

A. K. KLINE.

GOVERNOR FOR STEAM-ENGINES.

No. 171,939.

Patented Jan. 11, 1876.

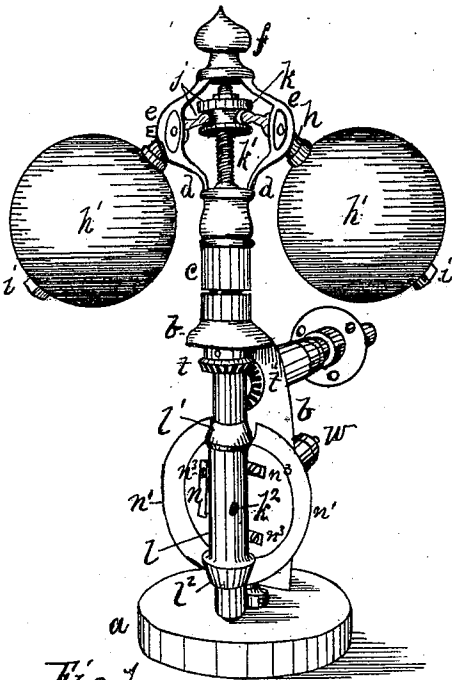


Fig. 1.

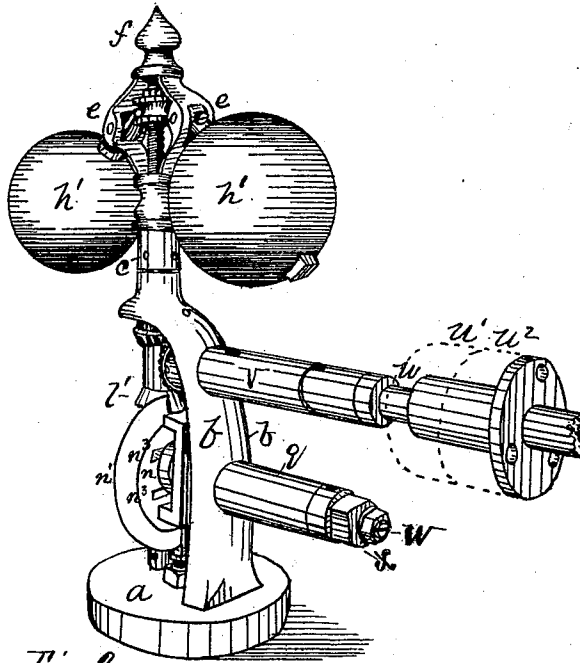


Fig. 2.

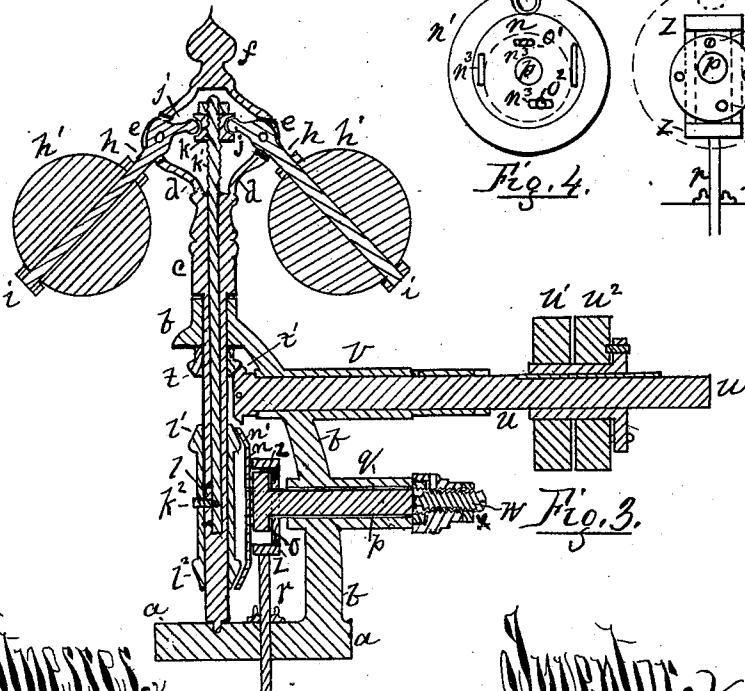


Fig. 3.

