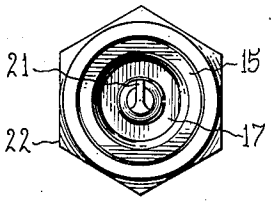
J. BERGE.

FLEXIBLE SHAFTING.

APPLICATION FILED APR. 14, 1919.

1,324,787. Patented Dec. 16, 1919.

Fig. 3



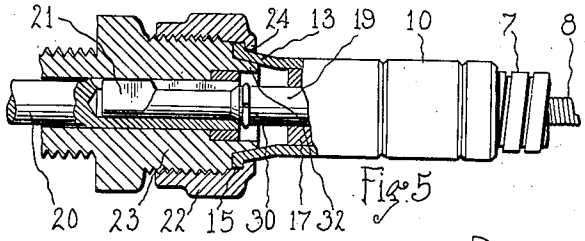


Fig. 5

Fig. 2

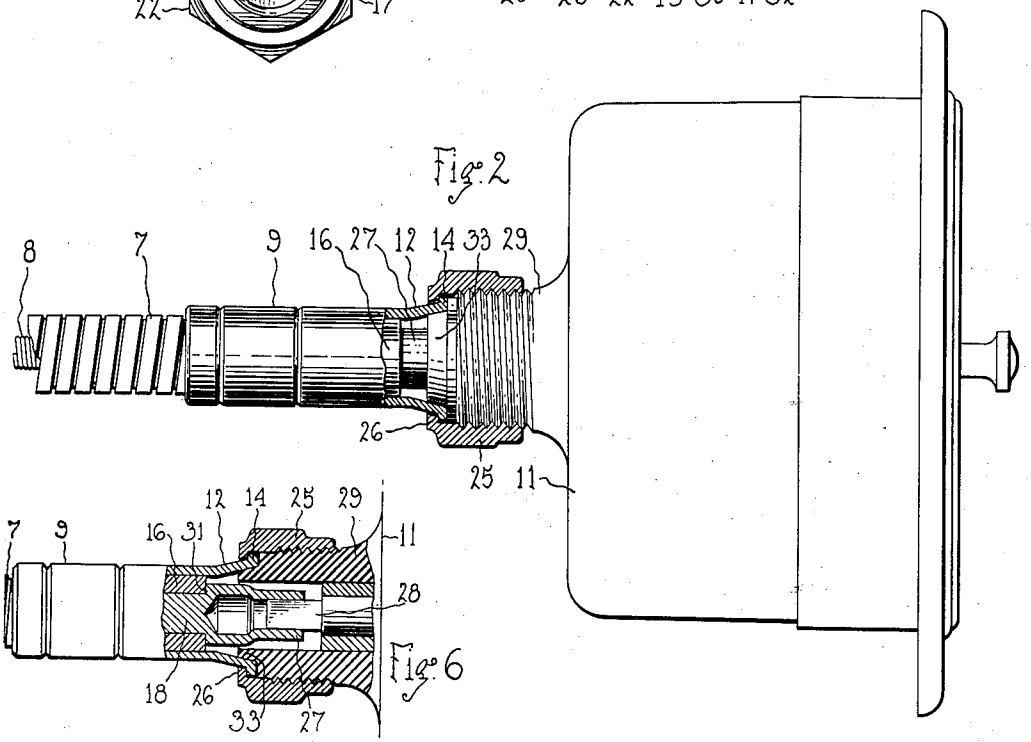


Fig. 6

Fig. 1

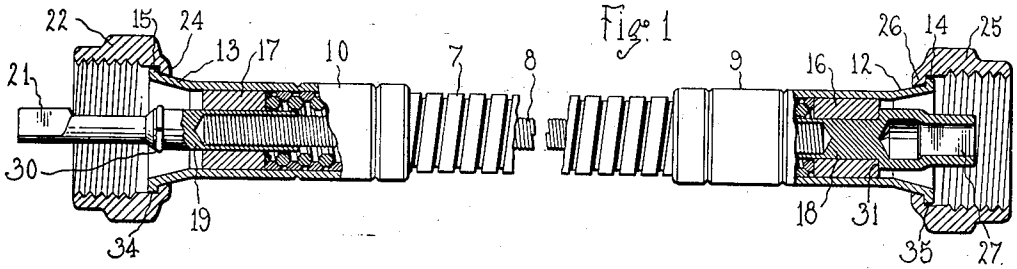
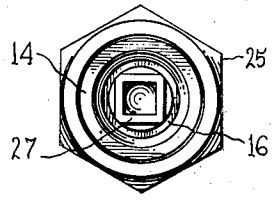


Fig. 4



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FLEXIBLE SHAFTING.

1,324,787. Specification of Letters Patent. **Patented Dec. 16, 1919.**

Application filed April 14, 1919. Serial No. 289,826.

To all whom it may concern:

Be it known that I, JOSEPH BERGE, a citizen of the United States, and resident of Flint, Genesee county, State of Michigan, have invented certain new and useful Improvements in Flexible Shafting, of which the following is a specification.

