

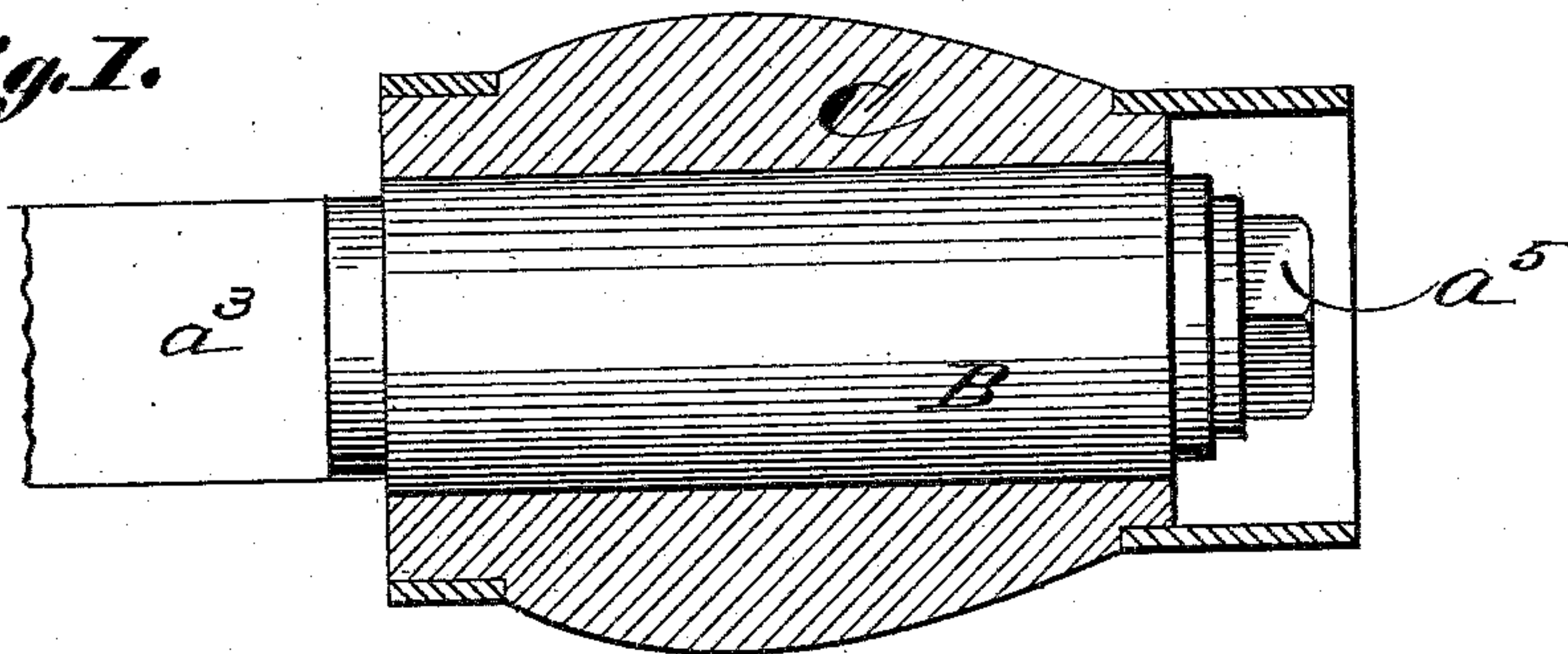
(No Model.)

