No. 764,228. PATENTED JULY 5, 1904.

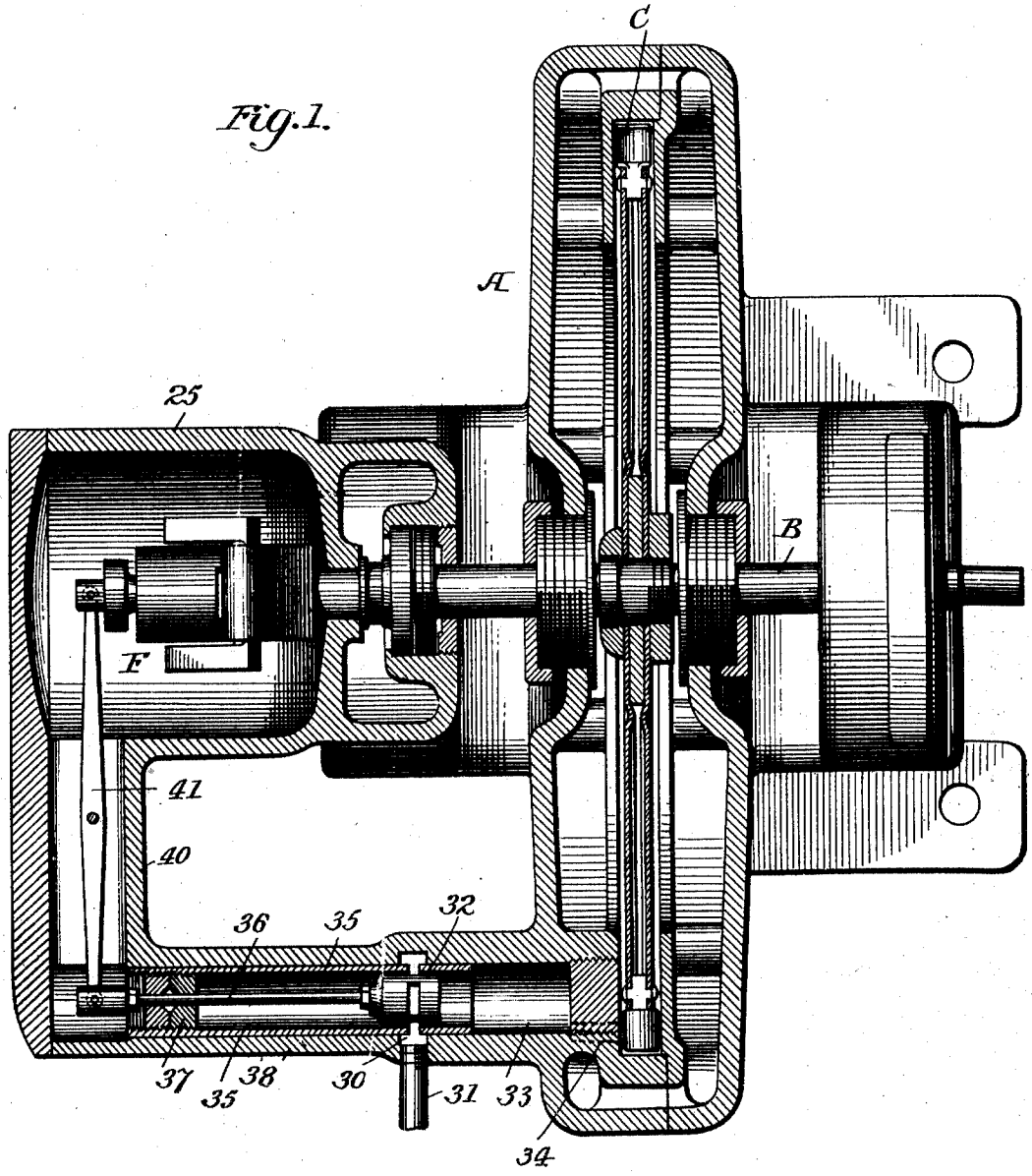
E. A. EDWARDS.

GOVERNOR FOR HIGH SPEED ENGINES.

APPLICATION FILED NOV. 25, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

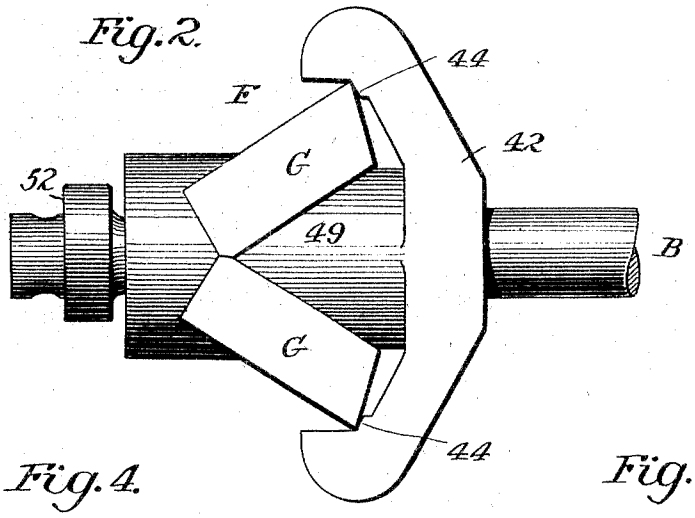


Fig. 4.

