

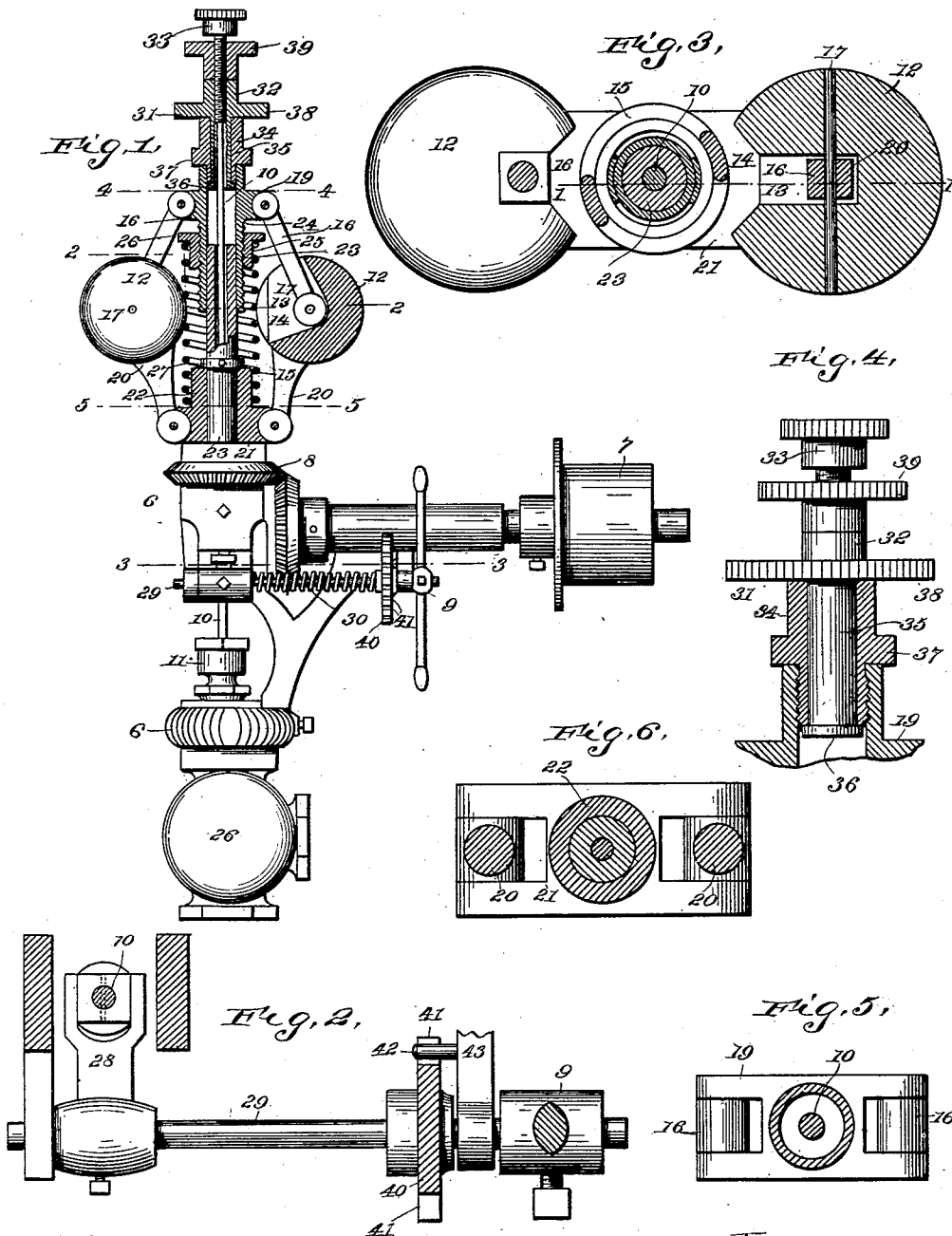
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Patented July 17, 1900.

J. E. KIMBLE.
STEAM ENGINE GOVERNOR.

(Application filed Feb. 21, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

JAMES E. KIMBLE, OF VICKSBURG, MICHIGAN.

STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 654,007, dated July 17, 1900.

Application filed February 21, 1899. Serial No. 706,402. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. KIMBLE, a citizen of the United States, residing at Vicksburg, in the county of Kalamazoo, State of Michigan, have invented a new and useful Steam-Engine Governor, of which the following is a specification.

This invention relates to that class of automatically-controlled fly-governors which employ a spiral spring to resist the centrifugal throw of the governor-balls, a vertically-playing governor-cap to which the governor-balls are connected by arms, the downward movement of which cap operates on the valve-stem to close the valve in regulating the supply of steam to the engine-cylinder, and a speeder having a thumb-wheel attached to the spring of said speeder for regulating its tension.

One object of the invention is to provide a more simple, effectual, readily-accessible, and easily-operated means for tensioning the governor-spring.

