

C. H. OSLUND.
 APPARATUS FOR STARTING GAS ENGINES.
 APPLICATION FILED MAR. 16, 1909.

975,567.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 1.

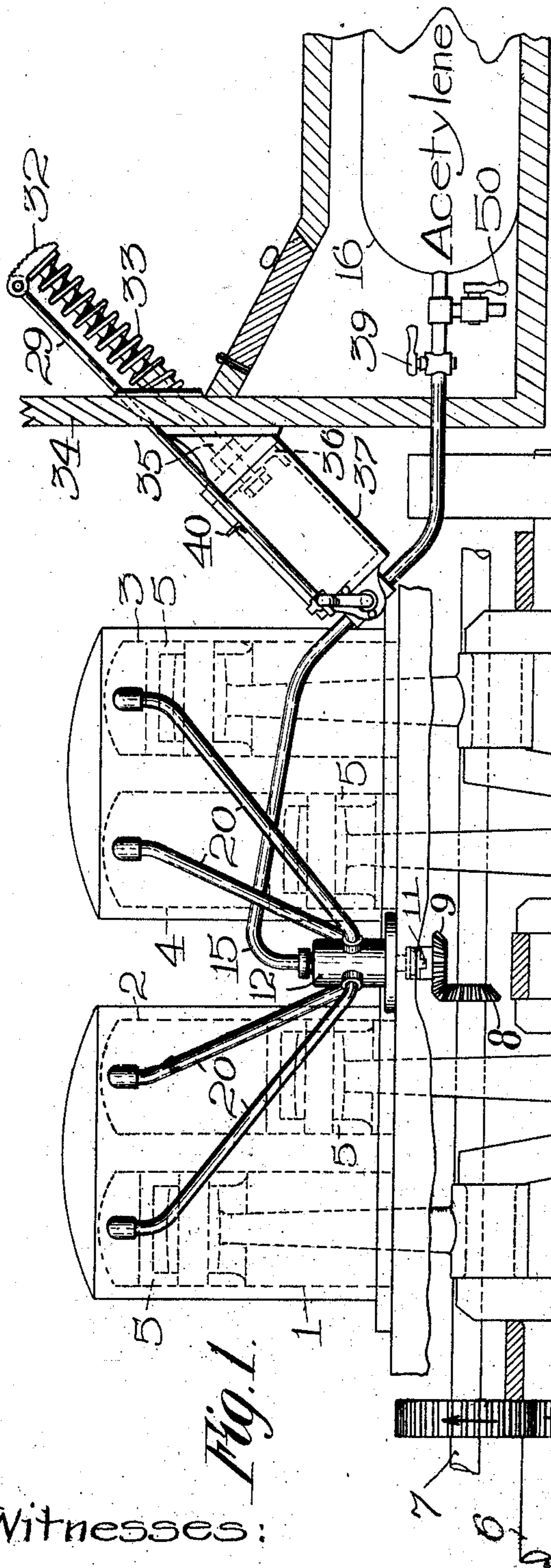


Fig. 1.

