

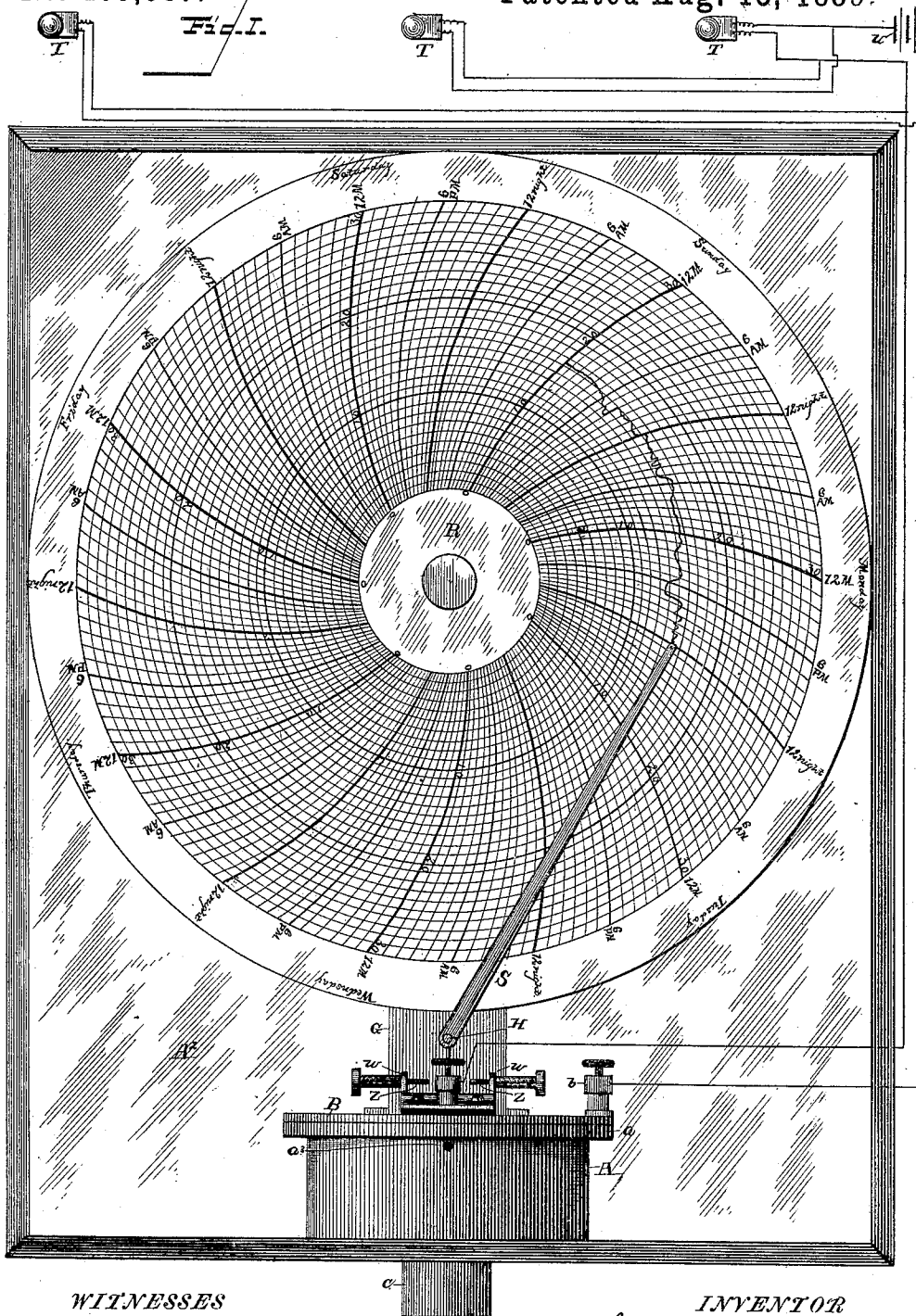
(No Model.)

