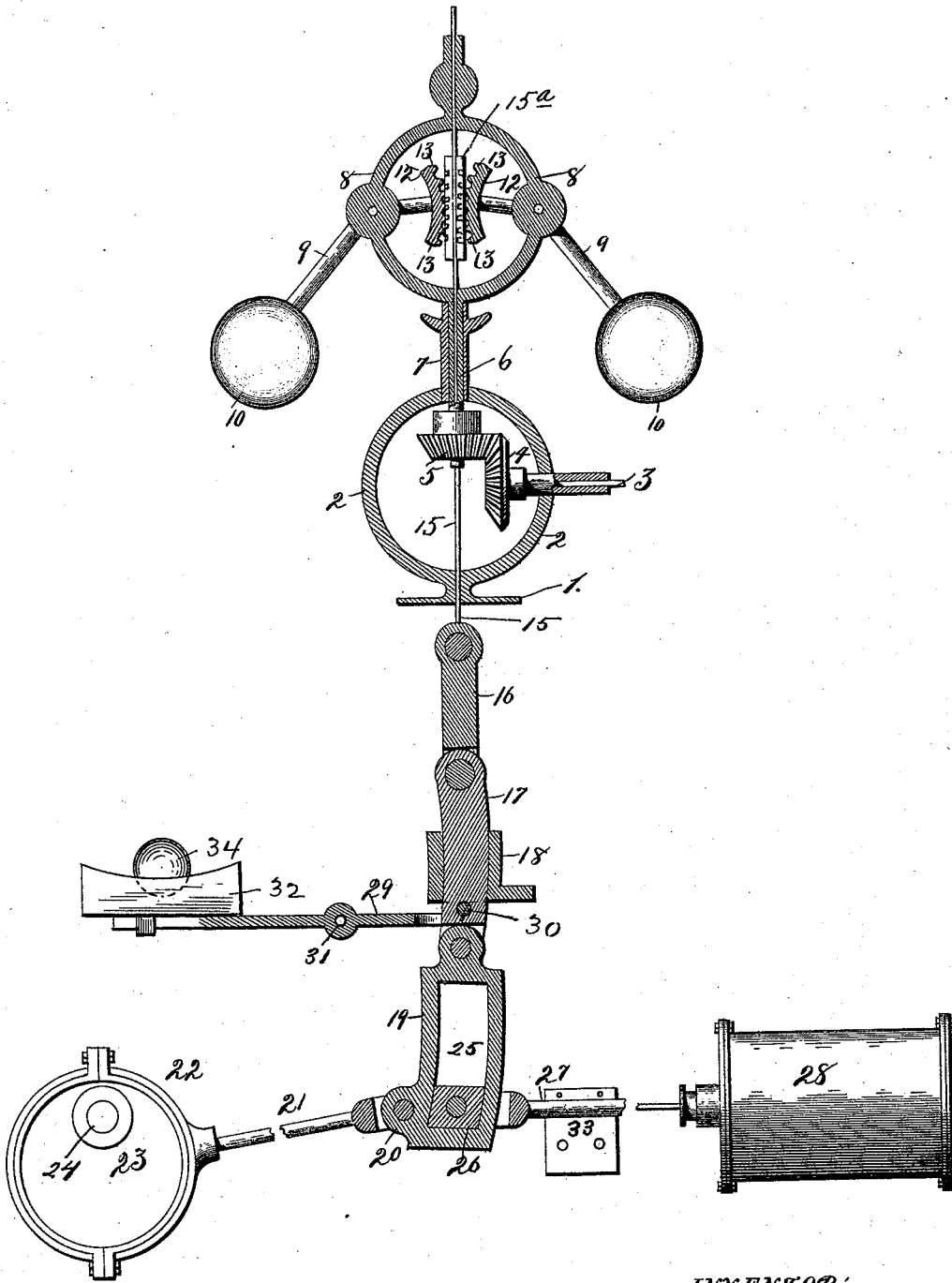


(No Model.)

N. FOUST.
LINK MOTION FOR ENGINES.

No. 497,648.

Patented May 16, 1893.



WITNESSES:

F. L. Durand
J. L. Coombs

INVENTOR,

Nathaniel Foust,
of Samuel Daguer & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

NATHANIEL FOUST, OF ST. MARY'S, PENNSYLVANIA.

LINK-MOTION FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 497,648, dated May 16, 1893.

Application filed August 9, 1892. Serial No. 442,542. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL FOUST, a citizen of the United States, and a resident of St. Mary's, in the county of Elk and State of Pennsylvania, have invented certain new and useful Improvements in Link-Motions for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

My invention relates to improvements in link-motions for steam-engines, in which the throw of the valve-rod is automatically regulated by a governor to increase or decrease the travel of the valve.

The object of the invention is to provide an improved construction of such devices, whereby I attain superior results with respect to economy, simplicity, and efficiency.

The invention consists in the novel construction and combination of parts hereinafter fully described and claimed.

The accompanying drawing represents a sectional view of a link-motion constructed in accordance with my invention.

