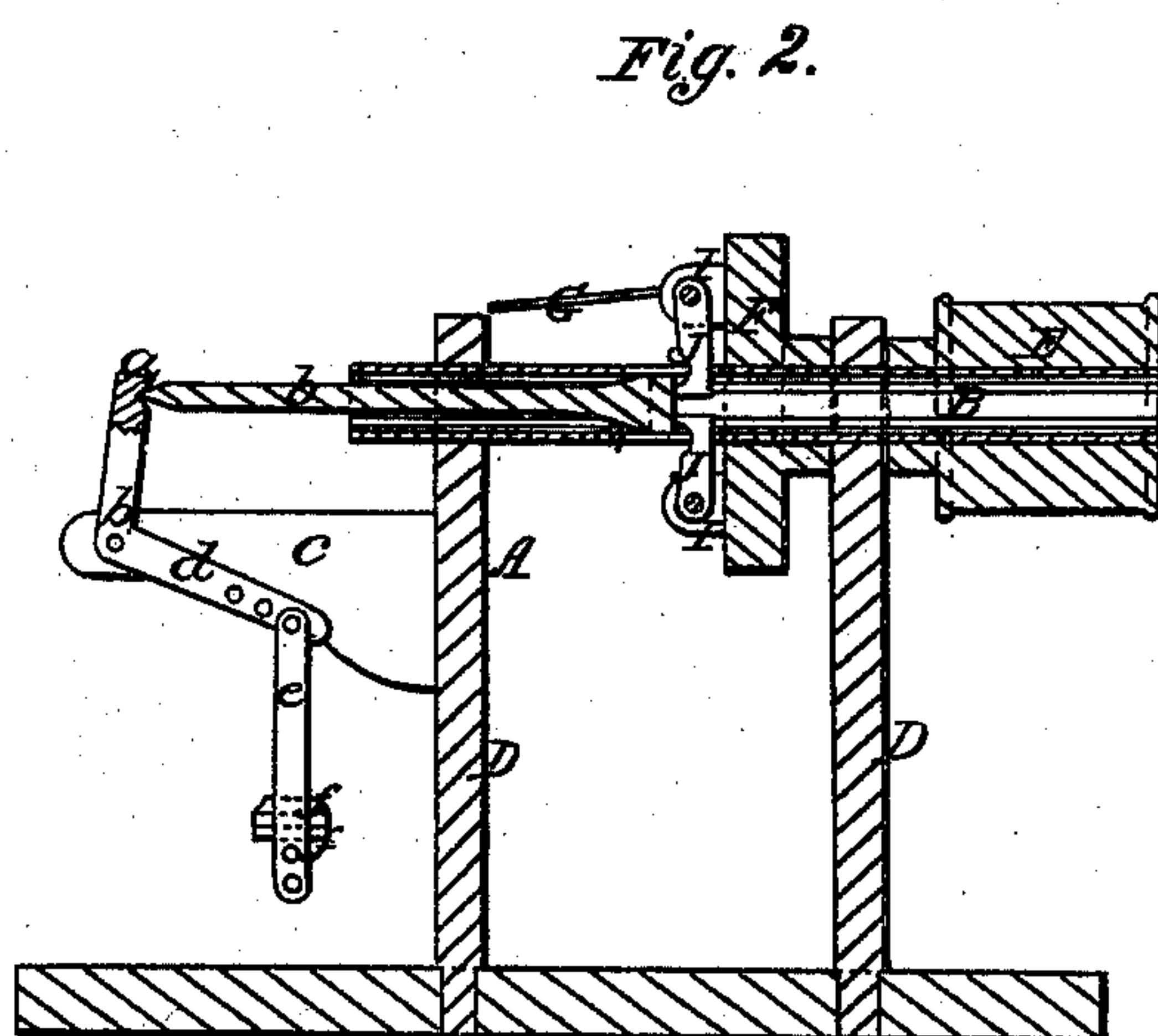