3 Sheets—Sheet 1.

G. M. WILLIAMS.
PRESSURE GAGE.

No. 409,087.

Patented Aug. 13, 1889.



WITNESSES

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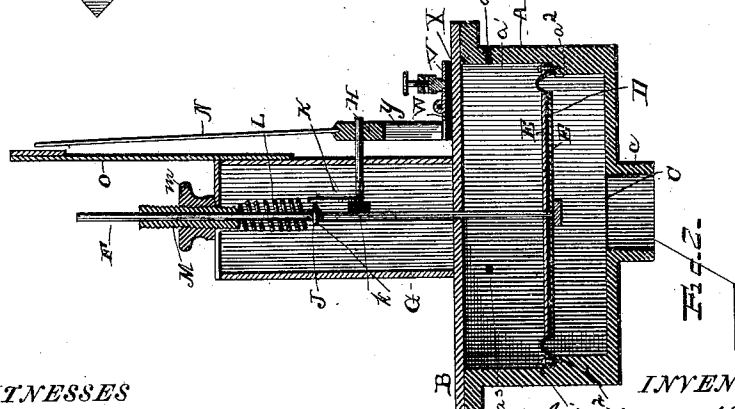
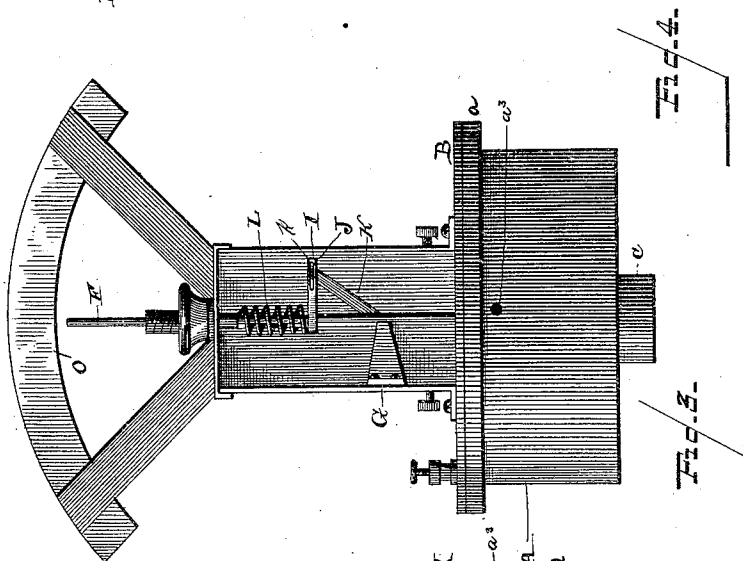
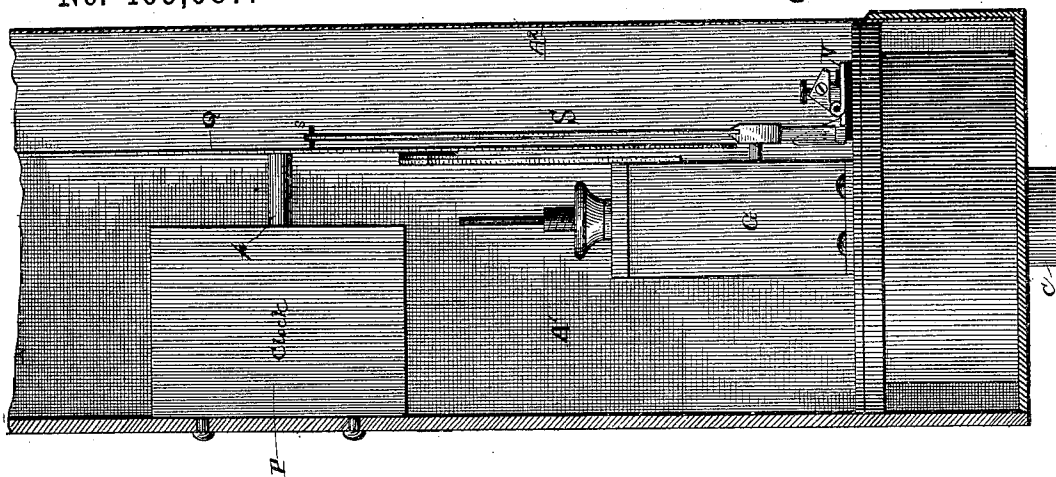
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WITNESSES

