(No Model.)

A. L. F. BAYLE.

DYNAMOMETRIC GOVERNOR FOR STEAM ENGINES.

No. 590,954. Patented Oct. 5, 1897.

Fig. 1.

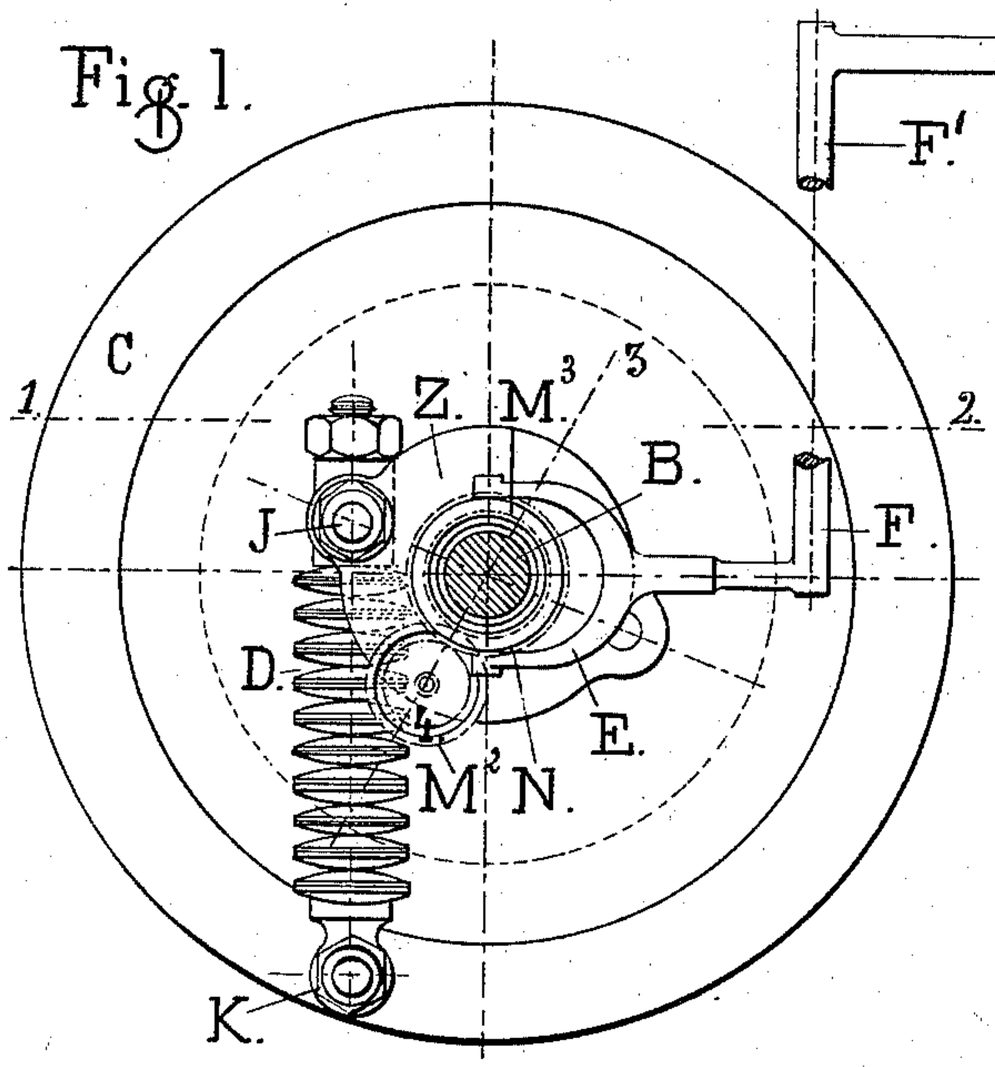


Fig. 3.

