No. 682,660. Patented Sept. 17, 1901.

H. W. YEOMANS.

REDUCING WHEEL FOR STEAM ENGINE INDICATORS.

(Application filed May 2, 1901.)

(No Model.)

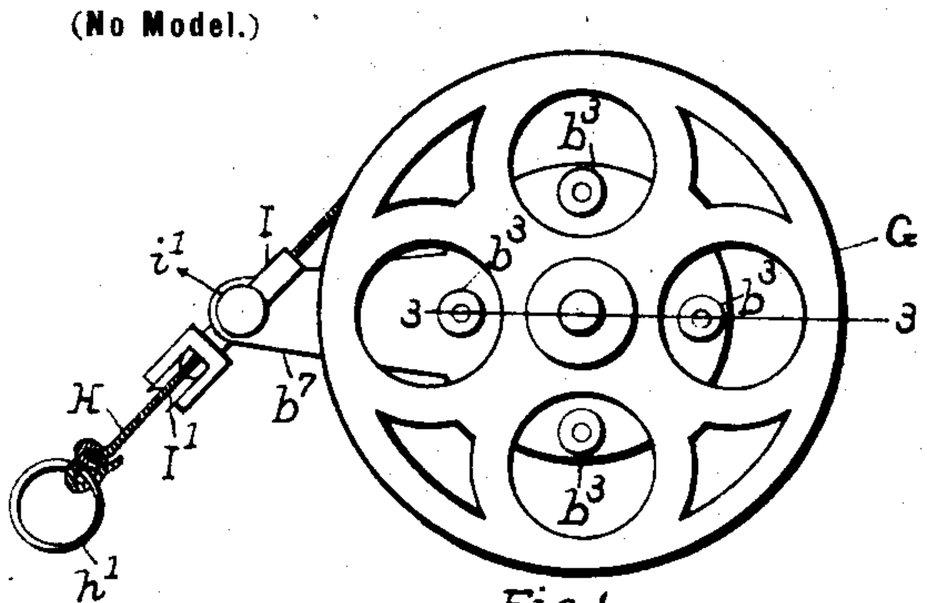

Fig 1

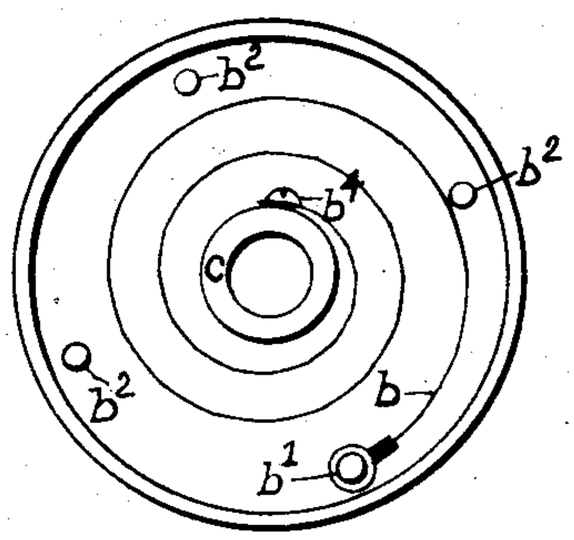

Fig 2

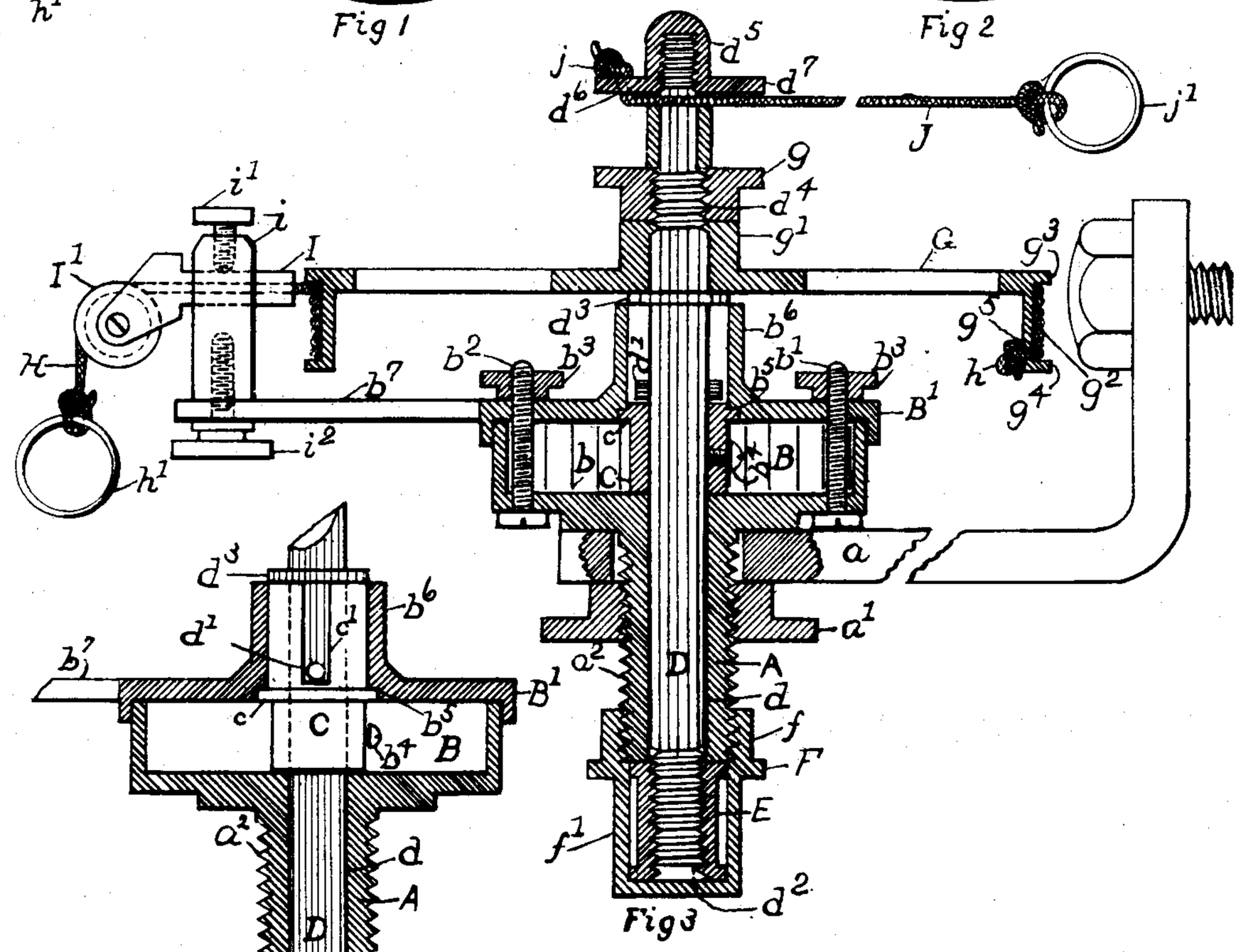

Fig 3

Fig 5

Fig 4

Fig 6

WITNESSES.

E. Landell

Susie M. Hannaford

INVENTOR.

Herbert W. Yeomans,

By Albert M. Moore,

His ATTORNEY

UNITED STATES PATENT OFFICE.

HERBERT W. YEOMANS, OF LOWELL, MASSACHUSETTS.

REDUCING-WHEEL FOR STEAM-ENGINE INDICATORS.

SPECIFICATION forming part of Letters Patent No. 682,660, dated September 17, 1901.

Application filed May 2, 1901. Serial No. 58,432. (No model.)

To all whom it may concern:

Be it known that I, HERBERT W. YEOMANS, a citizen of the United States, residing in Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Reducing-Wheels for Steam-Engine Indicators, of which the following is a specification.

This invention relates to reducing-wheels for steam-engine indicators; and it consists in the devices and combinations hereinafter described and claimed.

In this invention a single spindle is used for both the engine-cord and indicator-cord, the engine-cord being wound upon a wheel called the "cord-wheel," which is rigidly secured to the spindle concentrically therewith, while the indicator-cord is wound directly upon the spindle or upon a sleeve or bushing, which in use is rotary with the spindle, the attachment of the cords being such that one cord winds while the other cord unwinds, the coils of one cord being laid upon the spindle in the opposite direction to that in which the other coils are laid, so that the gears commonly used to reduce the speed and travel of the indicator-cord are unnecessary in this invention. The cords being of the same diameter and the spindle being caused to move endwise at every turn a distance equal to the diameter of the cord, no provision is necessary to traverse the cord-guides. The spindle has a long perfectly smooth bearing-surface within a stand or hollow stud which supports all the parts of the reducing mechanism, and said spindle has a reduced and screw-threaded lower end arranged to turn in a nut secured by a keeper against said lower end of said stand, the pitch of said threaded portion and of the nut being equal to the diameter of the cord. This nut is reversible, is entirely independent of the bearing of the spindle, and is readily removable, so that when worn another may be substituted for it.

