E. BROWN.

Speed-Measure.

No. 168,870. Patented Oct. 19, 1875.

Fig. 3

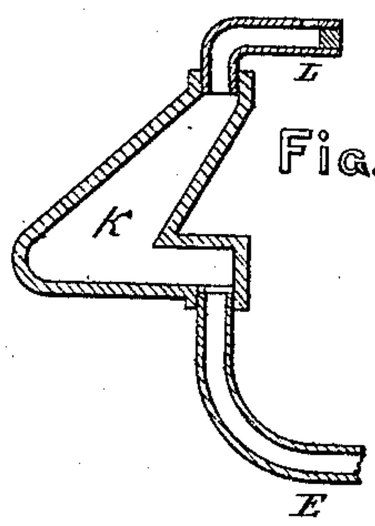


Fig. 1

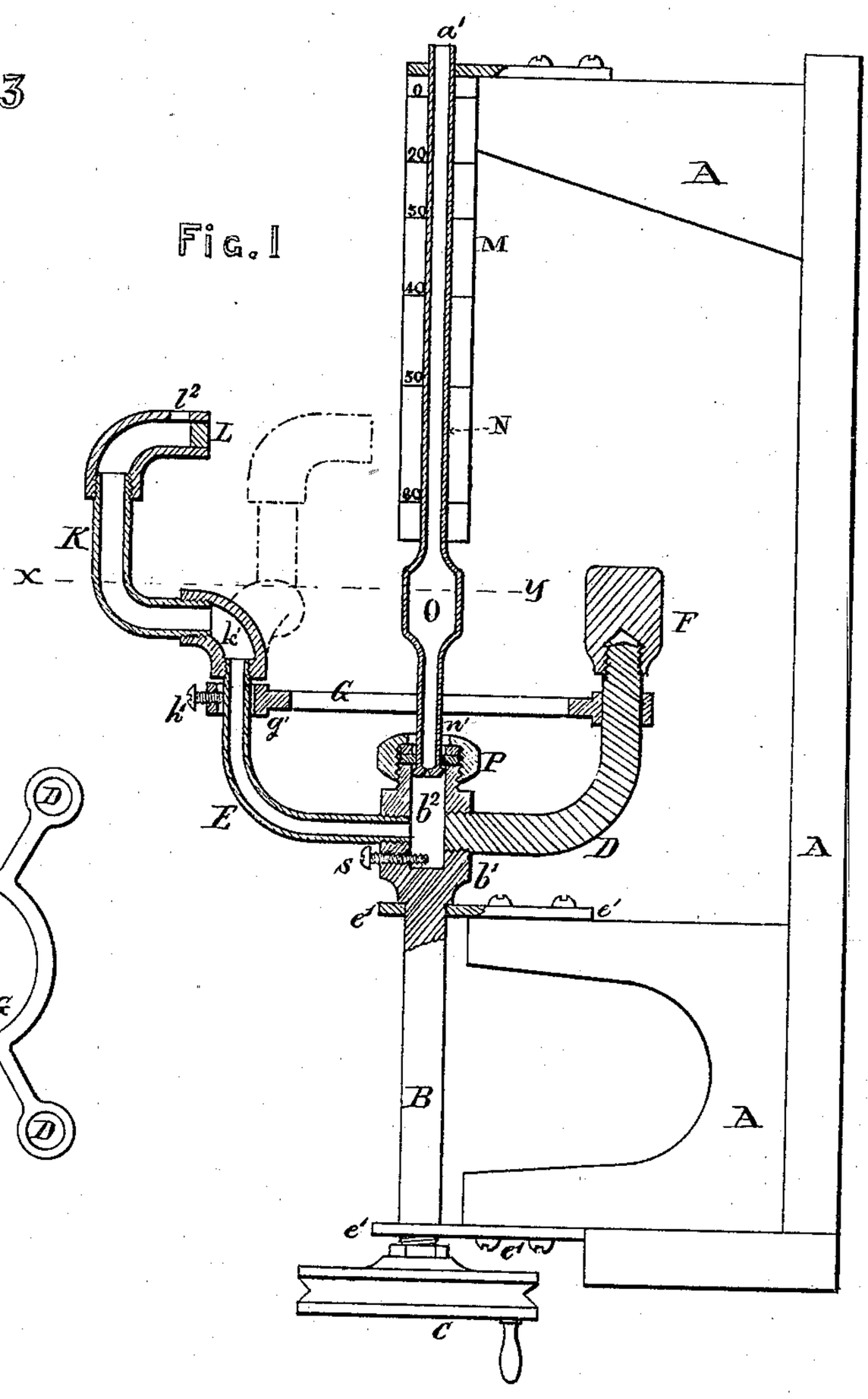
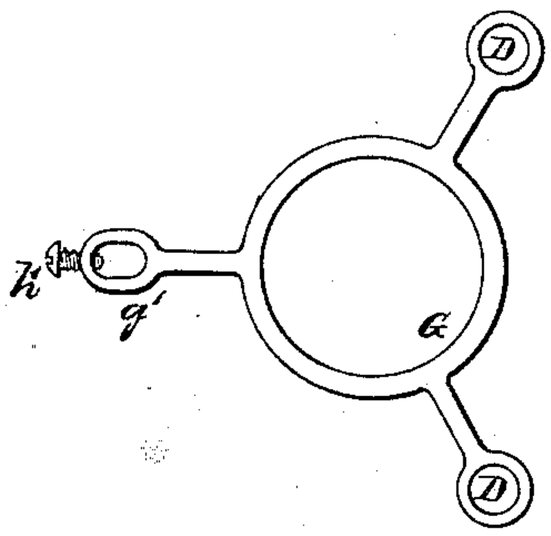