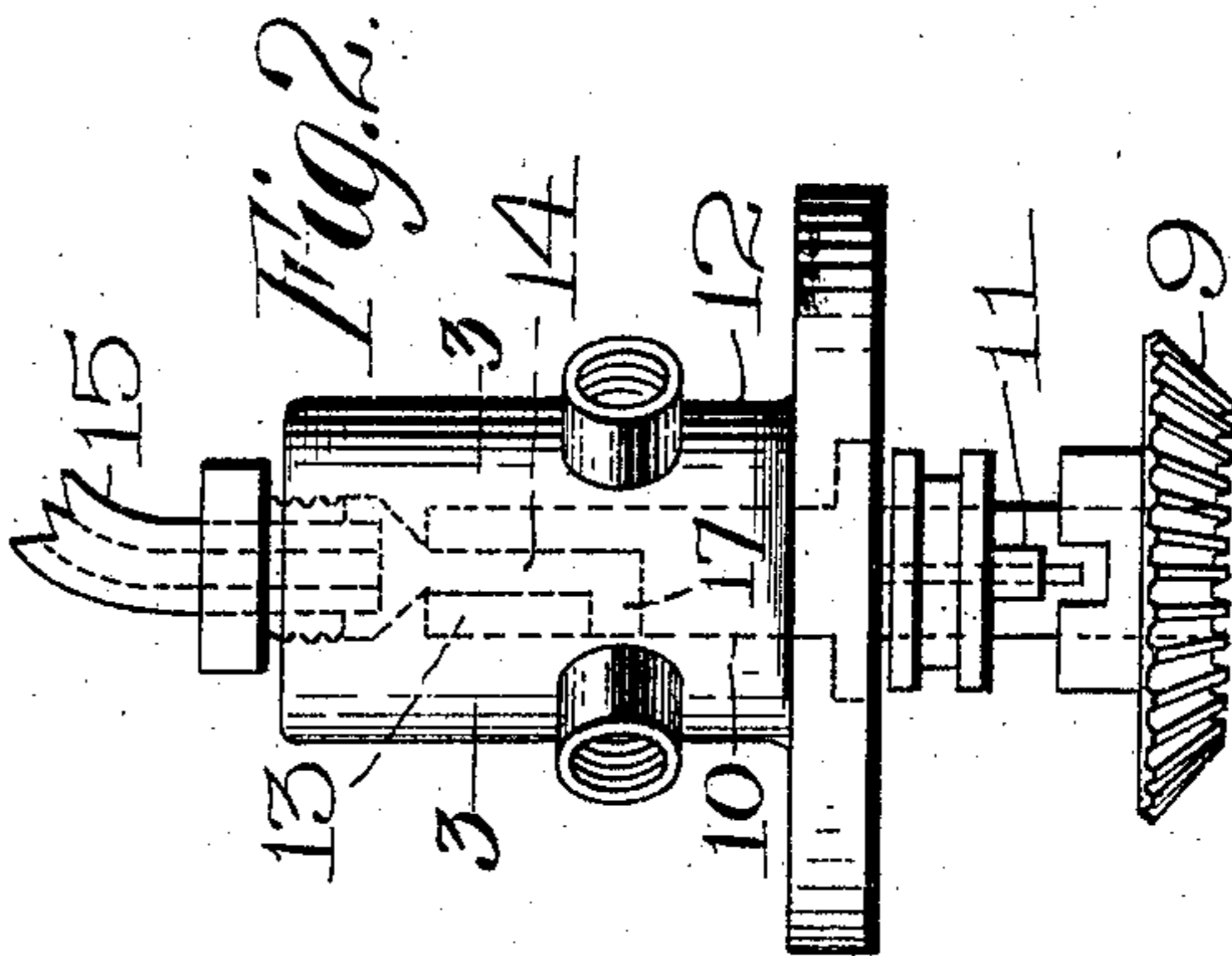


Fig. 2.

