(Model.)

# G. W. BROWN.

## STEAM ENGINE RECORDER.

No. 263,843. Patented Sept. 5, 1882.

Fig. 1

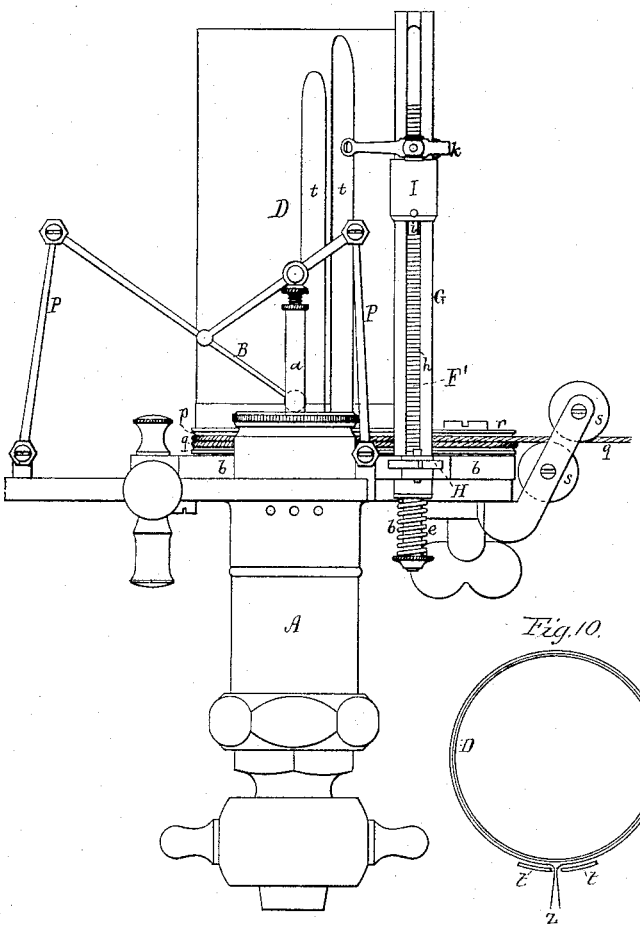


Fig. 2.

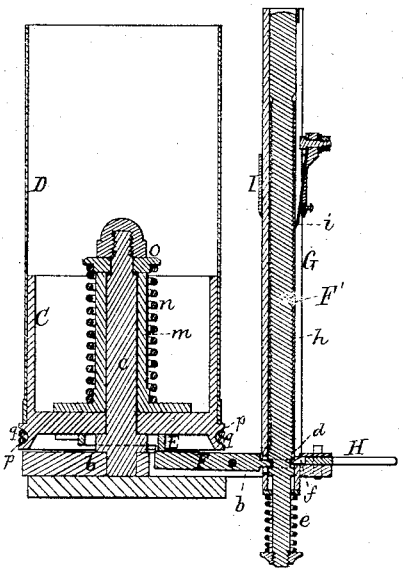


Fig. 10.

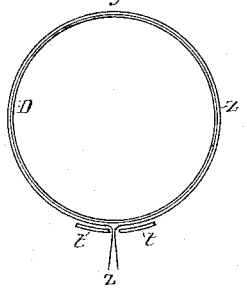


Fig. 4.

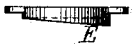


Fig. 5.

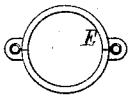


Fig. 3.

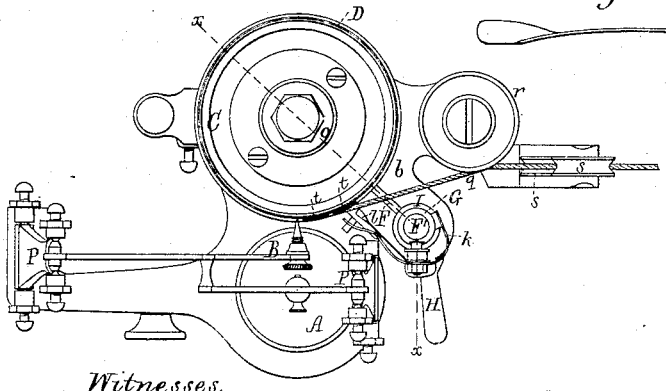


Fig. 8.

