(No Model.)

L. T. SNOW & F. H. PIERPONT.

REDUCING MECHANISM FOR STEAM ENGINE INDICATORS.

No. 515,175. Patented Feb. 20, 1894.

Fig. 1.

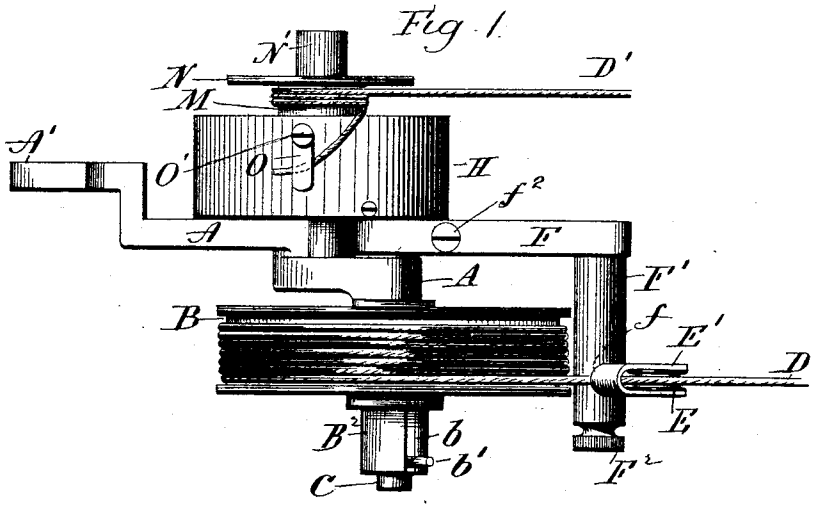


Fig. 2.

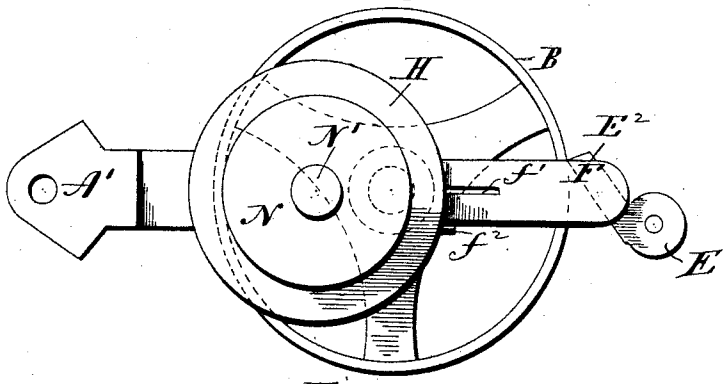
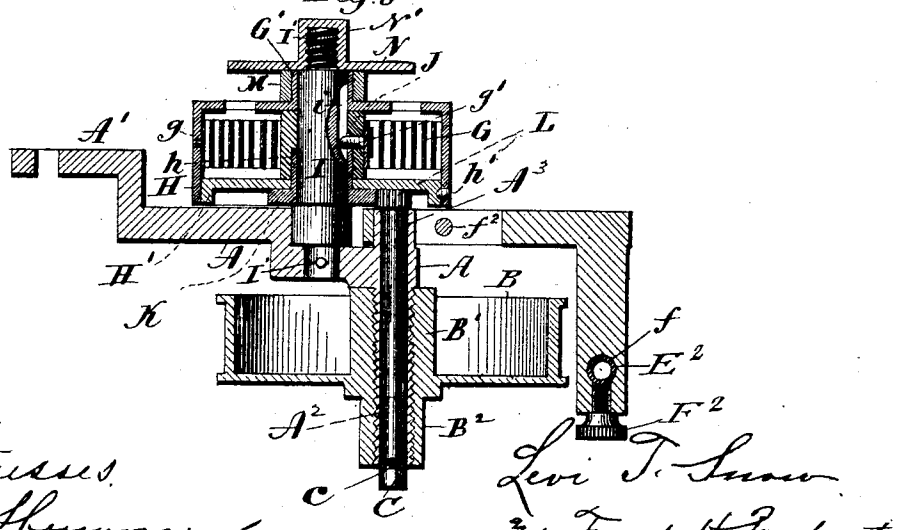


Fig. 3.



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UNITED STATES PATENT OFFICE.

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REDUCING MECHANISM FOR STEAM-ENGINE INDICATORS.

SPECIFICATION forming part of Letters Patent No. 515,175, dated February 20, 1894.

Application filed August 14, 1893. Serial No. 483,072. (No model.)