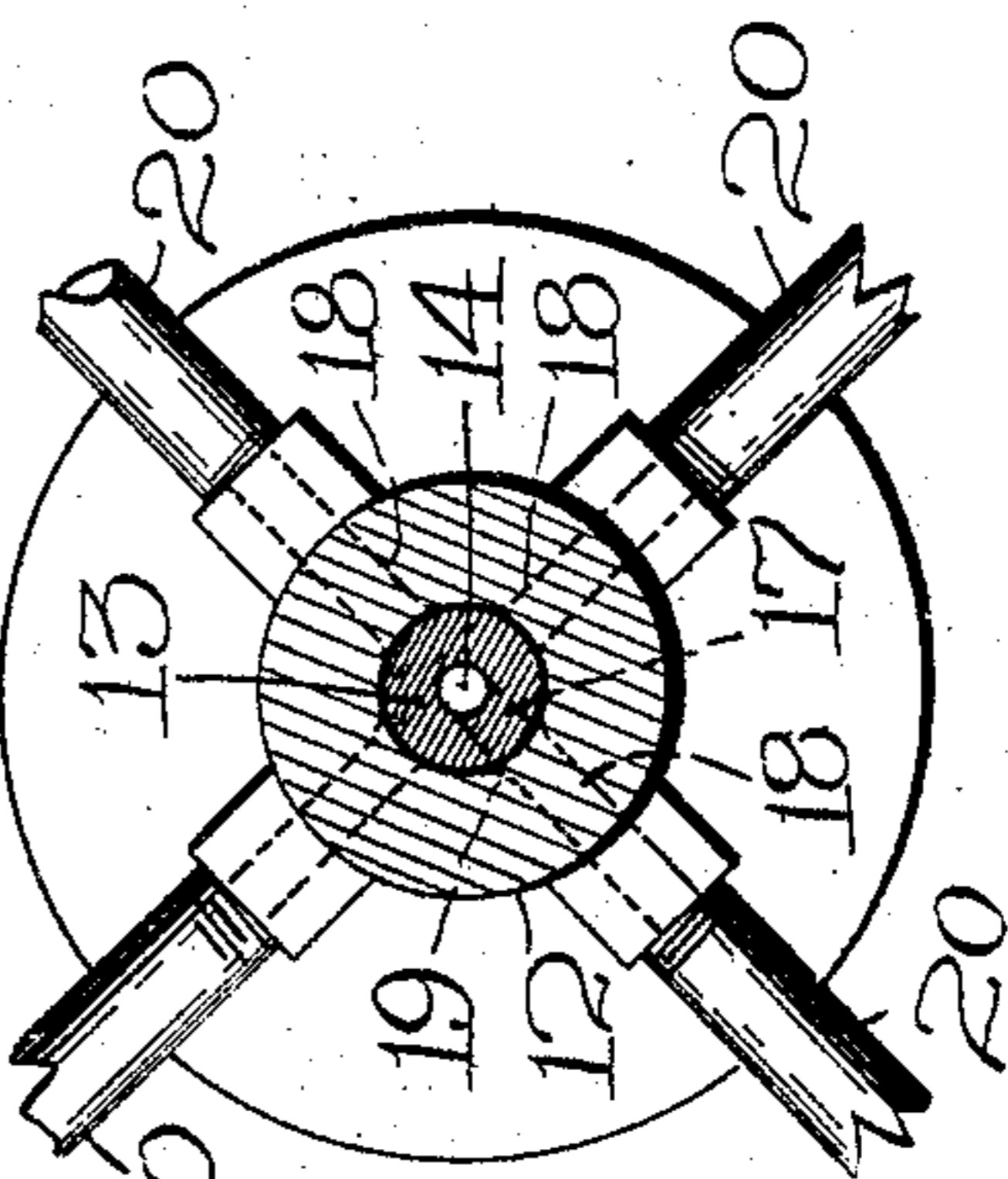


Fig. 3.

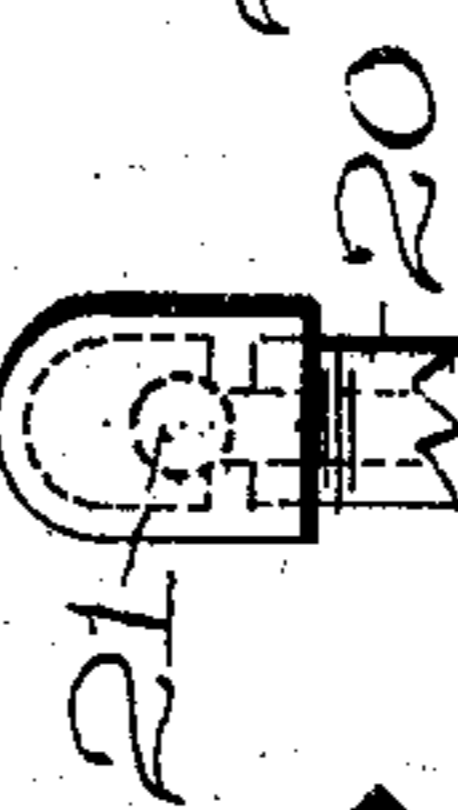


Fig. 4.

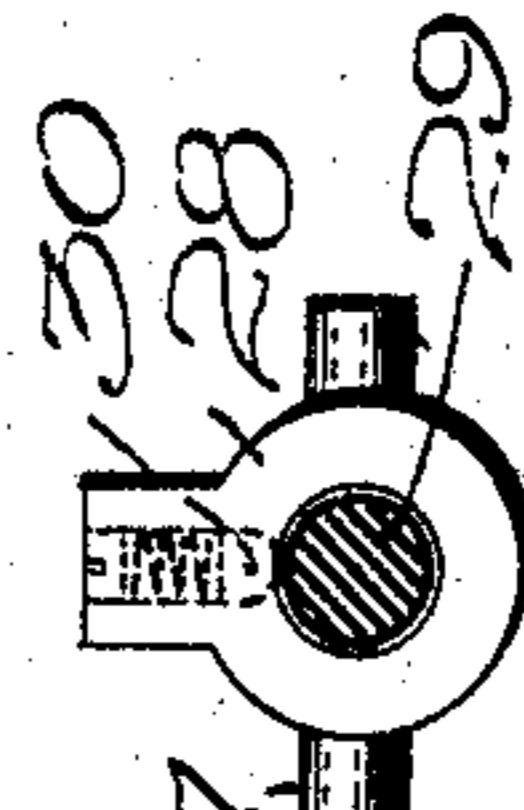


Fig. 5.

