

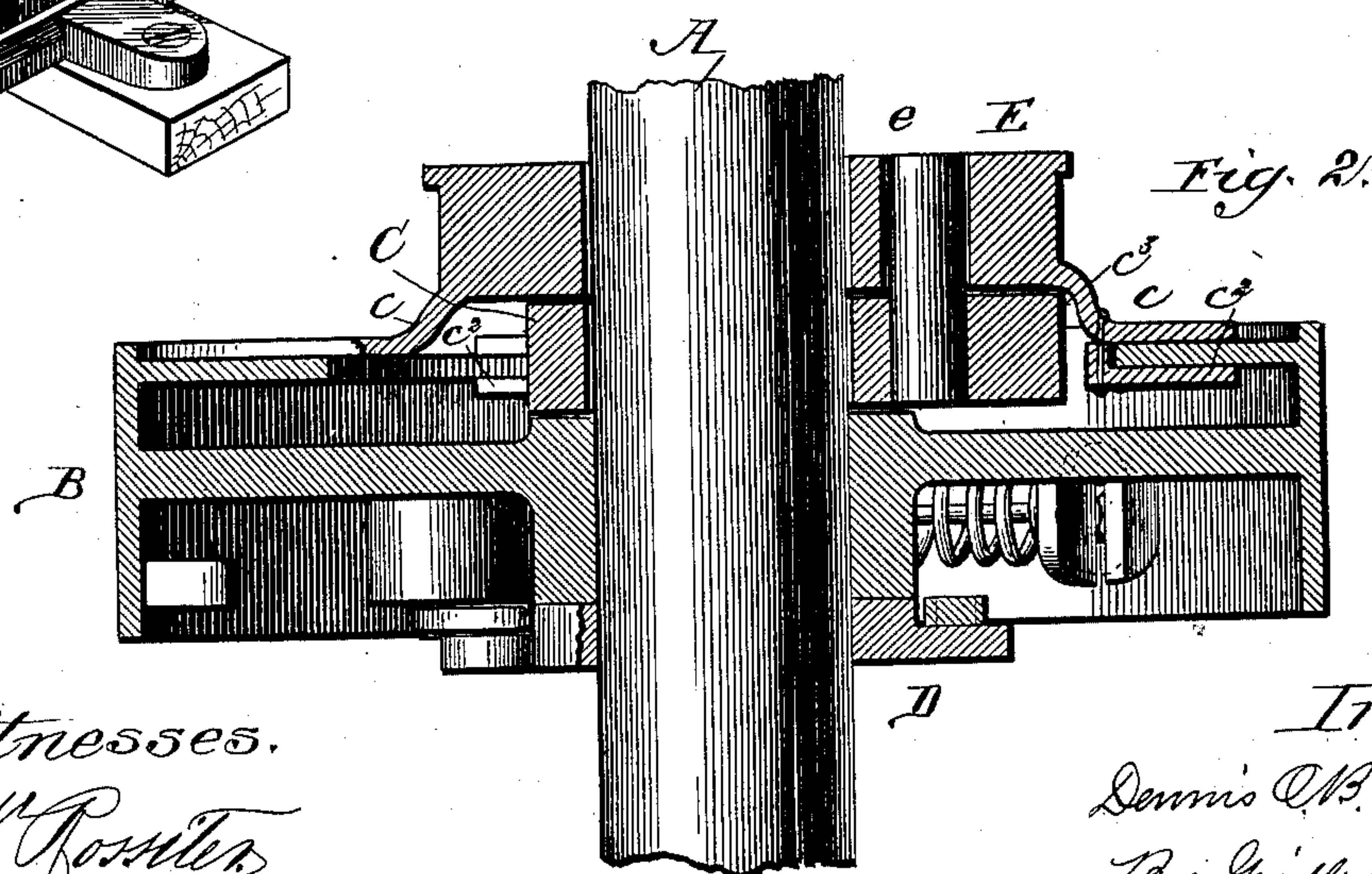
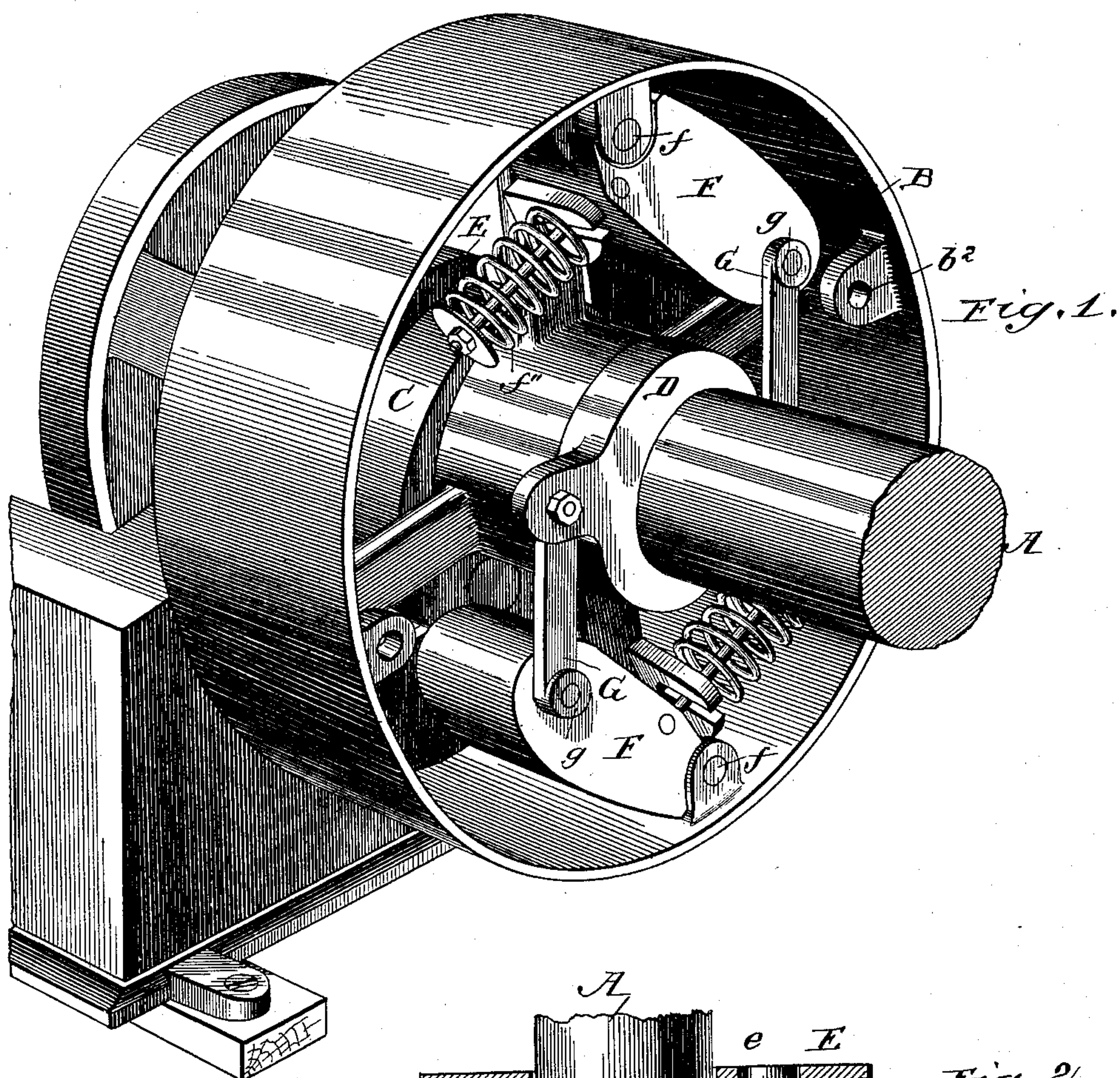
(No Model.)

