

H. E. McLEAN.
GOVERNOR FOR ENGINES.
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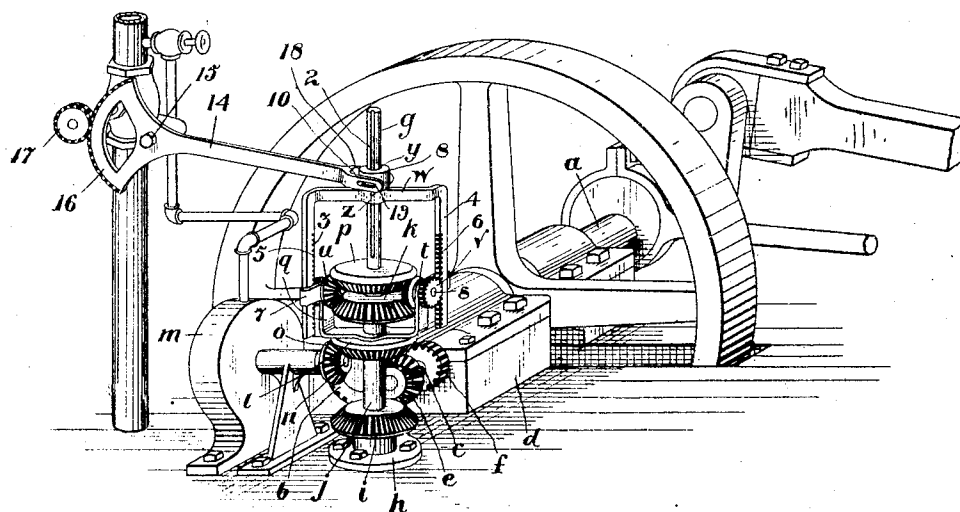


Fig. 1.

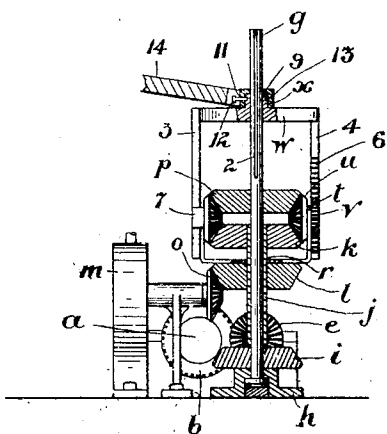


Fig. 2.

Witnesses.

Admission
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UNITED STATES PATENT OFFICE.

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GOVERNOR FOR ENGINES.

No. 798,045.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed May 15, 1905. Serial No. 260,175.

To all whom it may concern:

Be it known that I, HECTOR E. McLEAN, of the town of Manilla, in the county of Victoria, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Governors for Engines; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to improvements in governors for engines, as described in the present specification and set forth in the accompanying drawings, that form part of the same.

The invention consists, essentially, of a rotating shaft, an auxiliary motive power, a gear mechanism having connection with said shaft and said auxiliary motive power, and a controlling-gear actuated through the differential operation of the said gear mechanism and governing the speed of the shaft.

The object of the invention is to produce a governor in which the construction will be simple and durable and at the same time form a positive and accurate means of governing the feed, and whereby belts, weights, springs, or delicate operating parts will be entirely eliminated.

In the drawings, Figure 1 is a perspective view showing the main shaft of a steam-engine and the governing device. Fig. 2 is a side elevation of the device partially in section.

Like characters of reference indicate corresponding parts in each figure.

In the following specification the invention is described as applied to a steam-engine for the sake of convenience in the explanation.

a is the main shaft of an engine, and *b* is a spur-gear fixedly secured on the shaft *a*.

c is a shaft journaled in the pillow-block *d*, having a bevel gear-wheel *e* at the outer end thereof.

f is a spur-pinion secured to the shaft *c* intermediate of its length and rotating therewith and meshing with the spur-gear *b*.

g is a vertical shaft journaled in the foot-bearing *h* and arranged in direct alinement with the shaft *c*. *i* is a bevel-gear fixedly secured on the shaft *g* and meshing with the bevel-gear *e*, thus creating an operating connection to the said shaft *g* from the main shaft *a*.

j is a loose sleeve surrounding the lower portion of the shaft *g* and resting on the bevel-gear *i*. *k* and *l* are bevel-gears secured

to and rotating with the said sleeve *j*, the former secured to the upper end thereof and the latter intermediate of the length of said sleeve with the bevels reversed.

m is an auxiliary engine or motor of any suitable form, operating at a predetermined number of revolutions per minute, having a shaft *n* extending in the direction of and terminating adjacent to the shaft *g*.

