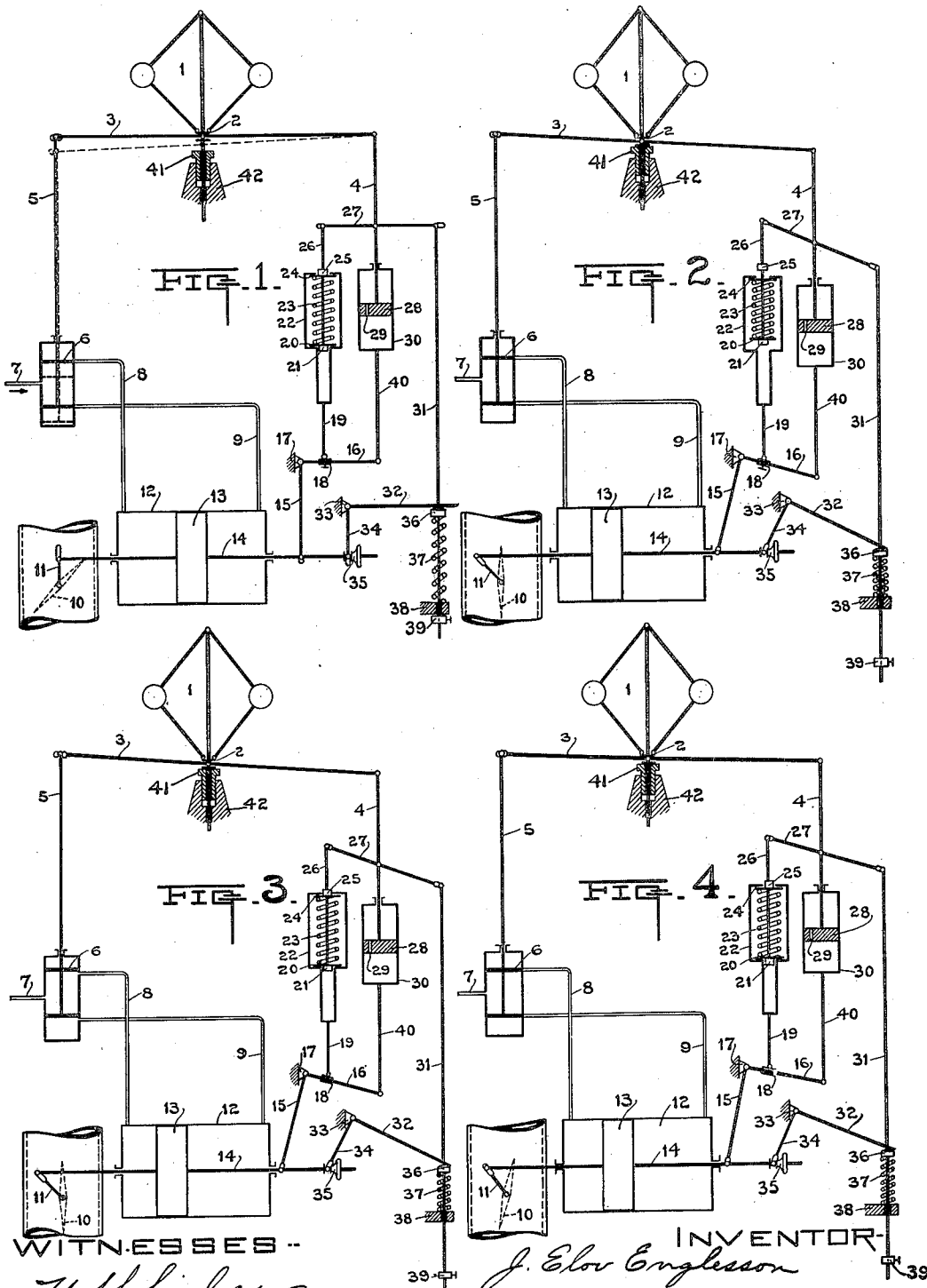


J. E. ENGLESSION.
TIME ELEMENT POWER LIMITING DEVICE.
 APPLICATION FILED MAR. 17, 1913.

1,102,731.

Patented July 7, 1914.



WITNESSES -

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TIME-ELEMENT POWER-LIMITING DEVICE.

1,102,731.

Specification of Letters Patent.

Patented July 7, 1914.

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To all whom it may concern:

Be it known that I, JOHN ELOV ENGLESSON, a subject of the King of Sweden, residing at Kristinehamn, in the Kingdom of Sweden, have invented a certain new and useful Improvement in Time-Element Power-Limiting Devices, of which the following is a specification.

This invention relates to devices for limiting the power furnished by a prime mover.

The object of the invention is to limit the power furnished by a prime mover.

The invention is applicable generally to governors for prime movers of any kind but is specifically illustrated in the accompanying drawing as applied to a governor for controlling the gate in the pipe line of a water wheel.

This invention is adapted for use where the head of water is variable and where an increase in the head might so increase the power of the unit as to endanger the electrical machinery driven thereby. In such a case the device is applied to limit the power to the maximum safe amount within the heating limit of the electrical machinery.