4 Sheets—Sheet 1.

D. O'B. LADD
GOVERNOR FOR ENGINES.

No. 363,651.

Patented May 24, 1887.



Witnesses.

W. Rosier

J. B. Halpenny.

Inventor.

Dennis O'B. Ladd,

By, Gridley Allen

Atty.

(No Model.)

4 Sheets—Sheet 2.

D. O'B. LADD

GOVERNOR FOR ENGINES.

No. 363,651.

Patented May 24, 1887.

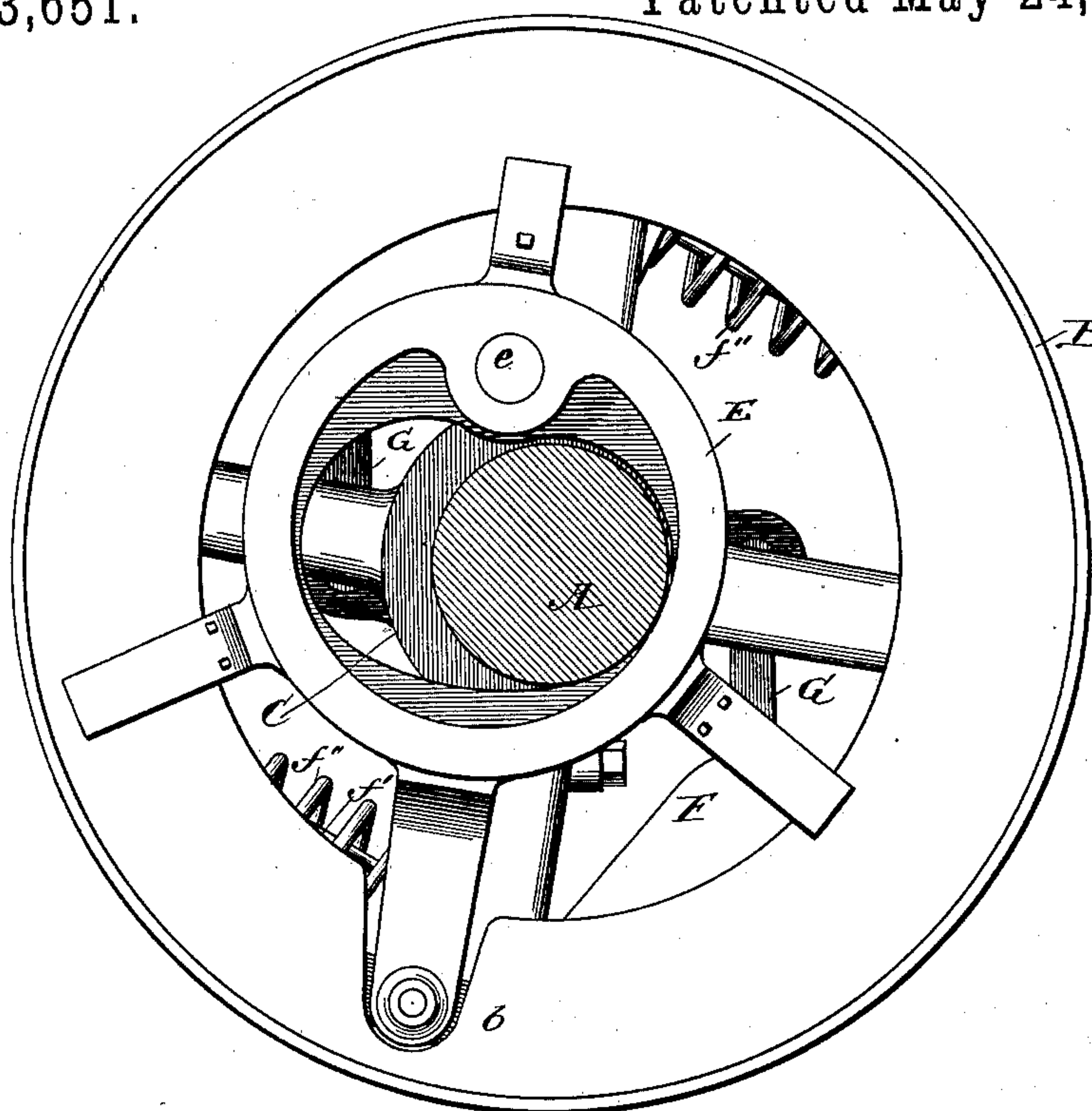


Fig. 3.

