(No Model.)

N. STOW.

FLEXIBLE SHAFT.

No. 571,869. Patented Nov. 24, 1896.

Fig. 1.

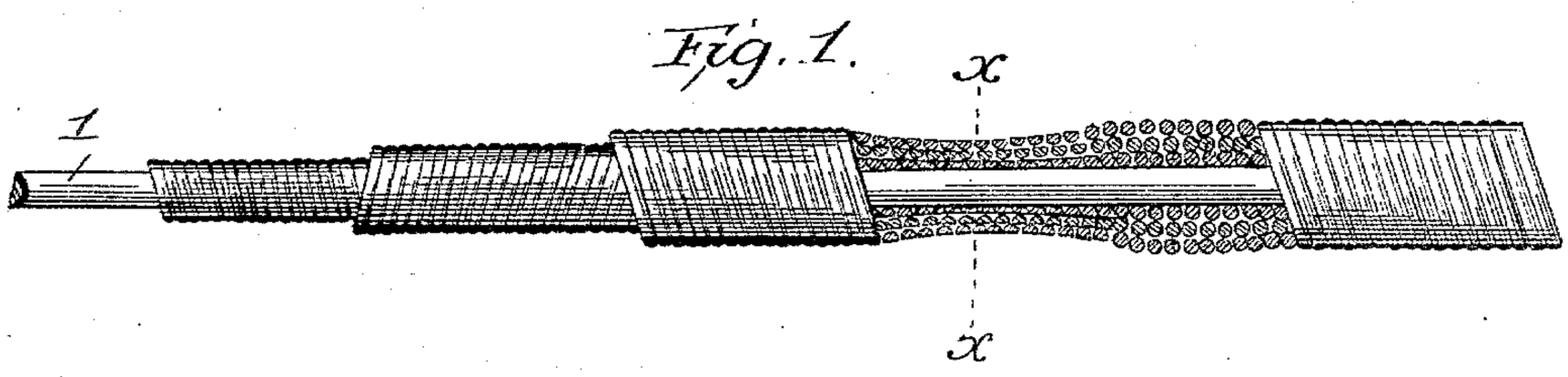


Fig. 2.

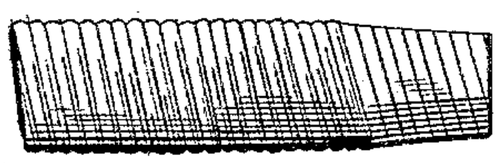


Fig. 3.

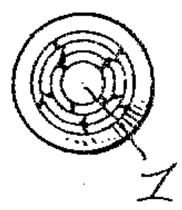


Fig. 5.

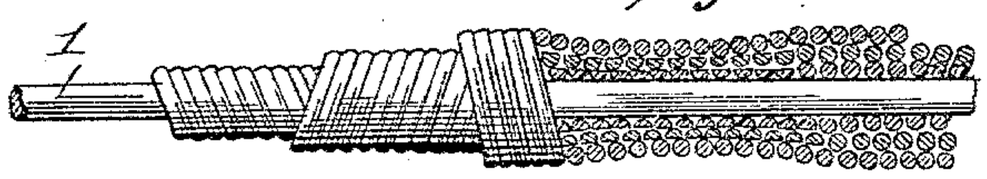
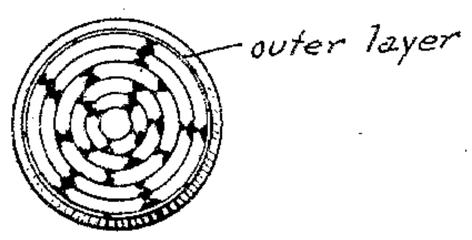


Fig. 4.



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UNITED STATES PATENT OFFICE.

NELSON STOW, OF BINGHAMTON, NEW YORK.

FLEXIBLE SHAFT.

SPECIFICATION forming part of Letters Patent No. 571,869, dated November 24, 1896.

Application filed December 27, 1895. Serial No. 573,535. (No model.)

To all whom it may concern:

Be it known that I, NELSON STOW, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Flexible Shafts; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

It is the object of my invention to provide a flexible shafting having a conical end ready for attachment to a rotary socket or like driving means without requiring the grinding away or otherwise preparing the end of the shaft after it has been cut up into the proper length.

In the drawings, Figure 1 is a side view showing a shaft in different stages of its construction and before it is cut up into lengths, the line x x indicating where the long length is cut to form the shafts of the desired lengths for use. Fig. 2 is a view of the shaft-section having the conical end ready for attachment to the socket or driving part. Fig. 3 is an end view of the improved conical end, and Fig. 4 is an end view of the old form of conical end. Fig. 5 is a view showing the outer layer not reduced.

In carrying out my invention I take a core 1, as shown in Fig. 1, and wind wire about the same, and at certain points along this layer, that is, at the point x, where the long length of shaft is to be divided up into the proper lengths for use, I grind the wire down to about one-fourth of its diameter, the grinding being done in such a manner that a taper is formed from the full diameter in opposite directions down to the minimum diameter of this layer at the central point of the grinding. Over this layer a second layer of wire is wound in the opposite direction, and this layer is ground or filed down directly over the point of the former grinding or reduction, this producing also a reduced part tapering toward a central point. Any number of layers may be thus applied, each being wound in a direction opposite to that of the preceding and each being reduced on the taper and over the point at which the previous layer is reduced. After these layers have been wound I may, as shown in Fig. 5, wind an outside layer of square round rectangular cross-sectional wire, and this is not reduced in itself, but fits into the reduced part of the other layers. It will thus be seen that each of the internal layers is partly reduced at certain points and the total reduction does not have to be borne by any one layer, as it is distributed throughout the internal layers. After the long length is thus manufactured it is cut up into the proper lengths as desired for use by cutting the shaft at the reduced part. This leaves a conical end on each of the sections, and both sections are thus adapted for attachment to the conical socket of the driver without further grinding.

It has been customary heretofore to form the shaft by layers cylindrical throughout and then to grind down the outer layer, as shown in Fig. 4, in order to fit the conical driving-socket. By my invention this grinding of the outside layer is entirely avoided, as it is only necessary to sever the shaft in the center of the reduced part, which will give a tapered end on each of the severed sections adapted to the tapered socket of the driving spindle or arbor without fitting or further grinding or reducing.

By my invention each grinding of the shaft forms two shaft ends or rather fits the shaft for final formation of the shaft ends by cutting the long length up into sections. The shaft end may be fitted in the socket by brazing or in any other suitable way.

The shaft is rendered elastic, and I am enabled to make a straight braze. The square wire on the outside makes a better bearing in the socket.

I claim—

1. A flexible shaft composed of layers of wire, the internal layers being reduced to form a tapered portion.

2. A flexible shaft composed of layers and

having a reduced or tapered portion, the reduction or grinding being distributed throughout the layers, substantially as described.

3. A flexible shafting having a tapered or reduced part and formed of layers the internal layers being tapered or reduced at the reduced part of the shaft while the outer layer is of the same diameter throughout, substantially as described.

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

NELSON STOW.

Witnesses:

WM. H. STILWELL,

JOHN M. HANFORD.