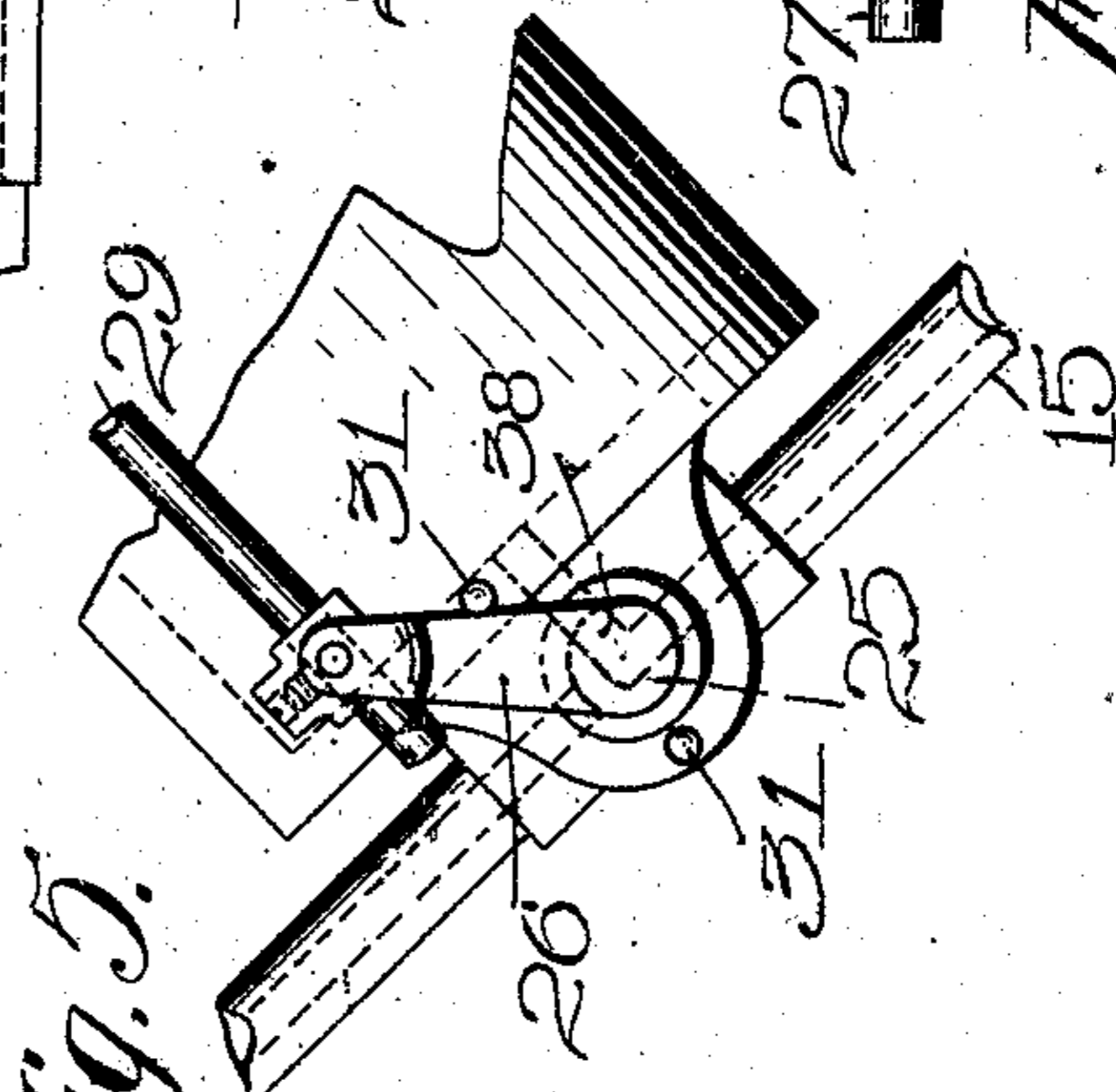


Fig. 6.

