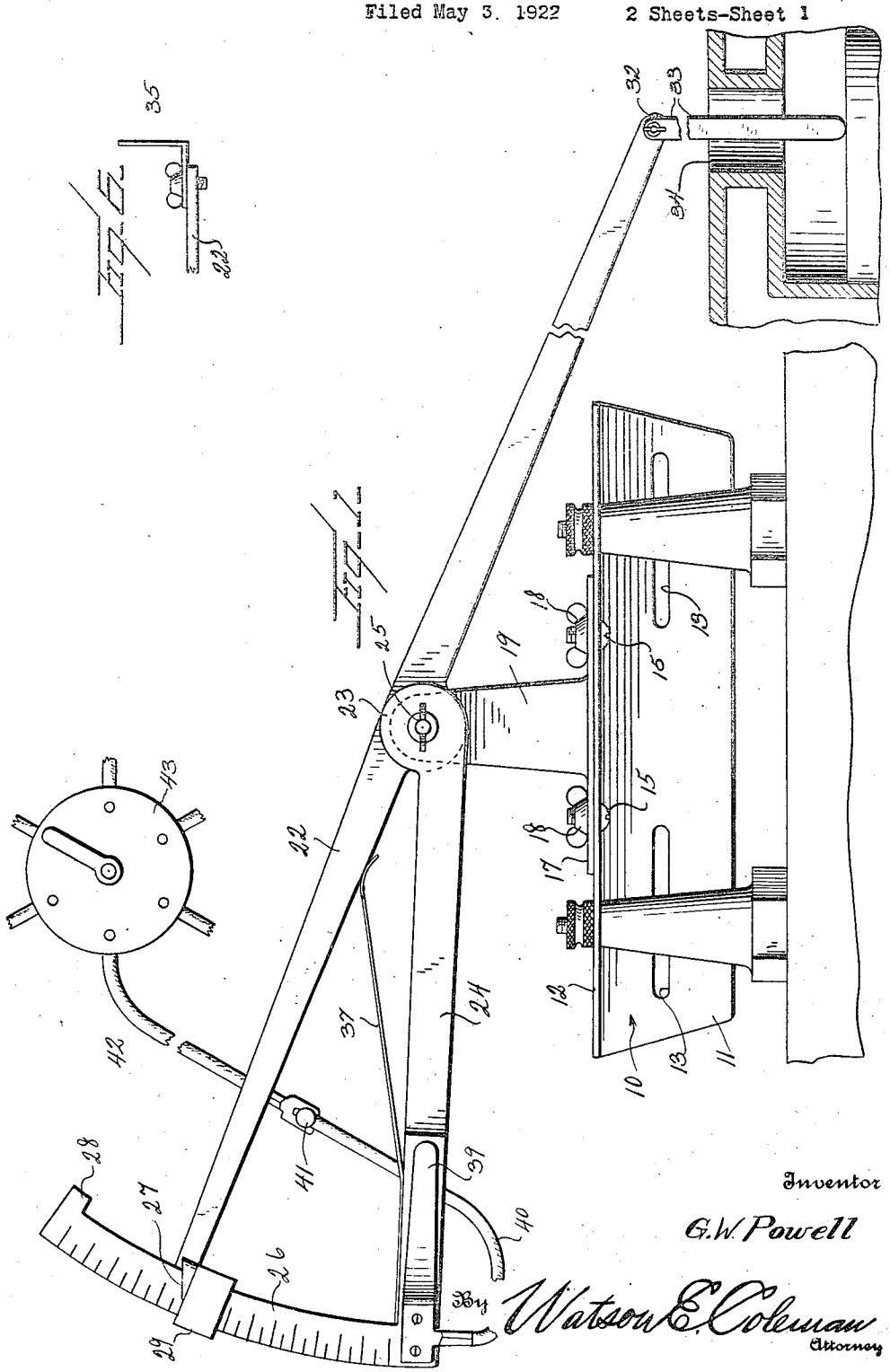
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GAUGE