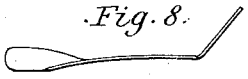

Fig. 6.

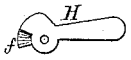


Fig. 7.

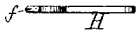


Fig. 9.

Witnesses.
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# UNITED STATES PATENT OFFICE.

GILMAN W. BROWN, OF WEST NEWBURY, ASSIGNOR TO THE CROSBY STEAM GAGE AND VALVE COMPANY, OF BOSTON, MASSACHUSETTS.

## STEAM-ENGINE RECORDER.

SPECIFICATION forming part of Letters Patent No. 263,843, dated September 5, 1882.

Application filed September 15, 1881. (Model.)

*To all whom it may concern:*

Be it known that I, GILMAN W. BROWN, of West Newbury, of the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Steam-Engine Indicators; and I do hereby declare the same to be described in the following specification and represented in the accompanying drawings, of which—

Figure 1 denotes an elevation of a steam-pressure indicator furnished with my invention, which is to determine the speed of the piston of the engine, or to register the number of its strokes, in any given period of time, and to do this on the paper on which the pressure may be or may have been registered. Fig. 2 is a transverse and vertical section taken through the speed-marking mechanism and the drum of the pressure-indicator on line *x x* of Fig. 3. Fig. 3 is a top view of the speed and pressure indicator. Fig. 4 is a side elevation, and Fig. 5 a top view, of the cam for actuating the lever of the speed-indicator. Fig. 6 is a top view, and Fig. 7 a side view, of the retaining-lever of the speed-indicator.

The nature of my invention is defined in the claims hereinafter set forth.

The steam-pressure indicator to which my invention is shown as applied is what is known as the "Crosby Indicator," it being to regulate the degrees of steam-pressure exerted on the piston of a steam-engine during its stroke. Such an indicator being fully described in the United States Patent No. 219,149, granted September 2, 1879, to George H. Crosby, it needs little, if any, explanation herein by me further than to state that in Figs. 1 and 3 of the drawings, A denotes its steam-cylinder; *a*, the piston-rod thereof; B, its marker-lever; C, the reciprocating drum; D, its paper carrier or sleeve, and P the "parallel motion."

To the base or bottom of the drum C there is fixed an annular cam, E, which is arranged over a lever, F, placed within and fulcrumed to the plate *b*, that supports the drum-sustaining spindle *c*. At its outer end the lever enters an annular groove, *d*, in a vertical screw or rack, F′, arranged within a stationary tubular and slotted standard, G. A spiral spring, *e*, suitably applied to the rack and the support-plate *b*, serves to depress the said rack, such rack being raised by the action of the lever F and the cam E while the latter is in the act of revolving one way with the drum C. A retaining-lever, H, provided with an inclined projection or cam, *f*, and arranged within and pivoted to the plate *b*, serves, when the said cam or projection is forced into the annular groove *d* in the rack, to elevate the rack, so as to move the lever F into and retain it in a position in which it will not be acted on or moved by the cam while the drum may be in revolution.

The standard G has in its side a long slot, *h*, through which a spring-pawl, *i*, projecting from a sleeve, I, extends to the rack, the sleeve being adapted to the standard so as to slide therein with sufficient friction to prevent such slide from being moved downward on the standard during a depression of the rack and slipping it (the latter) on the pawl; or for this purpose there may be fixed to the sleeve a friction spring or brake, *k*, to bear against the side of the standard. There projects from the sleeve a marker, *l*, which may be a stylus or pencil or a suitable device for marking or indenting paper when moved against the point or inner end of such marker. A top view of it on an enlarged scale is given in Fig. 8 and a side view in Fig. 9.

The drum C turns freely on its sustaining-spindle *c*, and there is within such drum, and extending upward from its bottom, a tubular spindle, *m*, that turns on the spindle *c*. About such a tubular spindle is a spiral spring, *n*, which, attached to the drum and to a head, *o*, fixed on the spindle, serves to effect the return rotary movement of the drum. The drum at its lower part has a groove, *p*, in and around it. To the drum and in this groove there is fixed a cord, *q*, which, after having been carried in such groove around the drum one or more times, is led partially about a wheel, *r*, and thence between guide-wheels *s s*, such cord, when the indicator is in use, being attached to the cross-head of the piston or some other proper movable part of the steam-engine. Like other drums of the kind, it and its supporting device are to be provided with

stops to insure of the drum being always arrested in one position on being revolved by its retracting-spring.