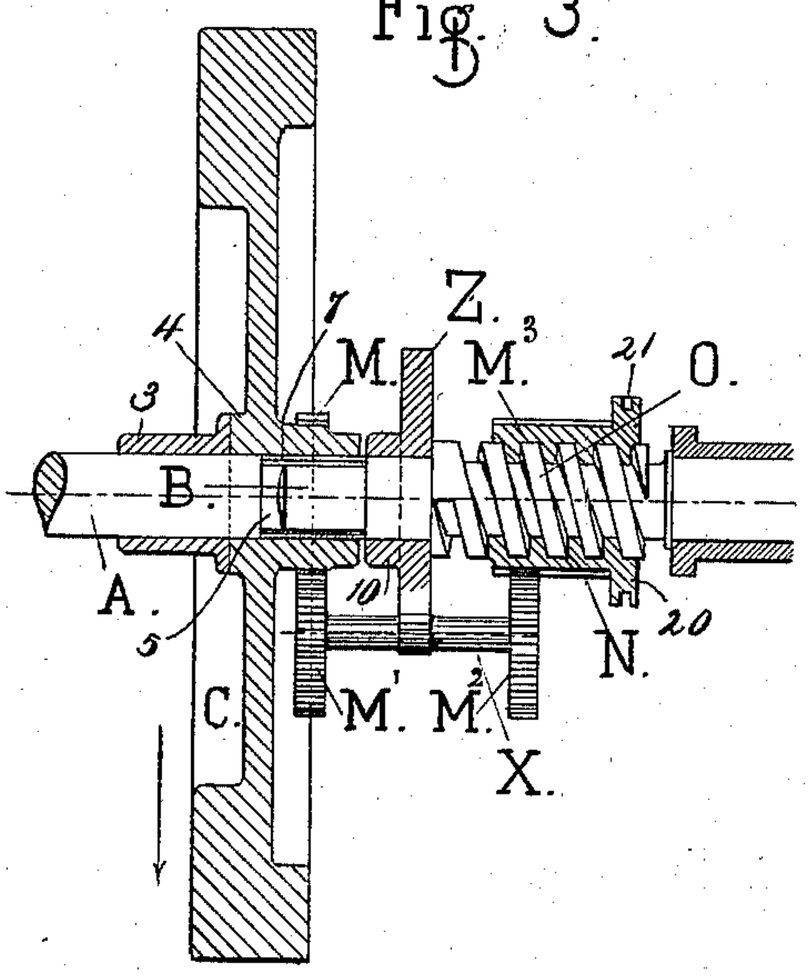


Fig. 2.

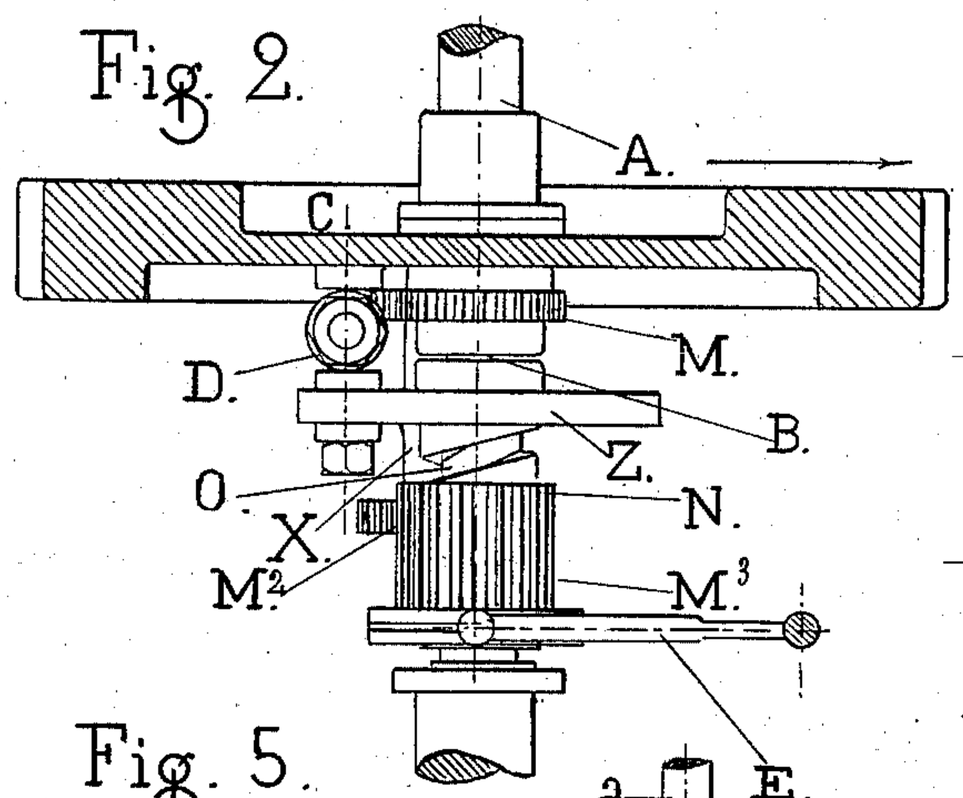


Fig. 4.

