

Dec. 11, 1956

F. TIRONE  
TOOL FOR CLAMPING VOLTAGE REGULATORS AND THE LIKE DURING  
ADJUSTING AND SETTING OPERATIONS THEREON  
Filed June 12, 1953

2,773,303

Fig. 1.

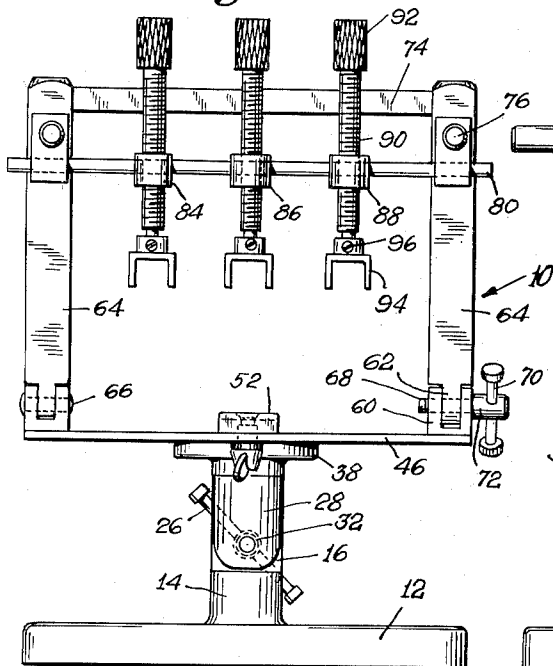


Fig. 2.

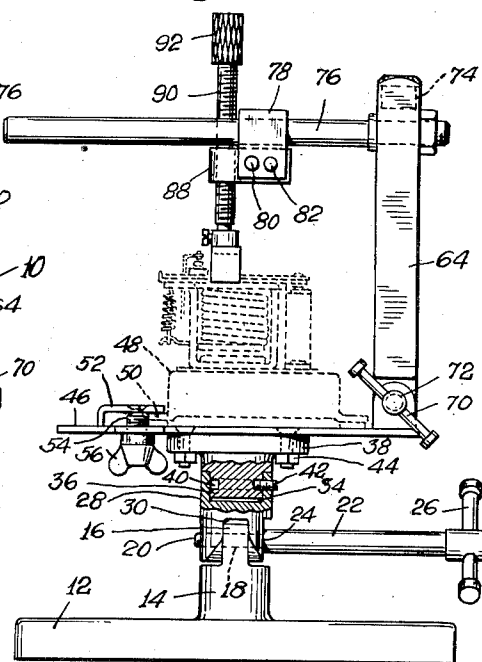
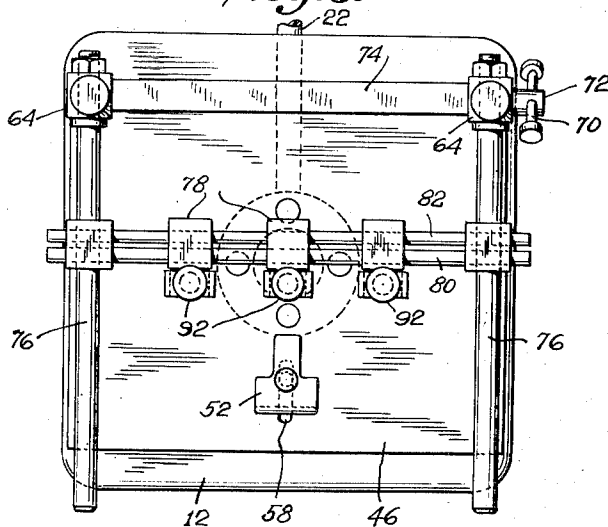


Fig. 3.



INVENTOR  
FELIX TIRONE

BY

Samuel J. Stree  
ATTORNEY

1

2,773,303

## TOOL FOR CLAMPING VOLTAGE REGULATORS AND THE LIKE DURING ADJUSTING AND SETTING OPERATIONS THEREON

Felix Tirone, Bayside, N. Y.

Application June 12, 1953, Serial No. 361,129

1 Claim. (Cl. 29—286)

This invention relates to an adjusting tool for voltage regulators and the like.

Although the invention relates primarily to voltage regulators of the kind used in the ignition systems of motor vehicles, it is also applicable to other types of voltage regulators and to other electrical apparatus in which precise adjustment and setting of contact points is required. For convenience and clarity, however, the invention will be described solely in terms of its application to motor vehicle voltage regulators but it will clearly be understood that this is purely illustrative of the principles of the invention.