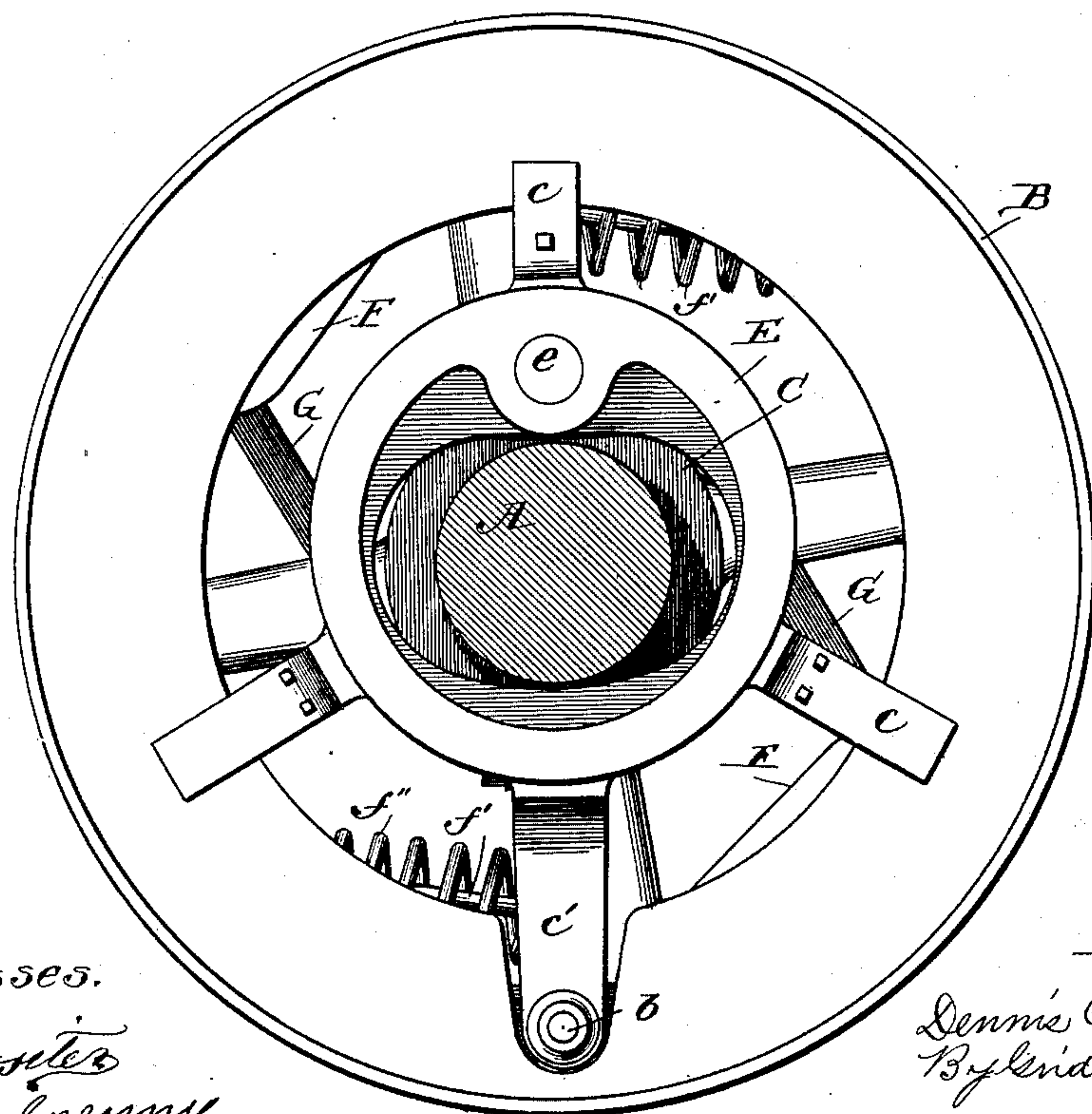


Fig. 4.

Witnesses.

W. Rossiter
J. B. Halpenny

Inventor

Dennis O. B. Ladd,
By Keadley & Gilchrist
his Attys.

(No Model.)

4 Sheets—Sheet 3.

D. O'B. LADD

GOVERNOR FOR ENGINES.

No. 363,651.

Patented May 24, 1887.

Fig. 5.

