

(No Model.)

J. P. DEVOISSAUD.
STEAM ENGINE GOVERNOR.

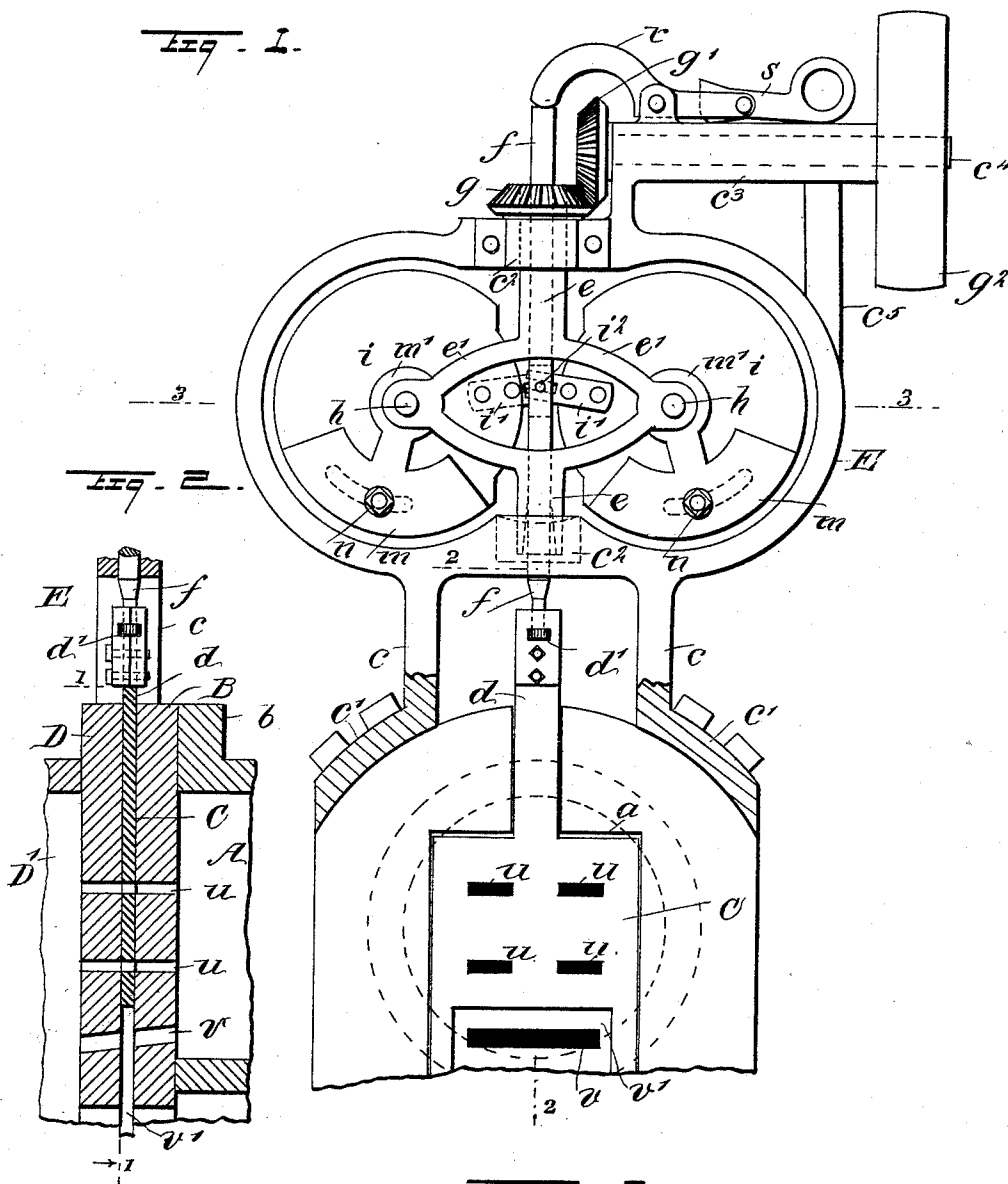
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Fig. 1.

Fig. 2.

Fig. 3.



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STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 519,942, dated May 15, 1894.

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To all whom it may concern:

Be it known that I, JOHN P. DEVOISSAUD, of Sherman, in the county of Grayson and State of Texas, have invented a new and useful Improved Steam-Engine Governor, of which the following is a full, clear, and exact description.

My invention relates to improvements in governors for steam engines of the high pressure type, and more particularly to such governors as are adapted to directly control the influx of steam to the engine cylinder.

The improved governor is especially well adapted for use in connection with a double cylinder single-acting steam engine of my invention that is the subject of another application, and in which a plate-like governor valve having suitable steam ports, is introduced within a vertical channel formed in the single head plate that closes one end of two steam cylinders, which are located in the same vertical plane on a bed-plate; said valve being directly attached to, and controlled by the governor, for the alternate introduction of steam directly through the cylinder head into the two cylinders, for the actuation of working parts of the steam engine.

The objects of my invention are, to produce a novel, simple governor, that will be sensitive, and steady in action, and adapted for direct connection to a vertical sliding cut-off valve, and contain reliable means for an exact adjustment of its parts, to suit the requirements of its service.