My invention relates to flexible shafting designed for use in connection with speedometers, odometers, and similar instruments used with vehicles to indicate the speed at which they are moving, the distance traveled, or to give other indications concerning the manner in which the vehicle is operating.

The object of my invention is to provide improved flexible shafting for the purpose above referred to; to which end my invention consists in certain new and useful improvements in and relating to the means whereby the ends of the flexible shafting are secured to the instrument to be driven and to the driving mechanism whereby the same is operated, as well also as in other features of construction and operation relating generally to various structural features of the shafting, all as will hereinafter and at length more fully appear.

My invention is illustrated in its preferred form in the drawing accompanying and forming a part of this specification; although it will be appreciated that the same may be embodied in various other specific forms, and that my invention includes all such variations and modifications of the particular form thereof herein illustrated as come within the scope of the concluding claims wherein the particular features in which the invention consists are pointed out.

Referring to the drawing:

Figure 1 is a view partly in section and partly in elevation showing my improved flexible shafting;

Fig. 2 is a view showing one end of the shafting as connected with an instrument to be operated thereby;

Fig. 3 is a view showing the shafting as seen from a position to the left of Fig. 1;

Fig. 4 is a view showing the right-hand end of the shafting shown in Fig. 1 in elevation;

Fig. 5 is a view showing the driving connection between an element of a vehicle and the left-hand end of the shafting shown in Fig. 1; and

Fig. 6 is a view showing the manner in which the right-hand end of the shafting shown in Fig. 1 is connected with the shaft of the instrument to be driven.

Referring to the drawing, the reference numeral 7 designates a non-rotatable flexible casing the purpose of which is to afford protection to the rotating flexible shaft 8 located within the same. The flexible casing 7, as well also as the flexible driving shaft 8, may be of any suitable construction so long as they perform the functions above referred to, as the invention to which this present application relates is in no way concerned with the details of construction of the flexible protecting casing, nor with the distinguishing feature of the driving shaft located within same.

The ends of the protecting casing 7 extend into tubular ferrules or sleeves 9, 10, these members being of rigid or non-flexible construction, in order to provide for the connection of the two ends of the protecting casing with the driving mechanism from which the shaft 8 is driven and with the instrument operated by the said shaft; which instrument is indicated by the reference numeral 11 in Fig. 2, and may as stated be a speedometer, odometer or other instrument.

The ends of the casing 7 may be secured in place within the sleeves 9, 10 in any suitable way, and the outer portions or ends of the sleeves are conical in form as shown at 12, 13. The extremities of the sleeves 9, 10 are provided with flanges 14, 15 which extend substantially at right angles to the sleeves, as best shown in Fig. 1 of the drawing.

Located within the sleeves 9, 10 are bearings 16, 17 within which coupling members 18, 19 are rotatably supported. These coupling members are provided with recesses in their inner ends into which the ends of the flexible driving shaft 8 extend, as shown in Fig. 1, and within which recess said ends are secured, whereby motion will be transmitted from the driving coupling member 19 through the shaft 8 to the driven coupling member 18, as will be understood.

The left-hand driving member 19 extends into a recess provided in a rotating member

or shaft 20 which is driven from a moving part of the vehicle, a driving connection between the member 20 and the said driving member 19 being maintained through a key 21 fitting into a key-way in the driving member, see Fig. 5. The left-hand end of the shafting, regarded in its entirety, is secured in place and to the driving mechanism by means of a nut 22 in threaded engagement with a bearing 23, whereby the rotating driving member 20 is supported, said nut having an inwardly extending ledge 24 which overlies the flange 15 of the tubular sleeve 10, as clearly shown in said figure.

The right-hand end of the shafting is connected with the instrument 11 to be driven through a similar nut 25, having an inwardly extending flange 26 which overlies the flange 14 of the sleeve 9, see Figs. 2 and 6, and the free end of the driven coupling member 18 is provided with an angular driving socket 27 which receives a similarly shaped end of the shaft 28 of the instrument driven by the flexible shaft 8, the nut 25 being in threaded engagement with a threaded boss 29 with which the instrument in question is provided.

The driving coupling member 19 is provided with a resilient split retaining ring 30 lying within a circumferentially extending groove provided in the said member, as best shown in Fig. 1, the purpose of this ring being to prevent the shaft 8 from moving longitudinally and leaving the bearings 16, 17 whereby the coupling members at its end are supported and within which they rotate; the shaft being restrained from longitudinal movement in one direction by a shoulder 31 upon the driven coupling 18 and in the other by the resilient split ring 30 which is sprung into place after the shaft with its coupling members has been assembled with the protecting casing 7, as will be appreciated.

It will be observed that the recess in the driving member 20 into which the left-hand end of the coupling member 19 extends is of considerable depth, so that the free end of the said member may move longitudinally therein to a considerable extent before the ring 30 engages with the bearing 17 and without interfering with the driving connection provided by the key 21; the ring in question being for the purpose of preventing the shaft as a whole, together with its couplings, from leaving the protecting casing 7, rather than to provide means for limiting movement of the shaft in the direction of its axis or a device wherein that end is accomplished.

