Nov. 14, 1933. J. G. SCHOTTHOEFER 1,935,131

COMBINED WRENCH AND GAUGE

Filed Aug. 1, 1931

Fig. 1.

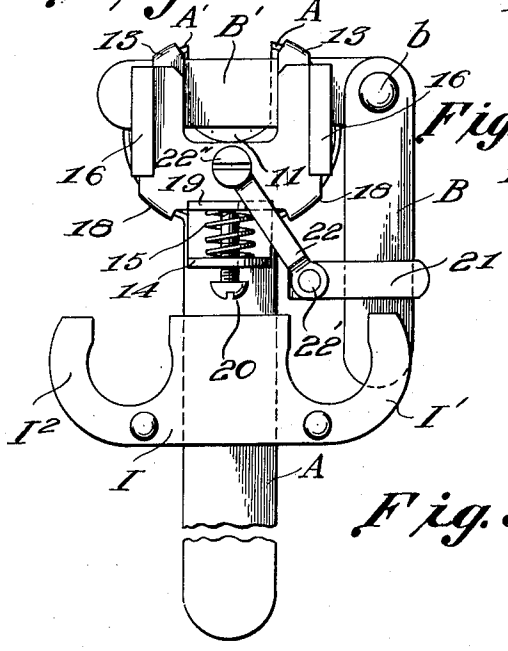


Fig. 2.

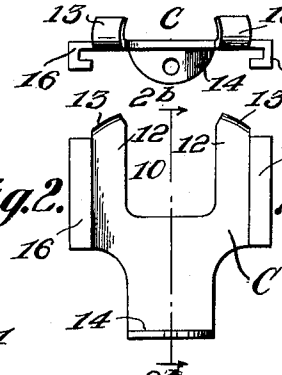


Fig. 2a.

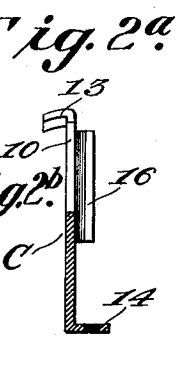


Fig. 2b.

Fig. 3.

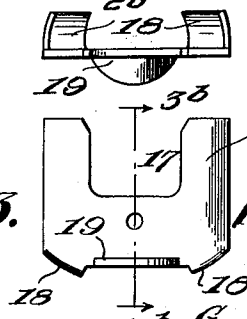


Fig. 3a.

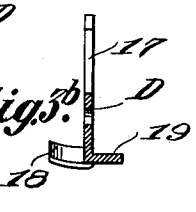


Fig. 3b.

Fig. 5.

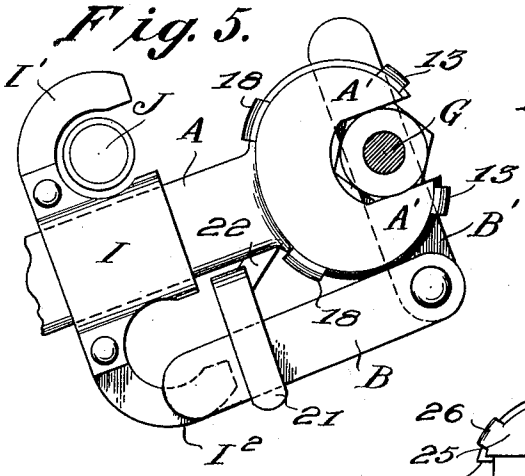


Fig. 6.

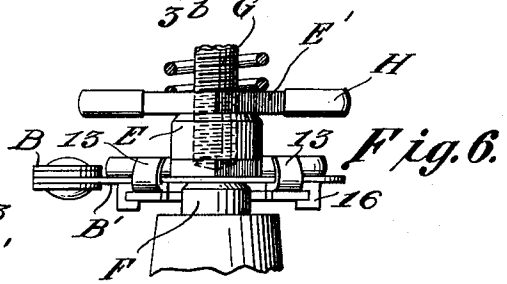


Fig. 4.