Witnesses:

G. F. Mason
E. M. Allen

Inventor:
 C. H. Oslund
 By Attorneys
Southgate & Southgate

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2 SHEETS-SHEET 2.

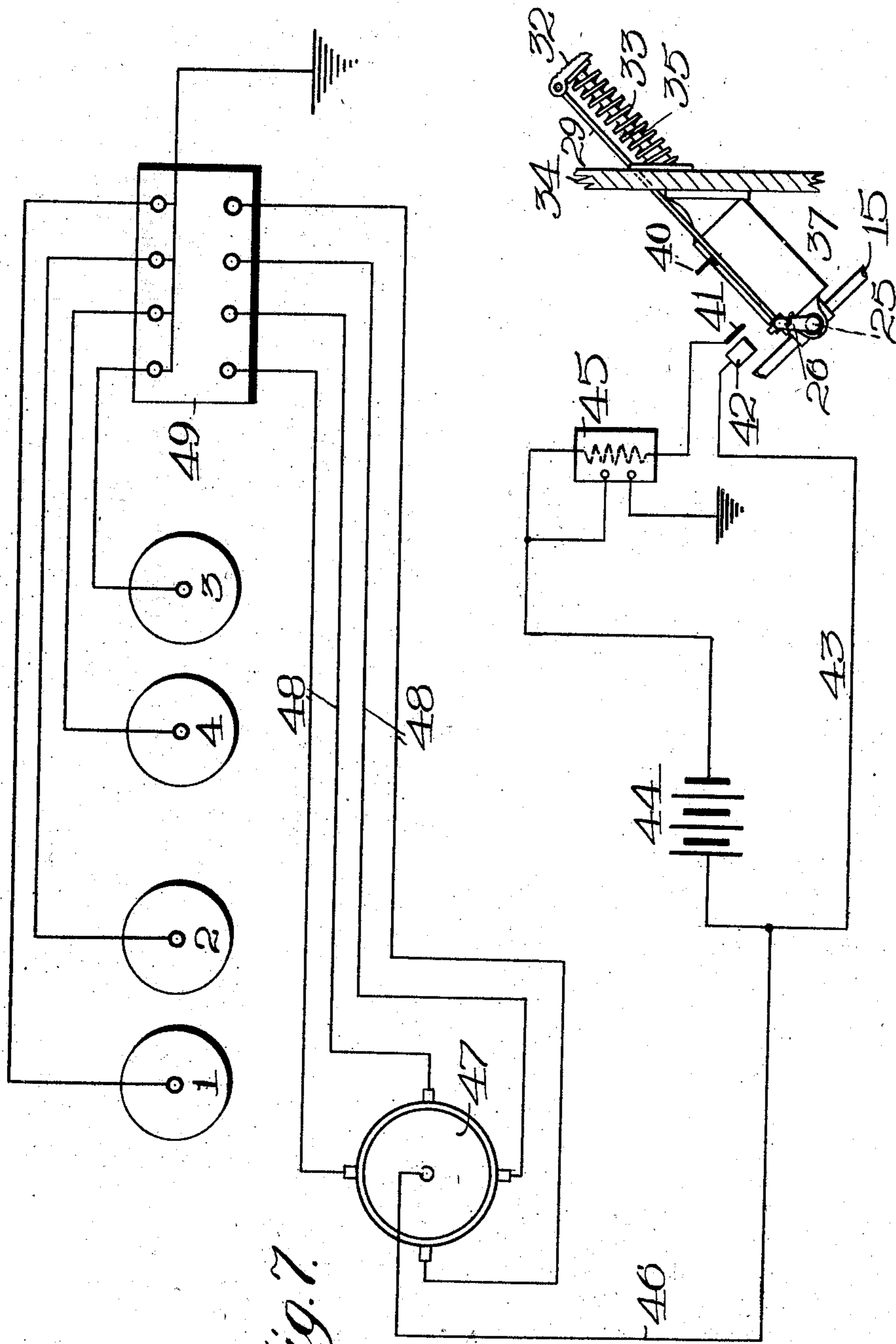


Fig. 7.

Witnesses:

C. F. Mason
C. M. Allen

Inventor:
 C. H. Oslund
 By Attorneys

Southgate & Southgate

UNITED STATES PATENT OFFICE.

CHARLES H. OSLUND, OF WORCESTER, MASSACHUSETTS.

APPARATUS FOR STARTING GAS-ENGINES.

