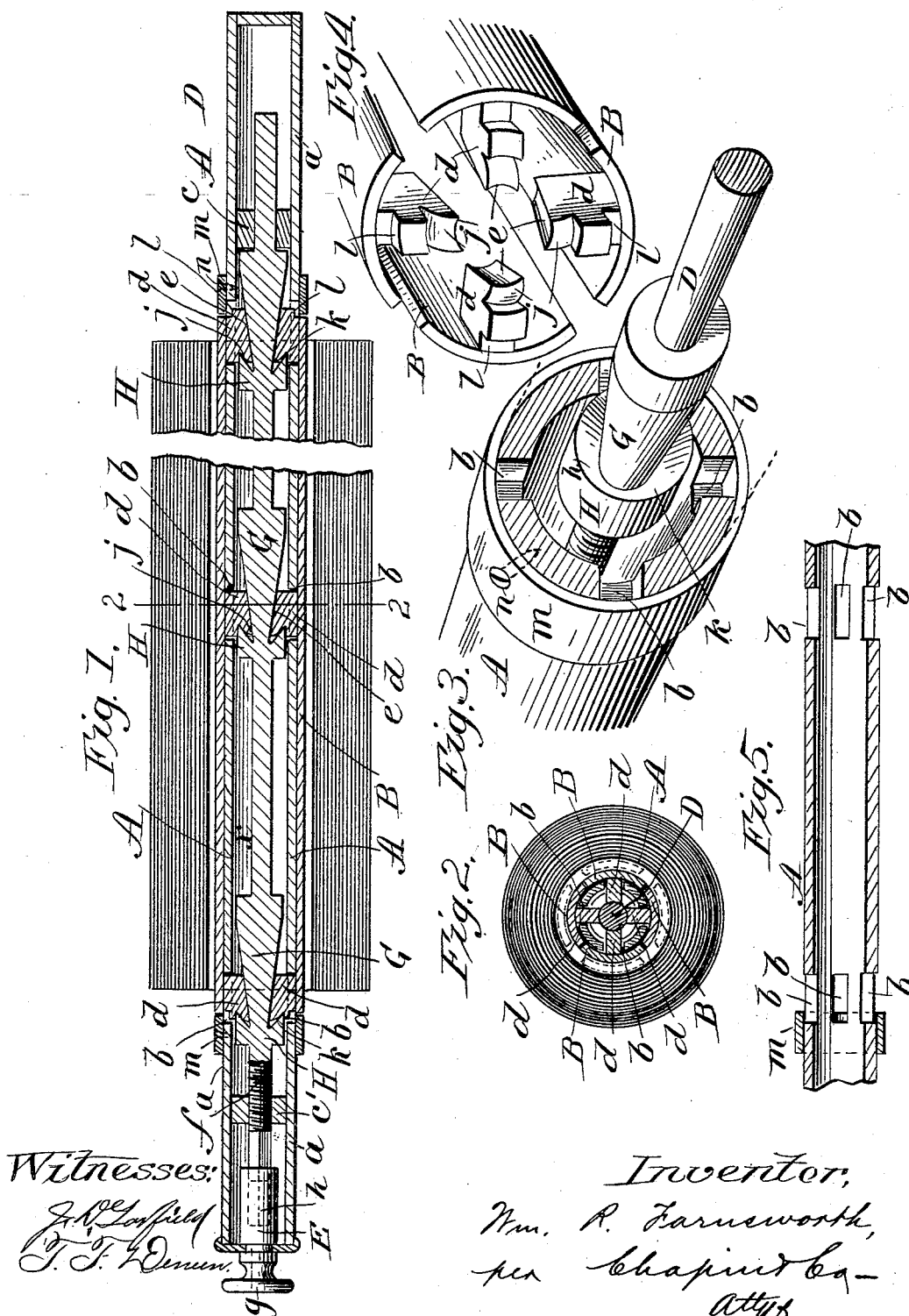


(No Model.)

W. R. FARNSWORTH.
EXPANSIBLE SHAFT.

No. 459,200.

Patented Sept. 8, 1891.



UNITED STATES PATENT OFFICE.

WILLIAM R. FARNSWORTH, OF TURNER'S FALLS, MASSACHUSETTS.

EXPANSIBLE SHAFT.

SPECIFICATION forming part of Letters Patent No. 459,200, dated September 8, 1891.

Application filed March 2, 1891. Serial No. 383,510. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FARNSWORTH, a citizen of the United States, residing at Turner's Falls, in the county of Franklin and State of Massachusetts, have invented new and useful Improvements in Expansible Shafts, of which the following is a specification.

The object of the present invention is the provision of a shaft or arbor which is expansible and contractible at will, and which shaft, when expanded, will so with certainty remain until the parts thereof are caused to receive their contracted dispositions through an intelligent manipulation of certain parts thereof. A shaft of this class has been especially designed and embodies the features of the present invention for constituting the core-shaft or mandrel about which to wind a web or continuous sheet of paper for newspaper and other use, which core-shaft, after such winding, is withdrawn from the paper roll which had been generated thereon, leaving an axial opening through the roll.