A further object consists in an improved construction of the governor-balls and the means and mode of their attachment to the governor-cap and collar for the purposes and advantages below described.

A further object is to provide the governor-cap with a cap-screw and other described features, including a stop-screw, which can be quickly adjusted in its relation to the valve-stem independently of the adjustment of the governor and speeder while the engine is running.

A final object is to provide the speeder with a thumb-wheel for regulating the tension of the spring, the periphery of said hand-wheel being provided with well-separated open notches to facilitate gripping it by hand and admit of the detachable engagement with the notches of a lateral projection by sidewise movement of said hand-wheel.

In the drawings forming a part of this specification, Figure 1 is an elevation of the governor, parts being in vertical section on line 1 1 in Fig. 3; Fig. 2, an enlarged section on line 3 3 in Fig. 1 looking from a point above; Fig. 3, an enlarged section on line 2 2 in Fig. 1 looking from a point above; Fig. 4, the cap-screw enlarged from Fig. 1; Fig. 5, an enlarged

section on line 4 4 in Fig. 1 looking from a point above, and Fig. 6 is an enlarged section on line 5 5 in Fig. 1 looking from a point above.

Referring to the lettered parts of the drawings, 6 is the body or framework of the governor; 7, the pulley, with which a belt (belt not shown) connects from the engine to impart motion to the governor; 8, the gears for transmitting motion from the pulley-shaft to the governor-balls; 9, the speeder with its spring 30; 10, the valve-stem, and 11 the stuffing-box to the valve-stem, all similar as heretofore constructed.

The governor-balls are in a general way spherical in form, as at 12, Figs. 1 and 3. Approximately one-fourth of the interior of these balls is chambered out from a little one side of the center, diverging to the periphery, as at 13, on the side next to the spring 15, where the opening flares laterally, as at 14, to allow the governor-balls 12 to approach nearer to the spindle 23. Within the chamber 13, at the center of the governor-balls, the lower ends of the arms 16 are pivoted to said balls at 17, Figs. 1 and 3. The upper ends of the arms 16 are pivotally attached to the ends of the governor-cap 19. Projecting downward from the lower side of the governor-balls 12 is an arm 20, (integral therewith,) one to each ball, and the lower ends of these integral arms are pivoted to the base 21 of the sleeve 22, Figs. 1 and 6. This construction is neat in appearance, with the upper and lower points of pivoting the arms of the governor-balls uniform, the attachment of the upper arms to the governor-balls hidden from view, and each ball and its arms having three equidistant joints, thus making an accurately and delicately acting nicely-balanced toggle arrangement, which in the actual use to which I have put the governors fully meets the design. It also enables me to make the construction more compact and narrower, with less distance from the outer sides of the governor-balls, and the attachment of the upper arms 16 is facilitated with more certainty of a nice balance.

At 23 is the spindle on which the cap 19, with its integral sleeve 24, and the sleeve 22, with its integral base 21, revolve, together with the governor-balls 12. The integral

sleeve 24, Fig. 1, is externally screw-threaded. On this sleeve is an interiorly-screw-threaded adjustable thumb-nut, adapted to be moved up and down, or this nut might be on the other sleeve 22. Said nut 25 has a milled flange for gripping hold of when operating the nut. A spiral spring 15, Fig. 1, for resisting the centrifugal throw of the governor-balls 12 is between the governor-cap 19 and the lower base 21 of the sleeve 22, the ends of the spiral spring being passed onto the sleeves, thus surrounding them and also, in effect, surrounding the valve-stem 10 within the spindle. One end of the spiral spring 15 rests against the thumb-nut 25. Turning the thumb-nut 25 in a direction away from the end of the spiral spring 15 decreases the tension of the spring 15, allowing the centrifugal throw of the governor-balls 12 to increase, which action draws down the cap 19 and its cap-screw 31 and lowers the valve-stem 10, thus closing to a desired degree the valve in the shell 26. Turning the thumb-nut in an opposite direction of course diminishes the centrifugal throw of the governor-balls and allows the valve-stem to be raised by the speeder 9, and thus opens the valve in the shell and automatically regulates the supply of steam into the cylinder of the engine.

The sleeves 22 and 24 assist in supporting the spiral spring 15, while one of them, as stated, bears the adjusting thumb-nut 25, and all the parts—viz., the governor-cap, the two sleeves, the thumb-nut, the spiral spring, the integral lower base of one of the sleeves and its integral gear 8, and the governor-balls and their arms—all thus compactly associated together will all revolve together around the spindle in unison, and hence around the valve-stem within the spindle.

It will be seen that the end of the spring 15 which passes onto the body of the nut 25 is larger than would be required for the spring to fit on the spindle. In fact, the whole of the spring is uniform in size with this end, and hence it is free from contact with said spindle. Also the flange 26 of the nut bears on the end of the spring and brings an equal pressure on all portions of said end of the spring, and thus prevents any canting over of the spring to cause a cramping or frictional contact of the body of the spring with what it surrounds. By this means a very prompt, accurate, and uniform action of the governor or governor-balls is established.

