

Aug. 21, 1934.

A. YORDI
BUSHING TOOL

1,970,682

Filed July 14, 1930

2 Sheets-Sheet 1

FIG. 1.

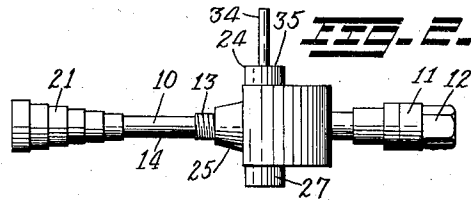
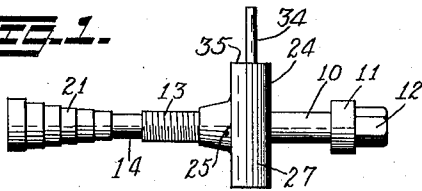


FIG. 3.

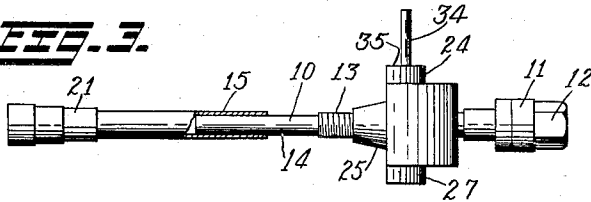


FIG. 4.

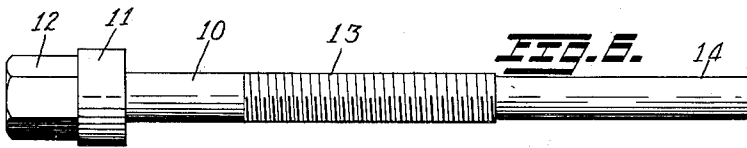
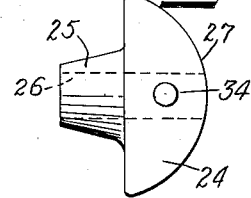


FIG. 6.

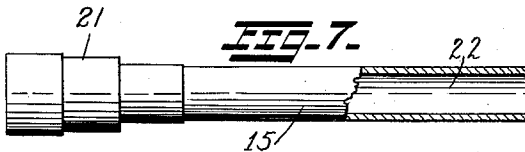


FIG. 7.

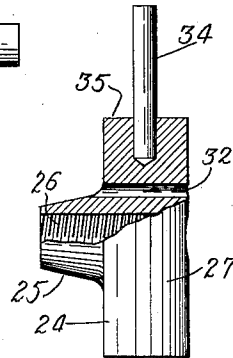


FIG. 9.

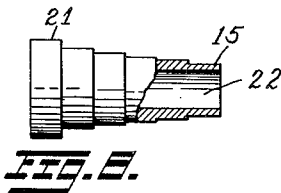


FIG. 10.

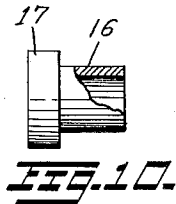


FIG. 11.

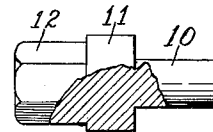


FIG. 12.

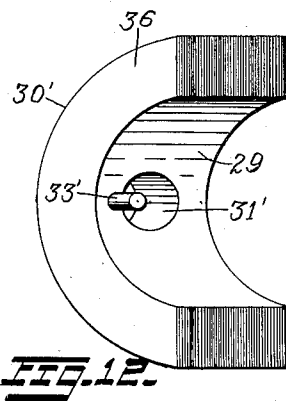


FIG. 13.

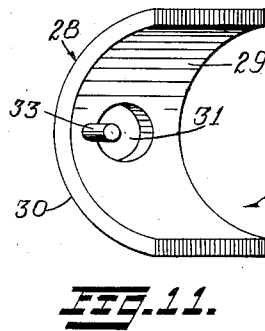


FIG. 14.

