No. 677,275. Patented June 25, 1901.

J. L. ROBERTSON, JR.

STEAM ENGINE INDICATOR.

(Application filed Feb. 26, 1901.)

(No Model.)

Fig. 1.

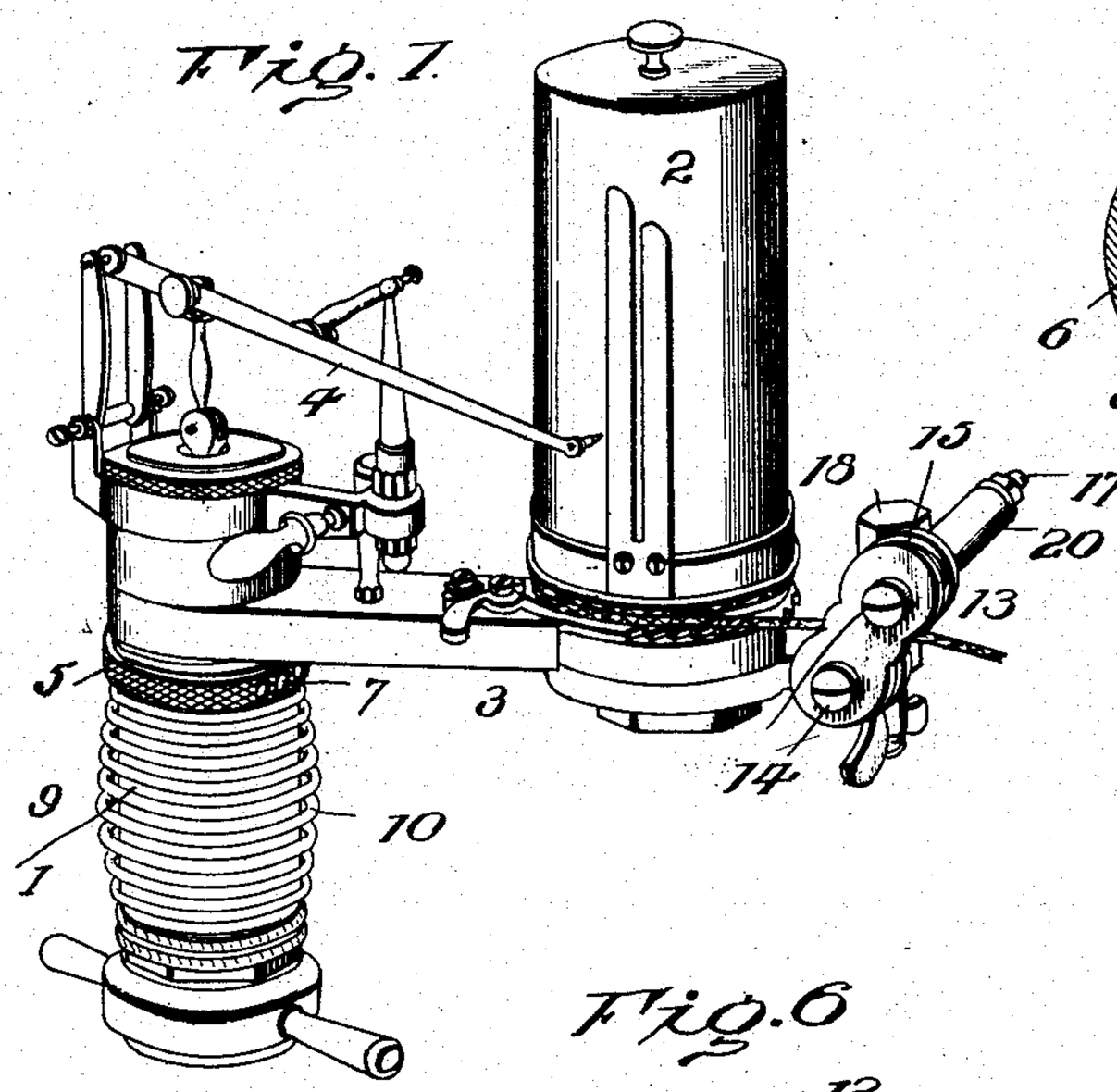


Fig. 2.

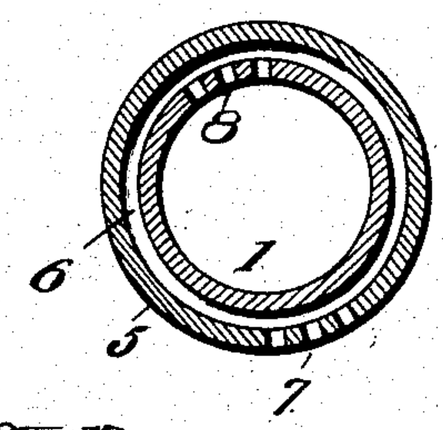


Fig. 4.

