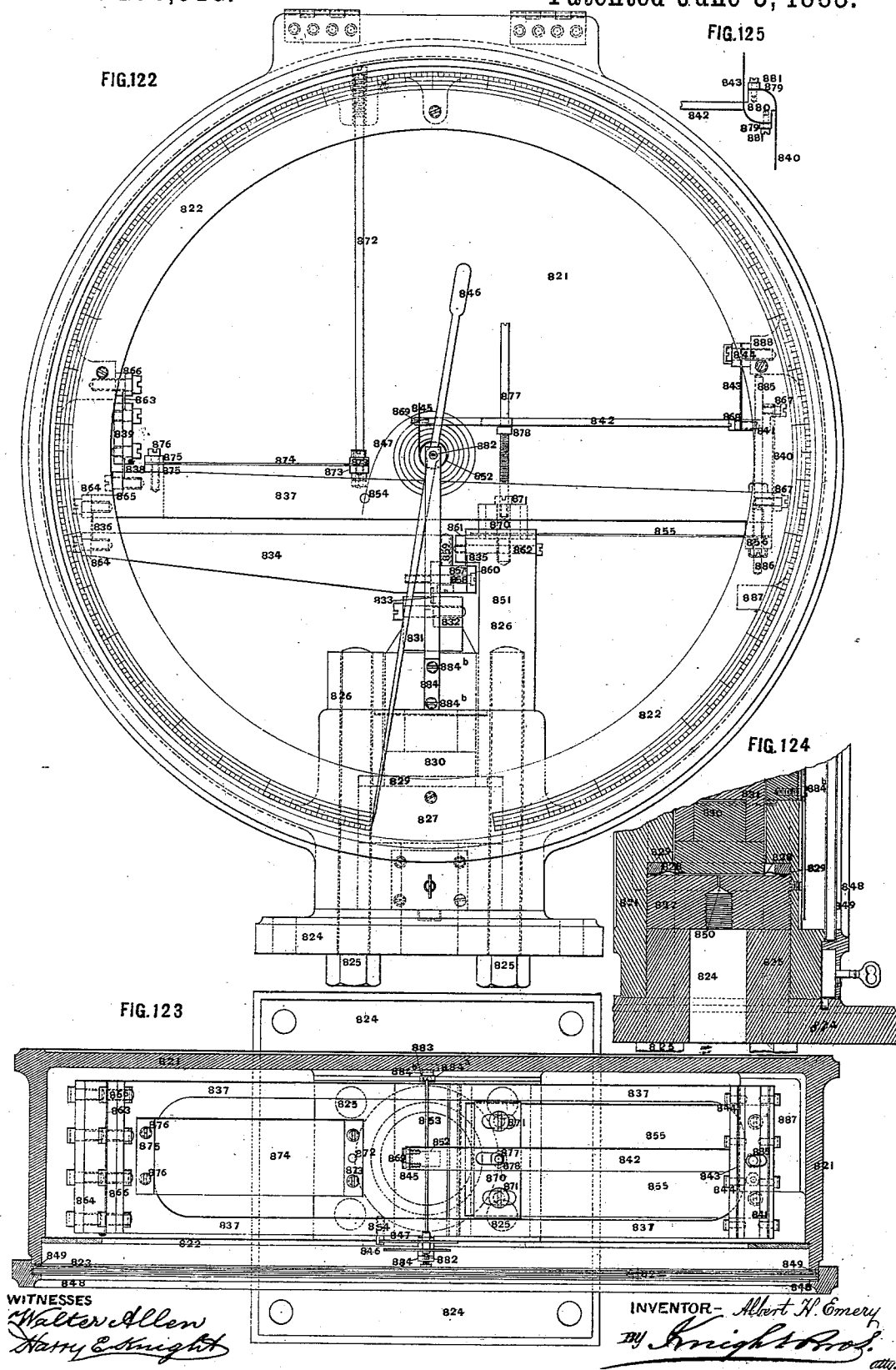


(No Model.)

A. H. EMERY.
PRESSURE GAGE.

No. 278,910.

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UNITED STATES PATENT OFFICE.

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PRESSURE-GAGE.

SPECIFICATION forming part of Letters Patent No. 278,910, dated June 5, 1883.

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To all whom it may concern:

Be it known that I, ALBERT H. EMERY, of the city, county, and State of New York, have invented certain new and useful Improvements in Pressure or Vacuum Gages, of which the following is a specification.

