we find in practice a very efficient and practical form; but we prefer to employ the variable expander-nozzle represented in Figs. 3 and 4, and consisting of articulating jaw-plates *o*, having intermeshing and suitably alternating distributing-plates *p*, calculated to effect lateral diffusion and expansion of the gases more effectively than other burners, and being variable at the will of the operator through the instrumentality of a lever or any approved contrivance enabling the jaws to be shifted at will for opening and closing them more or less to enlarge or diminish the direct passage, and thus cause more or less lateral diffusion. With the fire thus produced and having wide range rearwardly and laterally in the furnace-chamber, we also propose to use in some cases, or as desired, the lower fire burning upward from a bed of refractory, or refractory and absorbent, material, as in the case of our damp process, above referred to, for greater diffusion and intensity, and for preventing interruption of the upper fire, and also for the vaporizing and burning of any drippings of oil that may under some circumstances fail of being vaporized in the retort, and for that purpose we represent herein similar means or apparatus therefor, as the oil-holding troughs *q*, with the refractory materials, as porous stone, asbestos, or the like *s*, supported upon them or above, said troughs being arranged above the air-space *t* and having numerous air-tubes *u*, admitting air above the oil, and also arranged with spaces *v* between them for effective distribution of the air. The oil is supplied from the pipe *w* by a branch *x* to each trough, and an overflow *y*, connected by a branch *z* with each trough, allows any excess that may flow into the troughs to escape into a receptacle *z'*; but we may of course employ any other approved apparatus for the application of this lower fire.

It is to be noted that our invention is essentially favorable to the expansion and rarefaction of the combustible matters by reason of the progressively-increasing dimensions of the retort or retorts and the unobstructed issue out of which the vapors or gases escape in more expanded, and therefore more combustible, condition than when subject to compression by retention in the retorts through the effect of contracted issues.

By the greater expansion in the retort the vapors and gases are proportionately hotter, as well as more expanded, when reaching the point of combustion.

By introducing oil and steam together we prevent the formation of coke in our pipe-retort, and at the same time decompose the oil and steam together, thoroughly intermingling their vapors and withdrawing from the steam the heat-giving elements, which are perfectly amalgamated with the heat-giving elements of the oil. Thus we have the most perfect amalgamation and incorporation of hydrogen, carbon, and oxygen, especially when we use

air in addition, which gives us an additional supply of oxygen.

By the passing of the oil and steam through our pipe or pipe-retort we gradually, so as to procure best results, and yet thoroughly; (or instantaneously, as we choose,) vaporize and gasify the oil, separating both it and the vapor or water into their elements. The continual exhaust prevents any danger from explosion. The pipe or pipe-retort being adjustable, the heat is thrown against it at any angle and in any quantity desired, so that the vaporization of the products in the retort is automatic. We can use any triple-injecting system for supplying the air in conjunction with the steam and oil and passing them all through the pipe or pipe-retort.

We can provide for perfect vaporization by passing the retort-pipe any desired number of times around the furnace, or by having it pass back and forward in a coil several times in the rear or in the side or sides of the furnace.

We vary the conditions and modify the operations to counteract any deficiency which might occur from accident or improper working of the machinery employed by accidental causes, by supplying oil, or oil and steam, or steam and air, or oil, steam, and air, or oil and air, according to the circumstances required, in the manner and by the apparatus shown.

We provide against sudden extinguishing of the flames by our bed of refractory, or refractory and absorbent—we usually employ the latter—material beneath the flames of the burner, continuously supplied with oil and air, and steam, if desired, as specified. The flames and heat are presented to the furnace or surface being heated in the same condition or manner—that is, uniformity of distribution—as with coal or wood fire, but with much greater intensity.

What we claim, and desire to secure by Letters Patent, is—

1. The combination, with a furnace-chamber, of the vaporizing or gasifying pipe-retort and an injector for feeding it, said retort located and suitably coiled in the furnace-chamber, and arranged for the resultant vapors to pass out of the unobstructed inner terminal of the retort into the chamber, and also mounted on trunnion-pivots for varying and adjusting the inclination, substantially as described.

2. The combination, with a furnace-chamber, of the vaporizing or gasifying pipe-retort, an injector for feeding it, and the air-heating pipe-retort, said retorts located and suitably coiled in the furnace-chamber, and connected together by the annular injector *K* at the issue-nozzle *e*, for discharging the resultant vapors and the hot air, so as to combine and pass out of the inner terminals of the retorts *en masse* into the combustion-chamber, substantially as described.

3. The combination, with a furnace-cham-

ber, of the vaporizing or gasifying pipe-retort located and suitably coiled in the furnace-chamber, and arranged for the resultant vapors to pass out of the inner terminal of the retort into the combustion-chamber at or near the front of the same, an injector for primarily feeding the retort, and another injector feeding fresh air, oil, and steam at the inner terminal of said retort, substantially as described.

4. The combination, with a furnace-chamber, of the vaporizing or gasifying pipe-retort located and suitably coiled in the chamber, and arranged for the resultant vapors to pass unobstructedly out of the inner termi-

nal, an injector for feeding the retort, the air-heating pipe-retort, also located and coiled in the furnace-chamber and connected with the vaporizing-retort at its inner terminal, and the bed of refractory, or refractory and absorbent, material and oil-burners located below the retorts, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN WILSON.
ALLAN MASON.

Witnesses:

W. J. MORGAN,
A. P. THAYER.