Jan. 14, 1958 M. P. KITZMAN 2,819,534

TOOL FOR ADJUSTING VALVE MECHANISMS

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Fig. 1

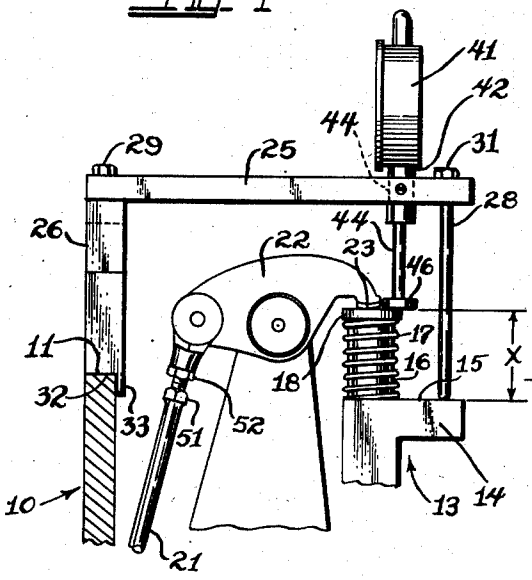


Fig. 2

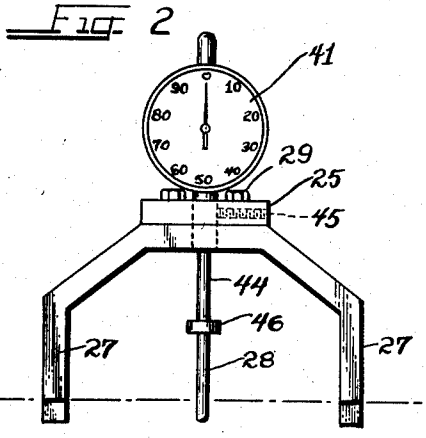
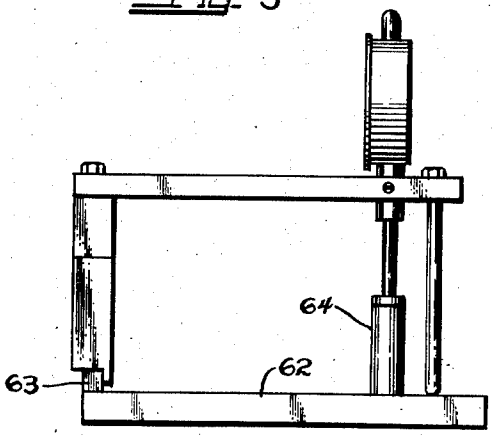


Fig. 3



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TOOL FOR ADJUSTING VALVE MECHANISMS

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1 Claim. (Cl. 33—181)

This invention relates to a tool for facilitating the adjustment of the position of a poppet type valve. In particular it has reference to a tool to aid in the accurate setting of the initial position of a fuel injector valve, for example as used in a diesel engine.

In certain types of diesel engines the injector valve is operated through a rocker arm and push rod receiving actuation from a cam shaft. Due to the precise relation to be established between the movable member of the valve and its related ports the utmost care must be taken to adjust the operating mechanism to some pre-determined position, e. g. as established on the dwell region of the related cam. In one type of engine, namely the Series 71 diesel engine manufactured by General Motors Corporation, Pontiac, Michigan, the procedure by which adjustment of the injector valve is established consists in setting the valve plunger follower disc a specified distance from a fiducial surface of the valve body. Under that procedure the manufacturer provided a gauge pin adapted to be interposed manually between the plunger follower disc and the fiducial surface. Since the gauged distance was to be measured in thousandths of an inch the slightest departure from perpendicularity of the gauge pin from the fiducial surface introduced error beyond the allowable tolerances and the establishment of the desired degree of accuracy in setting the valve plunger was frequently defeated.

My invention has for its principal object the provision of a tool for facilitating rapid attainment of the desired adjustment as aforesaid and which is incapable of introducing those errors heretofore attributable to the manipulation of a simple gauging pin.

Another object is to provide a tool thus characterized which allows adjustment of the relative position of the follower rod and rocker arm without the necessity of removing the tool from gauging position.

A further object is to provide a tool which is adaptable, by simple calibration, to any of a number of gauged distances for various applications.

Other objects and advantages will become apparent from the ensuing description which, taken together with the accompanying drawing, discloses a preferred form which the invention may assume in practice.

In this drawing:

Fig. 1 shows the invention tool in place;

Fig. 2 is a left side view of the showing of Fig. 1; and

Fig. 3 is a composite view of the tool and a master gauge for calibrating the same.

Regarded broadly the invention comprises a rigid framework having a tripod type of support. Two of the legs are adapted to bear upon a convenient fiducial surface of the cylinder head and the third leg bears on another fiducial surface, preferaby a face of the body of the injector valve thereby to establish a fixed reference. Mounted in the frame is a suitable type of dial indicator the anvil of which is positioned to abut the injector plunger follower. The dial indicator is calibrated to "zero" by an

adjunct which is a separately furnished counterpart of the reference just alluded to and which is provided with a plug or gauge of the predetermined distance to which the injector plunger follower is to be set. Thus, by simulating the conditions under which the invention tool is employed, the indicator may be calibrated to "zero" in a well-known manner and then utilized in the setting operation.

