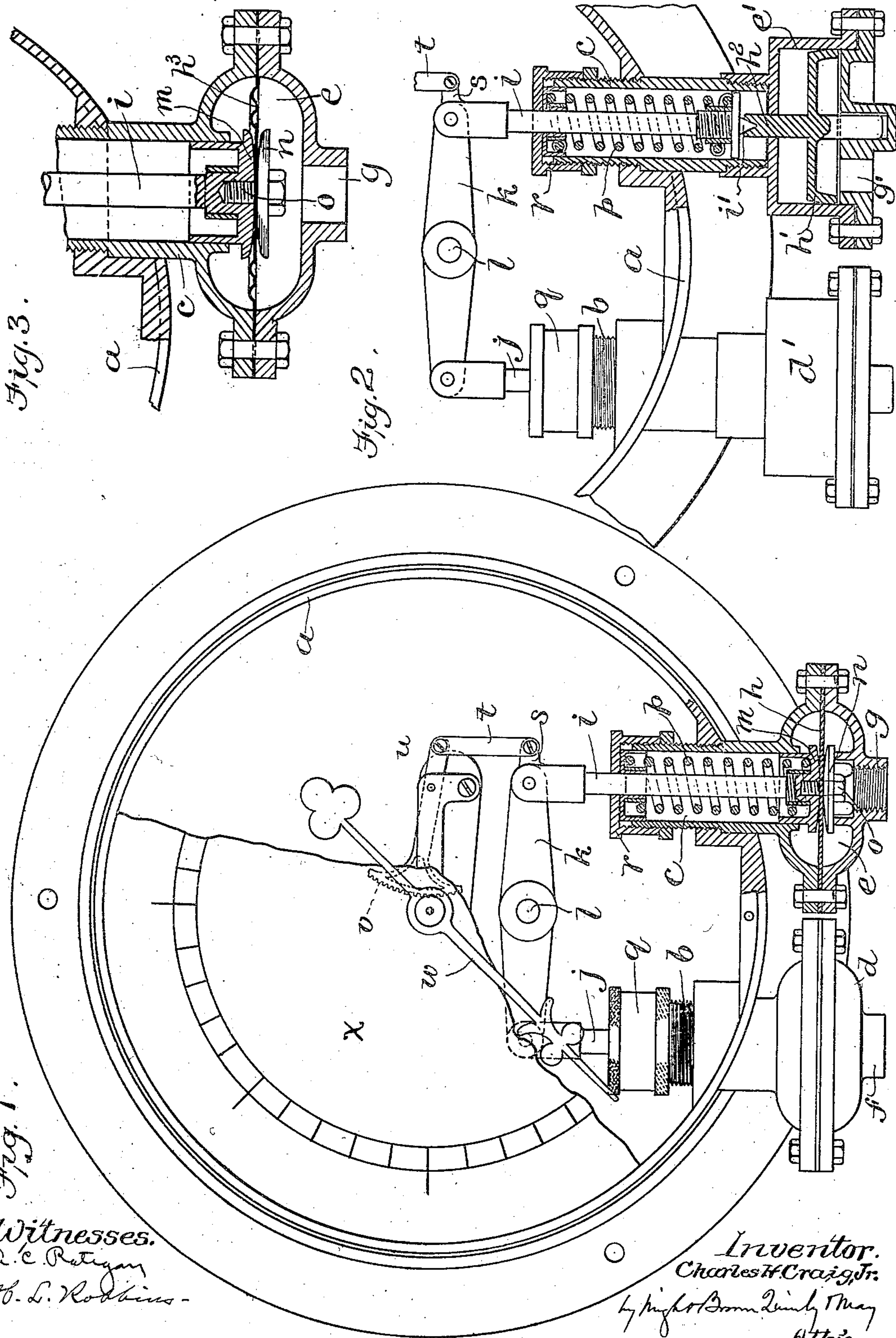


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DIFFERENTIAL PRESSURE GAGE.
APPLICATION FILED JAN. 30, 1907.

908,206.

Patented Dec. 29, 1908.



Witnesses.
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UNITED STATES PATENT OFFICE.

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DIFFERENTIAL-PRESSURE GAGE.

No. 908,206.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES H. CRAIG, Jr., of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Differential-Pressure Gages, of which the following is a specification.

This invention relates to pressure gages for indicating directly the differences between pressures, and has for its object to provide a gage of this character of great sensitiveness, and one of which the degree of sensitiveness can be adjusted so that relatively slight differences of pressure can be accurately indicated and read.

Of the accompanying drawings,—Figure 1 represents an elevation, partially in section, of a gage embodying the principles of my invention. Fig. 2 represents a modification of the pressure-actuated means. Fig. 3 represents a further modification of the pressure-actuated means.

The same reference characters indicate the same parts in all the figures.

a represents the casing of a gage into which are screwed cylinders *b* and *c*. The outer portions of these cylinders form chambers *d* and *e*, respectively, which have threaded inlets *f* and *g*, whereby a fluid-conducting pipe may be connected. Extending across each of the chambers is a diaphragm *h* forming a movable upper wall of the chamber, and to the diaphragms are connected rods *i* and *j* which are pivotally connected to a beam *k* which is pivoted at *l*.

The connection of the diaphragms with the rods is made through clamps *m* and *n* of which the former is secured to the rod, while the latter lies on the under side of the diaphragm and is connected with the first clamp by a bolt *o*. These clamps are formed with spherical surfaces where they abut against the diaphragm in order that their edges may not cut the latter when displaced. Springs *p* are located in the tubes *b* and *c* and are adjusted by means of screw-caps *q* and *r* threaded upon the ends of the tubes.

