

(No Model.)

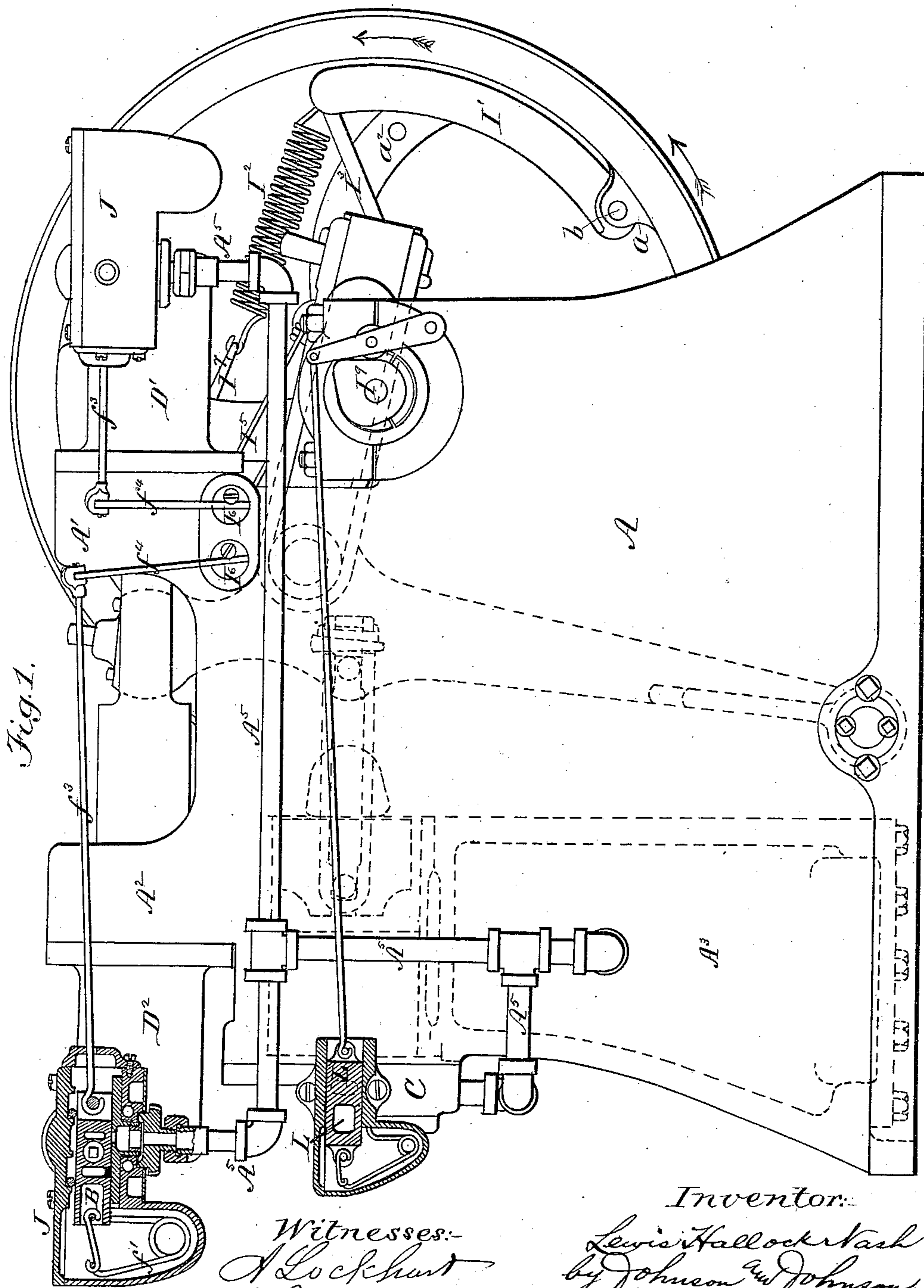
2 Sheets—Sheet 1.

