

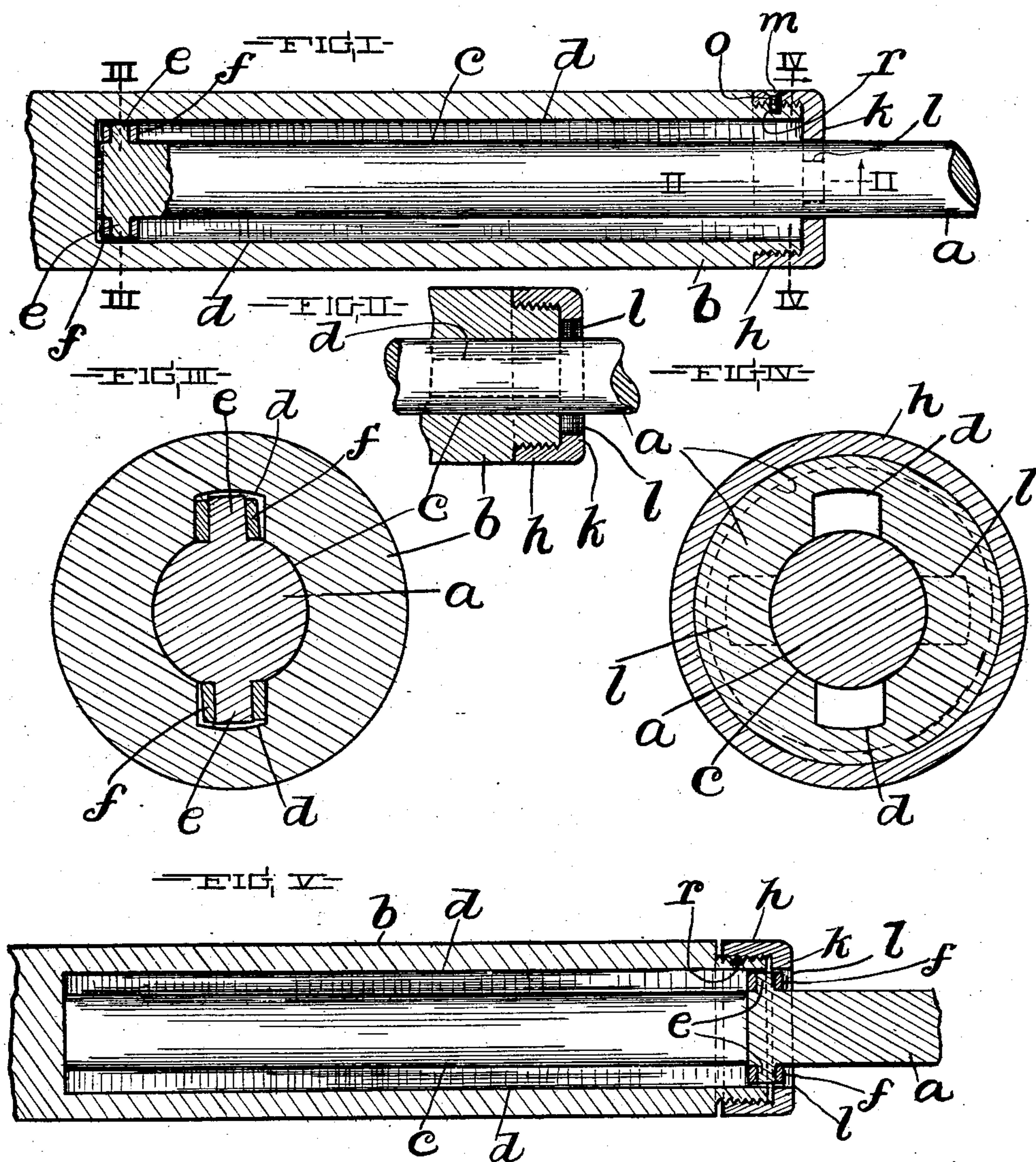
No. 729,365.

