

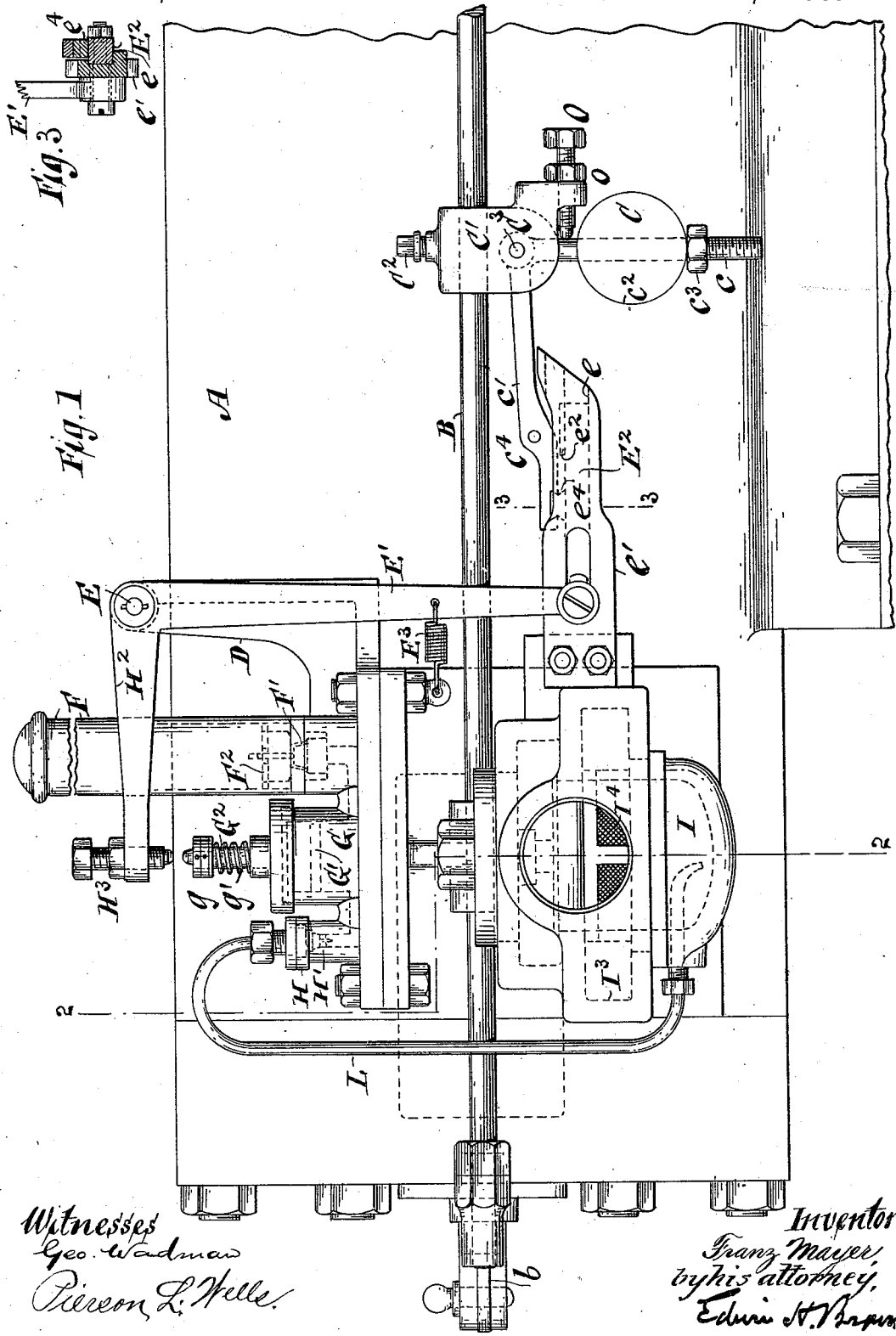
(No Model.)

2 Sheets—Sheet 1.

F. MAYER.
VAPOR ENGINE.

No. 549,677.

Patented Nov. 12, 1895.