Thus, turning to the drawing the cylinder head is indicated at **10** and a finished margin thereof at **11** represents one of the two fiducial surfaces. Such surface **11** is not intended to be limitative as other convenient fixed surfaces having the required accuracy may serve equally. In the example margin **11** is a portion of the peripheral wall against which the valve rocker cover is secured; a gasket being interposed when the valve cover is installed thereon, as will be understood. One of the injector valves is shown at **13** and includes a body casting **14** having a fiducial surface **15**, a plunger **16**, a restoring spring **17** and a follower **18** formed as a head of the plunger. Reciprocating movement is imparted to the plunger by a cam (not shown), a cam follower rod **21**, and a rocker arm **22**, all of which is well recognized in the art.

In adjusting the injector valve the cam is rotated to its dwell position at which condition of the parts actuated thereby some pre-determined distance X, measured from the follower **18** to surface **15**, must obtain. It will be noted that the rocker arm **22** is provided with a pad **23** in abutment with the follower **18** whereby the injector valve is reciprocated by the valve cam against the restoring force of the spring **17**.

The invention tool comprises a framework consisting of a plate **25**, a support **26** having two legs **27—27** and a spacer rod or leg **28**. Support **26** is secured in any suitable manner to the plate **25**, as by screws **29** and leg **28** may be passed through an aperture into the plate **25** and locked by a nut **31**. At its distal end of each of the legs **27—27** is provided with a surface **32** for abutment with the surface **11** to establish the fixed reference for one side of the tool. To prevent lateral dislodgment a depending projection **33** is provided. The distal end of the opposite leg **28** rests on the fiducial surface **15** and may be hemispherical at its end for spot contact.

A dial indicator **41** is fitted, by means of its shank **42**, in an aperture **44** in the plate **25** and is secured by a set screw **45**. The plunger **44** of the indicator preferably carries a pad **46** for abutment on the follower **18**.

From the foregoing it will have become apparent that, upon prior calibration of the indicator to "zero" when dimension X obtains between the active face of the plunger pad **46** and the tip of the post **28**, and when the tool is employed in the manner illustrated in Fig. 1, adjustment of the valve mechanism may be undertaken to restore "zero" reading. In general such adjustment is effected by rotation of the hexagonal portion **51** of the push rod **21** to change the effective length of the push rod in the well-understood manner. The locknut **52** is manipulated in its customary way. By pursuing the foregoing procedure the follower **18** may be positioned for establishment of dimension X with an accuracy dependent only on the fineness with which the dial of the indicator may be read.

Due to the tripod support no wobbling of the tool is possible and the same may be easily held in operative position during adjustment of valve position and just as easily shifted from one valve to another. It will be noted that, by splaying the legs **27—27** (Fig. 2) sufficient space is afforded for manipulation of the wrenches used for the parts **51** and **52**.

In order to facilitate calibration of the tool a dummy or master jig may be provided in accordance with Fig. 3. Such jig includes a base plate **62** simulating the surface

15, a rib 63 simulating the surface 11, and an accurate plug gauge 64 having a height X. Thus the invention tool may be initially calibrated for a selected dimension X and thereafter checked from time to time. If desired the plug 64 may comprise gauge blocks such as the well-known Johansson gauge blocks.

It is within the scope of the invention to mount the dial indicator for lateral movement in a slot in the plate 25 and to lock the same in a selected position for those applications wherein the part undergoing adjustment may be at varying distances from the legs 27—27.

While I have shown a particular embodiment of my invention it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made and I therefore contemplate by the appended claim to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

In a gauging tool which includes an indicator having an operating member to bear on an adjustable part for indicating the position thereof and for use wherein some predetermined dimension is to be established between a reference surface of said part and first and second fixed reference surfaces which are disposed on opposite sides of said adjustable part surface and which are perpendicular to the direction of adjustment of the part, and wherein at least one of said first and second surfaces meets a third,

fixed reference surface which is parallel to the direction of adjustment and wherein the indicator has a fixed location during use of the tool, the improvement which comprises a framework for supporting said indicator adapted to be held in operative position with respect to said fixed reference surfaces for locating the tool in directions parallel to the direction of adjustment of the part and perpendicularly thereto pending adjustment, said framework comprising a plate including means for holding the indicator, a first leg secured to said plate having a distal end for abutment with one of the first and second surfaces and a pair of spaced legs secured to said plate at the opposite end from said first leg, the distal ends of said pair of legs abutting the other of the first and second surfaces and providing with said first leg a tripod support, at least one of said pair of legs having a projection from its distal end including a face for abutment with the third surface to locate the tool in a direction perpendicularly to the direction of adjustment.

References Cited in the file of this patent

UNITED STATES PATENTS

1,303,387	Pogue	May 13, 1919
2,278,710	Orr	Apr. 7, 1942
2,471,746	Hilbert	May 31, 1949