No. 654,341. Patented July 24, 1900.

W. H. & F. B. BRISTOL.

DAMPING DEVICE FOR RECORDING INSTRUMENTS.

(Application filed May 24, 1900.)

(No Model.)

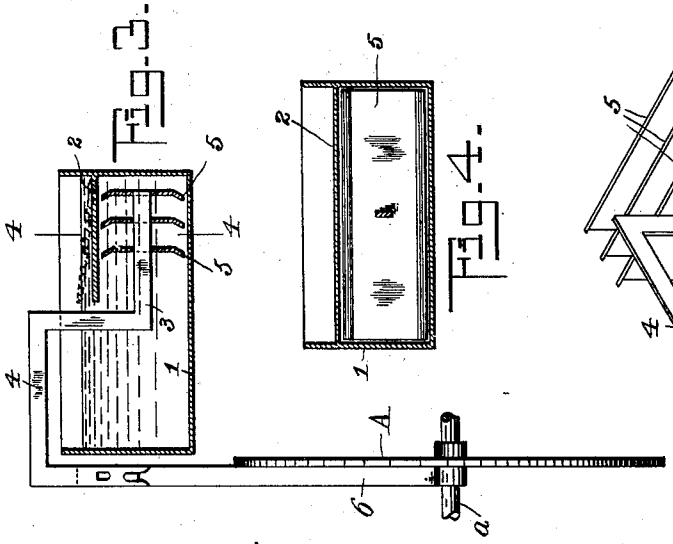


Fig. 3.

Fig. 4.

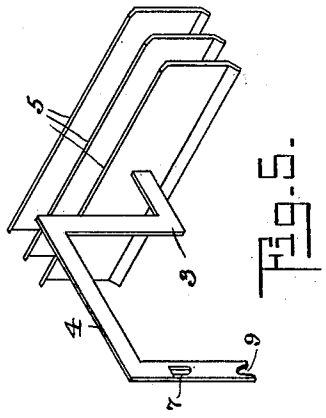


Fig. 5.

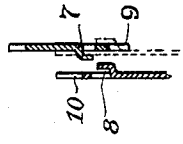


Fig. 6.

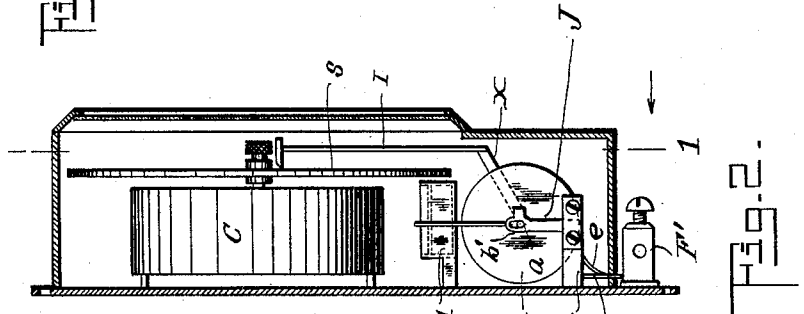


Fig. 2.

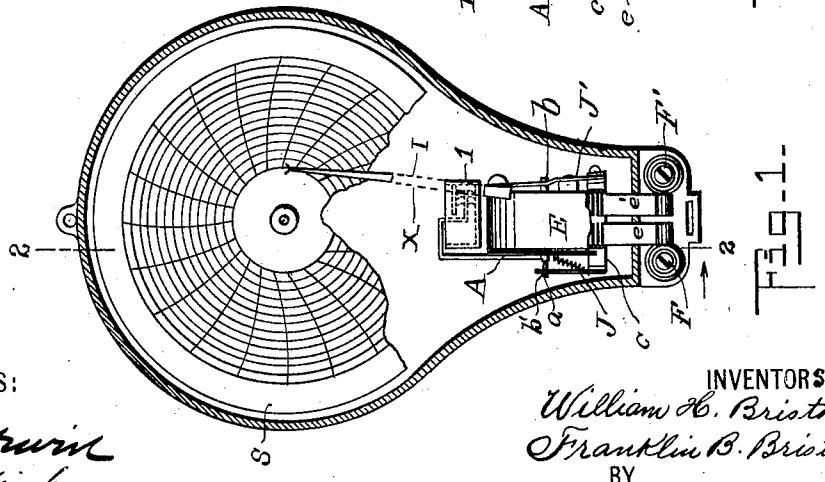


Fig. 1.

