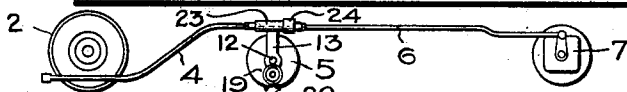
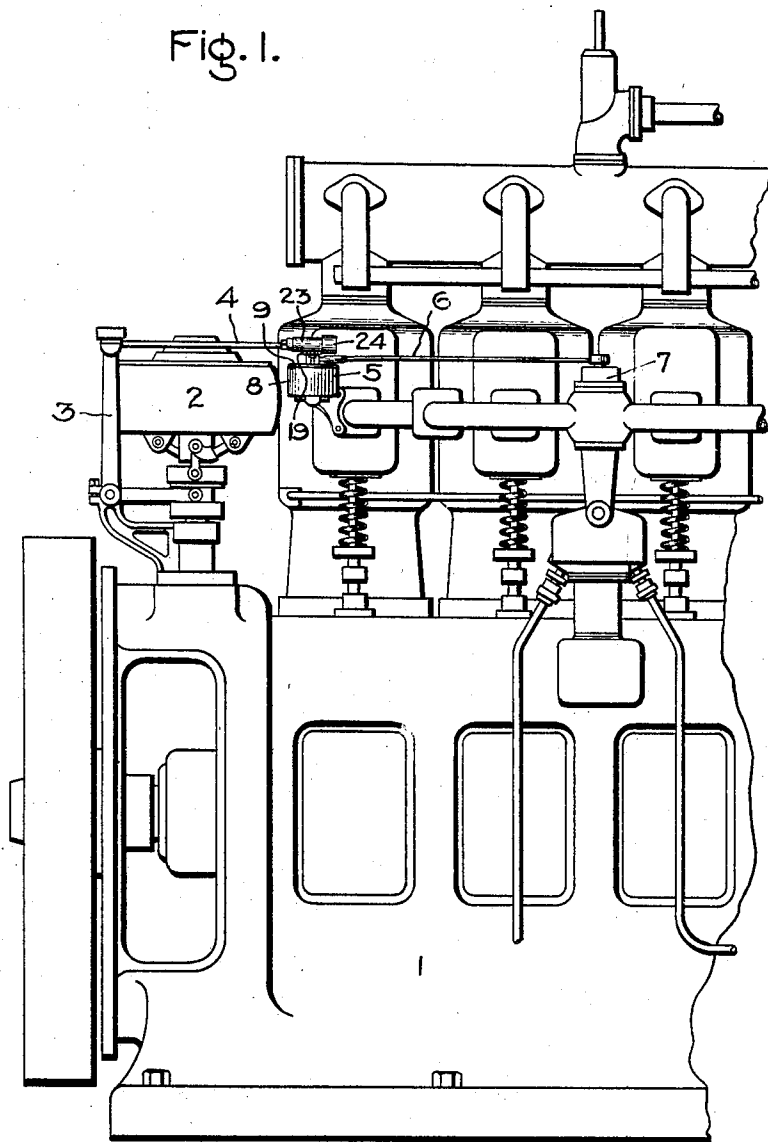


Fig. 1.



Witnesses:

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Fig. 6.

