No. 801,539. PATENTED OCT. 10, 1905.

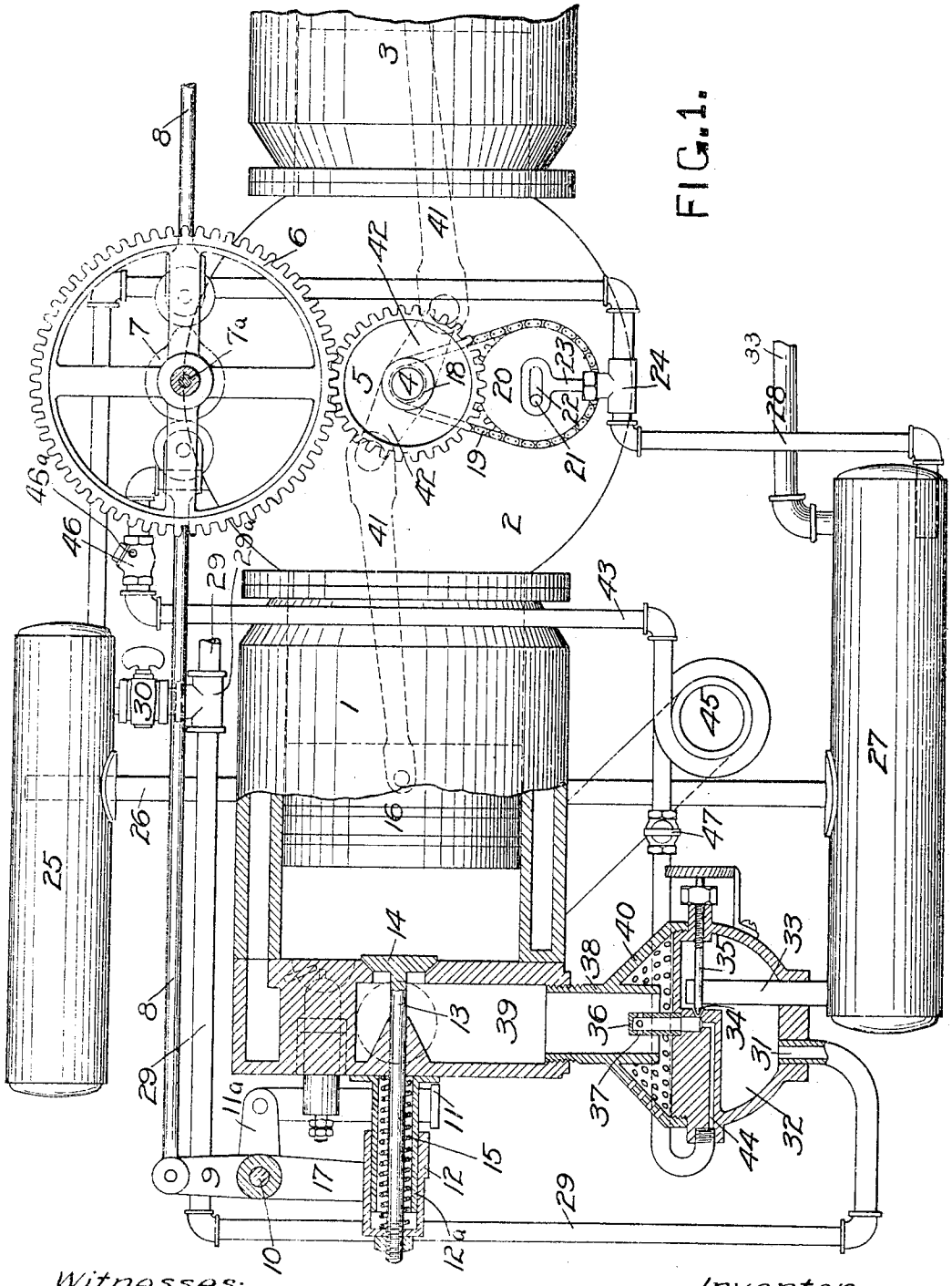
J. S. MORELAND.

CARBURETING APPARATUS AND FEED THEREFOR FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 21, 1904.

2 SHEETS—SHEET 1.

FIG. 1.



