No. 793,285. PATENTED JUNE 27, 1905.

J. L. DORMON.

GOVERNOR.

APPLICATION FILED JAN. 27, 1905.

Fig. 2.

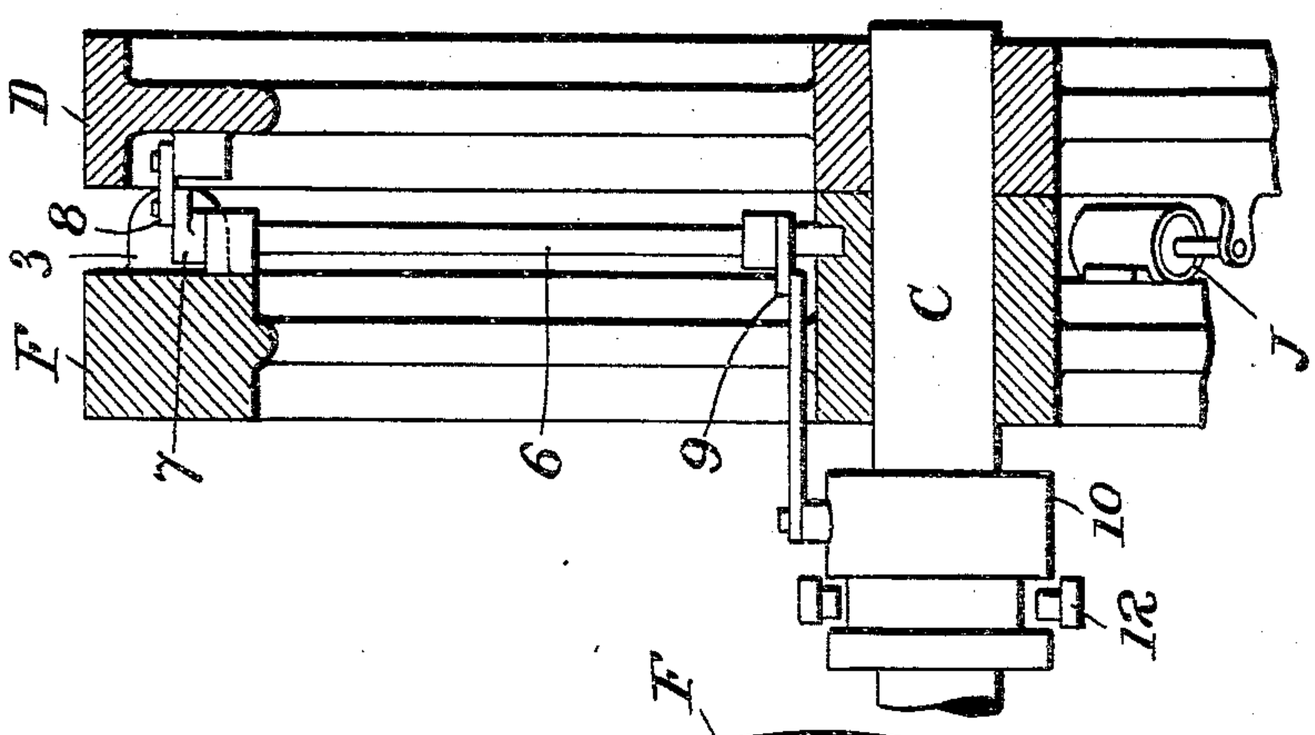
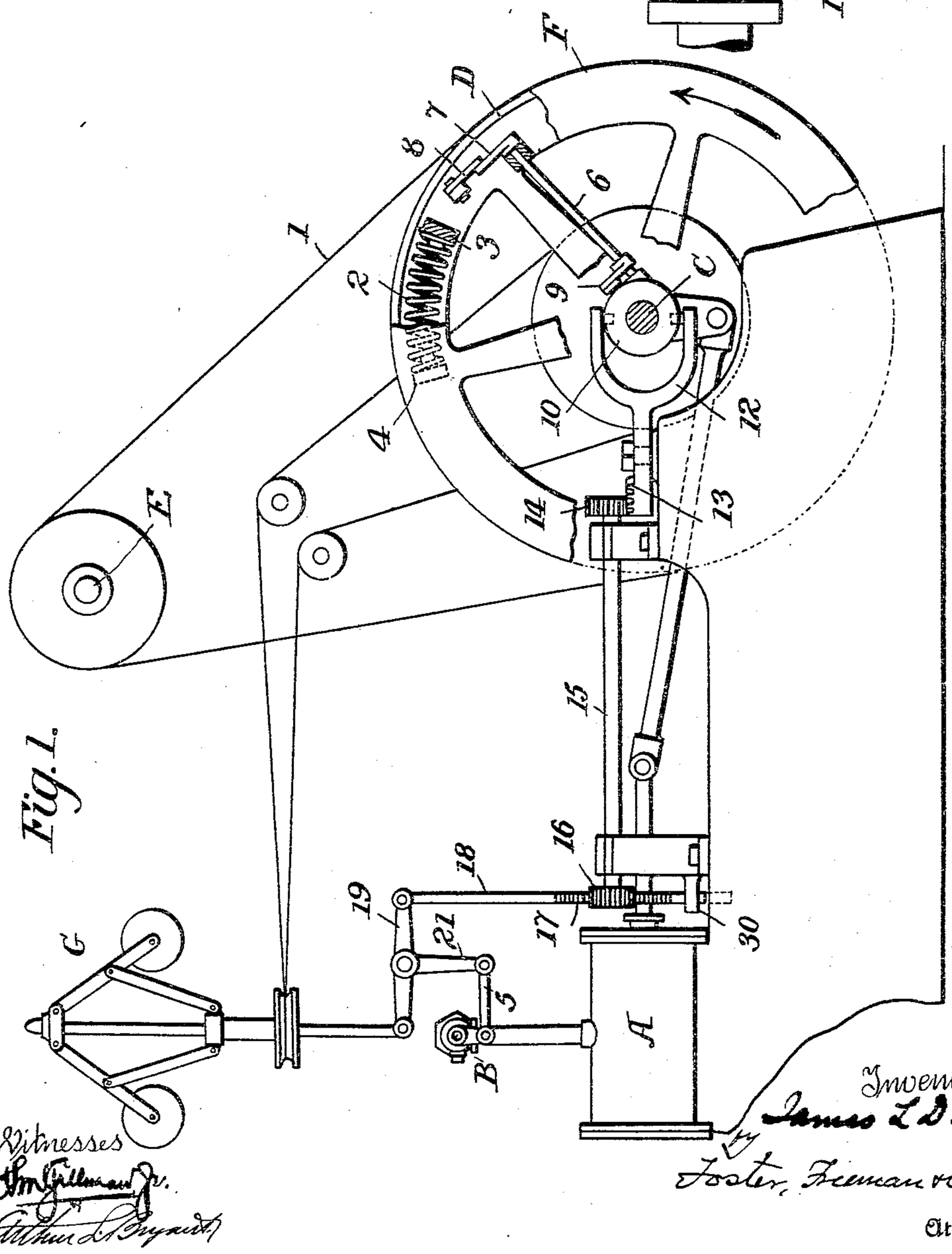