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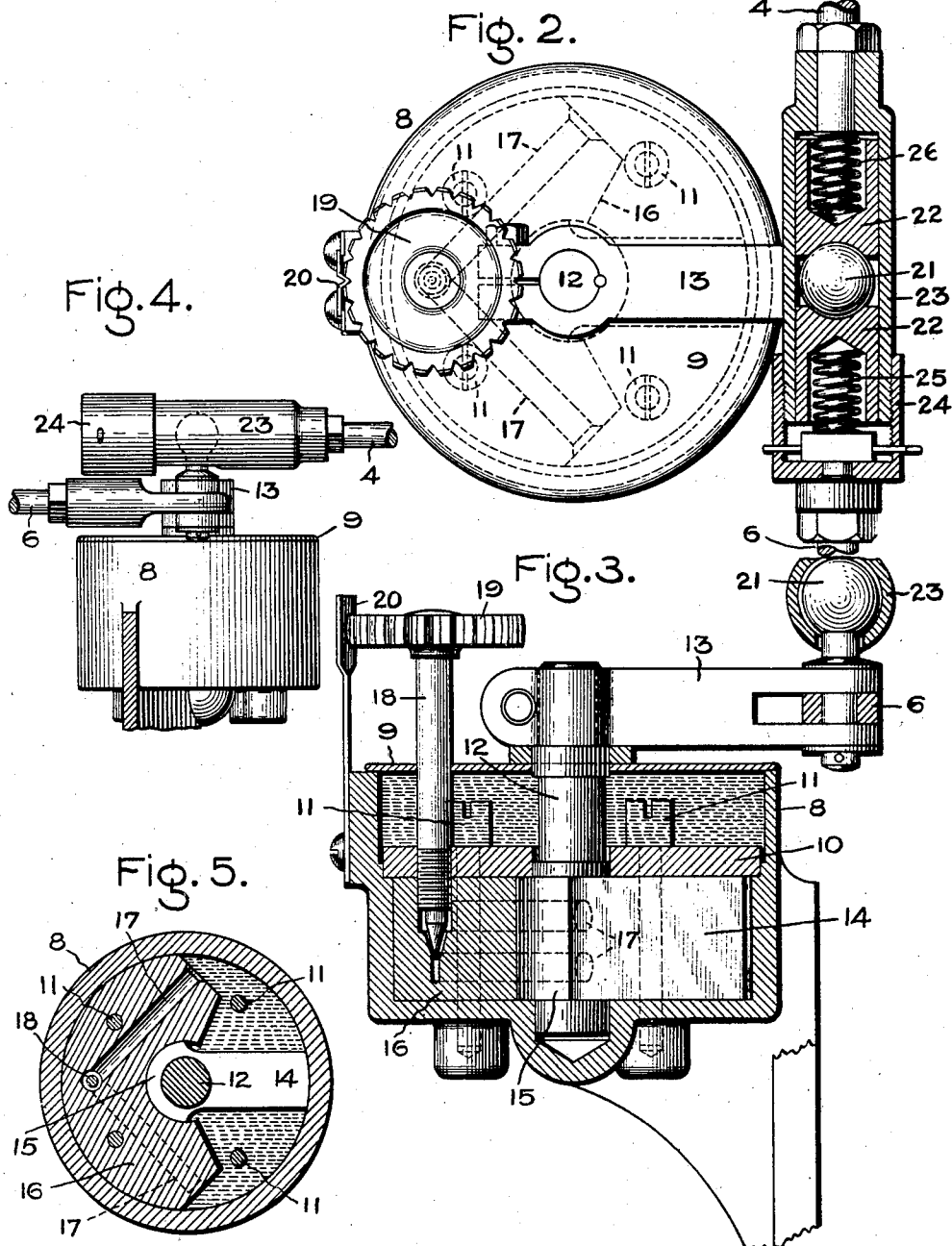
GOVERNOR FOR GAS ENGINES DRIVING ALTERNATORS IN PARALLEL.

APPLICATION FILED SEPT. 14, 1912.

Patented Mar. 13, 1913.

1,056,557.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

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GOVERNOR FOR GAS-ENGINES DRIVING ALTERNATORS IN PARALLEL.

1,056,557.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed September 14, 1912. Serial No. 720,344.

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, residing at Erie, in the county of Erie, State of Pennsylvania, have invented certain new and useful Improvements in Governors for Gas-Engines Driving Alternators in Parallel, of which the following is a specification.

This invention relates to internal combustion engines used for driving alternating current generators, and is especially applicable in the case of the parallel operation of such units. When two or more alternators are feeding the same bus bars, hunting is liable to occur, by reason of variations in angular velocity due to irregularities in the turning moments of the several machines. Such variations may be reduced by using heavy fly-wheels, on the engines, and also by damping the governor so that it will not respond to small and quick variations in speed such as occur during one revolution, but will respond only to steady and continued changes in speed. This result is obtained by fitting each governor with a dash-pot so that it is rendered more sluggish and will make no alteration in the supply of motive fluid except when the force acting on the governor is continued for some length of time.

The object of my invention is to improve this mode of control by interposing between the governor and dash-pot a lost motion device which will permit small variations in the position of the governor weights without affecting the dash-pot. In other words, the governor is left free to respond to small and quick variations in the speed of the machine, but these do not affect the throttle valve. The alternators can, therefore, hunt within a small predetermined range, due to slight variations in the speed of their driving engines resulting from cyclic variations in the cylinder firing, or other cause, but any differences in speed likely to prove serious are taken care of by the throttle, damped in its movements by the dash-pot.

