

W. S. MAYERS.
REDUCING WHEEL FOR ENGINE INDICATORS.
APPLICATION FILED OCT. 29, 1909. RENEWED SEPT. 2, 1911.

1,010,064.

Patented Nov. 28, 1911.

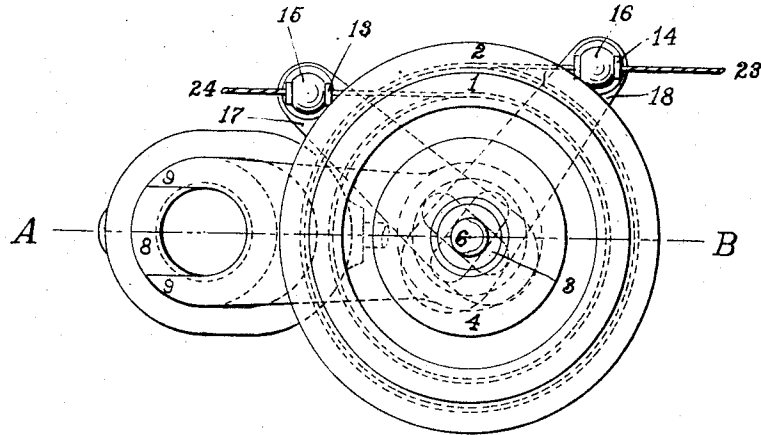


Fig. 1.

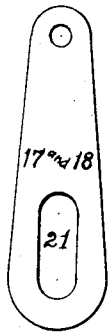


Fig. 4.

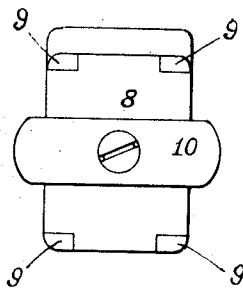


Fig. 3.

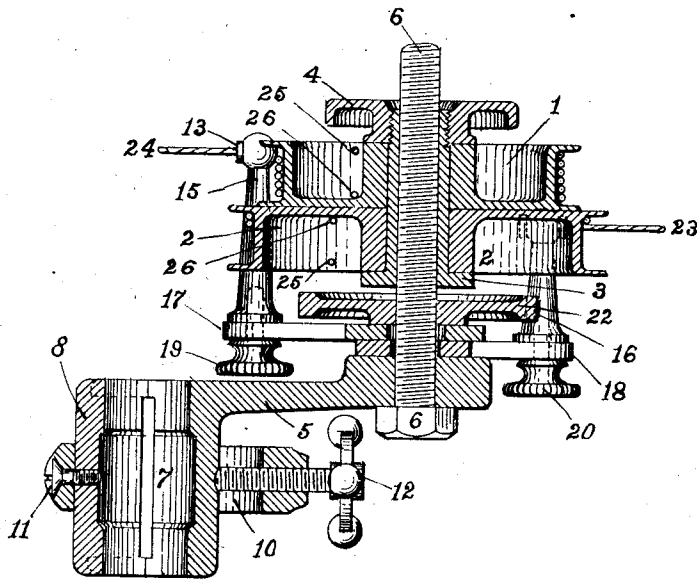


Fig. 2.

Inventor

Wilbur S. Mayers

Witnesses

R. L. Kingland
J. L. Poole

By

C. Edwin Mayers
Attorney

UNITED STATES PATENT OFFICE.

WILBUR S. MAYERS, OF FAIRMONT, WEST VIRGINIA.

REDUCING-WHEEL FOR ENGINE-INDICATORS.

1,010,064.

Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed October 29, 1909, Serial No. 525,397. Renewed September 2, 1911. Serial No. 647,395.

To all whom it may concern:

Be it known that I, WILBUR S. MAYERS, a citizen of the United States, residing at Fairmont, in the county of Marion and State of West Virginia, have invented certain new and useful Improvements in Reducing-Wheels for Engine-Indicators, of which the following is a specification.

