C. J. MANNING.

GAGE FOR INDICATING FLUID PRESSURES.

APPLICATION FILED FEB. 24, 1912.

1,166,070. Patented Dec. 28, 1915.

Fig. 1.

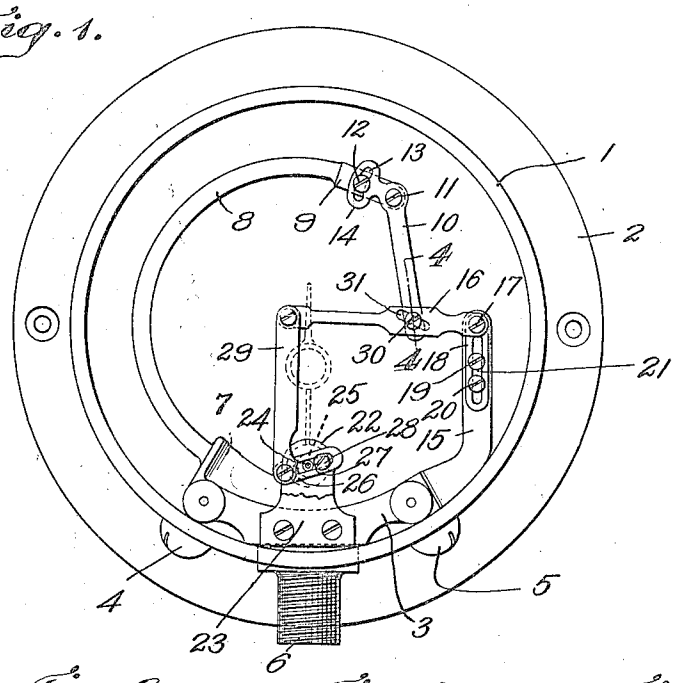


Fig. 2.

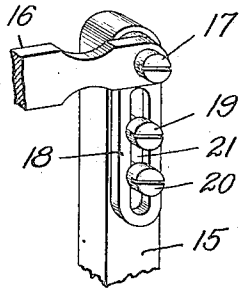


Fig. 3.

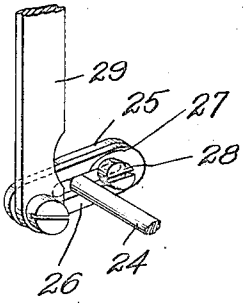
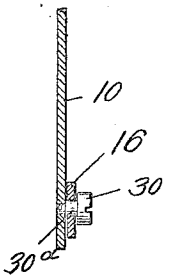


Fig. 4.



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UNITED STATES PATENT OFFICE.

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GAGE FOR INDICATING FLUID-PRESSURES.

1,166,070. Specification of Letters Patent. Patented Dec. 28, 1915.

Application filed February 24, 1912. Serial No. 679,733.

To all whom it may concern:

Be it known that I, COLEMAN J. MANNING, a citizen of the United States, and resident of Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Gages for Indicating Fluid-Pressures, of which the following is a specification.

This invention relates to a gage adapted to indicate pressure either higher or lower than the pressure of the atmosphere, or in other words, a gage which is not only of the kind commonly known as a "pressure gage," but one which is also a vacuum gage.

The principal object of the invention is to provide a gage suitable for these purposes, which is at the same time inexpensive and economical to build.

With this object in view my invention consists in the novel and improved gage and the parts thereof which I am about to describe and claim.

In the drawings Figure 1 is a front elevation of the gage embodying the principles of my invention in their preferred form. Figs. 2 and 3 are perspective views of details of construction. Fig. 4 is a sectional view of a detail on line 4—4 of Fig. 1.

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

In the drawing the gage is represented as though the glass face and dial had been removed, only the case and the operating mechanism being shown. The case is of any usual or desired form, being conveniently of cast metal and having a cylindrical inclosing wall 1 and a back wall which is provided with a flange 2 external to the cylindrical wall containing screw holes for convenience in mounting upon a support.

Within the inclosing wall is a casting or head 3 secured detachably by screws 4, 5 and having a nipple 6 passing through the wall. A part 7 of the head is formed as a conduit and is in communication with the nipple 6. A curved spring tube or Bourdon tube 8 is connected with the conduit 7 and lies well within the inclosing wall. On the end of the spring 8 is secured a block 9, to which is pivoted a lever 10. The pivot for this lever is preferably a screw 11 passing through the fulcrum of the lever and threaded into the block 9, the head of such screw overlying the lever and being adapted to clamp the same in various positions. A supplemental clamp is provided in the screw 12, which passes into the block 9 through a slot 13 in a widened part 14 of one arm of the lever.

