A. F. ROCKWELL.

CONTROLLER.

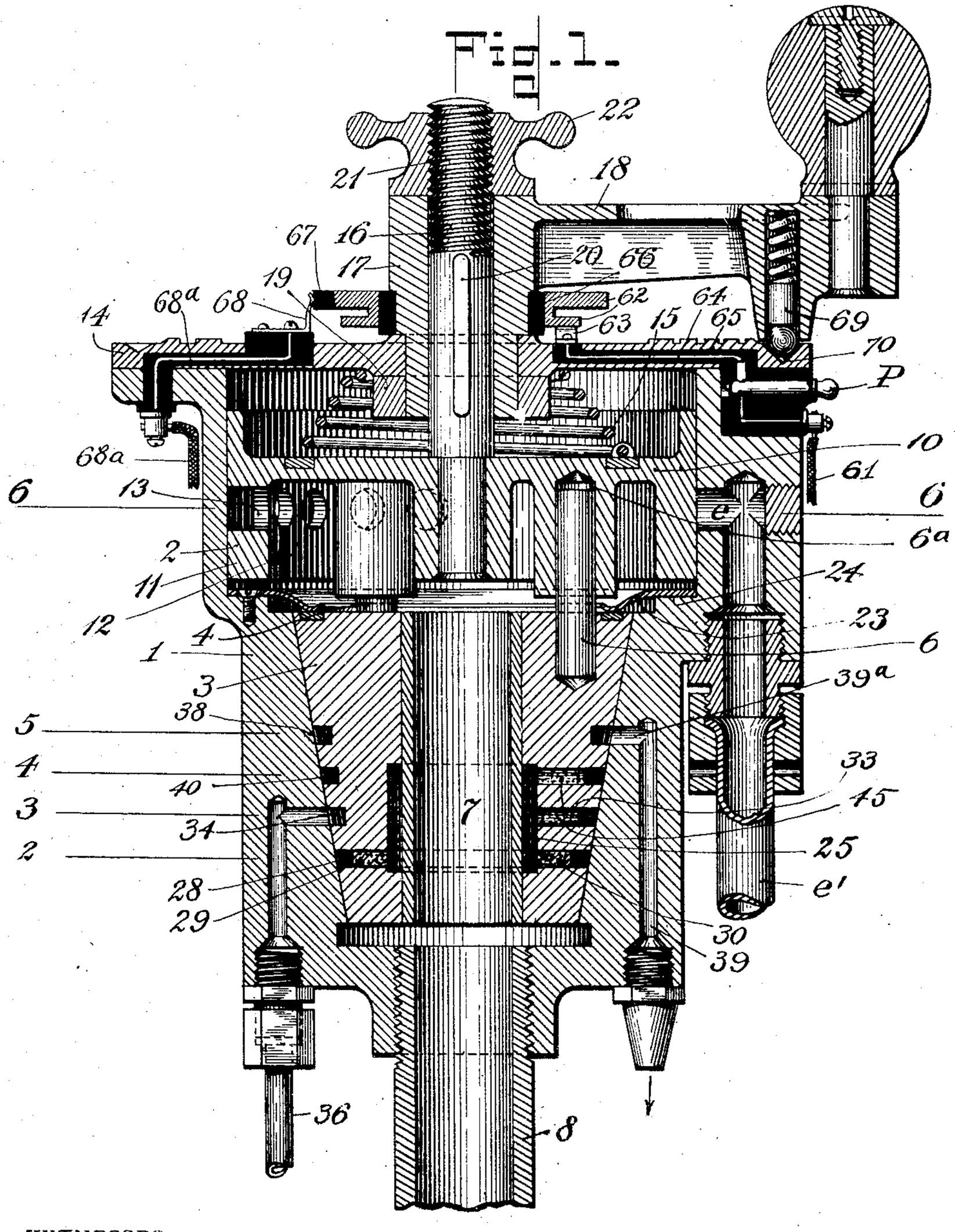
APPLICATION FILED MAR. 7, 1906.

962,253.

Patented June 21, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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4 SHEETS—SHEET 2.

Fig. 2.

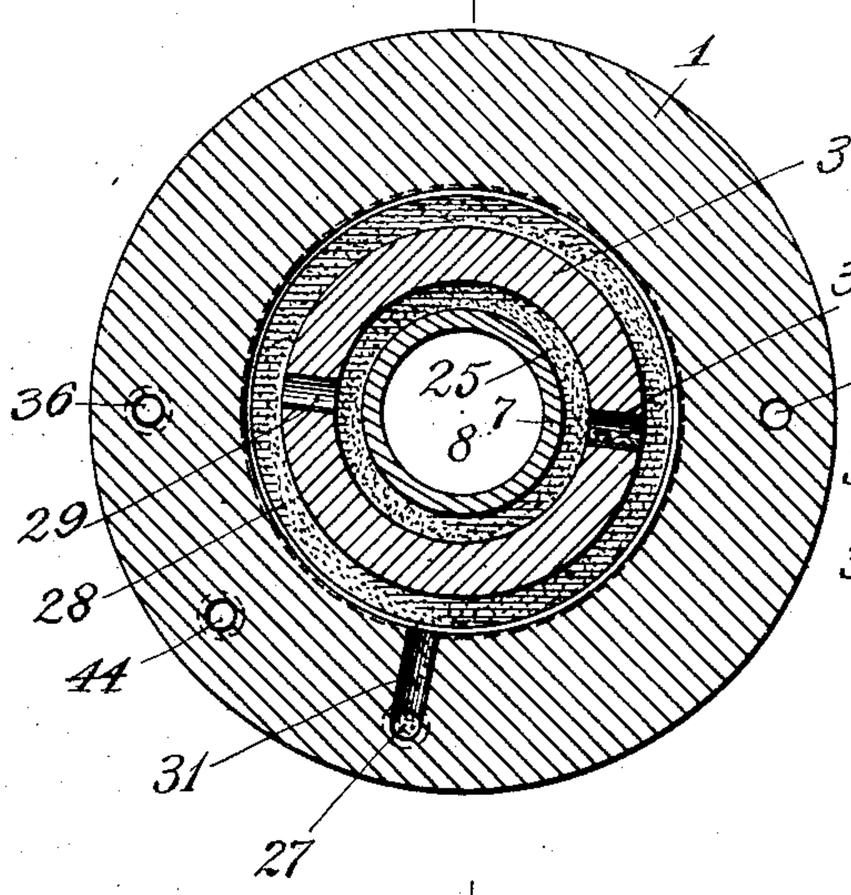

Fig. 3.