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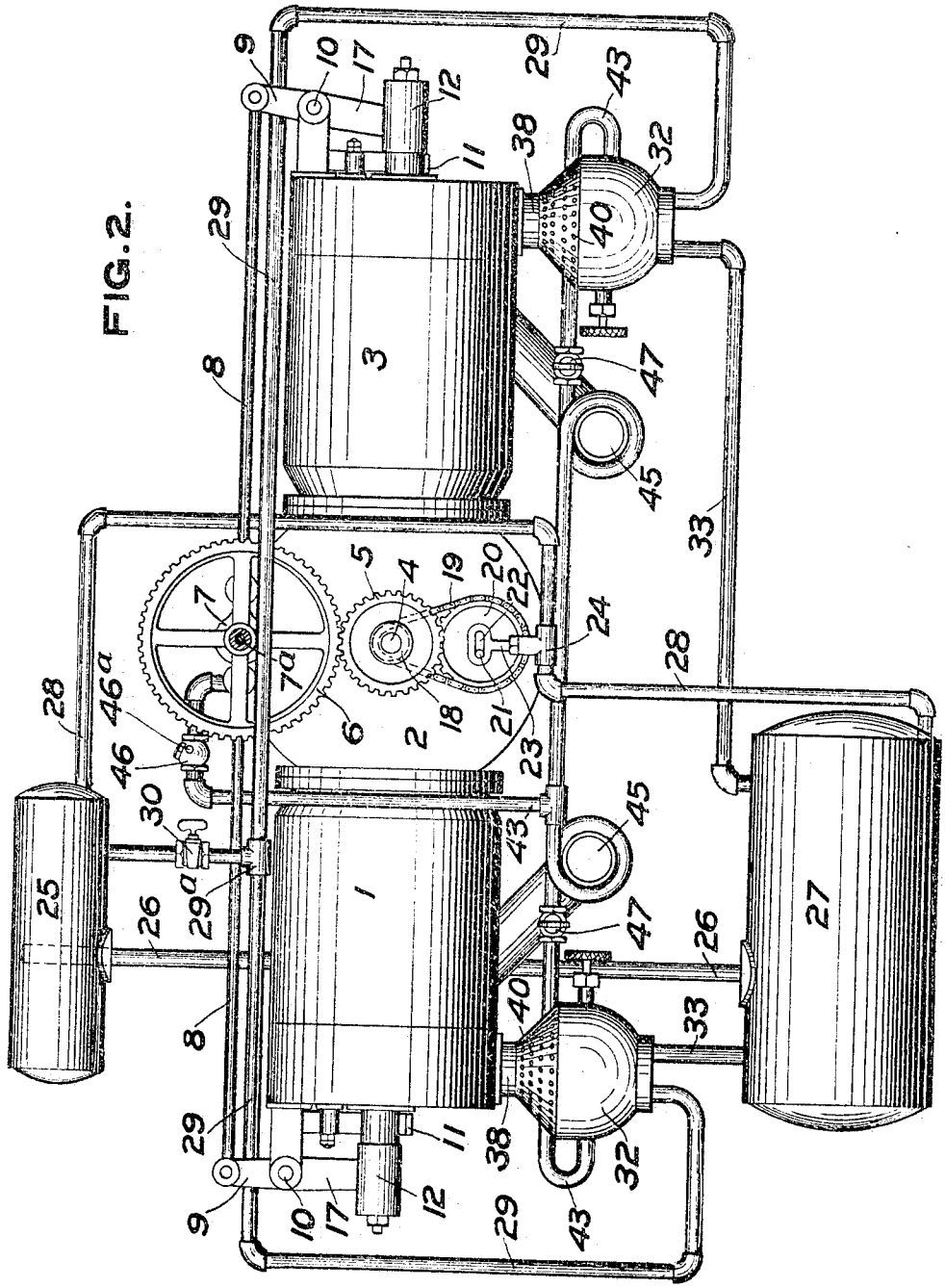
2 SHEETS—SHEET 2.

FIG. 2.



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UNITED STATES PATENT OFFICE.

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CARBURETING APPARATUS AND FEED THEREFOR FOR INTERNAL-COMBUSTION ENGINES.

No. 801,539. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed April 21, 1904. Serial No. 204,222.

To all whom it may concern:

Be it known that I, JOSEPH S. MORELAND, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Carbureting Apparatus and Feed Therefor for Internal-Combustion Engines, of which the following is a specification.

My invention relates to explosive-engines; and it consists in the parts, combinations, and arrangements herein described and claimed.

An object of my invention is to provide a simple and compact form of carbureter adapted to supply a combustible fluid to the mixing-chamber either by a positive spraying or atomizing action or by the suction action of air drawn into said mixing-chamber.

A further object of my invention is to provide a carbureter capable of using the heavier hydrocarbon oils and adapted to vaporize that grade of oils efficiently at the low piston speeds existing during the starting of the engine.

A further object of my invention is to provide means for maintaining a uniform head of combustible fluid in the several carbureters of a multiple-cylinder engine.

In the drawings, Figure 1 is an elevation of a two-cylinder engine embodying this invention. Parts of the device are shown in vertical section in this figure. Fig. 2 is an elevation of a complete two-cylinder engine embodying the same invention.

