March 25, 1941. O. B. BOLEY 2,236,422

CYLINDER PRESSURE INDICATING MEANS

Filed March 7, 1938

Fig. 1.

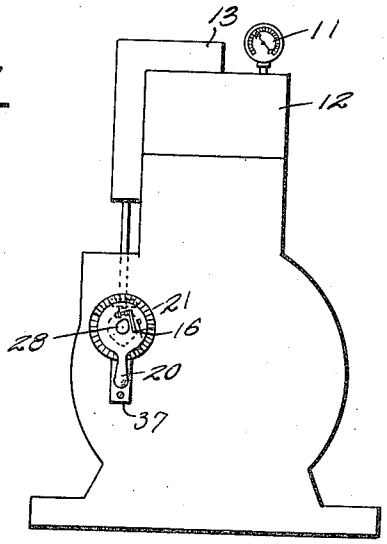


Fig. 2.

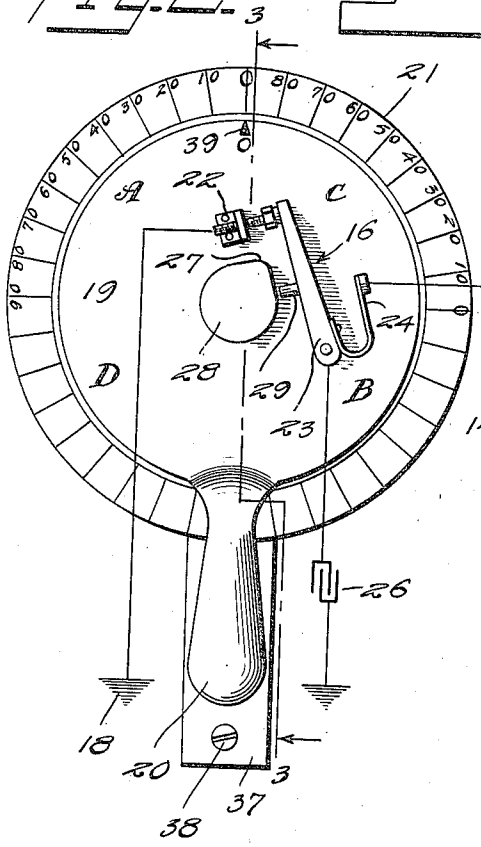
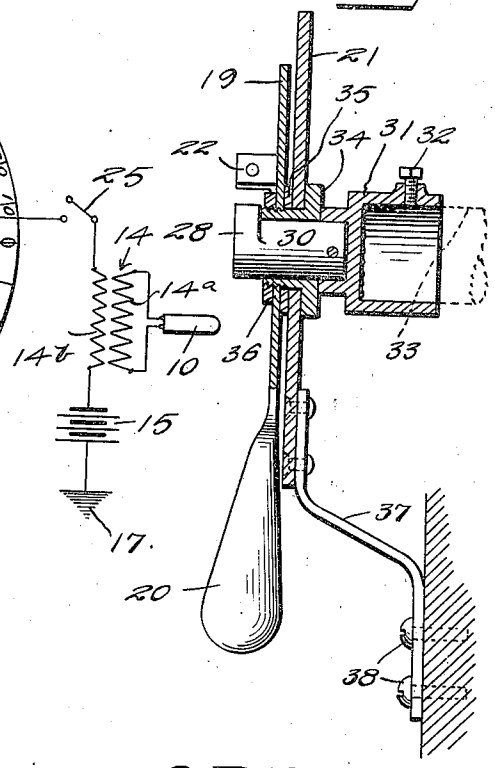


Fig. 3.



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Patented Mar. 25, 1941 2,236,422

UNITED STATES PATENT OFFICE

2,236,422

CYLINDER PRESSURE INDICATING MEANS

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Application March 7, 1938, Serial No. 194,485

4 Claims. (Cl. 73—51)

The object of the invention is to provide an appliance to be used in connection with engines, whereby the cylinder pressure within the cylinder, during the power stroke at any predetermined position of the piston, may be readily determined, so that selected readings may be taken and a pressure curve plotted therefrom; to provide an appliance of the kind indicated which provides for its use with a plurality of cylinders without the necessity for having to be set up for use with each particular cylinder; and generally to provide a device or appliance of the kind indicated which is of simple form and susceptible of cheap manufacture.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing but to which the invention is not to be restricted. Practical application may dictate certain changes or alterations and the right is claimed to make any which fall within the spirit of the invention.

Figure 1 is an elevational view showing the invention applied in operative position.

Figure 2 is a front elevational view of the invention.

Figure 3 is a sectional view on the plane indicated by the line 3—3 of Figure 2.

Although adapted for use on any form of engine in which cylinder pressure at that particular point is to be determined, the invention is illustrated as applied to an internal combustion engine and comprises a light 10, periodically energized, which serves as a means for noting the pressure on a pressure gage 11, the gage being connected to the cylinder 12 at the upper end of the latter and the light being preferably in facing relation to the gage and disposed within a housing 13 which, if desired, may also house the high tension transformer 14, across the secondary 14a of which the light is connected. The primary 14b of the transformer is connected in series with the battery 15 and make and break 16, one terminal of the battery being grounded, as indicated at 17, and one terminal of the make and break, preferably the fixed terminal, being grounded, as indicated at 18.

The make and break is carried on an angularly adjustable plate 19 which is provided with a radially projecting handle 20, so that the plate may be adjusted relative to the stationary plate 21.

