J. D. Lynde,

Engine Governor.

No. 112,058. Patented Feb. 21, 1871.

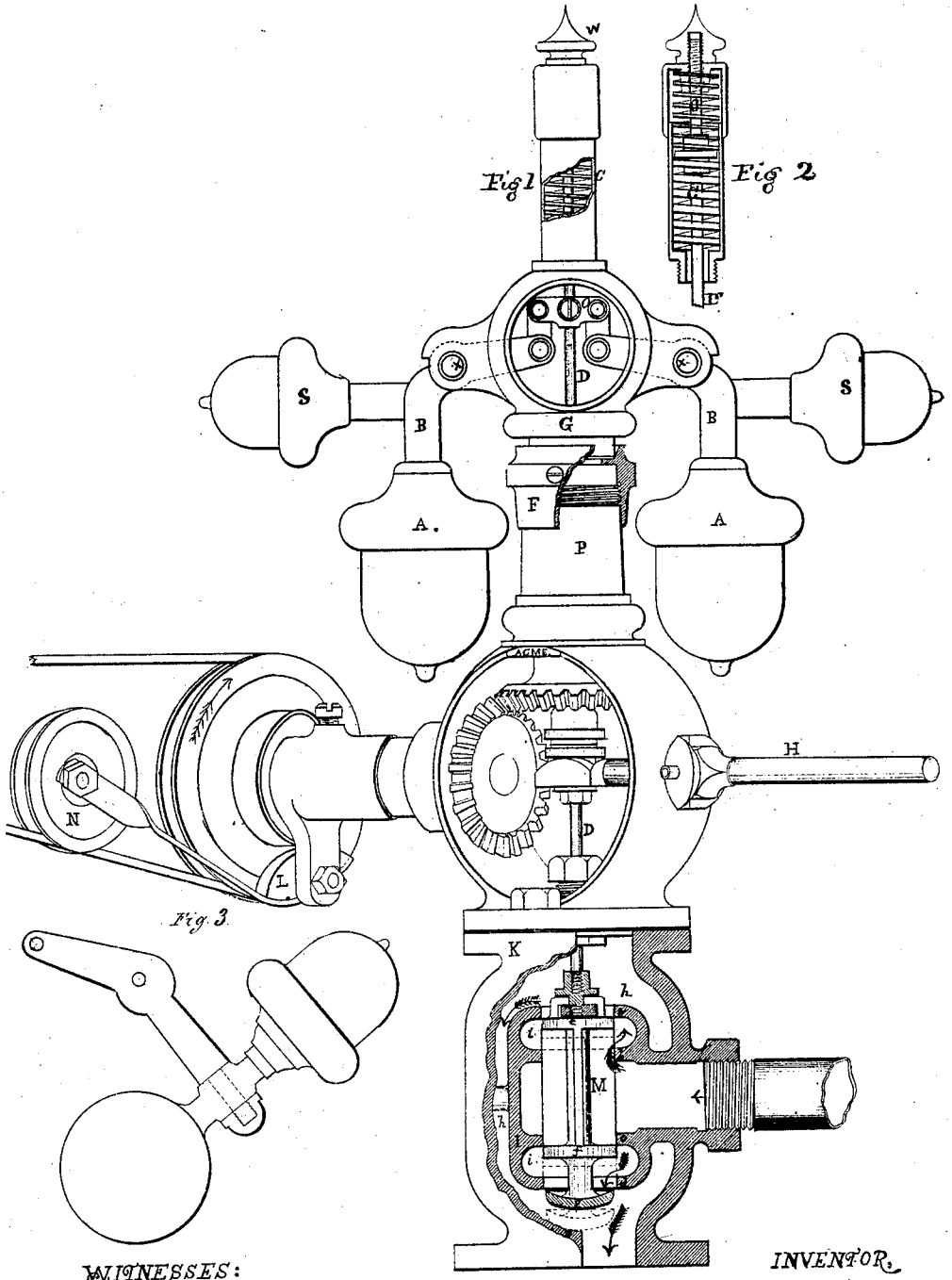

Fig. 3.

WITNESSES:

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Letters Patent No. 112,058, dated February 21, 1871.

IMPROVEMENT IN ENGINE-GOVERNORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN D. LYNDE, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Governors for Steam-Engines; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawing forming part hereof.

The object of this invention is to produce a governor for steam-engines which, in its movements, shall be more sensitive, more immediate in its action, and thereby more evenly regulate the motion of the engine, irrespective of its load.

The governing-valve is equally balanced under any and varying pressures of steam, and at any point of opening from the minimum to the maximum extent.

The centrifugal weights are so arranged in connection with the springs that the least change in the engine's speed will immediately be compensated for by a diminution or increase of the steam allowed to enter into the steam-cylinder, and thereby measure out the power in the exact ratio to the demand and uniform speed of the engine under various degrees of steam-pressure and resistance.

The construction of the brake and its arrangement, whereby to instantly and effectually arrest the ingress of steam to the steam-cylinder when the governor-belt runs off its pulley or breaks, is an essential object of this invention in preventing a break-down or other accident.

To obtain the best results from a governor it is imperiously necessary that the centrifugal weights be acted on by no power other than the motion of the engine, while they should be so suspended and in such a position as to expand most readily and with greatest power at a sudden start of the engine, and which position should also be that from which they will be the quickest depressed at any diminution of the speed of the engine. Many governors work well one way, while the other they are too slow.

Figure 1 of the drawing represents the spring-case, with a part cut out to exhibit a portion of the spring C.

Figure 2 is a sectional view of the case, containing springs C and *c*, with the rod D.