To these ends, my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly sectional side view on the line 1—1 in Fig. 2, of the improvement, secured upon the upper front end portion of a horizontal cylinder steam engine. Fig. 2 is a longitudinal sectional view of parts of the engine, and a transverse sectional view of the lower portion of the improvement, on the line 2—2 in Fig. 1; and Fig. 3 is a transverse sectional view of the improved governor, on the line 3—3 in Fig. 1.

The improved governor is especially well

adapted for use in conjunction with a steam engine having a horizontal cylinder A, shown broken in Fig. 2, its front head B, being vertically channeled to receive the flat plate-like governor valve C, that occupies said channel *a*, and is therein retained so as to slide steam tight, by the main valve seat D, which seat is secured upon the flange *b*, of the cylinder by screw bolts (not shown) the head B, being retained in place by similar means.

As indicated in Figs. 1 and 2, the frame E, of the improved governor, is secured by its curved pads *c'*, upon the cylinder flange *b* and main valve seat D, the frame consisting essentially of two parallel standards *c*, having the pads *c'* on their lower ends, and at their upper ends merging into a laterally elongated frame portion that equally projects beyond the standards, and is curved in said projecting side portions to produce two similar curvilinear walls that are joined at top and bottom by level and substantially parallel parts of the frame, as indicated in Fig. 1. The standards *c*, are so located, that the integral stem *d*, formed on the valve C, will occupy a vertical plane equally distant from said parts, the length of the valve stem being proportioned to permit it to project a suitable length above the head B and valve seat D. Two boxes *c²*, are formed on the governor frame at its transverse center, having removable cap pieces that are attached to the horizontal members of said frame.

An upright tubular shaft *e*, is provided, comprising two cylindrical portions that are held in alignment by the radial arms *e'* which latter are longitudinally slotted from their outer ends at their transverse centers, thus affording two parallel limbs for each arm, that extend from the tubular portions of the shaft, which are loosely secured to the frame by the boxes *c²*, the lower end of the hollow shaft being stepped in the lower box. Within the hollow shaft *e*, a spindle *f*, is loosely fitted, which extends above and below the frame and at its lower end is loosely clamped to the upper end of the valve stem *d*, as at *d'*. The upper tubular portion of the shaft *e*, is projected sufficiently above the upper frame box *c²*, to receive the bevel gear pinion *g*, which is thereon secured. From the upper box *c²*, a tubular box *c³* is horizontally extend-

ed in the same vertical plane with the frame of the governor, and in it a counter-shaft c^4 , is sustained to rotate, having a bevel gear pinion g' , secured on its inner end in mesh with the pinion g , a band pulley g^2 , being affixed to the outer end of the counter-shaft to accommodate a band (not shown) which is also engaged with a driving pulley on the crank shaft of the engine. Preferably the radial arms e' , are cut away in skeleton form by producing an oblong aperture in them which extends to points near their ends, the latter being transversely perforated at an equal distance from the longitudinal center of the spindle f , for the reception of the pivot bolts h . Two similar disks i , form important parts of the improvement, these being substantially circular in form edgewise and having parallel sides, their thickness being suitably proportioned to the width of the slots in the arms e' , wherein the disks are introduced and pivotally sustained by the bolts h . The edge portions of the disks i , that are nearest to the spindle f , are cut away to afford clearance, and from these edge portions finger plates i' , are projected and have a loose lapped contact within a longitudinal slot cut in the spindle f at a point nearly opposite the pivot centers of the disks, and have slotted ends that loosely engage a pin i^2 , transversely secured in the spindle. Upon each side of each of the disks i , a weight block m , is located, and these blocks that are arched edgewise to conform with the contour of the disks, each have a central inwardly extending arm projected from it, the arms being all of an equal length, and a boss m' , is formed on each arm, which bosses are centrally perforated to fit upon the pivot bolts h . A sufficient space is afforded at the sides of each disk i , to permit of the introduction of the bosses m' , between the disks and inner sides of the limbs on the arms e' , so that a pair of the weight blocks m , is thus disposed, one on each side of a disk i . The weight blocks m , are arranged to hang from the pivot bolts h , as indicated in Fig. 1, and are oppositely secured in place on a disk, by a bolt and nut n , which bolts pass through holes oppositely formed in the disks, and also through a curved slot in each disk, which slots are concentric with the radial center of the latter, so that the weight blocks may be rocked when loosened, and be made to assume a position near to or away from the spindle f , as may be desired.

On the top of the box c^3 , which is supported by a brace c^5 , an arm r , is pivoted, one portion of which is curved to project its free end above and rest upon the top of the spindle f , the other straight part of the said arm being pivoted to a cam lever s , that is so arranged as to depress the outer end of the curved portion of the arm r , when the lever is rocked into a vertical position, which will depress the upright spindle f ; the disposition of the lever in a horizontal plane removing press-

ure from the spindle so as to permit it to rise into a normal position, as shown in Fig. 1.

