Aug. 16, 1966 M. A. MOSKOVITZ 3,266,134

METHOD OF MANIPULATING A CARTRIDGE-TYPE BALL-JOINT

Original Filed Sept. 23, 1963

FIG. 1

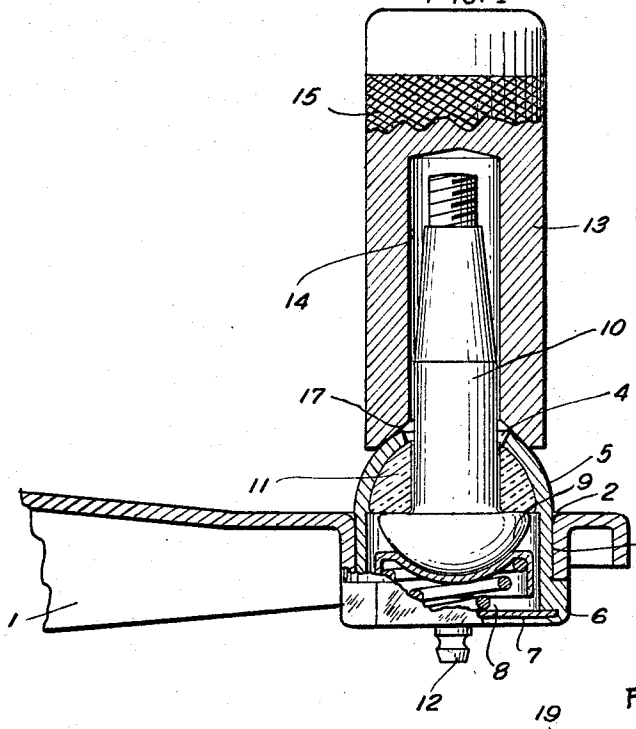


FIG. 3

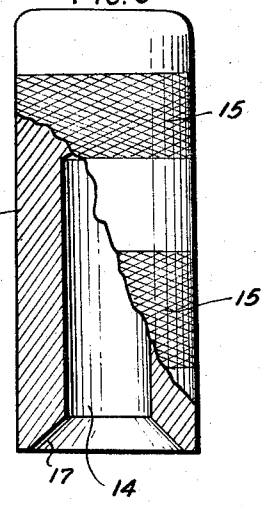


FIG. 2

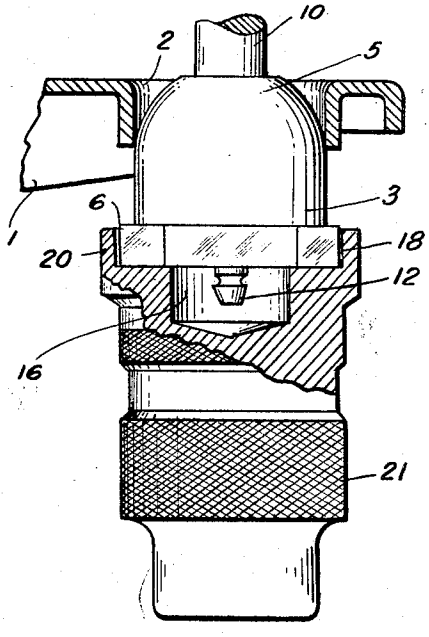
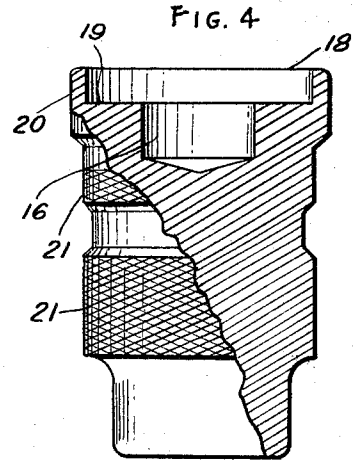


FIG. 4



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United States Patent Office 3,266,134 Patented August 16, 1966

3,266,134

METHOD OF MANIPULATING A CARTRIDGE-TYPE BALL-JOINT

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Original application Sept. 23, 1963, Ser. No. 310,791. Divided and this application Apr. 7, 1965, Ser. No. 448,564

2 Claims. (Cl. 29—401)

This invention is a division of my co-pending application Serial No. 310,791, filed September 23, 1963, now abandoned.

In present-day auto construction, a cartridge-type ball-joint is commonly employed for interconnecting control arms to the front wheel steering knuckles, and replacements become necessary from time to time, on account of wear of the same. Such replacements are costly, when made in the field, as the operation is cumbersome and tedious, and the principal object of my invention is to provide a method of making such replacements readily and easily.

A very important object of the invention is to so construct a tool for this purpose that is in the form of an annular elongated sleeve with a central axially extending opening thereinto from one or both ends, so that one such open end will receive only a portion of the projecting convex portion of the joint unit, while the other open end is of a size to receive the enlarged end of said unit, whereby axial thrust of the tool in one direction will drive the unit from the control arm eye, while axial thrust in the reverse direction will drive a replacement unit into said eye into operative position.

Many other objects and advantages of the construction herein shown and described and the method of using the same, will be obvious to those skilled in the art to which this invention appertains, as will be more clearly seen from the following disclosure.

To this end, my invention consists in the novel construction, arrangement and combination of parts, and the method of using the same, as herein set forth and will be readily understood from the description that follows.

In the drawings, wherein like reference characters represent like or corresponding parts throughout the views,

FIGURE 1 is a view partly in section and partly in elevation, showing the unit about to be driven from a control arm eye;

FIGURE 2 is a view, partly in section and partly in elevation, showing the drive-out tool;

FIGURE 3 is a view, partly in section and partly in elevation, showing the drive-in tool; and

FIGURE 4 is a section, partly in section and partly in elevation, showing the drive-in tool.