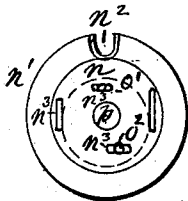


Fig. 4.

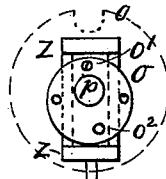


Fig. 5.

Witnesses

Wm B Jacoby

Henry Elmer

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per John Dyer for his atty.

# UNITED STATES PATENT OFFICE.

AARON K. KLINE, OF SOMERVILLE, NEW JERSEY.

## IMPROVEMENT IN GOVERNORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **171,939**, dated January 11, 1876; application filed May 5, 1875.

*To all whom it may concern:*

Be it known that I, AARON K. KLINE, of Somerville, county of Somerset and State of New Jersey, have invented certain new and useful Improvements in Steam-Engine Governor, of which the following is a specification:

My invention relates to that class of governors in which the valve is operated by mechanism consisting of a beveled sleeve, in combination, by friction, with a disk or circular plate, the beveled sleeve working vertically outside a vertical shaft, within which is a stem connected with weighted arms, the sleeve connected with the stem by a pin passing through a slot in vertical shaft, and as the sleeve is brought (by speed of the engine operating upon the centrifugal balls) into contact with the disk the valve is opened or closed; and the nature of my invention consists, first, in a new and improved construction of the disk, which is made of thin metal, and provided with a beveled rim, sloping forward and having a "gain" or "cut-away" in the rim, at what would be its uppermost point when at rest and valve closed. It is also provided with slots having bolts, whereby its position is regulated with regard to the yoke behind, and with which it is in combination, the yoke supporting it, and also connecting it with the valve-stem.

It further consists in a combination consisting of horizontal driving-shaft, beveled cog-wheels, vertical shaft, weighted arms, screw-head, stem-pin, beveled sleeve, disk with bevel-gain or cut-away, slots, bolts, yoke, and valve-stem.

The beveled cog-wheels connect the horizontal driving-shaft with the vertical shaft. The weighted arms are supported by and pivoted to the vertical shaft, and their inside ends arranged to run in a groove of the screw-head, which is threaded upon the upper end of the stem, as to be adjustable, and the said stem is placed vertically within the vertical shaft, and the pin forms the connection between said stem and the beveled sleeve. The beveled sleeve is arranged around outside the vertical shaft, and the pin passes through a slot in the vertical shaft, so that the sleeve may slide up and down according to the rise

of the centrifugal balls on the end of the weighted arms. The sleeve is provided with bevels at its upper and lower ends corresponding with the beveled rim of the disk, against which it operates by friction, each bevel being brought into contact accordingly as the centrifugal force causes the sleeve to rise or fall. The disk is circular. The rim nearly surrounds it, a portion being left out or cut-away at the place which would be uppermost when the valve is closed. This forms the gain or cut-away before mentioned. The disk is also provided with slots, through which are passed bolts, connecting it with the head of a shaft projecting behind, and the said shaft-head is so placed (with regard to the shaft proper and the disk) that an eccentric is formed, which, working within the yoke to which the valve-stem is attached, and revolving with the disk, causes the opening and shutting of the valve. The yoke is arranged to stand vertically, with the valve-stem projecting from its bottom, but, by turning it around horizontally when the valve is at one side, it will operate equally well. The yoke straddles the eccentric, and the curved surface of the same comes in contact with a head and foot bar of the yoke, so that the yoke must rise and fall as the eccentric is revolved. The connection between the disk and eccentric is made adjustable by means of slots and bolts, so that the action of the valve may be regulated to a nicety.