The spindle is rotated by pulling on the engine-cord against the resistance of a spring, the expansion of which when the piston or cross-head moves toward the reducing mechanism reverses the motion of the spindle, which is caused to descend by means of the nut and threaded lower end of the spindle. The spring is contained in a spring-box secured on the stand, the spring being a coiled flat spring like a clock-spring, one end of which is attached to the inside of the spring-box or spring-case, the other end of said spring being attached to a sleeve which loosely surrounds the spindle within the spring-case and is provided with a longitudinal slot to receive a projection on the spindle to cause the spindle and sleeve to rotate together and to permit the spindle to have a longitudinal movement in said sleeve. The spring is prevented from being broken by a too great reverse movement of the spindle and sleeve by means of a collar on the spindle striking on the top of said sleeve.

In setting up the device when the cord-wheel and the spindle have been turned with reference to the spring-case sufficiently to give a proper tension to the spring the nut on the lower end of the spindle may be turned up against the bottom of the stand and draw the collar down on the top of the sleeve with sufficient force to prevent the expansion or unwinding of the spring until the engine-cord has been properly wound upon the cord-wheel.

In the accompanying drawings, Figure 1 is a plan of my device; Fig. 2, a plan of the spring-box with the cover removed, showing the spring and means for attaching the same; Fig. 3, a central vertical section, enlarged, of my device on the line 3 3 in Fig. 1; Fig. 4, a front elevation of the spindle, the sleeve, and a section of the spindle-traversing nut, the keeper, the stand, the spring-box, and its cover; Fig. 5, a side elevation of said nut and the keeper; Fig. 6, an elevation of the spindle-traversing nut.

A indicates a hollow stand adapted to pass through a bracket *a*, the latter being secured, as by a bolt and nut, to any convenient stationary part of the engine, the bracket being clamped between the spring-box B, which is represented as integral with the stand A, and a nut *a'*, which turns on the threaded outer surface a^2 of said stand. Within the spring-box or spring-case B is arranged the coiled flat spring *b*, the same being secured at its outer end to a stud which projects from the bottom of said box up through the same, said stud being represented as a screw *b'*, which, with other screws b^2 b^2, serves to hold the cover B' in place on top of said box B, these screws

projecting up through said cover and carrying at their upper ends the nuts b^3, which turn down on top of said cover and may be readily removed by the fingers, if it be desired to remove the cover for any reason, without removing said screws, which are fitted so closely as to require the use of tools to remove them.

The inner end of the spring b is attached in any convenient manner, as by a screw b^4, to a sleeve C, which is provided with a flange c, arranged in an annular recess b^5 on the under side of the cover B', while the lower end of said sleeve rests upon the inside of the bottom of the box B, so that said sleeve is prevented from longitudinal movement. Above said flange c said sleeve passes freely through a sleeve-bearing b^6, which projects upward from the center of said cover to the top of said sleeve.

The spindle D has a long cylindrical smooth bearing-surface d within the hollow stand A, said cylindrical surface d extending also up through the sleeve C and for some distance above same. Said spindle is provided with projections d', which may be the end portions of a pin driven diametrically through said spindle, these projecting end portions entering vertical grooves c', which extend from the top of the sleeve C downward to or nearly to the flange c, this construction permitting the spindle to rise and fall in the sleeve, but causing the spindle and sleeve to turn with each other. The lower end of the spindle is screw-threaded at d^2 below the stand A and enters a correspondingly-threaded nut E, arranged below said stand and held against the same by a keeper F, said keeper consisting of a nut f, which screws onto the lower end of said stand and is provided with a yoke f', which extends under said nut, the nut when in use being clamped between the lower end of said stand and the top of the middle portion of said yoke so firmly as to prevent it from turning with the spindle, so that turning the spindle gives said spindle a longitudinal movement in said nut, stand, and sleeve C.

The downward longitudinal movement of the spindle D is limited by a collar d^3 striking upon the top of the sleeve C or sleeve-bearing b^6.

The cord-wheel G, or wheel which carries the engine-cord, is secured on the spindle D concentrically therewith, being clamped between the collar d^3 and a nut g, which turns on a threaded portion d^4 of said spindle against the top of the hub g' of said wheel G. Said wheel is of the usual form, having a broad flat face g^2 and flanges g^3 g^4.

