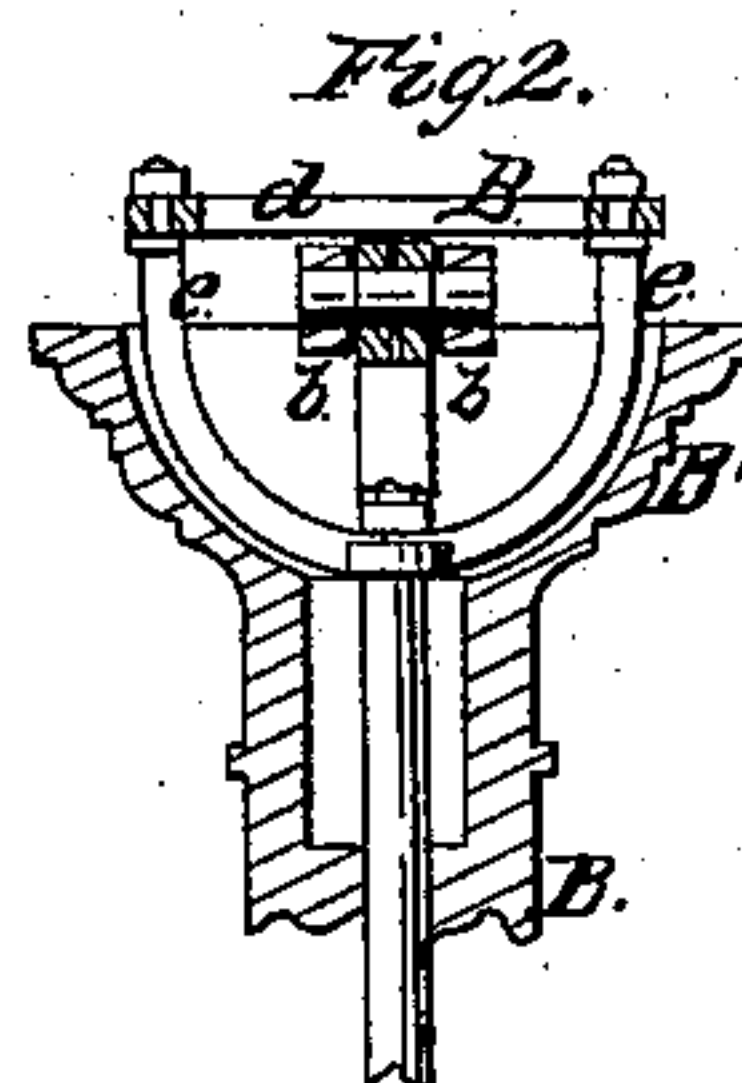
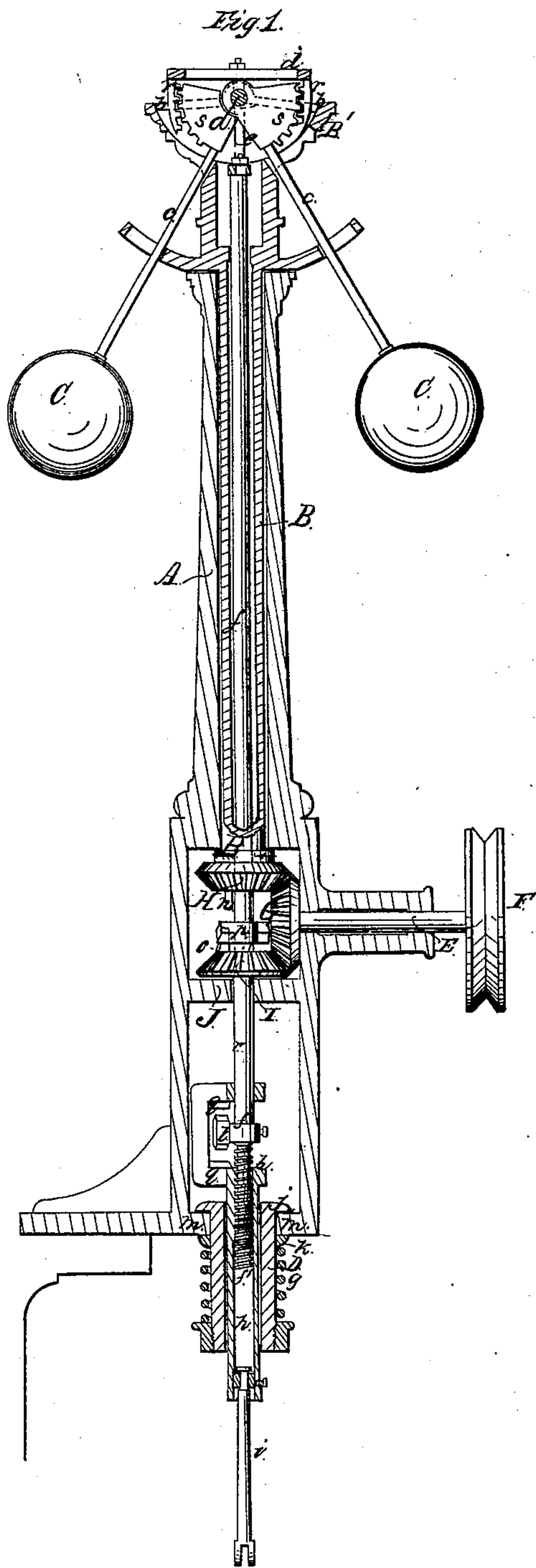