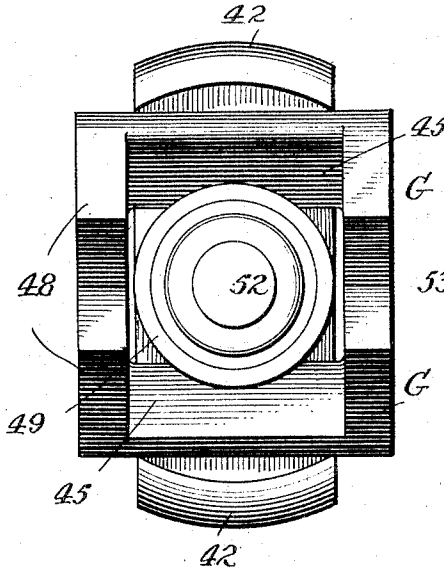


Fig. 3.

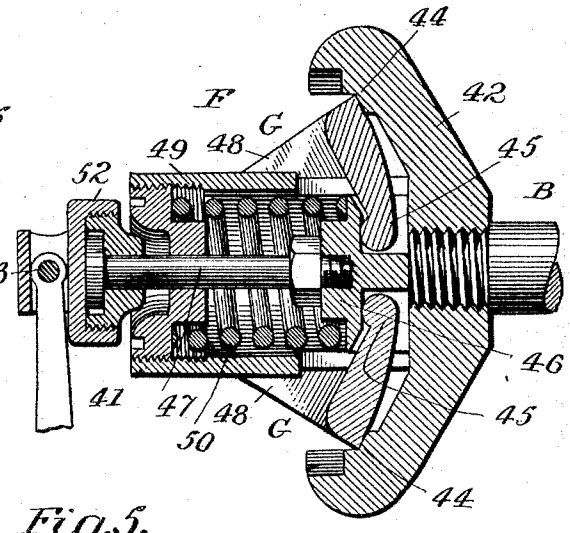
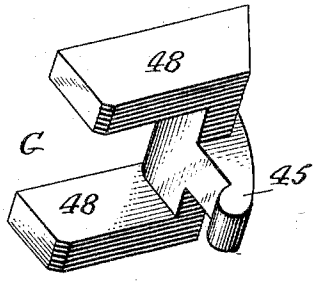


Fig. 5.



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No. 764,228. Patented July 5, 1904.

UNITED STATES PATENT OFFICE.

EDGAR A. EDWARDS, OF CINCINNATI, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO METROPOLITAN TRUST & SAVINGS BANK, TRUSTEE, A CORPORATION OF ILLINOIS.

GOVERNOR FOR HIGH-SPEED ENGINES.

SPECIFICATION forming part of Letters Patent No. 764,228, dated July 5, 1904.

Application filed November 25, 1901. Serial No. 83,532. (No model.)

To all whom it may concern:

Be it known that I, EDGAR A. EDWARDS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Governors for High-Speed Engines, of which the following is a specification.

My invention relates to the control devices of high-speed engines or other apparatus the speed of which is to be controlled; and my invention consists in constructing the governor to be used with high-speed engines, especially steam-turbines, and also in connecting it with the control device, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a sectional plan of sufficient of a steam-turbine and governing devices to illustrate my invention. Fig. 2 is a side view of the governor. Fig. 3 is a longitudinal section thereof; Fig. 4, an end view, and Fig. 5 a perspective view, of one of the governor-wings.