The paper-carrier, as in steam-pressure indicators, has two springs, *t t*, to hold the sheet upon it. After winding the said sheet about the carrier once and inserting it between the periphery of the carrier and the sheet-supporting springs thereof, one or both ends of the sheet should be extended outward a short distance from between the said two springs—that is, sufficiently for the part so projecting to strike the marker *l* in each advance rotary movement of the drum and carrier, all being as represented in Fig. 10, which is a top view of the paper-carrier, showing the manner of applying the paper thereto, the Z indicating the sheet of paper.

From the above it will be seen that as the carrier will be partially revolved during each stroke of the piston of the steam-engine there will be imparted to the rack F′, by means of the cam E, lever F, and spring *e*, a short reciprocating vertical motion, whereby the sleeve carrying the marker will, through the action of its pawl on the rack, be intermittently moved upward. Each movement takes place at each stroke of the engine-piston. As the marker, at the termination of each rise of it, will be struck by the paper, there will be made in the latter a mark, the number of such marks in any given time denoting the number of strokes the engine-piston may have made during such period. As represented, the part of the marker to be struck by the paper is made somewhat like the blade of a knife, but with a blunt edge. On the paper being moved around smartly against such edge the paper will be creased or indented by such edge. If a lead-pencil be substituted for the said marker, a pencil-mark will be made by it on the paper on its striking the point of the pencil. Thus it will be observed that with the speed-marking apparatus adapted as explained to a steam-engine indicator it will have not only a means of registering the varying pressure of the steam during a stroke of the piston of an engine, but means for registering the number of strokes made by the piston during a given period—as a minute, for example.

It will be evident that the cylinder-piston marker and parallel motion of the pressure-indicator may be dispensed with, in which case the speed-indicator or registering apparatus would consist of the rotary paper-carrier and its operative mechanism; but there is a new result or advantage gained by using with one paper-carrier two mechanisms, as described, for marking upon it, as in such case there is saved one carrier and its operative mechanism.

I do not claim, in combination with a steam-engine pressure-registering indicator, a marking-lever operated by a clock so as to mark or to indent the register-sheet of such indicator at the termination of each hour of the clock, such being as shown and described in the United States Patent No. 77,584, my invention or improvement being for a different purpose and to operate in a different manner and by means essentially different from a clock or the hour-wheel thereof.

What I claim as my invention is as follows, viz:

1. The combination of the rotary paper-carrier, essentially as and provided with mechanism for operating it as described, with a marker and means or mechanism, substantially as set forth, for imparting to such marker in a given period upward movements corresponding in number to that of the strokes of a steam engine piston during such period, in order that marks indicative of the number of such strokes may be made by the marker on a sheet of paper, when arranged on and moved by the carrier in manner essentially as explained.

2. The combination of a steam-pressure indicator, substantially as described, with a marker or means or mechanism, essentially as set forth, for imparting to such marker in a given period upward movements corresponding in number to that of the strokes of a steam-engine piston during such period, in order that marks indicative of such number may be made by the marker on a sheet of paper, when arranged on and moved by the steam-pressure indicator-carrier in manner as explained, the said carrier in such combination being capable of being used, as specified, for registering the varying pressure of the steam during a stroke of a steam-engine piston and for registering the speed of the engine or number of strokes of its piston in a given time.

3. The combination for operating the marker of the steam-indicator, such combination consisting of the cam E, lever F, rack F′, tubular and slotted standard G, spring *e*, sleeve I, pawl *i*, and friction-brake *k*, arranged and applied substantially as described.

4. The combination of the retaining-lever H and its cam *f* with the plate *b*, and with the cam E, lever F, rack F′, standard G, spring *e*, sleeve I, pawl *i*, and friction-brake *k*, arranged and applied substantially as set forth.

GILMAN W. BROWN.

Witnesses:
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E. B. PRATT.