Figure 3 is an exhibit of another method of construction and arrangement of the weights A and S, and which is believed to be the equivalent of the construction and arrangement of the weights A and S shown in the figure embracing the devices connected together.

In order that the weights A shall hang at all times nearest to a vertical position, and yet be as far as possible from the center of motion without loss of leverage, they are suspended by arms B, which are curved at any desired point between the fulcrums H and weights A. Hanging thus, they are in the best possible position to be actuated by the least increase of the engine's speed, and to exert the greatest force on the weights S S to lift them, and to compress the springs C and *c*, which are attached to the valve-rod D, for the purpose of aiding the depression of the weights A when the speed of the engine slackens.

The spring C also serves to take up loss motion in the various joints of connection, so that immediate action is obtained in making the changes required.

By tightening or loosening the springs C and *c*, by means of the nut W, the speed of the engine may be increased or diminished.

Now, in order to guard against any possible weakening of the springs C *c* the upper one is made much weaker than the other, and may be closed before the other one will be perceptibly compressed, which will occur about the time the weights A have expanded one-half their range of outward movement. The upper spring is coiled quite finely, occupying about one-half the usual space of spiral springs made of the same size of wire, and always being closed when in use, its elasticity will be permanent. While the lower spring is compressed so little the change in its strength will be of little, if any, importance, whereas, if it performed the duty of both, or that due to the necessary action of a single spring moving the whole distance, it would be less efficient in large governors. In small governors the distance the spring will be compressed is so little that one may be sufficient.

The weights S, shown in a horizontal position, are suspended on the arms B of the weights A by branch arms, so that, when the weights A extend outward by centrifugal force, the weights S are raised above the periphery of motion, and serve not only to steady the working of the governor, but, being carried above the central line of motion, when the speed of the engine slackens, the partial diminution of the very centrifugal force which raised the weights S renders available the weights A in instantly allowing them to depress, and thereby actuate, the governor-valve, so as to measure out the steam to the engine in such quantity as will cause a uniform motion, irrespective of sudden changes of resistance to the engine's power.

The devices connecting the arms B with the valve-rod D are of the most simple construction, and the bearings being all steel, the friction is reduced to the lowest possible amount.

A cross-head is secured to the valve-stem D by the hollow-pointed set-screw O.

To provide for wear the top of the column P is provided with a movable collar, F, which may be moved up as the bearing of the head G wears away and then held in place by a set-screw.

The valve-rod, coupling, and lever are similar to

those in common use. A weight sufficient to balance the valve may be used on the lever H, but in practice it is deemed unnecessary.

The lever H is used to depress the valve when starting the engine, and it also prevents the lower part of the valve-rod turning with the head G.

The valve-case I is inclosed in the outer case K, with the steam-passage *h* between them. The upper and lower steam-passages from the valve-case are the same as the lower one, described in my patent of October 11, 1870; but in this case the steam that passes up by disk E goes down through the passage *h*.

The drawing shows the governor at rest and its valve closed. Start the governor, and the weights A extend outward, depressing the valve until disk E reaches the seat *b* and disk *f* reaches the seat *d*, when the valve again closes the openings and the steam is cut off. Near these points is the working position of the valve, and where the steam is regulated when the engine is at work.

Disks E and *f* are exactly of equal diameter, and this fact has heretofore been regarded as balancing the valve; but it has been found that as the steam passes it presses under each disk, and thus the valve is out of balance, and lifting it upward interposes force against the regulating mechanism, not only involves unnecessary wear of the parts subject to friction, but unevenly feeds the steam to the steam-cylinder. In order to effectually counteract said upward force of the steam a supplemental disk, *g*, of the proper diameter, and less than the other disks, is suspended under the disk *f*, so that as the steam rushes down by disk *f* it strikes against disk *g*, and thereby balances the upward force described. A valve of this construction, with the steam-passages made with reference thereto, is not, as heretofore, limited in size by friction, but, to the contrary, it is found in practice that with an unusually large valve the governor is rather more effectual or sensitive in its action, because it requires less motion of its parts to let on, shut off, and regulate the ingress of steam to the cylinder in such an exact relative quantity as the increase or diminution of resistance may demand.

It has been heretofore found, in the usual practice that the steam is not readily shut off when the governor-belt breaks or runs off its pulleys, for the reason that the momentum of the governor-balls and other parts will, for some little time, keep them rotating several times, and thereby let on a full head of steam, causing disastrous jerks of the engine and machinery. By this invention such difficulties are entirely avoided by the pulley N and brake L. Thus, should the governor-belt run off or break, pulley N will fall, and thereby bring break L in contact with a flange on the side of the pulley of the governor so as to instantly arrest its movement and shut off the steam.

Having described my said invention,

What I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the weights A and S, curved arms B and their connections, springs C *c*, valve-stem D, valve M, with its surrounding chambers and its disk *g*, substantially as and whereby to perform the functions herein set forth.

2. The construction of the valve M, with its seats *a b c d* and disks E *f g*, substantially as set forth and for the purpose made known.

3. The supplemental disk *g* and its combination with the valve M, substantially as and for the purpose herein set forth.

4. The combination of the valve M with the case I and the annular steam passages *i i* and passage *h*, substantially as set forth.

5. The combination and arrangement of the pulley N and brake L, substantially as described.

6. The arrangement of the springs C *c*, weights A S, arms B, collar F, head G, standard P, handle H, pulley N, brake L, valve-stem D, valve M and its immediate surrounding devices, all substantially as herein set forth, and whereby to more evenly regulate steam-engines.

JOHN D. LYNDE.

Witnesses:
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