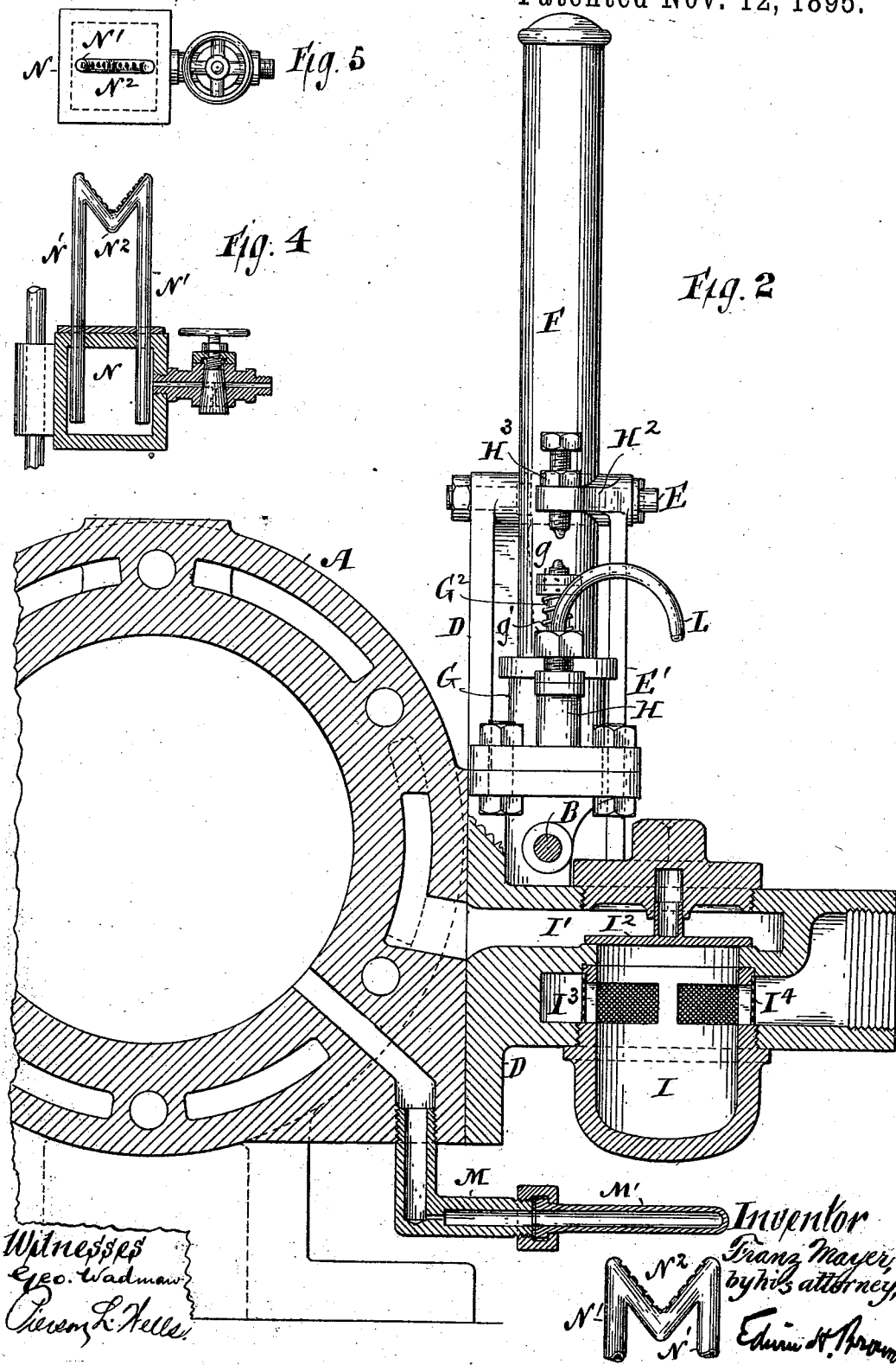
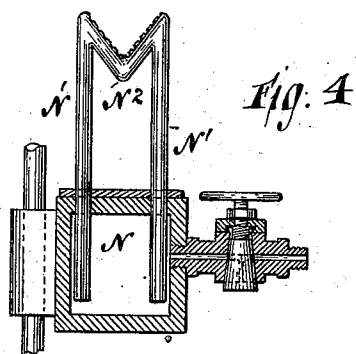
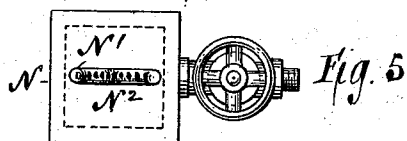
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2 Sheets—Sheet 2.

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VAPOR ENGINE.