The several working parts of the governor are supported by a proper standard with base, &c., the shafts passing through proper collars therein.

The eccentric-shaft is provided with proper devices, by which the pressure of the disk-bevel against the bevels of the sleeve is adjusted and the proper amount of friction regulated to suit the requirements.

Figure 1 is a perspective view of the governor in front. Fig. 2 is a perspective view of the same governor from rear. Fig. 3 is a vertical section of the same. Fig. 4 is the disk and eccentric, the disk viewed from front and the eccentric shown by dotted lines. Fig. 5 is the eccentric shown from front and the position of disk by dotted lines.

A represents the base of the governor. b is

the vertical standard, curving over at the top to receive the shaft *c*, which passes downward through said standard. The shaft rests in the base-plate *a*, and extends upward to *d*, where are formed two brackets, extending outward and upward to *e*, where they turn inward and upward, meeting in a cap, *f*, at top, forming the apex of the governor. At *e* the weighted arms *h* pass through said brackets and are pivoted thereto. The said arms *h* are provided with ball-weights *h'*, loosely slid thereon. A nut running on a thread of the arms forms a medium of shortening the reach, if desired, as shown at *i*. At *j* the inner ends of the arms are provided with rounded heads, fitting into a groove of the outer surface of the screw-head *k* of the stem *k'*. The screw-head *k* runs upon a threaded portion of the stem, and, by turning it upward or downward, the play of the balls *h* is lengthened or shortened as desired. The stem *k'* passes downward through the shaft *c*, inside the same, and at *k''* is a pin connecting it to the sleeve *l*. The pin plays upward or downward (in agreement with the rise or fall of the balls *h'*) and through the vertical slot *m* in shaft *c*. The sleeve *l* is provided with bevels *l'* and *l''*, arranged to correspond with and come in contact with the beveled edge *n'* of the disk *n*, so that the disk may be turned by the friction. The disk *n* is circular, and has a beveled edge, *n'*, reaching forward, as shown. A portion *n''* is cut away, leaving no bevel, so that when that portion is opposite the bevels *l'* and *l''* of sleeve *l* the disk is not in contact therewith. The disk is fastened to the eccentric *o* by screws or pins *o'* and *o''* passing through slots *n''* in central portion of disk *n*, so as to be adjustable. The eccentric-shaft is shown at *p*. The collar is

shown at *q*, and valve-stem at *r*. At *t* and *t'* are the beveled cog-wheels, forming the gearing connecting the vertical shaft *c* of the governor with the horizontal or driving shaft *u*, having pulleys *u'* *u''*, said shaft passing through standard *b*, inside-projecting collar *v* holding it in proper and steady position. At *w* is shown the set-screw, which is run into the collar *q*, its inner end rounded or pointed, and abutting against the end of the shaft *p*. A nut, *x*, is run upon and wrenched up after the desired pressure has been obtained, so as to hold it in position. The object of these devices is to regulate the pressure of the disk *m* against the bevels of sleeve *l*. By turning the eccentric *o* around, bringing the valve-stem to the side, it may be operated to open and close a valve in that direction. A yoke, *z*, connects valve-stem *r* with eccentric *o*.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. Disk *n* with bevel *n'*, gain or cut-away *n''*, slots *n''*, bolts *o'* and *o''*, eccentric *o*, eccentric-shaft *p*, and yoke *z*, all combined to operate substantially in manner and for the purpose described and set forth.

2. Driving-shaft *w*, cogs *t* and *t'*, vertical shaft *c*, weighted arms *h*, screw-head *k*, stem *k'*, pin *k''*, sleeve *l*, provided with bevels *l'* and *l''*, disk *n*, with bevel *n'*, gain or cut-away *n''*, slots *n''*, bolts *o'* and *o''*, eccentric *o*, eccentric-shaft *p*, yoke *z*, and valve-stem *r*, all combined to operate substantially in manner and for the purpose described and set forth.

AARON K. KLINE.

Witnesses:

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HENRY ELMER.