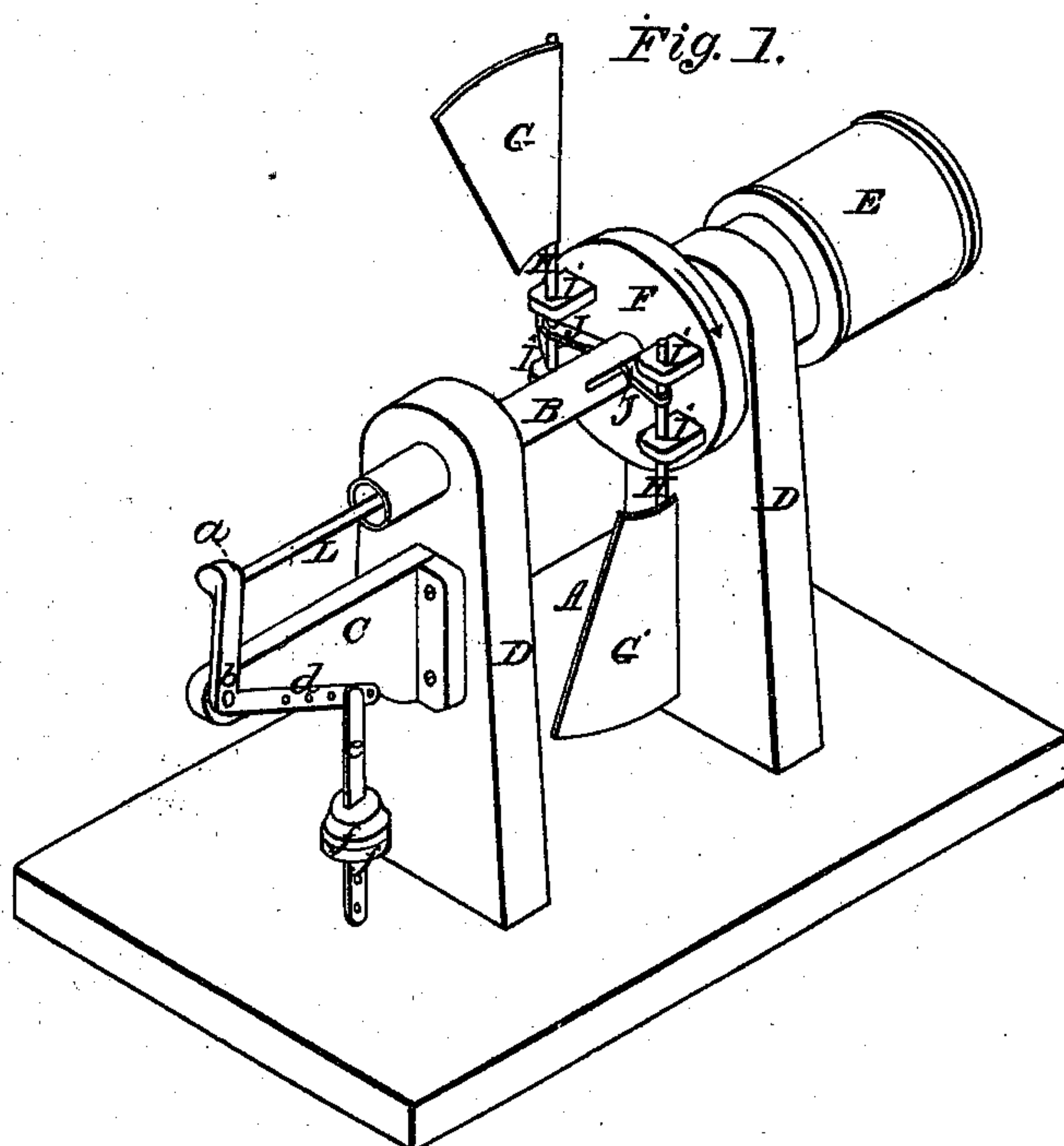


