Aug. 10, 1926. 1,595,388

W. W. ELLIOTT

FLEXIBLE SHAFT TERMINAL

Filed Oct. 4, 1922

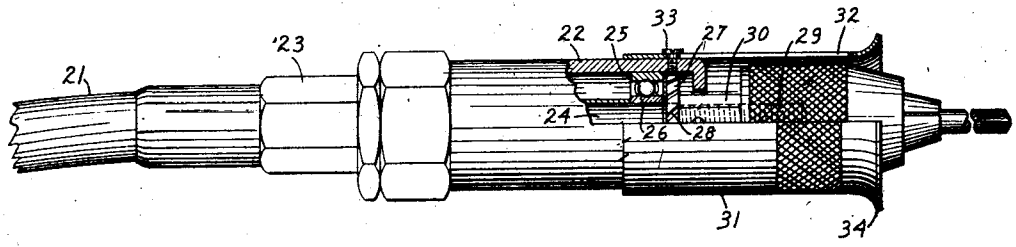


Fig.1

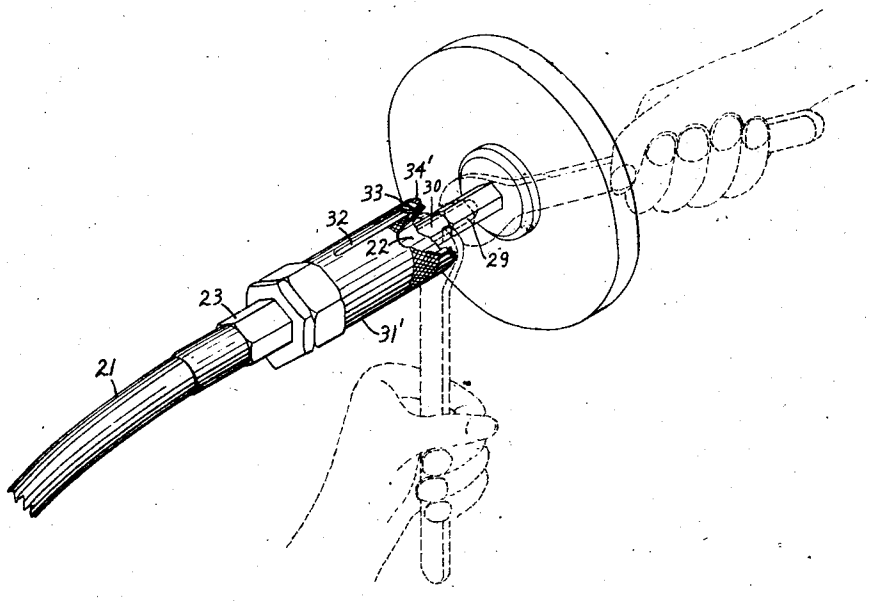


Fig.2

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UNITED STATES PATENT OFFICE.

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FLEXIBLE-SHAFT TERMINAL.

Application filed October 4, 1922. Serial No. 592,399.

This invention relates to flexible shaft terminals, and especially appertains to means for manually guiding and supporting the free ends of such shafts,—particularly those used in driving drills, grinders and other appliances the use of which involves relatively accurate direction and control.

In the use of such flexible shafts, it is not unusual to provide several arbors or several chucks, or both arbors and chucks, to be interchangeably mounted upon such flexable shaft terminals. When any one of such appliances is mounted upon a flexible shaft terminal, it is important that the screw threads connecting the parts shall be tightly set up, before the shaft is set in motion, as serious accidents are likely to result from the loosening of such appliances while the shaft is running, especially in the instance of emery wheels and other parts which revolve very rapidly during use. Inasmuch as the core or driving member of such a shaft is not exposed so it can be readily grasped, it has been customary to provide a hole through the casing and spindle of the shaft terminal, so that by placing a bar through such hole the spindle may be held against rotation while attachments are being tightened upon or loosened from such spindle, without subjecting the core of the flexible shaft to objectionable strain. Such holes through the terminal casing have provided opportunity for dirt and grit to enter the casing and thereby cause rapid deterioration of the bearings.

With a view of avoiding the objectionable features of an opening in the terminal casing, some spindles have heretofore been provided with openings in portions thereof which extended beyond such casing for corresponding use of a bar therein. The use of such outside openings has necessitated lengthening the projecting portions of such spindles, which, in turn, has caused the tool operated by the shaft to be situated at a greater distance from the terminal casing, so that the hand of a user in gripping the terminal was situated at a greater distance from the working point of the drill, wheel or other implement driven thereby, thus greatly adding to the fatigue of the user and materially impairing the quality of the work accomplished and the speed of the accomplishment.