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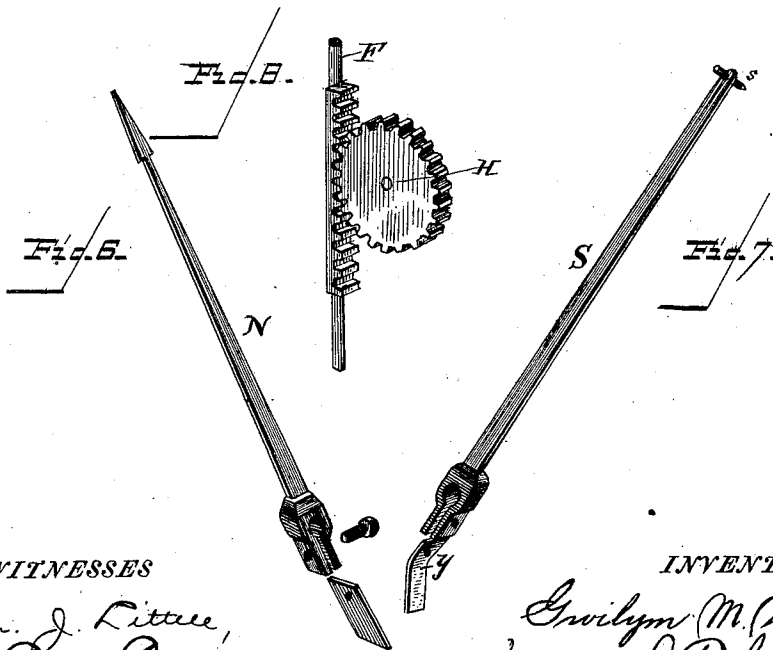
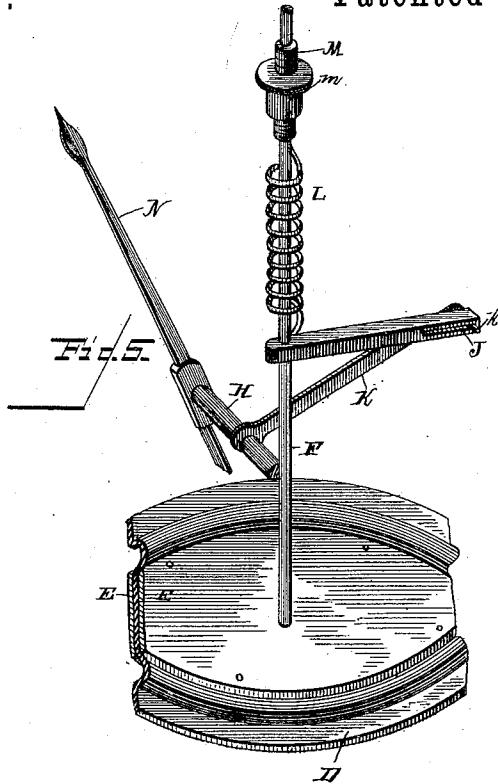
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3 Sheets—Sheet 3.

G. M. WILLIAMS.
PRESSURE GAGE.

No. 409,087.

Patented Aug. 13, 1889.



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UNITED STATES PATENT OFFICE.

GWILYM M. WILLIAMS, OF WILKES-BARRÉ, PENNSYLVANIA.

PRESSURE-GAGE.

SPECIFICATION forming part of Letters Patent No. 409,087, dated August 13, 1889.