My invention relates to improvements in devices used in combination with engine indicators for the purpose of transmitting the reciprocating motion of the piston of the engine to the indicator, minified to certain ratios so as to be within the range of travel of the recording drum of the indicator, and its advantages over devices of the kind as heretofore constructed lie chiefly in the absence of springs and gears, and in a reduced number of wearing parts, resulting in greatly increased reliability and durability.

It consists essentially of two reels having different circumferences and tightly clamped together, revolvably mounted upon a support which is adjustably secured to the cross-head or other reciprocating part of the engine, and having cords wound upon the reels with the unwound end of one cord attached to the indicator drum and the unwound end of the other extending in the opposite direction and attached to a fixed point.

In the accompanying drawing, which forms a part of this specification, Figure 1 is a plan view of my device. Fig. 2 is a sectional view through the center line A—B in Fig. 1. Fig. 3 is a side view of the holder or socket, as seen from the point A looking in the direction of the line A—B, and Fig. 4 is a plan view of the supports for the cord guides. The reels 1 and 2 are preferably made of material light in weight and are bored to fit loosely upon the bushing 3, resting upon its flange and tightly clamped thereon by the thumb nut 4 which is threaded into the top of this bushing.

The arm 5 carries at one end the tightly fitting bolt 6, firmly screwed in, and at the other end it is provided with a clamp socket 7. This socket is shown in the drawing as being cylindrical in shape but it may be made of any desired shape to suit the part

to which it is attached. It is provided with a movable section 8 which slides loosely between the parallel faces of the projecting lugs 9 which are either an integral part of or are firmly fixed to the other half of the socket and the arm 5. Around the socket is fitted the clamp ring 10 which is secured to the movable section 8 by the screw 11. This ring is elongated so that the section 8 may slide in and out to a limited extent between the lugs 9 as above described. I do not wish to limit myself to the use of this particular design of clamp socket as any other form may be substituted provided that it fulfils the conditions in relation to the adjustment of the position of the reducing wheel as hereinafter set forth.

When the device is in use a short piece of pipe or rod is screwed into and projects from the cross-head or some other reciprocating part of the engine, and is firmly clamped in the socket by tightening the screw 12 which, through the ring, draws the two sections of the socket together.

It will be seen that the position of the device with reference to the cross-head is changed by two adjustments. If it is so attached to the cross-head that the bolt 6 is in a vertical position the device is raised or lowered by sliding it up or down upon the above mentioned pipe or rod, and the bolt 6 is moved in a horizontal direction by turning the socket upon the pipe or rod. If it is attached to the cross-head with the bolt 6 in a horizontal position the vertical adjustment is made by turning the socket upon the pipe or rod, and the horizontal adjustment by sliding it upon the rod. These adjustments are utilized in setting the reducing wheel so that the cord leading from the indicator to the drum 1 or 2 will be parallel to the line of travel of the engine piston. The fixed point to which the other cord is attached is so chosen that the two cords will lie in approximately parallel lines. The distance between the socket 7 and the bolt 6 is great enough to allow the said pipe or rod to extend through the socket without interfering with the rotation of the largest sized reel which may be used.

In practice it is found necessary to spool

or guide the cord so that it will wind properly upon the reel. In devices of the kind heretofore constructed only one such reel is employed and it is attached to the indicator and fixed in one position but free to rotate. In this case the cord passes through a movable guide which travels across the face of the drum properly spooling the cord. In my device the cord guides remain in a fixed position relative to the non-rotating parts, after being once adjusted, and the spooling is accomplished by the travel back and forth of the bushing 3 upon the threads of the bolt 6 between certain limits, carrying with it the two reels, as will be hereafter further described.