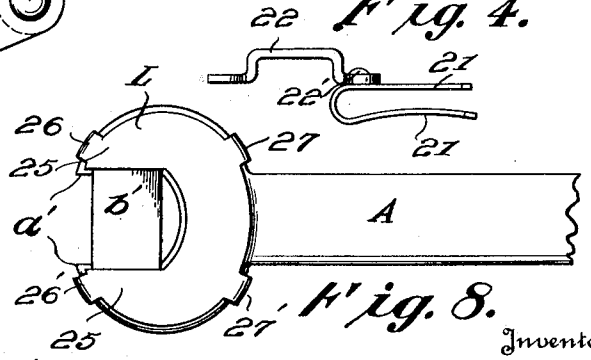


Fig. 7.

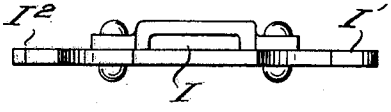


Fig. 8.

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UNITED STATES PATENT OFFICE

1,935,131

COMBINED WRENCH AND GAUGE

Joseph G. Schotthoefer, Peoria, Ill

Application August 1, 1931. Serial No. 554,577

18 Claims. (Cl. 81—3)

A fundamental purpose of this invention is to provide a combined wrench and gauge of simple and practicable construction, by which a nut or analogous device may be held against movement while another nut or analogous device is being adjusted and by which, at the same time, the pre-existing distance or clearance provided between said nuts or analogous devices may be accurately indicated and conveniently brought about in re-adjustment of said nuts or analogous devices relatively to each other.

A tool of this nature is especially useful in relation to the valves and valve stems and the valve pushers or tappets of internal combustion engines. In the use of these engines the valves have to be reground to their seats or replaced by new valves, at more or less frequent intervals, and as an incident to such operation, the valves with their stems are required to be freed from other parts of the valve mechanism to permit the valves to be removed or to be rotated or oscillated upon their seats, while, at the same time, the same clearance originally provided by the manufacturer of the engines between the valve stem and the valve tappet must be again provided in order that the best results in the operation of the engine may be assured. Again, it is the practice with several types of valve mechanisms to adjust the valves relatively to the tappets to compensate for wear in the latter, and this invention may be very usefully employed in the said operation.

In short, this invention when employed in the adjustments of parts of valve mechanisms to provide for an exact clearance between a valve tappet and the tappet engaging head of a valve stem, may be used in any relative adjustment of said tappet and head, regardless of which of these parts is the one actually moved, and in either case will provide means by which the pre-existing clearance between the relatively adjusted parts is retained.

A further purpose of the invention, therefore, is to provide a combined wrench and gauge by the use of which one member of the valve mechanism of an internal combustion engine may be held while another member of said mechanism is being adjusted and which, at the same time, will eliminate the necessity of the use of separate thickness gauges in the operation of producing the exact clearance between the valve tappet and the part connected to the valve stem which is to be engaged by said tappet predetermined to give the best results in the operation of the engine.

It may be here mentioned that a valve mechanism including a valve and a tappet engaging head normally fixed to the valve stem at the end thereof opposite the valve and detachable therefrom to free the valve and its stem for removal or for regrinding of the valve, is illustrated, described, and claimed in an application for Letters Patent of the United States executed and filed by me of even date herewith and titled Valve mechanism for internal combustion engines, the said application being numbered, serially, 554,576. This combined wrench and gauge is especially well adapted for use in relation to said mechanism, since it provides a means by which one of two members forming parts of the tappet-engaging head of the valve mechanism and adjustable relatively to each other may be held while the other member of said head is being adjusted to release the valve stem and thereby free the valve stem for removal of said stem and valve for regrinding of the valve, and also provides means by which the original clearance may be brought about without difficulty.

A further purpose of the invention is to provide a combined wrench and gauge having the foregoing capability and which also is provided with means to attach it releasably to a valve tappet, or other appropriate part of the engine, adjacent to but different from the tappet corresponding to the tappet engaging head which is to be operated on, to thereby leave both hands of the user free for the operations to be, or being, performed, that is, for freeing the valve stem from or attaching it to the tappet engaging head and for removing, replacing or regrinding the valve, or for any other operations which can be best performed when one hand of the mechanic is not occupied with the work of holding the member of the mechanism which is engaged by the combined wrench and gauge against movement with any other member of said mechanism.