The cylinder head B and main valve seat D, are horizontally slotted at proper distances apart in two places, to afford two live steam ports u , which extend from a steam chest D', into the cylinder A, and at a suitable distance below said live steam ports an exhaust port v , is cut through the head and valve seat. The steam ports u , are each bisected by a central web, that equals in width the breadth of the flat valve stem d , which projects vertically from the transverse center of the governor valve C. Live steam ports are cut in the governor valve C, to mate the live steam ports in the head B and valve seat D, and said valve C has a large aperture v' , cut in it, that is opposite the exhaust port v , which hole v' from its size is adapted to allow exhaust steam to freely pass from the cylinder without regard to the position given to the governor valve.

In service, when the engine is started and full steam pressure is required, the lever s , is elevated, which will depress the valve C, so that its upper set of live steam ports will lie in alignment with the lower ports in the cylinder head and main valve seat, the weight blocks of the governor being thus projected and maintained in upward and outward adjustment, so that a free flow of steam will be permitted from the steam chest D' to the cylinder A. After a maximum speed has been attained in the working parts of the steam engine, the lever s , is depressed into the horizontal position indicated in Fig. 1; this will release the weight blocks m , which by their gravity will cause the governor valve C, to assume the position indicated in Figs. 1 and 2, and while the engine is working at the speed which it is desired to maintain, the steam ports in the valve will remain in alignment with those in the head B and the valve seat D. Whenever an abnormal speed is produced in the working parts of the engine, from an increase of live steam pressure or a diminished load strain, the weights m , will be correspondingly rocked outwardly and upwardly, thereby moving the valve C, downwardly and diminishing the steam delivering capacity of the ports u . The adjustment of the weights m toward the spindle f , will give a greater range to their upward and outward movement, and consequently adapt them to slide the valve C or an equivalent device, a greater distance, the opposite adjustment of said weights that removes them farther from the vertical spindle, serving to diminish the reciprocation of the valve.

It is essential for the attainment of the highest degree of efficiency in the governor, that the speed communicated to the weight blocks m should equal that of the crank shaft, and furthermore that the distance between the pivot centers and circular outer edges of the weight blocks, should equal the length of the crank on the main engine shaft from

which motion is communicated to the governor, the pulley on the main shaft (not shown) being of an equal diameter to the band pulley *g*². The provision of the flat circular disks *i*, is a positive advantage, as these disks present a surface for the impinge of air sufficient to steady the action of the governor, and maintain a tensional strain on the band that drives the governor so as to prevent said band from slipping when in service.

It is evident that the improved governor may be used in connection with steam engines of various types for the regulation of steam conveyed thereto for their operation, hence its service is not restricted to a conjunctive use with the style of governor valve herein shown, others being equally available if adapted for a direct movement by the spindle *f*.

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

1. In a governor, the combination with a supported rotatable upright hollow shaft, and means to rotate the shaft, of a spindle, slidable in the shaft disks pivoted on radial arms of the hollow shaft and loosely connected to the spindle, and adjustable weights on the disks, substantially as described.

2. In a governor, the combination with a supported rotatable upright hollow shaft, radial slotted arms thereon, and a longitudinally slotted spindle therein, of two disks pivoted between limbs of the arms and loosely connected to the spindle in its slot, adjustable weight blocks on the disks, and a device to rotate the hollow shaft, substantially as described.

3. In a governor, the combination with a frame, a hollow shaft rotatable thereon, slotted opposite radial arms on said shaft, and a longitudinally slotted spindle in the shaft, of two disks pivoted between limbs of the radial arms, weight blocks hung from the pivots of the disks and adjustably secured in pairs

thereon, means to loosely connect the disks to the spindle in its slot, and a device to rotate the hollow shaft, substantially as described.

4. In a governor, the combination with a frame, a hollow shaft rotatable on said frame, two slotted radial arms oppositely projected from the hollow shaft between its ends, and a longitudinally slotted loose spindle in the hollow shaft, of two circular disks centrally pivoted between the limbs of the slotted arms, finger plates fast to the disks and lapped in the slot of the spindle, two pairs of weight blocks hung from the pivots of the disks and adjustably secured oppositely in pairs thereon, and a device to revolve the hollow shaft, substantially as described.

5. The combination with a governor valve arranged to slide in a vertical plane between an engine cylinder and a main valve seat, of a governor comprising a frame, a rotatable upright hollow shaft thereon, two slotted opposite radial arms on the hollow shaft, a cylindrical spindle longitudinally slotted near its center, two circular disks centrally pivoted between the limbs of the radial arms, weight blocks hung from the pivot centers of the disks and adjustably secured oppositely in pairs thereon, finger plates fast on the disks and lapped in the slot of the spindle, and a device to rotate the hollow shaft, substantially as described.

6. The combination with a frame, a hollow shaft, radial slotted arms thereon, and a longitudinally slotted spindle loose in the hollow shaft, of two disks centrally pivoted between limbs of the radial arms and loosely connected to the spindle in its slot, weight blocks hung on the pivots of the disks and adjustably secured to said disks, means to rotate the hollow shaft, and a device adapted to depress the spindle, substantially as described.

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