The cord guides consist of hardened steel bushings 13 and 14 tightly fitted into holes drilled through the tops of the standards 15 and 16. The bases of these standards are firmly held at the outer ends of the guide supports 17 and 18 by the thumb screws 19 and 20. The inner and larger ends of these arms have elongated holes 21 through which the bolt 6 passes and they are rigidly clamped together in any desired position between the thumb nut 22 and the top face of the arm 5 by screwing down the thumb nut. The elongated holes 21 allow the guide supports to be moved in and out in a radial direction thus shifting the standards and guides so that they may be placed as close as possible to their respective drums of different diameters without interfering. This adjustment also allows the guide supports 17 and 18 to be placed at any angle in planes perpendicular to the bolt 6 so that the guide bushings 13 and 14 may be placed in line with the cords. By loosening the thumb screws 19 and 20 the axes of the bushings 13 and 14 are placed in line with the cords so that there will be no binding or chafing. One or more small grooved pulleys may be substituted in either of the standards 15 and 16 in place of the bushings 13 and 14 without affecting the action of the device and I do not desire to limit myself in this particular to the use of either type.

When the device is in use, all the thumb screws and nuts are made tight and it will be seen that all the members except the drums 1 and 2, the bushing 3, and the thumb nut 4 are clamped together and are held immovable with reference to the engine piston.

The bore of the bushing 3 is loosely threaded into corresponding threads in the bolt 6 so that the bushing may freely turn upon the upper section of the bolt and at the same time move a distance equal to the pitch of the threads for each rotation toward or from the head of the bolt, according to the direction of rotation. The pitch of the threads in the bolt and bushing is preferably

made equal to the diameter of the cords. In Fig. 2 of the drawing, these threads are shown as being cut right handed and assuming in this case that the bolt 6 is in a vertical position, the reels are at their lowest point. Assume also that the unwound end of cord 23 is attached to the fixed point hereinbefore mentioned and that the unwound end of the other cord 24 is attached to the indicator drum and tensioned by its spring. If now the reducing wheel is moved from left to right giving the reels a counter clockwise direction as seen in Fig. 1, it is seen that the cord 24 will unwind from the reel 1 and the cord 23 will wind upon the reel 2. One or more of the rotations of the reels in this direction removes a like number of the turns of the cord from reel 1 and adds a like number to the reel 2 but, during this period, they have both been raised by the threads in the bolt and bushing to a distance equal to the diameter of the cord multiplied by the number of rotations, so that the guide bushing 13 will always remain in line with the top turn of the cord on reel 1 within certain limits and the bushing 14 will in a like manner remain in line with the bottom turn on reel 2. With the reducing wheel traveling in the reverse direction the reverse action takes place, the guide bushings still remaining in line with their cords as above described.

In the adjustment shown in Fig. 1 the cord 24 is attached near the bottom flange of reel 1 and cord 23 is attached near the top flange of reel 2. If the positions of the two guides and cords were reversed the cords would then be attached near the top flange of reel 1 and the bottom flange of reel 2. In this case, with the bushing at its lowest point, reel 1 would have no cord wound upon it and reel 2 would have its full number of turns. In order to provide for this change in the position of the two cord guides without removing the reels and inverting them I provide cord attachments on both sides of each reel which consist of the holes 25, 26 bored through the rims. Assuming that the cord which winds upon the smaller reel is attached to the indicator drum and the other cord to the aforesaid fixed point it is clear that the travel of the cord attached to the indicator will be equal to the difference between the circumferences of the two reels 1 and 2 multiplied by their number of revolutions and that this cord will always move in the same direction as that of the piston. If, however, the cord leading from the indicator drum is wound upon the larger reel and the other cord upon the smaller one the travel of the indicator cord will be the same as in the above case but in a direction in opposition to that of the piston.

The amplitude of the circumferential

travel of the indicator drum being practically constant for all sizes of engines I provide for the variation in the length of the piston stroke by the use of a set of interchangeable reels, or cylinders, any two of which may be used to form a differential pair having circumferential ratios suited to the length of the stroke of the engine.

It is evident that my reducing wheel may be attached to the engine cross-head in any position provided that the axis of the bolt 6 is always in a plane perpendicular to the line of travel of the piston. It is also evident that the threads in the bushing 4 and the bolt 6 may be cut either right or left handed without affecting the principle or utility of the device.

The cords are kept under the proper tension at all times by the torque of the adjustable spring in the indicator drum and the tension may be increased if necessary by the use of an auxiliary spring acting in conjunction with the said indicator spring.