Application filed November 15, 1888. Serial No. 290,891. (No model.)

To all whom it may concern:

Be it known that I, GWILYM M. WILLIAMS, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Pressure-Gages, of which the following is a specification.

This invention relates to pressure-gages; and it has for its object to provide a device of this character which will efficiently indicate the ventilating pressure on the air in mines or the pressure of air or gases in pipes, &c.

A further object of the invention is to provide in connection therewith an automatic recording attachment for recording the pressure upon a chart for a desired period.

In the drawings, Figure 1 is a front elevation of a pressure-gage embodying my invention, illustrating an electric-alarm attachment in connection therewith. Fig. 2 is a vertical longitudinal sectional view with the recording attachment removed. Fig. 3 is a rear elevation, parts being broken away. Fig. 4 is a side elevation with the circuit-closer of the alarm attachment thrown out of operation. Fig. 5 is a detail perspective view of the diaphragm, indicator-shaft, and intermediate connecting mechanism. Figs. 6 and 7 are detail perspective views of the indicator and recorder, respectively. Fig. 8 is a detail perspective view of a modification.

Corresponding parts in the figures are denoted by the same letters of reference.

Referring to the drawings, A designates a cylindrical drum, preferably provided at its upper edge with a peripheral flange a , to which is secured a top or cover B. From the center of the bottom C of the drum projects outwardly a cylindrical interiorly-screw-threaded portion c for connecting the drum with a pipe. Interiorly upon the side wall a' of the drum is an offset a^2 , extending entirely around the same.

D designates a circular diaphragm of the same diameter as the interior of and disposed within the drum. This diaphragm is formed of rubber or other flexible material, and is secured at its edge to the offset a^2 .

Metallic plates E E, circular in form, are provided at either side of the diaphragm to protect and stiffen it, and between the edges

of the plates and the secured edge of the diaphragm the latter is corrugated to permit vertical movement thereof. Between the diaphragm and the top of the drum the sides of the latter are provided with a series of apertures a^3 for the admission of the atmosphere.

Centrally from the diaphragm projects upwardly a vertical rod F, which passes through a perforation therefor in the top of the drum and into and through a rectangular casing G, secured upon the drum. Within the front wall of this casing and projecting exteriorly therefrom is journaled a horizontal shaft H, which is adapted to be partially revolved by the rod F as it moves vertically. To accomplish this, a bar I is secured transversely to said rod and projects at one side thereof and at right angles to the shaft. The free end of the bar is provided with a longitudinal slot J, disposed horizontally, for the reception and play of a horizontal pin k , provided at one end of a lever K, the other end of which being rigidly secured to the shaft. By this construction as the diaphragm is depressed the transverse bar is carried thereby, and draws the outer end of the lever K downward, thus partially rotating the shaft. A coil-spring L is attached at its lower end to the transverse bar I and at its upper end to a hollow adjusting-screw M, which passes through the top of the casing and encircles the rod F. Upon the end of this screw is disposed an adjustable thumb-nut m . The tension of the spring is exerted against depression of the diaphragm, so that as pressure is exerted above the diaphragm sufficient to overcome this tension to a greater or less degree the diaphragm is forced down, moving the shaft in a right-hand direction, but as the force is diminished the diaphragm is drawn up by the spring, imparting reverse movement to the shaft.

Upon the exterior end of the shaft H is secured one end of an indicator N, the other or free end of which travels over the front surface of a graduated arch O, secured upon the casing. When it is desired to have the pressure recorded at all times of the day and night, the recording attachment is employed, the graduated arch and indicator being removed or not, as desired. The recording attachment comprises a suitably-constructed clock P, the

casing of which is secured to the casing G at a suitable point thereon. The arbor *p* of the clock projects through the front wall of its casing, and upon the end thereof is rigidly mounted a disk Q, which, by reason of the construction of the clock, makes one complete revolution in a week.