Fig. 1.



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UNITED STATES PATENT OFFICE.

JAMES LAURENCE DORMON, OF CROWLEY, LOUISIANA.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 793,285, dated June 27, 1905.

Application filed January 27, 1905. Serial No. 242,968.

To all whom it may concern:

Be it known that I, JAMES LAURENCE DORMON, a citizen of the United States, residing at Crowley, in the parish of Acadia, in the State of Louisiana, have invented certain new and useful Improvements in Governors, of which the following is a specification.

My invention relates to the control of motors; and it consists of a governor device whereby the control-valve or other control device of the motor is shifted on any change of "load" and before any change of speed of the motor, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a side view of a reciprocating engine, illustrating my improved governor in one of its forms and one means of arranging the same, part of the fly-wheel being broken away. Fig. 2 is an enlarged cross-section through part of the fly-wheel and the drive-wheel, (governing-wheel,) showing the connection between the two.

A represents the prime mover, which, as shown, illustrates a steam-engine, but which may be a motor of any suitable character.

B is the control device of the motor, which control device, as represented, is the throttle controlling the flow of steam, but in the case of a steam-engine may be any valve or device of suitable character and in the case of other motors may be a rheostat, switch, or other device the adjustment and operation of which will determine and regulate the amount of steam or gas or other fluid, electric current, &c., supplied to operate the engine, and C represents the shaft of the engine, which shaft is provided with a disk, gear, or band wheel D, from which movement is imparted to the shaft E of the apparatus driven by the engine. In the case of the band-wheel a belt 1 transmits the motion; but where a gear is employed there will of course be a corresponding gear on the shaft E, or where there is a friction-disk the shaft E will have a corresponding friction-disk.