In the accompanying drawings, Figure 1 is a side elevation of part of an internal combustion engine, equipped with my improved governing device. Fig. 2 is a plan view of the dash-pot on a larger scale and partly in section. Fig. 3 is a sectional elevation of the same, Fig. 4 is a side elevation on a smaller scale, Fig. 5 is a horizontal sec-

tion and Fig. 6 is a plan of the governor dash-pot and throttle valve and their connections.

The internal combustion engine 1 is of the multi-cylinder type. It is assumed to be direct-coupled to an alternating current generator operating in parallel with other similar machines, though these are not shown in the drawing. The engine has a speed governor 2 of any desired construction, which actuates a bent lever whose upright arm 3 is connected by a rod 4 to a dash-pot 5, from which a rod 6 runs to the throttle valve 7 of the engine.

The dash-pot I prefer to use is of the horizontal vane type, because this can be readily sealed so as to exclude the entrance of air and thus its uniform operation can be insured. The plunger type of pot cannot be made air-tight without considerable trouble and expense in packing the rod. My improved dash-pot is illustrated on the second sheet of the annexed drawings and comprises a pot 8 having a lid 9 and a diaphragm 10 dividing it into upper and lower chambers and secured in place by screws 11. An upright shaft 12 is journaled in the bottom and in the lid through which it passes, its outer end carrying an arm 13 by which it can be turned. The shaft also carries a radial upright vane 14, whose outer end makes a sliding fit with the inside of the lower chamber of the pot, while its lower and upper edges fit equally tight against the bottom of the pot and the underside of the diaphragm 10, respectively. The hub 15 of the vane is cylindrical, and fits in a semi-cylindrical recess in one side of a thick partition 16 which fills part of the vane chamber and with said vane divides said chamber into two compartments. Ports 17 pass through this partition, connecting the two compartments. A needle valve 18 controls these ports, and varies the flow of the liquid therethrough and consequently also the rate of movement of the vane. The valve is made with a slight clearance so that it can never close the ports entirely and lock the vane. A notched head 19 on the valve spindle, cooperating with a spring detent pawl 20, enables the valve to be held at any adjustment.

The arm 13 is connected by the rod 6 with the throttle valve of the engine, the joints being such as to permit practically no lost

motion. But the joint between the arm on the rod 4 running to the speed governor is constructed to allow considerable play; preferably as follows: On the arm is a ball 21 clamped between two followers 22 which have cavities to fit said ball. The followers are held in a tube 23 secured to the rod 4 at one end, which is closed. The other end of said tube has a cap 24 screwed upon it in which is a seat for a spring 25 pressing one of the followers against the ball 21. A similar spring 26 at the other end of the tube urges the other follower against the ball. The tension of the spring can be adjusted by screwing the cap on or off. With this construction the rod 4 and tube 23 can move a small distance to and fro lengthwise, without moving the arm 13, the reciprocations being absorbed by the springs 25, 26. When the thrust on the rod exceeds the play permitted the followers in the tube, the arm 13 will be turned more or less depending upon the amount of change in the position of the governor ei. ats. This movement of the arm 13 will be transmitted unchanged to the throttle valve 7 at a rate of speed depending upon the rate of flow of the liquid in the dash-pot, through the ports 17. In whatever position the arm comes to rest, the springs 25, 26 still permit the small reciprocations of the governor rod 4 to occur as before.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. The combination with an internal combustion engine having a speed governor, a

throttle, and a dash-pot for damping the movements of said throttle, of a lost motion device between the governor and the dash-pot.

2. The combination with an internal combustion engine having a speed governor, a throttle, and a dash-pot for damping the movements of said throttle, of a rod connecting said governor and dash-pot, and means permitting a slight predetermined range of reciprocation of the said rod without affecting said dash-pot.

3. The combination with an internal combustion engine having a speed governor, a throttle, and a dash-pot for damping the movements of said throttle, of a rod connecting said governor with the movable member of said dash-pot, and a joint between said rod and member which yields to small lengthwise movements of said rod.

4. The combination with an internal combustion engine having a speed governor, a throttle, and a dash-pot for damping the movements of said throttle, of a rod connecting said governor with the movable member of said dash-pot, and spring followers carried by said rod and engaging with said movable member.

5. The combination with an internal combustion engine, having a speed governor and a throttle, of a vane dash-pot having an actuating arm connected with said throttle, a rod actuated by the governor, a tube on said rod, followers in said tube engaging with said arm, and springs forming a yielding connection between said followers and said tube.

In witness whereof, I have hereunto set my hand this eleventh day of September 1912.

HERMANN LEMP.

Witnesses:

OTTO F. PERSSON,
FRANK G. HATTIE.