The casing A is suitably constructed to receive the wheel C, mounted upon a shaft B, which is supported in bearings in arms of the casing, which latter is formed to constitute a casing 25, inclosing a governor F, secured to one end of the shaft B. Steam passes through the supply-pipe 31 to a port 30, which is controlled by a cylinder-valve 32, and from the latter the steam passes to a channel 33, leading to a port 34, (dotted lines, Fig. 1,) communicating with the nozzle by which steam is directed onto the buckets of the wheel. The governor controls the position of the valve 32, which is arranged in a sleeve 35 within the channel 33, the stem 36 passing through a suitable packing-box 37, all these parts being within the hollow arm 38 of the casing, extending parallel to the shaft B, which arm 38 extends from a radial hollow arm 40, communicating with the casing 25, and in the hollow arm 40 is a lever 41, which communicates motion from the sliding part of the governor to the stem 36. The governor is provided with a cross-piece 42, secured to the shaft B and having near the outer extremity bearings 44 for the corners of L-shaped wings G, each wing having a short central arm 45 bearing against a sliding block 46 on the end of a rod 47, extending axially beyond the shaft B and with forked arms 48 sufficiently separated to receive between them a casing 49, through which said rod slides, said casing containing a spring 50, bearing on the end of the casing and also on the block 46. The casing 49 is recessed for the passage of the arms 45, and the casing, arms, spring, block 46, and rod 47 all turn together with the cross-piece 42. In order to permit the rotation of these parts while connecting the rod 47 to the lever 41, the rod 47 is provided with a head confined within a recess in a block 52, which has a recess for a cross-piece 53, connecting the block 52 with the end of the lever 41. The ends of the arms 48 of the wings G normally make contact, as shown in Fig. 2, in which position the spring 50 tends to maintain them by forcing inward the block 46. When, however, the shaft B is put in motion and as the latter tends to increase its speed, there is a tendency of the arms 48 of the wings G to fly outward, rocking the wings upon their bearings 44, compressing the spring 50, and moving outward the rod 47, imparting a corresponding movement to the parts connected with the valve 32 and moving the latter to more or less close the steam-channel. The contact of the wings will be maintained until the speed of rotation of the shaft B begins to exceed the proper maximum, when the wings will separate, and the moment this begins there is imparted a corresponding movement to the control-valve. In extremely high speed engines—such, for instance, as steam-turbines—this movement will not begin until the shaft B has attained a very high speed of rotation, and thereafter an extremely limited movement of the wings G will be sufficient to impart such a movement to the valve 32 as will insure proper regulation of the steam-passage and maintain a substantially uniform rotation of the wheel of the engine.

It will be seen that in the construction of governor described there are no pivots or pins for supporting the wings G, so that there can be no wearing or lost motion, which is apt to result when pins are used for pivoting the wings to a governor; but, on the contrary, the corners of the wings have a direct bearing upon the shoulders 44, and if any wearing occurs the wings simply seat themselves upon the new surfaces without any lost motion or opportunity for undue play, the spring 50 always maintaining intimate contact between the surface of the parts which move upon each other.

By arranging the control-valve 32 to slide parallel to the shaft B, with a lever between the governor at the end of that shaft and the stem of the valve, I am enabled to bring the valve very close to the port 34, through which the steam passes to the nozzle, so as to reduce condensation to the very lowest possible limit, while securing such direct connection between the valve and the governor that there is opportunity for but little lost motion or wear of parts.

While I have shown such governor in connection with an engine of a particular construction, it will be evident that it may be employed wherever a high-speed governor is required. It will be seen, further, that the outer arms 48 of the wings of the governor when in normal meeting position are at an angle to each other. I have found in practice that this position is important, as there is a much more effective operation if the said arms swing outward from a normal position at an angle to each other than if they are normally parallel to each other and are then carried outward on an increase of speed. To vary the speed, it is necessary to vary the tension of the spring 50. This may be effected by different means; but as shown the casing 49 is made in two parts, the end portion being externally threaded to engage threads within the side portion, so that the end portion may be turned as a nut to regulate the spring tension.

For many purposes steam-turbines must be used in more or less exposed situations, and I have found that when so used the access of dust, moisture, &c., to the parts of the governing apparatus is extremely detrimental. It will be seen that by the above construction I inclose all these parts, and I thereby maintain the governor at a high degree of efficiency. While I prefer to have the valve-casing parallel to the shaft B, this is not always necessary.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. The combination in a high-speed governor, of a shaft, a cross-piece connected thereto, and L-shaped wings having corner-bearings upon the cross-piece, the outer arms of said wings meeting at an angle to each other, substantially as and for the purpose set forth.

2. The combination with a rotating shaft, of a cross-piece, L-shaped wings having corner-bearings on said cross-piece, inwardly-projecting arms and a block maintained in contact with said arms by a spring, and a rod connected with said block and with the control-valve of the engine, substantially as set forth.

3. The combination with a rotating shaft, of a cross-piece, L-shaped wings, a rod with a block against which said wings bear, arms 48 normally in contact with each other except at predetermined high speeds, and a spring bearing on said block, substantially as set forth.

4. The combination with a rotating shaft, of a cross-piece, L-shaped wings having corner-bearings on said cross-piece, a rod connected to operate the control-valve of the engine and provided with a block, a spring for maintaining said block in contact with the inner projecting arms of the wings, and a casing inclosing said spring, the outer arms of the wings being forked and in contact outside of said casing, substantially as set forth.

5. The combination with the shaft, cross-piece and wings, of a casing connected to the cross-piece, an adjustable end for the casing, and a spring interposed between the end and wings the whole being connected to and rotated by the shaft, substantially as described.

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

EDGAR A. EDWARDS.

Witnesses:
H. M. GILLMAN, Jr.,
W. CLARENCE DUVALL.