

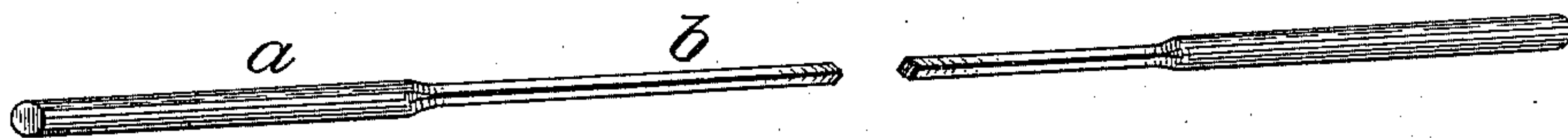
(No Model.)

W. G. ALLEN.  
METAL SPOKE.

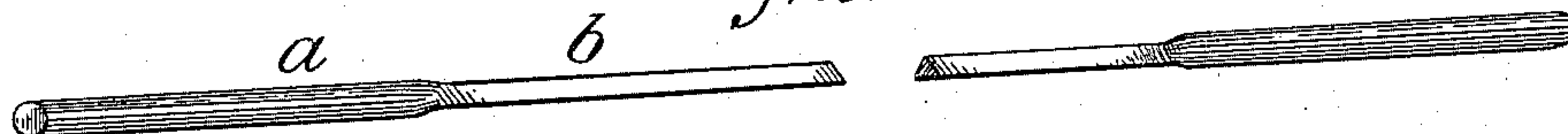
No. 598,620.

Patented Feb. 8, 1898.

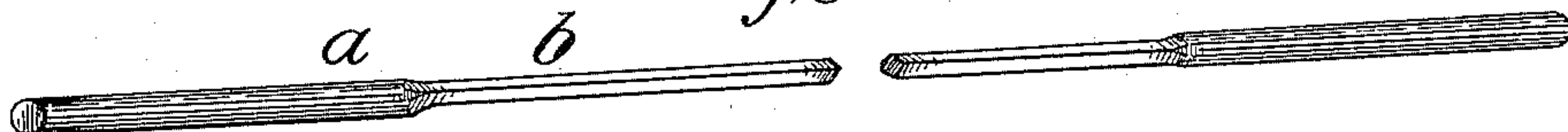
*Fig. I.*



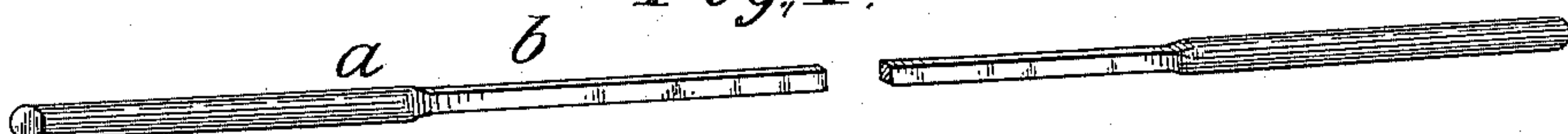
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Fig. 5*

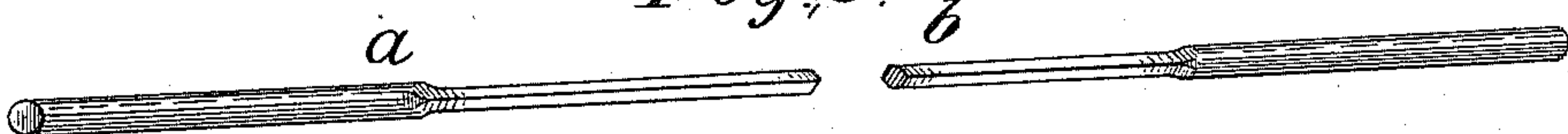
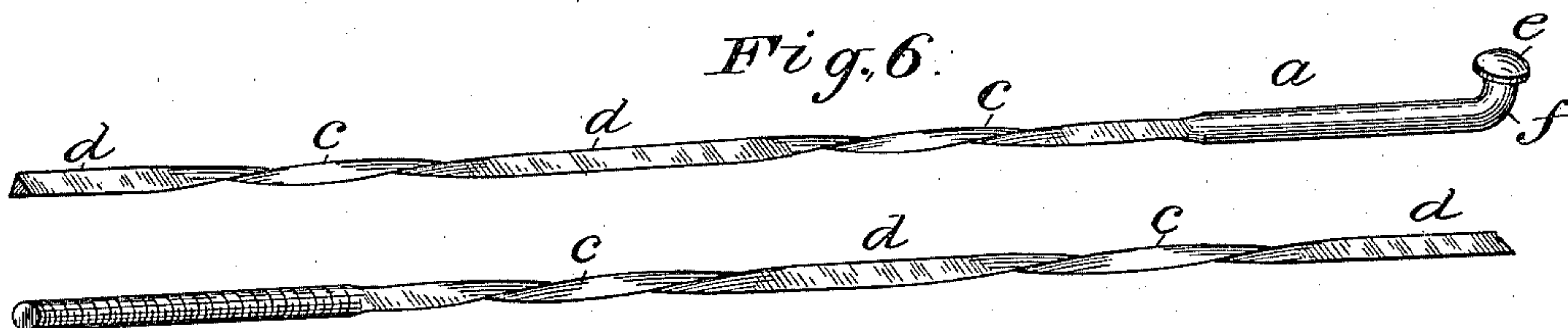


Fig. 6



*Fig. 7.*



Witnesses.

