

July 22, 1924.

R. J. K. GORE

1,502,244

ENGINE

Filed May 8, 1920

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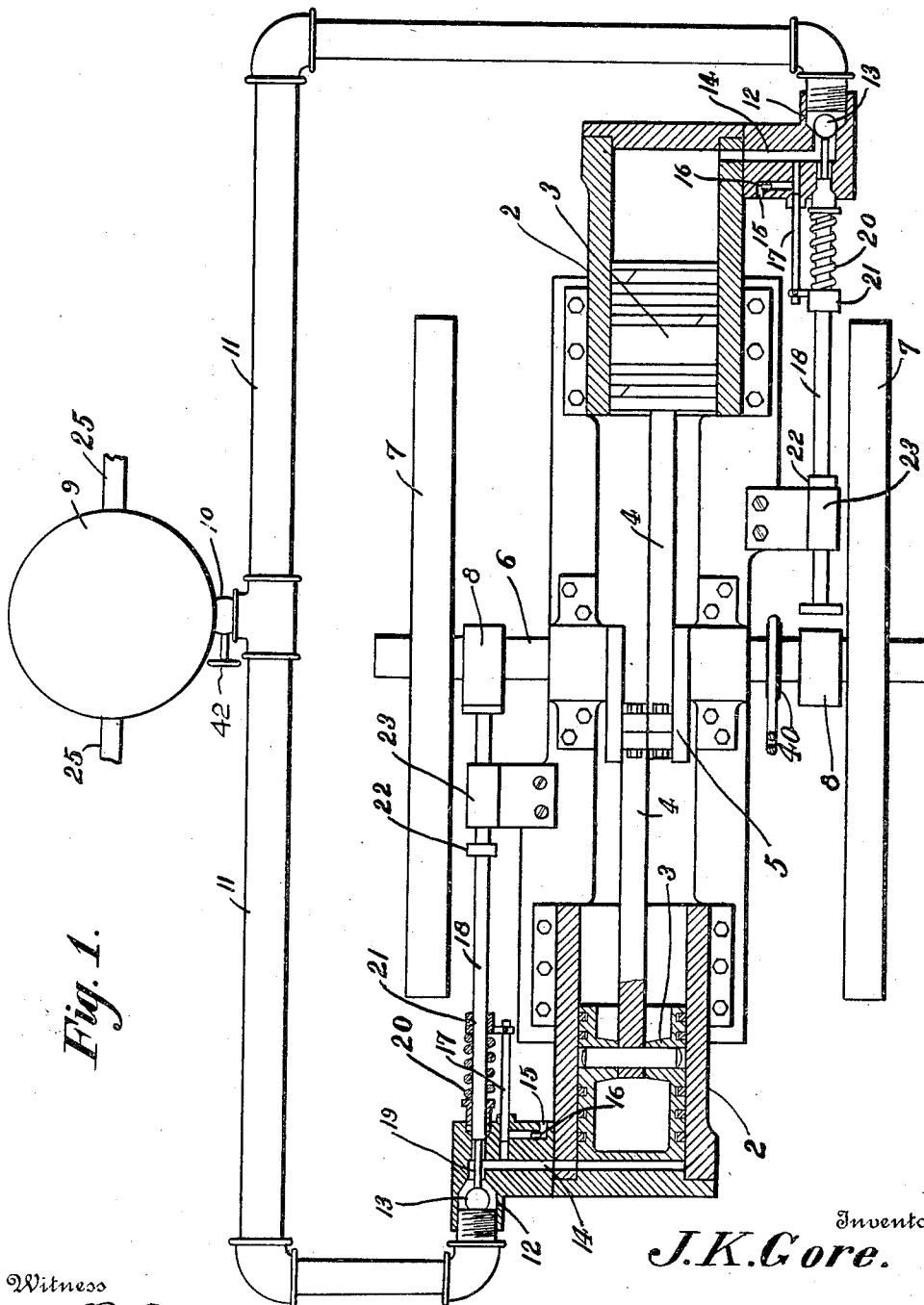


Fig. 1.

Witness

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Fig. 2.

