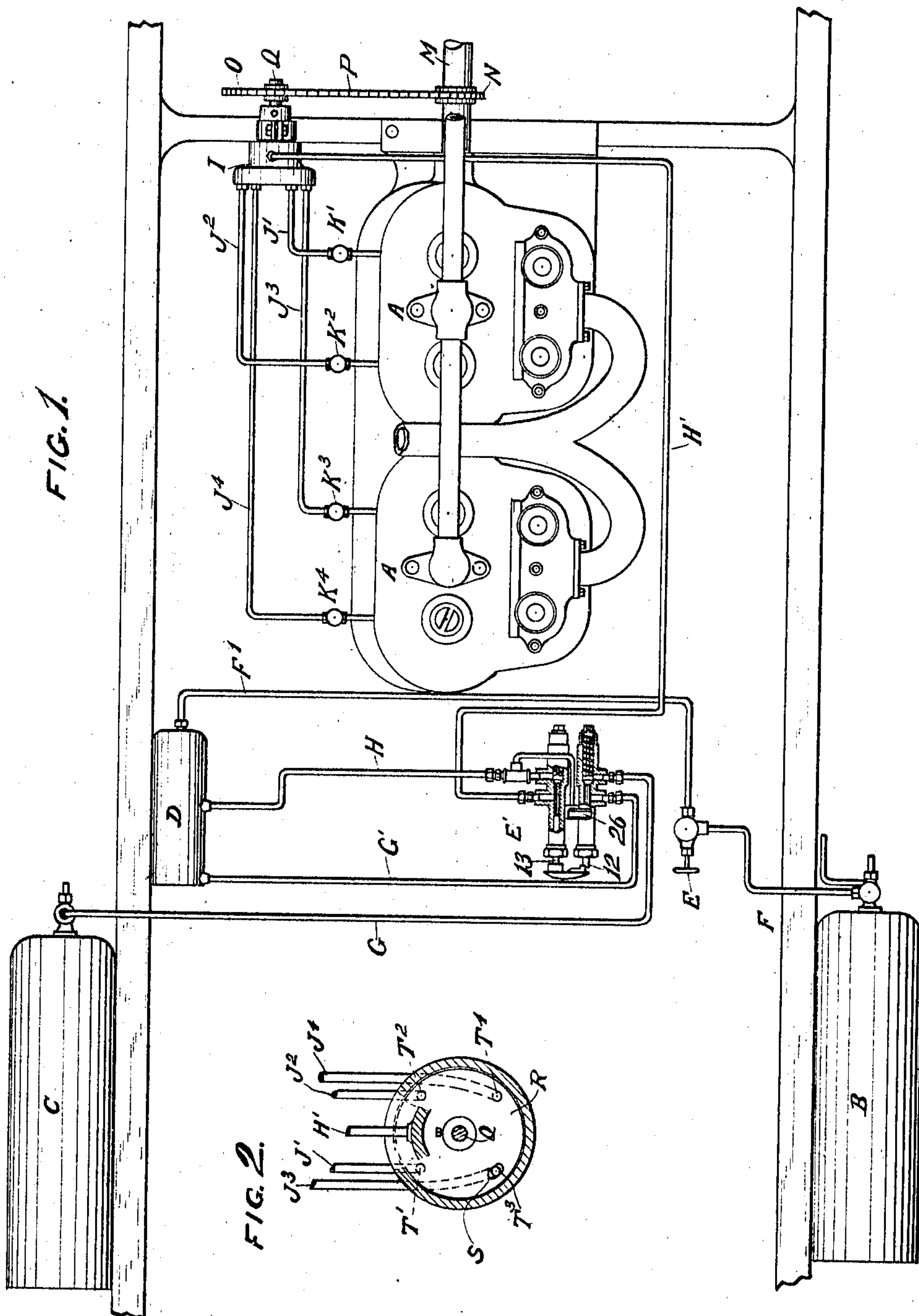


G. L. ODENBRETT.
GAS ENGINE STARTER.
APPLICATION FILED MAR. 25, 1909.

945,245.

Patented Jan. 4, 1910.
2 SHEETS—SHEET 1.



WITNESSES.

L. J. Thuermer

Anna F. Schmidtbauer

INVENTOR.