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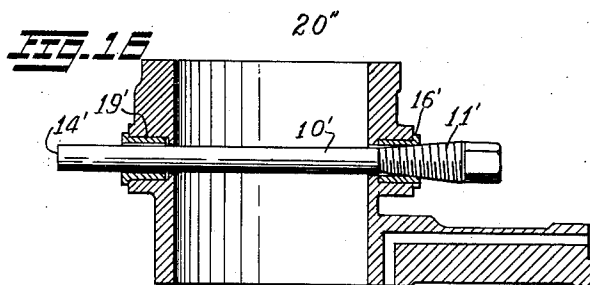
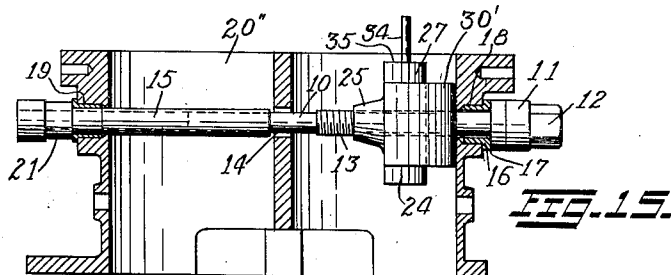
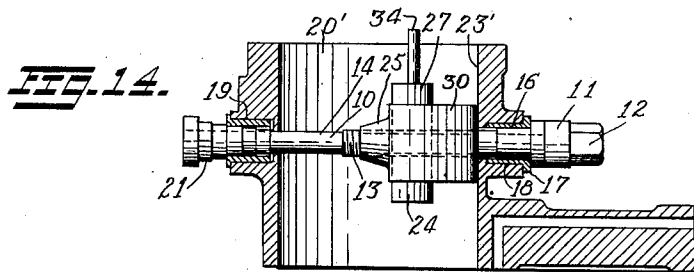
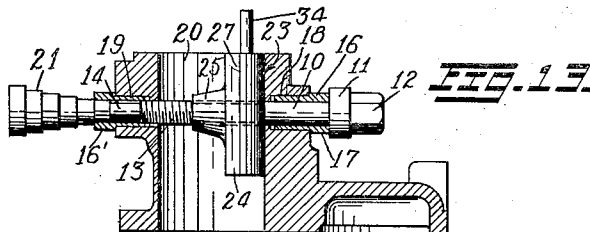
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1,970,682

BUSHING TOOL

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2 Sheets-Sheet 2



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1,970,682

BUSHING TOOL

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Application July 14, 1930, Serial No. 467,775

9 Claims. (Cl. 29—88.2)

This invention relates to bushing tools and more particularly to bushing inserters, although certain features thereof may be employed with equal advantage for other purposes.

It contemplates more especially the provision of novel and inexpensive means adaptable for inserting different sized bushings without effecting deformation or strain in the mounting thereof.

The insertion of bushings in devices such as carburetors presents problems of alignment and deformation of the walls thereof owing to the ductility thereof. This is especially prevalent in carburetors, since such are moulded or otherwise cast from rather ductile material such as brass which offers little resistance to deformation.

The insertion of throttle rod control bushings in carburetor housings, ordinarily creates stresses and strains sufficient to permanently deform the walls thereof. This manifestly is undesirable and for that reason known methods and devices designed for this purpose have not proven entirely satisfactory.

One object of the present invention is to simplify the construction and improve the operation of devices of the character mentioned.

Another object is to provide a novel means for inserting bushings with the desired accuracy of alignment.

Still another object is to provide a bushing inserter of novel design which enables the assembly of bushings without deformation or injurious stresses.

A further object is to provide a bushing inserter which is capable of ready alignment with precision for bushing insertion without wall deformation.

A still further object is to provide a self-aligning bushing tool capable of application to bushings of varying sizes and shapes without impairing the simplicity thereof.

Still a further object is to provide a bushing tool having wall reinforcing means in combination therewith for precluding deformation and insuring bushing alignment.

An additional object is to provide a universally adaptable bushing tool capable of use with devices of varying sizes and configuration.

Other objects and advantages will appear from the following description of an illustrated embodiment of the present invention.