The make and break comprises a stationary contact 22 and a movable contact 23 in the form of a pivoted arm spring pressed into engagement with the fixed contact by a leaf spring 24 to which the primary 14b of the transformer is connected but through a switch 25, so that the circuit on the primary may be open when the device is not in use. A condenser 26 is connected between the contact arm 23 and the ground to avoid the deleterious effects of sparking when the make and break is opened, as it will be when the rise 27 of the cam 28 passes the lug 29 on the contact arm 23.

The cam 28 is formed as an element of a stub shaft 30 pinned or otherwise secured to a socket member 31 which, by means of a set screw 32, is designed for mounting on the cam shaft 33 of the engine, so that the cam 28 will rotate in timed relation with the cam shaft 33. The stub shaft 30 is surrounded with a flanged bushing 34 on which the plate 21 is mounted, the plate 19 being also mounted on the bushing with a friction washer 35 interposed between it and the plate 21, the plate 19 abutting a nut 36 on the forward end of the bushing and the plate 21 abutting the rear flange of the latter.

The plates 19 and 21 are normally relatively stationary but the former is angularly adjustable with respect to the latter and its adjusted position is maintained by the friction washer 35. The plate 21 is stationary with respect to the engine and to insure this is provided with an angular arm 37 by means of which it may be secured to the engine frame by screws 38 engaged in tapped holes formed in the frame.

In the illustrated embodiment, the device is designed for use on a four cylinder engine and the stationary plate 21 is divided into four quadrants indicated as A, B, C and D respectively, each quadrant having ten degree divisions marked respectively 10, 20 etc.

The plate 19 is of smaller size than the plate 21, so that the markings on the latter at the periphery may be readily visible for registration with the indicator 39 marked on the plate 19, the movement of the plate 19 to any one of the divisions in a particular quadrant, indicating the position of the piston in the cylinder to which the particular quadrant is related. But movement of the plate 19 changes the position of the make and break 16 relative to the cam shaft, so that with the plate 19 in a particular position, the make and break is opened by the rise 27 on the cam 28 at the indicated position of the piston in the particular cylinder under consideration. If the switch 25 be closed, as it will when a test is being run, the opening of the make and break will result in a decline of the magnetic field in the primary 14b with the result that a current

will be set up in the secondary 14a, thus causing the lamp 10 to be energized. The lamp 10 is designed to be a neon lamp or any other acceptable lamp with a minimum after glow.

In the particular cylinder under test, the pressure gage will be continually changing but the operator, having made the proper setting of the plate 19, will watch the gage and at the point where it is desired to measure the presure, the light wil be energized, so that the pressure at that instant can be noted on the gage. This can be checked up by taking several readings in any adjusted position. The plate 19 is then shifted to the next position and a reading similarly taken. From the series of readings thus made, the desired pressure curve may be plotted and similarly the curve for all cylinders by carrying out the series of operations for each cylinder by adjustment of the plate 19 in the several quadrants of the stationary plate 21.

The invention having been described, what is claimed as new and useful is:

1. In a cylinder pressure indicating means wherein the cylinder under test is equipped with a pressure gage and a piston movable therein, the combination of a visual indicator, a circuit maker and breaker, and an energizing circuit containing the latter and the indicator, actuating means for the maker and breaker driven in timed relation with the engine piston, and a mounting for the maker and breaker adjustable to vary the point of actuation of the latter, the visual indicator being in the form of a light directed on the face of the gage.

2. In a cylinder pressure indicating means wherein the cylinder under test is equipped with a pressure gage and a piston movable therein, the combination of a visual indicator in the form of a light directed on the face of the pressure gage, a circuit maker and breaker, and an energizing circuit containing the latter and the indicator, actuating means for the maker and breaker driven in timed relation with the engine piston, and a mounting for the maker and breaker adjustable to vary the point of actuation of the latter, the said mounting comprising a pair of plates of which one is stationary with respect to the cylinder and the second angularly adjustable with respect to the first and bodily supporting the maker and breaker.

3. In a cylinder pressure indicating means wherein the cylinder under test is equipped with a pressure gage and a piston movable therein, the combination of a visual indicator in the form of a light directed on the face of the pressure gage, a circuit maker and breaker, and an energizing circuit containing the latter and the indicator, actuating means for the maker and breaker driven in timed relation with the engine piston, and a mounting for the maker and breaker adjustable to vary the point of actuation of the latter, the said mounting comprising a pair of plates of which one is stationary with respect to the cylinder and the second angularly adjustable with respect to the first and bodily supporting the maker and breaker, the two plates having a common mounting and a friction washer surrounding said mounting and interposed between them.

4. In a cylinder pressure indicating means wherein the cylinder under test is equipped with a pressure gage and a piston movable therein, the combination of a visual indicator in the form of a light directed on the face of the pressure gage, a circuit maker and breaker, and an energizing circuit containing the latter and the indicator, actuating means for the maker and breaker driven in timed relation with the engine piston, and a mounting for the maker and breaker adjustable to vary the point of actuation of the latter, the said mounting comprising a pair of plates of which one is stationary with respect to the cylinder and the second angularly adjustable with respect to the first and bodily supporting the maker and breaker, the two plates having a common mounting and a friction washer surrounding said mounting and interposed between them, the stationary plate being marked off in angular units to correspond with the position of the cylinder piston and the adjustable plate having an indicator for selective registration with any of said markings.

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