The invention is also applicable to cases where there is likely to be a shortage of water supplied to the prime mover and where if the amount of water used by the prime mover is too great the head would be decreased below the proper amount.

This invention is also adapted for use in cases where only a part of the available power of the prime mover is to be used, as where only up to a certain maximum amount of power is sold. In such cases if a consumer is carrying a load which is in excess of this maximum, the power furnished him will be limited to this maximum and the consumer will thereby automatically be forced to himself furnish the excess over said maximum of power required. In these cases it is necessary that the unit be furnishing power to this consumer alone.

This invention is an improvement of prior invention for which application Serial No. 706,308 was filed June 27, 1912, and the improvement thereover relates to the feature of permitting the main gate or valve of the prime mover to first take a position beyond a predetermined limiting position, to which position it is then slowly returned through the intermediary of a time element device. This improvement over the prior invention

is thereby adapted to temporarily permit the furnishing of power in excess of that to which the prime mover is finally to be limited. This feature will therefore permit at times the restoration of the system to normal condition from a condition of short circuit, for instance, and where the excess of power furnished for the short limited time is sufficient to burn out the electrical short circuit of the line supplied by the electrical machine driven by the prime mover.

One of the embodiments of the invention is illustrated in the accompanying drawing in which all the figures are diagrammatic,—Figure 1 showing the device in normal running position in full lines and the overload condition in dotted line position of the floating lever and servo-motor valve; Fig. 2 showing the device in full open position of the main gate, the collar of the speed responsive means being in lowest position, the servo-motor returned to mid position, and the secondary compensating means being under stress by the motor operated power limiting means; Fig. 3 showing the device under conditions similar to that in Fig. 2 except that the secondary compensating means has operated to place the servo-motor valve in an opposite position to that first assumed; and Fig. 4 showing the device with the main gate or valve returned to its predetermined limiting position and the servo-motor valve returned to mid position.

Referring to the drawings, the device is illustrated as applied to an indirect governor for a prime mover not shown. The elements comprising the device and shown in the drawing are the main gate or valve 10; the servo-motor 13; the servo-motor valve 6; the speed responsive means 1; the primary compensation means, the leverage and dash pot 30; the secondary compensation means, the leverage and spring casing 22; and the power limiting means, the motor affected bell crank lever 32, 34, and the adjustable stop 41 for the collar of the speed responsive means.

The main gate or valve 10 is located in the pipe line leading to the prime mover not shown, and carries an operating arm connected to the piston rod 14 of the piston 13 of the servo-motor 12. The servo-motor has pipes 8, 9, leading from the ends thereof to the valve casing of servo-motor valve

6, the inlet 7 to the casing being communicable by means of the valve to either one of the pipes 8, 9, the other being communicable at the same time to the exhaust. Oil under pressure is preferably indicated to be supplied through the inlet 7, as usual in such cases. The servo-motor valve 6 has its stem 5 connected to one end of floating lever 3, which intermediate its end is connected to collar 2 of the speed responsive means 1. The other end of floating lever 3 is connected to piston rod 4 of piston 28, having port 29 therethrough and slidable in dash pot 30, connected by rod 40 to arm 16 of bell crank lever 15, 16, having a stationary pivot 17 and having its arm 15 pivotally connected to piston rod 14 of the servo-motor 12. A stop 41 is adjustable in a stationary part 42 of the frame of the device and is located directly underneath the collar 2 of the speed responsive means.

The secondary compensation means has a spring casing 22 pivotally connected by rod 19 to a slide 18 adjustably positionable on arm 16 of bell crank lever 15, 16. Washers 20, 24, are loosely located at the upper and lower ends of and within spring casing 22 and are normally held against the ends of said casing by spring 23 under stress between them. Rod 26 extends loosely through washers 20, 24, and has thereon stops 21, 25, on the outer sides of the washers 20, 24, and incapable of passing therethrough. Rod 26 is pivotally connected at its upper end to floating lever 27, which intermediate its end is pivotally connected to piston rod 4, and at its other end is pivotally connected to rod 31 loosely sliding through the part 38 of the frame of the device, and has stops 36, 39, thereon, the latter of which is adjustable. A spring 37 surrounds the rod 31 and is stressed between stop 36 and the part 38 of the frame. Bell crank lever 32, 34, may be forked at the ends of its arm 32, which takes over the stop 36 of the rod 31. Bell crank lever 32, 34, has a stationary pivot 33, and its remaining arm 34 is pivotally and slidably engaged by cross-head 35 adjustably positioned on piston rod 14 of servo-motor 12.

While the invention has been shown with primary and secondary compensation means segregated, it is intended of course that these may be assembled in a single unitary means similarly to that illustrated in the application hereinabove identified. It will also be understood that in that case the motor operated power limiting means, the bell crank lever 32, 34, and rod 31, will be associated to operatively connect with the point of the T-lever of that application, which is connected to its stationary fulcrum.