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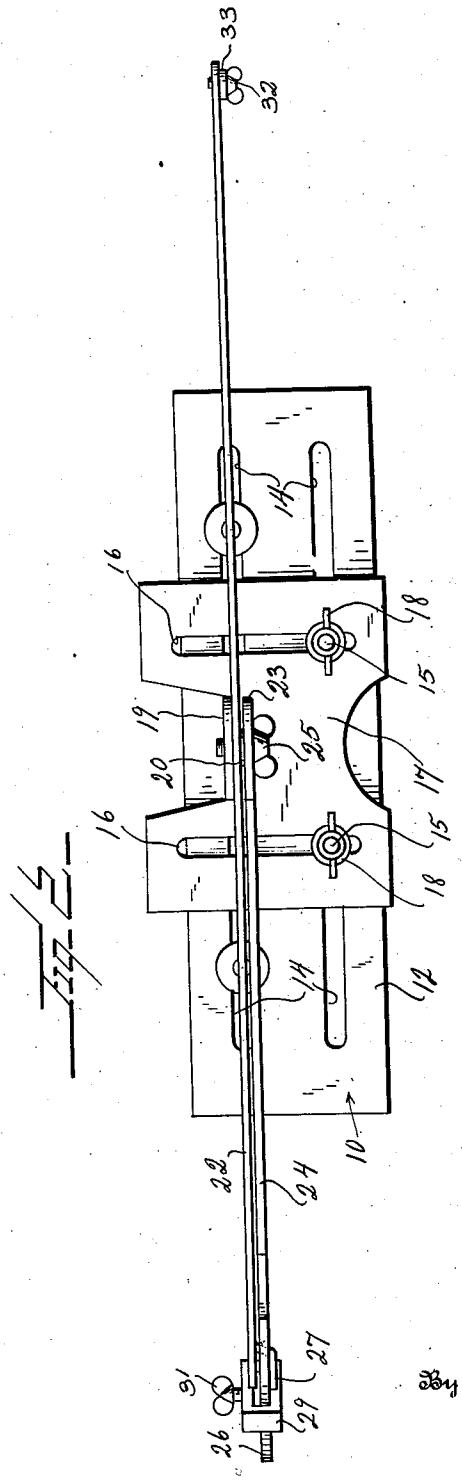
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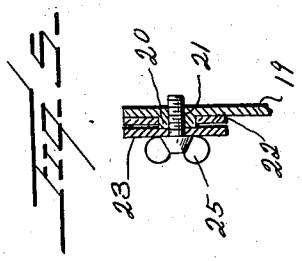
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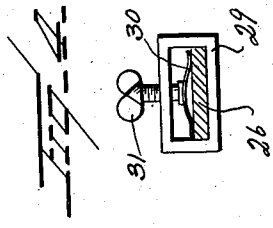
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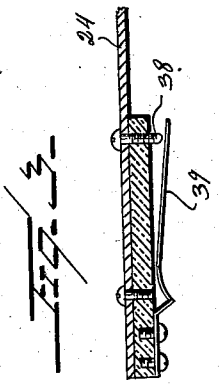
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Inventor

G. W. Powell

By Watson E. Coleman

Attorney

Patented Mar. 4, 1924. 1,485,429

UNITED STATES PATENT OFFICE.

GEORGE W. POWELL, OF LA GRANDE, OREGON.

GAUGE.

Application filed May 3, 1922. Serial No. 558,173.

To all whom it may concern:

Be it known that I, GEORGE W. POWELL, a citizen of the United States, residing at La Grande, in the county of Union and State of Oregon, have invented certain new and useful Improvements in Gauges, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in gauges, and more particularly to a gauge for indicating the proper sparking points of gasoline engines of automobiles and the like.

An important object of the invention is to provide a device of this character which may be employed with as great facility in engines, the spark plug openings of which are formed in the side walls of the cylinder, as in engines where the spark plug openings are formed in the head of the cylinder in the usual manner.

A further object of the invention is to provide a device of this character which may be employed with different makes and constructions of engines, the device being adjustable to compensate for the difference of construction.

A still further object of the invention is to provide means whereby the top center of piston travel may be readily determined together with means for showing the amount of travel of the piston between the limits of its spark attachment.

These and other objects I accomplish by the construction and arrangement shown in the accompanying drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein like reference characters designate like parts throughout.

In the drawings:

Figure 1 is a side elevation partially in section and partially diagrammatic showing adjusting apparatus constructed in accordance with my invention;

Figure 2 is a plan view thereof;

Figure 3 is a sectional view through the spark gap apparatus;

Figure 4 is a detail view of the clamp;

Figure 5 is a section taken through the mounting for the arm and lever; and

Figure 6 is a detail view showing a tappet for use in cylinders in which the spark plugs are entered from the side.