In the drawings:

Figure 1 is a view in elevation of a device embodying features of the present invention.

Figure 2 is a view similar to Figure 1 of a de-

vice having a curved rather than straight reinforcing member thereon.

Figure 3 is a view in elevation of a device similar to that shown in Figure 2, parts thereof being broken away to clarify the showing.

Figure 4 is a plan view of a radius nut employed in connection with the device employed shown in Figure 2.

Figure 5 is a fragmentary sectional view in elevation of the radius nut shown in Figure 4.

Figure 6 is a view in elevation of a draw bolt constituting an element of the device shown in Figures 1, 2 and 3, it being adapted for operative connection with the radius nut shown in Figure 5.

Figure 7 is a fragmentary sectional view of an aligning sleeve axially slidable over the extremity of the draw bolt shown in Figure 6.

Figure 8 is a fragmentary sectional view of a stepped sleeve which constitutes a modified form of the device shown in Figure 7, it being capable of telescopic association with bushings of varying diameter.

Figure 9 is a fragmentary sectional view in elevation of the engaging shoulder employed in connection with the head of the draw bolt disclosed in Figure 6.

Figure 10 is a fragmentary sectional view in elevation of a bushing capable of telescopic association with the sleeve disclosed in Figure 8 or engageable by the head of the draw bolt shown in Figure 6 for insertion in a manner which will appear hereinafter.

Figure 11 is a perspective view of a spacer member employed in connection with the radius nut disclosed in Figure 4.

Figure 12 is a perspective view of a spacer member possessing a comparatively lesser radius than the corresponding element disclosed in Figure 11, it being capable of substitution for association with the radius nut to accommodate different sized or shaped walls.

Figure 13 is a sectional view in elevation of a housing showing the manner in which the bushing tool is applied in its operative position.

Figure 14 is a similar view of a housing with bushing tool in operating position, these being of larger size than the showing in Figure 13.

Figure 15 is a sectional view in elevation of a partitioned housing showing the manner in which the bushings and inserters therefor are placed in position for the specified purpose.

Figure 16 is a sectional view in elevation of a housing showing a bushing remover in operative position.

The structure selected for illustration comprises a draw bolt 10 having an enlarged peripheral shoulder 11 proximate one extremity thereof to merge with a nut or other polygonal extremity 12 serving as a means of imparting rotation thereto. As shown, the draw bolt 10 is provided with a threaded portion 13 which terminates in a reduced shank 14 for the axial reception of an aligning sleeve 15. With the draw bolt 10 thus far described, a bushing 16 of any desired shape or configuration may be placed thereon so that the shoulder 17 thereof impinges against the draw bolt shoulder 11 prior to its projection through aligned bores 18 and 19 provided in any suitable housing such as a carburetor 20 to insert or install throttle lever control bushings therein. So that the sleeve 15 may be placed in the bore 19 in opposite alignment with the bore 18 for the installation of a bushing therein, the sleeve 15 is provided with a series of concentrically stepped shoulders 21 of gradually increased diameters. To this end, the sleeve 15 is provided with an axial bore 22 extending entirely therethrough for the slidable reception of reduced draw bolt shank 14 to effect the alignment thereof with respect to the bore 18 prior to the insertion of the bushing therein.

In order that the insertion of the bushing 18 may not deform the contour and shape of the housing wall 23, a radius nut 24 is operatively connected to the draw bolt 10 through the medium of the threads 13 provided thereon. In consequence thereof, the radius nut 24 is provided with a boss 25 having an interiorly threaded bore 26 complementary to the threads 13 of the draw bolt 10 for engagement therewith. In order that the radius nut 24 may conform with and reinforce the wall 23 of the housing 20 in the vicinity of the bore 18, the exterior edge 27 thereof is provided with a corresponding curvature having the radius of the interior chamber 23 of the housing 20. In consequence thereof, the radius nut 24 is first inserted in the chamber 23 for the reception of the draw bolt 10; thereafter in threaded engagement therewith so that the bushing 16 carried thereon in impinging engagement with the draw bolt shoulder 11 may be wedged or drawn in to the bore 18 responsive to the rotation of the polygonal head 12 relative to the radius nut 24, thereby avoiding any deformation of the housing wall 23.