975,567.

Specification of Letters Patent.

Patented Nov. 15, 1910.

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To all whom it may concern:

Be it known that I, CHARLES H. OSLUND, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Apparatus for Starting Gas-Engines, of which the following is a specification.

This invention relates to an apparatus for starting gas engines.

As is well known the present practice of starting gas engines, such as are used for automobiles and the like, is awkward and undesirable, and many inventions have been made for the purpose of doing away with the cranking up of the engines in order to get them started.

To provide for efficiently accomplishing this result is the principal object of this invention.

Another object of this invention is to utilize for this purpose a source of energy which is already provided on most automobiles and other motor vehicles.

It also involves improvements in several features of construction as will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a side view somewhat diagrammatic in form of a four-cycle gas engine suitable for use on an automobile showing one way in which the invention may be applied thereto; Fig. 2 is a side view of a valve for controlling the starting arrangement; Fig. 3 is a sectional view of the same on the line 3—3 of Fig. 2; Fig. 4 is a side view on enlarged scale of a detail; Fig. 5 is a side view on enlarged scale of mechanism for operating the manually controlled valve shown in Fig. 1 for setting the device into operation. Fig. 6 is a sectional view of a detail of the same; and Fig. 7 is a diagrammatic view of an ordinary form of wiring showing how it may be controlled by the last mentioned valve operating mechanism.

The invention is shown in the drawings as applied to a four-cycle gas engine having the four cylinders 1, 2, 3, and 4, and pistons 5 therefor, said pistons being connected as usual with a crank shaft 6. This crank shaft, as is usual, is geared up two to one with a longitudinal shaft 7 so that the latter shaft runs half as fast as the crank shaft. This is the shaft which controls the sparking arrangement, etc. According to the present

invention this shaft is shown as provided with a gear 8 meshing with a gear 9 on a shaft 10, these two gears preferably being miter gears. The gear 9 is loose on the shaft 10 and is adapted to be connected therewith by clutch 11 of any desired construction. These latter parts are supported from a valve casing 12 mounted on the frame of the machine or in any desired position, and in this valve casing is a valve 13 fixed to the shaft 10. This valve has a central passage 14 connecting through a conductor, pipe, or tube 15 with the acetylene or other gas tank 16 with which most motor vehicles are provided for the purpose of supplying fuel to the lights. The valve 13 is also provided with a radial passage or outlet port 17. It will be obvious that as the engine operates, the clutch 11 being thrown in, the valve 13 can constantly be in communication with the acetylene tank so as to admit pressure to the valve and that the passage 17 of the valve will rotate in unison with the rotation of the shaft 7. In the casing 12 are a plurality of passages 18 adapted to communicate with the passage 17 in turn as the shaft 10 rotates. These passages are eased off slightly at 19, the solid space between each two fillets 19 being very slightly shorter than the width of the passage 17, so that if the valve stops with the passage 17 between two of the passages it will always be in communication with one. The passages 18 connect with four conductors or pipes 20 which communicate with the respective cylinders 1, 2, 3 and 4 so as to admit the acetylene to one cylinder at a time, and prevent its introduction into more than one at the same time. At the point where each of these pipes enters the cylinder is a check-valve 21 for preventing back pressure from the cylinder interfering with the operation of the device or going back to the acetylene tank.

From what has been stated it will be seen that the valve 13 always rotates with the crank shaft and that whenever the engine stops the passage 17 will be left in communication with one of the cylinders. The parts are so set up that the cylinder with which the passage 17 communicates is always the one which is ready to explode a charge, that is, the one in which the piston has passed the dead center ready for ignition and is just starting forward on its explosion stroke. The acetylene is forced into

this cylinder and the explosion takes place. This forces the piston forward. Before this piston starts back on the exhaust stroke, another cylinder takes the regular fuel. From
 5 this it will be seen that means is provided whereby the pressure from the acetylene tank can be introduced at any time into the engine and that another means is provided
 10 whereby the introduction of the acetylene into the engine will necessarily take place in such a manner as to introduce that pressure where it is needed in order to start the proper piston. In this way a method of operation is provided whereby a source of
 15 pressure present in nearly every motor car, namely the acetylene gas for lighting, is automatically introduced into the proper cylinder to start the engine.

