No. 733,181. PATENTED JULY 7, 1903.

W. D. FORSYTH.

FLEXIBLE SHAFTING.

APPLICATION FILED DEC. 2, 1902.

NO MODEL.

Fig. 1.

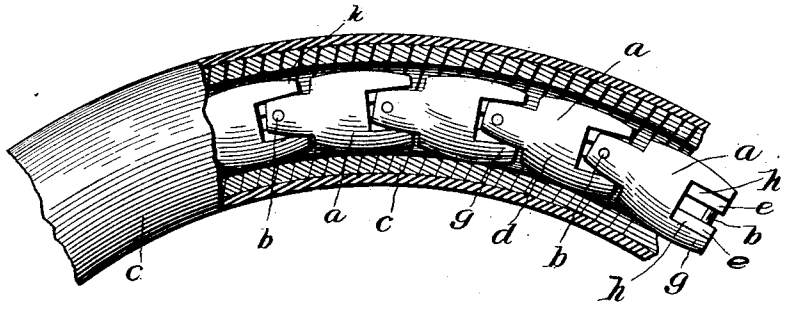


Fig. 2.

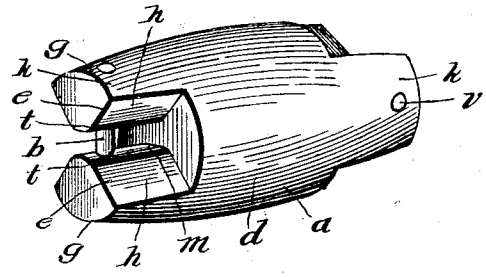
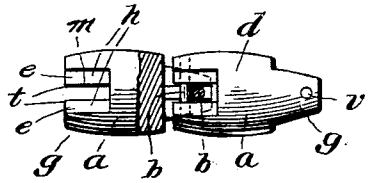


Fig. 3.



Inventor

Wilber D. Forsyth.

Witnesses

R. A. Boswell.

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By his attorney E. W. Anderson.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 733,181. Patented July 7, 1903.

UNITED STATES PATENT OFFICE.

WILBER D. FORSYTH, OF PITTSBURG, PENNSYLVANIA.

FLEXIBLE SHAFTING.

SPECIFICATION forming part of Letters Patent No. 733,181, dated July 7, 1903.

Application filed December 2, 1902. Serial No. 133,616. (No model.)

To all whom it may concern:

Be it known that I, WILBER D. FORSYTH, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have made a certain new and useful Invention in Flexible Shafting; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The invention relates to flexible shafts; and it consists in the novel construction and combinations of parts, as hereinafter set forth.

The object of the invention is, mainly, to provide for flexible shafts a smooth-running flexible sectional core wherein the sections or links will keep themselves in true position at all times, thus avoiding irregular movements from the central line, which are apt to cause binding through the enlargement of the general diameter of the core, producing thereby excessive heat and diminishing the effective power.

In the accompanying drawings the letter *a* designates one of the sections or link-pieces of the series which constitutes the flexible shaft or core. As usually employed the sections, being connected by the transverse pins *b* at their ends, constitute a flexible core, which core is introduced into a flexible casing or sleeve *c*, said sleeve not being designed to turn in the working, which is accomplished by the rotation of the flexible core, to which the bit or other tool is attached.

Each section or link *a* is similar to the next one and consists of a cylindrical body portion *d* of about one-third the length of the section. Opposite sector-form extension-lugs *e* project from each end of the body portion in such wise that there is at each end of such body portion a pair of such sector-form lugs having convex exterior faces *g* coincident with the cylindrical face of the body portion and radial side faces *h* approximating each other to give the sector form in cross-section. The exterior curved face of each lug is slightly rounded in at the end of the lug, or, in other words, the lugs are usually made slightly tapering from the body toward their ends, as indicated at *k*, to provide for easy flexure and in order to avoid any angular presentation of the end of the lug outward when the core is flexed. The opposite sector-lugs are quadrants or of nearly quadrant extent, and the pair on one end of the section is located at right angles to the pair at the other end of the section with respect to the axis of the section.

The sector-lugs at each end are centrally separated from each other by a passage, (indicated at *m*,) and between the radial faces of the lugs are made quadrant intervals, whereby are provided the quadrant V-form seats *t*, which engage the lugs of the adjacent links or sections. The lugs are provided at their ends with radial apertures *v*, in which are placed the transverse diametric pins *b*, spanning the passages *m* of the sections and serving to hold the sections of the core together. The lugs are usually made slightly tapering from the body toward their ends to provide for easy flexure and to avoid angular projections when the core is flexed. Sufficient play is given between the crossed connecting-pins to allow for a flexure of any required radius. This core is designed to be very strong, because its sector-form lugs have their greatest mass at their outer portions, where there is most leverage, and as their engaging sides are radial they present themselves in suitable position for transmitting pressure of rotation without slip. The sector form also allows freedom of flexure in the planes of the quadrant radial faces, as well as in the planes of the pins and intermediate planes.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The flexible-shaft link consisting of the cylindrical body portion, having at each end, opposite sector-form quadrant-lugs at right angles with the similar lugs of the opposite end, said lugs being centrally separated, and transverse connection-pins spanning such separations, substantially as specified.

2. A flexible core consisting of a series of links having cylindrical body portions and terminal sector-form quadrant-lugs, engag-

ing each other by the radial inner faces of said quadrant-lugs, and transverse diametric connecting-pins, substantially as specified.

3. The combination with a flexible-shaft casing, of the series of cylindrical sections having the sector-form opposite end lugs provided with inward-rounded ends, and centrally separated, and the transverse diametric pins passing through the ends of said lugs, and connecting the sections, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

WILBER D. FORSYTH.

Witnesses:
A. FRASER LEGGATE,
S. J. CROSS.