PATENTED MAY 26, 1903

I. LEHMAN.  
EXTENSIBLE SHAFT.

APPLICATION FILED JULY 31, 1902.

NO MODEL.



WITNESSES:

Daniel E. Daly.  
Nelson Schwartz

INVENTOR

Isador Lehman

BY

Simon D. W. Dyer  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

ISADOR LEHMAN, OF CLEVELAND, OHIO.

## EXTENSIBLE SHAFT.

SPECIFICATION forming part of Letters Patent No. 729,365, dated May 26, 1903.

Application filed July 31, 1902. Serial No. 117,804. (No model.)

*To all whom it may concern:*

Be it known that I, ISADOR LEHMAN, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Extensible Shafts; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in extensible shafts.

The object of this invention is to provide a shaft which comprises an endwise-slidable section extending into and longitudinally of and operatively connected with a relatively stationary section of the shaft, to provide an improved operative connection between the said shaft-sections, and to exclude dirt and foreign matter from within the relatively stationary section.

With this object in view the invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, largely in central longitudinal section, of my improved extensible shaft. Fig. II is a horizontal section on line II II, Fig. I. Fig. III is an enlarged transverse vertical section on line III III, Fig. I. Fig. IV is an enlarged transverse vertical section on line IV IV, Fig. I, looking in the direction indicated by the arrow. Fig. V is a side elevation, in central longitudinal section, illustrating the manner of introducing the endwise-shiftable shaft-section into the relative stationary shaft-section.

My improved extensible shaft comprises an endwise-shiftable shaft-section *a*, which extends into and longitudinally of the relatively stationary section *b* of the shaft. The shaft-section *b* is provided, in one end portion thereof and centrally, with a bore *c*, which extends a suitable distance inwardly from the outer extremity of the said end portion and is just large enough diametrically to accommodate the extension of the shaft-section *a* into and longitudinally of the said bore and to accommodate the shiftable of the said shaft-section *a* endwise of the shaft-section *b*. Two parallel grooves *d* and *d* are formed in

the surrounding wall of the bore *c* at opposite sides, respectively, of the said bore and are engaged by projecting members with which the shaft-section *a* is provided, which projecting members comprise, respectively, a lug *e*, which is integral with the shaft-section *a* and projects from the said shaft-section *a* at a right angle to the axial line of the shaft, and an antifriction-roller *f* is mounted upon the said lug and is smaller diametrically than the engaging groove *d*, so that each roller *f* during the rotation of the shaft engages only one of the side walls of the engaging groove *d*, as shown in Fig. III. It will be observed, therefore, that the rollers *f* have their axes at right angles to the axial line of the shaft.

The shaft-section *b* is reduced in external diameter a short distance along the outer end of the bore *c* inwardly from the outer extremity of the said bore, and the said diametrically-reduced end of the said shaft-section *b* is screw-threaded externally, and a correspondingly internally screw-threaded sleeve *h* is mounted upon the said diametrically-reduced end of the said shaft-section.

The sleeve *h* is provided at the outer extremity of the said diametrically-reduced end of the shaft-section *b* with an internal annular flange *k*, which closely but easily embraces the shaft-section *a* at the outer extremity of the bore *c* and forms a guard arranged to prevent the ingress of dirt and foreign matter into the grooves *d* of the shaft-section *b*, and the said flange *k* is provided with two diametrically oppositely located slots *l*, which are adapted upon the required manipulation of the sleeve *h* during the assemblage of the parts to register with the grooves *d* of the shaft-section *b*, as shown in Fig. V, so as to accommodate the passage of the roller-bearing members of the shaft-section *a* into the said grooves during the introduction of the said shaft-section *a* into the shaft-section *b*, and obviously, therefore, the said sleeve *h*, as shown in Fig. V, is not fully screwed into place on the shaft-section *b* until the said roller-bearing members have, during the assemblage of the parts, passed fully into the said grooves *d*, and the said sleeve is turned enough when the roller-bearing members of the shaft-section *a* have wholly passed into the grooves *d* during the assemblage of the parts to bring the slots *l*



of the sleeve-flange  $k$  out of registry with the grooves  $d$  and to close the said slots at the inner side of the said flange by the flange-facing surface of the adjacent end of the shaft-section  $b$ , as shown in Fig. II, so as to prevent dirt or foreign matter from passing into the grooves  $d$  through the said slots.