No. 549,677.

Patented Nov. 12, 1895.



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UNITED STATES PATENT OFFICE.

FRANZ MAYER, OF NEW YORK, N. Y.

VAPOR-ENGINE.

SPECIFICATION forming part of Letters Patent No. 549,677, dated November 12, 1895.

Application filed March 9, 1895. Serial No. 541,202. (No model.)

To all whom it may concern:

Be it known that I, FRANZ MAYER, of the city, county, and State of New York, have invented a certain new and useful Improvement in Vapor-Engines, of which the following is a specification.

My invention relates to vapor-engines of the kind wherein power is derived from the explosion of a mixture of air and a combustible vapor or gas in a cylinder. I may utilize any vapor or gas, but preferably I employ the vapor of kerosene, benzine, or analogous hydrocarbons.

The present invention especially concerns the construction and operation of mechanism for delivering the liquid hydrocarbon to the vaporizer, the regulation of the quantity of the same so delivered, its vaporization and intermixture with air, and final ignition.

I will describe a vapor-engine embodying my improvement and then point out the novel features in a claim.

In the accompanying drawings, Figure 1 is a side view of an engine embodying my improvement, certain parts, however, being omitted. Fig. 2 is a sectional view on the line 2 2 of Fig. 1. Fig. 3 is a sectional view in the line 3 3 of Fig. 1. Fig. 4 is a longitudinal section of a heater embodied in the improvement. Fig. 5 is a top view of the same.

Similar letters of reference designate corresponding parts in all figures.

A designates the cylinder of an engine. It may or may not be provided with chambered walls to receive circulating cooling-water.

The cylinder may be provided with a piston and piston-rod of the usual type, and a suitable connecting-rod and crank-shaft may be supplied for the purpose of transmitting power, or the piston may be what is ordinarily known as the "trunk-piston." These parts form no part of my invention, and as they may be of any approved type I have not considered it necessary to illustrate the same.

B is a rod extending lengthwise of the engine and deriving a longitudinally-reciprocating motion therefrom. For instance, it may be connected with an eccentric-strap, the latter encircling an eccentric actuated by

the engine in a manner well known, or it may be operated by gears deriving motion from the crank-shaft of the engine. At one end this rod B is connected with a lever *b*, from which a suitable slide-valve is operated to control the exhaust-opening for the cylinder. As these parts may also be of any approved or suitable construction, I have not thought it necessary to illustrate them. The rod B also in the present instance serves to control the operation of a governor C. A block C' is provided with a set-screw C², by which it may be attached at any point of the rod B.

C³ is the fulcrum-point of an elbow-lever comprising a downwardly-projecting arm *c* and a horizontally-projecting arm *c'*. A weight *c*² is carried by the arm *c*. Preferably it will be adjustable along the arm *c*. To this end the weight *c*² may so engage with the arm *c* as to be capable of sliding along the same, and a nut *c*³ may be supplied for adjusting purposes. The free end of the arm *c'* is provided with a catch *c*⁴, whose purpose will appear presently.

D is a bracket attached to the side of cylinder A and provided with a suitable appurtenance carrying the fulcrum-pin E for an elbow-lever whose downwardly-projecting arm E' is pivoted to a slide E², carried in guides *e*, supported by a bracket *e'*. A lug *e*² projects from the upper surface of the slide E² and is adapted to be engaged by the catch *c*⁴ at the end of arm *e'*.

E³ is a spring attached to the arm E' and a stationary piece, by which the arm E' is urged toward the inner end of its movement.

The outer end of the bracket *e'* projects upwardly under the arm *c'* and is adapted to engage with a cross-pin *y*, extending from the arm *c'*, thereby lifting the latter as the slide E² is drawn forward by the catch *c*⁴, thereby releasing the slide from the catch, which thereupon returns to its normal position under the influence of spring E³.

F is a supply-tank for the kerosene, benzine, or other liquid employed. It is provided at its lower portion with an upwardly-closing valve F', supported from a bridge-piece F².

G is a cylinder provided with a piston G'. A piston-rod G² projects upwardly through the cylinder-cover and is provided with a collar g, which may be made adjustable. A spring g' is interposed between the collar g and the cylinder-head to hold the piston in an elevated position.

II is a projection carried by the bracket D, having an interior passage-way controlled by a downwardly-closing valve II'. The chambers and passage-ways of the projection II, the cylinder G, and the reservoir F are in direct communication with each other through suitable passage-ways.