George L. Odenbrett,

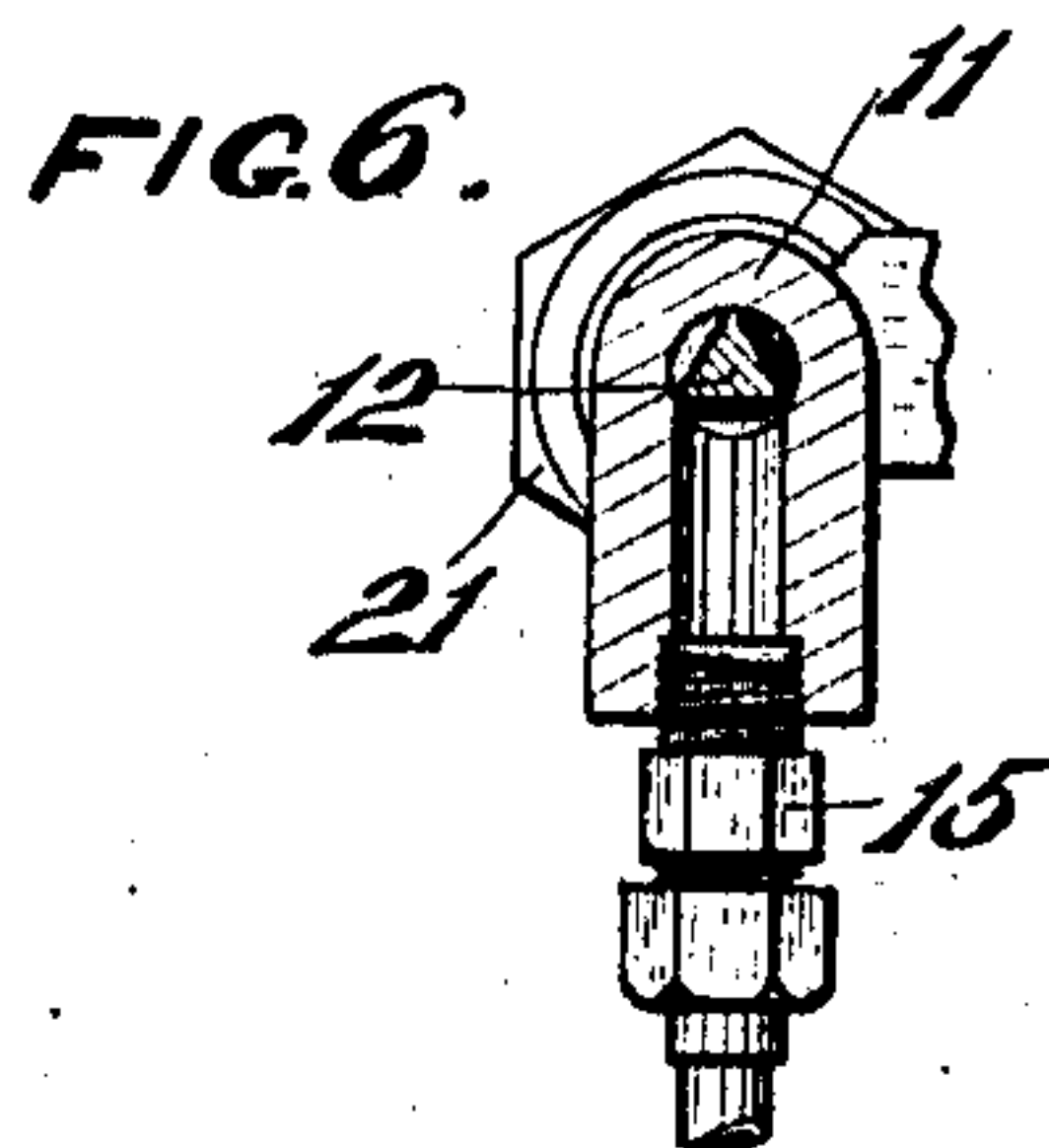
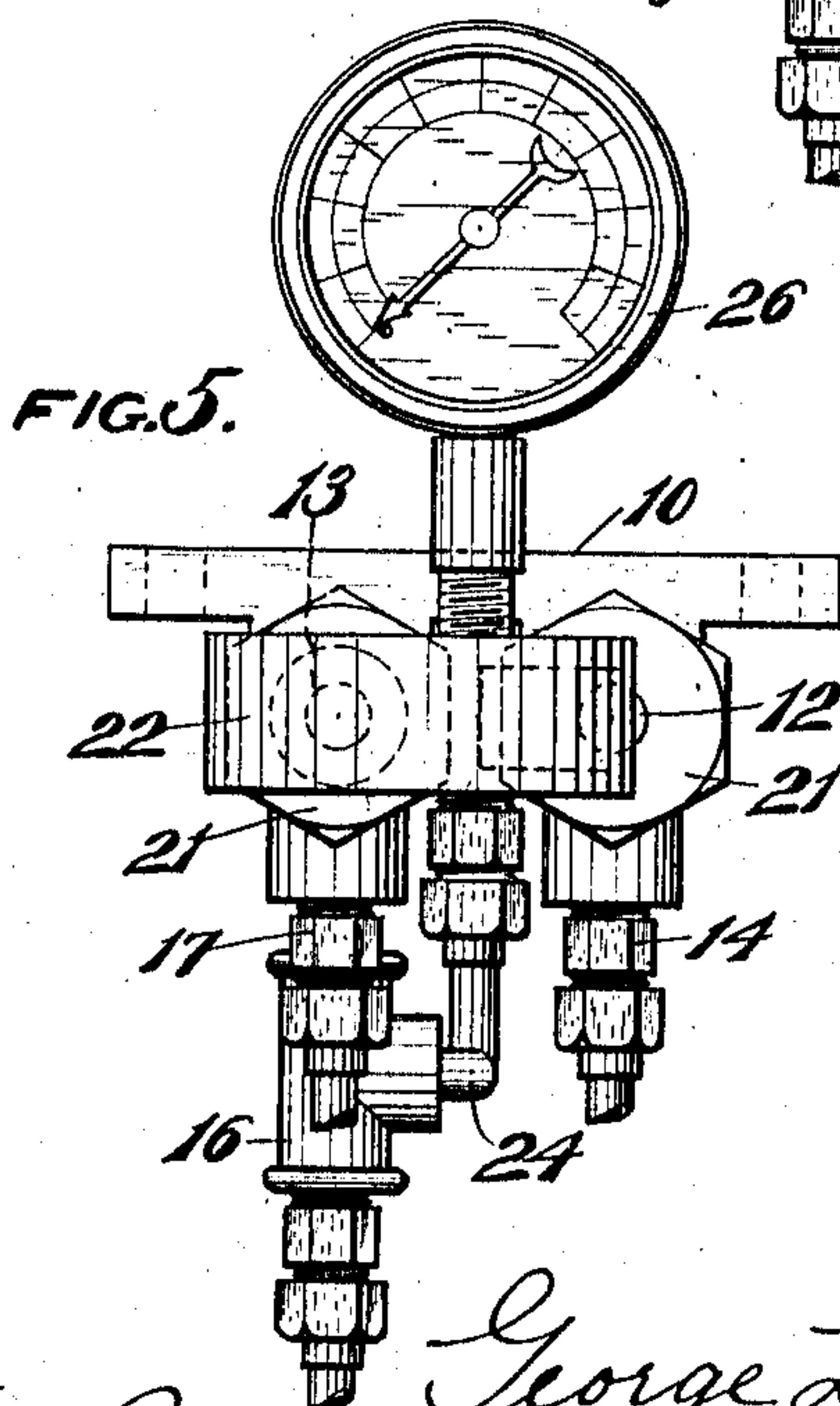