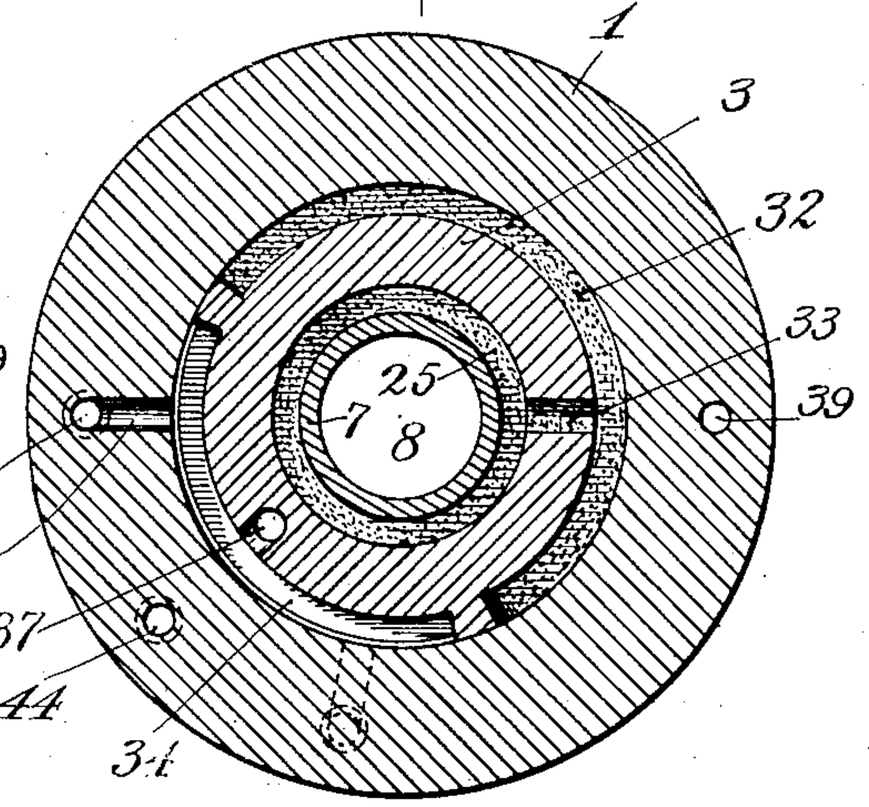

Fig. 4.

Fig. 5.

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4 SHEETS—SHEET 3.

Fig. 7.