A lug *s* is formed upon one end of the beam *k* or on the head of the rod *i*, and is connected by means of a link *t* with a pivoted lever *u* having a gear segment *v* which meshes with a pinion on the spindle of a hand or indicator *w*. By means of the gear segment, the hand is swung over a dial *x*.

Pressures being admitted to the chambers beneath the diaphragms, act upon the beam *k* on opposite sides of the pivot of the latter so that each pressure opposes the other, and no motion whatever will be given to the beam if the pressures are even. In case one pressure is greater than that of the other, the beam will be moved by the greater pressure, forcing the diaphragm in the other chamber in opposition to the fluid pressure acting thereon. Then the hand is moved proportionally to the difference in pressure until the motion is checked by the increasing resistance of one of the springs *p*. Thus the differences between two pressures are directly indicated by the hand, there being no indication of the absolute value of either pressure alone.

In Fig. 2, a modification which consists in substituting a piston *h'* in the cylinders *d'* and *e'* is shown. The pressure fluid is admitted through inlets *g'* into the chamber below the piston and tends to force the latter upward against the resistance of the spring *p*. In this form of the device, the tubes *b* and *c*, springs *p*, rods *i* and *j*, beam *k* and screw-caps *q* and *r* are the same as previously described. The connections of the pistons with the rods *i* and *j* are made by bearing cones *i''* entering the conical sockets in rods *h''* formed upon the pistons.

In Fig. 3 is shown a modification by which the differences between very slight pressures may be measured. This form dispenses with the spring *p* and to take the place of the latter there is substituted a metal diaphragm *h''* which is resilient. The diaphragm has a number of annular corrugations to increase the amount of flexure which is possible to give it. It is secured to the rod *i* in the same manner as is the diaphragm *h*. The flexible diaphragm *h''* interposes comparatively little resistance to displacement, and therefore is adapted to move the indicator by a comparatively large amount in registering very small pressures.

The three forms of pressure means are alike in this, that each consists of a chamber having a movable wall, since the diaphragms *h* and *h''* and the piston *h'* are the displaceable walls of the pressure chambers in which the fluid is admitted. Each of these movable walls is similarly displaced by the fluid and acts upon the indicator.

I claim:—

1. A gage consisting of a plurality of chambers adapted to simultaneously receive fluid under pressure and each provided with a movable wall displaceable by pressure, said walls being so positioned that the pressure exerted against each is in the same direction, an indicator and a differential device connected with said walls and said indicator whereby the latter will disclose the differences between the pressures acting upon said device.

2. A gage comprising a plurality of chambers adapted to simultaneously receive fluid under pressure and each provided with a movable wall displaceable by pressure, said walls being so positioned that the pressure against each is in the same direction, a rod secured to the movable wall of each chamber, an indicator, and a differential device connected with said rods and said indicator, whereby the latter will disclose the differences between the pressures acting upon them.

3. A gage consisting of a plurality of chambers adapted to simultaneously receive fluid under pressure and each provided with a movable wall displaceable by pressure, said walls being so positioned that the pressure exerted against each is in the same direction, a pivoted bar connected at its ends with the movable wall of each chamber whereby the pressure of each wall tends to turn it in a different direction, and an indicator for showing the resulting motion of the bar.

4. A gage consisting of a plurality of chambers adapted to simultaneously receive fluid under pressure and each provided with a movable wall displaceable by pressure, said walls being so positioned that the pressure exerted against each is in the same direction, a pivoted bar connections between the same and each of the movable chamber walls, whereby the pressures thereof act oppositely on the bar giving it a motion proportional to the differences in such pressures, and means for returning said bar to its normal position.

5. A gage consisting of a plurality of chambers adapted to receive fluid under pressure, each having a movable wall displaceable by pressure, a pivoted bar, and connections on opposite sides of the pivot of the bar with the movable chamber walls, whereby the pressures of the latter are

caused to actuate the bar proportionally to the differences between them.

6. A differential gage comprising two chambers adapted to receive fluid under pressure, a movable wall in each chamber displaceable by pressure of the fluid therein, a rod connected to each of said movable walls, and a bar connected to each of said rods and pivotally mounted intermediate the points of connection therewith.

7. A differential gage comprising two chambers adapted to receive fluid under pressure, a movable wall in each chamber displaceable by variations in pressure of the fluid therein from a predetermined amount, constructed and arranged so as to oppose a yielding resistance to such displacement, motion-transmitting members connected to said walls, and a pivoted connecting member attached to each of the transmitting members in such manner that positive pressures applied to the latter may, at one and the same time, urge the connecting member to turn in opposite directions about its pivot.

8. A gage consisting of a plurality of chambers adapted to simultaneously receive fluid under pressure and each provided with a movable wall displaceable by pressure, said walls being so positioned that the pressure exerted against each is in the same direction, an indicator, and connections between said displaceable wall and indicator wholly external to the chambers, operating proportionally to the differences between the several fluid pressures for moving the indicator to show such differences.

9. A gage consisting of a plurality of chambers adapted to receive fluid under pressure from different sources, a movable wall for each chamber displaceable by pressure, a pivoted bar, connections with the bar and the several displaceable walls arranged so as to tend to move the bar at the same time in opposite directions about its pivot, a rotary indicator and a segment engaged therewith and oscillated by movements of said bar, whereby the indicator is caused to move proportionately to the differences in the pressures.

In testimony whereof I have affixed my signature, in presence of two witnesses.

CHARLES H. CRAIG, JR.

Witnesses:

A. C. RATIGAN,

ARTHUR H. BROWN.