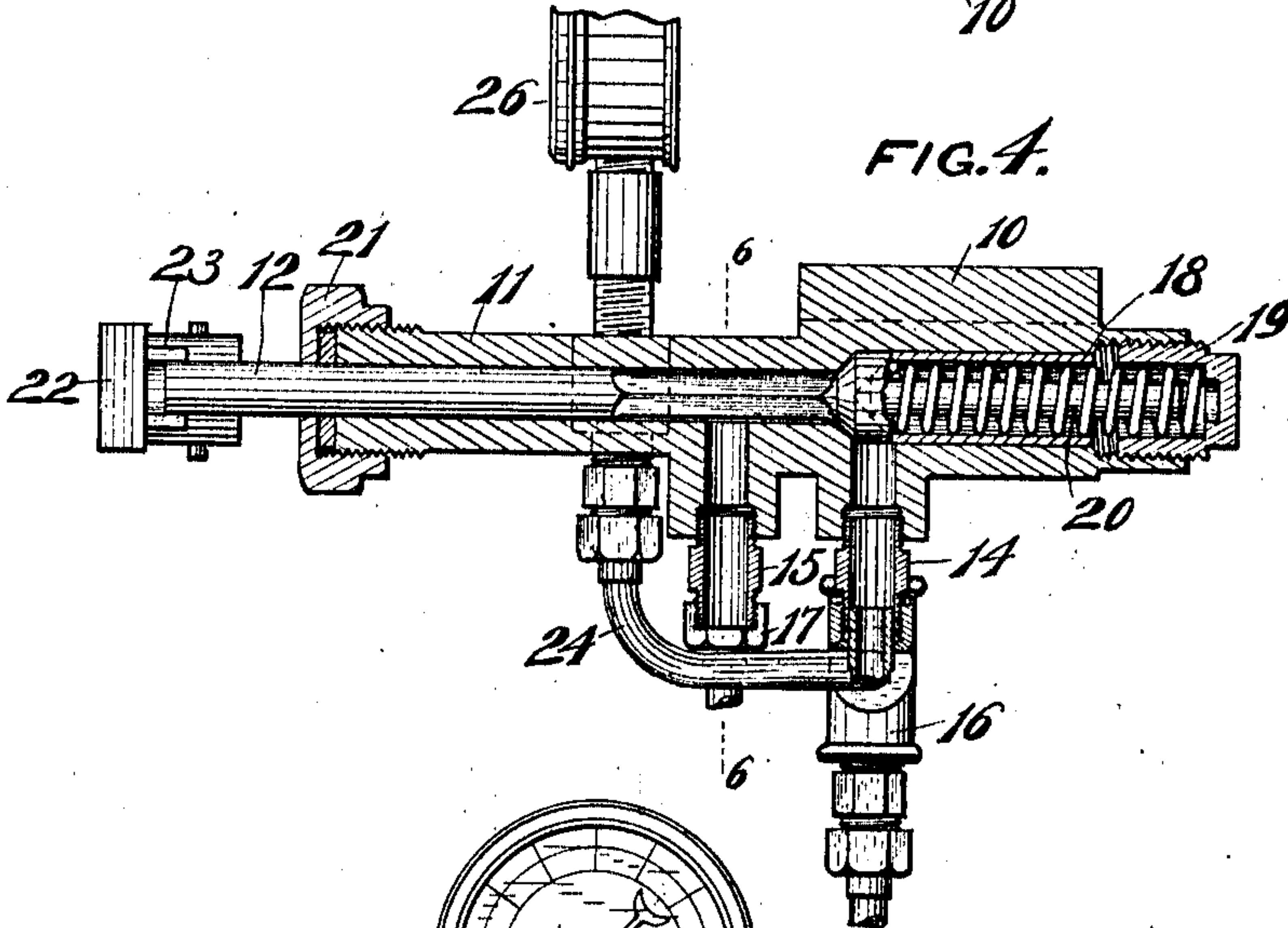
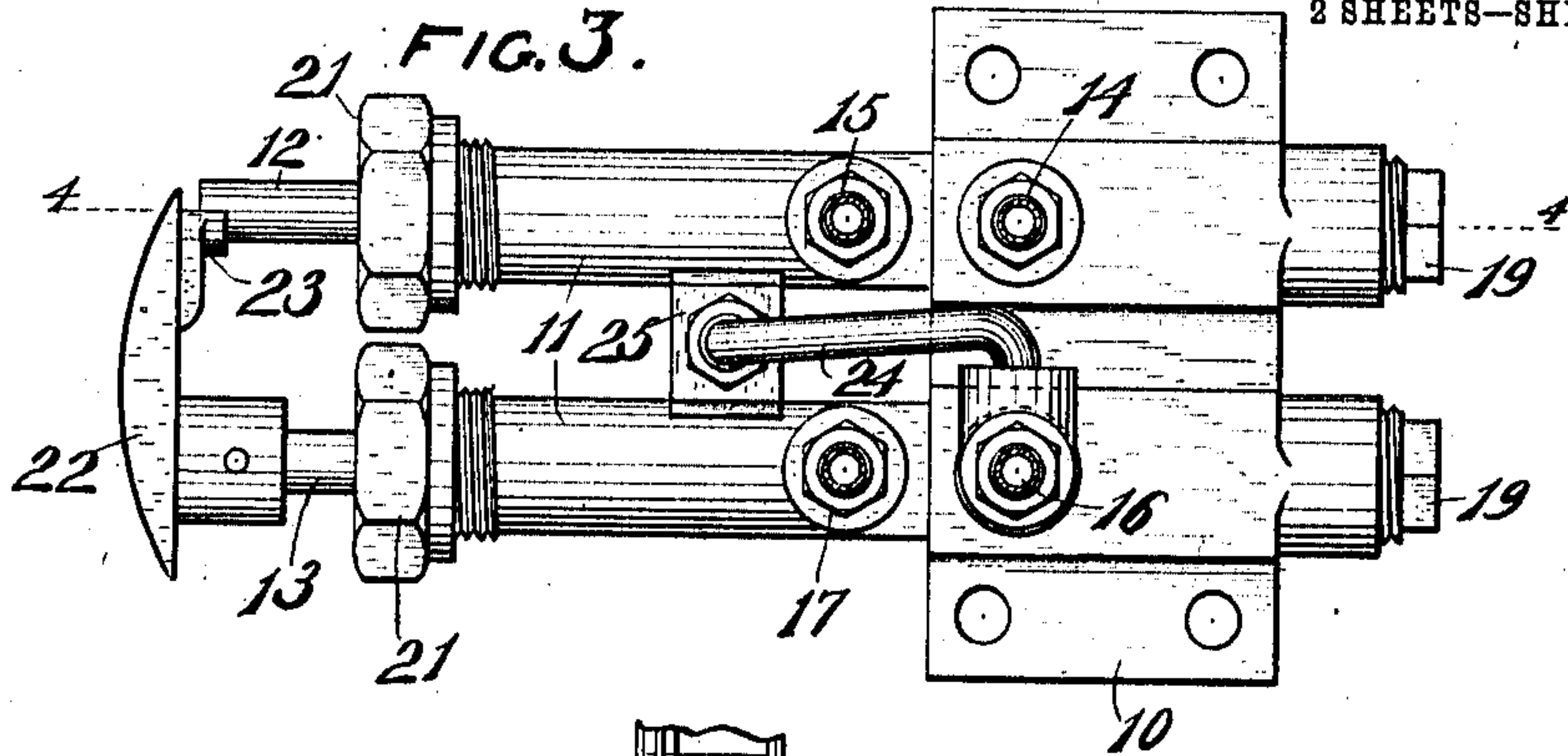
By *Benedict, Morsell & Caldwell*
ATTORNEYS.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GEORGE L. ODENBRETT, OF MILWAUKEE, WISCONSIN.

