J. WARWICK, W. S. MARSHALL & A. SIMPSON.

Device for Changing Speed.

No. 215,417. Patented May 13, 1879.

Fig. 1.

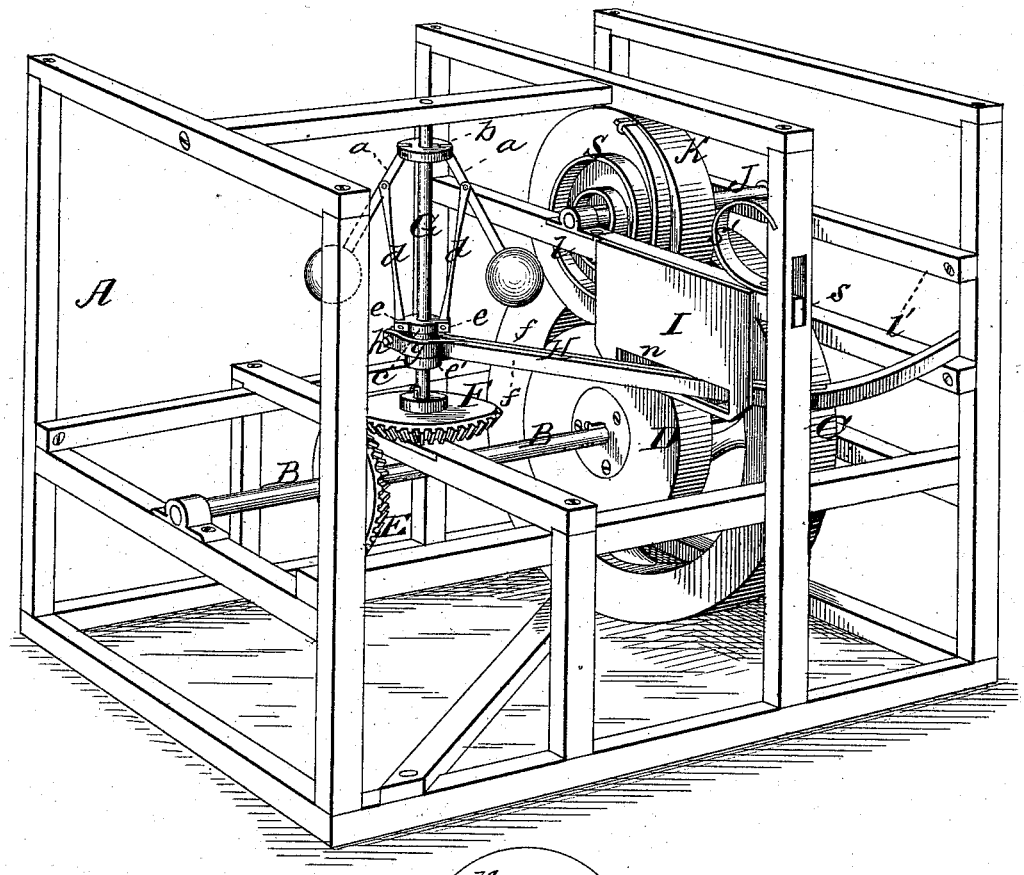
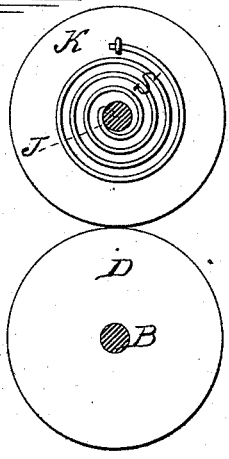


Fig. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN WARWICK, OF MEDO, MINN., WILLIAM S. MARSHALL, OF BATAVIA, ILL., AND ADAM SIMPSON, OF OWATONNA, MINN.

IMPROVEMENT IN DEVICES FOR CHANGING SPEED.

Specification forming part of Letters Patent No. **215,417**, dated May 13, 1879; application filed November 2, 1878.

To all whom it may concern:

Be it known that we, JOHN WARWICK, WILLIAM S. MARSHALL, and ADAM SIMPSON, respectively of Medo, county of Blue Earth, and State of Minnesota, of Batavia, county of Kane, State of Illinois, and of Owatonna, in the county of Steele and State of Minnesota, have invented a new and valuable Improvement in Speed-Regulators; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a perspective view of my improved speed-regulator, and Fig. 2 is a detail showing the attachment of the driving-pulley to its shaft.

This invention has relation to improvements in speed-regulators.

The object of the invention is to derive from an irregularly-acting driving mechanism a power which, when communicated to the driven mechanism, will be absolutely regular in its effects.

The nature of the invention consists in combining with a driven shaft having a balance-wheel and a friction-gear, and a governor actuated thereby, a vibrating bridge-tree actuated by a lever through said governor, a shaft having its inner bearing in said tree, and a friction-gear flexibly connected with said shaft.