Referring more particularly to the drawings, wherein I have shown a preferred embodiment of the invention, **1** indicates one end of a supporting assembly, as for instance the lower control arm, one end of which has an eye **2** therethrough, into which there fits a pre-assembled ball joint unit A in tightly interlocked engagement therewith. Although such interlocks are sometimes by a threaded interconnection, it is shown herein as being a good and tight press-fit friction interlock.

Such a cartridge-type unit includes the usual hollow shell, housing or casing B, having the externally convex surface **5** reduced toward one end and there is an opening **4** through said end, the larger diameter and **3** of said spherical shell being of such size that it makes a tight press-fit engagement through the eye **2**, as indicated in FIG. 1. A stud C is arranged within said casing, having its shank **10** rotatable and tiltable within the casing and having its free end projecting through said opening **4**.

The other end of said casing is provided with a radially outwardly projecting flange **6**, of such size so that it can not be passed through said eye. This larger end **6** has the usual closure plate **7** thereacross, and there may be suitable pressure means, such as the spring **8**, to engage a plate that seats the stud head.

A wear take-up bearing **11** may be interposed between the concave interior surface of said reduced end **5** of the shell B and said stud C, so that movement of the latter is transmittted through said bearing to said shell. A grease fitting **12** may be carried by said joint, to communicate with the chamber within the latter, for lubrication, if so desired.

When it becomes necessary to replace such a joint unit, present shop practice is to first disconnect the control arm, its shaft, the spring and shock absorber, from the car, after which the control arm is placed in a vise for subsequent operations. Obviously, such procedure requires considerable time and trouble, and the use of shop space such as the work-bays and other facilities, both during the unit removal and its replacement.

In the invention as herein set forth, it is not necessary to remove the control arm from the car, both in cartridge removal and joint replacement and to that end I have formed a tool whose main element for unit removal is preferably of a single piece of axially elongated relatively sturdy metal, such as of steel, as indicated at **13**, and having a central bore **14** thereinto from an end to thereby provide an annular sleeve D that fully and loosely receives the exposed length of the stud shank **10** thereinto, there being a preferably tapered cavity **17** that provides a beveled radially-inexpandible surface extending axially into said tool and communicating with said bore as shown in FIGS. 1 and 2. The exterior surface of said element B may be knurled or otherwise roughened as at **15—15** to thereby better grasp the tool during use.

It is important that the size of said tool D is sufficiently small at its open end to be able preferably to pass through said eye, and that said tapered portion of the cavity be of a size that when the tool is mounted on said reduced end of the shell and is co-axial with the latter, the bounding wall of said tapered portion forms a good annular contact with the shell convex surface, substantially tangentially engaging said surface about said opening **4**, along a diameter spaced radially outwtrdly from said opening **4**.

When about to remove a worn or defective cartridge from the control arm, all of the various parts to which it is connected, are left connected thereto and intact, and there is no need for dis-assembly of the unit, except that said arm is first dis-connected from the knuckle (not shown) to which it is secured, this being done by a simple removal of a fastening nut, and then the car is placed so that the control arm is on jacks or the like, so that impact pressures directed toward said eye will be taken by the jacks.

Then the said tool D is positioned in axial registry with said cartridge unit A, as indicated, with the tapered end **17**, and the stud shank within the bore **14**, whereby there is a tangential engagement of said cavity end annularly about the reduced convex end of said shell and spaced radially from the opening **4** through the latter. In this relationship, proper actuating force applied to said tool toward said eye, will knock said unit from its engagement with said eye to permit of subsequent replacement of a similar joint unit.

For inserting a replacement joint into the empty eye, there is shown a tool E, having a cavity from one end as at **16** to loosely receive the grease fitting **12** thereinto, the outermost or terminal end **18** of said cavity

being radially enlarged and of a size to comfortably receive the enlarged end **6** of the cartridge and providing a radial flange **20** about said seat **18**. The axial length of said cavity **18** and of the flange **20** is less than the height of said flange **6**, so that when the tool is positioned with a replacement cartridge unit therein, as shown in FIG. 3, and arranged in axial registry with said eye, the shell flange **6** will be properly seated within the cavity **18**, with only a small portion of the cartridge flange projecting axially beyond said tool.

To insert a new cartridge into the eye, said cartridge is seated in said cavity **18**, as indicated in FIG. 3, after which registry, the required thrust is applied to said tool E, driving the cartridge forwardly until the flange **6** of the cartridge abuts against the adjacent planar face of said eye. The relationship between the depths of the cartridge flange **6** and the radially enlarged cavity **18** of said tool element insures proper and complete insertion of the cartridge will be obtained.

Both the knock-out and replacement steps are performed in but a fraction of the total time required by the usual method first described, principally because no time is needlessly lost in initially preparing the control arm for such operations, and such savings in time and labor will materially reduce the costs involved in such replacement operations under my improved method.

I claim:

1. In the method of replacing a permanently assembled ball-joint unit in the eye of a control arm without complete disassembly of said control arm, and wherein said unit is of the type having a shell whose one end is externally convex and that has an opening therethrough through which the shank of a stud projects outwardly from the shell, the other end of said shell being closed and radially enlarged so that the shell can be inserted into said eye from only one direction, and wherein said ball-joint units are of differing sizes; said method including pressing against said convex surface of said shell in substantially tangential and annular engagement therewith while supporting said arm until said unit is displaced from said eye, and then replacing a like cartridge unit into the empty eye by peripherally supporting said unit and forcing the same axially toward said eye while so supported and until the unit abuts against said control arm about said eye to limit further insertion into said eye.

2. The method of claim **1** wherein replacing of the ball-joint unit is done while supporting the control arm by a jack or the like.

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