GAS-ENGINE STARTER.

945,245.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed March 25, 1909. Serial No. 485,636.

To all whom it may concern:

Be it known that I, GEORGE L. ODENBRETT, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Gas-Engine Starters, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide an improved valve mechanism for use with gas engine starters such as covered by Letters Patent issued to me on October 13, 1908, No. 892,544, such valve mechanism being designed to accomplish the successive steps in the operation of the engine starter by the application of pressure to a plunger by means of the foot or otherwise so as to quickly accomplish the starting operation without requiring the driver to manipulate a series of hand valves.

The improvements covered by this invention consist of a valve construction to be operated by the pressure of the foot on a plunger to first open a charging tank containing gas under pressure to the proper cylinder of the engine through a selecting valve and then by further pressure to open a connection from a compressed air reservoir to said charging tank, so that the air under pressure will drive the gas before it into the proper cylinder of the engine and there become mixed with it to explode when the proper admixture is formed and start the engine in operation.

With the above and other objects in view the invention consists in the gas engine starter herein claimed, its parts and combinations of parts and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the different views; Figure 1 is a plan view of a gas-engine starter constructed in accordance with this invention and mounted on an automobile frame, with the valve construction partly in section and laid out in diagram to more clearly show the air and gas passages; Fig. 2 is a detail sectional view of the selecting valve thereof, the pipe connections having a somewhat different arrangement than as shown in Fig. 1, for clearness of illustration; Fig. 3 is a bottom view of the valve construction; Fig. 4 is a sectional view thereof on the plane of line 4-4 of Fig. 3; Fig. 5 is a front elevation thereof; and, Fig. 6 is a transverse sectional

view through one barrel thereof on the plane of line 6-6 of Fig. 4.