It also consists in combining with a driven gear having fixed bearings a driving friction-gear vertically adjustable and flexibly connected to its shaft, as will be hereinafter more fully set forth.

In the annexed drawings, the letter A designates a rectangular frame affording bearings at its middle portion to a transverse shaft, B, having on one end a balance-wheel, C, and friction-gear D, and near the other end a bevel-gear, E, that engages a similar gear, F, upon a vertical governor-shaft, G. The arms *a* of this governor are pivoted to a collar, *b*, fixed on the said shaft, and are connected to a vertically-movable sleeve, *c*, thereon by means of rods *d*. This sleeve is provided with opposite lugs *e* upon its upper edge, to which the said rods *d* are pivoted, and upon its lower edge with a flange, *e'*, that supports one end of a lever, H. This lever is made of two sections, *f*, clamped together by suitable bolts, and having each a bend, *g*, forming together a ring, *h*, that loosely incloses the sleeve *c* between its flange and lugs aforesaid, so that the governor-shaft rotates freely without interference therefrom. This lever extends through a slotted plate, I, on a beam, *l*, extending across the frame A, and affording a bearing to the inner end of a shaft, J, and its free end rests upon a beam, *l'*, of the frame.

Lever H has free horizontal motion relative to the shaft G, and may, consequently, be shifted from the rear end of slot *n* of plate I to its front end, or to any intermediate point, thus increasing the leverage of beam *l* without stopping the device.

The beam *l* is pivoted at one end to the frame, and its other end extends through a vertical guide-slot, *s*, in one of the uprights of the said frame; consequently it has free vertical vibration relative to the same. It is held down under ordinary circumstances in a horizontal position by a curved or other spring, *s'*, secured at one end to said beam and at the other to the frame.

Upon shaft J is a loose friction-gear, K, whose periphery is tangential to that of the gear D when the bridge-tree *l* is horizontal, and which is flexibly secured to said shaft by means of a coil-spring, S, secured rigidly at its inner end to the said shaft and at the other to the friction-gear K.

As shaft J is rotated through any suitable mechanism rotary motion is communicated to the shaft B, and through it and suitable connections to the driven mechanism. At the same time the governor mechanism is actuated by the gears E F; and should the speed acquired be too great the governor raises lever H, vibrates beam *l* upward, and disengages the friction-gears K and D, thus disconnecting the driving and driven mechanisms.

The stored-up power in the balance-wheel continues to drive the latter mechanism until the governor drops slightly and re-engages the gears D K, thus reconnecting the driving and driven mechanisms. The speed at which the driving and driven pulleys K D are dis-

connected is regulated without stopping the mechanism by shifting lever *l* front or back in slot *n*, as the case may be—in the first instance increasing the power exercisable by the bridge-tree lever *l*, and in the second instance lessening it. The greater the leverage of the bridge-tree *l* the less the speed at which the mechanism must work to disconnect pulley K from pulley D and the reverse. The gear K being flexibly connected by the spring S to its shaft, the gears D K are engaged without jar or sudden concussion, the faster motion of gear K blending, as it were, with the slower motion of gear D until finally they become equal.

It will be seen from the above description that, by means of the device above described, irregular motion imparted to the shaft J is rendered absolutely regular before it reaches the driven mechanism, and regular results are obtained therefrom.

It will be observed that by adjusting the balls on the governor the speed at which it will act may be regulated at pleasure.

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

1. The combination, with the shaft B, its balance-wheel C, friction-gear D, and a governor mechanism operated by said shaft, of the shaft J, the vibratory bridge-tree *l* affording a bearing to one end of said shaft, a friction-gear, K, flexibly secured thereto and engaging gear D, and a lever actuated by said governor to raise the friction-gears out of engagement with each other, substantially as specified.

2. The combination, with the shaft B, having a friction-gear, D, and balance-wheel C, of a governor connected to and operated by said shaft, a friction-gear, K, engaging gear D, mounted on a shaft, J, journaled at one end in the bridge-tree *l*, adapted to be raised by said governor off the wheel C through the medium of the bar H, substantially as specified.

3. In a speed-regulator, the combination, with a fixed driven friction-gear, of an adjustable driving friction-gear flexibly connected to its shaft, substantially as set forth.

4. The combination, with a governor mechanism, a driving-shaft, B, operating the same, a driven pulley, D, a driving-pulley, K, bridge-tree *l*, plate I, and its oblong slot *n*, of a lever, H, operated by the governor to raise the bridge-tree, and vibrating horizontally with reference to the governor, substantially as specified.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

JOHN WARWICK.
W. S. MARSHALL.
A. SIMPSON.

Witnesses to signature of John Warwick:
GEORGE CANON,
JOHN CANON.

Witnesses to signatures of W. S. Marshall and A. Simpson:
LEWIS L. WEELOCK,
LEWIS L. WHEELER.