

April 13, 1926.

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J. G. PAULIN

INSTRUMENT FOR MEASURING PRESSURES AND FORCES

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FIG. 1.

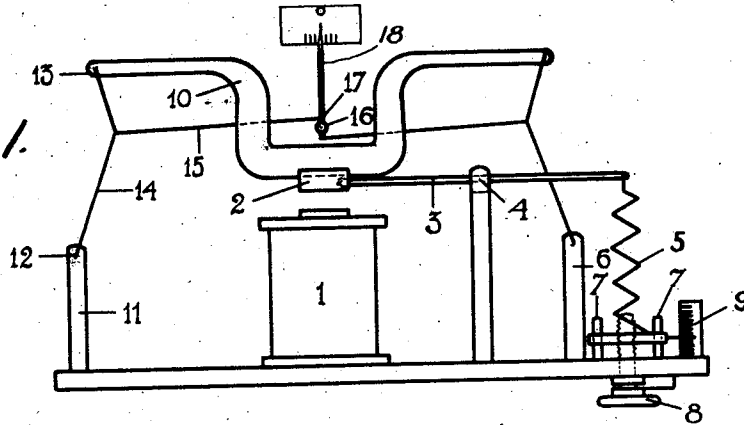


FIG. 3.

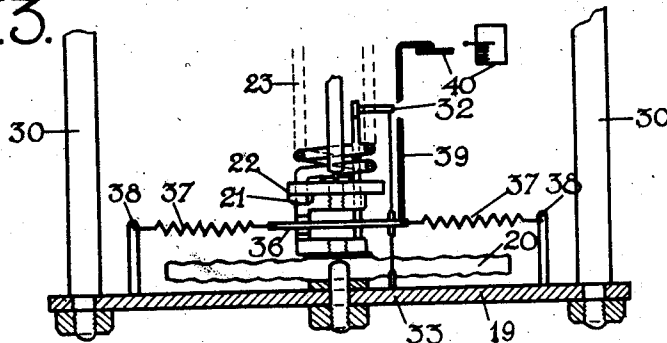
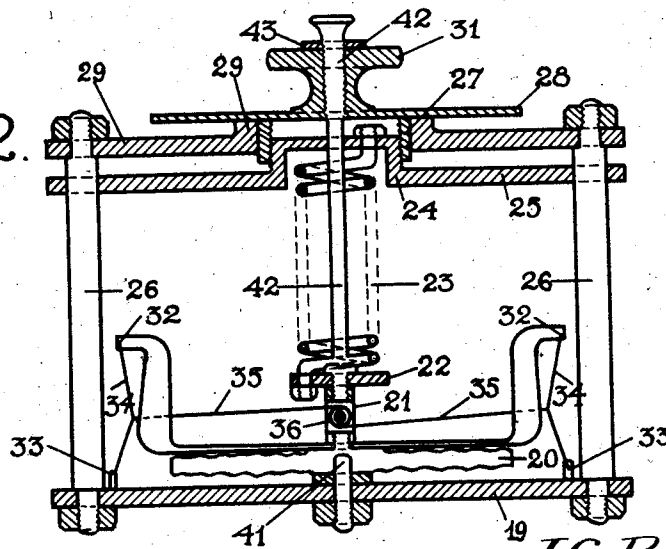


FIG. 2.



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UNITED STATES PATENT OFFICE.

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INSTRUMENT FOR MEASURING PRESSURES AND FORCES.

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To all whom it may concern:

Be it known that I, JOSUA GABRIEL PAULIN, a subject of the King of Sweden, and resident of 31 Hollandaregatan, Stockholm; Sweden, have invented certain new and useful Improvements in Instruments for Measuring Pressures and Forces, of which the following is a specification.

This invention relates to instruments for measuring pressures, forces, electric currents, etc., in which the movable organ taking up the load is brought back to its initial position under the action of springs, and the invention more especially is characterized by the movable organ being connected with an angular-bent strap or string connected with the stand of the instrument and by a second strap or string running from the knee of the first-named strap or string to a spring-actuated shaft with which is connected an index.

The invention is illustrated in the annexed drawings, in which Fig. 1 shows a galvanometer, amperemeter, or voltmeter on the electromagnetic principle. Figs. 2 and 3 show a barometer.

In Fig. 1, an electric current to be measured passes through a solenoid or electromagnet 1. An armature 2 is fixed to a lever 3 fulcrumed at the point 4. On the end of the lever 3 acts a spring 5, the other end of which is fastened to the nut 6 guided by the pins 7 and acted upon by a screw 8, by which the tension of the spring may be regulated. This tension can be directly or indirectly read on the scale 9.

The movements of the armature may be observed by means of an arm or index fixed direct to the lever 3 and moving over a scale, which may, for instance, be provided with a zero-point in its center. The reading is obtained by bracing or slackening the spring 5 by means of the screw 8 until the index points to zero. The tension of the spring, as read on the scale 9, is a measure of the intensity of the current passing through the solenoid 1.