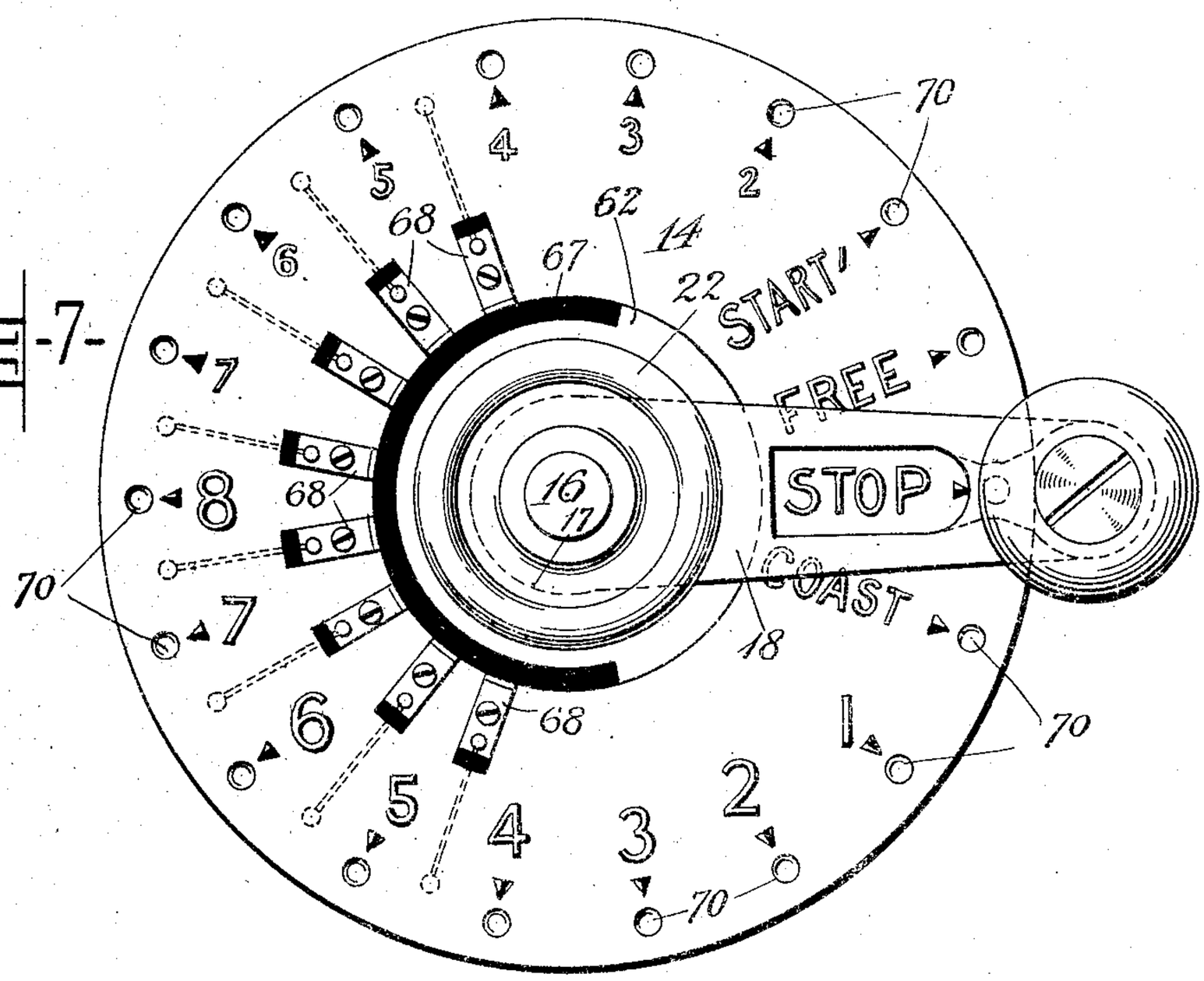
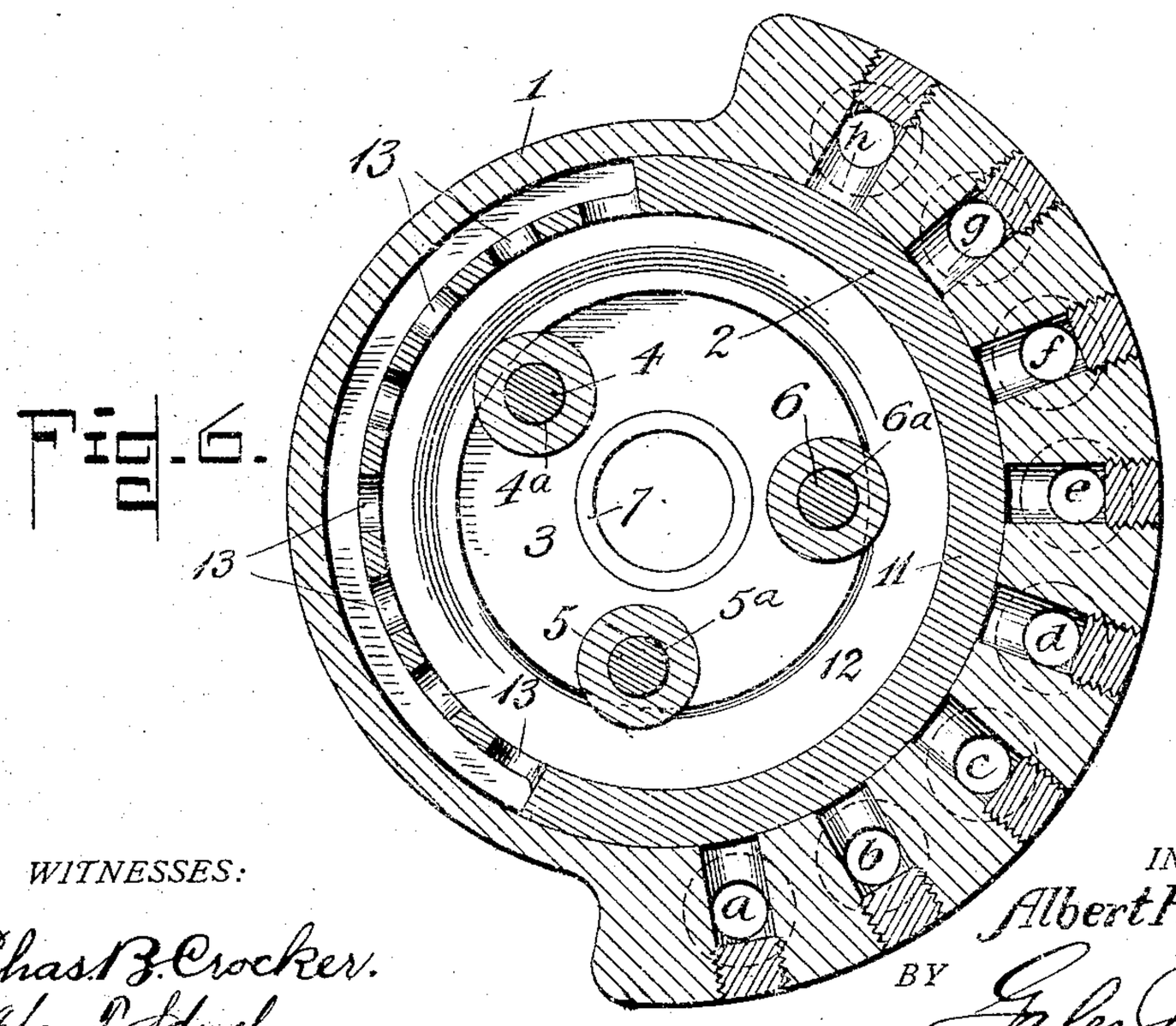


Fig. 6.