All of the above-described parts will vary according to the character of the motive power and motor employed and the special form of apparatus and gearing; but in any case movement is imparted directly or indirectly to the shaft C, and the part D, which I shall hereinafter call a "drive-wheel," (but which may be of any of the constructions above set forth,) is normally caused to rotate with and at the same speed as the shaft, but is so mounted that the power of the motor is transmitted through it to the load and so that it is capable of a slight rotary movement independently of the shaft—that is to say, a slight change of its radial position with respect to the said shaft. As one means of securing and utilizing this limited independent movement in the operation of the engine I interpose between a part carried by the shaft—as, for instance, the fly-wheel F and the drive-wheel D, (which, however, might be the armature of an electric dynamo or a drum or gear)—a spring 2, which is compressed or distended when the parts are in motion until its tension causes the parts D and F to rotate together, the tension upon the spring 2 when the engine is in operation being at all times in proportion to the load being carried; but upon the partial or entire removal of the load, either gradually or suddenly, the distention or contraction of said spring imparts a limited independent rotary movement to the drive-wheel D. This independent rotary movement of the drive-wheel D backward or forward with respect to the shaft, as the case may be, is definitely limited by means of any suitable stops, and the strength of the spring 2 is so adjusted that when the engine is running "free" or carrying no load the drive-wheel D will independently rotate as far forward with respect to the shaft and fly-wheel as the stop or limiting device will permit, and so that when the maximum load for which the engine is designed is thrown on the drive-wheel D will independently rotate as far backward with respect to the shaft and fly-wheel as the other stop or limiting device will permit, and for any intermediate amount between no load and full load the drive-wheel will occupy with respect to the shaft and fly-wheel a corresponding intermediate position between the said extreme "forward" position and the said extreme "backward" position. As illus-

trated in Fig. 1, the spring 2 is interposed between a bracket 3 on the fly-wheel F and a bracket 4 upon the drive-wheel D and is under compression in proportion to the load being carried when the engine is in operation. The said independent rotary motion of the drive-wheel D is made the means through any suitable devices of actuating the control device B of the engine whatever may be the character of such device in such manner that upon such change of the position of the drive-wheel D with respect to the shaft and fly-wheel occasioned by and corresponding to any change in the amount of load being carried the control device B will be so shifted as to increase or decrease the power supplied to the engine in proportion to the increase or decrease of load and at practically the same instant that the increase or decrease of load occurs. In many instances a centrifugal speed-governor may be also employed to advantage to operate either independently of or in conjunction with my governing device, as conditions of operation may require, and I have illustrated a ball-governor G connected to one end of the "floating lever" 19, so as to operate the lever 5 of the control device; but any suitable form of speed-governor may be employed. While various different forms of connections may be used for imparting to the control device the said independent movement of the part D, I have shown merely for purposes of illustration an arrangement which is constructed as follows: A rock-shaft 6 is carried by the fly-wheel F and has an arm 7 connected by a link 8 with the drive-wheel D and a crank-arm 9, which is connected by a rod to the sleeve 10, sliding longitudinaly upon but turning with the shaft C. The pins on a fork 12 also enter a groove of the sleeve 10, and this fork being pivoted at an intermediate point, as illustrated, carries at its other end a curved rack 13, engaging a pinion 14 on a shaft 15, and another pinion 16 on this shaft engages a rack 17 upon a rod 18, connected with one end of a lever 19, the other end of which is connected with the usual sliding rod of the governor G. It will be evident, therefore, that the lever 19 is a floating lever, one end of which may be lifted or depressed by the speed-governor G and the other end of which may also be lifted or depressed by the said independent movement of the drive-wheel D, resulting in the rocking of the shaft 6 and the sliding of the sleeve 10. The lever 5 of the control device B is centrally connected to the lever 19 by a connecting-rod 21, and the control device is therefore under the control of both the speed-governor G and what I term the "power-governor," operated by the drive-wheel D. It will of course be evident that where the speed-governor G is not employed the connection will be only between the drive-wheel D and the control device. It will be evident, however, that when both are employed the governor G will operate effectively, especially in starting up the engine under load.