Another purpose of this invention is to provide a means by which an ordinary thickness gauge may be detachably applied to a tappet wrench of any usual construction, thereby producing a combined wrench and gauge having the utility hereinbefore expressed: and still another object of the invention is to provide a means by which the usual and well known thickness gauge may be applied to tappet wrenches of different sizes.

A structural embodiment of this invention, adapted to attach a thickness gauge of ordinary or any suitable construction detachably to a tappet wrench of an ordinary type, to thereby carry out all the foregoing several purposes, and of simple and practicable construction, is illustrated in the accompanying drawing and will be described in detail, without intending, however, to restrict the

invention in all respects to the details of this embodiment, since I am aware that the invention may be otherwise embodied without departing from its spirit as defined by appended claims.

In said drawing, wherein like characters of reference denote corresponding parts in the several views:

Fig. 1 is an elevation or plan of a combined wrench and thickness gauge of a preferred construction, showing the arrangement of the parts when in their operative relationship:

Figs. 2, 2^a and 2^b are views of one member of the gauge attaching means adapted to engage the jaw of a wrench; Fig. 2 being a plan view or side elevation of said member, Fig. 2^a being an end view of the same, and Fig. 2^b being a section on the line 2^b 2^b of Fig. 2:

Fig. 3, Fig. 3^a and Fig. 3^b are respectively a plan or elevation, an end view, and a sectional view on the line 3^b 3^b of Fig. 3 of another member of said means, complementary to the member shown in Figs. 2, 2^a, and 2^b, for engaging said jaw of the wrench:

Fig. 4 is a detail representation of a member of the means by which the thickness gauge or feeler is attached to the wrench:

Fig. 5 is a view showing the combined wrench and gauge applied to the elements of a valve mechanism for use in the adjustment hereinbefore referred to, the wrench and gauge being viewed from the side opposite that in which they are seen in Fig. 1:

Fig. 6 is an end view of the parts shown in Fig. 5:

Fig. 7 is a detail representation showing the means by which the combined wrench and gauge is held rigidly in place when its jaw has been applied to a nut to be held against movement, thereby making it unnecessary for the mechanic to continue his grasp on the wrench in order that the member engaged by the wrench may be held against movement: and

Fig. 8 is a detail representation of one end of a wrench provided with a gauge of simplified construction adapted to be used when adjustment to wrenches of different dimensions and different thicknesses of gauging elements is not required.

Referring to the particular embodiment of the invention illustrated in Figs. 1–7, inclusive:

A designates the handle and A′ designates the spaced jaws at one end of said handle, forming parts of a flat wrench of any suitable construction, the one herein illustrated being a "tappet wrench", so called. B designates the handle member of an ordinary thickness gauge and B′ designates one of the gauging elements or "feelers", forming part of said gauge. It is well understood that each of these thickness gauges commonly includes a plurality of feelers of different thicknesses, respectively, and that these feelers, when in closed position, are retained between the sides of the handle B from which they may be severally opened for use in gauging the clearance between a tappet and the adjacent portion of a valve stem which is to be operated under control of said tappet. *b* designates the pivot about which the end of each feeler turns into and from its open position.

This thickness gauge is secured to the wrench in such a position that the particular feeler which is in use will span the space between the jaws A′ by an attachment which forms an important part of this invention. This attachment comprises an adjustable means of clamping nature for securing it to the jaws of the wrench, a holder, also of clamping nature, to receive the handle of the gauge and an appropriate connection between said means and holder. As here shown the adjustable means for securing the attachment to the wrench includes a member C which lies underneath the jaws A′ and has a cut-out portion 10 corresponding to the space 11 between the jaws of the wrench. This cut-out portion of the member C provides two spaced arms 12, 12 and these arms are formed at their forward ends with lips 13, 13 to engage over the corresponding ends of the jaws A′ of the wrench. The opposite end of the member C is formed with a flange 14 which provides an abutment for a tensioning spring 15. The outer longitudinal sides of the arms 12, 12 of this member are provided with guide channels formed by flanges, 16, 16 of appropriate shape. These guide channels receive the adjacent edges of a member D which is complementary to the member C and is slidably mounted against the undersurface of the latter. This member D also has a cut-out portion, marked 17, which is in registration with the cut-out portion 10 of the member C. It also is formed with lips or flanges 18 to engage the rear ends of the jaws A′ A′ and with a flange 19 which is aligned with the flange 14 of the member C and forms an abutment for the corresponding end of the spring 15.

