(No Model.)

C. E. KIMBALL.

VALVE GEAR.

No. 353,032. Patented Nov. 23, 1886.

FIG. 1.

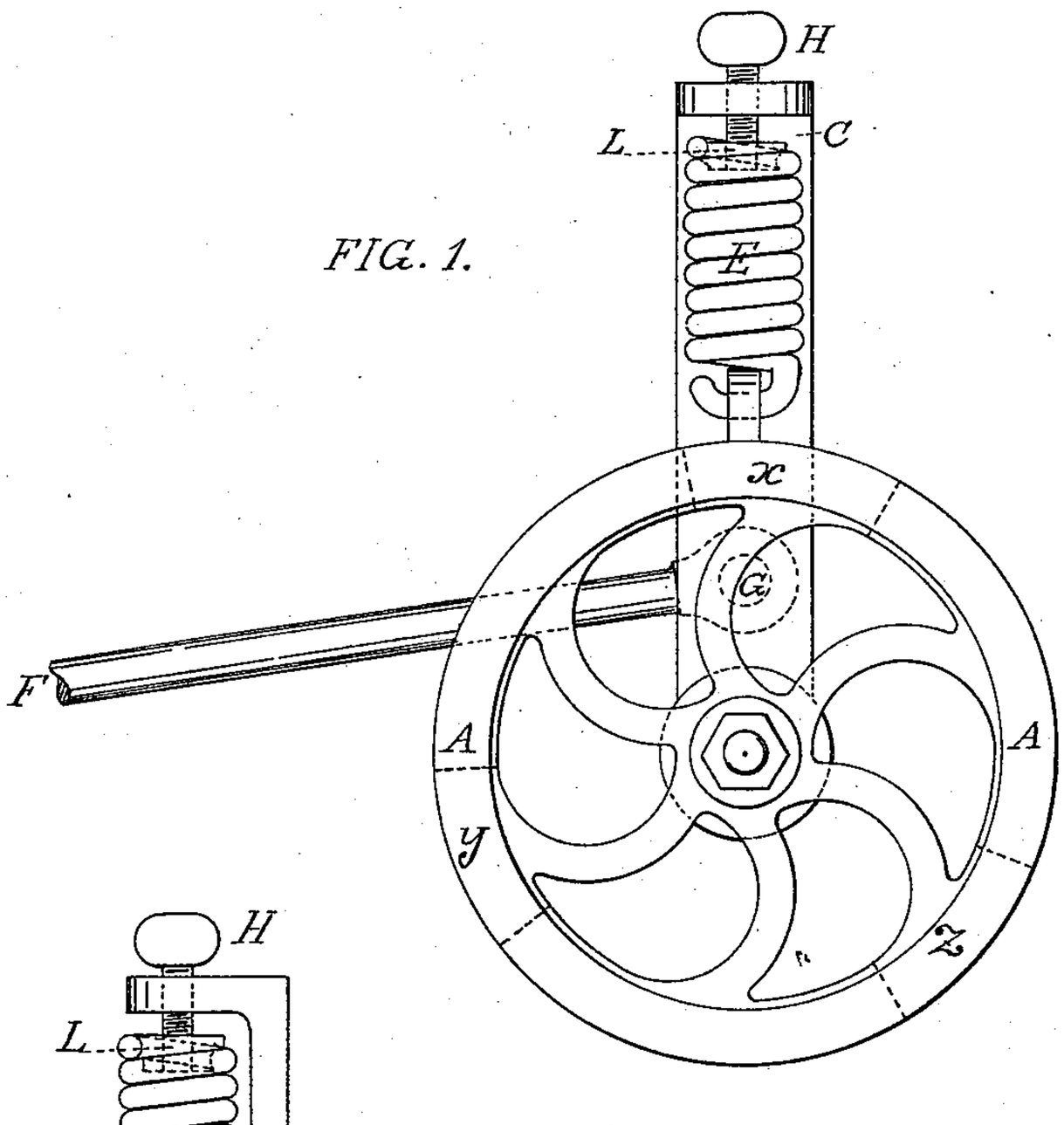
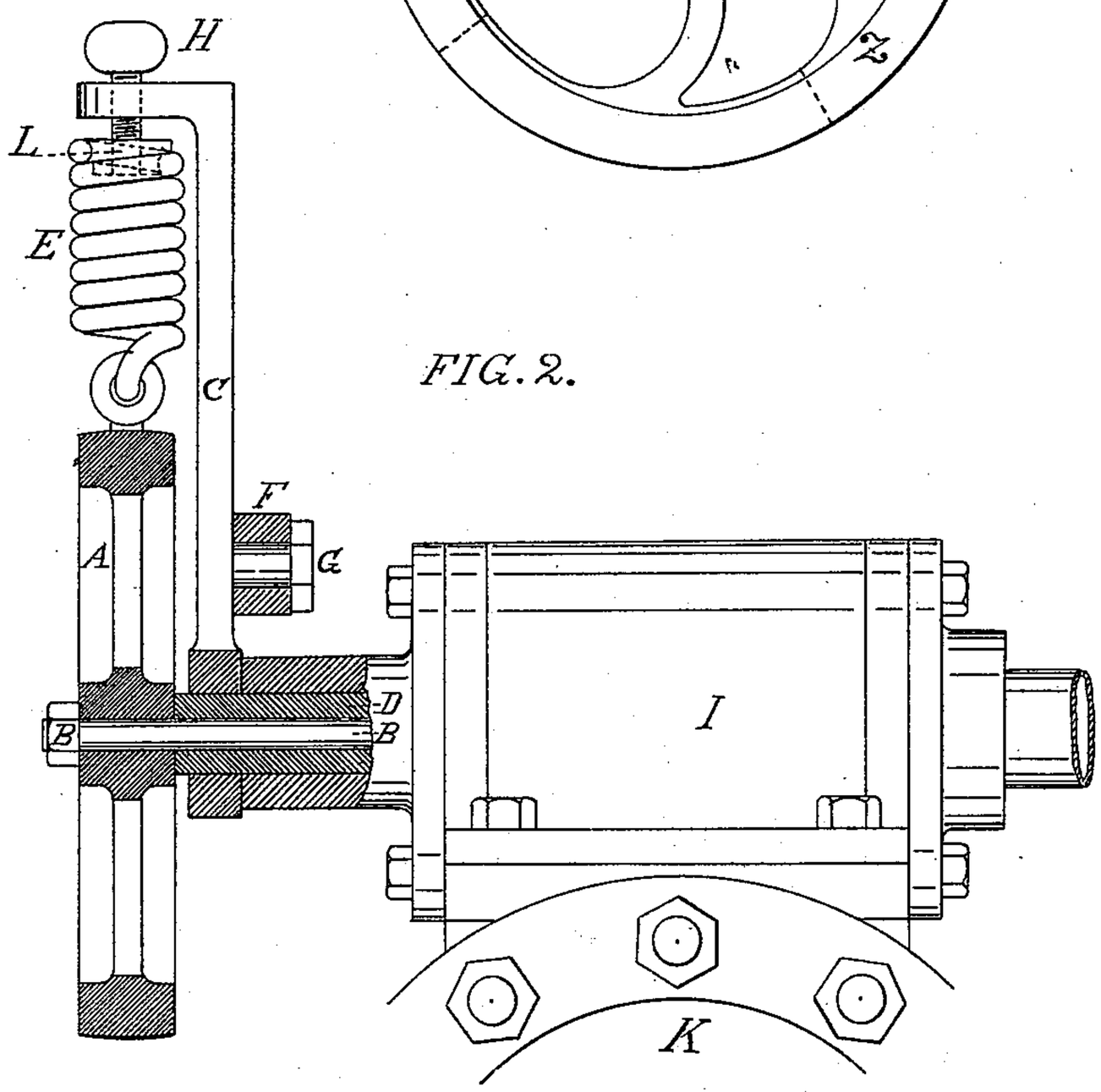