The engine-cord H is attached to the wheel G in any usual manner and is represented in Fig. 3 as passed through a hole g^5 and knotted at h. Said engine-cord is coiled around the wheel G between its flanges and passes from the wheel through the guide I and over the pulley I' in the usual manner, the free end of the cord being attached to a ring h', which may be attached in the usual manner to the cross-head or other part that has the same movement as the piston of the engine. The guide I is supported in a guide-post i, secured by a thumb-screw i' in an obvious manner to an arm b^7, with which the cover B' is provided; said guide passing through said guide-post and being retained therein by a set-screw i^2 in an obvious manner.

The indicator-cord J is wound upon the spindle D above the nut g or upon a bushing or sleeve which fits said spindle and is clamped endwise between said nut g and another nut d^5, which turns upon the threaded upper end of said spindle, one end of said cord J being passed through a hole d^6 in the flange d^7 of said nut d^5 and knotted at j, the other end of the cord J being attached to a ring j' or hook, which may be caught on a projection on the indicator-drum in the usual manner.

The cords H J are of the same diameter, which diameter equals the pitch of the nut E, the cord H being wound from the bottom upward on the rim of the wheel G and the cord J being wound on the spindle or its bushing from the top downward, so that as the spindle rises the cord H unwinds and the cord J is wound up; but the parts of the cords not wound always remain at the same height above the lower end of the stand and parallel with each other.

By loosening the keeper F and turning down the nut E on the spindle and then turning the keeper until the nut E is again clamped against the lower end of the stand the downward longitudinal movement of the spindle before the collar d^3 strikes the top of the sleeve C may be increased, or by turning the nut in the other direction before clamping the amount of the longitudinal traverse of said spindle may be reduced. When said keeper is loosened and the nut E is turned up on the spindle until the collar d^3 is drawn down upon the top of the sleeve C or sleeve-bearing b^6 and said nut is against the lower end of the stand, the cord-wheel G is prevented from turning, making it more convenient to wind the engine-cord upon said cord-wheel properly. In any case the nut E must be properly adjusted and secured before using the reducing-wheel.

The above-described construction is very accurate and very durable, as the nut E may be used as long as it retains enough of its thread to raise the spindle and when worn out may be replaced at a slight cost, the other parts not being liable to need repairs, and very simple, dispensing with the gears or cord commonly used between the cord-wheel and the indicator-cord sleeve, such gear being soon worn and such intermediate cord requiring accurate adjustment of its length.

I claim as my invention—

1. The combination with the spindle, having an external screw-thread, of the cord-wheel and the indicator-cord sleeve, each arranged concentric with the other and with

said spindle and movable therewith, the engine-cord and the indicator-cord, each having a diameter equal to the pitch of said screw-thread and arranged to wind and advance in opposite directions on said cord-wheel and indicator-cord sleeve, respectively, a nut, to engage said screw-thread and means of securing said nut from rotary movement, to cause said spindle to traverse longitudinally.

2. The combination of the hollow stand, the spindle, rotary therein and having at opposite ends of said stand, a collar and an external screw, a nut held from rotary movement and engaging said screw, a spring-box on said stand, a sleeve, surrounding said spindle within said box and rotary with said spindle.

3. The combination of the hollow stand, the sleeve, supported by said stand, in line therewith, the spindle, passing through and turning in said stand and sleeve and provided with a collar above said sleeve and with a screw-thread which extends below said stand, a nut turning on said screw-thread, and a keeper, consisting of a nut turning on an external screw-thread with which the lower end of said stand is provided to clamp said first-named nut against the lower end of said spindle and to prevent the rotation of said first-named nut.

4. The combination of the hollow stand, the non-rotary spring-box, the spindle, adapted to turn in said stand and box and having above said box a collar and below said stand a screw-thread, a nut engaging said screw-thread, clamping means, to hold said nut from rotation and against the lower end of said stand, a sleeve, arranged within said spring-box below said collar and rotating with said spindle, the spring secured at one end to said sleeve and at the other end to said box, and a cover, surrounding said sleeve, above a flange, with which said sleeve is provided, and secured on said box, to prevent said sleeve from moving longitudinally with said spindle.

5. The combination with the stand and non-rotary spring-box, of the spindle, adapted to be turned therein, a spring, one end of which is secured to said spring-box, means of connecting the other end of said spring to said spindle, to rotate said spindle while permitting the longitudinal movement thereof, a nut, surrounding said spindle and engaging an external screw-thread with which said spindle is provided, means for holding said nut from rotating or moving with said spindle, a cord-wheel concentric with said spindle and rotary therewith.

In testimony whereof I have affixed my signature in presence of two witnesses.

HERBERT W. YEOMANS.

Witnesses:
ALBERT M. MOORE,
SUSIE M. HANNAFORD.