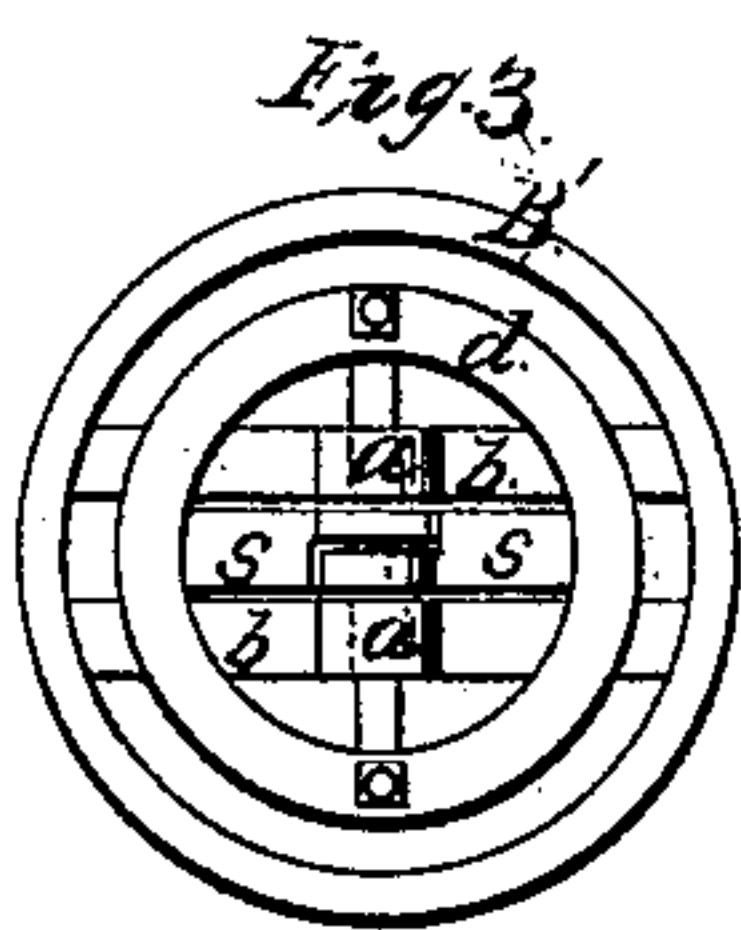