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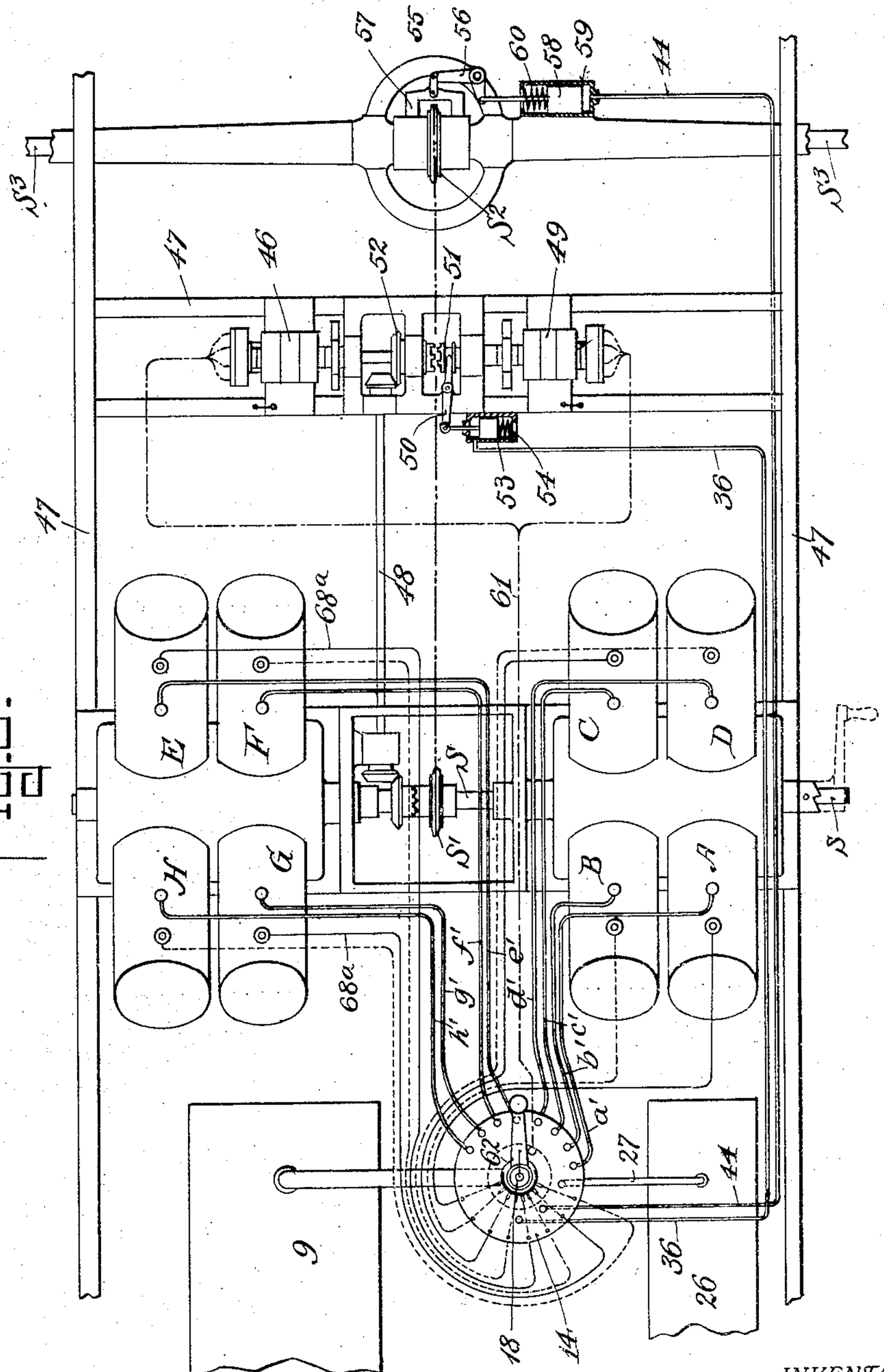
4 SHEETS—SHEET 4.

FIG. 8.



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UNITED STATES PATENT OFFICE.

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CONTROLLER.

962,253. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed March 7, 1906. Serial No. 304,763.

To all whom it may concern:

Be it known that I, ALBERT F. ROCKWELL, a citizen of the United States, residing at Bristol, county of Hartford, State of Connecticut, have invented a certain new and useful Controller, of which the following is a full, clear, and exact description, 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, forming part of this specification.

This invention relates to a controller for governing the supply of fluid from a common source of supply to a number of receiving units.

The invention is illustrated as being applied to a plurality of explosion motor cylinders, and so connected with the explosion chambers thereof, that the explosive fuel, such as gas, may be permitted to enter said cylinders, or it may be cut off as desired.

Among the various objects of my invention is the provision of means whereby a single controller may be used for cutting off or permitting the introduction of an explosive fluid into any number of a battery of cylinders, the fluid to be supplied from a common source of supply.

Another object of the invention is to provide means whereby the fluid may be throttled.

Another object of the invention is to provide means whereby a spark-plug in each cylinder will be thrown into electrical circuit simultaneously with, or at about the same time as the introduction of the fuel into the explosion cylinder.

Another object of the invention is to provide means whereby the spark-plug will be cut out of circuit when the fuel supply is cut off.

Another object of the invention is the provision of means whereby two sets or batteries of cylinders may be caused to impart motion to a common shaft, or one battery may be run to the exclusion of the other.

Another object of the invention is to provide means whereby two magnetos may be used, one for each battery, the construction of the controller being such that when one battery is cut out, the magneto common thereto will be thrown out of operation, but as soon as said battery is thrown into operation the magneto for supplying current to the spark-plugs in the cylinders thereof will be caused to operate.

Other objects and advantages as well as the novel details of construction of this invention will be specifically set forth hereinafter, it being understood that changes in form, proportion and minor details of construction may be resorted to without departing from the spirit of this invention or sacrificing any of the advantages thereof.

In the preferred form of my invention, I have illustrated it as being applied to a motor vehicle wherein a brake is utilized for stopping the vehicle after the supply is cut off from all of the cylinders of the motor, and I have also shown provision for permitting the brake to be applied when the supply is cut off from all of the cylinders, and for releasing the brake from contact with the part to be braked as soon as fuel is introduced into the motor.

While the controller may be used for various purposes, I prefer to employ it in connection with the drive mechanism or motor of a motor vehicle, and I have, therefore, illustrated it as coöperating therewith.