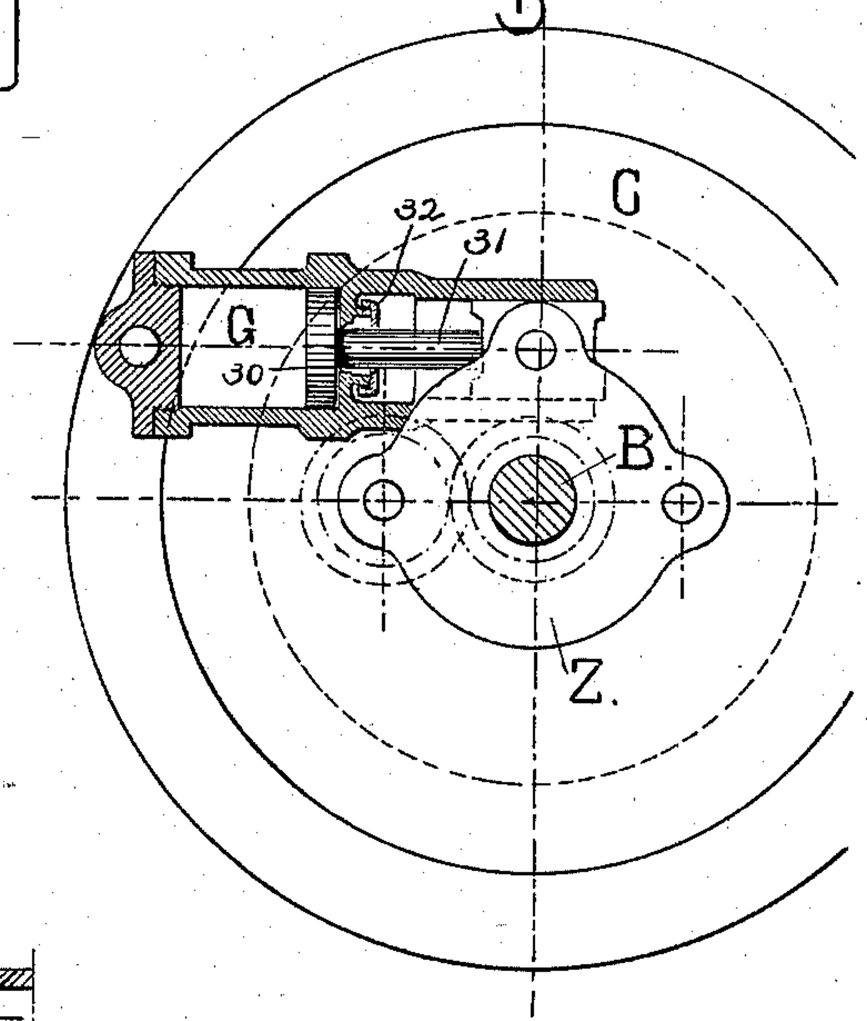
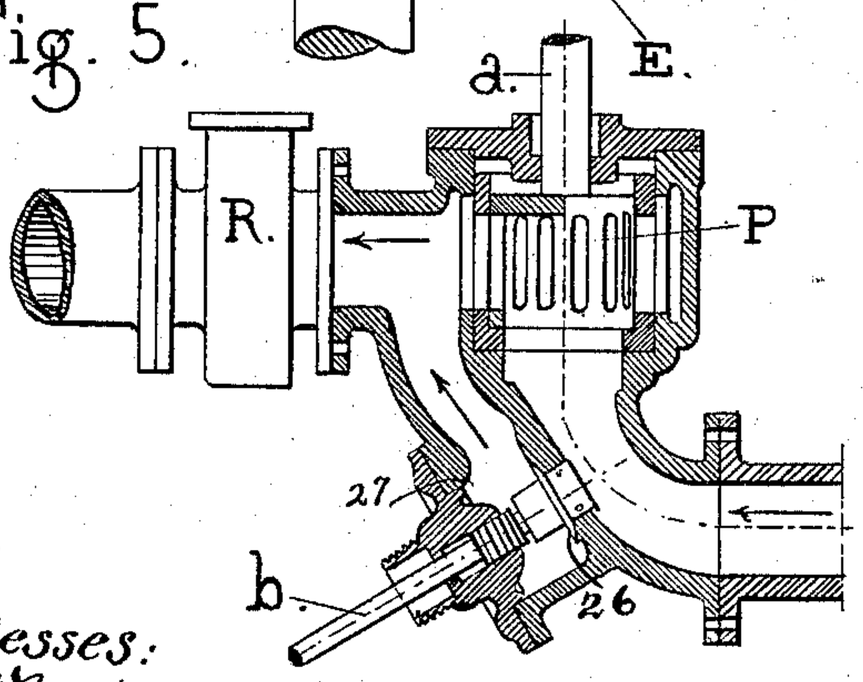