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DAMPING DEVICE FOR RECORDING INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 654,341, dated July 24, 1900.

Application filed May 24, 1900. Serial No. 17,821. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BRISTOL, residing at Hoboken, in the county of Hudson and State of New Jersey, and FRANKLIN B. BRISTOL, residing at Naugatuck, in the county of New Haven and State of Connecticut, citizens of the United States, have invented certain new and useful Improvements in Damping Devices for Recording Instruments, of which the following is a specification.

Our invention has reference to improvements in damping devices for indicating and recording instruments, and particularly for voltmeters, ampere-meters, wattmeters, and similar instruments for indicating and recording an electric current for the work done thereby.

It is well known that in electrical instruments the current is either on in full or entirely off. Consequently the movements of the parts operated by the current when connection is made or broken are so sudden that the inertia of the parts will carry the indicating device beyond its true position.

The object of our present invention is to overcome the sudden movements of the parts, thereby causing the indicating-arm to have a "dead-beat" movement.

To this end our invention consists, essentially, in a damping device participating in the movements of the indicating or recording arm and connected with the armature or other part of the indicating or recording device moving in parallel planes or lines, said damping device being composed of a horizontally-placed box provided with a horizontal shelf and filled with liquid above the level of said shelf and a dasher having one or more vanes placed within said box between the shelf and its bottom. The vanes, therefore, move in parallel planes through the liquid, and thus act as a retarding means against sudden movement. Heretofore vanes having a combined linear and angular movement through a wide range have been employed; but the same are very liable to cause splashing of the liquid out of the box.

The nature of our invention will best be understood when described in connection with the accompanying drawings, in which Figure 1 represents a sectional elevation on the line 1 1, Fig. 2, of an ampere-meter embodying our damping device. Fig. 2 is a vertical cross-section on the line 2 2, Fig. 1. Fig. 3 is an enlarged sectional elevation of the damping device. Fig. 4 is a vertical section on the line 4 4, Fig. 3. Fig. 5 is a perspective view of the dasher. Fig. 6 is a sectional view of the detachable dasher connection.

Similar letters and numerals of reference designate corresponding parts throughout the several views of the drawings.

In the present example we have shown our improved damping device applied to an ampere-meter of the construction illustrated in the patent to William H. Bristol, No. 533,270, dated January 29, 1895; but of course it could be equally well applied to any other recording or indicating instrument.

Referring to the drawings, the letter E designates a coil or solenoid secured to the back of the casing, and A is a movable armature arranged in line with the coil E and moving in parallel planes toward and from the coil or solenoid. The armature A is secured to a horizontal non-magnetic shaft *a*, passing through the coil or solenoid E and having at opposite ends V-shaped notches *b b'*. The notches rest on knife-edges formed in flexible supports J J', secured to a suitable bracket *c*, affixed to the back of the casing. The coil or solenoid E has its terminals *e e'* connected to binding-posts F F', secured to the casing. To an extension of the flexible support J' is secured a pointer, recording-arm, or like device I, arranged adjacent to a scale or chart S in the usual manner and having a marker bearing on the chart S, to which latter a rotary motion is imparted by a suitable clock-movement C. It will be readily seen that when the armature A moves toward the coil or solenoid E the flexible support J' is deflected about its point of attachment, and consequently the recording-arm I, which practically forms a prolongation of said support, participates in said movement about the point of attachment of the support as a center and moves through a greatly-increased arc.

The construction so far described is prac-

tically that of the prior patent, No. 533,270, previously referred to, and we make no claim to the same, as our invention relates solely to the damping device shown in connection with this construction. The damping device illustrated in said prior patent is connected with and operated by the angularly-moving support J, and consequently the vane moves through a wide range and also angularly. In our present construction the vane or vanes are connected with and operated from the armature A, which, as before stated, moves toward and from the coil or solenoid E in parallel planes, and consequently the motion of the vane is not multiplied, and the vane moves also in parallel planes.