R designates a chart, of paper or similar material, designed to be secured upon the disk. Upon the face of the chart are four heavy equidistant circular lines which divide the chart into three main divisions, the lines being numbered, commencing with the inner one, 0, 10, 20, and 30, respectively. The main divisions are subdivided into ten equal divisions by lighter lines, such divisions indicating the pressure. The time is indicated by fourteen heavy diverging arc-shaped lines connecting the inner and outer circular lines, which divide the chart into fourteen divisions of twelve hours each, a week (seven days) in all. Each of these divisions is divided by lighter lines into two equal divisions of six hours each, which are also divided by still lighter lines into six equal divisions of one hour each. Near the periphery of the chart and above every other twelve-hour line are the days of the week in their respective order, and the lines under the days are marked "12 M.," while the intermediate twelve-hour lines are marked "12 night." The first and last six-hour lines are marked "6 A. M." and "6 P. M.," respectively.

The pressure is recorded upon the above-described chart by a pen or pencil *s*, provided at the free end of an arm S. The other end of the latter is rigidly secured to the shaft H, and as the latter is partially rotated by the movement of the diaphragm the pen or pencil at the end of the arm describes an arc upon one side of the chart corresponding to the arc lines upon the latter. Said arc, when continued to one side, passes through the center of the chart.

In connection with the above-described gage I find it advantageous to employ an alarm, preferably the electric-alarm attachment illustrated in the drawings. This alarm mechanism comprises, preferably, a series of bells T and a battery U, connected by wires with the pressure-indicator. One of the wires is secured to a binding-post *b*, of the ordinary form, upon the top B of the drum A, and the other wire to a similar binding-post *v*, provided upon an insulated circuit-closer. The latter comprises a rigid plate V, secured upon the top of the drum A at the front thereof and at right angles to the shaft II. At the rear edge of this plate is hinged a plate W, provided at its ends with upwardly-projecting parallel lugs *w w*, which are at an equal distance from a line drawn vertically through the center of the shaft II but below the latter.

The circuit-closer is insulated by the employment of a plate X, of non-conducting material—such as hard rubber—disposed between it and the top B, while the securing-

screws are also insulated in a similar manner, as shown. From the shaft II projects downwardly and between the lugs *w* a metallic plate Y, which is adapted, when the pressure is sufficiently high or low, to come in contact with the inner end of one of the screws Z Z, provided through the lugs *w*, to close the circuit and sound an alarm. These screws are on a direct horizontal line with each other and are adjustable, whereby the circuit may be closed at any desired point upon either side. When the gage is to be used independent of the alarm mechanism, the plate W is turned forward upon its hinges and out of reach of the plate Y. It will be obvious, however, that the alarm is not essential to the operation of the gage, and that any suitable construction of alarm may be employed in lieu of that above described.

All the mechanism contained within and upon the drum A and casing G is preferably inclosed by a casing A', provided with a glass door A², through which can be seen the pressure indicated.

The operation and advantages of my invention will be readily understood by those skilled in the art to which it appertains.

The drum is connected by a pipe with a receptacle or chamber containing air, gas, or other substance. It will be obvious that the gage adjusted as described is designed to indicate pressures or densities less than the atmosphere. In this case the atmosphere entering the drum above the diaphragm, and being of greater density than the substance below said diaphragm, the latter is depressed until the tension of the spring is equal to the difference in pressure. As the diaphragm is depressed, it carries with it the rod F, and by reason of the connection between said rod and the shaft II the latter is turned in a right-hand direction, carrying with it the indicator or recorder, which respectively indicates or records a greater difference of pressure. When the pressure below the diaphragm increases, the depression of the latter by the atmosphere is partially overcome and the shaft reverses its motion accordingly, and a less degree of difference in pressure is therefore indicated or recorded.

To indicate pressures or densities greater than that of the atmosphere, the location of the spring is reversed—that is, so its tension will be exerted from below the bar I and against the upward movement of the diaphragm. In this event it will be observed that the greater pressure is exerted from below the diaphragm and the tension of the spring will equal this pressure, which will be indicated or recorded in the manner before described.