Referring to the drawings forming a part of this application, 1 and 3 indicate two opposed cylinders of an explosive-engine provided with trunk-pistons 16, which are shown connected by connecting-rods 41 to diametrically-opposed cranks 42 on an engine-shaft 4, suitably journaled in a closed crank-casing 2, arranged in open communication with the inner or idle ends of the engine-cylinders. The shaft 4 may be provided with the usual fly-wheel and is connected by suitable gearing 5 and 6 with a counter-shaft 7^a. A cam 7 is secured to the counter-shaft in position to engage the inner ends of rods 8 8 for operating the valve mechanism.

At the rear of each engine-cylinder is journaled a shaft 10, provided with a crank 9, which is pivotally connected to the corresponding operating-rod 8. Each shaft 10 carries an arm 17 in position to engage operatively the stem of any usual type of spring-closed exhaust-valve. The exhaust-valve spring is preferably constructed of sufficient strength normally to maintain the rod 8 in its inward position, although additional means could be employed for this purpose, if desired. A crank 11^a, secured to each shaft 10, carries a link 11, constructed to engage and lock a head 12 on the stem 13 of an inlet-valve 14. The head 12 is slidably mounted on a hollow guide 12^a, containing a spring 15 for normally maintaining the inlet-valve closed.

In the operation of the above-described valve mechanism each rod 8 is thrown to its outward position by the cam 7 during the exhaust-stroke of the corresponding engine-piston, thereby rocking the shaft 10 to force the exhaust-valve open against the tension of its spring and to lock the inlet-valve positively in its closed position. Upon completion of the exhaust the rod 8 is released from the cam 7 and shifted by the action of the exhaust-valve spring into its inward position, thus leaving the exhaust-valve closed and the inlet-valve unlocked in condition to be opened freely by the suction of the engine during the charging stroke of the engine-piston.

Each engine-cylinder is provided with a mixing-chamber comprising a compartment 39 and a cylindrical section 38, arranged in communication with its inlet-port and with a carbureter. The carbureter is shown comprising a reservoir 32, provided with an inlet-pipe 31 and an overflow-pipe 33, said pipes being suitably proportioned and arranged.

An aperture 34, controlled by a needle-valve 35, is shown for feeding hydrocarbon from the reservoir 32 to a supply-pipe 36. Said supply-pipe preferably extends axially within the cylindrical section 38 and is provided with a closed end and with a peripheral series of perforations 37. A screen 40, carried by the section 38, is detachably secured to the carbureter, as by screw-threads, in position to admit air to the mixing-chamber around the supply-pipe 36.

The inlet-pipe 31 of each carbureter is fed by a pipe 29, connected to a T-coupling 29^a, which latter communicates, through a valved connection 30, with a hydrocarbon-supply tank 25. The overflow-pipe 33 of each carbureter is shown leading to a hydrocarbon-storage tank 27 of suitable size, which receives an overflow-pipe 26 from the supply-tank 25.

During the operation of the engine the hydrocarbon is delivered from the storage-tank to the supply-tank through a pipe 28 and pump 24. The pump 24 is operated by the engine in any suitable manner, as by a slotted pump-plunger 23 engaging a crank-pin 21 on a sprocket-disk 20, said sprocket-disk being driven, through a chain 19, by a sprocket-wheel 18 on the engine-shaft 4.

One or both carbureters may be provided with means for starting the engine comprising a passage 44, communicating with the lower portion of the supply-tube 36 and connected by a pipe 43 with the closed crank-casing 2. Such pipe carries a cut-off cock 47 and is provided with a check-valve 46 and an air-inlet valve 46^a on the crank-casing side of said check-valve. As shown in the drawings, the pipe 43 may be coiled about the exhaust-conduit 45 for heating the air forced through said pipe.

In the operation of my invention the needle-valve 35 is adjusted to provide the desired feed of hydrocarbon to the supply-tube 36 and the cock 47 is opened. The engine is then started in any usual manner. Upon the inward stroke of the engine-pistons the air in the crank-casing will be compressed and forced through the pipe 43 into the lower portion of the charged supply-tube 36, thereby forcibly blowing the air and oil in the form of fine spray through the perforations 37. This spraying action is sufficient to produce an efficient vaporization of heavy fuel-oils and acts to force the oil positively in an atomized condition into the mixing-chamber, from which it will be freely drawn into the engine-cylinder upon the suction-stroke of the piston. After the speed of the engine has been sufficiently increased to produce satisfactory operation of the carbureter by the suction of the air around the hydrocarbon-supply tube 36 the cock 47 may be closed and the hydrocarbon supplied to the mixing-chamber by the suction of the air drawn therein about said supply-tube.

It will thus be seen that my invention provides a construction capable of advantageously using the cheaper and inferior grades of fuel-oils and in which such oils can be either forcibly sprayed or drawn by suction into the mixing-chamber from a single supply-tube.