Voltage regulators are provided with electromagnets which, when energized, attract a plate on which a contact point is mounted. When this contact plate is attracted electromagnetically, its contact point disengages a second contact point which is mounted on a fixed bracket. It is essential to the proper functioning of the voltage regulator that the two contact points be precisely spaced from each other a predetermined micrometric distance when the contact plate is attracted to and in engagement with the core of the electromagnet which is individual to it.

It is accordingly necessary to precisely adjust and set the contact points. This is conventionally done in the following manner: The contact plate is manually held in engagement with the core of the electromagnet. A feeler or gauge is then inserted between the two contact points. If the space between the two points is too large, the fixed bracket is bent downwardly toward the contact plate. If the space between the points is too small, the fixed bracket is bent upwardly away from the contact plate. Another way in which voltage regulators may be set, and this may lead to even more precise results than the method above described, is to place the feeler between the core of the electromagnet and the contact plate and when said core and said contact plate are both in engagement with the feeler, the two contact points should be in contact with each other to close the circuit. If they are not in contact with each other, the fixed bracket must be bent in one direction or the other to bring the fixed contact point in engagement with the contact point on the contact plate.

It is the principal object of this invention to provide a tool on which a voltage regulator may be mounted and clamped in place and which is provided with adjustable means for clamping the contact plate or plates against the electromagnet or electromagnets, leaving the hands free for bending the fixed bracket in either one direction or the other to the desired and required extent. In this connection it will be understood that a typical voltage regulator is equipped with three electromagnets and a corresponding number of contact plates bearing a movable contact point and a corresponding number of fixed brackets supporting a fixed contact point.

Voltage regulators are made in different sizes and shapes and the arrangement of their several parts may vary. It is therefore essential that the tool herein claimed be readily adjustable to accommodate the various types

2

of voltage regulators that may be encountered. The present tool is accordingly adjustable in three dimensions: it is adjustable for forward and backward movement on a horizontal plane, it is adjustable for lateral movement and it is also adjustable vertically.

Another important feature of this invention is the means which is provided for quickly applying the tool to a voltage regulator and equally as quickly disengaging the tool from the voltage regulator, without disturbing the adjustment or setting of the tool. Thus it is possible to adjust and set a plurality of voltage regulators of like design and proportions without varying the adjustment or setting of the tool. This is an important feature in mass production work.

Still another important feature is the clamping means for clamping the voltage regulators in place on the platform of the tool herein claimed. This is a very simple mechanism which readily clamps and unclamps the voltage regulators.

Still another important feature of the invention is the tilting and swivel mechanism by which the tool may be turned about a vertical axis and tilted about a horizontal axis to any desired and convenient position. For example, some workers may find it desirable to manipulate the feeler and to bend the fixed brackets when the voltage regulator is held in one position and other workers may find it more convenient to deal with these matters when the voltage regulator is held in another position. A change of position may also be found desirable to compensate for variations in the direction of travel of the light rays which illuminate the contact points. For example, light from the sun will travel in one direction in the morning and in another direction at noon and in still another direction in the afternoon. The work of setting voltage regulators is so precise that it is a considerable advantage to be able to change the position of the voltage regulator and the tool herein claimed in order to derive the greatest benefit from the sunlight.

A preferred form of this invention is shown in the accompanying drawing in which:

Fig. 1 is a front view of a tool made in accordance with this invention.

Fig. 2 is a side view thereof, showing, in dotted lines, a typical voltage regulator clamped in place on the platform of said tool, part of the tool being broken away and shown in section to disclose its swivel construction.

Fig. 3 is a top view of said tool.

Referring now to Figs. 1 and 2 of the drawing, it will be seen that the tool 10 which is herein claimed is mounted on a base 12 which may, if desired, be screwed down to a suitable support such as a work bench or table top. Extending upwardly from the base is a vertical column 14 which is reduced at its upper end to form a tongue 16. A transversely extending hole 18 is formed in said tongue 16 to accommodate the reduced end 20 of a clamping screw 22. An annular shoulder 24 is formed on said clamping screw between its main body portion and said reduced end 20. A handle 26 is attached to the outer end of said clamping screw so that it may be turned in either direction for clamping or unclamping purposes.

A yoke 28 is provided with a vertically extending slot 30 to accommodate tongue 16. A hole 32 is formed in the legs of said yoke 28 to accommodate the reduced end 20 of said clamping screw 22. It will be noted that the hole in one of said legs is tapped and that at least a portion of reduced end 20 of the clamping screw is provided with external threads for engagement therewith. Shoulder 24 engages the opposite leg of said yoke. Consequently, when the clamping screw is turned in one direction, it squeezes the yoke 28 against tongue 16 and when the clamping screw is turned in the opposite direction it releases said yoke from such engagement with tongue 16.