In the said drawing, the reference numeral 1 designates a stand or base-plate adapted to be secured to a steam-engine at a convenient point, having curved arms 2, in which is journaled a shaft 3, driven from some moving part of the engine, as usual, and provided with a bevel-pinion 4, which meshes with a similar pinion, 5, on a vertical shaft 6, journaled in a hollow sleeve 7, in the upper ends of the arms 2. The upper end of this shaft is provided with arms, 8, to which are pivoted levers or arms 9, carrying at their outer ends weighted balls 10, and having their inner ends provided with segments 12, having rack-teeth 13, which engage with similar teeth on a sleeve 15^a secured to the vertical rod 15.

The parts so far described may be of any ordinary or suitable construction, and form no part of the present invention.

Pivoted to the lower end of the governor rod 15, is a short arm 16, which in turn is pivoted to an arm 17, which plays up and down in a stationary guide-box 18, secured to the

engine. Pivoted to the lower end of arm 17 is a slotted link 19, provided with a lug 20, to which the eccentric rod 21 is pivoted.

The numeral 22 denotes the eccentric strap, 23 the eccentric, and 24 the eccentric shaft. Mounted and working in the slot 25 in this link is a link-block 26, which is pivotally connected with the valve-stem 27.

The numeral 28 denotes the valve chest and 29, a tension or regulating lever pivoted upon a pin 31, suitably fastened to the engine and having a bifurcated end, embracing the lower end of arm 17 and engaging with a pin 30 thereon. A similar pin, not shown, is provided upon the opposite side of the arm. The outer end of lever 29 is provided with a cage 32, in which is located a gravity ball or sphere 34, which, by its movement, aids in actuating the lever.

The operation is as follows: As the shaft 6 and the balls 10 are rotated, the latter will spread out more or less, according to the speed of the engine, and the governor-rod and the link will be raised or lowered so that the action of the governor will automatically control the length of the leverage between block 26, which connects, adjustably, the lower end of the link to the valve-stem, and the fulcrum formed by the pin connecting arms 16 and 17,—block 26 sliding in the slot of the link (or rather, to be more correct: the link sliding up or down upon the block) and said block being prevented from following the movement of the slotted link in which it works by reason of its connection with the valve stem. By means of the stationary guide-box 18, in which the arm 17 slides, lateral play of the jointed arms or links 16, 17, and 19 is prevented, so that the block 26 cannot "bind" in its slot, and facilitating, also, the operation of the counterbalance lever 29. The function of this lever, with its automatically adjustable weight 34, is to create a variable tension on the valve-stem. When the speed of the engine is normal and the governor-stem 15, with its connecting-links 16, 17 and 19 (which are merely jointed elongations of the governor-stem) is moved in a downward direction, due to a partial rising of the balls 10, the pin 30 will push down upon the bifurcated inner end of lever 29,

the outer end of which will rise and lift cradle 32 and its ball or spherical weight 34, which will roll in its cradle in the direction of fulcrum 31, thus reducing the downward
 5 tension or pressure at the outer end of the lever and decreasing resistance against stem 15. On the other hand, when the speed of the engine is slackened from any cause, the lifting of governor-stem 15—16—17, with its
 10 pin or stop 30, permits the outer end of lever 29 to drop, and the ball will now run outward, toward the outer end of its cradle, thus increasing the leverage or tension against pin 30 and the governor-stem. In other words,
 15 the function of lever 29 and its automatically adjustable weight 34 is to increase or decrease, automatically, the resistance of the governor to the speed of the engine; gradually "easing" all up-and-down movements
 20 of the stem and thus obviating any sudden jar or shock due to irregular steam-supply, or other causes. I am aware, however, that such a regulating or "easing" device has been used before, and I do not, therefore, claim it
 25 broadly, but only as an old element in a novel combination of several parts, in themselves old, which go to the make-up of my complete device, and without which this combination would be inoperative in practice, because it is
 30 of the utmost importance that the slotted link 19 shall work without any sudden shock or movement (which is obviated by the interposition of this regulating lever) for the reason that block 26 fits closely within the
 35 slot 25 (as shown on the drawing) and would be liable to breakage, twisting, or other injury, or to "bind" in the slot, if the valve-

stem should move with a sudden or jerky motion.

Having thus described my invention, what I claim is—

1. The combination, in the valve-gear mechanism of steam-engines, of the following elements: the governor proper having vertically reciprocating rod 15; joints 16 and 17, the latter working through a guide-box 18 and provided with a transverse pin 30 near its lower end; weighted tension-lever 29; slotted link 19; eccentric rod 21 articulated to the lower end of said slotted link; box 25 on which said slotted link is free to slide, and valve-stem 27; all constructed and combined substantially in the manner and for the purpose herein shown and described.

2. In the valve-gear mechanism for steam-engines, the combination of the valve-stem, a block at the outer end of said stem, a slotted link sliding on the block and articulated to the lower end of the vertically movable governor-stem, and a tension or regulating lever carrying an automatically adjustable weight at its outer end and so connected to the governor-stem as to automatically regulate or ease the vertical play or movements of said stem relative to the box which connects it with the valve-stem; substantially as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

NATHANIEL FOUST.

Witnesses:

I. E. WEIDENBOERNER,
 WILLARD MCVEAN.