What I claim is—

1. In an explosive-engine, a carbureter comprising a supply-tube for supplying combustible fluid under suction, and controllable means for admitting air under pressure to said supply-tube for forcibly spraying combustible fluid therefrom, substantially as described.

2. In an explosive-engine having a mixing-chamber provided with an air-inlet, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction of air drawn into said chamber, and automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from said supply-tube into the mixing-chamber, substantially as described.

3. In an explosive-engine having a mixing-chamber, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber, automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from said supply-tube into the mixing-chamber, and means for controlling said automatically-operated means, substantially as described.

4. In an explosive-engine having a mixing-chamber, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction of air drawn into said chamber, pneumatic means constructed to spray combustible fluid forcibly from said supply-tube into the mixing-chamber, and means for controlling said pneumatic means, substantially as described.

5. In an explosive-engine having a mixing-chamber, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, and means constructed to admit air under pressure to said supply-tube for forcibly spraying combustible fluid therefrom into the mixing-chamber, substantially as described.

6. In an explosive-engine having a mixing-chamber, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, a reservoir communicating with said supply-tube, means for regulating such communication, and automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from said supply-tube into the mixing-chamber, substantially as described.

7. In an explosive-engine having a mixing-chamber provided with an air-inlet, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, and controllable means constructed to admit air under pressure to said supply-tube for forcibly spraying combustible fluid therefrom into the mixing-chamber, substantially as described.

8. In an explosive-engine having a mixing-chamber provided with an air-inlet, a carbureter, a supply-tube therefor constructed and situated to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, a reservoir communicating with said supply-tube, adjustable means for regulating such communication, and automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from said sup-

ply-tube into the mixing-chamber, substantially as described.

9. In an explosive-engine having a mixing-chamber provided with an air-inlet, a carbureter, an upright supply-tube therefor constructed to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, a reservoir for combustible fluid communicating with said supply-tube, adjustable means for regulating such communication to maintain a desired level of combustible fluid in said supply-tube, and controllable means constructed to admit air under pressure to said supply-tube below the level of the combustible fluid therein, substantially as described.

10. In an explosive-engine having a mixing-chamber provided with an air-inlet, a screen carried by such mixing-chamber, a carbureter detachably secured to said screen and comprising a supply-tube situated to supply combustible fluid to the mixing-chamber by the suction action of air drawn into said chamber, said supply-tube constructed with a closed upper end and a peripheral series of perforations, means constructed to maintain a desired level of combustible fluid in said supply-tube, and controllable means constructed to admit air under pressure to the lower portion of said supply-tube, substantially as described.

11. In an explosive-engine provided with the usual single-acting cylinder, the combination of a closed casing inclosing the engine-crank and communicating with the idle end of the single-acting cylinder, whereby air will be compressed in said crank-casing upon the inward stroke of the engine-piston, a mixing-chamber for the engine-cylinder provided with an air-inlet, a carbureter comprising a supply-tube constructed and situated to supply combustible fluid to said mixing-chamber by the suction action of air drawn into said chamber, and a controllable connection between said closed crank-casing and the lower portion of said supply-tube, substantially as described.

12. In a multiple-cylinder explosive-engine, a mixing-chamber for each of the engine-cylinders provided with an air-inlet, a carbureter for each of said mixing-chambers constructed and situated to supply combustible fluid to said chamber by the suction action of air drawn thereinto, automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from a desired number of said supply-tubes into the corresponding mixing-chambers, and means for controlling said automatically-operated means substantially as described.

13. In a multiple-cylinder explosive-engine, a mixing-chamber for each of the engine-cylinders provided with an air-inlet, a carbureter for each of said mixing-chambers constructed and situated to supply combustible fluid to said chamber by the suction action of air drawn thereinto, a common means constructed to maintain a uniform level of combustible fluid in said several supply-tubes, automatically-operated means, independent of the suction in said mixing-chamber, constructed to spray combustible fluid forcibly from a desired number of said supply-tubes into the corresponding mixing-chambers, and means for controlling said automatically-operated means substantially as described.

14. In a multiple-cylinder explosive-engine, a mixing-chamber for each of the engine-cylinders provided with an air-inlet, a carbureter for each of said mixing-chambers, a supply-tube for each carbureter an inlet-pipe for each of said supply-tubes, a common supply-tank connected to said several inlet-pipes, means constructed to admit air under pressure to said several supply-tubes for forcibly spraying combustible fluid therefrom an overflow-pipe for each of said carbureters, a common storage-tank connected to said several overflow-pipes, an overflow-pipe leading from said supply-tank to said storage-tank, a pump, a feed-pipe leading from said pump to the storage-tank, and a delivery-pipe leading from said pump to the supply-tank, substantially as described.

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