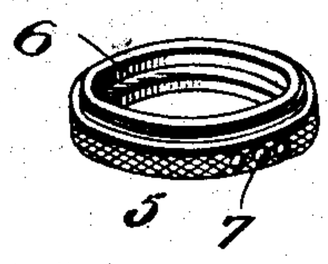


Fig. 6.

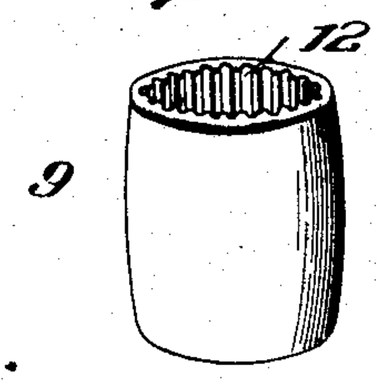


Fig. 7.

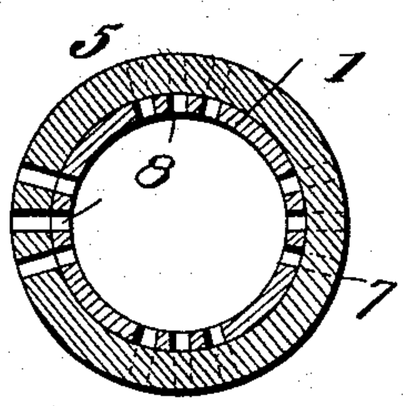


Fig. 3.

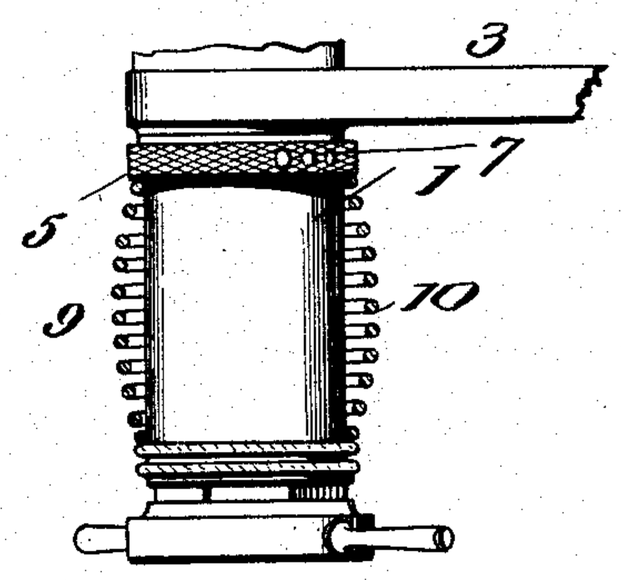
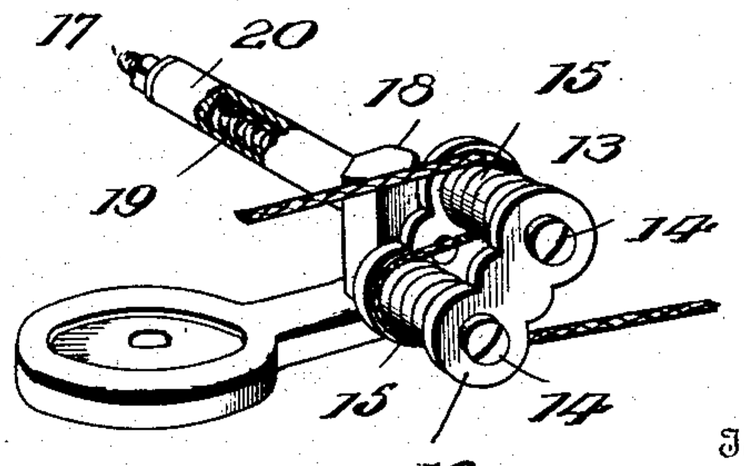


Fig. 5.



Witnesses

Inventor

By

Attorney

UNITED STATES PATENT OFFICE.

JAMES L. ROBERTSON, JR., OF NEW YORK, N. Y.

STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 677,275, dated June 25, 1901.

Application filed February 26, 1901. Serial No. 48,972. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. ROBERTSON, Jr., of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Engine Indicators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in steam-engine indicators.

The primary object of the invention is to provide an inclosure or guard for the indicator-cylinder whereby it may be easily handled either in changing position or in steadying the device while taking cards.