The purpose of the conical portions 12, 13 of the sleeves 9, 10 is to center the said sleeves properly as the nuts 22, 25 are screwed in place, the operation of screwing the nuts into their final position acting to aline the sleeves in question, and, as necessarily follows, the coupling members 18, 19 which are concentrically supported relative to said sleeves, with the driving member 20 and with the driving shaft 28 of the instrument to be operated. The feature in question thus prevents binding action between the coupling members and the elements with which they are operatively connected during the process of connecting the two ends of the shafting with the vehicle and with the instrument to be driven and the bearing 23 which supports the driving member or shaft 20 and the boss 29 upon the instrument to be operated are provided with conical projections 32, 33 which enter the interiors of the conical portions 12, 13 to further insure a proper centering and alinement of the parts as the nuts 22, 25 are screwed into their final positions, as will be understood.

As above stated the inwardly extending ledges 24, 26 overlie the outwardly extending flanges 15 and 14, and the said flanges lie in recesses provided in the interior of the nuts 22 and 25 when the parts are assembled, such recesses being indicated by the reference numerals 34, 35 in Fig. 1. These internal recesses are greater in diameter than the flanges which lie in them, the purpose of this feature being to avoid binding action between the peripheries of the flanges and the nuts as the nuts are screwed into their final position; the peripheries of the flanges being thus spaced apart somewhat from the adjacent side walls of the recesses so that they are free to move laterally or float up to the instant that the inner surface of the ledges engage the flanges and clamp them to the conical ends of the bearing 23 and boss 29, thus more certainly insuring the connection of the shafting with the driving means and with the instrument to be driven without binding action.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In flexible shafting of the class described, a non-rotatable flexible tubular protecting casing; a rigid tubular sleeve into which the end of said casing extends and the outer end of which sleeve is conical in form; a bearing secured in place within said sleeve; a coupling member rotatable in said bearing; and a flexible driving shaft located within said casing and the end of which shaft is connected with said coupling member to drive the same.

2. In flexible shafting of the class described; a non-rotatable flexible tubular protecting casing; a rigid tubular sleeve into which the end of said casing extends and the outer end of which sleeve is conical in form and is provided with a flange or shoulder at its extremity; a bearing secured in place

within said sleeve; a coupling member rotatable in said bearing and having an angular driving socket in its outer or free end; and a flexible driving shaft located within said casing and the end of which shaft is connected with said coupling member to drive the same.

3. In flexible shafting of the class described, a non-rotatable flexible tubular protecting casing; two rigid tubular sleeves secured one to each end of said casing; two bearings secured in place one within each of said sleeves; two coupling members rotatable one in each of said bearings, and one of which members is provided with a shoulder in engagement with one of said bearings; a flexible shaft extending between and the ends of which are connected with said coupling members; and a retaining member detachably connected with the other of said coupling members and adapted to prevent said driving shaft and coupling members from leaving said bearings.

4. In flexible shafting of the class described, a non-rotatable flexible tubular protecting casing; two rigid tubular sleeves secured one to each end of said casing; two bearings secured in place one within each of said sleeves; two coupling members rotatable one in each of said bearings, and one of which members is provided with a shoulder in engagement with one of said bearings; a flexible shaft extending between and the ends of which are connected with said coupling members; a circumferentially extending groove provided in the other of said coupling members; and a resilient ring located within said groove and adapted to prevent said shaft and coupling members from leaving said bearings.

5. In combination with an instrument to be driven having a shaft, and a threaded boss surrounding said shaft and having a conical end; of a non-rotatable flexible tubular protecting casing; a rigid tubular sleeve into which the end of said casing extends and the extremity of which sleeve is conical and of such size as to fit over the conical end of the boss aforesaid, and is provided with a flange extending substantially at right angles to the axis thereof; a nut in threaded engagement with said boss and which nut is provided with an inwardly extending ledge adapted to overlie said flange, and with an internal recess of greater diameter than and within which said flange lies; a bearing secured in place within said sleeve; a coupling member rotatable in said bearing and which member is operatively connected with the shaft aforesaid of the instrument to be driven; and a flexible driving shaft located within said casing and the end of which shaft is connected with said coupling member to drive the same.

6. In combination with an instrument to be driven having a shaft, and a threaded boss surrounding said shaft and having a conical end; of a non-rotatable flexible tubular protecting casing; a rigid tubular sleeve into which the end of said casing extends and the extremity of which sleeve is conical and of such size as to fit over the conical end of the boss aforesaid; a nut in threaded engagement with said boss and in engagement also with said sleeve to thereby clamp said sleeve and the end of said shaft to the instrument to be driven; a bearing secured in place within said sleeve; a coupling member rotatable in said bearing and which member is operatively connected with the shaft of the instrument to be driven; and a flexible driving shaft located within said casing and the end of which shaft is connected with said coupling member to drive the same.

In testimony whereof I affix my signature.

JOSEPH BERGE.