C. ZENS.  
CARRIAGE AXLE.

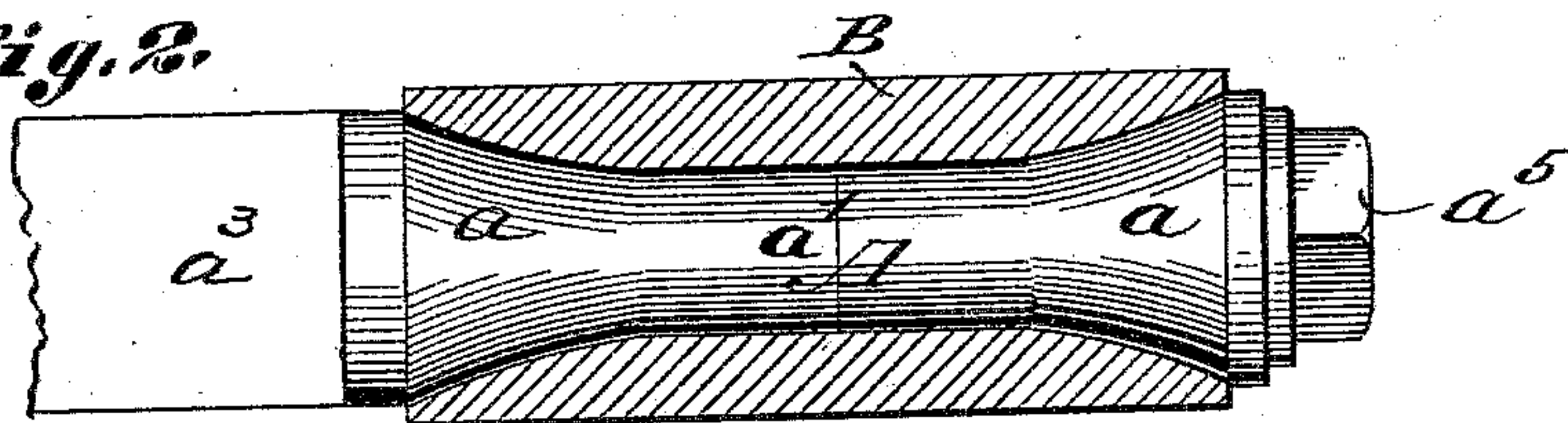
No. 303,099.

Patented Aug. 5, 1884.