o is a bevel-pinion fixedly secured to the end of the shaft *n* and meshing with the bevel gear-wheel *l* and in this manner rotating the said gear-wheel *l* and sleeve *j* independently from the shaft *g*.

p is a bevel-gear fixedly secured to the shaft *g* immediately above the sleeve *j*.

q is a U-shaped bracket having a central orifice *r* in the lower portion thereof and the shafts *s* journaled in the bearings *t* at the upper extremities thereof.

u represents bevel-pinions fixedly secured to the inner ends of the shafts *s* and meshing with and operatively connecting the gears *k* and *p*, thus establishing the connection between the auxiliary engine *m* and the main shaft *a*.

v represents spur-pinions fixedly secured on the outer ends of the shafts *s*.

w is a yoke having a central boss *x*, an orifice *y* through said boss and yoke, and a key *z* in the wall of said orifice. The yoke *w* is slidably arranged on the shaft *g*, the key *z* extending into the keyway 2. The downwardly-extending arms 3 and 4 of the yoke are offset in reverse directions and have the racks 5 and 6 engaging the pinions *v* from opposite sides.

7 represents guiding-lugs extending from the bracket *q* around the arms 3 and 4 and retaining the racks 5 and 6 in engagement with the pinions *v*.

8 is a collar encircling the shaft *g* and having the recess 9 in its lower side and fitting loosely over the boss *x* on the yoke, permitting the latter to turn freely without rotating the said collar. The collar 8 has the pins 10 extending outwardly therefrom and the threaded orifice 11 through the wall of said recess. A set-screw 12 is inserted in the threaded orifice 11 and extends into an annular groove 13 in the boss *x* to retain the collar 8 on the boss.

14 is a lever pivotally supported at 15 and having a quadrant 16 at one end meshing with the pinion 17, secured to the valve-spindle,

and at the other end a fork 18, in the prongs of which are the slots 19, through which the pins 10 from the collar extend.

In the operation of this device the auxiliary motor is placed adjacent to the main shaft driven by the engine to be governed. The angularly-arranged supplementary shaft *g* is journaled in a suitable bearing adjacent to the main shaft and to the shaft extending from the auxiliary motor. It will be thus seen that the main shaft and the shaft from the auxiliary motor are within operating distance of the supplementary shaft and may be readily connected to the gears on the said supplementary shaft to operate the same.

In the arrangement described the shaft *c*, journaled in the pillow-block *d*, has a fixedly-secured gear-wheel *f* meshing with the gear-wheel *b* on the main shaft. The said shaft *c*, journaled in the pillow-block, has at its outer end a bevel-gear *e*, meshing with a bevel-gear *i*, fixedly secured to the supplementary shaft. This insures the rotation of the supplementary shaft correspondingly with the main shaft. The auxiliary motor drives the bevel-gear *i*, fixedly secured to the sleeve *j*, and this gear rotates the sleeve, which causes the gear at the upper end thereof to revolve. The bevel-gears *k* and *p*, one on the supplementary shaft and the other on the sleeve, revolve in the same direction, and the bevel-pinions *u*, interposed therebetween, effect the differential means of governing the position of the quadrant at the end of the lever 14 in relation to the pinion 17 on the valve-spindle. The bevel-pinions *u*, connecting the gear *p* on the supplementary shaft, and the gear *k* on the sleeve will remain stationary continuously, while the said gear on the supplementary shaft and the said gear on the sleeve continue to revolve at an even speed as the yoke and bracket supporting the said pinions also rotate; but in the event of a difference between the number of revolutions of the shaft of the auxiliary motor and the main shaft occurring the said bevel gear-wheels will immediately show such difference by variation in speed, and as the gear-wheel *k*, secured to the sleeve, always travels at the same speed, governed by the predetermined number of revolutions of the motor-shaft *n*, the variations will be entirely confined to the bevel gear-wheel *p*, fixedly secured to the supplementary shaft. The moment this variation of speed occurs the bevel-pinions *u*, connecting the said two gear-wheels, must rotate. This will cause the spur-pinions *v*, meshing with the racks 5 and 6 of the yoke *w*, to rotate and move the said yoke upwardly or downwardly on the said supplementary shaft, and as the said yoke is lifted upwardly or downwardly the collar secured thereto is caused to slide on the said shaft, which lifts or drops the forked end of the

controlling-lever 14, and consequently turns the quadrant 16 on its pivot. This governs the feed to the engine and increases or diminishes the speed of the main shaft, as the case may be, until the said main shaft is brought to the desired number of revolutions per minute.