It will be understood, of course, that the sleeve 22, its base 21, and the upper one of the gears 8 are all integral and must be held down to place so the gears will mesh. Otherwise the centrifugal throw of the governor-balls would raise said sleeve and gear. For this purpose I attach a ring 27 on the spindle just above the upper end of the lower sleeve 22.

The valve-stem 10 is vertically movable in the hollow interior of the spindle 23 and is attached to the speeder 9 by the arm 28, projecting from the shaft 29, as heretofore. The

spring 30 of the speeder 9 (shown in Fig. 1) does not appear among the details enlarged in Fig. 2.

Certain means have heretofore been employed for forming a detachable connection of the upper end of the valve-stem 10 with the cap 19 during the downward movement of the latter by the outward throw of the governor-balls 12 by centrifugal force. I accomplish this, as stated, in a manner that the means for establishing this connection can be adjusted while the engine is running. I term this means as a whole a "cap-screw," (shown at 31, Figs. 1 and 4,) and it is constructed as follows: At 34 is a screw-threaded plug screwed into the cap 19. A stock 32 has a pendent portion 35 loose in said plug, and said portion has a flanged head 36 below the lower end of the plug 34, and thus the stock is attached to the plug in a swiveled manner. The plug 34 has a wrench-seat 37 for the use of a wrench in screwing it into the cap 19, and the stock has a thumb-wheel 38, preferably milled on the edge for gripping it with the thumb and fingers while adjusting the stop-screw 33, which is screwed into the top of the swiveled stock in position for the upper end of the valve-stem 10 to contact with it. Thus an immediate fine adjustment to control the supply of steam passing into the engine-cylinder can be effected independently of and without interfering with the particular adjustment of the governor and speeder.

On the shaft 29 of the speeder 9 is a hand-wheel 40, adapted to turn and to slide lengthwise thereon, and is attached to the end of the spring 30, Fig. 1. This hand-wheel 40 has a series of well-separated open notches 41 cut in from the periphery, leaving it rough around the edge, and can thus be more easily held when gripped by the thumb and fingers, which is quite important, since it has to be held and turned against a stiff-spring resistance when tensioning said spring. The notches 41 pass sidewise onto a laterally-extending projection 42 of the speeder-support 43 to hold the hand-wheel 40 from turning. Thus the notches made in this manner serve two purposes. Of course when desiring to turn the hand-wheel to tension the spring 30 said hand-wheel 40 is moved laterally away from the projection 42 and the particular notch which engages the projection passes off from said projection.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of the upright spindle, the lower revoluble collar; the revoluble, vertically-movable governor-cap, a spiral spring on said spindle between the governor-cap and collar; solid spherical governor-balls having the lower integral arms pivoted to said revoluble collar, said governor-balls having the interior recessed openings beginning at one side of the interior center and extending

therefrom, laterally upward obliquely, and obliquely laterally downward to the periphery toward the spring, thus opening this entire side and a portion of the top, said opening flaring both ways laterally at the edges next to the spring, and the arms pivoted at the upper end to the governor-cap, and pivoted at the lower end in the recessed opening at the interior center of the governor-balls, substantially as set forth.

2. The combination of the spindle, the governor-cap and its integral sleeve revoluble on the spindle, the valve-stem connected to said governor-cap, the revoluble lower sleeve and its integral base, a spiral spring having its ends surrounding the sleeves, and an adjusting-nut screw-threaded on a sleeve and vertically adjustable thereon, the body of said nut being surrounded by one end of the spring, and said nut also being provided with the flange resting on the end of said spring and pressing equally upon all portions of its end when compressing the spring by a movement of the nut, substantially as set forth.

3. In a fly-governor, the combination of a spindle, the governor-cap, a valve-stem within said spindle; the screw-threaded plug pro-

vided with a wrench-seat and screwed into the governor-cap; the stock provided with a thumb-wheel and having a pendent portion loose in said plug and attached thereto in a swiveled manner; and a stop-screw for the valve-stem adjustably screwed into the swiveled stock, substantially as set forth.

4. In a speeder for engine-governors, the combination of the revoluble and laterally-movable hand-wheel attached to one end of the speeder-spring, said hand-wheel having a series of well-separated, open notches around its periphery, to facilitate gripping it with the hand; and a projection extending laterally from a portion of the speeder-frame to which it is attached, in position for the notches of the hand-wheel to pass onto and off from the projection sidewise, when the hand-wheel is moved in either lateral direction, substantially as set forth.

In testimony of the foregoing I have hereunto subscribed my name in the presence of two witnesses.

JAMES E. KIMBLE.

Witnesses:

LEVI F. COX,
PHILLIP SCHAN.