In addition to what has been described
 20 it is preferred to provide means whereby the acetylene gas can be shut off from the conductor 15 so that the acetylene can be used for lighting in the regular way. For this purpose and another one, as will appear
 25 below, a valve 25 is employed in the conductor 15. This valve is shown as having an operating arm 26 on which is pivotally mounted by means of studs 27 a block 28. This block is provided with an opening
 30 through which can slide a rod 29. This rod is normally held with sufficient tightness by a spring-pressed plug 30 so that when the rod is pushed the arm will be turned. As the plug 30 bears on the rod by friction
 35 only, when the arm rotates against one of the stops 31, the rod can be pushed still further without breaking anything. This rod 29 is shown as extending back into position to be operated by the foot of the operator, and is provided with a plate 32 for
 40 that purpose. Under this plate is a spring 33 for normally pulling the rod back, this plate bearing on the dash 34 of the vehicle in the present case. It will be understood
 45 that the valve 25 could be so constructed that the gas from the acetylene tank could be allowed to flow freely through the conductor 15 after the rod 29 was pressed down, but it is preferably to provide means whereby a definite
 50 charge of gas can be kept ready to introduce into the cylinder so that the acetylene tank will not be called upon for more than is necessary, and there will always be a charge for starting the engine so that the operator
 55 will not have to be careful about not using too much of the gas in the tank 16 for lights. Within the spring 33 is a piston rod 35 connected with a piston 36 in a cylinder 37. The valve 25 is provided with a passage 38
 60 so constructed that when the rod 29 is pulled up and the arm is caused to engage the stop 31 this passage connects the acetylene tank with the cylinder 37. The gas then flows into this tank and pushes the piston 36 back
 65 assisted by the spring 33. In this way a

definite amount of gas will always be available in the cylinder 37. Now when it is desired to start the engine, it being remembered that the valve 13 is always automatically brought to the proper position to conduct the gas to the right cylinder, all that is
 70 required is to push down the plate 32 so that the valve 25 will be turned to permit the gas in the cylinder 37 to flow into the engine cylinder which is in position to receive
 75 the charge. At the same time the tank 16 is automatically cut off. It will be understood of course that the tank 16 preferably is provided with a hand-operated valve 39 for shutting off the tank altogether when it
 80 is desired to do so. After the cylinder has been charged and the engine started the operator removes his foot from the plate 32 and the spring 33 operates the rod 29, changes the valve back to the position shown
 85 in Fig. 5, and withdraws the piston so that a charge of gas will be introduced into the cylinder 37, at the same time shutting off communication between that cylinder and the valve casing 12. A valve 50 is shown
 90 for controlling the lights.

It will be understood that the sparking arrangement can be operated in the regular way, and that therefore no description of that operation has been given above. It is
 95 preferred, however, to provide means whereby the spark will be caused to take place at the proper time. For this purpose the rod 29 is provided with a projection 40 which at the proper time engages a movable contact member 41 to bring it into contact with the other terminal 42 of a circuit 43. In this way when the plunger is down the contact is closed at this point and the spark
 100 plug in the proper cylinder is caused to be energized and the spark to be made at the proper time to explode the charge of acetylene gas which has been sent into it. The remainder of the wiring diagram will be well understood, as it involves merely a battery 44, an electromagnetic release switch
 105 45, a circuit 46 which connects through a timer 47 with the selected one of a series of conductors 48 through a coil 49 to the desired one of the cylinders 1, 2, 3 or 4 in which the spark plugs are located. When the contact points 41 and 42 are connected by means of the projection 40, the switch 45 is magnetically connected and remains so until opened by hand. Therefore only one
 120 battery is necessary.

Many of the advantages and the operation have been described in the course of the description of the mechanism so that a further detail description thereof is not necessary.

While I have illustrated and described a preferred embodiment of the invention, I am aware that many modifications can be made by any person skilled in the art, and that it
 130

can be applied to many other types of gas engines without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to this particular type of gas engine or to all the other details of construction shown, but

What I do claim is:—

1. In a device for starting gas engines, the combination with the gas engine, of a receptacle for gas under pressure, a cylinder for receiving a charge of gas from said receptacle, and a valve having passages for simultaneously disconnecting said cylinder from the gas receptacle and connecting it with a cylinder of the engine.

2. In a device for starting gas engines, the combination of a source of gas pressure, a conductor for connecting said source of pressure with the engine, a valve in said conductor, a cylinder adapted to be connected by said valve either with the source of gas pressure or with the engine, and a piston in said cylinder for forcing the gas into the engine.