A further object is to provide improved means for taking up slack in the drum-cord, thereby avoiding damage consequent upon the cord falling from the drum and becoming entangled in the operative parts of the indicator.

A further object is to improve the construction, increase the efficiency, and enhance the durability of steam-engine indicators in general.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective showing an indicator equipped with my improvements. Fig. 2 is a horizontal cross-section of the cylinder with parts omitted. Fig. 3 is a side view of the cylinder with its guard in section. Fig. 4 is a perspective view of the exhaust-controller. Fig. 5 is a view of the take-up device detached, with parts broken away. Fig. 6 is a modification of the cylinder-guard. Fig. 7 shows in horizontal section modified means for controlling the exhaust.

Referring to the drawings, 1 designates the indicator-cylinder, 2 the card-drum, and 3 the supporting-arm for the latter.

Within the cylinder is the ordinary piston (not shown) for operating the indicator mechanism 4, the construction and operation of which may be after any preferred form.

5 is a ring encircling cylinder 1 at a point above the upward limit of movement of the piston, preferably just below the arm 3. It is shown as formed with an inner annular channel 6 and ports 7 opening therefrom. In that part of the cylinder surrounded by this ring are formed ports 8, corresponding to the ports 7, to allow of the escape of any steam that may be on top of the piston. The ring being formed with the channel may be turned axially, according to the direction in which it is desired the steam should escape, so as not to interfere with the operator. The channel within the ring may be dispensed with, in which event the holes in the ring may be placed coincident with any one of several sets of ports in the cylinder. (See Fig. 7.)

9 is a hand-guard surrounding the cylinder to permit the latter to be grasped either when change of position is required or it is necessary to steady the instrument while taking a card. This comprises an inclosure with intervening air-spaces which prevent the heat of the cylinder being transmitted to the guard. In Figs. 1 and 3 I have shown the guard as composed of a continuous wire 10, secured at its ends, but out of contact with the cylinder throughout the length thereof, leaving surrounding air-spaces, while in Fig. 6 the guard is shown in the form of a bulged sleeve of non-conducting material with inner longitudinal grooves 12, forming air-channels.

13 is a take-up device for preventing the cord from falling from the drum. Upon two shafts 14 are series of small loose metallic pulleys 15, so arranged that they can work in opposite directions, and from one side of the frame 16, in which these shafts are mounted, extends a shaft 17, supported by a bracket 18, held to the drum-supporting arm. This shaft is normally without tension; but a few turns of the frame 16 by hand gives sufficient tension to a spring 19, coiled around the shaft 17 and inclosed by sleeve 20, to serve to immediately take up any slack in the cord. This attachment acts both as a guide-pulley and a take-up, preventing the drum-cord from falling. It may be located at any desired point between the source of motion and the indicator-drum. Heretofore one of the greatest annoyances in indicator practice in using detent motion has been to prevent the slack cord (caused by the drum not revolving) from

dropping off the bottom and becoming entangled in other parts of the instrument, often resulting in breakage and great damage. The take-up attachment permits the use of detent motion without any danger from slack cord with or without any form of reducing motion.

From what has been said the advantages of my improvements will be at once apparent to those skilled in the art to which the invention appertains.

I claim as my invention—

1. In a steam-engine indicator, means whereby the instrument may be steadied in operation without burning the hand of the operator, comprising a guard surrounding the piston-cylinder and forming between itself and such cylinder spaces through which air may pass from end to end, as set forth.

2. In a steam-engine indicator, means whereby the instrument may be steadied in operation without burning the hand of the operator, comprising a hand-guard surrounding the piston-cylinder and projecting outwardly therefrom, forming between itself and such cylinder spaces through which the air may pass from end to end of the guard, as set forth.

3. A steam-engine indicator having a hand-guard surrounding its piston-cylinder composed of a continuous wire secured at its ends and coiled around, and projecting outwardly from, said cylinder, as set forth.

4. The take-up device herein described comprising two shafts between which the drum-cord is designed to be passed, and means acting on said shafts to bodily turn them in unison independently of the axial movements, as set forth.

5. The take-up device herein described comprising two shafts, a frame supporting the same, and a spring acting on said frame to turn it as against the pull of the cord, as set forth.

6. The combination with the card-drum of a steam-engine indicator and a cord for turning said drum, of a take-up device comprising two shafts having loose pulleys thereon, a frame supporting said shafts, a pivot-shaft for said frame, and a spring for turning said frame axially, said cord being caused to engage the pulleys of the two shafts, as set forth.

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

JAMES L. ROBERTSON, JR.

Witnesses:

S. V. V. HOFFMAN,

THOS. G. KEOGH.