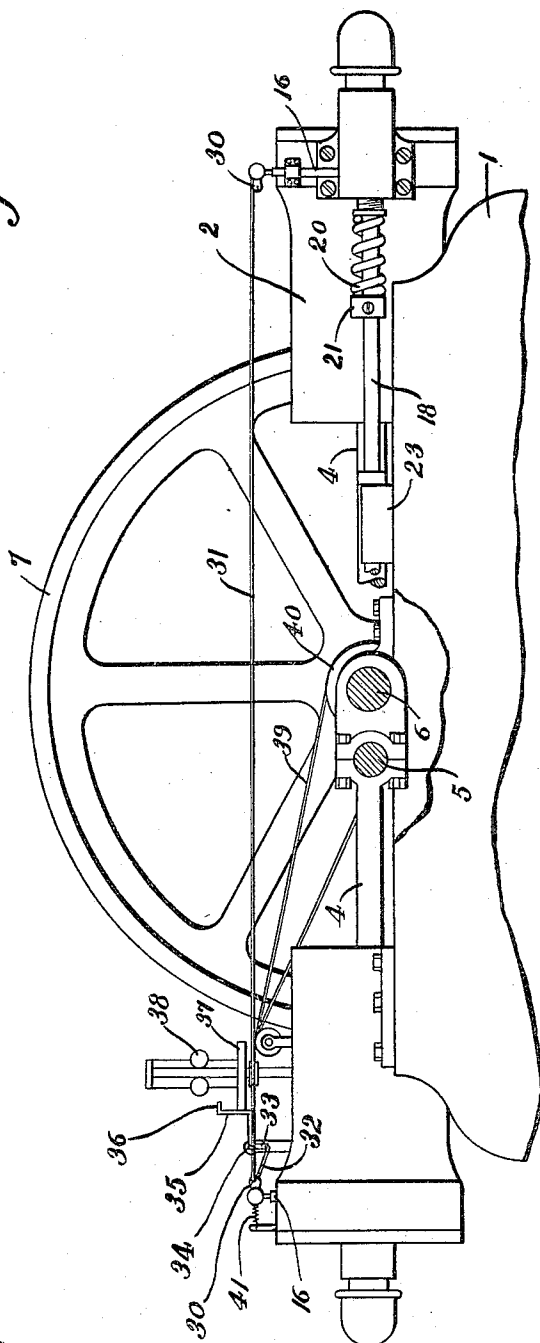
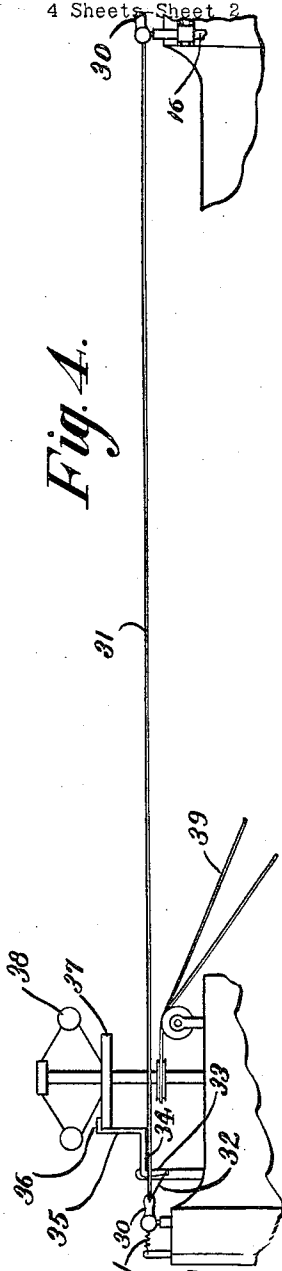


Fig. 4.