This gage is constructed with a pressure-chamber permanently attached to a chamber-base which is removable from the base of the gage and from the pressure-column or a part thereof. The column may be formed in two parts, the lower being attached to the pressure-chamber diaphragm. The removable chamber is tightly clamped between the casing and the base of the gage by means of screws. A removable fulcrum-block, secured to the base by the same or other screws, forms an attachment for the flexible fulcrum-plates of one or more transmitting-levers, and for a standard constituting the front bearing of the rotary indicator. A secondary transmitting-lever is fulcrumed to the case by compound flexible plates connected by an intermediate clamping-piece, affording limited horizontal play to the fulcrum. This lever is held against longitudinal motion by a flexible fixing-plate constituting a spring, which serves also as the pressure-resisting spring, and is attached adjustably to the fulcrum-block. The transmitting-levers are made double, constituting wide frames, and are thus adapted to receive transmitting-plates, which are made thin for flexibility and wide for strength. The width of the lever-frames and connecting-plates also adapts them to transmit their pressure in a vertical plane without lateral or oblique strain. A hair-spring is provided to offer such slight resistance to the rotation of the indicator as will serve to keep the parts taut. The final lever of the series is preferably mounted on a fulcrum-block constructed with two arcs, around which its flexible fulcrum-plate and the flexible plate which connects it to the intermediate lever are respectively drawn in order to keep the fulcrum-points in the same horizontal line. An adjustable stop limits the downward movement of this lever when pressure is withdrawn. Stop-screws are employed to limit the vertical movement of the intermediate lever. From the final lever motion is communicated to the rotary indicator by a

coiled metallic band. The indicator-pivots run in jeweled bearings, one of which is mounted in a supporting and adjusting screw.

The invention is represented in the accompanying drawings by four figures, numbered 122 to 125, inclusive. Figure 122 is a front elevation of a gage. Fig. 123 is a horizontal section of the same. Fig. 124 is a vertical section of the base, showing the liquid-pressure chamber and its attachments. Fig. 125 is a detached elevation of the fulcrum and attachments of the last transmitting-lever.

821 represents a cylindrical casing provided with a dial, 822. The glass front 823 is set in a frame, 848, attached to the case in any preferred manner. A packing, 849, of leather or other suitable material, is interposed between the glass and its frame.

824 represents a base-piece connected with the casing by screw-bolts 825, and serving also to connect an annular fulcrum-block, 826, by which the primary lever, hereinafter described, is attached to the case. The fulcrum-block 826 may, if preferred, be attached to the neck of the case by separate screws. The base 824 is formed with an annular flange, as shown in Fig. 124, projecting upward within the neck of the case in contact with a plate, 827, forming the base of a removable pressure-chamber. The pressure-diaphragm 828 is secured at its outer edge to the chamber base-plate 827, and when made in annular form, as in the present illustration, is secured at its inner edge to the lower part of a pressure-column, 830 831. The outer edge of the diaphragm is clamped by a casing-ring, 829, interposed between the chamber-base 827 and a shoulder within the case. The pressure-chamber base 827 has a central pressure-duct, 850, and is tapped, as shown, with a screw-thread, to receive a screw-plug for attaching the liquid pressure pipe. The diaphragm of the pressure-chamber may be either made annular, as shown, and attached to the base of the pressure-column, or it may consist of a continuous disk with the pressure-column resting upon it, either with or without a separate casing-ring, 829, interposed between the case 821 and the base 827 of the pressure-chamber. This construction adapts the entire pressure-chamber, consisting of the chamber-base 827 and dia-

phragm 828, casing-ring 829, and the base 830 of the pressure-column, to be removed from the case when the latter is taken off its base 824. The pressure-column 831 carries a clamping-plate, 832, securing thereto the lower edge of the thin flexible transmitting-plate 833, the upper edge of which is clamped by the block 857 and screws 858 to a lever, 834, fulcrumed by a flexible plate, 835, to the standard 851 of the fulcrum-block 826. The fulcrum-plate 835 is attached to the lever 834 by clamp-plate 860 and screws 858, and to the fulcrum-block 851 by clamp-plate 861 and screws 862. The block 857 is fastened to the lever 834 by screws 858 and 859. The fulcrum-block 826 is of annular form, encircling the pressure-column, and is constructed with a slight hub or shoulder resting within a recess in the neck of the casing 821, as shown in Figs. 122 and 124, to secure the said fulcrum-block or bracket against lateral motion while it is held down to the neck of the casing by bolts 825. The free end of the lever 834 is connected by a thin flexible plate, 836, and clamps 864 with a secondary double lever, 837, fulcrumed to the case through the medium of clamps 865 866 and two thin flexible plates, 838 863, which are connected by a rigid clamping-piece, 839. This attachment permits the horizontal motion of the fulcrum 838 due to the vertical movement of the lever. The free end of the lever 837 connects by a flexible plate, 840, and clamps 867 with the upper part of a fulcrum-block, 841, carrying an arm, 842, secured thereto by clamping-screws 868, which serve also to clamp thereto the lower end of the suspending-plate 843. The upper end of the plate 843 is clamped to the case by plates and screws 844. To the extremity of the lever 842 a flexible transmitting-band, 845, is clamped adjustably by a plate and screws, 869. The said transmitting-band is coiled around a small drum, 852, on the shaft 853 of the indicator 846. A hair-spring, 847, connected at one end to the shaft or drum of the indicator and at the other end to the lever 837 by a slotted pin, 854, resists the rotation imparted to the indicator by an upward movement of the levers above described, and serves to keep the connections at a proper tension. The main resistance to the pressure is by the spring 855, which is clamped at one end adjustably to the top of the standard 851 by the slotted plates 870 and screws 871, and at the other end to the free end of the lever 837 by clamp 856. The spring-plate 855 serves also to fix the lever 837 against horizontal motion. For automatic adjustment to counteract the effect of changes in temperature, a rod, 872, is provided, of metal either more or less expandible than the material of the case, said rod being fixed adjustably in the case, as shown, and connected by clamps 873 to a plate-spring, 874, which is clamped to the lever 837 near its fulcrum end by plates 875 and screws 876. By the vertical adjustment of the rod it may be made to increase or decrease the strain upon the spring, and to exert a strain either upward