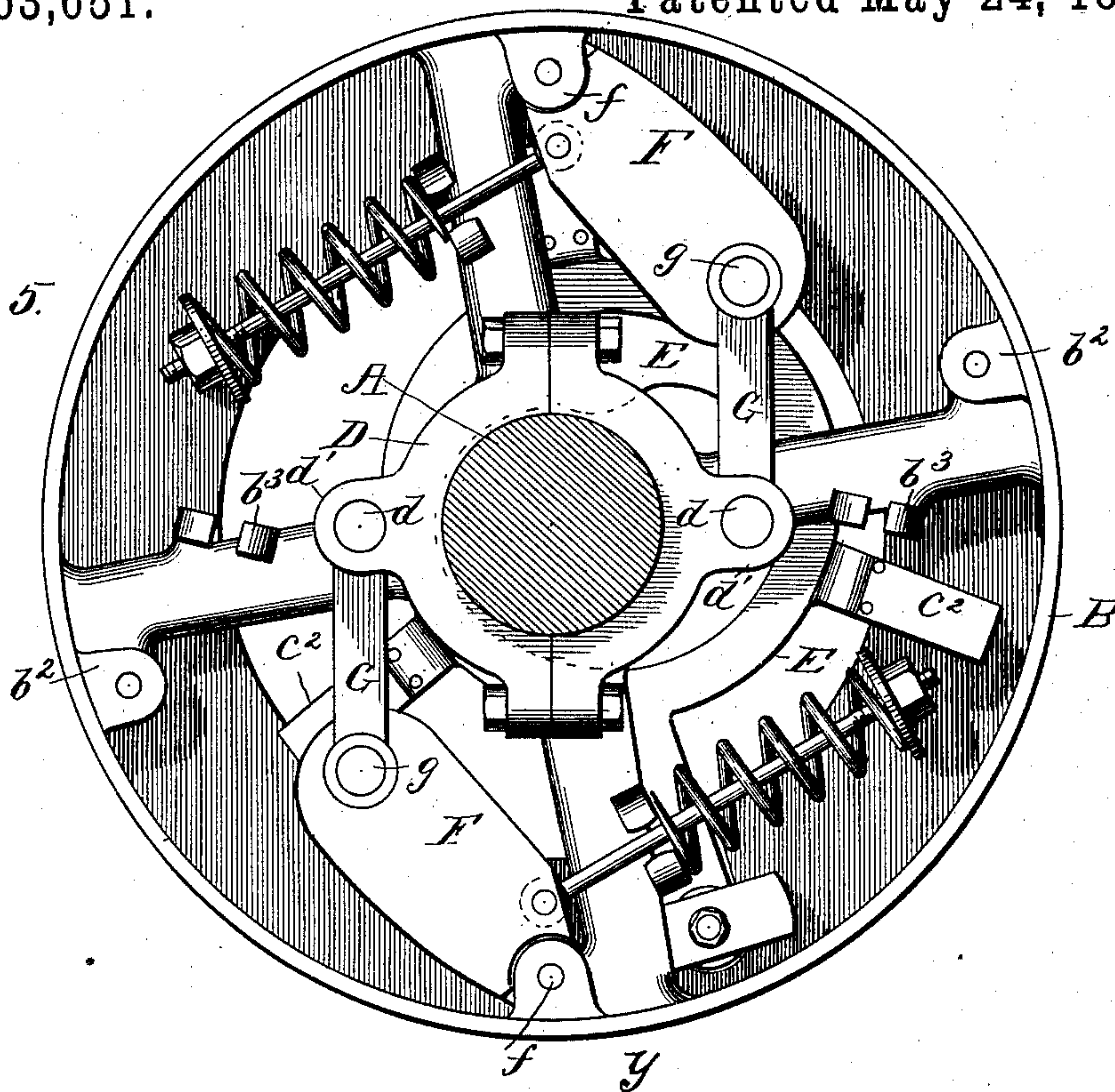
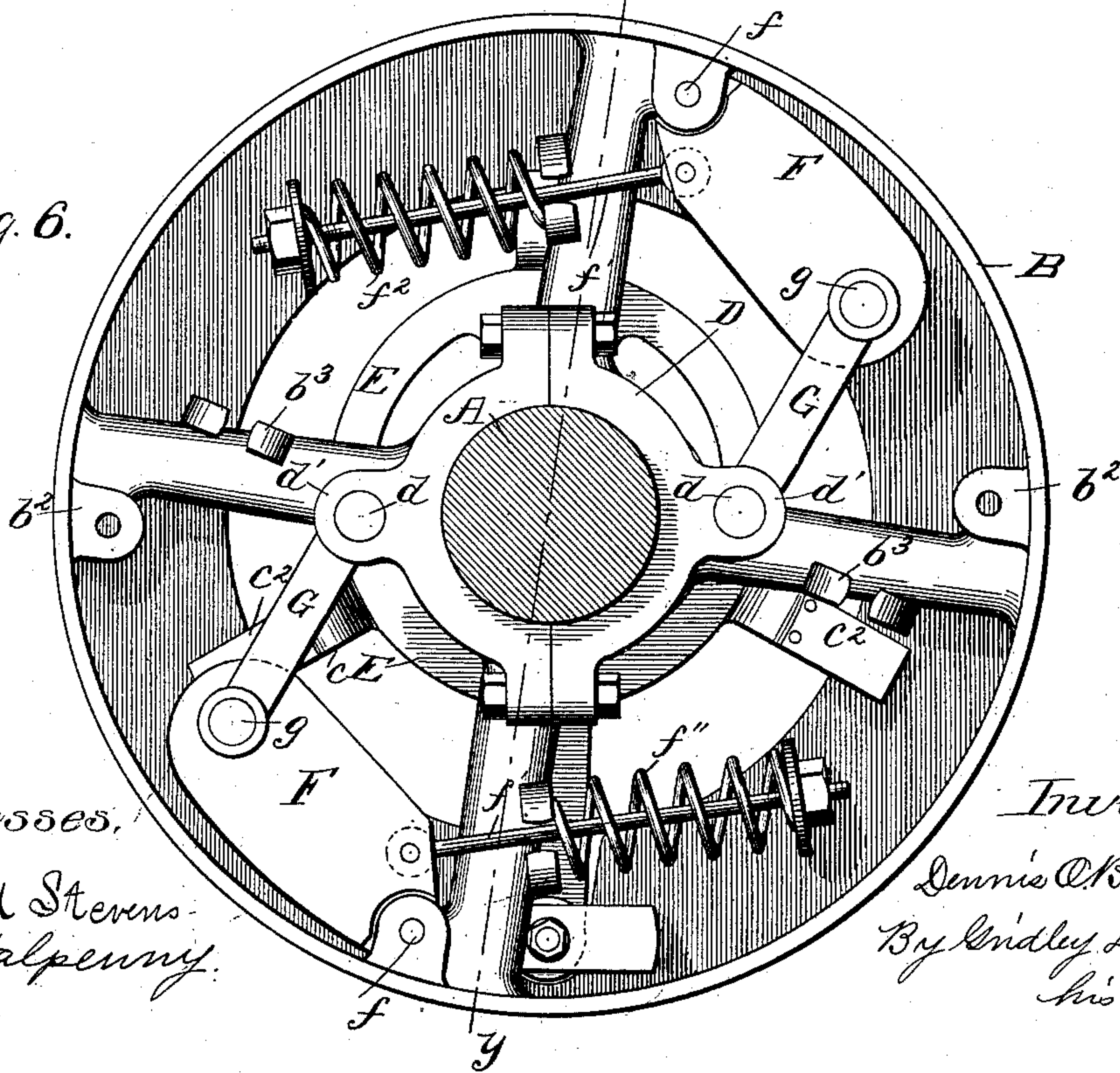


Fig. 6.