Fig. 2



Witnesses { John F. Grant.
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UNITED STATES PATENT OFFICE.

EDWARD BROWN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SPEED-MEASURES.

Specification forming part of Letters Patent No. **168,870**, dated October 19, 1875; application filed April 16, 1875.

To all whom it may concern:

Be it known that I, EDWARD BROWN, of 311 Walnut street, Philadelphia, Pennsylvania, have invented certain Improvements in Revolution-Indicators, of which the following is a specification:

This instrument depends for its action on the centrifugal force of a body of mercury contained in a cup communicating by a revolving arm with a central glass indicating-tube. The rise and fall of the liquid in the glass tube indicates on a scale-plate behind the turns made per minute by the steam-engine.

The improvements herein described consist of a mode of adjusting the instrument by making the mercury-cup to turn eccentrically upon the revolving arm, whereby the radius of the cup, or its distance from the central glass tube, may be materially changed. In addition to this I apply a strap to some unyielding part of the machine, and pass it over the pipe connecting the mercury-cup with the glass tube. There is an adjusting-screw in the end of this strap, by which the instrument is finally adjusted to perfect accuracy. To prevent the mercury flying out of the cup by a sudden acceleration of speed I secure to the upper end of the mercury-cup a bent pipe, which can be turned around the top of the cup, so as always to point toward the central glass tube. Also, in the combination of the rotating mercury arm and cup with a central glass indicating-tube, having an enlarged chamber at the mercury-level. The upper part of the tube above the chamber contains a colored liquid lighter than mercury. A screw is placed at the lowest part of the mercury-chamber, which answers as an adjusting-screw, to compensate for the evaporation of the colored liquid, and also as a valve to draw off the mercury.

Referring to the drawings, Figure 1 is an elevation of the machine, partly in section. Fig. 2 is a plan of a brace, being designed for an instrument with three arms. Fig. 3 is a modified form of mercury-cup.