In these drawings, A, A represent a multiple cylinder engine, as here shown there being four cylinders in all, arranged vertically at the front or boot of the automobile frame as usual, and B is an acetylene or other gas reservoir and C a compressed air reservoir secured to the sides of the automobile frame, D being a charging tank in any desirable location and likewise secured to the frame. A hand valve E is provided within convenient reach of the driver, preferably on the dash board and controls communication between a pipe F leading from the gas tank B and a pipe F' leading to the charging tank B. A valve construction E' controls communication between a pipe G leading from the air reservoir C and a pipe G' leading to the charging tank B and also between a pipe H leading from the charging tank D and a pipe H' leading to a selecting valve I, which is desirably secured at the front part of the automobile frame as shown. The selecting valve I has pipes J¹, J², J³ and J⁴ leading therefrom at different positions on its disk-shaped head to the explosion chambers of the respective cylinders of the engine, these pipes being provided with check valves K¹, K², K³ and K⁴ arranged to prevent a flow therethrough from the cylinder toward the selecting valve.

The crank shaft M of the engine has a pinion N thereon which is geared to a sprocket wheel O by means of a chain P, said sprocket wheel O being mounted on a shaft Q which is journaled in the casing of the selecting valve I with a disk-shaped valve member R rigidly but adjustably secured thereon. The disk valve R is thus rotated by the engine at a speed which will cause it to make one revolution with each two revolutions of the crank shaft, the pinion N and the sprocket wheel O being so proportioned, and serves to control communication between the pipe H' which connects with the space on one side thereof, and the pipes J¹, J², J³ and J⁴ which connect with the casing on the other side thereof, by means of an elongated opening S therein being brought into register with the mouths of these pipes in succession. The disk valve R is so positioned on the shaft Q that the opening S will always register with that pipe which leads to the engine cylinder in which the piston is in position to receive an explo-

sion and the fit of the disk valve within the casing is sufficiently close to prevent communication between the pipe H' and any of the pipes with which the opening S is not in register.

The valve construction E' constituting the improvement of the present invention over the hand valves of the former device comprises a valve casing 10 adapted for attachment to the frame of the vehicle at any convenient place, preferably at the dash board, and is provided with a pair of parallel tubes or barrels 11 which project forwardly to form guides for a pair of spring pressed plunger valves. The bore through the barrels 11 and the casing changes in diameter to form valve seats upon which the conical shoulders of the enlarged rear ends of valve stems 12 and 13 fit to normally close communication between pipe connections 14 and 15 on one side of the device and pipe connections 16 and 17 on the other side of the device, each pair of pipe connections being disposed on opposite sides of the valve seats so that when the valves are closed there is no communication between them.

The valve stems are reduced in size ahead of the valve portions to permit of free communication between the respective pipe connections when the valves are unseated. The valve stems are normally held closed by means of coil springs 18 contained within their rear ends which are made tubular for this purpose, said springs bearing against hollow plugs 19 which are threaded in the rear of the casing, there being a short rod 20 within each spring to limit the inward movement of the valve rod. At the front ends of the barrels 11 they are provided with bushing caps 21 to prevent the leakage of compressed air or gas around the valve stems and the front end of the valve stem 13 has mounted on it a plunger head 22 by means of which it may be forced against the pressure of its spring to open its valve upon the first portion of the movement, said plunger head extending into the line of the valve stem 12 with a guide 23 thereon fitting around the valve stem 12 and adapted to engage said valve stem 12 and force it to move to open its valve against the pressure of its spring upon a further movement of the plunger head. From the pipe connection 16 a pipe 24 extends forwardly and up through a cross piece 25 between the barrels 11 where it has an upstanding pressure gage 26 mounted on its end within plain sight of the driver. The pipe H from the charging tank D also connects with the pipe connection 16 containing the gage connection while the pipe H' connects with the pipe connection 17 and the pipe G from the air reservoir connects with the pipe connection 14 while the pipe G' leading to the charging tank D connects with the pipe connection 15.

In starting the engine the driver first opens the gas valve E admitting a predetermined quantity of gas to the charging tank D, as will be indicated by the pressure indicator 26, then the gas valve is closed and the driver presses upon the plunger head 22 with his foot sufficient to overcome the first spring resistance and thereby opens the valve 13 so as to allow the gas in the charging reservoir to pass through said valve 13 and the pipe H to the proper cylinder of the engine, as determined by the position of the selecting valve I, and when the pressure gage indicates that this has been accomplished he presses with greater force on the plunger head 22 to cause the other valve 12 to open and thereby open the connection from the compressed air reservoir C through pipes G and G' to the charging tank D from which the air passes through pipe H and the open valve 13 and the pipe H' into said cylinder where it mixes with the gas forced before it and, as the ignition device is being kept in operation, as soon as the proper mixture of air and gas is attained it explodes and starts the engine in operation. The removal of the foot from the plunger head restores the valve parts to their normal closed positions ready for the next starting operation.