When no centrifugal governor is used, the parts should be so adjusted that when there is no load, and consequently no material tension on the spring 2, enough steam will be admitted to run the engine free at normal speed. In this case in starting up without load on the introduction of steam the engine would run up to normal speed and upon throwing on the load either partially or entirely there would be an immediate change of position of the drive-wheel D with respect to the shaft in proportion to the amount of load, and a proportionate amount of steam will be at the same time admitted to the engine to carry the load, and in case of a decrease of load, resulting in a decrease of the tension on the spring 2, there would be a proportionate independent movement forward of the drive-wheel D with respect to the shaft C, which by the means before described would at the same time the decrease of load occurred operate the control device B and reduce the amount of steam admitted to the engine in proportion to the decrease of load. To start up under a load in this case, the rod 18 is thrown out of gear with the pinion 16 (by shifting its guide 30) or the connection between the drive-wheel and control device is broken by some other suitable means and the regulation effected by hand until normal speed is attained, when the connection may be reëstablished and operations carried on as before described. When a centrifugal or speed governor also is used, as illustrated, the parts should be adjusted in such case also that when the engine is running at normal speed without load enough steam will be admitted to maintain the normal speed. In such case the speed-governor G will be holding its end of the floating lever 19 at a point about midway between an extreme high and an extreme low position. There being no material resistance to the revolution of the drive-wheel, the spring 2 will have the drive-wheel (independently) rotated as far forward with respect to the shaft as the stop will permit, and by the operation of the aforesaid devices the power-governor end of the floating lever 19 will be elevated to its highest position. Then when any load, either large or small, is thrown on the engine either gradually or suddenly the increased resistance to the revolution of the drive-wheel D simultaneously causes it to rotate (independently) backward against the resistance of the spring 2 a distance in proportion to the increase of load, thereby by means of the devices shown or other suitable devices depressing the end of the lever 19 a proportionate distance, also depressing the lever 5 a proportionate distance and by means of the control device G admitting more steam to the engine in exact proportion to the in-

crease of load at the same time that the increase occurs without permitting any change in the speed of the engine. It will thus be seen that during the operation just described as there is no change of speed the speed-governor will be holding its end of the lever 19 stationary, the regulation being effected entirely by my power governor device. Then should there be a decrease of load the decreased resistance to the revolution of the drive-wheel D will permit the tension of the spring 2 to simultaneously rotate the drive-wheel (independently) forward with respect to the shaft C a distance in proportion to such decrease of load, thereby by means of the said devices or by other suitable means elevating the end of the lever 19 a proportionate distance, also elevating the lever 5 a proportionate distance, and by means of the control device G admitting less steam to the engine in exact proportion to such decrease of load and at the same time that the decrease occurs without permitting any change in the speed of the engine, the speed-governor in the meantime holding its end of the lever 19 stationary, the regulation being effected by my power-governor, as aforesaid. It will be seen that by these means I secure a uniform rotation of the shaft, and it will be evident that these parts will operate upon the control device to regulate the energy supplied to the engine simultaneously with any change of load and will be more sensitive in their action than if depending upon the engine to first change its speed and then thereby control the governor which operates the control device. In other words, my improved governing device will act to insure the maintenance of a uniform speed of the shaft C regardless of changes of load instead of depending upon the change of speed of the shaft C to regulate the power applied to the shaft, and I am therefore enabled to drive the part E, whatever it may be, with a uniform motion not secured by an ordinary centrifugal or speed governor.

When a centrifugal governor is used with the parts adjusted as aforesaid, it will be evident that in starting up without load more than enough steam to run at normal speed without load will be at first admitted and gradually decreased until the normal speed is attained, so that, on starting, the engine will quickly run up to normal speed, and in starting up under load the only difference will be that as soon as steam is admitted the tension on the spring 2 will regulate the power-governor end of the lever 19 in proportion to the load, and the speed-governor G will have its end of the lever 19 depressed at first, so as to admit more than enough steam to run at normal speed with the load then being carried, the amount of steam being gradually reduced until normal speed is attained, after which operations will be carried on as before described.