As an example of the utility and manner of employment of a roll such as hereinafter described, methods of procedure in the output of paper from the factory and the use thereof by the consumer, both as more commonly practiced without an expansible roll and as is convenient with the use of such a roll will be explained. As more commonly practiced at the paper-factory, the web or continuous sheet of paper is wound upon a solid shaft or bar of iron or steel which is longer than the width of the sheet, so that the ends thereof form journal-bearings. The shipment of the roll of paper is made with the said axial shaft, which latter cannot practically be withdrawn, and the consumer makes use of the projecting journal constituting portions of the shaft for mounting the roll on or adjacent to the printing-press, and after the paper has been drawn off and used the central shaft is generally returned to the paper-manufacturer to form the core for a new roll; but by the plan of utilizing an expansible shaft the paper is wound upon such shaft when the same is in its expanded condition, and then after the roll has been wound to the desired bulk to secure the contraction and withdrawal of the shaft from the roll

is secured, leaving a round axial opening through the latter. The roll of paper is then shipped minus any metallic core or journal-shaft, and the printer or consumer on desiring to use the paper and having been provided with a similar expansible shaft to the one on which the paper was originally wound enters the same while contracted into the axial opening in the roll, and expanding the shaft mounts the roll upon or in relation to the printing-press, as ordinary.

The invention consists in the construction and combination of parts, substantially as will hereinafter more fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a central longitudinal section through the shaft and through a roll of paper within which said shaft is entered, the shaft being shown as contracted. Fig. 2 is a cross-section on the line 2 2, Fig. 1. Fig. 3 is a view, on a somewhat enlarged scale, of portions of the expansible shaft shown in perspective as seen at the left of the point *x* in Fig. 1 and as will hereinafter become manifest from the following description. Fig. 4 is an enlarged perspective view taken at the end portions of the segment-sections, showing the radial lugs internally projected therefrom. Fig. 5 is a longitudinal sectional view of a portion of the tube which constitutes a part of the present improved expansible shaft.

The tube A is of a length enough longer than the width of the paper to be wound thereon to constitute journals, the same, as indicated at *a*, being turned down suitably therefor. The said tube A is at suitable intervals in its length provided with series of apertures *b*, substantially as shown, and B B represent long segments—such, for instance, as would be formed by sawing a tube which would inclose the tube A longitudinally into equal sections. Each of these segmental sections B is provided with internally-extended lugs *d*, which correspond to and are adapted to loosely fit within and through the apertures *b* of the tube A. These lugs *d* have their inner surfaces inclined, as at *e*.

D represents a rod which is centrally and longitudinally supported and capable of a slight endwise movement in the said tube A. The tube A toward one end is provided with the internal flange *c*, which constitutes a bearing for one extremity of the said rod, while the other extremity thereof extends through and within the flange-piece or collar *c'*. This latter extremity of the rod D at a short distance within its end is screw-threaded, as indicated at *f*, and has an engagement with the said part *c'*, which is supported on and movably fixed to the interior of the tube A.

E represents a cylindrical piece, which is axially mounted for free rotation, but confined against endwise movement upon and within the said tube A, and is provided with a handle or thumb-knob for insuring a convenient rotation of the said part. The said cylindrical part E has in substance a spline connection with the rod D, so that as part E is turned, insuring likewise a rotation of the rod, the latter will, owing to its screw-thread engagement with the internal flange *c'*, move endwise, and be freely permitted so to do with relation to the said part E. As particularly indicated, the extremity of the rod is squared, and the rotatable part has longitudinally thereof a squared socket, (indicated by *h*.) The rod D has at suitable intervals in its length and more or less, as deemed necessary and in accordance with the different lengths of the shafts, enlargements *G* of conical form, substantially as shown, and which are arranged relative to the inner and correspondingly-inclined surfaces of the segment-lugs *d*, so that as the rod D is drawn in one direction the conical enlargements *G* will impinge against said lugs, forcing same and the segments outwardly and insuring, practically, an expanded periphery of the shaft. The lugs *d* are provided in their ends with recesses, having one side of each inclined, as at *j*, while the rod D is provided with dogs H, which are in the form of flanges or enlargements with one end of each depressed, forming the annular rib *k*, the inner surface of which impinges upon the inclined surfaces *j* of the segment-lugs. If the segments are in their distended relations, the points of said ribs *k* will be backed out a short distance from the innermost depths of the lug-recesses; but of course on properly forcing the rod D endwise the said dogs H will exert a forcing action to inwardly draw through their lugs the segment-sections B B. It will be noted, and as indicated in the drawings, that the seg-

ment-lugs nearest the ends of the tube A are at their outer ends of step form, as at *l*, and that the collars *m*, which are shown as provided and removably secured by means of the screws *n* or otherwise on the tube by their inner ends overlie the borders of the apertures *b*, and act as checks to the undue outward movements of the segments or against their disengagement from the shaft.

The expansible shaft described is, as will be manifest, applicable to purposes other than the one hereinbefore particularly set forth.

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

1. In an expansible shaft, the combination, with a tube having radial openings through different portions of its wall and a series of segmental sections lying along and outside of the said tube and provided with lugs which extend inwardly therefrom through the said tube-apertures which have recesses in their ends, of a longitudinal rod movable within said tube and having inclined portions thereof which engage and outwardly force the said segment-lugs on one movement of the shaft, said shaft also having thereon flanges which engage with the recesses in the said lugs for insuring on the reverse movement of the said rod the drawing in of the lugged segments, for the purpose set forth.

2. The combination, with a tube having apertures through different portions of its wall and provided in one end portion with an axial bearing *c* and at its other end having a portion *c'*, with a central screw-threaded opening therein, of a series of segmental sections lying along and outside of the tube and having the lugs *d*, which project inwardly through the said tube-apertures and which have their inner surfaces inclined and also provided in their ends with the recesses with inclines *j*, substantially as described, the rod by one extremity supported in said bearing *c* and by its other having a screw engagement with the said part *c'*, and said rod provided with the inclined enlargements *G*, and the flanges H H, having their ends inclined, as shown, the rotatable part mounted in one end of the tube and confined against rotation and with which the extremity of said rod has substantially a spline engagement, all substantially as described and shown.

WILLIAM R. FARNSWORTH.

Witnesses:

H. A. CHAPIN,
WM. S. BELLOWS.