It will thus be seen that I have provided a holding device which includes two members, C, D, respectively formed to engage the forward and rearward ends of the jaws A′ of a wrench and also having openings in registration with each other and with the space between said jaws; and that the length of the device is adjustable to fit wrench jaws of various sizes. It will also be seen that the members C and D are under tension of a spring 15 which holds their lips tightly against the forward and rearward edges of the wrench jaws and is adapted to so function with relation to jaws of different lengths, the holding device including said members being thereby adapted to be applied to wrench jaws of different lengths. A regulating screw 20 extends through the lip or flange 14 and enters the lip or flange 19 and is adjustable in accord with the length of the jaws to which the device is attached. The tendency of the spring is to pull said lips or flanges toward each other.

The holder for the thickness gauge includes a member having spaced spring jaws 21, 21 to receive the handle of the thickness gauge between them. This holder is provided with a link 22, one end of which is pivoted at 22′ on one of the clamping jaws 21 and the other end of which is pivoted at 22″ to the member D.

When the parts are mounted in their operative relationship the particular feeler B′ which is in use spans the space between the jaws of the wrench and underlies said jaws and is held against accidental displacement by the side arms 12, 12 and lips 13, 13 of the member C, the correlation of said arms and jaws being such that a space is provided between them to receive said feeler.

It will be noticed that the spaces 10 and 17 of the members C and D afford access to the feeler B′ of the valve tappet F, hereinafter described, or of any other object upon which the feeler is to rest in the use of the device and also that the flanges 14 and 19 of the members C and D form finger pieces for convenience in moving said members C and D relatively to each other in order that the attachment may be readily applied to or removed from the jaws.

In the use of this combined tappet wrench

and gauge in any operation which calls for an adjustment of two members, as E E', relatively to each other and wherein one of said members, as E, is arranged to be engaged by a valve tappet, F, and wherein a clearance space is provided between said member and said tappet, the combined wrench and gauge is applied in such position that the jaws A' A' of the wrench will engage a correspondingly formed end of the part presented to the tappet (as member E, for example) and when properly so applied, the feeler or blade B' will rest upon the tappet and close said clearance space, as shown in Fig. 6. The member E, or other part so engaged by the wrench, will thereby be held against rotative movement and the complementary member E' may then be slackened about the valve stem G as is usual in the operation of freeing the stem from the tappet engaging head provided at the end of the stem opposite the valve, not shown. This turning of the member E' of the tappet engaging head may be conveniently effected by a separate wrench H. It is considered to be unnecessary to set forth herein, in detail, the entire procedure which is incidental to the operation of freeing a valve in order that the same may be re-ground or re-placed by a new valve, or for any other purpose, which heretofore has resulted in a change of the clearance space between the valve tappet and the tappet engaging head of the valve and thereby called for re-adjustments which materially added to the expense of the operation. It is well understood that these operations vary in accordance with the particular work which is to be done and also in accordance with different types of constructions of valve mechanisms and it is not my purpose to restrict the use of this combined wrench and thickness gauge to any particular construction of valve mechanism since it may be employed, with great resulting economy, in any valve mechanism wherein there are two relatively adjustable parts, one of which is arranged to be engaged by a tappet or the like, and with a clearance space between it and said tappet, which space must be preserved, and the other of which is adjustable as a step in the operation of compensating for wear of the tappet or of freeing the head from the stem, for regrinding of the valve, or any other purpose. At the end of the operation it is necessary only that the member E of the tappet head be in engagement with the feeler B, to assure that the clearance originally provided by the manufacturer is retained and since the feeler remained on the tappet throughout the entire operation, no gauging is necessary for the reason that the pre-existing clearance will be provided merely by removing the wrench and gauge.