Fig. 5.



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UNITED STATES PATENT OFFICE.

ANTOINE LÉGER FÉLIX BAYLE, OF CHERBOURG, FRANCE.

DYNAMOMETRIC GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 590,954, dated October 5, 1897.

Application filed January 27, 1896. Serial No. 577,007. (No model.) Patented in France December 2, 1895, No. 252,684, and in Germany September 15, 1896, No. 88,454.

To all whom it may concern:

Be it known that I, ANTOINE LÉGER FÉLIX BAYLE, a citizen of France, and a resident of Cherbourg, France, have invented certain new and useful Improvements in Dynamometric Governors for Steam-Engines, (patented in France December 2, 1895, No. 252,684, and in Germany September 15, 1896, No. 88,454,) of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar letters and figures of reference indicate corresponding parts.

The present invention has reference to governors for steam-engines, particularly those designed to operate at a high degree of speed—as, for instance, when the primary drive-shaft of the engine is intended to directly actuate the armature-shaft of a dynamo-electric generator. Under such circumstances it is desirable to provide an automatically-acting governor adapted whenever the speed of the engine and that of the driven machine relatively vary to quickly and positively restore and maintain the unitary rotation of the same.

My improved governor embodies simple and efficient provision for fulfilling the requirements above noted and in addition presents other novel features of construction.

In the drawings accompanying this specification, Figure 1 is a front view showing the essential parts of my improved governor. Fig. 2 is a horizontal sectional plan view of the parts illustrated in Fig. 1, the section being taken in the plane indicated by the dotted line 1 2 in said figure. Fig. 3 is a detail sectional view of the governor, taken in the plane defined by the diagonally-extending dotted line 3 4, Fig. 1. Fig. 4 is a view somewhat similar to Fig. 1, but illustrating a modification; and Fig. 5 is another detail sectional view disclosing a valve highly suitable for operation in connection with my improved governor.

The balance-wheel C is not directly secured on the engine drive-shaft A, as ordinarily, but is attached thereto by means of an independently-formed collar 3, connected to the wheel-hub 4 at its inner side and to said shaft. This arrangement permits the central opening 5 in the hub to be utilized as a recess for the free reception and bearing of the alined shaft B of the driven machine, for which purpose the hub-opening is lined with a suitable antifriction-bushing 7. The outer portion of the hub has a gear-ring M locked thereon.

Rigidly mounted on the shaft B contiguous to the hub 4 is a plate Z, of the configuration shown in Figs. 1 and 3, and also having a hub extension 10 to maintain it the proper distance from the wheel C. It will be observed that this plate Z has an upper and a lower ear, both of which are perforated, the former containing a bolt J, serving as connection for the inner end of an expanding spring D, the outer end of which is attached to the face of the balance-wheel C, near its periphery. The lower ear constitutes the bearing for the mediate portion of a short horizontal shaft X, carrying at its ends small gear-wheels M′ and M^2, meshing with the teeth of the ring M and those of a sleeve N, respectively. As will appear, the wheels M′ M^2 and engaged gear parts present epicycloidal gearing. Motion is transmitted from the shaft A to its shaft B through the medium of the spring connection between the balance-wheel and the plate. The sleeve N referred to internally conforms to the threaded portion O of the shaft B, the said sleeve having an end flange 20, provided with an annular groove 21, receiving the upper and lower inwardly-turned terminal projections of a fork E, forming part of the valve-operating appliances. While the latter are somewhat incompletely represented, it will be understood that F and F′ designate the angle-joints of rods which connect with the controlling-valve, the longitudinal movement of the fork E in either direction resulting in an increased supply or cut-off adjustment of said valve proportionate with the sleeve movement.