J. A. Marden.

Governor.

Nº 89,780.

Patented May 4, 1869.



Witnesses,
Geo. A. Leering.
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Inventor,
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United States Patent Office.

JEREMIAH AVERY MARDEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO GEORGE M. GIBSON AND THOMAS A. JOHNSTON, OF SAME PLACE.

Letters Patent No. 89,780, dated May 4, 1869.

IMPROVEMENT IN GOVERNORS FOR STEAM AND OTHER ENGINERY.

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

To all to whom these presents shall come:

Be it known that I, JEREMIAH AVERY MARDEN, of Boston, in the county of Suffolk, and State of Massachusetts, have made a new and useful invention having reference to Steam and other Enginery; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a perspective representation, and

Figure 2, a vertical and longitudinal section of a governor, in the construction of which my invention is embodied.

The invention comprising the subject-matter of this patent is intended to constitute a governor (for regulating the speed of steam-engines and other motors) possessing the desired simplicity and durability, combined with extreme cheapness of production and a highly sensitive and effective action.

The invention consists in the arrangement of one or more shallow vanes, or blades, affixed to arms, swivelled to a revolving disk, which is mounted upon a tubular shaft, supported suitable in bearings, and carrying a sliding spindle, connected with the engine-valve, by an intermediate lever and weighted connecting-rod, the whole being so arranged that by friction upon the blades, induced by contact with the atmosphere, against which they are driven by the revolution of their supporting-disk, they shall govern and control, in combination with the weighted lever, the longitudinal movement of the spindle, and of the weighted rod and engine-valve.

Referring to the drawings, before mentioned as accompanying this specification, and which illustrate my invention, it will be seen that the device comprising my invention is shown at N; in which B denotes a tubular shaft, properly supported in bearings, fixed to uprights D D, making part of the standard, or frame to which the working-parts are applied.

To one extremity of the shaft B, and outside of one upright, I affix a driving-pulley, E, while upon the opposite side of the upright D, I affix to the shaft a disk, F.

G G', in the drawings, denote two thin flat blades, or vanes, affixed, at one edge, to the outer extremities of two oscillating rods, or rocker-shafts, H H, supported within guides, or bearings I I, affixed to the inner face of the disk F, and extending in opposite directions therefrom, the said vanes being of like size and shape, and in disposition being concentric with the path of revolution of the disk and its shaft, and when at their extreme inward positions, are parallel, or thereabouts, to such shaft.

To each rod H a tripper, or pallet, J, is affixed, each pallet projecting laterally inward from the rod, and extending into the interior of the tubular shaft, through a longitudinal slot cut within opposite sides thereof, as represented in the drawings.

L, in the drawings, denotes a spindle, disposed loosely within the bore of the shaft B, and abutting

at one end against the free ends of the pallets J J, before mentioned, the opposite extremity of the spindle projecting some distance beyond the shaft, and being stepped in an upright arm, *a*, of a bell-crank lever, *b*, this lever being fulcrumed to a bracket, *c*, or to any suitable projection, or extension of the frame which supports the working-parts of the device.

From the lower or horizontal arm, *d*, of the bell-crank *b*, I suspend a connecting-rod, *e*, such rod having a series of weights, *f f*, properly combined with it.

The lower end of the rod *e* is to be connected with the valve of the engine, which the device is intended to control, in such manner that fluctuations of the bell-crank *b* shall produce corresponding reciprocations of the rod, and through it the valve.

Although various modifications of the characteristic features of my invention may be developed, the above description embraces one form of construction which I have put into practical use.

The operation of the device, as above constructed, may be thus described, premising such description by the supposition that it will be seen that a revolution of the shaft and disk, in the direction of the arrow, upon the latter, will have the effect, varying in degree with rapidity of revolution of such disk, of deflecting the vanes G G', by impact with the atmosphere, from a parallel to an oblique position with respect to the axis of their shaft; it also being understood that the weights upon the rod *e* are of more than sufficient gravity to maintain the spindle L in contact with the pallets J J, under all conditions of service; notice also being taken of the fact that a depression of the rod *e*, and of the lower arm of the lever *b*, by the action of the weights, produces an opening of the valve, and increasing the amount of steam admitted to the engine; whereas the gravity of the weights operates through the medium of the lever *b* and rod *e*, to move the valve in one direction, or to open it, and the contact of the revolving blades with the atmosphere tends to force the spindle and lever, and, consequently, the valve in the opposite direction, and so as to close the latter. An entire preponderance of either will, of necessity, detract to some extent from the perfect working of the apparatus.

Therefore, the amount of weights applied to the rod *e* should be varied, according to the number of revolutions to be obtained from the engine per minute, since the greater the rapidity with which the vanes are impelled through the atmosphere, the greater will be their resistance thereto, the result of which is to drive the spindle and lever in a direction opposite to that effected by the weights; in other words, if a sufficient quantity of weights is added to the rod *e* to overcome the action of the semi-rotation of the blades upon the spindle L, the valve is caused to remain fully open, or approximately so, and the engine attain too great speed, while, *vice versa*, should sufficient weights be removed to allow the vanes to remain at their extreme oblique position, they will actuate the spindle and lever in opposition to the gravity of the weight,

to such an extent as to close the valve, and reduce the speed of the engine to too low a degree.