It will be understood from the foregoing that screw 22, and more particularly its reduced end 20, serves as a pivot or pinion about which the yoke 28 may pivot. Since the screw is horizontally aligned, the pivotal movement of said yoke 28 will be about a horizontal axis which coincides with the longitudinal axis of said screw. When said clamping screw 22 is in loose engagement with the yoke, the yoke is free to engage in pivotal movement as above described. When the clamping screw tightly engages the yoke, said yoke is clamped tight against tongue 16 and pivotal movement is thereby prevented.

The upper end of yoke 28 is provided with a cylindrical recess 34 which accommodates a cylindrical portion 36 of supporting bracket 38. An annular groove 40 is formed in cylindrical portion 36, concentrically therewith. It will appear from the foregoing that cylindrical portion 36 of bracket 38 is rotatably mounted in recess or socket 34 of yoke 28 and consequently, the bracket 38 as a whole is rotatably movable relative to said yoke 28. When the yoke is in vertical position as shown in Figs. 1 and 2, the axis of rotation of bracket 38 will similarly be vertical. When the yoke is tilted on its horizontal axis, the axis of rotation of bracket 38 will, of course, be inclined relative to the vertical. A set screw 42 is provided in yoke 28 for engagement with annular groove 40. This set screw prevents dislodgement of cylindrical portion 36 of bracket 38 from recess or socket 34 but it does not prevent the rotary or swivelling movement of said bracket relative to said yoke.

Bolts 44 secure platform 46 to bracket 38. It is on this platform that the voltage regulator 48 is placed as Fig. 2 clearly shows. It will be noted that the voltage regulator is provided with a flange 50 along its bottom edge. Advantage is taken of this flange to clamp the voltage regulator in place on platform 46. The clamping means is an L-shaped clamping plate 52, a clamping screw 54 and a butterfly nut 56. The clamping screw projects upwardly through a slot 58 in the platform and its upper end is secured to said L-shaped clamping plate 52. The butterfly nut is situated below platform 46. When the L-shaped clamping plate 52 engages flange 50 of the voltage regulator, and butterfly nut 56 is turned into tight abutment with the bottom of platform 46, the clamping plate 52 will hold the voltage regulator firmly in place on said platform.

Affixed to the two back corners of platform 46 is a pair of U-shaped brackets or yokes 60, each of which receives a tongue 62 formed at the lower end of an upright 64. A rivet or bolt 66 projects through registering holes formed in said yoke and tongue 62 at one corner of platform 46 to pivotally support the upright 64 which is located at said corner. A clamping screw 68 having a handle 70 projects through registering holes formed in the other yoke 60 and in the other tongue 62. Said clamping screw 68 is in screw-threaded engagement with one of the arms of said yoke 60 and it is provided with an enlargement 72 which abuts the other arm of said yoke 60. Consequently, clamping screw 68 may be turned in one direction to clamp yoke 60 to tongue 62 to prevent pivotal movement of the upright 64 on which said tongue is formed. The clamping screw may be turned in the opposite direction to permit pivotal movement of said upright. It will be seen from the foregoing, that the two uprights 64 are pivotally mounted on platform 46, one of said uprights being pivotally mounted on rivet 66 at one back corner of said platform, the other upright being pivotally mounted on clamping screw 68 at the other back corner of platform 46.

Rivet 66 and screw 68 are axially aligned with each other so as to keep the pivotal axes of the two uprights 64 in alignment with each other. A crossbar 74 is affixed at one end to the upper end of one of said uprights 64 and at the other end to the upper end of the other of said uprights 64. It is by this means that the two uprights are locked together to form a single frame which

is pivotally movable about the common axis of rivet 66 and screw 68. Secured to the upper ends of the two uprights 64 is a pair of rods 76 which occupy parallel positions on a common horizontal plane when the two uprights are in vertical position. When the two rods 76 are so situated, the horizontal plane which they occupy is parallel to the horizontal plane which platform 46 is adapted to occupy and which it does occupy when yoke 28 occupies a vertical position.

Slidably mounted on rods 76 is a pair of slides 78. Cross rods 80 and 82 are secured at their respective ends to said slides 78. These two cross rods 80 and 82 occupy parallel positions and they prevent relative movement between the two slides 78. Consequently, the two slides are slidably movable integrally with each other forwardly and backwardly on and along rods 76.