The operation of the device is as follows: Assuming that the device is operating under normal running conditions satisfying a load

which is within its power capacity, and that a sudden load is thrown upon the prime mover causing the speed responsive means 1 to lower its collar 2, and causing the floating lever 3 to assume the dotted line position of Fig. 1, the servo-motor valve 6 will thereby be depressed causing fluid under pressure to pass through pipe 9 to the right-hand end of servo-motor 12 and exhausting the left-hand end through pipe 8. Under these conditions the piston 13 will move from the position shown in Fig. 1 to the position shown in Fig. 2, causing the main gate or valve 10 to be thrown to a position beyond a predetermined limiting position. These conditions will enable the prime mover to furnish power in excess of that to which it is desired to limit the same, but such excess of power will be furnished only for a short time as will be presently indicated. During the motion of the piston 13 to the left, bell crank lever 15, 16 will be rotated in a clockwise direction to depress rod 40, and through the practically rigid connection of dash pot 30 will also depress piston rod 4 and the right-hand end of floating lever 3, the left-hand end of which will be correspondingly elevated to bring the servo-motor valve 6 to mid position. At the same time during the motion of the piston 13 to the left, bell crank lever 32, 34, will also be rotated in a clockwise direction to depress rod 31, stressing spring 37 between collar 36 and part 38 of the frame, and thereby also depressing the right-hand end of floating lever 27, thereby elevating the left-hand end thereof, and placing spring 23 under compression between the lower washer 20 and the upper washer 24 and upper end of spring casing 22 which itself has been slightly depressed through its connection by rod 19 to arm 16 of bell crank lever 15, 16. All the action so far described takes place within a comparatively short interval of time during which the collar 2 of the speed responsive means 1 had quickly responded to the comparatively sudden increase in load as assumed.

The secondary compensation means, which with the dash pot 30 constitutes a time element device, immediately begins to function by extending spring 23 from its stressed condition to that of Fig. 1. In doing so it slowly depresses rod 26, the slow action being brought about by the slow release of oil within dash pot 30 below piston 28 through port 29. There will therefore be a corresponding depression of rod 4 and the right-hand end of floating lever 3 with a corresponding elevation of the left-hand end of floating lever 3, stem 5 and servo-motor valve 6. As this action consumes a certain time interval, the prime mover will during that interval of time be furnishing power in excess of that which it is predetermined it

should furnish. As soon however as servo-motor valve 6 is elevated, fluid pressure is admitted through pipe 8 to the left-hand end of servo-motor 12 and exhausted from the right-hand end thereof through pipe 9, and its piston 13 is moved toward the right to bring main gate or valve 10 to the predetermined limiting position for the desired power to be furnished by the prime mover. This position of the main gate 10 is shown in Fig. 4, and by reason of the primary compensation means, namely the bell crank lever 15, 16, rod 40, dash pot 30, piston rod 4, floating lever 3, and valve stem 5, servo-motor valve 6 will be at once returned to mid position. Inasmuch as the device has been assumed as being overloaded, the collar 2 will have remained in contact with the stop 41, so that under the conditions illustrated in Fig. 4, it is impossible to operate the main gate 10 to a position of wider opening without first causing same to take a position of less opening, or, in other words, without first taking the overload off the machine.

Stops 39 and 41 are made adjustable, as is also the crosshead 35, in order to adjust the device for any predetermined amount of power it is desirable to furnish by the prime mover.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In an indirect governor for a prime mover, a speed responsive means, a motor for actuating the main valve of the prime mover, a means for controlling said motor, said means being governed by said speed responsive means, and means for finally returning said valve to a predetermined limiting position from a temporary position beyond.

2. In an indirect governor for a prime mover, a speed responsive means having a collar, a motor for actuating the main valve

of the prime mover, a means for controlling said motor, said means being governed by said speed responsive means, a compensation means, means connecting said motor and said compensation means for temporarily first permitting said valve to assume a position beyond a predetermined limiting position, and a stop for the collar of said speed responsive means coacting with said compensation means for causing the positioning of said valve in said predetermined position.

3. In an indirect governor for a prime mover, a speed responsive means having a collar, a motor for actuating the main valve of the prime mover, a means for controlling said motor, said means being governed by said speed responsive means, a primary compensation means for normally returning said controlling means to mid position, a secondary compensation means, means connecting said motor and said secondary compensation means for temporarily first permitting said valve to assume a position beyond a predetermined limiting position, and a stop for the collar of said speed responsive means coacting with said compensation means for causing the positioning of said valve in said predetermined position.

4. In an indirect governor for a prime mover, a speed responsive means, a motor for actuating the main valve of the prime mover, a means for controlling said motor, said means being governed by said speed responsive means, primary and secondary compensating means, said primary compensation means being adapted to normally return said controlling means to mid position, a motor affected means connecting at two points to said secondary compensating means for opposite effect thereon, and a stop for said speed responsive means.

In testimony whereof I hereto affix my signature in the presence of two witnesses.

J. ELOV ENGLESSON.

Witnesses:

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DAVID DROHNBLAD.