3. In a device for starting gas engines, the combination of a source of gas pressure, a conductor communicating therewith and with the gas engine, a valve in said conductor for closing direct communication between the source of gas pressure and the engine, a cylinder adapted to be connected by said valve either with the source of gas pressure or with the engine, a piston in said cylinder, and means for forcing said piston toward the valve to force the charge of gas to the engine.

4. In a device for starting gas engines, the combination of a source of gas pressure, a conductor communicating therewith and with the gas engine, a valve in said conductor for closing direct communication between the source of gas pressure and the engine, a receptacle connected with said valve, and means for turning said valve to simultaneously shut off communication between the cylinder and source of gas pressure and connect the cylinder with the engine.

5. The combination with a gas engine, of a source of gas pressure connected with the several cylinders of said engine, means for opening the connection between said source of gas pressure the cylinder which is ready to receive a charge, and means for controlling the connection of said source of supply with said cylinders comprising a valve, a rod for operating the valve, and a spring for normally holding the valve closed and a device for opening the valve and positively forcing the gas along said connection.

6. In a starting device for gas engines, the combination of a source of gas pressure, a conductor therefrom to the cylinders of the engine, means for controlling said conductor automatically from the engine to cause the gas to be introduced into the cyl-

inder which is ready to receive a charge, a valve in said conductor, a crank-arm on the valve, a sliding rod for operating the crank-arm, a spring operating the rod for normally holding the crank-arm in position to close the valve, and a receptacle connected with the valve, said valve having means for disconnecting the receptacle from the source of gas pressure and connecting it with one of the engine cylinders when said rod is operated.

7. In a device for starting gas engines, the combination of a source of gas pressure, a conductor for connecting said source of pressure with the engine, a valve in said conductor, a cylinder adapted to be connected by said valve either with the source of gas pressure or with the engine, a piston in said cylinder, a rod for operating the valve, a piston rod, a spring for forcing said piston upwardly, and means for connecting said rods with each other so that they move in unison.

8. In a device for starting gas engines, the combination of a source of gas pressure, a conductor communicating therewith and with the gas engine, a valve in said conductor for closing direct communication between the source of gas pressure and the engine, a cylinder adapted to be connected by said valve either with the source of gas pressure or with the engine, a piston in said cylinder, means for forcing said piston toward the valve to force the charge of gas to the engine, and means for simultaneously turning said valve to shut off communication between the cylinder and source of gas pressure and connect the cylinder with the engine.

9. In a device of the character described, the combination of a conductor, a two-way valve therein having an arm; operating stops for said arm, a block mounted on the arm and having a passage therethrough, an operating rod slidably mounted in said passage, and means on the block for frictionally holding said rod so that the reciprocation of the rod will operate the arm.

10. In a starting device for gas engines, the combination of a source of gas pressure, a conductor therefrom to the cylinders of the engine, means for controlling said passage to cause the gas to be introduced into the cylinder which is ready to receive a charge, a valve in said conductor, and manually controlled means for operating the valve comprising a crank-arm on the valve, a sliding rod for operating the crank-arm, a spring operating the rod for normally holding the crank-arm in position to close the valve, a plunger moving with the rod, and electrical connections controlled by the rod for causing a spark when the valve is opened to explode the charge.

11. In a starting device for gas engines, 1

the combination with a gas engine having cylinders and spark plug, with a source of gas pressure, means for conducting the gas to the several cylinders of the engine, means
5 for controlling the conducting means to introduce the gas into the cylinder which is ready to receive a charge; a valve in the conducting means, means for opening said valve comprising a sliding rod, a plunger
10 sliding with the rod, an electric circuit connected with the spark plug, and means connected with said rod for closing said circuit when the valve is open.

12. In a device for starting a gas engine,
15 the combination with the gas engine having cylinders and a spark plug, of a conductor communicating with said cylinders, a receptacle for receiving an explosive gas, a valve having means for simultaneously cutting off

communication between said receptacle and
20 the cylinders of the engine and for permitting the introduction of a gas into the receptacle, and means for subsequently simultaneously operating said valve to prevent the admission of gas into said receptacle and
25 forcing the gas out of said receptacle into the engine cylinders, the last named means having a device for connecting the spark plug with the source of electricity to explode the charge. 30

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

CHARLES H. OSLUND:

Witnesses:

A. E. FAY,

C. FORREST WESSON.