or downward, as required to bring the indicator to zero. If found necessary to compensate for changes in temperature, the rod may be applied under the lever 837, instead of above it, as here shown.

877 is a stationary rod rising from the standard 851, and provided with a nut, 878, which constitutes an adjustable stop to limit the descent of the lever 842. The action of this stop is to limit the downward movement of the lever 842 at such time that the band 845 shall not be loosened on its barrel by the farther movement of the lever after the rotation of the indicator is stopped by its having reached the limit of its permitted movement. In practice it is best to so adjust the said stop-nut 878 that the lever 842 will strike it just before the needle completes its movement, so that the living force of the needle or indicator is partially consumed by the elastic action of the lever 842, band 845, arbor 853, and needle 846. The result is, that the needle strikes very gently at the limit of its motion. It is preferred to thread the rod 877 to its upper end and employ a second nut above the lever to limit its upward play. The fulcrum of the said lever 842 is preferably constructed as shown at 880 in Fig. 125, the flexible plates or metallic straps 840 843 being secured to the said fulcrum by screws 881 and clamp-plates 879, and stretched around arcs, as represented, so that the fulcrum distances will remain unchanged under a deflection of the lever. The shaft 853 of the rotary indicator runs in jeweled bearings 882 883, which are set in standards 884 884^a, fixed to the annular fulcrum-block 826 by screws 884^b. The vertical motion of the lever 837 is limited by stop-screws 885 886 coming in contact with lugs 888 887, projecting inward from the case 821, the lug 888 constituting the boss for the attachment of the clamp 844.

Any novel subject-matter I have set forth and not claimed or attempted to claim in this application I have claimed or attempted to claim in other applications or have reserved to be claimed in future original applications.

The following is here claimed as new:

1. The combination of the gage-case 821, base-piece 824, chamber-base 827, and connecting-screws 825, as and for the purposes set forth.

2. The combination of the removable pressure-chamber, the pressure-column, and the gage-case, as and for the purposes set forth.

3. The combination of the gage-case 821, the pressure-column 830 831, made in two separable pieces, the removable pressure-chamber 827 828, and the transmitting-plate 833, as and for the purposes set forth.

4. The combination of the gage-case 821, base 824, pressure-chamber 827 828, pressure-column 830 831, fulcrum-block 826, and fixing-screws 825, as and for the purposes set forth.

5. The fulcrum-plates 838 863 and clamp-plates 839, in combination with the lever 837 and gage-case 821, as and for the purposes set forth.

6. The combination of the fulcrum-block 826, the standards 884 884^a, and the shaft 853 of the rotary indicator, substantially as set forth.

7. The combination, with the load-lever 837 and fulcrum-block 826 851, of the fixing and resisting spring 855, arranged as described, to secure the lever against longitudinal or lateral motion.

8. The combination of the gage-case 821, projecting lugs 887 888, load-lever 837, and stop-screws 885 886, as and for the purposes set forth.

9. In combination with a lever, 842, actuating a rotary indicator, 846, a standard or rod, 877, and one or more stop-nuts, 878, to limit the

vertical motion of said lever, substantially as set forth.

10. In combination with the lever-arm 842 and indicator-needle 846, having elastic connections, the adjustable stop 878, to arrest the motion of the lever-arm, substantially as set forth.

11. The combination of the lever 842, flexible band 845, indicator-axis 853, bearing-supports 884 884^a, and supporting and adjusting screw 882, substantially as and for the purposes set forth.

ALBERT H. EMERY.

Witnesses:

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MAHLON RANDOLPH.