Means for preventing circumferential displacement of the sleeve  $h$  upon the assemblage of the parts is provided, as shown in Fig. I, and comprises a screw or pin  $m$ , which extends through a hole  $o$ , formed in the said sleeve, into the hole  $r$ , formed in the shaft-section  $b$ , and the arrangement of the parts is such that when during the assemblage of the parts the sleeve has been turned far enough to bring the hole  $o$  in the sleeve into registry with the hole  $r$  in the shaft-section  $b$  the slots  $l$  of the sleeve-flange  $k$  shall be out of registry with the grooves  $d$  of the said shaft-section and closed at their inner sides, as aforesaid.

What I claim is—

1. An extensible shaft comprising the following: a shaft-section provided interiorly with a bore which extends a suitable distance inwardly from one extremity of the said section and has a groove which is formed in the surrounding wall of the said bore and extends inwardly from the outer extremity of and parallel with the bore; a shaft-section engaging and extending longitudinally of the said bore and provided with a roller engaging the aforesaid groove and having its axis at a right angle to the axial line of the shaft, and a sleeve attached to the interiorly-bored shaft-section at the outer end of the aforesaid bore and provided with an inner annular flange which closely but easily embraces the roller-bearing shaft-section.

2. An extensible shaft comprising the following: a shaft-section provided interiorly with a bore which extends a suitable distance inwardly from one extremity of the said section and has a plurality of grooves which are formed in the surrounding wall of the said bore and extend inwardly from the outer extremity of and parallel with the bore, and a shaft-section engaging and extending longitudinally of the said bore and provided with roller-bearing members which project into the aforesaid grooves and have the rollers smaller

diametrically than the width of the engaging grooves.

3. An extensible shaft comprising the following: a shaft-section provided interiorly with a bore which extends a suitable distance inwardly from one extremity of the said section and has a plurality of grooves which are formed in the surrounding wall of the said bore and extend inwardly from the outer extremity of the bore to the inner end of the bore; a shaft-section engaging and extending longitudinally of the said bore and having members projecting into the aforesaid grooves, and a sleeve attached to the interiorly-bored shaft-section at the outer end of the aforesaid bore and provided with an inner annular flange which closely but easily embraces the aforesaid bore-engaging shaft-section.

4. An extensible shaft comprising the following: a shaft-section provided interiorly with a bore which extends a suitable distance inwardly from one extremity of the said section and has a plurality of grooves which are formed in the surrounding wall of the said bore and extend inwardly from the outer extremity of and parallel with the bore, which shaft-section is screw-threaded externally at the outer end of the said bore; a shaft-section engaging and extending longitudinally of the said bore and having members which engage the aforesaid grooves; an internally-screw-threaded sleeve screwed onto the interiorly-bored shaft-section at the outer end of the aforesaid bore and provided with an inner annular flange which closely but easily embraces the aforesaid bore-engaging shaft-section and has slots arranged to register with the aforesaid grooves upon turning the sleeve upon the sleeve-bearing shaft-section to the required extent, and means for preventing circumferential displacement of the said sleeve when the sleeve is arranged with its slots out of registry with the said grooves.

In testimony whereof I sign the foregoing specification, in the presence of two witnesses, this 21st day of July, 1902, at Cleveland, Ohio.

ISADOR LEHMAN.

Witnesses:

C. H. DORER,  
TELSA SCHWARTZ.