FIG. 2.



WITNESSES:

C. F. Gooding

Wm. D. Coppernoll.

INVENTOR

Charles E. Kimball,

William H. Sisson,

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES E. KIMBALL, OF ANAMOSA, IOWA.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 353,032, dated November 23, 1886.

Application filed April 14, 1886. Serial No. 198,868. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. KIMBALL, of Anamosa, in the county of Jones and State of Iowa, have invented certain new and useful Improvements in Cut-Off Governors and Valve-Gear for Steam-Engines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to work a cut-off by means of a balance-wheel or by weights attached rigidly to a rocking bar or stem as an axis, which rocking stem operates the cut-off valves, whereby the admission of steam to the cylinder of a steam-engine shall be controlled and regulated.

Referring to the drawings, Figure 2 is a side view of part of an engine-cylinder surmounted with a valve-box fitted with my improvement. Fig. 1 is a front or end view of the balance-wheel and the parts used to operate the same.

The lettering of the parts is the same throughout the drawings.

K is the engine-cylinder, surmounted by the valve-box I.

B is a rocking stem or rod which works the cut-off valve. The stem or rod B is rigidly secured to the axis of the balance-wheel A.

F is the eccentric-rod, pivoted at its outer end by the stud G to the rocking arm C, which works the sleeve D, by which the main valve of the engine is operated.

To the balance-wheel A is secured one end of the spring E, which at its other end is connected to the arm C by the adjusting-screw H, which engages with the plate L, secured to said spring E, so that by turning the screw H any desired tension of the spring E can be obtained.

In place of the balance-wheel A, may be used any one or more of the segments thereof—as, for instance, those marked X Y Z, or any of them—with their corresponding spokes and hub, such segments forming a weighted arm or arms radiating from the axis and secured to said spring E.

The operation of my invention is as follows: When the engine is started, the arm C, being connected with the eccentric-rod F, is swung back and forward by the movement of said eccentric-rod, and carries with it the end of the spring E, which is secured to said arm C. The spring E as it is moved pulls upon and carries with it the balance-wheel A, causing it to partially revolve upon its axis, and thus to turn the stem or rod B; but the balance-wheel A, having a heavy rim, will not follow closely the movement of the arm C, because of the inertia of said wheel A and because the spring E will, when pulled by the arm C, stretch or give until the inertia of the balance-wheel A is overcome and the balance-wheel is started. When started, the momentum of the balance-wheel or of the weighted arms, if they be used instead, will tend to carry the balance-wheel or arms farther than the arm C moves, and until the tension on the spring E, which pulls in unison with the movement of the arm C, overcomes the momentum of the wheel or arms and reverses its motion, which oscillating of said balance-wheel, being constant, will alternately open and close the cut-off valves, thus governing and regulating the cut-off as desired, the constant tendency of the balance-wheel being to move steadily and to impart a regular reciprocating motion to said stem B, thus cutting off the steam at regular intervals, the spring E being of sufficient strength and stiffness to compel said balance-wheel A to move, and thus, by the stem B, to open and close said cut-off valves. By varying the tension on the spring E the travel of the balance-wheel A will be extended or diminished, and the motion of the engine correspondingly accelerated or retarded, as desired.

The spring E may be either in the form shown or it may be a coiled spring, such as is used in the balance-wheel of a watch, or any other form of spring, as desired, and the balance-wheel A may be weighted in any part to give greater efficiency to its working under different circumstances.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The spring E and the balance-wheel A, as shown, and means for operating the same, in combination with a stem or rod to operate the cut-off valves of a steam-engine connected with and operated by said balance-wheel A, whereby the action and motion of the cut-off

valves is governed and regulated, substantially as shown and described.

2. In a steam-engine, the combination of the eccentric-rod F, stud G, arm C, spring E, balance-wheel A, and stem B, substantially as and for the purpose described.

3. In a steam-engine, the combination of the eccentric-rod F, stud G, arm C, sleeve D, spring E, adjusting-screw H, plate L, balance-wheel A, and stem B, substantially as and for the purpose specified and described.

4. In a steam-engine, the combination of the eccentric-rod F, stud G, arm C, sleeve D, spring E, adjusting-screw H, plate L, weighted arms X Y Z, (or any of said arms,) radiating from the axis, and stem B, to operate the cut-off valves, substantially as and for the purpose described.

CHARLES E. KIMBALL.

Witnesses:

C. F. GOODING,

WM. D. COPPERNOLL.