A is the frame carrying the machine. It branches into a fork at the lower end, with bearings e', in which the upright spindle B turns. The upper end of the spindle is enlarged at b^1, and has a central hole, b^2, drilled in it. Into this head is screwed a small pipe, E, and a solid arm, D. K is the mercury-cup, secured to the pipe E by a quarter-turn, k'. This places the center of the mercury-cup eccentric to the end of the pipe E, and permits a change in the distance of the mercury-cup from the center of the instrument by turning it around to the position shown by the dotted lines. To the top of the mercury-cup is screwed a quarter-bend, L, having its upper leg pointing toward the central glass tube N, which prevents the mercury flying out by a sudden spurt of the engine, and at the same time permits free access of air to the mercury, and avoids the elongation of the mercury-cup K. In adjusting the instrument, by turning the mercury-cup, this bend L must always be pointed toward the glass tube. Into the head b^1, on the opposite side to E, is screwed a solid arm, D, which carries a balance-weight, F. A brace or strap, G, fits over the arm D at one end, and over the pipe E at the other. The boss g', which passes over pipe E, has an elongated hole in it, so that the mercury-cup may, by means of the adjusting-screw h', be moved with great precision nearer to or farther from the glass tube. By making the brace G with three arms, as in Fig. 2, and two balance-arms, D, the arms may be rigidly braced, so as not to come unscrewed. The glass tube N is secured in the head b^1 by a stuffing-box, P, and turns with it. The upper end turns in a bearing on the end of the arm A. Near the bottom of the tube is an enlargement, O, the top of which is on a level with the bottom of the mercury-cup K. By making the mercury-cup and the enlargement O the same size, and the bore of the glass tube one-sixth or less of the diameter of the enlargement O, a small rise and fall of the mercury, corresponding to a low speed of rotation, will give a great motion to the fluid in the small part of the indicating-tube, and by this combination a minimum quantity of mercury, which is an expensive article, is required to operate it. The glass indicating-tube is contracted below the enlargement O to a small neck, n', which passes through the stuffing-box P. This plan affords observation of the level of the mercury in the enlargement O, and obviates the danger of drawing the colored liquid from the tube by a sudden spurt of the engine. A screw, S, passes

into the chamber b^2, by turning which the liquid in the glass tube may be adjusted to O on the scale. This is also used to draw off the mercury.

When the interior core of the mercury-cup K is made parallel and perpendicular, the figures on the scale-plate are very close together in the low numbers. This may be partially obviated by making the mercury-cup larger at its base, or with its top nearer to the glass tube, or by combining both features, as shown in Fig. 3.

To operate the instrument it is first fixed upright to a post or wall, and mercury poured into the hole l^2 until it stands on a level with the line X Y. The exact level of the mercury is easily seen through the glass. Colored water, or a mixture of water and glycerine, is poured into the top of the glass tube at a' until it stands at O. The instrument being then driven at about the speed calculated, the mercury-cup K is turned on its axis until the indicating liquid in the central glass points to the correct speed per minute, or nearly so. The instrument is finally adjusted to perfect accuracy by the screw h'.

This construction of the instrument obviates the difficulty heretofore experienced of speeding the instrument accurately to the scale after it has been attached to the steam-engine. Any driving-pulleys on hand may be used which will give an approximate speed within ten or twenty per cent., and then the instrument is adjusted as previously described.

I claim—

1. In a revolution-indicator, the revolving mercury-cup K, turning eccentrically upon the connecting-arm E, for adjusting the instrument to the scale, substantially as described.

2. In a revolution-indicator, the combination of the revolving mercury-cup K with the turn L, pointing radially to the central glass tube.

3. In a revolution-indicator, the combination of the revolving mercury-cup K, the connecting-arm E, the strap G, and adjusting-screw h', substantially as herein described.

4. In a revolution-indicator, the combination of the revolving mercury-cup K, the connecting-arm E, and the enlargement O of the central glass indicating-tube, substantially as herein described.

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Witnesses:
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