The damping device illustrated consists of a box 1, placed horizontally and secured to the back of the casing in any suitable manner. Said box, Figs. 3 and 4, which is preferably made rectangular in form, is provided with a shelf 2, located a short distance below its top and extending completely across the box from its front to its back and partially across the box end to end, leaving a space for the insertion of the dasher 3 and for the communication of liquid, with which the box is filled above the shelf. This liquid may be glycerin or other liquid usually employed for such purposes. The dasher 3 (see Figs. 3, 4, and 5) consists of a rod 4, suitably bent to clear the box and provided at its inner end with one or more vanes 5, arranged transversely thereto and formed of thin plates of metal of such dimensions that the edges of the vanes quite closely approach the bottom and sides of the box 1 and the bottom of the shelf 2. The outer end of the dasher is connected to an arm 6, rigidly secured to the armature A of the indicating or recording device. Of course the outer end of the dasher could be secured directly to the horizontally-moving armature-shaft *a* instead of to the armature A, or the arm 6 could be connected to the said shaft. The connection of the dasher-rod with the arm 6 is made detachable for the purpose of permitting the insertion of the dasher into the box and its removal therefrom. The connection shown in the present instance, Figs. 5 and 6, is formed by striking up tongues 7 and 8 on the dasher-rod 4 and the arm 6 from opposite sides and forming the ends of the two parts with sockets 9 and 10, so that when the two ends are slid together the tongues enter the slots and overlap the ends, thus securely holding the parts together.

It will be readily understood that when the armature A moves toward the coil or solenoid E through its short range the vanes 5 of the dasher are similarly and correspondingly moved, and consequently the heavy liquid is forced to pass between the edges of the vanes and the contiguous walls of the box 1 and shelf 2, thus exerting a retarding action on the movement of the armature in a most uniform and effective manner, but not influencing the ultimate positions of the indicating or recording arm and its operating parts when the current is switched on or off.

Of course it is to be understood that one vane would suffice; but a plurality of vanes is preferable, for the reason that the retarding effect is increased by the friction of the moving liquid at the narrow passages formed by the vanes.

While we have hereinbefore described the shelf 2 as being horizontally placed within the box 1, thus obtaining a chamber of uniform vertical cross-section throughout, it may be desirable to obtain a different damping effect at different points in the path of the indicating or recording arm I. To obtain such an effect, the shelf 2 may be inclined as shown in dotted lines in Fig. 3 or in the opposite direction, or it may be curved in any desired form to produce, with the box, a chamber of varying vertical cross-section. The chamber consequently offers varying resistances to the movements of the vane or vanes. The same effect could be obtained by changing the vertical cross-section of the box by inclining or curving the sides or bottom thereof.

What we claim as new is—

1. In an indicating or recording instrument, the combination with an operative part moving in parallel planes, of a damping device comprising a box horizontally placed and having a shelf therein, a dasher provided with one or more vanes placed between the shelf and the walls of the box to form narrow passages with the box and shelf, and a connection between the operative part and the dasher, substantially as described.

2. In an electrical indicating or recording instrument, the combination with a coil or solenoid, an armature arranged adjacent to the coil or solenoid and adapted to move in parallel planes, a box horizontally placed and having a shelf therein, a dasher provided with one or more vanes placed between the shelf and the walls of the box to form narrow passages with the box and shelf, and a connection between the armature and the dasher, substantially as described.

3. The damping device herein described consisting in a box horizontally placed and having a shelf therein, and a dasher provided with one or more vanes placed between the shelf and the walls of the box to form narrow passages with the box and shelf.

4. In an indicating or recording instrument, the combination with an operative part moving in parallel planes, of a damping device comprising a box horizontally placed and having a shelf therein, a dasher provided with one or more vanes placed between the shelf and the walls of the box to form narrow passages with the box and shelf, and a detachable connection between the operative part and the dasher, substantially as described.

5. The damping device herein described

consisting in a box horizontally placed and having a shelf therein, forming with said box a chamber of varying vertical cross-section, and a dasher placed in said chamber and provided with one or more vanes forming passages with the box and shelf.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

WILLIAM H. BRISTOL.
FRANKLIN B. BRISTOL.

Witnesses:
CHAS. W. BANBY,
EDGAR H. BRISTOL.