Having thus described my invention the following is what I claim as new therein:—

1. In a reducing wheel for engine indicators the combination of an adjustable support for alining the cord with the axis of the engine, a spindle secured therein, a pair of connected reels of different circumferences rotatably mounted on the spindle, arms fastened to the spindle, standards supported by the arms, and apertured heads on the ends of the standards for guiding a cord on said reels.

2. In a reducing wheel for engine indicators the combination of an adjustable support for alining the cord with the axis of the engine, a spindle secured therein, a bushing rotatably mounted on the spindle, a pair of differential reels adjustably mounted on the bushing, and means for guiding a cord on said reels.

3. In a reducing wheel for engine indicators the combination of an adjustable support for alining the cord with the axis of the engine, a spindle secured therein, a bushing rotatably mounted on the spindle, a pair of differential reels adjustably mounted on the bushing, arms adjustably secured to the spindle, standards supported by the arms, and apertured heads on the ends of the standards for guiding a cord on said reels.

4. In a reducing wheel for engine indicators the combination of a support for alining the cord with the axis of the engine, a threaded bolt secured to the support, a bushing having threads therein registering with the threads on the bolt, a pair of connected reels of different circumferences adjustably mounted on the bushing, arms having elongated holes therein to receive the bolt, a nut on the bolt adapted to clamp the arms against the support, standards sup-

ported by the arms, and the standards having apertures near the top thereof for guiding a cord on said reels.

5. In a reducing wheel for engine indicators the combination of a support, a threaded bolt secured to the support, a bushing having threads therein registering with the threads on the bolt, a pair of reels of different circumferences adjustably mounted on the bushing, means for clamping the reels together and securing them on the bushing, arms having elongated holes therein to receive the bolt, a nut on the bolt adapted to clamp the arms against the support, standards supported by the arms and the standards having apertures near the top thereof for guiding a cord on said reels.

6. In a reducing wheel for engine indicators the combination of an adjustable support, a threaded bolt secured to the support, a bushing having threads therein registering with the threads on the bolt, a pair of reels of different circumferences adjustably mounted on the bushing, threads on the end of said bushing, a thumb nut secured on the end of the bushing adapted to clamp the reels thereon, arms having elongated holes therein to receive the bolt, a nut on the bolt adapted to clamp the arms against the support, standards supported by the arms, and the standards having apertured heads for guiding a cord on said reels.

7. In a reducing wheel for engine indicators the combination of a support, the support provided with a socket, the socket being divided longitudinally into two sections, a ring encircling the socket, a screw threaded in the socket adapted to draw said sections of the socket together, a threaded bolt secured to the support, a bushing having threads therein registering with the threads on the bolt, a pair of differential reels mounted on the bushing, threads on the end of said bushing, a thumb nut secured on the end of the bushing adapted to clamp the reels thereon, arms having elongated holes therein to receive the bolt, a nut on the bolt adapted to clamp the arms against the support, standards supported by the arms, and the standards having apertured heads for guiding a cord on said reels.

8. In a reducing wheel for engine indicators, the combination of a support having a clamp socket, a threaded bolt secured to the support on one side of the said clamp socket whereby the position of the bolt is adjustable by the rotation of the socket, a bushing having threads therein registering with the threads on the bolt, a pair of connected reels of different circumference adjustably mounted on the bushing, arms having elongated holes to receive the bolt, a nut on the bolt adapted to clamp the arms against the support, standards supported by

the arms, said standards having apertures near the tops thereof for guiding a cord on said reels.

9. In a reducing wheel for engine indicators, the combination of a support having a clamp, a threaded bolt secured to the support in a plane parallel with the clamp, arms on the support, a reel holding member on the support, reels thereon, guiding stand-

ards carried by the arms and having apertures therein to receive a cord for engaging the reels. 10

In testimony whereof I affix my signature in the presence of two witnesses.

WILBUR S. MAYERS.

Witnesses:

J. W. STEVENS,

R. O. NUZUM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."