In the drawings illustrating the preferred embodiment of my invention: Figure 1 is a vertical, longitudinal, sectional view through a controller constructed in accordance with my invention; Fig. 2 is a sectional view on the line 2 of Fig. 1; Fig. 3 is a sectional view on the line 3 of Fig. 1; Fig. 4 is a sectional view on the line 4 of Fig. 1; Fig. 5 is a sectional view on the line 5 of Fig. 1; Fig. 6 is a sectional view on the line 6—6 of Fig. 1; Fig. 7 is a top plan view of the controller; and Fig. 8 is a diagrammatical view of a motor applied to the running-gear of a motor vehicle, the controller being illustrated as being connected therewith, and in communication with a gas supply, as well as with an air pressure for controlling the second magneto and the brake, these latter elements being also shown in diagram.

The invention is illustrated as comprising a casing having a sectional plug therein consisting of two parts. The valve casing is designated by the reference numeral 1. The plug member 2 is for controlling the gas supply, and the plug member 3 is for controlling a fluid pressure, preferably air.

The two parts 2 and 3 are connected by a series (in this instance 3) of connecting pins 4, 5 and 6, which pins are so disposed that they will permit the two plug members to be assembled only when they are in certain specified positions relative to each other.

Assuming that the controller is to be arranged in a vertical position, the pins 4, 5 and 6 will preferably be rigid with the lower plug member 3 and fit loosely in the sockets 4^a, 5^a and 6^a in the upper plug member 2. The lower plug member 3 is preferably in the form of a truncated cone, having a central aperture 7 in communication with the supply pipe 8, which supply pipe is also in communication with a fuel tank or other source of supply 9. The plug member 2 is positioned above the member 3 and is illustrated as comprising a disk 10 having a depending annular flange 11 to form a gas chamber 12 with which the aperture 7 communicates. The flange 11 is arranged at right angles to the disk 10 to permit of a longitudinal adjustment of the plug member as will be hereinafter explained. Communicating with the casing 1, and adjacent to the plug member 2 are a number of outlet ports, equal in number to the number of cylinders to be supplied with gas. In the present instance, I have illustrated the casing as being constructed with eight ports, and these I have designated as a, b, c, d, e, f, g and h respectively. These ports may communicate with the gas chamber 12 in the casing through the ports 13 in the flange 11. For the purpose of strengthening the flange 11, and furthermore to make clear how the ports a to h are permitted to communicate with the gas chamber, I have illustrated a number of openings 13 corresponding to the number of outlet ports in the casing. It is obvious, however, that instead of having a plurality of openings 13 a single slot may be cut in the flange 11 of sufficient length to take in the number of ports. The cap piece 14 on the controller may be secured to the flange by any suitable means, and interposed between the cap piece or top 14 and the upper plug member 2 is a spring 15, which will have a tendency to cause the plug member 2 to maintain its proper position within the shell.

The plug member 2 is carried by a stem 16 which is rigid therewith and which projects through the top of the casing and through the sleeve 17 on the controlling lever or handle 18. The sleeve 17 projects through the top of the casing and is held rotatably secured thereto by a collar 19. The stem 16 is provided with longitudinal ribs or splines 20, which fit in the grooves in the sleeve 17 and the outer end of said stem is threaded as at 21 to receive an adjusting nut 22, which adjusting nut may be turned to impart longitudinal movement to the plug member 3, so as to increase or decrease the size of the openings between the outlet ports a to h and the gas chamber 12. Any longitudinal movement which may be imparted to the plug member 2 will not be imparted to the plug member 3, because the plug member 3 is held against any longitudinal movement by a spring annulus 23 rigidly fastened to a shoulder 24 within the valve shell, and which bears against one end of said plug member 3.

The plug member 3 is provided with a pressure chamber or receiving chamber 25, which is always under pressure and which receives its pressure from a suitable source of supply, for example a tank or reservoir 26 which is in communication with said chamber 25 as by a tube 27. The chamber 25 is in communication with an annular groove 28 through the medium of the ports 29 and 30. Now as this groove is at all times in communication with the pipe 27 through the port 31 in the casing, it is obvious that pressure will be supplied to the chamber 25 irrespective of the direction in which the plug member 3 is turned. This chamber 25 supplies pressure to certain fluid conductors for operating certain parts in connection with the vehicle motor, such for example, as starting the second magneto and for applying the brake.

For controlling the magneto the plug 3 is constructed as shown in plan in Fig. 3, the pressure side being indicated at 32, and shown as approximately a semi-circular groove in the periphery of the plug, which groove is in communication with the chamber 25 through a port 33. The opposite groove 34 which is in the same horizontal plane with the groove 32 is the exhaust side, and either the groove 32 or the groove 34 may be brought into communication with the port 35 in the valve shell which is a part of the pipe for controlling the magneto clutch shifter. Therefore, if the groove 32 is caused to register with the port 35 pressure will be admitted into the pipe 36, but if the groove 34 is permitted to register with the port 35 the pressure in the tube 36 will be permitted to exhaust through the longitudinal port 37 in the plug member 3 thence into the circumferential groove 38 and then out through the exhaust port 39 in the valve shell, which port has a branch 39^a in communication with the said groove 38, this latter construction being clearly shown in Fig. 5.

For controlling the brake I have provided in the plug 3 an approximately circular groove 40, the ends of which terminate adjacent a partition 41, through which a branch port 42 leads into the exhaust port 37, which port 42 may also register with the branch port 43 in communication with the brake

pipe 44. The groove 40 receives its pressure from the pressure chamber 25 through the port 45. When the groove 40 is in communication with the port 43, pressure will be supplied to the pipe 44, but when the port 42 is in communication with the port 43 the pressure will be permitted to exhaust through the pipe 37 into the upper groove 38 and thence through the exhaust port 39. The pipes which lead from the valve casing to the various cylinders are lettered to correspond with the outlet ports for the gas, except that the letters as applied to the pipes are primed; thus the port *a* in the valve casing communicates with the pipe *a'*, the port *b* with the pipe *b'*, and so on up to *h*.