The increase of the speed of the fixed gear on the supplementary shafts in relation to the rotation of the gear on the sleeve will cause the bevel-pinions to rotate in one direction, while the diminishing of the speed of the said gear on the supplementary shaft in relation to the rotation of the gear on the sleeve will of course cause the pinions to rotate in the other direction, and thus insure the upward or downward movement of the yoke, as set forth. The salient feature of this invention is the application of a gear mechanism to the automatic regulation of the feed to govern the speed at a predetermined number of revolutions for a minute. It is well known that the application of a gear mechanism to the regulation or government in mechanical devices is positive and less liable to get out of order than any other form of construction, and, further, it insures the exact operation of the valve in a steam-engine and in an electrical engine the exact operation of the finger of the rheostat.

It must be understood that this regulating device may be applied to many forms of engines or motors, though the most common application will likely be to steam-engines. Another point may be mentioned in connection with this device, and that is that the dependence for governing on centrifugal action is entirely eliminated.

What I claim as my invention is—

1. In a governor for engines, the combination with a main shaft having a gear-wheel mounted thereon and rotating therewith, and an auxiliary motive power driving a gear-wheel secured to its shaft, of a supplementary shaft journaled adjacent to the aforesaid shaft, a gear-wheel secured thereto coacting with the gear-wheel of the main shaft, a gear-wheel secured thereto intermediate of its length, a loose sleeve surrounding a portion of the said shaft, a gear-wheel secured thereto coacting with the intermediately-arranged gear-wheel on the supplementary shaft, a gear-wheel on said sleeve driven by the auxiliary motor and turning said sleeve, a controlling-lever, and means establishing a differential connection between said lever and gear mechanism, as and for the purpose specified.

2. In a governor for engines, the combination with a main shaft having a gear-wheel mounted thereon and rotating therewith, and an auxiliary motive power driving a gear-wheel secured to its shaft, of a supplementary shaft journaled adjacent to the aforesaid shaft,

a gear-wheel secured thereto coacting with the gear-wheel of the main shaft, a gear-wheel secured thereto intermediate of its length, a shaft journaled parallel with the main shaft having a gear-wheel secured thereto meshing with the aforesaid gear-wheel on the main shaft and a gear-wheel meshing with one of the said gear-wheels on the supplementary shaft, a loose sleeve surrounding a portion of the said supplementary shaft, a gear-wheel secured thereto coacting with the intermediately-arranged gear-wheel on the supplementary shaft, a gear-wheel on said sleeve driven by the auxiliary motor and turning said sleeve, a controlling-lever, and means establishing a differential connection between said lever and gear mechanism, as and for the purpose specified.

3. In a governor for engines, the combination with a main shaft having a gear-wheel mounted thereon and rotating therewith, and an auxiliary motive power driving a gear-wheel secured to its shaft, of a supplementary shaft journaled adjacent to the aforesaid shaft, a gear-wheel secured thereto coacting with the gear-wheel of the main shaft, a gear-wheel secured thereto intermediate of its length, a loose sleeve surrounding a portion of the said shaft, a gear-wheel secured thereto coacting with the intermediately-arranged gear-wheel on the supplementary shaft, a gear-wheel on said sleeve driven by the auxiliary motor and turning said sleeve, a yoke slidably arranged on the supplementary shaft, having downwardly-depending arms offset and racks arranged thereon, pinions suitably journaled and connecting said racks and the aforesaid coacting gears, and a lever connected with said yoke at one end and at the other to the

engine driving the main shaft, as and for the purpose specified.

4. In a governor for engines, the combination with a main shaft having a gear-wheel mounted thereon and rotating therewith, and an auxiliary motive power driving a gear-wheel secured to its shaft, of a supplementary shaft journaled adjacent to the aforesaid shaft, a gear-wheel secured thereto coacting with the gear-wheel of the main shaft, a gear-wheel secured thereto intermediate of its length, a loose sleeve surrounding a portion of the said shaft, a gear-wheel secured thereto coacting with the intermediately-arranged gear-wheel on the supplementary shaft, a gear-wheel on said sleeve coacting with said gear on the auxiliary motor-shaft and turning said sleeve, a yoke slidably arranged on the supplementary shaft having downwardly-depending arms offset and racks arranged thereon, a U-shaped bracket embracing the said supplementary shaft connected to said yoke and having shafts journaled at the upper extremities thereof and bevel-pinions fixedly secured to the inner ends of said shafts and meshing with the aforesaid coacting gears and spur-pinions fixedly secured to the outer ends of said shafts and meshing with the racks on said yoke, and a lever having one end supported on said yoke and the other end operatively connected to the engine to be governed, as and for the purpose specified.

Signed at Toronto this 25th day of April, 1905.

HECTOR E. McLEAN.

Witnesses:

H. DENNISON,
E. WILKIN.