What I claim as my invention is:

1. A starter for multiple cylinder gas engines, comprising a selecting valve driven by the engine and adapted to establish communication with the respective cylinders of the engine when their pistons are in position to receive an explosion, a charging chamber communicating with the selecting valve, an air reservoir and a gas reservoir communicating with the charging chamber, a controlling valve in the connection between the gas reservoir and the charging chamber, and a double valve having an operating member which when partially operated serves to open one valve member to open the communication between the charging chamber and the selecting valve and which operating member when further operated serves to open another valve member to open the communication between the air reservoir and the charging chamber.
2. A starter for multiple cylinder gas engines, comprising a selecting valve driven by the engine and adapted to establish communication with the respective cylinders of the engine when their pistons are in position to receive an explosion, a charging chamber communicating with the selecting valve, an air reservoir and a gas reservoir communicating with the charging chamber, a controlling valve in the connection between the gas reservoir and the charging chamber, a gage connected with the charging chamber to indicate the pressure therein, and a double valve having a plunger which when partially operated serves to open one valve member

to open the communication between the charging chamber and the selecting valve and which plunger when further operated serves to open another valve member to
 5 open the communication between the air reservoir and the charging chamber without closing the first mentioned valve member.

3. A starter for multiple cylinder gas engines, comprising a selecting valve driven
 10 by the engine and adapted to establish communication with the respective cylinders of the engine when their pistons are in position to receive an explosion, a charging chamber communicating with the selecting valve, an
 15 air reservoir and a gas reservoir communicating with the charging chamber, a controlling valve in the connection between the gas reservoir and the charging chamber, a gage connected with the charging chamber to indicate the pressure therein, and a double
 20 valve, comprising a casing having a pair of parallel barrels with bores of different diameters to form valve seats therein, valve stems slidably mounted in the bores of the
 25 barrels and having shoulders forming valves to fit on the valve seats, pipe connections for each barrel on opposite sides of the valve seat, the pipe connections for one valve being connected to the terminals of the communication between the charging chamber
 30 and the selecting valve and the pipe connections of the other valve being connected with the terminals of the communication between the air reservoir and the charging chamber, springs for holding the valves normally
 35 closed, and a plunger head on the stem of the valve in the communication between the charging chamber and the selecting valve for opening the valve of said communication by a partial movement thereof and adapted
 40 to engage the other valve stem to open the valve in the communication between the air reservoir and the charging chamber with a further movement thereof.

45 4. A starter for multiple cylinder gas engines, comprising a selecting valve driven by the engine and adapted to establish communication with the respective cylinders of

the engine when their pistons are in position
 to receive an explosion, a charging chamber 50
 communicating with the selecting valve, an air reservoir and a gas reservoir communicating with the charging chamber, a controlling valve in the connection between the gas reservoir and the charging chamber, a gage 55
 connected with the charging chamber to indicate the pressure therein, and a double valve, comprising a casing having a pair of parallel barrels with bores of different diameters to form valve seats therein, valve stems 60
 slidably mounted in the bores of the barrels and having shoulders forming valves to fit on the valve seats and being tubular at their enlarged rear ends, coil springs seated in the tubular ends of the valve stems, screw plugs 65
 threaded in the ends of the barrels and forming bearings for the spring, rods contained in the springs to limit the movements of the valve stems, pipe connections for each barrel on opposite sides of the valve seat, the 70
 pipe connections for one valve being connected to the terminals of the communication between the charging chamber and the selecting valve and the pipe connections of the other valve being connected with the 75
 terminals of the communication between the air reservoir and the charging chamber, packing glands between the ends of the barrels and the valve stems, a plunger head on the stem of the valve in the communication 80
 between the charging chamber and the selecting valve for opening the valve of said communication by a partial movement thereof, and a guide on the plunger head for the other valve stem, said plunger head being 85
 adapted to engage said other valve stem to open the valve in the communication between the air reservoir and the charging chamber with a further movement of the plunger head. 90

In testimony whereof, I affix my signature, in presence of two witnesses.

GEORGE L. ODENBRETT.

Witnesses:

R. S. C. CALDWELL,

ANNA F. SCHMIDTBAUER.