The cylinders to which gas is supplied are lettered according to the same alphabetical arrangement, although capital letters are applied to the cylinders, so that the port *a* communicates with the cylinder A through the pipe *a'*, the port *b* communicates with the cylinder B through the pipe *b'* continuing up to *h*.

It is to be understood that the cylinders A to H are provided with the necessary appurtenances to constitute an explosion motor.

The pistons in the cylinders are connected in a suitable manner to the crank-shaft S which is the drive shaft of the motor, and from which motion is imparted to the driver S' and thence to the driven member S^2 which drives the axle S^3. The primary magneto 46 carried by the frame 47 may have motion imparted thereto by a drive rod 48.

As I will ordinarily use not more than four of the cylinders, a single magneto capable of supplying sufficient ignition to four of the cylinders will suffice for ordinary work; however, I have provided an auxiliary magneto, called the second magneto, and designated by the reference numeral 49. This second magneto will ordinarily be inoperative unless five or more cylinders are employed for generating power. In the event that five or more cylinders are employed, the magneto 49 will be thrown into operation through the medium of a clutch shifter 50, which may operate the clutch 51 so as to receive motion through the rod 48 and the gear element 52 in an obvious manner. This shifter 50 will ordinarily be held in position to prevent the clutch 51 from being thrown into engagement with the clutch face on the element 52, but when it is desired to throw said clutch into engagement with the clutch face on the element 52, this can be accomplished by the introduction of air into the cylinder 53 causing pressure to overcome the spring 54 and thereby apply the clutch. The pressure will be supplied through the pipe 36 which is in communication with the port 35, and the groove 32 is so relatively positioned that pressure will not be permitted to enter the pipe 36 until gas has been admitted into the port *e* of the valve casing. Therefore, it will be seen that this clutch cannot be operated until the fifth cylinder is being supplied with gas. The pressure will remain, however, while any of the cylinders E, F, G and H is being used, but as soon as these four cylinders are cut out of operation, the groove 34 will be in register with the pipe 36 through the pipe 35, permitting the air to exhaust through the port 37, in which event the spring 54 will be sufficient to throw the clutch out of engagement with its complementary clutch member. Likewise, the brake is operated. This brake is designated by the numeral 55 and is capable of having a normal tendency to be applied, but by means of pressure it is held out of engagement with the part to be braked, while the vehicle is moving.

In order to show a convenient form of brake, I have illustrated it as comprising the elbow lever 56 having a brakeshoe 57 connected thereto, the elbow lever 56 being operated by a piston 58 in the cylinder 59. The spring 60 will have a normal tendency to force the piston 58 from left to right (see Fig. 8) and thereby apply the brakeshoe 57. The ports in the controller, however, are so arranged that during the whole time that the motor is operating, or any gas is being supplied to any motor cylinder this brake will be held off or unapplied. This is done by admitting pressure into the brake cylinder 59 against the face of the piston 58 opposite to the face against which the spring bears, and this pressure is admitted into the pipe 44 having communication with the groove 40 through the medium of the port 43. In view of the fact that the groove 40 is in the form of almost a complete circle it is apparent that pressure will be supplied in the pipe 44 during almost the complete revolution of the plug 3. The only time that communication will not be had with the pipe 44 is during the time that all of the ports *a* to *h* are closed, and communication with the magneto pipe 36 is closed, it being obvious that at this time it might be desirable to apply the brake.

As has been heretofore said one of the objects of this invention is to provide means whereby as the gas supply is admitted to each succeeding cylinder, the spark plug in that particular cylinder will be thrown into circuit with a suitable source of generation, as for example, the magneto, and as the gas supply is cut off from each succeeding cylinder, the spark plug will be thrown out of circuit. I will now proceed to describe a form of accomplishing this through the medium of the controller.

The magnetos 46 and 49 are cut into a single conductor 61 which conductor supplies current to a rotatable circuit maker

and breaker 62 a branch conductor being in circuit with the conductor 61 and a contact 63 which always bears against the maker and breaker 62. The branch conductor is designated by the reference numeral 64 and is insulated from the valve casing by suitable insulation 65. The maker and breaker 62 is always insulated from any handled parts by an insulation 66, and its periphery is partly insulated as shown at 67. Carried by the top of the shell, but insulated therefrom, are a plurality of contacts 68, equal in number to the number of spark plugs or cylinders. In the present instance, I have illustrated eight of these contacts to correspond to the eight cylinders and eight gas supply ports heretofore described. Leading from each contact 68, is a conductor 68ª connected to the several spark plugs. Now it will be seen that when the controller handle is at its safety or stop position, that is to say when all the gas is cut off, these contacts 68 will be out of circuit, there being no current supplied thereto. Suppose, however, it is desired to start the motor, the controller handle will be moved around to cause the port *a* to be opened to admit gas into the cylinder A. At the same time that this is being done the lower plug 3 having been carried along with the other plug 2 will admit pressure into the pipe 44 and take off the brake.