A. F. Ward,

Governor.

No 17,817.

Patented July 14, 1857.



UNITED STATES PATENT OFFICE.

A. F. WARD, OF LOUISVILLE, KENTUCKY.

GOVERNOR OF STEAM-ENGINES, &c.

Specification of Letters Patent No. 17,817, dated July 14, 1857.

To all whom it may concern:

Be it known that I, A. F. WARD, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful

Improvement in Governors for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation partly in section, of a governor with my improvement. Fig. 2, is a sectional view taken at right angles to Fig. 1, of the head of the governor shaft and the connection of the governor rod. Fig. 3, is a top view of the same.

Similar letters of reference indicate corresponding parts in the several figures.

The object of my invention is to make the governor effective in regulating the speed of the engine under greater variations of the load than can be compensated for by the common arrangement of connections with the regulating valve.

This invention consists in the arrangement and employment of a double-armed screw socket, clutch, and friction socket, in the manner hereinafter described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a stationary pillar which supports all the working parts of the governor, said pillar being supposed to be bolted to the engine framing or to any suitable support.

B, is the main spindle of the governor, fitted to the interior of the governor A. It is hollow and made with a broad head B', which is constructed with two cross-pieces b, b, which receive the transverse pin a, on which swing the governor arms c, c, carrying the balls C, C. The arms c, c, are provided at a suitable distance from the pin a, with toothed segments s, s, described from the center of a, said segment gearing with two toothed racks r, r, attached rigidly to a horizontal ring d, which is secured to a yoke e, to which the governor rod f, is connected in such a manner as to turn freely within it.

This rod f, fits to guides within the spindle B, and the lower part of the pillar A. By the action of the segments s, s, on the toothed racks r, r, the balls are made to act on the governor rod f, so as to produce the same effect as any ordinary governor connection, that is to say, to act upon the regu-

lating valve or cut-off to the extent necessary to control the speed of the engine under all minor variations of its load, or of the pressure of steam in the boiler.

The connection of the governor rod f, with the regulating valve or other device by which the supply of steam is regulated, is effected by providing the lower portion of the rod with a male screw f', and fitting the said screw with a female screwed socket h, to the lower part of which a rod i, is connected by a swivel joint. This rod i, connects with the valve or other device aforesaid. It is obvious that by turning the rod f, while the socket h, is held stationary the length from the connection of the said rod with the yoke e, to the lower end of the rod i, must be increased or diminished. This mode of completing the connection is not, however, new, but it is the means of turning the rod f, which constitute the invention.

D, is a metal socket fitted to turn in a bearing m, m, in the bottom of the pillar A. This socket receives within it the socket h, which is fitted to it with a square or feather so as to slide up and down but not turn within it. The socket D, is provided with a fixed collar j, at the top, which rests on the top of its bearing in the pillar A, and is fitted below the pillar with a movable collar k. Below the movable collar k, a strong spring g, is coiled around the socket D, and this spring is compressed between the collar k, and a nut l, at the bottom of the socket in such a manner as to draw down the collar j, and force up the collar k, into contact with the top and bottom of its bearing m, m in the pillar, with sufficient force to produce an amount of friction between the socket D, and its bearing greater than the friction of the screw f', in the socket h, so that said screw may turn without turning the socket D.

E, is a horizontal shaft by which the governor is driven, said shaft working in a bearing in the pillar A, and receiving a rotary motion through a band from the engine to its pulley E, and giving rotary motion to the governor spindle by a bevel wheel G, gearing with a spindle B.

I, is a bevel wheel fitted loosely to the governor rod f, and resting on a fixed saddle J, provided for the purpose in the pillar. This wheel I, gears with G, and derives a continuous rotary motion therefrom in the opposite direction to the wheel H. The wheel H carries a pin n, with a beveled point and

the wheel I, a similar pin *o*, and the governor rod *f*, carries a clutch *p*, whose edges are beveled like the points of the pins *n*, *o*, which clutch, when the rod is moved up or
 5 down beyond the limited distance which is necessary to the ordinary action of the governor, comes in contact with the pin *n*, or *o*, and thus causes the rod *f*, (which, during the ordinary action of the governor, does not
 10 rotate) to rotate in one direction or the other and thus to turn the screw *f'*, in the female screw socket *h*, and cause the said socket to be raised or lowered, thus lengthening or shortening the governor connection, and by that means increasing or diminishing the supply of steam to a greater extent than is done by the simple action of the governor balls.