W. R. Edelen.  
Paul Lewis

*Inventor,*

William G. Allen,  
by Folio & Macero,  
his attorneys.



# UNITED STATES PATENT OFFICE.

WILLIAM G. ALLEN, OF HARTFORD, CONNECTICUT.

## METAL SPOKE.

SPECIFICATION forming part of Letters Patent No. 598,620, dated February 8, 1898.

Application filed September 22, 1897. Serial No. 652,566. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM G. ALLEN, of Hartford, Connecticut, have invented a new and useful Improvement in Metal Spokes, which improvement is fully set forth in the following specification.

This invention relates to the construction of metal wheel-spokes for bicycles and other vehicles; and its object is to produce a spoke which, while possessing great tensile strength in proportion to weight and capable of being readily and cheaply made, shall present a brilliant and elegant appearance in comparison with the spoke now ordinarily used.

The principal departure from ordinary practice in making the improved spoke consists in forming the intermediate portion of irregular or angular instead of circular cross-section, leaving the ends rounded. I further preferably impart to this intermediate portion as a finishing step a twist, so that the edges or angles form parallel helices. Spokes of this description impart to the wheel a highly-ornamental appearance, and when in motion the reflection of light from the angles of the spoke, particularly when twisted, produces a brilliant scintillating effect. In making spokes of this sort several difficulties have to be avoided in order to obtain a successful result. If the blank were reduced to angular or irregular cross-section and twisted from end to end, it would have to be drawn very hard in order to obtain the requisite tensile strength. In such case the bending of the headed end to form the shoulder is difficult and the metal when bent is greatly strained and breaks readily at the bend. Moreover, if the stock is angular there would not be a suitable bearing under the head. It also becomes difficult to shape the other end and cut the thread thereon.

In making the improved spoke I proceed in the following way: The blanks are cut of proper length from steel-wire stock of circular cross-section of the proper softness and toughness to admit of threading and of bending the headed end without loss of strength. The middle part of the blank is then brought to a triangular, square, hexagonal, or other polygonal or irregular cross-section, leaving the ends circular in cross-section. This change of shape is preferably effected by the use of rolls

having grooves of proper shape and adapted to act on the middle part of the blank and finished, if desired, by swaging-dies; but the means employed form no part of the invention and may be of any suitable sort. The physical effect produced is to increase the hardness, compactness, and tensile strength of the middle portion, leaving the ends unaltered. The middle portion is then preferably twisted, making a spiral of greater or less pitch, as desired. In changing the shape of the middle portion of the spoke it is advantageous at the same time to reduce it in sectional area, and the procedure above described will accomplish that result. Obviously a blank having circular ends of greater diameter than the angular reduced portion can be produced in other ways; but that described above is believed to be the most practical and effective. The subsequent operations of heading, bending, and threading are or may be performed in the usual way.

Many specific varieties of spokes can be produced within the scope of the invention. As already stated, the reduced middle portion may be of various forms in cross-section, and the helices may have various pitches. The twist may also extend over a part only of the reduced portion and may be interrupted at one or more places, thus producing different effects upon the eye and giving to different wheels distinctive appearances.

In the accompanying drawings, which form part of this specification, Figures 1 to 5, inclusive, illustrate blanks having their middle portions of different polygonal form in cross-section. Fig. 6 illustrates a twisted spoke, and Fig. 7 another form of twisted spoke, the end portions being broken away.

In Figs. 1 to 5, *a* designates the circular ends, and *b* the polygonal intermediate portion, of the spoke. In Fig. 1 this portion presents in cross-section a square, in Fig. 2 a triangle, in Fig. 3 a pentagon, in Fig. 4 an oblong parallelogram, and in Fig. 5 a hexagon.

As shown in Fig. 6, the middle portion of the finished spoke has twisted parts or sections *c*, alternating with plain or untwisted parts *d*. A wheel provided with these spokes would exhibit while in motion bright circular bands separated by duller zones. Of course the number of twisted sections may be greater



or less than shown in this figure. Fig. 6 also shows one of the ends provided with a head *e* and shoulder *f* and the other with a screw-thread. It will be understood, however, that  
 5 the invention is applicable to spokes which are not shouldered at one end or which have other attaching means than those shown.

Fig. 7 illustrates a spoke which has the middle portion twisted from end to end.

10 The foregoing description will enable persons skilled in the art of metal-working to comprehend my invention fully and to modify the construction of the spoke in various ways additional to those specifically indicated.

15 Having now particularly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A metal spoke having end portions of circular cross-section, and an intermediate  
 20 portion of angular cross-section and twisted so that the edges form parallel helices, substantially as described.

2. A metal wheel-spoke having end portions of relatively large diameter, and a re-  
 25 duced middle portion of polygonal cross-section

twisted so that its angles form parallel helices, substantially as described.

3. A metal spoke having end portions of circular cross-section, and a reduced twisted middle portion of polygonal cross-section, 30 substantially as described.

4. A metal spoke having end portions of circular cross-section of relatively soft metal and a harder middle portion of polygonal cross-section, the middle portion being twist- 35 ed, substantially as described.

5. A metal spoke having end portions of circular cross-section and a reduced middle portion of polygonal cross-section, the edges forming parallel helices extending over part 40 of said middle portion, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM G. ALLEN.

Witnesses:

REEVE LEWIS,  
 S. T. CAMERON.