L. H. NASH.

GOVERNOR FOR GAS ENGINES.

No. 334,038.

Patented Jan. 12, 1886.



Witnesses:
A. Lockhart
A. Rawlins

Inventor:
Lewis Hallock Nash
by Johnson and Johnson
Attys.

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Fig. 2.

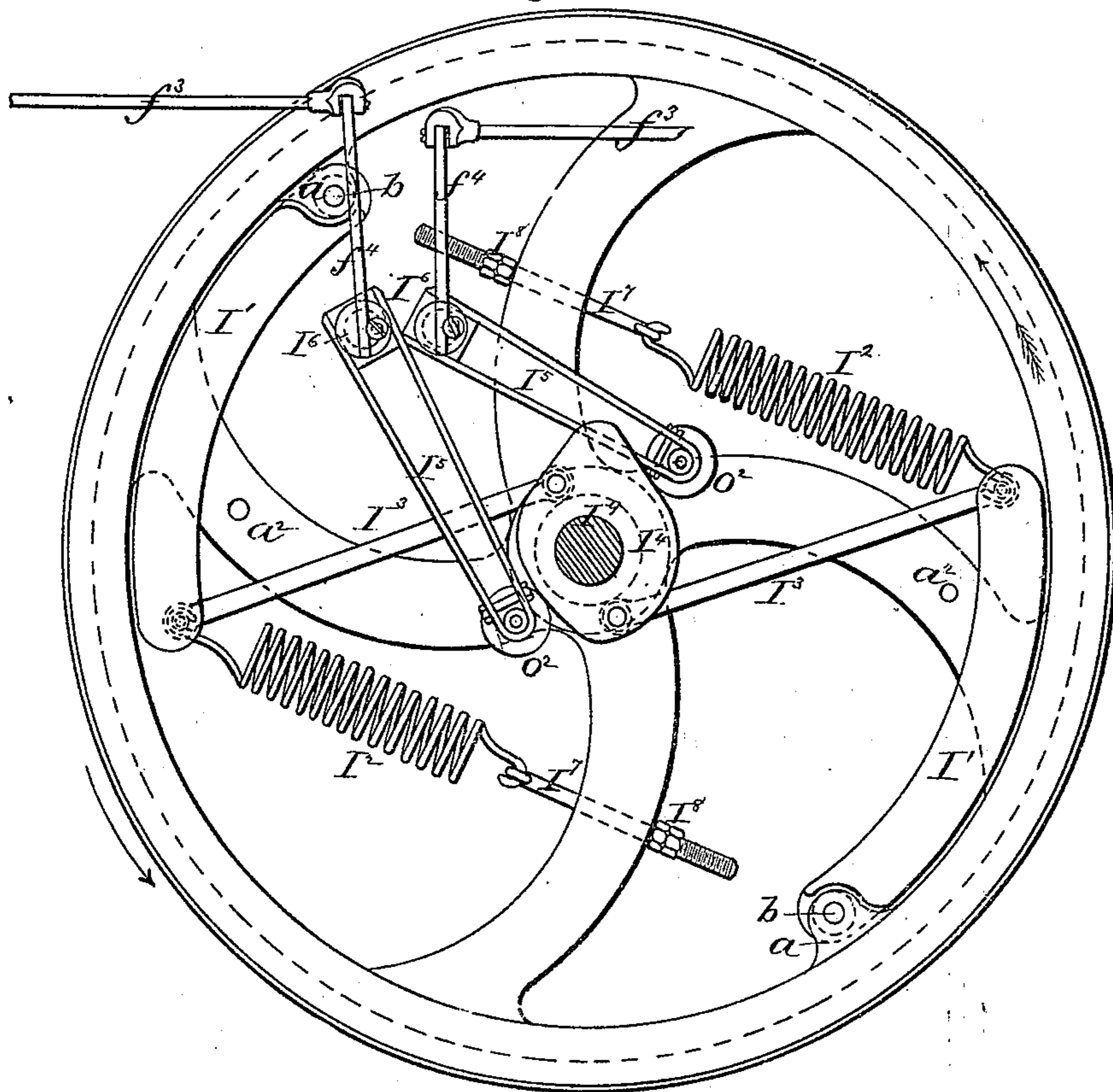
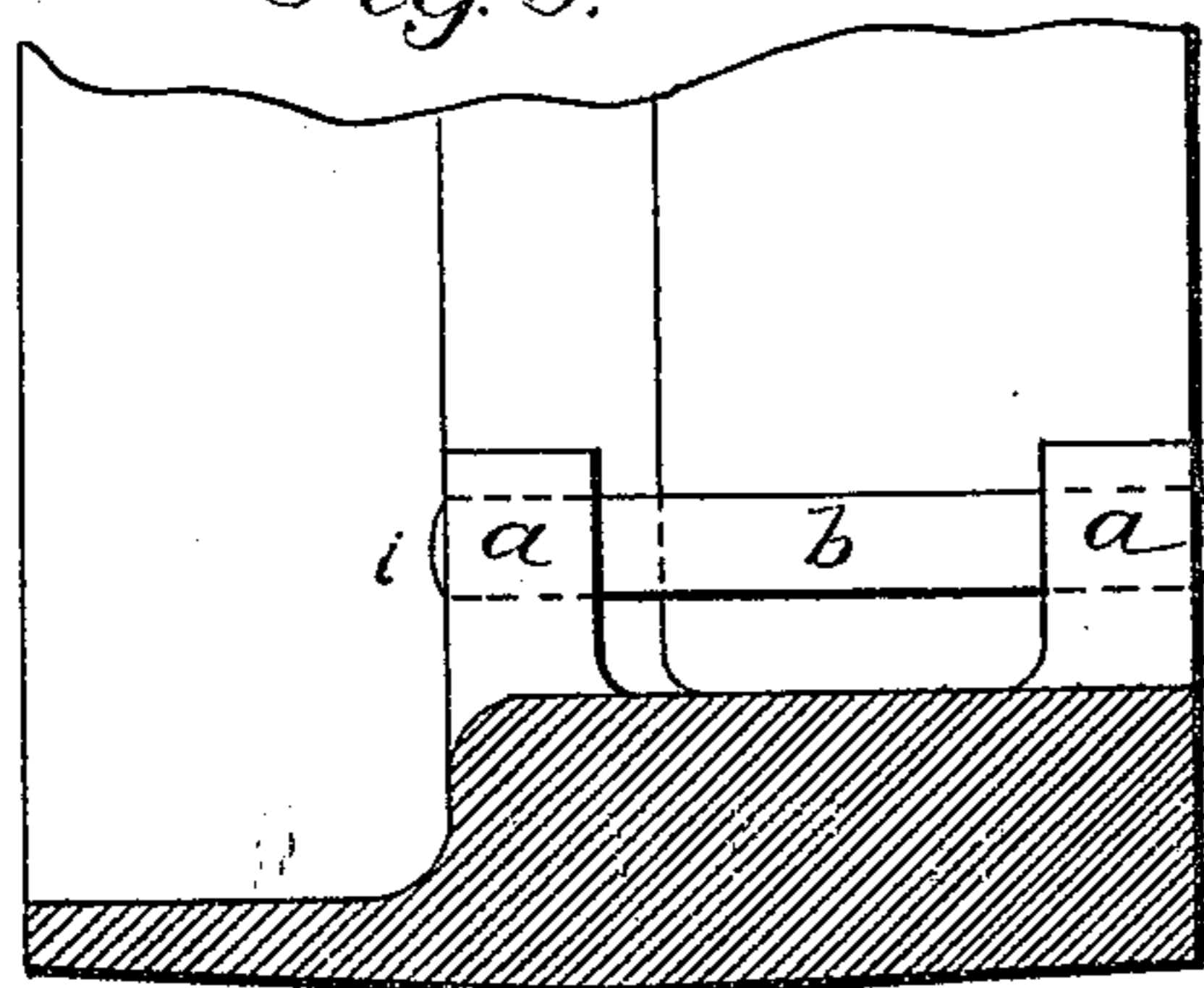


Fig. 3.