Witness

*[Signature]*

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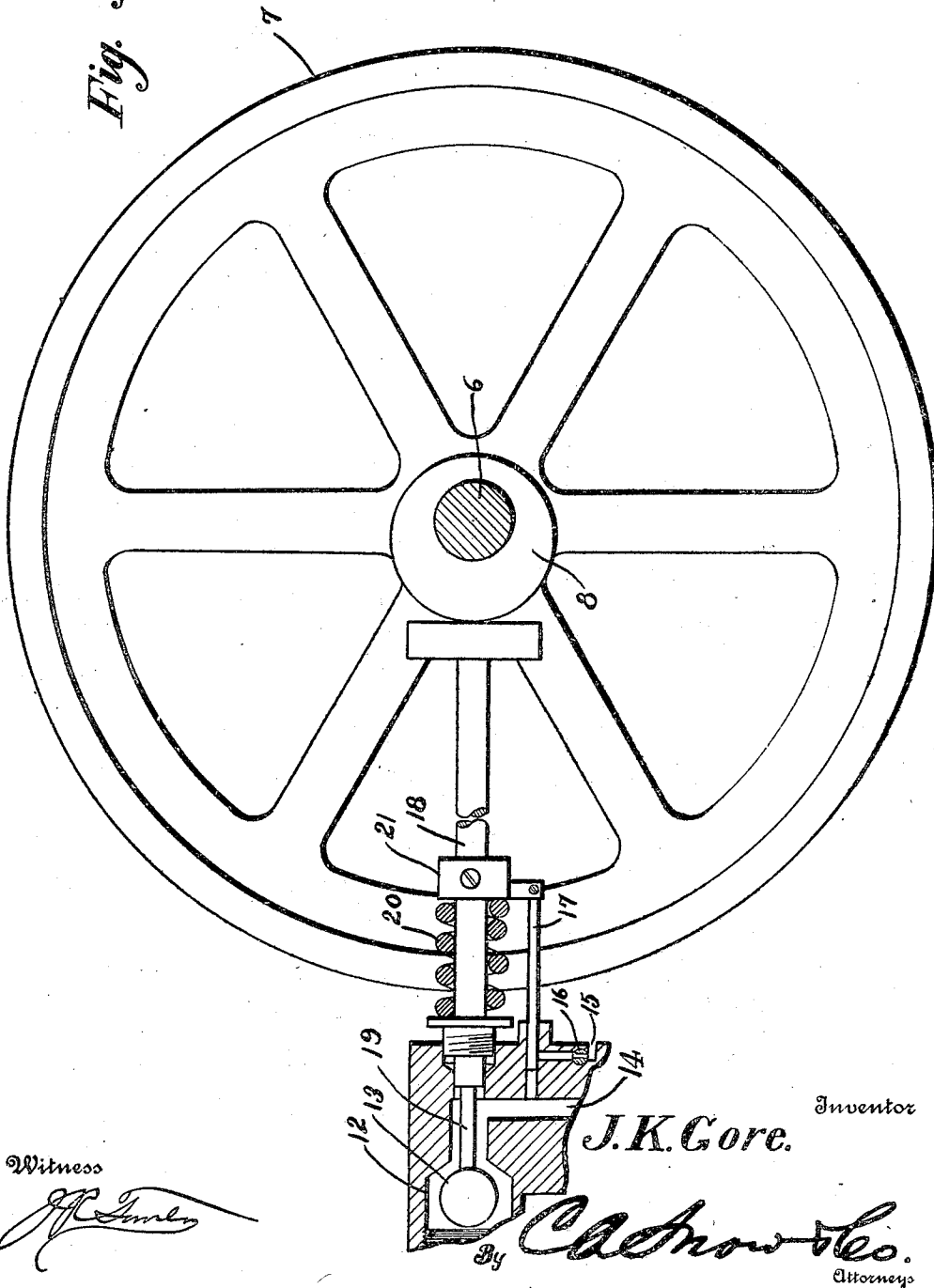
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Fig. 3.