Referring now more particularly to the drawings, the numeral 10 indicates an attaching plate substantially V-shaped in cross section and having the arms 11 and 12 thereof provided with slots 13 for the reception of securing means whereby it may be secured to an engine or other suitable fixed support adjacent the engine. The plate forming the arm 12 of the attaching plate is provided with spaced longitudinally aligned extending slots 14 through which extend headed elements 15 having the heads thereof arranged beneath the plate and having the shanks thereof threaded. These threaded shanks extend through transverse slots 16 formed in the base 17, upon which base wing nuts or the like, as indicated at 18, engage the threaded elements for clamping the base 17 in adjusted position. Because of the arrangement of the slots 14 and 16 at right angles to one another, the base 17 is capable of a wide range of adjustment upon the arm 12.

Extending upwardly from the base 17 is a stem or support 19 provided at its upper end with a pivot 20 having a threaded bore 21. Mounted for oscillation upon the pivot is a lever 22 and abutting the end of the pivot 20 is an ear 23 formed upon the end of an arm 24. An adjusting clamp screw 25 extends through the ear 23 and engages in the threaded bore of the pivot 20 for maintaining the arm 24 in adjusted position. The arm 24 is provided at its free end with an arcuate graduated scale 26 with which one end of the lever 22 coacts, this end of the lever being provided with a pointer 27. The free end of the arcuate scale is provided with a stop 28 limiting the movement of the lever in one direction upon the scale and the scale has slidably mounted thereon an adjustable indicator 29. This indicator is preferably in the form of a yoke surrounding the scale and freely slidable thereon and having a spring 30 for engaging against the scale to hold the yoke in adjusted position. The tension of this spring may be adjusted by means of a thumb screw 31 or the like so that this tension may be at all times sufficient to hold the yoke in adjusted position. The opposite end of the lever is provided with means 32 for electrically and mechanically attaching thereto sounding or tappet arms 33 for extension into the cylinder through the spark plug opening 34 thereof. These arms will, of course, be made of different constructions for use in connection with engines of different types.

Where the arm 33 is for use in connection with a cylinder having an unobstructed passage through a spark plug opening 34 in the top of the cylinder and where the only motion transmitted to the arm is a vertical one, these tappet arms may be made perfectly straight, as indicated in Figure 1. Where the spark plug opening is in the side wall, these arms are provided with an angular extension 35 adapted to extend through the spark plug opening into the cylinder for engagement by the piston 36 during its upward travel. This angular extension being rigidly secured to the tappet arm, proper engagement of the end thereof by the piston will cause a vertical travel of the main portion of the tappet arm and a corresponding travel of the lever. It is understood that the width of the spark plug opening is ordinarily sufficient to cover the amount of travel of the piston during the range of the spark.

Carried by the arm 24 are a pair of contacts 38 and 39, one of which, 38, is electrically connected to the arm 24 and the other of which, 39, is insulated therefrom and has connected thereto a wire 40 provided at its free end with a connector 41. The contacts 38 and 39 are so spaced as to provide therebetween a spark gap which is arranged so that it will be visible.

In the use of my device for adjusting the spark of the engine, the attaching plate 10 is first secured to a suitable support, preferably the engine, by removing the nuts from the attaching screws of certain of the spark plugs and replacing these nuts after the plate has been arranged upon the plugs with the attaching screws extending through the slots 13 thereof. The lead wires 42 of the spark plugs are then disconnected from the spark plugs but left engaged with the distributer 43. The plug of the cylinder from which it is desired to make the test is then removed and the base 17 adjusted upon the plate 10 so as to bring the end of the lever 22 to which the tappet arm 33 is secured into alignment with the spark plug opening and the tappet arm is then secured to the end of the lever and extended into the cylinder and the wire 41 from the contact 39 is connected to the lead wire 42 of the distributer 43 which is normally attached to the removed spark plug. The arm 24 bearing the scale is then adjusted so that the operation of the lever under influence of the piston engagement with the tappet will maintain the pointer upon the scale. This arm has secured thereto a spring 37 which engages the lever and the lever is accordingly moved upwardly until it engages the stop 28. The engine is then cranked and as the piston moves upwardly its engagement with the tappet arm will cause the pointer to move away from the stop upon the scale, moving with it the indicator or yoke 29. Arriving at the upward limit of its travel, the movement of the piston is reversed and accordingly the movement of the pointer is reversed which moves away from the yoke, leaving the yoke in a position to indicate the highest point of travel, and moves toward the stop 28. The spark lever may then be adjusted to its full retarded position and upon connection being made with the corresponding contact in the distributer 43, an electrical circuit is completed through the engine to the tappet 33, through lever 22 and arm 24 to the contact 38 and from the contact 39 to the distributer, causing the spark to jump across the gap between the contacts 38 and 39, indicating the sparking point for a full retarded spark. This position being noted and the space between the yoke and the pointer at the time of operation being correctly gauged, the cranking operation is continued and the spark adjusted to its full advanced position. When the spark occurs again, as it will before the arrival of the piston at top dead center, the position of the spark with relation to the piston movement may be determined by the space between the pointer and the yoke. If the two distances between the yoke when the spark occurs in full advanced and full retarded position do not correspond, which is the preferred adjustment of the spark, they may be readily corrected by simply continuing the cranking of the engine until the pointer 27 engages against the yoke and the piston is at its top center, then adjusting the spark controlling lever to a point midway of the segment and adjusting the cam of the distributer so that contact is made and the spark passes between the contacts 38 and 39 while the piston is at top dead center.