To illustrate the operation of the improvement, I will suppose the governor to rotate in the direction of the arrow shown on the lower part of the spindle B, in Fig. 1, and the arrangement of the regulating valve to be such that the supply of steam is increased by
 20 the elongation of the governor connection and diminished by the shortening thereof. When the governor has been adjusted to run the engine at a given speed with a given load and a given pressure of steam in the boiler, the clutch *p* will continue to rotate clear of the pins *n*, *o*, so long as the variation of the load or pressure is only very slight and the regulation of the engine will be effected by the action of the balls without varying
 30 the length of the connection. If, however, the load be increased very considerably, the balls will fall far enough to carry down the clutch *p*, till the pin *o*, strikes it and carries the rod *f*, in the opposite direction to the governor, causing the screw *f'*, to work in the screw socket *p*, and force the said socket downward, thus elongating the connection with the valve until the engine receives steam enough to bring the engine up to the
 40 desired velocity, when the balls raise the clutch *p*, clear of the pin *o*. If, on the contrary, the load of the engine be suddenly diminished and the balls fly out far enough to bring the clutch *p*, in contact with the pin *n*, the rod *f*, will be turned, by the action of said pin on the clutch, in the reverse direction to that first mentioned and thereby will raise up the female screw socket *h*, and thus shorten the connection till the supply of
 50 steam is checked or cut off sufficiently to bring the engine back to the required speed. In order, however, to stop the further elongation or contraction of the connection, if the full head of steam should be let on or the
 60 steam should be entirely cut off before the

complete regulation is effected, and to prevent the governor connection being broken by the continued working of the screw *f'*, in the female screw, I provide the upper end of the socket *h*, with a double arm *q*, *q'*, and
 65 between the upper arm *q*, and lower one *q'*, I secure a clutch *t*, to the rod *f*. If the socket *h* should work down low enough to give the fullest supply of steam, the arm *q'*, descends low enough to be struck by the
 70 clutch *t*, and by that means the socket *h*, and the socket D, also, are caused to rotate with the rod *f*. Or if the socket *h* should work up high enough to shut off the steam entirely, the arm *q'*, is raised high enough to
 75 be struck by the clutch which acts, as before stated, to carry around the sockets *h*, and D, till the velocity is reduced.

I do not claim as new in governors, the employment of a screw, operated in different directions by a self-acting clutch; the said screw raising or lowering a nut or socket which is connected by a rod to the throttle-valve. An example of such an arrangement may be seen in the withdrawn
 80 application of Samuel P. Brown, 1855. Another example may be seen in the water-wheel governor of Jas. Finlay, 1849. In neither of the above examples is the nut or socket provided with double arms; nor is
 85 any friction socket employed as in my improvements. For want of these parts, the nut, in Brown's device, is liable to be run off the screw-rod and the throttle-valve entirely disconnected from the governor;
 90 again, the nut is liable to be run up above the screw-thread, and there worn out or jammed; thus preventing its proper action at the needed moment. This latter difficulty is also apparent in Finlay's device.
 95 But my arrangement of double-armed socket clutch, and friction socket, renders the action of the regulating nut or socket certain in both directions, without a chance of failure.
 105

What I claim as my invention and desire to secure by Letters Patent, is—

The arrangement of the friction socket D, the female-screw socket *h*, with its arms *q*, *q'*, and the clutch *t*, on the governor rod *f*, the
 110 whole combining to operate as described so that the female-screw socket *h*, may be prevented turning till the full supply of steam is given or till the steam is cut off entirely and afterward be caused to turn with the
 115 governor rod.

A. F. WARD.

Witnesses:

J. C. BAIRD,
 JAS. HARRIS.