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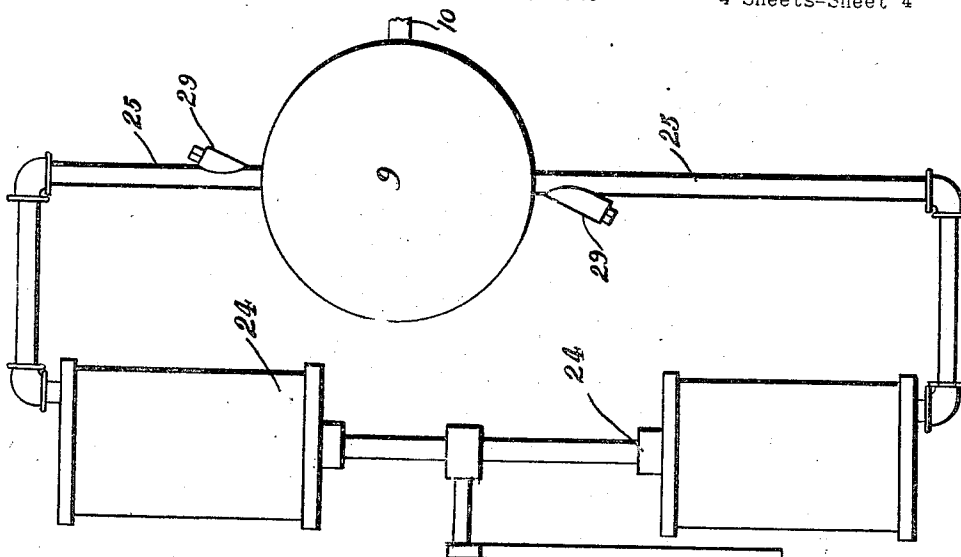


Fig. 5.

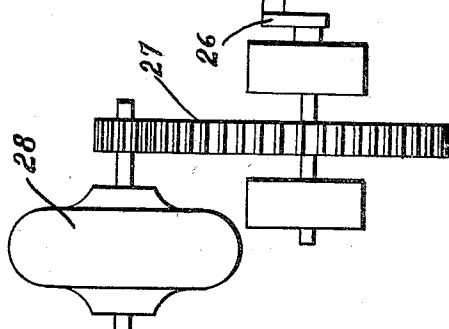
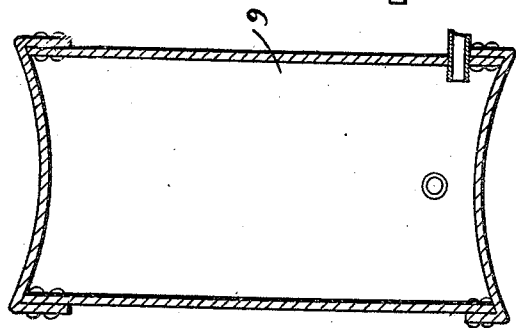


Fig. 6.



Witness  
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Patented July 22, 1924.

1,502,244

# UNITED STATES PATENT OFFICE.

ROBERT J. K. GORE, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO WILLIAM J. GRANDCHAMP, OF DETROIT, MICHIGAN.

## ENGINE.

Application filed May 8, 1920. Serial No. 379,926.

*To all whom it may concern:*

Be it known that I, ROBERT J. K. GORE, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Engine, of which the following is a specification.

This invention relates to engines and more particularly to a motor adapted to be operated by air under pressure, there being a simple form of valve mechanism combined with the engine whereby pressure will be admitted successively to the cylinders so as to drive the pistons and set up a rotation of fly wheels at a high speed, it being possible, after such a speed has been obtained, to shut off the exhaust so as to conserve the supply of compressed air until the operation of the engine due to momentum of its fly wheels, becomes reduced whereupon the exhaust can be opened and the actuation of the motor continued as before.

With the foregoing and other objects in view, which will appear as the description proceeds the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that, within the scope of what is claimed, changes in the precise embodiment of the invention shown can be made without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is a view partly in plan and partly in section through the apparatus, the means for placing air under pressure in the storage tank being shown in diagram.

Figure 2 is a side elevation of a portion of the structure, parts being broken away.

Figure 3 is an enlarged section through the valve mechanism of one of the cylinders.

Figure 4 is a view showing, in diagram, the controlling governor and the valve mechanism operated thereby.

Figure 5 is a detail view of the air compressing mechanism.

Figure 6 is a section through the air tank.

Referring to the figures by characters of reference 1 designates the base of the engine on which are mounted oppositely disposed cylinders 2 having pistons 3 therein connected by pitmans 4 to a crank 5 forming

a part of a shaft 6. This shaft is journaled on the bed or base of the engine and carries heavy fly wheels 7 and a pair of cams 8.