It will likewise be obvious that the device may be readily employed for adjusting the valves of the engine so that they may be opened at the proper time, this adjustment usually being accomplished through the medium of the cam shaft and the adjustment of a single valve ordinarily sufficing beyond the minor adjustment to the tappets for all of the valves of the engine. It will, of course, be obvious that the amount of travel of the pointer 27 may be regulated by regulating the lengths of the work and power arms of the lever 22.

From the foregoing it is believed to be obvious that a gauge constructed in accordance with my invention is particularly well adapted for the purpose for which it is intended for the reason that it may be applied to engines of various types and may be employed for gauging and correcting the distances at opposite sides of the dead center at which the sparking occurs. It will furthermore be obvious that the construction as hereinbefore set forth is capable of some change and modification without materially

departing from the spirit of my invention and I accordingly do not limit myself thereto except as hereinafter claimed.

I claim:

1. In an adjustment gauge for engines having reciprocatory pistons, an adjustable support, a lever pivoted upon the support, an arcuate scale adjustable upon the support and with which one end of the lever coacts, and an indicator slidable upon the scale and disposed in the path of said lever.

2. In an adjustment gauge for engines having reciprocating pistons, a support adapted to be adjustably secured to the engine, a lever pivoted intermediate its ends upon the support, an arm carried by the support and adjustable thereon with the pivot of the lever as a center, means for securing the arm in adjusted position, an arcuate scale carried by the free end of the arm and with which one end of the lever coacts, and an indicator slidable upon the scale and disposed in the path of said lever, said indicator including means maintaining the same in adjusted position upon the scale, the opposite end of the lever being provided with a tappet for engagement with the piston.

3. In an adjustment gauge for engines having reciprocating pistons, a support adapted to be adjustably secured to the engine, a lever pivoted intermediate its ends upon the support, an arm carried by the support and adjustable thereon with the pivot of the lever as a center, means for securing the arm in adjusted position, an arcuate scale carried by the free end of the arm and with which one end of the lever coacts, an indicator slidable upon the scale and disposed in the path of said lever, said indicator including means maintaining the same in adjusted position upon the scale, the opposite end of the lever being provided with a tappet for engagement with the piston, and means upon the scale coacting with the adjacent end of the lever limiting the movement of the lever upon the scale in a direction away from said indicator.

4. An adjustment gauge for internal combustion engines having reciprocatory pistons and a plurality of cylinders each provided with a spark plug, said gauge including a plate having slots therein receiving the main electrodes of the spark plugs of a pair of adjacent cylinders, said slots being of considerable length and permitting engagement of the plate with variously spaced spark plugs within certain limits, a second plate adjustable upon the first named plate, a support extending upwardly from the plate, an arm associated with the support, a bolt extending through the arm and support and clamping the arm in adjusted position upon the support, a lever pivoted intermediate its ends upon the bolt, an arcuate scale carried by the free end of the arm and with which one end of the lever coacts, and a tappet carried by the opposite end of the lever and adapted to extend into a third cylinder of the engine through the opening provided by the removal of the spark plug thereof.

In testimony whereof I hereunto affix my signature.

GEORGE W. POWELL.