The second arm II² of the elbow-lever, of which arm E' constitutes one member, extends horizontally from the fulcrum-pin E and is provided at its outer end with an adjustable stop II³ for coacting with the piston-rod G² of the piston G'. The stop is here shown to be in the form of a screw, which may be provided with a lock-nut. It is evident that when the piston G' is forced downward valve F' will close, while the passage-way controlled by valve II' will be unobstructed.

I is the vaporizer, here shown to be in the form of a cup provided with screw-threads, by which it may be attached to the bracket D. The interior opening of the vaporizer I is continued upward through the bracket D and is extended through a lateral passage-way I' and a suitable chamber in the cylinder-wall to the cylinder end. The interior opening of the vaporizer I is closed to a movement of the motive fluid from the passage-way I' backward to the vaporizer by suitable valve I².

I³ is an annular chamber surrounding the extension of the opening of the vaporizer I and communicating with the atmosphere. Preferably there will be provided a cylinder I⁴ of gauze or perforated metal, through which the air must pass to reach the interior of the vaporizer I.

L is a conduit or pipe forming a continuation of the passage-way in the projection II and at its lower end projecting into the vaporizer I.

M is a bent tube entering a tapped opening in the cylinder-casting, to the outer extremity of which there is coupled or otherwise attached an ignition-tube M'. The opening in which the tube M is screwed is continued through the cylinder-walls and enters that end of the cylinder to which the mixed vapor and air are admitted.

The ignition-tube may be of any suitable material which may be subjected to a high degree of heat; but preferably I will use porcelain.

N is a burner-body for holding a combustible liquid. It is provided with upwardly-extending tubes N' N', which at their upper extremities are formed or provided with a downwardly-extending loop or bend N², whose

members are provided with perforations on their upper surfaces, through which issues a combustible fluid constituting the heater for the vaporizer I. The ignition-tube M' will also be preferably located immediately below the vaporizer to receive the heat from this heater. This formation of the upwardly-extending tubes N' N' and the downwardly-extending bend N² is especially desirable, as if a liquid is used to supply the heater it will be vaporized by the heat of the flame and issue in the form of gas from the perforations in the bend N². The gas issuing from the perforations may be mixed with air previous to its ignition, if found desirable.

During the operation of the engine the ignition-tube M' is to be kept at a high temperature by the burning gas.

As the governor C is designated to operate the slide E² only on its backward movement, a stop O may be carried by the block C' and project into the path of the arm c to prevent any unnecessary backward movement of the arm. It is here shown to be in the form of a screw provided with a lock-nut o.

The operation of the engine may be described as follows: As the reciprocating rod B moves to the left in Fig. 1, it carries the governor C to a position in which the arm c contacts with the stop O. On the movement of the rod to the right, arm c is swung upon its pivot C³ to the left, the amount of this swinging movement or its angularity with the vertical depending upon the rapidity of movement of the rod B. Consequently if the engine is running at a high speed or above that to which it may be adjusted the arm c' will be elevated so high that the catch e⁴ will not engage with the lug e² and the slide E² will remain undisturbed; but if the movement of the engine is below the normal the arm c will swing but a slight distance to the left, the catch e⁴ will engage with the lug e², and the slide E² will be pulled forward. As a result, piston G' will be depressed and fluid will be injected into the vaporizer to supply the cylinder of the engine.

Mixed vapor and air are drawn into the engine-cylinder by the movement of the piston through the passage-way I', the valve I² being momentarily lifted from its seat. When the piston reverses its movement, valve I² drops upon its seat, the mixed vapor and air are compressed and forced into the ignition-tube M', explosion takes place, and the piston is forced in the reverse direction. The exhaust-valve is now opened by the movement of the rod B and the products of combustion exhausted from the cylinder.

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

1. In a vapor engine, the combination of a vaporizer, a passage way for the inflow of air communicating with the interior of the vapor-

izer, a perforated piece I⁴, and a valve for preventing the flow of vapor backward into the vaporizer, substantially as specified.

5 2. In a vapor engine, the combination of the reservoir F, the valve F', the cylinder G, the elbow lever E, the piston G', the tubular projection H and the valve H', substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of 10 two subscribing witnesses.

FRANZ MAYER.

Witnesses:

L. G. KURTZ,
EDWARD SCHORN.