A compressed air storage tank 9 is located adjacent the base 1 and has an outlet pipe 10 provided with branches 11 which open into ports 12 extending to the outer ends of the respective cylinders 2. Each of these ports has a ball valve 13 normally held to its seat by the pressure from the pipe 11 so that air will be held against admission to the cylinder 2. Extending from each of the air passages 14 which connect the cylinders 2 with the ports 12 are exhaust ports 15 each of which has a rotary valve 16 therein and a slide valve 17. The slide valves 17 are connected and move with plungers 18. Each plunger has a pin 19 projecting from one end thereof and toward the ball valve 13 adjacent thereto and mounted on each plunger 18 is a spring 20 which bears against a collar 21 and serves to hold the plunger normally shifted away from the ball valve. The plungers 18 are limited in their movement by collars 22 or the like mounted thereon and which are adapted to bear against the guides 23 in which the plungers are mounted.

Air may be placed under compression in the tank 9 by any suitable means provided for that purpose. For example a double action pump 24 may be connected by pipes 25 to the tank 9, this pump being operated by a crank 26 driven through gears 27 from a motor 28. It is intended to operate this pump only when the pressure in the tank falls to a predetermined degree. It will be understood of course that the pipes 25 will be provided with check valves to prevent escape of pressure by way of the pipes 25. These check valves have been indicated at 29.

Any suitable means may be provided for automatically operating the valves 16. For example, and as shown in diagram in Figure 4, these valves may be provided with laterally extending arms 30 connected by a rod 31 so that the two valves will rotate in unison. Another arm 32 may be extended from one of the arms 30 and connected by a rod 33 to a bell crank lever 34 which, in turn, has an upwardly extending rod 35 attached to it and carrying a finger 36. This finger overhangs a disk 37 which forms the movable end portion of a centrifugal governor 38. A cord belt 39 may be used to drive this

governor from a pulley 40 on the shaft 6. The parts can be so timed and proportioned that when the shaft 6 rotates at a predetermined speed the disk 37 of the governor  
5 will be elevated against the finger 36 and shift the finger so as to simultaneously rotate the valve 16 and cut off the exhaust ports of the two cylinders irrespective of the positions of the slide valves 17. A spring  
10 41 can be used for holding the two valves 16 normally open.

In using the motor herein described air is first placed under pressure in the tank 9 and is then directed into the branch pipes  
15 11 by opening a valve 42 in the pipe 10. The shaft 6 is rotated and the cams 8 will successively engage the rods 18 and shift them longitudinally so as to unseat the ball valves 13 successively. Thus air will be ad-  
20 mitted successively to the two cylinders 2, thereby to drive the pistons 3 in proper succession. Each time a spring 20 returns its rod 18 after unseating its valve 13, the rod 18 will shift valve 17 so as to open the  
25 exhaust port 15. The valve 16 in this exhaust port is normally open and it will therefore be seen that until the engine obtains a predetermined speed, air will be exhausted therefrom through the ports 15  
30 during each return stroke of each piston, the exhausting of the spent air being permitted because the slide valves 17 are in open position during said return stroke. When, however, the speed of the engine becomes  
35 such as to lift the governor disk 37 against the finger 36, the mechanism controlled by the governor will shift the valves 16 so as to close them. Accordingly the momentum of

the wheels 7 will be sufficient to continue the operation of the engine against the pres- 40  
sure of air exerted upon the pistons but as the momentum is reduced the valves 16 will be opened automatically by the spring 41 and the engine will again be driven by the  
45 air under pressure, as before. By thus utilizing an engine in which momentum is employed for carrying it at intervals, considerable saving in compressed air results.

What is claimed is:

The combination with a crank shaft, a cyl- 50  
inder and a piston mounted for reciprocation in the cylinder and connected to the crank shaft, of an inlet port and an exhaust port in communication with one end  
55 of the cylinder, means for directing fluid under pressure to the inlet port, a ball valve for closing the inlet port, a slide valve for closing the exhaust port, a plunger mounted for reciprocation by the crank shaft, a pin  
60 actuated thereby for unseating the ball valve, a connection between the slide valve and the plunger, yielding means for holding the plunger at one extreme position with  
65 the pin out of contact with the ball valve and with the slide valve in open position, said plunger being shiftable to simultaneously unseat the ball valve and close the exhaust port.

In testimony that I claim the foregoing as my own, I have hereto affixed my signa- 70  
ture in the presence of two witnesses.

ROBERT J. K. GORE.

Witnesses:

ARTHUR R. KOSEL,  
THERESA M. KOSEL.