Witnesses:-

A. Lockhart
C. Rawlings

Inventor:-

Lewis Hallock Nash
by Johnson & Johnson
Attys.

UNITED STATES PATENT OFFICE.

LEWIS HALLOCK NASH, OF BROOKLYN, ASSIGNOR TO THE NATIONAL METER COMPANY, OF NEW YORK, N. Y.

GOVERNOR FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 334,038, dated January 12, 1886.

Application filed August 20, 1885. Serial No. 174,892. (No model.)

To all whom it may concern:

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Governors for Gas-Engines, of which the following is a specification.

So far as I know and can find, there are no gas-engines in use in which the governor controls the speed of the engine with a satisfactory degree of promptness, and therefore the speed of a gas-engine is much more irregular than that of a steam-engine, for the reason that special adaptation of a governor for a gas-engine has not hitherto been effected to accomplish the desired results of regulating every impulse of a gas-engine, so that the force of every explosion of the gas shall be equal when the engine is developing steady power and instantly increased or diminished as the work of the engine varies.

My improved governor device is applied to the balance-wheel, and is of such a construction as to specially adapt the wheel to operate a valve for admitting to the power-cylinder a definite quantity of combustible mixture at each stroke of the engine in charges exactly suited to the work, and for this purpose I have devised a governor device with special reference to its sensitiveness of action in relation to the speed of the balance-wheel.

I have illustrated in the accompanying drawings a double-acting gas-engine composed of two single-acting power-cylinders, and a valve for each, controlled by my improved balance-wheel governor, and such illustration is only given as one instance of the application of my governor device.

In the drawings, Figure 1 represents in elevation a gas-engine of separate and distinct coacting single-acting power-cylinders W, placed in line, showing their valve-governor-operating connections. Fig. 2 represents in elevation the balance-wheel with the governor appliances, and Fig. 3 a section of the wheel-rim.

The inner side of the balance-wheel rim is cast with lugs *a*, to which are pivoted by pins *b* arms I, having freedom to swing at their non-pivoted ends toward and from the rim, so as to form swinging weights. These pivoted weights

are curved to conform to the rim, and are connected at their free ends to springs I^2 , preferably of spiral form, which are connected to the spokes of the wheel by an adjusting device, I^7 , set by the lock-nuts I^8 , to regulate the tension of the springs to balance the centrifugal force of the pivoted weights in the revolution of the wheel. The free ends of the pivoted weights are also connected by links I^3 with a cam, I^4 , upon the shaft I^9 , such connection being made by pins on opposite sides of the shaft. This cam I^4 is free to turn on the shaft, and is of such a form, in connection with the valve connecting mechanism, as to properly operate the valves. This valve-connecting mechanism consists of a rocking arm, I^5 , hung upon one end of a rock-shaft, I^6 , mounted in the engine-frame, (shown in Fig. 2,) to the other end of which rock-shaft is fixed a lever-arm, f^4 , which connects with the valve-connecting rod f^3 . The free ends of the rocking arm I^5 are provided with a roller, o^2 , which rolls upon the surface of the cam I^4 , so that the turning of the latter operates the rocking arms, and through the latter the valve-operating connections. The roller is maintained in contact with the cam by means of a spring, f' , which I prefer to place in the valve-case J, so as to exert its force directly pulling upon the valve B, and thereby gain the advantage of taking up all lost motion of the valve connecting and operating devices. I prefer for compactness to use a torsion-spring, f' , and to place it in a chamber at the rear of the valve-case J, as shown in Fig. 1, so that in this arrangement the roller is kept pressed in contact with the cam by a pulling force exerted through the valve B; but I may place the spring in any other convenient relation with the valve-connections.