To all whom it may concern:

Be it known that we, LEVI T. SNOW, of New Haven, in the county of New Haven, and FRANK H. PIERPONT, of Hartford, in the county of Hartford, State of Connecticut, have invented a new Improvement in Reducing Mechanism for Steam-Engine Indicators; and we do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in side elevation of a reducing mechanism constructed in accordance with our invention; Fig. 2, a plan view thereof; Fig. 3, a view of the mechanism in vertical central section.

Our invention relates to an improved reducing mechanism for steam-engine indicators, the object being to provide a simple, compact, durable, easy-running device, which shall very accurately reduce and transmit the reciprocating movement of the engine piston or cross-head to the drum carrying the diagram upon which the record is made.

With these ends in view, our invention consists in a reducing mechanism having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

The bracket A, which is adapted at its outer end A′ to be attached to the indicator or to a stationary part of the engine, as may be found most convenient or desirable.

It may be well to here explain that by the term indicator we mean to define any of the steam-engine indicators in common use of the type which includes a drum adapted to carry a chart, a pen or pencil to mark upon the chart as the drum is moved, and devices placing the pen or pencil under the control of the steam-pressure of the engine. As an organization the indicator is stationary, and the bracket A may be attached to its frame or to a stationary part of the engine at a convenient point. By preference, however, the bracket will be attached to the indicator. The said bracket is constructed at its opposite end with an externally threaded, fixed hollow sleeve A^2, carrying the wheel or drum B, which has an internally threaded hub B′ fitting over the said sleeve, and an outwardly projecting collar B^2, containing a longitudinal slot *b*, receiving the ends of a coupling-pin *b*′, which is inserted into a transverse hole *c*, formed in the outer end of a shaft C, which passes through the externally threaded hollow sleeve A^2, before mentioned. As herein shown the said sleeve is made integral with the bracket, but it may be made independently thereof and fixed thereto. It will be understood from this construction that the said wheel B is coupled for rotation with the shaft C, but that it will have an additional longitudinal movement back and forth on the threaded sleeve within the limits of the length of the slot *b* formed in its collar. As herein shown the longitudinal movement of the drum B is in a vertical plane. The said wheel or drum B, which is made as light as consistent with rigidity, is provided upon its opposite edges with radial flanges, and receives one end of the engine-cord D, the other end of which is attached to the piston or cross-head, or other corresponding moving part of the engine. In order that the said cord may be regularly wound upon the wheel or drum B, we provide the device with a guide-roller E, which is journaled in a frame E′, having a cylindrical shank E^2, which is set into an inclined cylindrical opening *f*, formed near the outer end of a large stud F, which stands at a right angle to the plane of the wheel and close to the edge thereof, the said stud being fixed in the outer end of an arm F′, the inner end of which is bifurcated as at *f*′, and furnished with a clamping-screw f^2, adapting it to be clamped upon a small hub A^3, located in line with the externally threaded sleeve A^2, but on the opposite side of the bracket therefrom. The outer end of the stud F, is furnished with a set-screw F^2, the inner end of which impinges against the shank E^2 of the frame E′ in which the guide-roller E, is mounted. By loosening the set-screw F^2, the said frame may be turned, so that the roller will stand at any desired angle with respect to the periphery of the wheel or drum B, which as it rotates,

moves longitudinally with respect to the shaft C, and hence laterally to the guide-roller.

The object of providing for moving the wheel or drum as described, is of course, to cause the cord D, to be wound and unwound regularly upon and from the wheel or drum. The unwinding of the cord is effected by the piston or cross-head as it moves away from the indicator. For the winding of the cord as the piston or head approaches the indicator, the mechanism is provided with a coiled spring G, the outer end of which is attached by a screw g to the inner face of a rotating spring-box H, which turns upon a fixed stud I, secured to the bracket by means of a pin I′, or in any other suitable manner, and extending parallel with but in the opposite direction from the externally threaded sleeve A^2 before mentioned. The inner end of the said spring is attached by a screw g' to a collar J, located within the box H, encircling the stud I, and coupled therewith by means of the screw g', which enters a longitudinal groove i formed in the said stud. The inner end of the spring is therefore, through the medium of the screw g', the collar J, and the stud I, connected with the bracket A. A flanged disk H′, is adapted to fit closely within the open inner end of the spring-box, and conceals and protects the spring therein. The said disk H′ is provided with an inwardly projecting sleeve h, which encircles the stud I, and which enters a circular recess formed for it in the inner end of the collar J, the said sleeve forming a long bearing for the disk upon the stud I. The spring-box H, and the disk H′, are normally coupled together by a screw h', which passes through the edge of the box, and engages with the periphery of the disk, as clearly shown in Fig. 3 of the drawings. A gear-wheel K, rigidly connected with the outer face of the disk, and concentric therewith, meshes into a pinion L, located upon the extreme inner end of the shaft C, before mentioned. The spring-box G, is furnished with an outwardly projecting hub G′, which receives a collar M, upon which the indicator-cord D′ is wound, the cord being retained upon the collar by means of a cap N, having a central, outwardly projecting, internally threaded socket N′, adapting it to be screwed down over the reduced threaded end I′ of the stud I. By removing this cap, the collar M, may be replaced by a larger or smaller one, according to the dictation of circumstances. One end of the said indicator-cord D′ is wound upon the drum, which is not shown, while the opposite end is secured to the spring-box by being drawn under a spring-finger O, attached to the periphery thereof, by a screw O′, as seen by reference to Fig. 1 of the drawings.