Witnesses,

David Stevens
J.B. Halpenny.

Inventor:

Dennis O.B. Ladd,
By Andley Fletcher,
his Atty.

(No Model.)

D. O'B. LADD

4 Sheets—Sheet 4.

GOVERNOR FOR ENGINES.

No. 363,651.

Patented May 24, 1887.

Fig. 7.

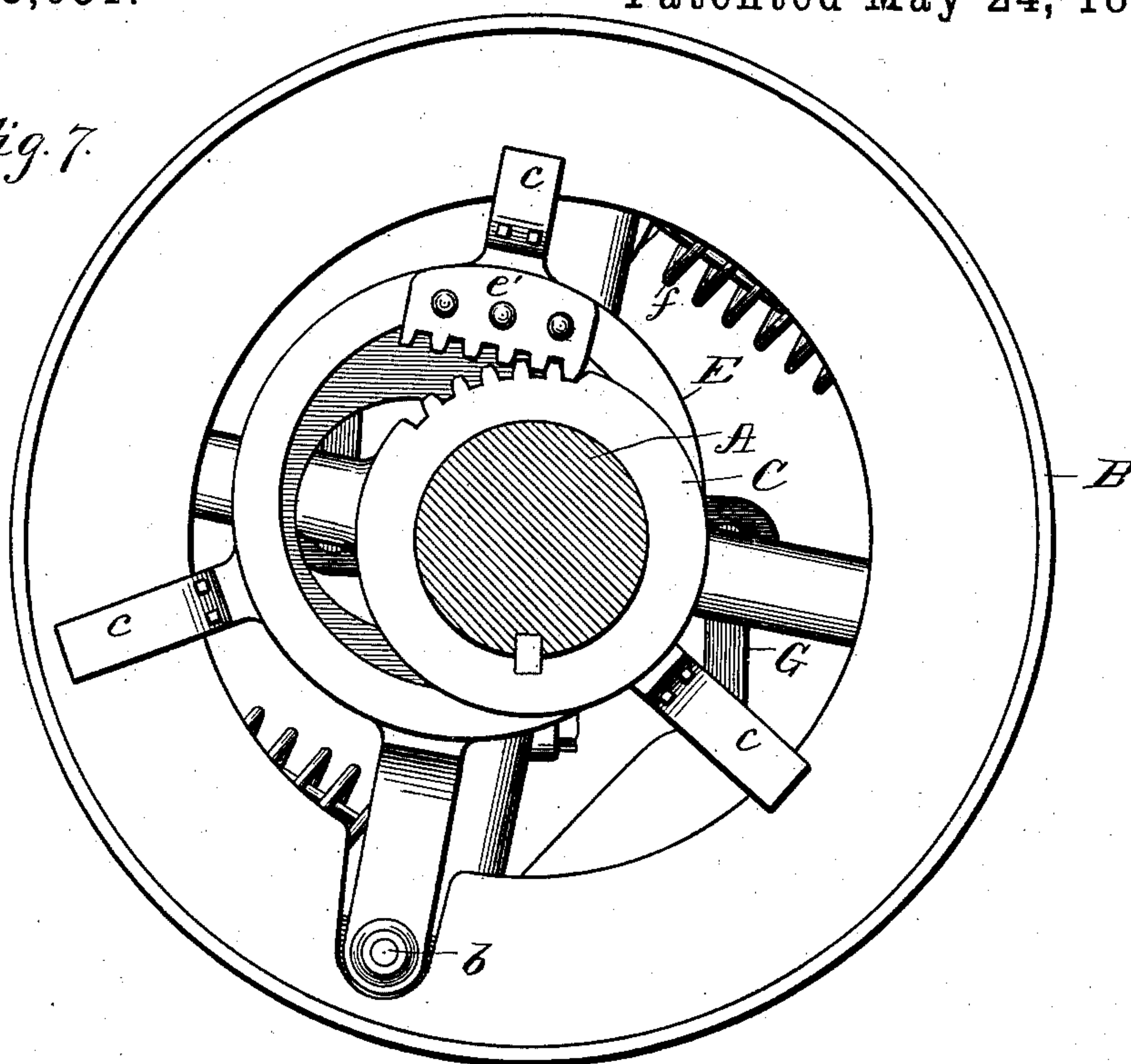
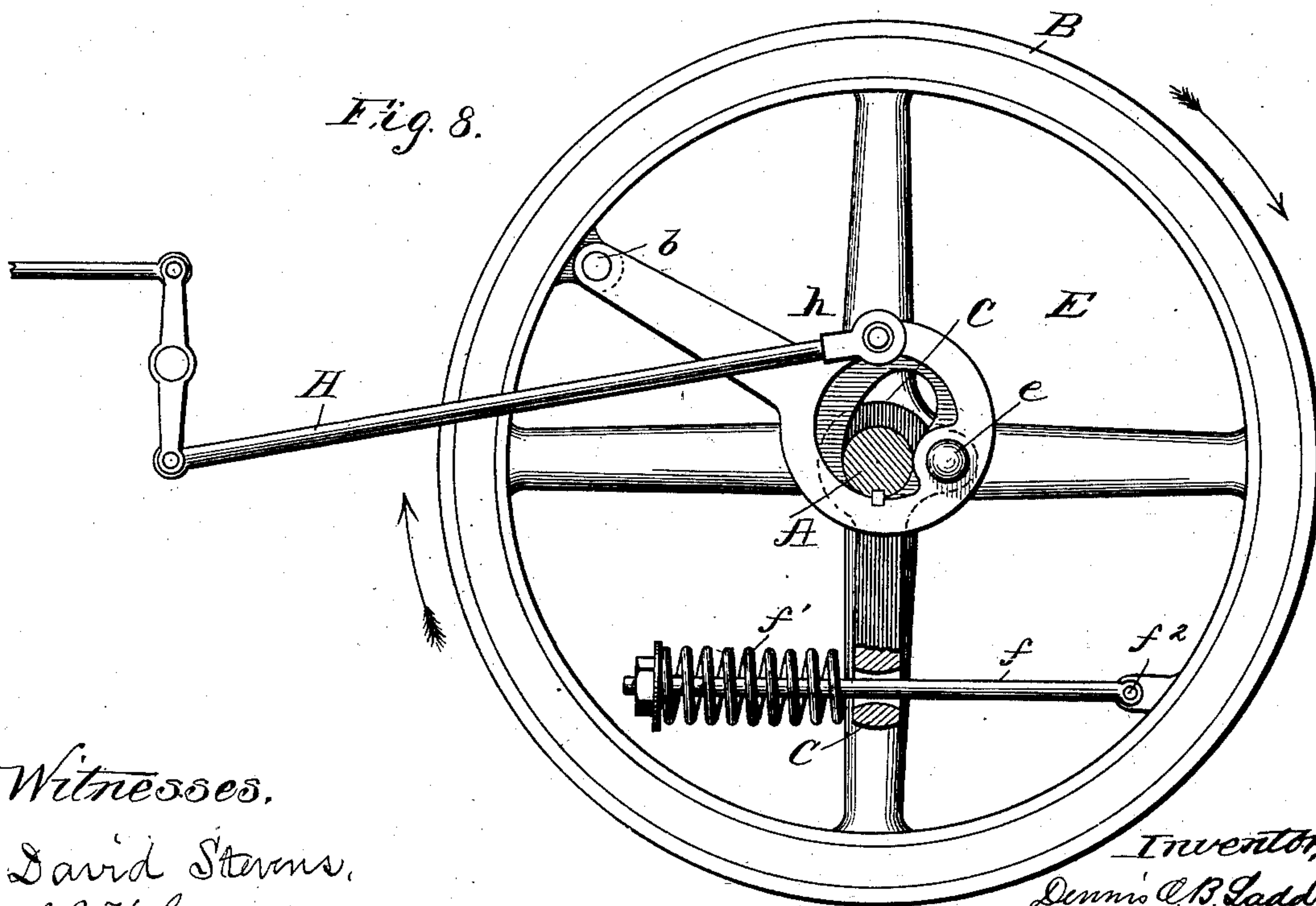