The term "radius nut" is used to denote that such a member has an end surface which is curved or arcuate about an axial point transverse to the bore of the nut with the intermediary distance, constituting the radius; therefore, this expression denotes curvature or the presence of an arcuate surface.

Prior to the drawing of the bushing 16 for fixed association within the bore 18 of the housing 20, the aligning sleeve 15 is placed in position for the reception of the drawing bolt shank 14 with one of the stepped shoulders 21 thereof in telescopic engagement with the bore 19 opposite the bore 18 or with a bushing 16 previously inserted in a manner described in connection with the bushing 16. By so doing the insertion of the bushing 16 is effected in true alignment and without stressing or creating any deformation in the walls 23 of the carburetor housing 20, these being usually cast or otherwise shaped from ductile material such as brass.

Housings vary in size and configuration and, therefore, the radius nut 27 of fixed curvature is not suitable nor complementary to all situations.

This is also true of the sleeve 15, and on that account the latter is provided with the stepped shoulders 21 to effect alignment with the bores or bushings possessing various diameters within the range of the stepped variation provided thereon. Moreover, the radius nut 24 is rendered suitable for true fit or circumferential contact with the interiorly chambered housing 20, by the application or association of a spacer element 28 thereon. The spacer element 28 comprises an arcuate plate which may vary in thickness to define an interior curvature 29 equivalent or corresponding with the curvature 27 of the radius nut 24. This presents an exterior curvature 30 of larger radius to fit a situation such as presented by a housing 20' having an enlarged interior chamber wall 23' corresponding in curvature with that of the arcuate exterior surface 30 of the spacer element 28. To this end, the spacer element 28 is provided with a bore 31 somewhat larger in diameter than the interiorly threaded bore 26 of the radius nut 24 so that the draw bolt 10 may be projected therethrough.

In order to prevent relative movement between the spacer element 28 and the radius nut 24, the latter is provided with an aperture 32 extending therethrough in parallelism with the bore 26 for the reception of a correspondingly positioned and shaped stud 33 fixed to the spacer element 28 for projection from the curved surface 29 thereof, it being complementary to and associable with the radius nut 24 to retain the assembled relation therebetween without accidental displacement. As shown, the radius nut 24 has a stud or rod 34 extending from the top surface 35 thereof to enable the manual retention of the radius nut 24 against displacement with the draw bolt 10 responsive to the rotation thereof. With this arrangement and resort to the spacer element 28, the bushing tool previously described may be applied to an enlarged housing 20' without entailing any appreciable labor or expense in rendering the tool applicable for different situations.

It is to be noted that additional spacer elements 36 may be provided so that the thickness thereof varies to an extent which will provide varying exterior radii 30'; however, the interior radius 29' is constant to enable association and assembly with the correspondingly curved surface 29 of the radius nut 24. The bores 31' and projecting stud 33' are similarly shaped and positioned so that a single radius nut 24 may be used without variation in different sized housings 20' such as shown in Figure 14.

With this arrangement, it may be well to provide an extended sleeve shank 15' so that true alignment may be effected prior to effecting the insertion of the bushings in a manner described supra. The number of stepped shoulders 21 as well as the size thereof including the elongation of the sleeve shank 15 may be varied within a wide range as commercial practice may dictate. Of course, the draw bolt 10 may be employed in connection with the radius nut 24 without resort to an aligning sleeve 15 and such variations may be made in the form and association of the elements as may be deemed advisable or practical to meet different and special situations. In the removal of the bushings 16, a draw bolt 10' is preferably provided with a threaded tapered or frusto-conical shoulder 11' of sufficient elongation to accommodate various sized bushings.