In the example shown the governor device is organized to operate the valves of separate and distinct single-acting power-cylinders, and the roller arms are for that purpose placed on opposite sides of the cam I^4 , and the arrangement of the valve-connections is such as to operate the valves alternately.

In the operation of the engine the governor device acts to vary the point of the stroke of the valve at which the admission of the charge is cut off and the charge ignited as follows,

viz: The engine being in motion, a high speed will cause the pivoted weights to be thrown outward toward or against the wheel-rim, causing the springs to expand and the cam; 5 by means of its weight-connecting links, to be turned upon its shaft in the direction of the moving wheel, and thereby change the position of the cam with respect to the rollers to so govern the stroke of the valve as to ignite the 10 charge at an earlier point of the stroke, thereby reducing the quantity of the charge and, in proportion, the power developed. On the contrary, the engine being under reduced speed, the springs will act to overcome the 15 centrifugal force of the pivoted weights and draw them in toward the center, such movement being limited by the stop-pins a^2 on the spokes, thereby causing the cam to turn back upon its shaft, and hence the charge is cut off 20 and ignited at a later point in the stroke of the valve, causing the engine to develop a greater amount of power.

To obtain a sensitive action of the governor device, I use comparatively heavy weights 25 and extremely elastic springs, so that a slight variation in the velocity of the balance-wheel will move the weights quickly and to the proper extent. The speed of the engine may be changed by increasing or diminishing the 30 tension of the springs by their adjusting devices. The governor-wheel may be adapted to control the valves of two or more power-cylinders by similar connecting mechanism for each valve.

35 The engine-frame A supports separate and distinct trunk-cylinders A' A^2 in the same horizontal line, each cylinder having its combustion-chamber formed by separate cylindrical caps D' D^2 , within which operates a double-ended plunger suitably connected with and 40 operating the power-transmitting shaft I^9 of the balance-wheel. The supply-valve cases J J are mounted directly upon the combustion-chamber, and one of said valve-cases is shown 45 in section with the slide-valve and its connecting-rod f^3 , which, by the lever-arm f^4 , is connected with the governor device of the balance-wheel. I have also shown in section a valve,

L, which I use in connection with a compression-cylinder, C, (shown by dotted lines,) for 50 supplying a gas engine with a uniform mixture of air and gas, the said compression-cylinder connecting with a reservoir, A^3 , in the engine-frame, and supplying the engine-valves by the pipes A^5 . These several things 55 relating to the engine, however, which I have only briefly referred to, are fully and completely described, shown, and claimed by me in separate and distinct applications for patents filed of even date herewith, so that it is 60 only the matter relating to the governor device, which I have particularly described, that constitutes the subject-matter of this application.

I claim— 65

1. The balance-wheel governor device herein described, consisting of the pivoted weights I' , the springs I^2 and their adjusting connections, the loose cam I^4 , and the links I^3 , connected thereto and to the free ends of said 70 weight-arms, in combination with the rocking arm I^5 , the lever f^4 , and the supply-valve, as set forth.

2. The combination, with the slide-valve, the loose cam, and the rocker-arm I^5 , connected with said valve, of a spring for maintaining the rocker-arm in contact with said cam, and a governor device carried by the balance-wheel, consisting of the pivoted 75 weights, the adjustable springs, and the links, 80 all constructed and arranged to operate in the manner and for the purpose described.

3. A balance-wheel governor consisting of the pivoted weights, the springs for supporting the weights, the links, the loose cam, and 85 means for adjusting the tension of said springs to change the speed of the engine, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing 90 witnesses.

LEWIS HALLOCK NASH.

Witnesses:

A. E. H. JOHNSON,
J. W. HAMILTON JOHNSON.