As long as the shaft B revolves in unison with the drive-shaft the gears M′ M^2 have no relative rotation with respect to the ring M and sleeve N. When, however, the driven machine offers resistance, the plate Z will revolve more slowly, resulting in the gear-wheel M′ being positively rotated by the ring M, and

thus cause the wheel M^2 to turn the sleeve N on the shaft B and effect its longitudinal travel thereon to shift the fork and operate the valve-controlling devices. Should the speed of the driven machine become unduly accelerated, the plate Z will turn faster than the balance-wheel, distend the spring, and effect the opposite movement of the sleeve. When the desired adjustment of the valve has been secured, the power exerted by the spring will properly reverse the operation of the epicycloidal gearing and restore the parts to their normal working condition.

The feed-valve of the engine may be of the type illustrated in Fig. 4, in which P indicates the valve proper, regulated by the governor and controlling the main steam-passage, while *b* refers to a hand-operated plug-valve 26, interposed in a side passage 27. In starting the engine the valve 26 will be "operated" to admit the necessary steam through the side passage until the desired speed has been attained. The said valve is then closed, and thereafter variations in the steam-supply will be automatically effected by the governor. The engine can be stopped by operating a cut-off valve located at R.

To meet variations in a dynamo-machine greater than the capacity of the apparatus thus far described, a manometer may be so located as to be affected by the conductor of the machine and operate an ordinary centrifugal governor to control the valve R.

Manifestly the arrangement of valve-operating connections will vary according to the application of the improved governor.

In certain contingencies where irregularities of speed of the driven machine occur so abruptly that they might cause absolute cessation of operation or subject the parts to undue strain it will be advantageous to employ the construction shown in Fig. 4, where a cylinder G, adapted to contain oil, is illustrated as being connected to the face of the balance-wheel, near its periphery, the piston 30 in said cylinder being connected by its piston-rod 31, playing through a suitable stuffing-box 32, with the ear of the plate Z.

The object in employing oil is to take advantage of its limited compressibility, so that the epicycloidal gearing will not be suddenly thrown into operation to an extent sufficient to cause the instantaneous cut-off of the steam-supply.

The automatic governor described is not only simple, efficient, and comparatively inexpensive, but is of such character that it can be readily applied to existing machines.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an automatic governor for steam-engines, the combination with the balance-wheel transmitting motion to the driven shaft through a yielding connection with a plate Z in said shaft, of a shaft X bearing in said plate and carrying gears meshing with teeth carried by the wheel and with those of a valve-controlling part respectively, substantially as set forth.

2. In an automatic governor for steam-engines, the combination with the balance-wheel transmitting motion to the driven shaft through a yielding connection with a plate Z in said shaft, of a shaft X, bearing in said plate and carrying gears meshing with teeth carried by the valve and with those of a valve-controlling sleeve revoluble in a threaded portion of the driven shaft, substantially as set forth.

3. In an automatic governor for steam-engines, the combination with the balance-wheel, the hub, the recess of which receives the end of the driven shaft, a yielding connection between said wheel and shaft, and gears carried by the latter and meshing with teeth carried by the wheel and with those of a valve-controlling part respectively, substantially as set forth.

4. The combination with the flexibly-connected balance-wheel and driven shaft and its gears carried by the latter and meshing as described, of a sleeve N, revoluble on a threaded part of the shaft and having an annular channel engaging a valve-operating fork, substantially as set forth.

In witness whereof I have signed this specification in presence of two witnesses.

ANTOINE LÉGER FÉLIX BAYLE.

Witnesses:

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HENRI JACQUEMON.