It is, however, important that the transmission of the movement of the movable member to an index be brought about in the simplest and most frictionless way. According to the present invention this may be done in the following manner: From a point firmly connected with the said movable member to a point immovably connected with the fixed stand of the instrument there

is stretched a flexible band, strap, or string, from the middle of which is stretched another band or string, the other end of which is fastened to a point firmly connected with the shaft of the index, the first-named band or string being thus bent in its middle into a knee, preferably in the form of an obtuse angle.

In Fig. 1 an arrangement is shown for indicating the movements of the armature of a galvanometer. An arm 10 is firmly connected with the armature 2. The pillar 11 is fixed to the base-plate of the instrument. From the point 13 on the arm 10 to the point 12 on the pillar 11 is stretched a flexible band or string 14. From the middle of this band or string is stretched another band or string 15, whose other end is fastened to the point 17 on the index shaft 16. A second system of bands or strings may, of course, be arranged in symmetry with the former one, as shown in the figure. This latter system tends to turn the index shaft in the same direction as the former system under the action of the movements of the armature. The bands or strings are being stretched by elastic force acting clockwise on the index shaft. This latter can be mounted, and the elastic force acting on the bands or strings applied, in a known manner. It is, however, preferable to suspend the index shaft in the manner described below with reference to Figs. 2 and 3.

The mode of operation of the instrument is as follows:—

If an electric current passes through the electro-magnet 1, the armature 2 is attracted and consequently the index 18 turns to the right. By means of the screw 8 the spring 5 is stretched until the index points to zero. If properly graduated, the scale can indicate the strength or tension of the current.

Figs. 2 and 3 illustrate the application of the invention on the construction of a barometer. The instrument is placed on a base-plate 19. 20 is an ordinary evacuated diaphragm (membrane) box, 21 a clamp screwed on to the upper side of the box 20 and to the disc 22. The coil 23 is fastened to the disc 22 and to the screw-threaded ring 24, which has two projecting arms 25 provided at their ends with apertures fitting to cylindrical rods 26 acting as guides, when the ring 24 is being raised or lowered. A nut 27 for the threaded ring 24 is fixed to the disc 28, which is supported by a ring

28 resting on, and fastened to, the pillars 26 and 30.

If the disc 28 is turned by means of the button 31, the ring 24 can be raised or lowered and the coil 23 thus tightened or slackened. The movements of the diaphragm are indicated as above set forth. Between the two soldering-points 32 on the clamp 21 and the points 33 on the stand 10 are stretched the metal springs 34. The two strings 35 are soldered to symmetrically situated points on the shaft 36, which passes through a hole in the clamp 21 and may be journalled in a known manner, but 15 it is preferably connected at its ends with coil-springs 37 connected with the stand 38. The index 39 is fixed to the shaft 33 and moving over the scale 40. The movements of the diaphragm are limited by a pair of stop members, the pin 41 and the screw 42, which latter is secured to the button 31 by means of the nut 43. The disc 28 may be provided with a graduation in millimeters of mercury. A fixed mark may be 25 used as index on the ring 29.

The above described mode of suspending the index shaft 36 on two coil-springs, instead of journalling it in the known manner, may also be applied to instruments, which 30 are not constructed on the "zero-measuring" principle, but in which an index indicating the movements of the movable member shows the pressure, the intensity of current, etc., direct on a scale.

35 Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

40 1. An instrument for measuring pressures, forces, electric currents et cetera, comprising an index, a shaft carrying the index, a movable force receiving member, spring means connected with said member and counteracting the said forces, a knee-bent

flexible member having one end thereof fixed to the movable member and the other 45 end fixed to the frame of the instrument, a connection extending from the flexible member to the said index carrying shaft for the purpose of transmitting the movements of the said movable member to the index shaft. 50

2. An instrument for measuring pressures, forces, electric currents et cetera, comprising an index, a shaft carrying the index, a movable force receiving member, spring means connected with said member and 55 counteracting the said forces, adjustable means associated with said spring means for retaining the movable member in zero position, a knee-bent flexible member having one end thereof fixed to the movable 60 member, and the other end fixed to the frame of the instrument, a connection extending from the flexible member to the said index carrying shaft for the purpose of transmitting movements of the said movable mem- 65 ber to the index shaft.

3. An instrument for measuring fluid pressures, comprising an index, a shaft carrying the index, a diaphragm device exposed to the fluid pressure, spring means 70 connected with said diaphragm device and counteracting the fluid pressure, adjusting means cooperating with the spring means for retaining the diaphragm in zero position, a knee-bent flexible member having 75 the one end thereof fixed to the movable member and the other end fixed to the frame of the instrument, a connection extending from the flexible member to the said index carrying shaft for the purpose of transmitting the movements of the said movable member to the index shaft. 80

In witness whereof I have hereunto set my hand.

JOSUA GABRIEL PAULIN.