An important object of this invention is to provide means whereby a flexible shaft terminal may be manually gripped in close proximity to the implement driven thereby, so as to enable such implement to be more accurately guided and more forcefully applied by a given effort of the user, than in the case of prior art terminals.

Another object is to provide simple and effective means whereby the spindle of such a terminal may be held against rotation, without affording opportunity for dust and grit to enter the bearings and without objectionably weakening such spindle by providing a large opening therethrough.

To these and other ends, therefore, the nature of which will be readily understood as the invention is hereinafter disclosed, this invention consists in the features of construction, combination of parts and in the unique relations of the members to the relative proportioning and disposition thereof; all as hereinafter more completely described, illustrated in the accompanying drawing, and more particularly pointed out in the annexed claims.

An illustrative embodiment of this invention is shown in the accompanying drawing which forms a part of this specification, in which similar reference characters denote similar or corresponding parts throughout all of the views, of which:

Figure 1 is a side elevation, with certain parts broken away and shown in section, of an embodiment of this invention in a flexible shaft terminal equipped with a drill chuck; and

Fig. 2 is a perspective view of a slightly different embodiment of this invention in a flexible shaft terminal equipped with an emery wheel, and illustrates the facility with which appliances may be firmly attached to or disconnected from flexible shaft terminals embodying this invention.

Referring to Fig. 1,—the typical flexible shaft casing 21 is suitably secured to the terminal casing member 22 in any well known manner, as by means of the coupling 23.

The spindle member 24 is suitably journaled in the casing member 22, as by means of anti-friction bearing devices such as that comprising the annular ball race pieces 25 and 26.

The flange 27 is secured to the spindle

member 24 near the end thereof which projects out of the casing member 22; and said flange has the diagonal slots 28 formed therein, the direction of the slant of said slots being such that the intended direction of rotation of the spindle 24 will tend to cause movement of lubricant past said flange in a direction away from the bearings, so that there will be no opportunity for any dust or grit (to which the outer face of said flange may be exposed) to reach the bearings.

A flexible shaft contained in the casing 21 may be connected to the spindle 24 in any desired manner.

A portion of the spindle 24 extends from the end of the casing 22 opposite to that to which the coupling 23 is secured, such extending portion being threaded at 29 to facilitate attachment thereto of desired appliances such as a chuck, arbor or the like. Between the thread 29 and the adjacent end of the casing 22, the spindle 24 is so formed as to facilitate engagement thereof by a suitable implement for holding said spindle against rotation. Such facilities may comprise an opening through the spindle for receiving a suitable bar, if the spindle is of such diameter as to permit, without objectionable weakening thereof, the formation therein of a hole of sufficient diameter to receive a bar of such size as to afford adequate strength for the purpose. In order to avoid such weakening of the spindle 24, especially when such spindle is of comparatively small diameter, it is preferable to provide an enlarged hexagonal surface 30, which surface may be formed integral with the spindle 24 or may comprise a nut suitably secured thereto.

The sleeve 31 is mounted upon the casing 22, the outside surface of said casing and the inner surface of said sleeve being so relatively formed that said sleeve may freely slide telescopically between two positions on said casing to the end that, when said sleeve is in one of said positions, a portion thereof will enclose the projecting end of spindle 24 and a desired portion of an intended appliance mounted thereon, and so that when said sleeve is in the other of said positions it will so expose the extending portion of the spindle 24 that access may be had to the end thereof for attaching thereto or removing therefrom an intended appliance.

The slot 32 is formed in the sleeve 31 for receiving the screw 33, which screw is fixed in the casing 22; and the relative construction and arrangement of said slot and screw is such as to permit intended relative travel of the sleeve 31 lengthwise of the casing 22, but will prevent relative rotation between said sleeve and said casing. When the terminal is intended for use with drill chucks or other appliances to which thrust should be imparted lengthwise thereof, it is desirable that the end 34 of the sleeve 31 should be flared outwardly, as indicated by Fig. 1, to facilitate so gripping such sleeve as to enable it to be forcefully urged in the intended direction with a minimum of fatigue to the user.