We will suppose the instrument to be adjusted to allow the engine to run at the rate of two hundred revolutions per minute. If it is desired to increase this ratio to three hundred, more or less, more weights, as practice shall determine, are to be added to those upon the rod *e*, which will cause the power of the weight to overbalance that of the blades, and by lowering the rod *e*, open the valve, and admit a greater quantity of steam to the engine.

Vice versa, should it be desirable to reduce the rate of speed below two hundred revolutions, weights are to be taken from off those originally upon the rod *e*, which allows the superior action of the power exerted by the vanes to drive the spindle against the crank *b*, to such an extent, and in such a direction, as to close the valve partially, and reduce the speed of the engine.

The instrument being thus adjusted to the number of revolutions required by the engine, becomes afterward automatic, and regular in performing its functions, the vanes standing preferably about midway between their extreme positions.

Should the engine increase in speed to too great an extent, beyond the mean stand-point required, the increased resistance of the vanes to the atmosphere, consequent upon their accelerated flight, tends to overcome the power exerted by the weight, and to deflect the said vanes toward their extreme oblique position, with respect to the tubular shaft and spindle, and, in manner as before explained, effects a longitudinal movement of the latter, in such a direction as to raise the rod *e* and close the valve, and consequently reduce the amount of steam admitted to the engine.

Per contra, should the speed of the engine decrease from the desired stand-point to an excess, the diminished speed and resistance of the vanes allow the gravity of the weight to overcome the power exerted by such resistance upon the spindle, and, by lowering the rod *e*, open the valve, and increase the amount of steam admitted to the engine.

As I desire to secure about an equal action of the power exerted by the vanes and the weights, respectively, the number of the latter must be varied, according to the various conditions of speed and labor required of the engine.

Practice will soon enable experienced persons to regulate it perfectly.

As before observed, various modifications may be made of my invention.

For instance, in lieu of the disposition of the vanes as before explained, their supporting-rods may be applied radially to the disk, and pivoted thereto, and with the inner extremities of such rods extending into the interior of the tubular shaft, and abutting against the spindle, the faces of the vanes being placed at an angle of about forty-five degrees to the path of revolution of the supporting-disk.

Under this arrangement of the vanes, their impact against the atmosphere has the effect of producing a

forward movement of the lower extremities of their rods, which act directly upon the spindle, with the same effect as the pallets *J J*, before mentioned.

Although in the present instance I have shown two vanes, in practice it may be found expedient to employ three, or even a greater number. This, however, would undoubtedly add to the expense of the device, without an equivalent benefit.

I would remark, that in place of the weights *f f*, a spring, or other equivalent device, may be employed, which, in case of marine engines, might be important.

I would also remark, that a belt, driven by a pulley from the engine, is to travel about the pulley *E*, so as to rotate the disk *F* at the rate of about three hundred revolutions per minute.

One advantage of my invention, which will readily manifest itself, is that it is equally effective in any requisite position, and for this reason will be found valuable for marine engines, where ordinary governors cannot be used.

Another advantage of my invention results from several points of economy, as compared to "propeller-governors," so called, and to the generality of governors now in use.

One point of economy is the small cost of construction.

Another is that it requires no care beyond that required to oil its bearings.

Another is that it dispenses with the use and waste of oil, as well as time required to replenish the same, as in propeller-governors.

It has been found, in practical use of my invention, that its valve-controlling portion does not fluctuate to the extent observable in other governors, and although being very sensitive, maintains an even and steady motion of the engine, irrespective of sudden changes of resistance to the engine's power.

In practice, the vanes should be enclosed within a screen or shield, of such formation that, while permitting free access of the atmosphere to the vanes, it shall protect them from any strong currents of wind, which would tend to impair their efficient action, and from liability to accidents.

Having thus described my invention,

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

1. The construction and arrangement of the vanes *G G'*, in combination with the weight *f*, substantially as herein made known.

2. The combination of the vanes *G G'*, spindle *L*, bell-crank *b*, with the weight *f*, whereby to regulate steam and other enginery, substantially as herein set forth.

3. The combination and arrangement of the vanes *G G'*, rods *H H*, pallets *J J*, and spindle *L*, substantially as before explained.

JEREMIAH AVERY MARDEN.

Witnesses:

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EDMUND H. HEWINS.