At one end of the head or casting 3 is an upright or post 15 which supports the adjustable fulcrum of a lever 16. Said fulcrum is conveniently a screw 17 carried by a slotted plate 18 which is adjustable up and down on the upright and is secured in its various adjustments by screws 19 and 20 which pass through a slot 21 into the upright 15.

On the head 3 is a lug or projection 22, formed conveniently as an integral part of the head, and detachably fastened to the head is a plate 23 which extends over the lug 22 but is separated therefrom by a space of considerable width. The lug and plate furnish bearings for an arbor or shaft 24, which carries a pointer or other indicator. This pointer overlies the dial, which is omitted from the present drawings, hence the pointer is indicated in dotted lines. Secured to the arbor 24 is an arm 25, shown best in Fig. 3, and overlying the arm is a slotted plate 26, which extends on both sides of the arbor. A slot 27 of this plate contains the arbor and also a screw 28 which is threaded into the arm 25. Said plate, when secured by setting up the screw 28, constitutes a lever arm rigidly connected with the arbor. Pivotally connected with the plate at one side of the arbor is a link 29 of which the other end is pivotally connected to the lever 16 previously mentioned.

The lever 10 previously described is connected with the lever 16 by a stud 30 secured to lever 10 and passing through a slot 31 in lever 16. Such stud is preferably a screw, having a shank 30^a Fig. 4 which passes freely through the slot 31, and a head which overlies the edges of the slot. The end of the shank which is screwed into lever 10 is reduced to provide a shoulder which is so placed as to come to a bearing on the lever 10 when the head of the screw is farther distant from such lever than the thickness of the lever 16. In this way the stud 30 may be tightened without binding the two levers together, and thereby permitting

free pivotal and translative movement of the stud 30 in the slot 31.

This completes the description of the construction of the particular embodiment of my invention shown in the accompanying drawings.

It will be readily seen that an excess of pressure in the spring tube over that of the atmosphere will cause the block 9 on the end of the tube to move upwardly, while a diminution of pressure to less than the atmospheric will produce an opposite effect, the external effect of such movements being proportional to the pressure differences. For the sake of brevity of description, I will term pressures greater than atmospheric as "positive" pressures and those less than atmospheric as "negative" pressures or vacuums. The effect of a positive pressure acting through the connections described is to swing the pointer from left to right, and the effect of a negative pressure is to swing it to the left. As the connections provide a multiplying leverage, very slight movements of the spring tube produce comparatively wide movements of the pointer. As the lever 10 is rigid with the spring tube when adjusted, some slight play takes place between the stud 30 and the lever 16 in these movements. The amount of play, however is inappreciable and does not impair the accuracy of the instrument.

The construction described permits three distinct adjustments, one of which alters the amplitude of swing of the pointer for the same pressures, another of which changes the position of the pointer without altering its amplitude of swing, and the third of which alters both the position and amplitude of movement of the pointer. The first of these adjustments is provided by the plate 26, which can be adjusted so as to bring its pivotal connection with the link 29 toward or from the pointer arbor 24, and thereby shorten or lengthen the lever arm through which the link acts upon the pointer. The second is provided by the adjustable fulcrum 17, which can be raised or lowered, that is, moved in a direction transverse to the lever 16, thereby turning such lever about the stud 30 and shifting the position of the pointer. The third adjustment is accomplished by swinging the lever 10 about its point of adjustment with the block 9, and thereby shifting the stud 30 in the slot 31. This slot is inclined to the path in which stud 30 moves when such adjustments are made, consequently the lever 16 is then turned about the fulcrum 17 and the pointer shifted to one side or the other. At the same time the lever arm represented by the distance between the stud 30 and fulcrum 17 is varied, and thereby the movement of the pointer with respect to that of the spring is changed. This adjustment of calibration is a finer and more delicate one than is given by movement of the plate 26 on the arm 25, and supplements such adjustment.

A gage made as hereinbefore described can be produced at relatively low cost and is exceedingly accurate. The provisions for adjustment enable the gage to be calibrated with accuracy.

The foregoing detailed description has been given in order to furnish sufficiently complete information to enable others skilled in the art to make and use the invention upon expiration of my exclusive right to the same, but without intending to limit my invention to the exact constructions described.

It is within my contemplation to provide other constructions varying considerably in appearance from this one but having the equivalent provisions for operation and adjustment.