By arranging the spring G independently of the wheel or drum on which the engine-cord is wound, we reduce the weight of that part to the minimum, and hence secure the best results, for it is necessary that it shall respond as promptly as possible to the action of the spring, and so keep the slack of the cord taken up during the inward stroke of the piston or other part to which the outer end of the engine-cord is attached. Furthermore, by interposing gearing between the surfaces on which the two cords are wound, we are enabled to arrange for a reducing effect which cannot be secured when both of the cords are wound upon surfaces applied to the same center, as has been generally done.

To change the tension of the spring G, the screw h' is removed, and then while the wheel or drum B, is held against rotation, the spring box is turned with relation to the disk H′, one way or the other, according as it is desired to raise or lower the tensional force of the spring. Then after the spring has been brought to the right tension, the box and disk are secured together again by means of the screw h'.

Our improved construction is very light and compact, affords considerable range of adjustment to meet the requirements of different engines, and has been found to give very accurate and satisfactory results. The device runs so smoothly and with so little vibration that it may be attached directly to the indicator without interfering with the action thereof. Moreover the interposition of the gearing between the drum of the engine cord and the spring, makes the action of the latter slow and short, thereby prolonging its life and making its tension uniform throughout the length of its action.

We would have it understood that we do not limit ourselves to the exact construction herein shown and described, but hold ourselves at liberty to make such changes and alterations as fairly fall within the spirit and scope of our invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a reducing mechanism for steam-engine indicators, the combination with a bracket, of a wheel or drum mounted thereupon to have rotary and longitudinal movement, and receiving the engine cord, a guide connected with the bracket and standing adjacent to the periphery of the drum, a rotatable spring-box mounted independently of the drum and adapted to have the indicator-cord connected with it, and gearing between the said box and wheel or drum, substantially as described, and whereby the overlapping of the coils of the engine-cord upon the drum is prevented by the longitudinal movement of the drum, substantially as described.

2. In a reducing mechanism for steam-engine indicators, the combination with the bracket thereof, of an externally threaded sleeve, a wheel or drum for the engine-cord, having an internally threaded hub taking into the threads of the said sleeve on which the wheel or drum moves longitudinally as it ro-

tates, a shaft passing through the hub of the wheel or drum and coupled therewith, a rotatable spring box connected with the bracket independently of the said wheel or drum, a spring located in the said box and having one end attached thereto, gearing between the said box and shaft, means carried by the box for receiving the indicator-cord, and a guide located adjacent to the periphery of the wheel or drum for guiding the engine-cord, substantially as described.

3. In a reducing mechanism for steam-engine indicators, the combination with a bracket, of a wheel or drum for the engine-cord connected with the bracket for rotary and longitudinal movement, a guide for the said cord located adjacent to the periphery of the wheel or drum, a rotatable spring-box connected with the bracket, a spring located therein and having one end secured to it, gearing between the box and wheel or drum, a removable collar connected with the drum to receive the indicator-cord, and a cap impinged against the outer end of the said collar for retaining the cord thereon, substantially as described, and whereby the overlapping of the coils of the engine-cord upon the drum is prevented by the longitudinal movement of the drum.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

LEVI T. SNOW.
FRANK H. PIERPONT.

Witnesses to the signature of Levi T. Snow:
GEO. D. SEYMOUR,
JAMES L. BALDWIN.

Witnesses to the signature of Frank H. Pierpont:
CHARLES ROSENTHAL,
ROBERT THALHEIMER.