There of course may be a single spring 2 or a nest of springs, or instead of one there might be two or more arranged at different points on the drive-wheel, and the spring may be of metal, rubber, or of any suitable form or material, and instead of one rock-shaft 6 there of course might be a plurality arranged at different points. The projection and brackets before described for positively limiting the independent movement of the drive-wheel might preferably be provided with cushions or springs to prevent shock in case of any great sudden increase or decrease of load. In many cases a fly-wheel should be used of sufficient size and weight to accomplish the purposes for which such wheels are usually employed; but in some cases—as, for instance, a heavy water-wheel—the fly-wheel might be reduced in weight or omitted altogether. In the case of a direct-connected engine and dynamo the armature of the dynamo could be substituted for and in place of the drive-wheel D. In some cases one or more dash-pots T could be interposed with advantage between the drive-wheel and fly-wheel or some other part carried by the shaft C for the purpose of preventing the said independent movement of the drive-wheel from taking place too suddenly and to prevent vibration. The drive-wheel should be allowed only sufficient independent movement to properly operate the devices between it and the lever 19, and no more. All or any of these different devices, additions, or modifications may be used or not, as the circumstances may render proper or desirable. To prevent too sudden an action, a dash-pot J may be put between the two wheels F D—for instance, the cylinder of the dash-pot on the wheel F with an arm on the wheel D, connected to the piston-rod of the dash-pot.

I claim—

1. A governor in which are combined a motor and its control device, a drive-wheel mounted to continuously turn with but capable of limited independent rotation on the shaft of said motor, means for turning said wheel independently of the shaft when the load is varied, and connections between said drive-wheel and the control device whereby the latter is shifted when the said drive-wheel has an independent movement, substantially as set forth.

2. A governor in which are combined a motor and its control device, a speed-governor, a drive-wheel capable of limited independent rotation on the shaft of the motor, means for turning said drive-wheel independently of the shaft when the load is varied, and connections between said drive-wheel and the control device whereby the latter is

shifted, independent of the action of the speed-governor, when said drive-wheel has an independent movement, substantially as set forth.

3. The combination with the shaft of an engine, of a drive-wheel mounted to turn continuously with but to have a limited independent rotation on said shaft, a control device for the engine, and connections whereby the movement of the drive-wheel independent of the shaft is the means of shifting the control device, substantially as set forth.

4. The combination with a motor and its shaft and with a control device for the motor, of a wheel mounted upon said shaft to turn continuously with but independently thereof to a limited extent and connected to drive the load, and connections whereby the independent movement of the said wheel operates the control device, substantially as set forth.

5. The combination with a motor and its shaft and with a control device for the motor, of a wheel mounted upon said shaft to turn independently thereof to a limited extent and connected to drive the load, a spring interposed between the said shaft and the said wheel, and connections whereby the independent movement of the said wheel operates the control device, substantially as set forth.

6. The combination of the motor, control device, shaft, wheel D having a limited independent rotary motion on said shaft, a sleeve sliding on the shaft, connections between the sleeve and the wheel D whereby the independent movement of the latter slides the sleeve, and connections whereby the movement of the sleeve may operate the control device, substantially as set forth.

7. The combination of the motor, control device, shaft, wheel D having a limited independent rotary motion on the shaft, connections between the sleeve and the wheel D whereby the independent movement of the latter slides the sleeve, connections whereby the movement of the sleeve may operate the control device, and a speed-governor also connected to operate said control device, substantially as set forth.

8. The combination of an engine, or other motor, and its shaft, a control device, a speed-governor, a lever connected to be operated by the speed-governor and to operate the control device, a wheel D having a limited independent movement of rotation upon the said shaft, and connections whereby the said independent movement imparts movement to the said lever operated by the speed-governor, and connections from the center of said lever to the control device whereby the movement of the said lever operates the control device, substantially as set forth.

9. The combination with a motor and its control device, of a governor, through which the power of the motor is transmitted to the load, means for retaining the latter in position according to the resistance of the load, and connections between the said governor and the control device whereby the latter is shifted as a result of the load changing and independently of the changes of speed of the motor, substantially as set forth.

10. The combination with a motor and its control device and speed-governor, of a governor, means for retaining the latter in position according to the resistance of the load, and connections between the said governor and the control device whereby the latter is shifted as a result of the load changing and independently of changes of speed of the motor, and connections between the speed-governor and the control device whereby the latter may be shifted by a change of speed, whereby the control device may be operated either by the speed-governor or the power-governor acting separately or together, substantially as set forth.

11. The combination with a motor and its shaft and with a control device for the motor, of a wheel mounted upon said shaft to turn continuously with but independently thereof to a limited extent and connected to drive the load, connections whereby the independent movement of the said wheel operates the control device, and a dash-pot, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES LAURENCE DORMON.

Witnesses:

JAMES R. WEBSTER,

WARREN E. SCOTT.