While I have designated the members 18 and 26 by the term "plate," it is to be understood that such term is intended to be merely descriptive of the particular members illustrated and is not intended to be a limiting term. I consider that any member capable of serving the functions of the plates 18 and 26, as hereinbefore described, is within the scope of my invention and within the meaning of the term "plate" as herein used.

I claim:

1. A gage for indicating pressures, comprising an actuator movable by the fluid of which the pressure is to be measured, an oscillatively mounted indicator, an arm connected with said indicator, a link pivoted to said arm, a lever pivotally connected with said link, a fulcrum for said lever, and a member secured to, and projecting rigidly from, said actuator, and having a sliding engagement with the said lever.

2. A gage for indicating pressures, comprising an actuator movable by the fluid of which the pressure is to be measured, an oscillatively mounted indicator, an arm connected with said indicator, a link pivotally connected with said arm, a lever pivotally connected with said link, a fulcrum for said lever adjustable in a direction transverse to the lever, and a member secured to, and projecting rigidly from, said actuator, and engaged with the said lever, said member being angularly adjustable with respect to the actuator, and being engageable with the lever at different points of the latter.

3. A gage comprising essentially, a case, a head secured in said case and having a nipple external to the case, said head having also a conduit portion communicating with the nipple, a curved spring tube adapted to be mounted upon the head in communication with the conduit portion, a lever pivotally mounted upon the free end of said spring tube, and adapted to be fixed in

various positions angularly about its pivot, a post or upright projecting from said head, a lever having its fulcrum on said post, extending transversely of the first named lever, and having a connection therewith, a link connected to the second named lever, an indicator arbor, and an arm attached to said arbor and connected with said link.

4. A gage comprising essentially, a case, a head secured in said case and having a nipple external to the case, said head having also a conduit portion communicating with the nipple, a curved spring tube adapted to be mounted upon the head in communication with the conduit portion, a lever pivotally mounted upon the free end of said spring tube, and adapted to be fixed in various positions angularly about its pivot, a post or upright projecting from said head, a plate adjustably mounted on said post and movable in a line approximately parallel to said lever, a lever having its fulcrum on said plate, extending transversely of the first named lever, and having a connection therewith, a link connected to the second named lever, an indicator arbor, and an arm attached to said arbor and connected with said link, the effective length of said arm being variable, whereby to alter the amplitude of movement of the arbor.

5. A gage comprising essentially, a case, a head secured in said case and having a nipple external to the case, said head having also a conduit portion communicating with the nipple, a curved spring tube adapted to be mounted upon the head in communication with the conduit portion, a lever pivotally mounted upon the free end of said spring tube, and adapted to be fixed in various positions angularly about its pivot, a post or upright projecting from said head, a lever having its fulcrum on said post, extending transversely of the first named lever, and having a connection therewith, a link connected to the second named lever, an indicator arbor, and an arm attached to said arbor and connected with said link, the connection between said levers being provided by a stud on the first named lever entering a slot in the second named lever, said slot being inclined to the movements of the stud produced by angular adjustments of the first named lever, whereby such adjustments may change both the position of the arbor and the amplitude of movement thereof.

6. A gage comprising a spring tube, a lever pivoted to said tube adjustable about its pivot, means for securing said lever rigidly to said tube in its various adjustments, a pivotally mounted second lever extending transversely of said first lever and having a sliding and oscillative engagement therewith, whereby adjustment of the first lever causes movement of the second lever about its fulcrum and alters the leverage which said first lever exerts on the second lever, an oscillative pointer, an arm connected to said pointer, a plate adjustable longitudinally of said arm, and a link connecting said second lever and said plate.

7. A pressure gage comprising essentially, a pivotally mounted pointer, an arm connected to said pointer, a plate connected to said arm with provision for adjustment longitudinally thereof, a link connected to said plate, a pivotally mounted lever having an adjustable fulcrum connected to said link, a pressure actuated member, and a motion-applying connection between said member and said lever, adjustable with respect to both, whereby to change the position and amplitude of motion of said lever.

8. In a pressure indicating gage, the combination with a pressure operated actuator and an indicator, of motion transmitting connections between said actuator and indicator, comprising a lever, means for connecting said lever with the indicator, said means adjustable in a manner such as to vary the amplitude of movement of the indicator, an adjustable fulcrum for said lever, by adjustments of which the position of the indicator may be altered, and adjustable connecting means between the actuator and an intermediate point of the lever, adjustable to make further and finer alterations in the position and movement of the indicator.

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

COLEMAN J. MANNING.

Witnesses:
C. F. BROWN,
P. W. PEZZETTI.