Referring now to Fig. 2, the shaft casing 21, terminal casing 22, and coupling 23 are the same as in Fig. 1; but the sleeve 31′ differs from the sleeve 31 of Fig. 1 in that the end 34′ thereof is not shown as being flared outwardly.

When it is desired to attach a grinding wheel to the spindle 24, as indicated by Fig. 2,—the sleeve 31′ is moved as far as it will go toward the end of the casing 22 situated furthest from the threaded portion 29 of the spindle 24, and the arbor of the emery wheel should then be screwed upon said threaded end, and finally tightened by engaging the enlarged hexagonal surface 30 and a corresponding surface of the arbor by suitable wrenches, or the like, as indicated by Fig. 2.

In the use of the embodiment of this invention, as shown by the accompanying drawing, the sleeve 31 is moved as far as it will go, toward the emery wheel, or other device carried by the threaded end 29 of the spindle 24, which may then be driven by means of the flexible shaft connected therewith; the sleeve 31 being meanwhile firmly grasped by the user in close proximity to the grinding wheel or other appliance, thus permitting such appliance to be guided and applied more accurately and effectively and with less fatigue than would be the case without the sleeve 31, besides protecting the hand of the user from accidental contact with the rapidly moving end of the spindle 24 which projects outside of the casing 22.

As many changes could be made in the construction, form, number and arrangement of parts, and many apparently widely different embodiments of this invention can be made without departing from the scope thereof, it is intended that all matters contained in the foregoing detailed description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What I claim and desire to secure by Letters Patent of the United States is:

1. In a flexible shaft terminal, a relatively stationary casing and a revoluble spindle an end of which extends from said casing and is arranged for attachment thereto of desired appliances such as a chuck, arbor, or the like,—in combination with a sleeve carried by and freely movable relatively to said casing, said sleeve so formed as to either expose or serve as a cover for said spindle end and an intended appliance mounted thereon, dependent upon the relative positionings of

said sleeve and said casing, and means for retaining said sleeve upon said casing while permitting limited relative lengthwise movement therebetween for the attainment of such relative positionings.

2. In a flexible shaft terminal,—a relatively stationary casing and a revoluble spindle an end of which extends from said casing, in combination with a sleeve carried by and freely movable relatively to said casing, said sleeve being formed so as to provide an outward flare at an end thereof to facilitate actuation by a user, so as to adapt same for positioning thereof upon said casing to either expose or serve as a cover for said spindle end, and so as to provide a slot therein so formed that the walls thereof will be adapted to cooperate with a screw carried by said casing to retain said sleeve thereon while permitting relative lengthwise movement therebetween for attaining such relative positionings, and a screw situated within said slot and carried by said casing.

3. In a flexible shaft terminal,—a relatively stationary casing and a revoluble spindle an end of which extends from said casing, in combination with a sleeve carried by and freely movable relatively to said casing, said sleeve so formed as to either expose or serve as a cover for said spindle end, dependent upon the relative positionings of said sleeve and said casing, and means for retaining said sleeve upon said casing while permitting limited relative lengthwise movement therebetween for attainment of such relative positionings.

4. In a flexible shaft terminal,—a relatively stationary casing and a revoluble spindle an end of which extends from said casing, in combination with a sleeve secured to said casing and slidable lengthwise thereof between fixed limits so that, when said sleeve is at one end of the travel thereof relative to said casing, a portion of said sleeve will enclose said projecting spindle end, the outside surface of said enclosing portion of said sleeve being formed and arranged to facilitate so gripping such sleeve as to forcefully urge same in the direction of the extending end of said spindle.

5. In a flexible shaft terminal,—a relatively stationary casing and a revoluble spindle an end of which extends from said casing, in combination with a sleeve secured to said casing and slidable lengthwise thereof between fixed limits so that, when said sleeve is at one end of the travel thereof relative to said casing, a portion of said sleeve will enclose said projecting spindle end, the outside surface of said enclosing portion of said sleeve being flared outwardly.

6. In a flexible shaft terminal,—a relatively stationary casing and a revoluble spindle one end of which extends from said casing, in combination with a sleeve so secured to said casing as to permit limited relative lengthwise movement therebetween whereby, when said sleeve is at one end of the travel thereof relative to said casing, a portion of said sleeve will enclose said projecting spindle end.

In witness whereof, I hereunto subscribe my name, this 27 day of September, 1922.

WINFRED W. ELLIOTT.