With this construction, the forced axial engagement responsive to the rotation thereof in the direction of the bushing 16' to effect biting

engagement with the bore, creates a fixed connection therebetween to an extent sufficient to effect removal without any appreciable resistance. The removal is preferably accomplished by tapping the extremity 14' of the draw bolt 10' which preferably extends through the opposite bore 19' provided in the housing 20'' for exterior access. As a result, a hammer or other implement may be used for striking the exteriorly accessible extremity 14' of the draw bolt 10' to the end of accomplishing immediate removal.

With a device of the character described hereinabove, it will be apparent that bushing insertion and removal is capable of ready accomplishment without any possible deformation or injurious stresses to the member designed for the reception thereof. Moreover, the tool is universally adaptable to various sized members and housings so that an inexpensive device of novel design has been provided for application without entailing much time, labor or expense.

Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention as defined in the appended claims.

I claim:

1. In a bushing manipulating device of the character described, the combination with a bushing engaging draw bolt, of a radius nut displaceable responsive to the rotation of said draw bolt, and an aligning draw bolt sleeve telescopic on said draw bolt for the purpose set forth.

2. In a device of the character described, the combination with a bushing engaging draw bolt, of a radius nut responsive to the rotation of said draw bolt, a radius spacer concentrically associated with said radius nut for ready detachment therefrom, and an aligning draw bolt sleeve for the purpose set forth.

3. In a device of the character described, the combination with a bushing engaging draw bolt, of a radius nut responsive to the rotation of said draw bolt, a radius spacer concentrically associated with said radius nut for ready detachment therefrom, an aligning draw bolt sleeve for the purpose set forth, there being concentrically stepped shoulders on said sleeve to engage correspondingly shaped bushings.

4. In a device of the character described, the combination with a draw bolt, of a bushing engaging sleeve operatively connected to said draw bolt, there being stepped shoulders on said sleeve to singly engage correspondingly sized bushings for aligning said draw bolt, and a wall engaging member on said draw bolt to preclude wall deformation responsive to bushing insertion.

5. In a device of the character described, the combination with a draw bolt, of a wall engaging member in threaded engagement with said draw bolt, and bushing engaging means on said draw

bolt for aligning said wall engaging member and draw bolt, and complemental means on said wall engaging member and draw bolt to effect relative displacement therebetween responsive to the rotation of said draw bolt.

6. In a device of the character described, the combination with a draw bolt, of a wall engaging member in threaded engagement with said draw bolt, spacer members complemental to said wall engaging member for detachable association therewith, and bushing engaging means on said draw bolt for aligning said wall engaging member and draw bolt, and complemental means on said wall engaging member and draw bolt to effect relative displacement therebetween responsive to the rotation of said draw bolt.

7. In a device of the character described, the combination with a draw bolt, of a wall engaging member in threaded engagement with said draw bolt, spacer members complemental to said wall engaging member for detachable association therewith, bushing engaging means on said draw bolt for aligning said wall engaging member and draw bolt, and complemental means on said wall engaging member and draw bolt to effect relative displacement therebetween responsive to the rotation of said draw bolt, said bushing engaging means comprising concentrically stepped peripheral shoulders for telescopic reception of various sized bushings.

8. In a device of the character described, the combination with a draw bolt, of a wall engaging member in threaded engagement with said draw bolt, spacer members complemental to said wall engaging member for detachable association therewith, bushing engaging means on said draw bolt for aligning said wall engaging member and draw bolt, complemental means on said wall engaging member and draw bolt to effect relative displacement therebetween responsive to the rotation of said draw bolt, and means for precluding relative movement between said wall engaging and spacer members.

9. In a device of the character described, the combination with a draw bolt, of a wall engaging member in threaded engagement with said draw bolt, spacer members complemental to said wall engaging member for detachable association therewith, bushing engaging means on said draw bolt for aligning said wall engaging member and draw bolt, complemental means on said wall engaging member and draw bolt to effect relative displacement therebetween responsive to the rotation of said draw bolt, means for precluding relative movement between said wall engaging and spacer members, and means projecting from said wall engaging member for maintaining its relative rotatable position with said draw bolt.

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