Fig. 8.



Witnesses.

David Stearns,
J.B. Halpenny

Inventor,
Dennis O.B. Ladd,
By: Lindley & Clutcher
Attys

UNITED STATES PATENT OFFICE.

DENNIS O'B. LADD, OF CHICAGO, ILLINOIS.

GOVERNOR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 363,651, dated May 24, 1887.

Application filed August 6, 1886. Serial No. 210,180. (No model.)

To all whom it may concern:

Be it known that I, DENNIS O'B. LADD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Automatic Valve-Governors for Steam-Engines, of which the following is a description, reference being had to the accompanying drawings, in which—

Figure 1 is a rear perspective view of my
10 improved governor. Fig. 2 is a transverse sectional view thereof, taken upon the line x x , Fig. 6. Fig. 3 is a front view illustrating the relative positions of the respective parts when the eccentric is at the extreme point of
15 eccentricity. Fig. 4 is a like view showing the eccentric at the minimum of eccentricity. Fig. 5 is a back view showing the relative positions of said various parts when the eccentric is at its maximum point of eccentricity. Fig.
20 6 is a like view showing the same at its minimum point of eccentricity. Fig. 7 is a front view of said governor, showing a modification of the manner of connecting the eccentric with the shaft; and Fig. 8 is a still further modifi-
25 cation, in which the centrifugal weights are dispensed with.

Like letters of reference indicate like parts in the different figures.