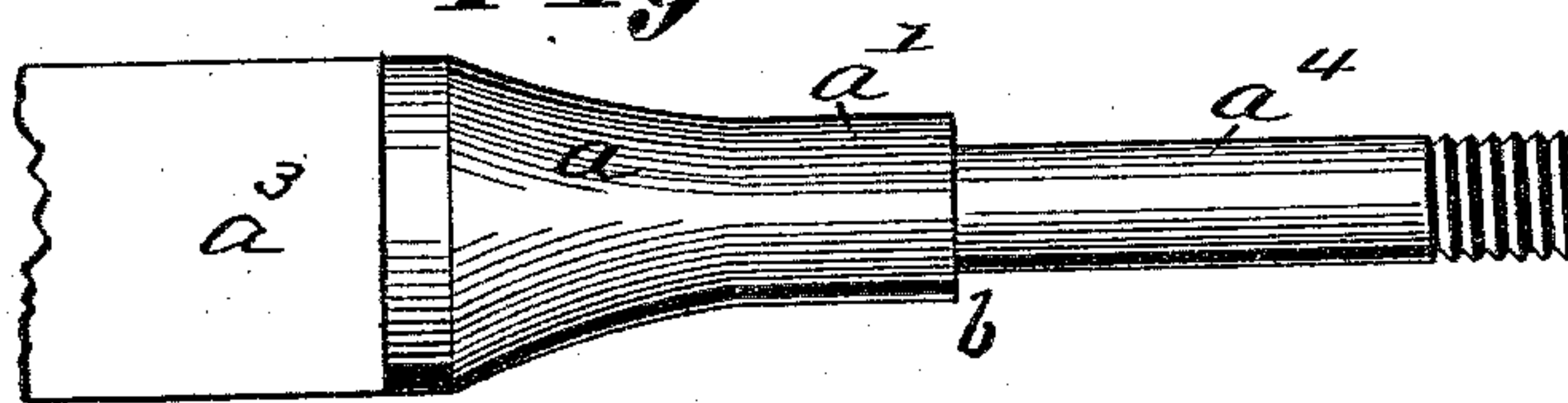
*Fig. 1.*



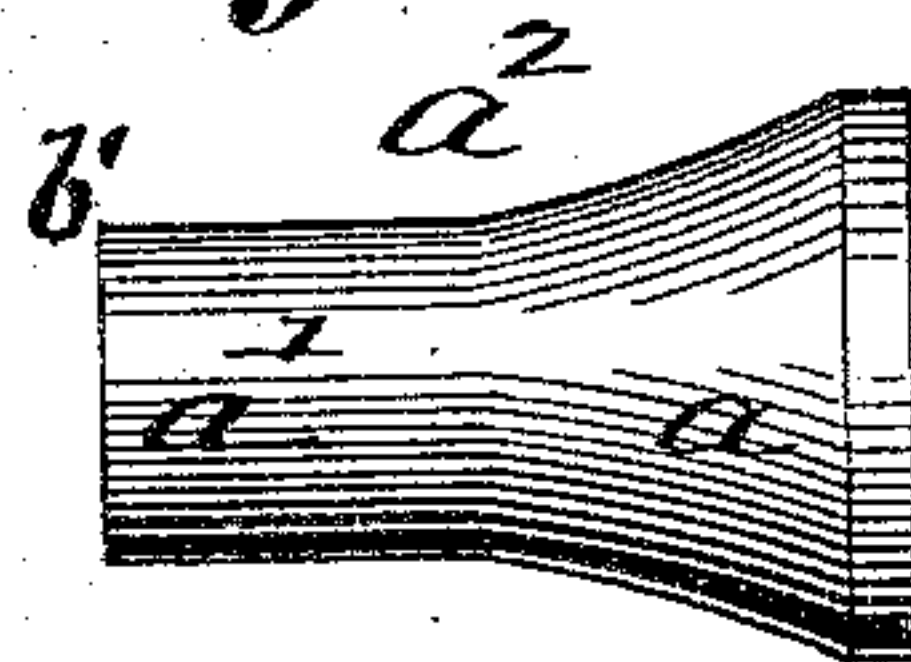
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Attest:*  
*Charles Pickles*  
*C. C. Hunt.*

*Inventor:*  
*Charles Zens*  
*by C. C. Hunt atty*



# UNITED STATES PATENT OFFICE.

CHARLES ZENS, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO  
FRANK J. DEXTER, OF SAME PLACE.

## CARRIAGE-AXLE.

SPECIFICATION forming part of Letters Patent No. 303,099, dated August 5, 1884.

Application filed November 5, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES ZENS, of St. Louis, Missouri, have made a new and useful Improvement in Carriage-Axles, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a side elevation, partly in section, the axle and box being in elevation and the hub in longitudinal section; Fig. 2, a view showing the spindle in side elevation and the box in section; Fig. 3, a view showing the spindle in side elevation, the detachable portion of the spindle being removed; and Fig. 4 a side elevation of the detachable portion of the spindle.

The same letters of reference denote the same parts.

This invention relates to the construction of the axle-spindle A. Its noticeable feature is making it concave throughout its length, and more particularly described as follows: Beginning at each end  $a$  of the spindle, it tapers in a curve toward the middle of the axle. The curve, however, does not extend throughout the length of the spindle, but the central portion,  $a'$ , of the axle is made cylindrical—that is, the axle may be regarded as being composed of a cylinder joined at each end to a conical frustum.

To enable the box B and hub C to be attached, the spindle has a detachable portion,  $a^2$ , which, after the box has been placed in position, is slipped onto the extension  $a^1$  of the fixed portion of the spindle, and secured thereon by the nut  $a^3$ , as shown in Figs. 1 and 2.

Several advantages accrue from this construction. The axle-spindle is strengthened at its inner end, at which point an axle-spin-

dle, as hitherto made with a square shoulder, is apt to break. The wheel runs more steadily in consequence of the concave shape of the spindle, and especially when the middle portion,  $a'$ , thereof is cylindrical. Further, the oil used in lubricating the spindle is retained to better advantage.

The main portion  $a^3$  of the axle is made the same size as the end  $a$  of the spindle. This prevents the axle from breaking on the inner side of the spindle.

It will be observed that at  $b$ , I form an annular shoulder at the termini of the cylindrical fixed portion  $a'$  by reducing the cylindrical extension  $a^1$ , which shoulder is about midway of the length of the axle-fixed part of the arm. The detachable portion  $a^2$  has a conical portion,  $a$ , of the same size as the conical portion  $a$  on the fixed arm, and also a cylindrical portion,  $a'$ , of about the same length and diameter as the cylindrical portion  $a'$  on the fixed axle-arm. Now, when the detachable portion  $a^2$  is slipped on the reduced extension  $a^1$ , and the nut  $a^3$  screwed home on the latter, the end  $b'$  of the detachable portion  $a^2$  will be forcibly pressed against the shoulder  $b$  of the cylindrical portion  $a'$  and leave a closely-fitting joint.

I claim—

A carriage-axle spindle composed of two sections, each having a cone and a cylindrical extension thereof, one of which sections is integral with the axle, and the other removable and fitting on the end of the axle, and adapted to be confined thereon by a nut, substantially as described.

CHARLES ZENS.

Witnesses:

C. D. MOODY,  
C. E. HUNT.