In order that the combined wrench and gauge may be mechanically held in operative relation with the part held thereby and with the tappet F, from the beginning to the end of the work which is to be performed, thereby leaving both hands of the user free for the performance of such work, I have provided a member which includes a sleeve I by which it is mounted upon the handle A of the wrench and also includes a hook I' to engage over a tappet J adjacent the tappet F. Since there are several of these tappets and their associated valves in a single engine, and since certain of these are necessarily at the extreme opposite ends of the series, I provide two hook-like members I', I^2 extending in opposite directions from the sleeve I and handle A of the wrench, in order that all the tappets may be properly engaged in their order. In this connection it will be apparent that if the tappet J be assumed to be the one at the end of the series and the tappet F be assumed to be the one next adjacent to said tappet, J, the hook I^2 may be applied to said tappet F and when so applied the wrench will be operative upon and will be held in operative relation with, the tappet engaging head associated with the tappet J.

In Fig. 8, I have illustrated a very simple form of the invention when it is to be applied to and is to be used as a permanent part of, a wrench and for attaching a single feeler or blade to said wrench. In other words, this construction lacks the features of adjustability to different sizes of wrench jaws and also lacks the capability of attaching a thickness gauge having a plurality of feelers to said wrench, inherent in the construction previously described herein. In short, a combined gauge and wrench constructed in accordance with this figure of the drawing may be properly regarded as being a "single purpose" wrench and gauge, respectively applicable to particular makes of valve mechanism for which they are particularly intended. This embodiment of the invention consists of a holding member L having spaced jaws 25 respectively to lie underneath the jaws *a'* of the wrench and having lips 26, 26' and 27, 27' to engage the forward and rearward surfaces of said jaws. A feeler *b'* is mounted in the space between the confronting surfaces of the jaws and arms of the wrench and holding member and is held in position by said holding member.

While I have illustrated the invention as applied to a flat wrench having jaws at one end thereof only, it is apparent that it is applicable in principle and without substantial change to a double-ended wrench, so called, of appropriate nature and therefore I would have it understood that it is not restricted to a wrench of a single-ended type. Moreover, although this tool was particularly designed for use in the operation in valve grinding and clearance adjusting, or analogous operations in relation to valve mechanisms of internal combustion engines, yet it may be usefully employed, in principle, in other relationships and for that reason I do not wish it to be understood that it is restricted in its utility to the particular use set forth. Finally, while I have illustrated its use in relation to that type of valve mechanism in which the adjustable member substantially forms part of the valve stem, yet it will be understood that it is equally useful in relation to that type of valve mechanism in which the tappet or a member thereof is adjusted, both types of valve mechanisms being well known and common in the art. It will be apparent that when the part to be adjusted is the tappet or an element thereof, the tool will be reversed from the position illustrated in the drawing, that is, the object held by the jaws of the combined wrench and gauge will be the tappet adjusting screw, for example.

Having thus described the invention as exemplified by two embodiments thereof which differ substantially from each other, in their details, what I claim is:

1. A tool of the kind described, including a wrench having spaced jaws at one end, a feeler whose ends lie against said jaws and whose intermediate portion spans the space between the jaws, and a holding means which supports said feeler and attaches the same to the wrench-jaws,

said holding means having an opening substantially in registration with the opening between the jaws of the wrench and affording access to the portion of the feeler between the wrench-jaws.

2. A tool of the kind described, including a wrench having spaced jaws, a feeler which lies against said jaws and spans the space between the same, and a holding means which lies against the feeler and is provided with an opening to enable the feeler to rest upon an object in relation to which the tool is to be used, said holding means also having lips to attach the holding means and feeler to the wrench.

3. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object and with a feeler which spans the space between said jaws, the tool having an opening adapting said feeler to rest upon one object while its jaws are engaged with another object being held by said jaws, the tool also including a means for holding it in operative relation with said objects, said means being attached to and projecting from the handle.

4. A tool according to claim 3, in which the holding means projects laterally from the handle and has a hook shaped element at either free end thereof.

5. A tool according to claim 3, in which the holding means projects laterally in opposite directions from the handle and has hook shaped elements at both free ends thereof.

6. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object, a feeler which spans the space between said jaws, and a longitudinally extensible holding means for attaching the feeler releasably to the jaws, said holding means having an opening to enable the feeler to rest upon an object while its jaws are engaged with the first mentioned object.

7. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object, a feeler which lies against said jaws and spans the space between the same and means for clamping the feeler releasably to the jaws, said means including members which are relatively adjustable to extend or contract the length of the holding means and said members provided with elements to engage opposite ends of the jaws, the holding means also having an opening adapting the feeler to rest upon an object while its jaws are in a holding relation with the first mentioned object.

8. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object, a thickness gauge, including a handle and a feeler, and means, including members respectively engaged with the handle and feeler, for holding said thickness gauge in operative relationship with the handle and jaws of the tool, the member which holds the feeler having an opening adapting said feeler when in its operative position with relation to said jaws to rest upon an object while the said jaws are in operative relationship with the first mentioned object.

9. A tool according to claim 8, in which the means engaged with the handle of the thickness gauge is open at one end for the convenient insertion and removal of said handle and exerts tension on said handle.

10. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object, a thickness gauge, including a handle and a feeler, a longitudinally extensible means for holding the feeler in operative relationship with said jaws, said means having an opening adapting its feeler to rest upon an object aligned with said nut and provided with elements at its opposite ends to engage the corresponding ends of the jaws, a holding member engaging the handle of the thickness gauge, and a link connecting said holding member with said means.

11. A tool according to claim 10 in which said longitudinally extensible means is formed of a plurality of members slidably mounted one upon the other and having jaw-engaging lips at opposite ends of said means, and includes a spring for holding said members under tension.

12. A tool of the kind described, comprising a handle provided at one end with jaws spaced from each other and adapted to engage a nut or analogous object, a thickness gauge including a handle and a feeler, means for attaching the thickness gauge to the tool with said feeler in operative relationship with said jaws, said means including parts which respectively engage the handle and feeler of the thickness gauge, the tool having an opening adapting the feeler to rest upon one object when the jaws are engaged with the first mentioned object, and means carried by the first mentioned handle for securing the tool detachably to an object adjacent that engaged by said jaws.

13. A tool according to claim 12, in which the last mentioned means projects laterally in opposite directions from the tool handle and is provided at its free ends with hook-shaped elements.

14. Means for attaching a thickness gauge having a handle and a feeler to a wrench, said means including a member to hold the handle of the thickness gauge and another member to hold said feeler in operative relationship with the jaws of the wrench, the latter member having an opening through which the feeler, when in its operative position, may rest upon one object when said jaws are in operative relationship with another object being held by said jaws.

15. Means for attaching a feeler removably in operative relationship with the jaws of a wrench, including a plurality of members having a slidable engagement one with another and provided with elements for attaching them to the wrench-jaws, and a tensioning means interposed between said members, said means also having an opening through which the feeler may rest upon one object when the jaws of the wrench are in operative relationship with another object being held by said jaws.

16. Means for attaching a feeler removably in operative relationship with the jaws of a wrench, including a plurality of superimposed relatively slidable members provided with projections to engage the front and rear ends, respectively, of the wrench jaws, a tensioning spring, operative upon said members to hold said projections releasably in engagement with the ends of the jaws, said members also having projections to be engaged by the user for moving said members against the tension of the spring.

17. A mean for attaching a feeler removably in operative relationship with the jaws of a wrench, in accordance with claim 16, wherein the members are formed to provide an opening through which the feeler may rest upon one ob-

ject when the jaws of the wrench are in operative relationship with another object being held by said jaws, and wherein one of said members is formed at its opposite sides to provide longitudinal guiding grooves to receive the corresponding edges of the other member.

18. Means for attaching a thickness gauge having a handle and a feeler removably in operative relationship with the jaws of a wrench, said means including a plurality of members having a slidable engagement one with another and provided with elements for attaching them to the wrench jaws and having an opening through which the feeler may rest upon one object while the jaws of the wrench are in operative relationship with another object being held by said jaws, tensioning means interposed between said members, the attachment also including a holding member to engage the handle of the thickness gauge and means of pivotal nature connecting the latter holding member with the members which attach the feeler to the jaws of the wrench.

JOSEPH G. SCHOTTHOEFER.