The object of my invention is to provide an
30 automatic governor and "cut-off" for steam-engines which may be so constructed as to regulate the throw of the valve in proportion to the work to be accomplished, the primary object being to utilize the inertia of the bal-
35 ance-wheel itself (preferably in connection with centrifugally-acting weights) to assist in controlling the valve-eccentric, and thereby render said governor extremely sensitive, and so uniform and smooth in its action that what
40 is known as "pounding," so common and objectionable in poorly-governed engines, and so injurious to machinery, may be wholly dispensed with. I accomplish said object substantially in the manner hereinafter more par-
45 ticularly described, and definitely pointed out in the claim.

In the drawings, A represents the engine-shaft, upon which is loosely mounted the bal-
50 ance-wheel B. Upon opposite sides of said balance-wheel, and keyed rigidly to said shaft, I place collars C D, which serve to prevent a longitudinal movement of the balance-wheel

upon the shaft, as well as other functions hereinafter described.

Adjacent to the collar C, I place an eccen- 55
tric, E, through a suitable opening in which the shaft passes. Said eccentric is preferably provided with a series of radial and laterally-bent arms, $c c c'$, the latter of which is loosely
60 pivoted to the balance-wheel by means of a pin or bolt, b , Figs. 3 and 4, while the arms are provided with plates c^2 , Figs. 2, 5, and 6, bolted rigidly thereto, so that the ends of said arms
65 c and the plates c^2 are upon opposite sides of the web b' of the balance-wheel, which they loosely straddle, said web forming a guide therefor and permitting an eccentric move-
ment of the eccentric E, while it receives a lateral support.

The sleeve C is provided with a lug, c^3 , which 70
projects radially therefrom, from which a pin, e , is preferably projected into the eccentric E at a point diametrically opposite to the pin b , so that the center of the shaft A is normally in
75 alignment with the pins b and e . It is obvious therefore that whenever the balance-wheel fails to revolve synchronously, or in unison with the shaft, the eccentricity of the eccentric is pro-
80 portionately varied, which in turn governs the "throw" of the valve. In order to retain this normal relation of the parts, I prefer to provide the following-described mechanism:

Pivoted to the balance-wheel, preferably at the points $f f$, are weights F F, to the oppo-
85 site or free ends of which are loosely attached, by means of pins $g g$, links G G, loosely connected by means of pins $d d$ to radially-projecting lugs $d' d'$, extending in opposite direc-
90 tions from the collar D. The weights F F are capable of a centrifugal movement, but are retained in their normal position, as shown in Figs. 1 and 5, by means of rods $f' f'$ and springs
95 $f^2 f^2$, connected with said weights and balance-wheel, substantially in the manner shown and as is usual in governors of this class. As the
100 motion of the shaft becomes accelerated the centrifugal tendency of the weights overcomes the resistance of the springs and they move outwardly. At the same time the inertia of the
balance-wheel prevents it from retaining the speed of the shaft, and it falls back, thus in-
creasing the sensitiveness, while abrupt move-
ments in either extreme, which is the cause of
"pounding," so called, are wholly prevented.

Fig. 8 shows a modification of said construction, in which a rack, e' , engaging with teeth upon the eccentric C, is shown in lieu of the pin e . It is obvious that the inertia of the balance-wheel alone would accomplish this result, which may be illustrated as follows:

Assuming that there may be a sudden or partial cessation of the work to be accomplished by the engine—as, for example, the breaking of a driving belt or shaft—the crank would, in this event, plunge forward at a high rate of speed; but the balance-wheel, being loose upon the shaft, would retain its normal degree of speed, which would result in suddenly changing the position of the eccentric and cutting off steam entirely.

Fig. 8 illustrates a governor constructed in this way, in which the part C is elongated to form an arm, through a hole in the outer end of which the rod f is projected, and connected by a knuckle joint at f'' to a lug upon the rim of the balance-wheel, the spring f' bearing upon the opposite side of said arm, whereby the eccentric is normally maintained at its maximum eccentricity to the shaft A. The eccentric-rod H is shown as attached to a wrist-pin, h , upon the eccentric E, which is equivalent to the usual attachment.

It is manifest that the construction shown

in said last-named figure is the same in principle as that shown in the others, the weights F and links G in the latter serving to connect the rods f' with the balance-wheel in lieu of the direct connection last described.

By means of the lugs $b^2 b^2$ and flanges $b^3 b^3$, Figs. 1, 5, and 6, the position of the weights and springs may be reversed, so that the engine may be caused to run backward, if desired.

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

The combination, with a balance-wheel loosely mounted upon the shaft, of the weights F, attached as shown, and held normally, as specified, by the springs f^2 and rods f' , links G, loosely connected with a rigid collar, D, and eccentric E and collar C, connected and arranged substantially as specified, said eccentric being provided with arms $c c c$, loosely attached to said wheel, whereby a lateral movement of the eccentric may be prevented, substantially as described.

DENNIS O'B. LADD.

Witnesses:

D. H. FLETCHER,
J. B. HALPENNY.