

UNITED STATES PATENT OFFICE.

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STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 550,225, dated November 19, 1895.

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To all whom it may concern:

Be it known that I, WILLIAM HOUGHTALING, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Steam-Engine Indicators, of which the following is a specification.

This invention consists in a steam-engine indicator provided with an adjustable part or member over which passes the cord that extends from the diagram barrel or holder to a moving part of the engine or to reducing mechanism connected with such part, whereby the cord may be taken up to cause said barrel or holder to move properly when a diagram is to be taken, and the cord may be slackened so that the barrel or holder will not move after the operation is finished without the necessity of detaching the cord from the moving part of the engine or unclutching the barrel.

It also consists in a cord having an elastic band or spring attached thereto in such a way as to keep the cord taut, and thereby prevent it from fouling when the diagram barrel or holder is not in motion, all as hereinafter described and claimed.

For the purpose of illustrating the invention I have chosen an indicator of that variety in which an oscillating diagram-barrel and a leading-off pulley are employed, although it is applicable to that class of indicators in which the diagram-holder has a reciprocating sliding movement.

In the accompanying drawings, Figure 1 represents a side view of the main portion of a well-known indicator, partially in section, with the improvements applied thereto, the cord which is attached to the moving part of the engine being taut. Fig. 2 shows a top view of the same with the diagram barrel and the leading-off pulley in horizontal section. Fig. 3 represents a portion of a top view with the position of the cord-tightener changed and a portion of the cord slack. Fig. 4 shows the cord-tightener and the arm upon which it is adjustably mounted, the said arm being secured to the arm that bears the leading-off pulley, and both arms being shown in section on line *xx* of Fig. 2.

A indicates the diagram barrel or holder,

which is mounted, as usual in this variety of indicators, on an arm B, projecting from the steam-cylinder C of the device. To the arm B another arm D is shown as attached in any suitable manner, as by a nut E, which is threaded onto a pin *e*, the said arm D bearing a carrier F, in which a "leading-off pulley" *f* is mounted. Ordinarily the cord G, which is attached to the diagram-barrel, runs directly from the latter over the pulley *f* and is attached, as by a hook, to some properly-moving part of the engine, or to reducing mechanism which is connected with such part.

To the arm D an arm H is secured in any preferred manner, as by a set-screw *h*, and this arm H carries upon it a pulley J adjustable longitudinally on the arm. The mounting of this pulley to secure the said adjustability may be any that is suitable; but it is shown as rotatably secured to a base or block K, having a depending pin *k*, as shown in Fig. 4, which passes through a slot *h'* in the arm, and the block is clamped in place on the arm by a nut L, threaded onto said pin. The cord G passes from the barrel A around the pulley J, and thence over the pulley *f* to a hook *g*, to which it is attached for convenience.

M indicates a cord the right-hand end, as seen in the drawings, of which is intended to be secured to a moving part of the engine or to well-known reducing mechanism, which is connected to said moving part. The left-hand end of this cord is shown as attached to a plate N, which is furnished with an eye *n*, for convenience of receiving the hook *g*. To this plate is also secured one end of an elastic band O, the opposite end of which is attached to the cord in any preferred manner, and in such a way that when the pulley J is in the position shown in Fig. 3 the portion *m* of the cord will be slack at the end of the return stroke of the engine-piston, but the portion to the right hand of said band will be held taut by the band, as well as the cord G, at all times.

The operation is as follows: Preparatory to taking a diagram the pulley J is moved to the position shown in Fig. 3 and the hook *g* is connected to the plate N, the cord M having been previously connected with the engine. The tension of the usual spring P in the diagram barrel (shown by dotted lines in

Figs. 2 and 3) is greater than that of the elastic band O at any time, so that as long as the pulley J remains in the position shown in Fig. 3 the barrel will not be rotated by a pull upon the cord M, the band O merely being stretched by such pull. When the paper has been secured in place on the barrel A and it is desired to take a diagram, the pulley J is moved outward and clamped by the nut L at the proper time in the position shown in Fig. 2, thereby stretching the band O until that part *m* of the cord M becomes taut. The next subsequent pull upon the cord will rotate the barrel, therefore, and the diagram will be taken. When a diagram has been produced and it is desired to stop the movement of the barrel, the pulley J is moved inward to the position shown in Fig. 3. All subsequent pulls upon the cord M while the pulley is in this position, therefore, will simply stretch the band O without rotating the barrel.

By employing the adjustable pulley J or equivalent means the rotation or non-rotation of the barrel is secured as may be desired, while the employment of the elastic band O or equivalent means, (as a weak coiled spring,) in connection with the cord M, or with such portion of the cord G as is always beyond the pulley *f* to the right hand, as seen in the drawings, the cord G will be held taut at all times and so will the cord M, except its portion *m*, during the return strokes of the engine-piston, when the barrel is not to rotate. The band O or equivalent spring prevents such a looseness of the cords G and M when the barrel is not in movement, therefore, as would endanger the proper working of the device by the cords becoming fouled in any way.

Although I prefer to employ the leading-off

pulley *f* and to locate the adjustable pulley J between it and the diagram-barrel, yet it will be evident that the pulley *f* may be dispensed with and the adjustable pulley J may perform the office of a leading-off pulley as well as the office of taking up or slackening the cord. It will be evident, also, that the pulley J may be dispensed with and the leading-off pulley *f* be made adjustable on an arm similar to II, for the purposes named. It will be seen, also, that a cord may be used which extends continuously from the barrel to the running part of the engine (or to the reducing mechanism) and the elastic band or spring be secured to such cord between the pulley and engine to perform its office.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A steam-engine indicator having a diagram-barrel, or holder, a cord leading therefrom, an adjustable part or member over which such cord passes, and an elastic member secured to and along the cord between the barrel, or holder, and the part to which the cord is to be attached, substantially as and for the purposes specified.

2. In a steam-engine indicator the combination with a diagram-barrel, or holder, a leading-off pulley, and a cord passing from said barrel or holder over said pulley, of an adjustable member, over which the cord also passes, located between said barrel, or holder, and said pulley; and an elastic member secured to and along the cord between the said pulley and the part to which the cord is to be attached, substantially as and for the purposes specified.

WILLIAM HOUGHTALING.

Witnesses:

JAMES GRAY,

SAML. DE VORKIN.