It will be obvious that by varying the superficial area of the diaphragm very small or large pressures or densities may be measured and recorded.

When it is desired to have the pressure recorded, the device therefor is employed, its

operation being independent of the indicator. The recording-arm is attached to the shaft H at such an angle that it moves only across the right-hand side of the chart. As the shaft
 5 turns by the movement of the diaphragm, it carries the recording-arm with it, and the pen or pencil at the outer or free end of said arm records the pressure upon the chart. By reason of the revolution of the chart and the
 10 time-divisions thereon the time of day or night at which a certain pressure is shown is also recorded.

The desired adjustment of the indicator or recorder is effected by the thumb-nut *m*.

15 To indicate a pressure above or below the desired limit at a place distant from the gage, the alarm mechanism is brought into use. To this end the plate W of the circuit-closer is turned down to a horizontal position when
 20 the lugs thereon are, one at each side the plate Y, connected with the shaft H. The screws Z in the lugs are adjusted to the desired point. It will thus be seen that when the pressure is sufficiently strong or weak to permit
 25 the plate Y, which is rigidly secured to the shaft, to come in contact with one of the screws Z the circuit is closed and an alarm sounded until a higher or lower degree of pressure is exerted, as the case may be, to
 30 break the circuit.

The desirability of employing several alarm-bells connected with the main by branch wires is that if the circuit at one of the bells
 35 be destroyed the remaining ones will still sound the alarm until the circuit is broken by the action of the pressure upon the gage.

I do not wish to be understood as limiting myself to the exact construction herein shown and described, but reserve to myself the
 40 right to all such modifications as properly fall within the spirit and scope of my invention. For instance, a pinion-and-rack-bar connection (illustrated in Fig. 8) between the rod F and shaft H, in lieu of the bar I and lever,
 45 may be employed.

I claim as my invention—

1. The combination, with a drum and a casing mounted thereon, of a diaphragm disposed in the former, a shaft journaled in the
 50 latter, and mechanism connecting the dia-

phragm and shaft, consisting of a rod projecting upwardly from said diaphragm, a longitudinally-slotted bar projecting from said rod, and a lever rigidly secured to said shaft and provided at its free end with a pin play-
 55 ing in the slotted bar, said connecting mechanism being adapted to impart a partial rotary motion to the shaft during the movement of the diaphragm, substantially as set forth.

2. The combination, with a drum and a casing mounted thereon, of a diaphragm disposed in the former, a shaft journaled in the latter and carrying an indicator or recorder, connection between the diaphragm and shaft, whereby motion of said diaphragm is im-
 60 parted to the shaft, and adjusting mechanism connected with the shaft and adapted for the adjustment of the indicator or recorder, substantially as and for the purpose set forth.

3. The combination, with a drum provided with an inlet-opening at one end and air-perforations near the other end, and a casing mounted thereon, of a diaphragm disposed in said drum between the inlet-opening and air-perforations, a shaft journaled in said casing and carrying an indicator or recorder, connection between the diaphragm and shaft, whereby motion of said diaphragm is imparted to the shaft, and adjusting mechanism connected with the shaft and adapted for the ad-
 70 justment of the indicator or recorder, substantially as and for the purpose set forth.

4. The combination, with a drum and a casing mounted thereon, of a diaphragm disposed within the former, a shaft journaled within the latter, and connection between the diaphragm and shaft, whereby said shaft is adapted to be rotated by the action of the diaphragm, a graduated arc mounted upon the casing, an indicator secured to the outer
 80 end of the shaft and adapted to travel over said arc, and an adjustable spring-connection between the diaphragm and casing, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in
 95 presence of two witnesses.

GWILYM M. WILLIAMS.

Witnesses:

T. H. SANDOW,
 H. W. DEIBLE.