Slidably mounted on cross rods 80 and 82 are three additional slides 84, 86 and 88 respectively. These additional slides are individually slidably movable on and along cross rods 80 and 82. Since there are two such rods 80 and 82, slides 84, 86 and 88 are prevented from engaging in any form of movement on cross rods 80 and 82 except movement longitudinally of said rods or, stated differently, movement toward or away from each other, laterally of the tool as a whole.

It will be observed from the foregoing, that slides 84, 86 and 88 are movable in two directions: They are all movable simultaneously either forwardly or backwardly by reason of the fact that they are all mounted, indirectly, on slides 78. They are individually movable sidewardly on rods 80 and 82. Consequently, they are movable both sidewardly, forwardly and backwardly.

Each slide 84, 86, 88 is provided with a tapped hole to receive a clamping screw 90. The tapped hole extends vertically of each of these slides when uprights 64 occupy a vertical position and rods 76 occupy a horizontal position. At the upper end of each screw 90 is a knurled knob 92 and at the lower end of each screw is an inverted U-shaped yoke 94. Each yoke 94 is rotatably movable relative to the screw 90 which supports it and a set screw 96 prevents axial movement of said yoke relative to said screw 90.

The three yokes 94 are adapted to engage the three contact plates of a typical voltage regulator. They straddle a leaf spring on each of said contact plates, one of the contact points being secured to said leaf spring. Consequently, it is possible by turning knob 92 to move yoke 94 into engagement with the contact plate and to press said contact plate downwardly into engagement with the core of the adjacent electromagnet or into engagement with a feeler placed between said contact plate and said core. The bracket which supports the other contact point may now be bent, if this proves necessary, to properly position the contact point which it supports relative to the contact point on the leaf spring of the contact plate.

When the points of a particular voltage regulator are properly set, all that need be done to disengage yokes 94 therefrom is to loosen clamping screw 68 and to tilt uprights 64 and crossbar 74 backwardly, in clockwise direction as viewed in Fig. 2. Clamping plate 52 would then be loosened with respect to flange 50 and the voltage regulator may then be removed. Another voltage regulator would then be replaced on platform 46 and clamped in place thereon by means of clamping plate 52. Uprights 64 would then be tilted in counterclockwise direction as viewed in Fig. 2 in order to bring yokes 94 into engagement with the contact plates of the voltage regulator. Screws 90 would be adjusted, if necessary, as above described.

The foregoing is illustrative of a preferred form of this invention and it will clearly be understood that this preferred form may be modified and other forms may be provided within the broad spirit of the invention and the broad scope of the claim.

1 claim:

A tool for clamping voltage regulators and the like during adjusting and setting operations thereon, comprising: a base, a post on said base, a second post disposed on the first post, a horizontal clamp screw interconnecting said posts and serving as a pivot between them and enabling the second post to pivot about the axis of said clamp screw relative to said first post, said clamp screw serving also as clamping means between the two posts to clamp the second post in selected fixed positions relative to the first post, a bracket rotatably mounted on the second post for rotary movement about the longitudinal axis of said second post, a set screw interengaging said bracket with said second post to lock said bracket in selected fixed positions relative to said second post about its longitudinal axis, a platform mounted on said bracket, a pair of bearings on said platform, an upright frame mounted on said bearings for pivotal movement about an axis which is situated adjacent the platform and parallel thereto, a clamp screw comprising one of said bearings and adapted to clamp said upright frame in selected fixed positions about said last mentioned axis, a pair of

spaced parallel guide tracks supported on said upright frame in perpendicular relation thereto, a pair of carriages slidably mounted on said guide tracks, a pair of guide rods mounted on said carriages in spaced parallel relation to each other, laterally of said guide tracks, a plurality of slides mounted on said guide rods for movement along said guide rods toward and away from each other, adjusting screws in said slides which are adjustable relative to said slides toward and away from the platform, and inverted U-shaped yokes swivelly mounted on said adjusting screws for engagement with a voltage regulator mounted on said platform.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |                |               |
|-----------|----------------|---------------|
| 135,593   | Rykert -----   | Feb. 4, 1873  |
| 1,182,780 | Limpert -----  | May 9, 1916   |
| 2,047,190 | Blickman ----- | July 14, 1936 |
| 2,347,854 | Tyson -----    | May 2, 1944   |
| 2,487,022 | La Placa ----- | Nov. 1, 1949  |
| 2,546,458 | Launder -----  | Mar. 27, 1951 |