The motor shaft having been cranked or the ordinary rotation being otherwise provided, the operation of the motor will begin, because the turning of the handle to admit gas into the first cylinder will have been effective in rotating the maker and breaker 62, so that a non-insulated part will come into contact with the first contact 68, supplying the spark to the spark plug of the cylinder A. When it is desired to throw the second cylinder into operation the handle is moved to point 2 immediately after "start," causing *b* to supply gas to the pipe *b'* and thence to the cylinder B. This operation will throw the second contact 68 into circuit. The third and fourth cylinders will be supplied in the same way, that is, for each cylinder that is thrown in there will be a contact thrown into circuit, and it should be borne in mind that all this time the brake is being held off. Now when it is desired to throw the fifth cylinder in, the handle is moved around to the fifth point and the groove 32 is caused to communicate with the pipe 36 through the port 35, causing the pressure to be exerted against the piston in the cylinder 53 to throw the second magneto into operation and retain it there during the entire time that more than four cylinders are contributing to the motive power of the motor. When the fifth cylinder is being supplied with gas the fifth contact 68 is thrown into circuit, the second magneto is operating, the brake is still being held off, and this condition will exist so long as the cylinders E, F, G, and H are operated in conjunction with the cylinders A, B, C and D. As soon as the controller is reversed to cut out the group comprising the cylinders E, F, G and H, that is to say, just as soon as the gas ceases to be supplied to the cylinder E (it being understood that E would be the last cylinder of this group to be cut out) the groove 32 will be out of communication with the pipe 36, and the pressure in the pipe 36 will be permitted to exhaust through the port 37 around the groove 38 and thence through the exhaust port 39. Pressure being relieved within the cylinder 53, the spring 54 will be effective in throwing the clutch member 51 out of engagement with its complementary member.

Suppose during any of the time that one or more of the cylinders are being supplied with gas it may be found necessary or desirable to feed the quantity of gas into the cylinder or cylinders in proportion to the amount of air to be mixed therewith prior to the explosion. This can be under the control of the operator by controlling the head or nut 22, so as to impart a longitudinal movement to the plug member 2, and the size of the gas openings *a* to *h* may be regulated to compensate for the volume of gas passing therethrough after each explosion. The adjustment of the said plug member through the medium of the nut 22, or some other suitable device, may be controlled to such an extent that the gas can be throttled to any degree by the operation.

In addition to the operation heretofore described, I also provide means for taking off the brake prior to introducing any gas into the first cylinder, and also for holding off the brake if the cylinder H becomes the last cylinder from which gas is cut off. For example, suppose the car is to be started. When the handle is moved to "free" the brake is taken off, then by moving the handle to "start" the first cylinder is supplied with gas and the remaining cylinders are in turn supplied in the manner heretofore described, until all eight cylinders are supplied. Now by a continued rotation of the valve plug members, the cylinder A will first become cut out, then the cylinder B, C, D etc., until all of them may be cut out except H. If the handle is then turned so as to stop at "coast", gas will have been cut off from all the cylinders and the brake will be held off permitting the vehicle to run free, but as soon as the handle is moved to "stop" the brake will be applied.

It will be apparent from the above that the cylinders may be successively cut off by moving the handle in either direction, and that they may be cut in operation likewise. The spring-pressed rotatable dog 69 carried

by the handle is adapted to engage the recesses 70 in the top of the valve shell for the purpose of holding the handle in any position in which it has been adjusted, but this holding will only be a frictional engagement, so that while the handle will not voluntarily move out of position, it may be readily moved by the operator.

It is obvious that the motor cannot be started unless a spark is supplied for the spark plugs. In order to avoid the annoyance w ich might result from an unauthorized use of the motor, if for example, the general arrangement heretofore described was applied to a motor vehicle, I have provided means for preventing an unauthorized use of the motor by inserting a removable plug P between two spaced terminals of the conductor wire 61. When the operator is leaving the vehicle, this plug can be pulled out so that irrespective of any position of the handle 18 a circuit cannot be formed.

What I claim is:

1. The combination with a driven part, a motor therefor, and a brake for said driven part, of a source of charge supply for said motor, a generator of charge-exploding energy for said motor, means for operating said generator to render the same active and inactive, means for operating said brake to render the same active and inactive, and a controller provided with means for controlling the supply of charge to said motor, with means for controlling the operating means for said brake and with means for controlling the operating means for said generator; substantially as described.

2. The combination with a driven part, a motor therefor, and a fluid controlled brake for said driven part, of means for supplying charges to said motor, a generator for supplying charge-exploding energy to said motor, fluid controlled means for controlling said generator, a source of fluid supply, a controller having an inlet port for receiving said fluid and outlet ports leading respectively to the brake-controlling mechanism and the generator-controlling mechanism, and a valve in said controller controlling said ports; substantially as described.

3. The combination with a driven part, a motor therefor, means for supplying charges to said motor, and a fluid operated brake mechanism for said driven part, of a fluid controlled generator mechanism for supplying charge exploding energy to said motor, a source of fluid supply, a controller having a port receiving said fluid and also having ports connected respectively with the brake mechanism and the generator mechanism, an exhaust port from said controller, and a valve in said controller having a receiving chamber adapted to receive fluid from said inlet port and provided with outlets leading to said respective outlet ports, said valve also having passages leading from said respective outlet ports to said exhaust port; substantially as described.

4. The combination with a driven part, a brake therefor, and a motor for said driven part, of a controller for said brake and said motor and movable in a given direction from brake-applying position through a complete cycle to again assume said brake-applying position, and means whereby movement of said controller from brake-applying position serves to release said brake, further movement of said controller in the same direction serves to render said motor active with successively increasing energy, further movement of said controller in the same direction serves to render said motor inactive with successively decreasing energy, and further movement of said controller in the same direction serves to apply said brake; substantially as described.

5. The combination with a driven part, a brake therefor, and a motor for said driven part, of a controller for said brake and motor and movable in the same direction from brake-applying position through a complete cycle to again assume brake-applying position, and means whereby movement of said controller from brake-applying position serves to release said brake without rendering said motor operative with respect to said driven part, further movement of said controller in the same direction serves to render said motor operative with respect to said driven part, further movement of said controller in the same direction serves to render said motor inoperative with respect to said driven part but leaves said brake still unapplied, and further movement of said controller in the same direction serves to apply said brake; substantially as described.

6. The combination with a motor including a plurality of batteries of cylinders, of a separate generator of charge-exploding energy for each said battery, and means whereby the generator for a battery can be rendered inactive when its battery is inactive; substantially as described.

7. The combination with a motor including a plurality of batteries of cylinders, of means for supplying charge to cylinders of one battery to the exclusion of cylinders of another battery, a separate generator of charge-exploding energy for each of said batteries, and means whereby the said generator for a battery is rendered active when cylinders of its battery are supplied with charges and is rendered inactive when cylinders of its said battery are not so supplied; substantially as described.

8. The combination with a motor including a plurality of batteries of cylinders, of a generator of charge-exploding energy connected to the cylinders of one of said bat-

teries, a second generator of charge-exploding energy connected to a second of said batteries, actuating means having operative connection with one of said generators, and means for throwing said second generator into and out of operative connection with said actuating means; substantially as described.

9. The combination with a motor including a plurality of batteries of cylinders, of a generator of charge-exploding energy connected to the cylinders of one of said batteries, a second generator of charge-exploding energy connected to a second of said batteries, actuating means having operative connection with one of said generators, and means for throwing said second generator into and out of operative connection with said first mentioned generator; substantially as described.

10. The combination with a motor including a plurality of batteries of cylinders, of a shaft driven thereby, a generator of charge-exploding energy connected to the cylinders of one of said batteries, operative connection between said shaft and said generator, a second such generator connected to the cylinders of a second of said batteries, and means for throwing said second generator into and out of operative connection with said shaft; substantially as described.

11. The combination with a motor including a plurality of batteries of cylinders, of a shaft driven thereby, a generator of charge-exploding energy connected to the cylinders of one of said batteries, operative connection between said shaft and said generator, a second such generator connected to the cylinders of a second of said batteries, and a clutch between said generators; substantially as described.

12. The combination with a motor cylinder, and means for supplying charge thereto, of a generator of charge-exploding energy connected to said cylinder, actuating means for said generator, means for automatically throwing said generator out of operative connection with said actuator when charge is cut off from said cylinder, and means for automatically throwing said generator into operative connection with said actuator when charge is supplied to said cylinder; substantially as described.

13. The combination with a motor cylinder, and means for supplying charges thereto, of a generator of charge-exploding energy connected to said cylinder, actuating means for said generator, means for yieldingly holding said generator out of operative connection with said actuating means and for returning said generator to such condition when no charge is supplied to said cylinder, and means for automatically throwing said generator into operative connection with said actuating means when charge is supplied to said cylinder; substantially as described.

14. The combination with a motor cylinder, and a source of charge supply therefor, of a generator of charge-exploding energy connected to said cylinder, a driving element, fluid actuated shiftable connection between said generator and said driving element, a source of energy for said shiftable connection, and a controller interposed between said source of charge supply and said cylinder and between said source of energy and said shiftable connection and provided with means whereby in one position of said controller said cylinder is supplied with charge and said generator is operatively connected to said driving element and in another position of said controller said charge supply is cut off from said cylinder and said generator is operatively disconnected from said driving element; substantially as described.

15. The combination with a motor cylinder, and a source of charge supply therefor, of a generator of charge-exploding energy connected to said cylinder, a driving element, fluid actuated shiftable connection between said generator and said driving element, a source of energy for said shiftable connection, and a controller interposed between said source of charge supply and said cylinder and between said source of energy and said shiftable connection and provided with operatively connected valves controlling respectively the said supply and the said energy for operating said shiftable connection; substantially as described.

16. The combination with a motor including a plurality of batteries of cylinders, and means for supplying charge to said cylinders, of actuating means, a generator of charge-exploding energy connected to the cylinders of one of said batteries and normally in operative connection with said actuating means, a second generator of charge-exploding energy connected to a second battery of said cylinders and normally out of operative connection with said actuating means, and means for operatively connecting said second generator with said actuating means when a cylinder of said second battery is supplied with charge; substantially as described.

17. The combination with a motor comprising a plurality of cylinders, and charge-exploding means for the respective said cylinders, of a source of charge supply, a source of energy for said charge-exploding means, and a controller having an inlet for the charge, outlets for said charge in connection with the respective said cylinders, a valve controlling said outlets and adapted to place a desired number of them in communication

with said inlet, a terminal from said source of energy, conductors for said energy and leading to the respective said charge-exploding means of said cylinders, a connector adapted to connect said terminal from said source of energy with said respective conductors, and a movable element to which said valve and said connector are both connected, said valve and said connector being so related to each other that when, by movement of said movable element, the said valve permits communication between said source of charge supply and a desired number of said cylinders, said connector also connects said terminal from said source of energy with the said conductor or conductors leading to the said charge-exploding means of the cylinder or cylinders thus supplied with charge; substantially as described.

18. The combination with an explosion motor having cylinders arranged in a plurality of batteries, of a source of electrical energy for each battery, a fuel supply for all of the cylinders, a controller for admitting fuel into the several cylinders, and means for permitting said source of energy for a battery of cylinders to supply current thereto only during the time that the cylinders and their pistons of the particular battery are contributing to the motive force of the motor.

19. The combination with a motor including cylinders having spark plugs, a driven part, and means for communicating motion from the motor to the driven part, of a magneto for supplying an electric current to the spark plugs in some of the cylinders, means for driving said magneto from the motor, a second magneto for supplying current to the spark plugs in other of said cylinders, said second magneto being adapted to be driven through the driving means for the first magneto, a normally applied brake for the cylinders, and a controller operative to successively permit the introduction of fuel from the source of supply to the cylinders having the spark plugs which receive their current from the first magneto, said controller being movable to a position to permit fuel to be introduced into a cylinder or cylinders, the spark plugs of which receive current from the second magneto, the operation of the controller being such that when fuel is admitted into a cylinder whose spark plug receives current from the second magneto said second magneto will be thrown into operation, and the controller being also effective for releasing the brake as soon as communication is established between any cylinder and the source of fuel supply.

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

ALBERT F. ROCKWELL.

Witnesses:

CHAS. TREADWAY,

CHAS. R. ANDERSON.