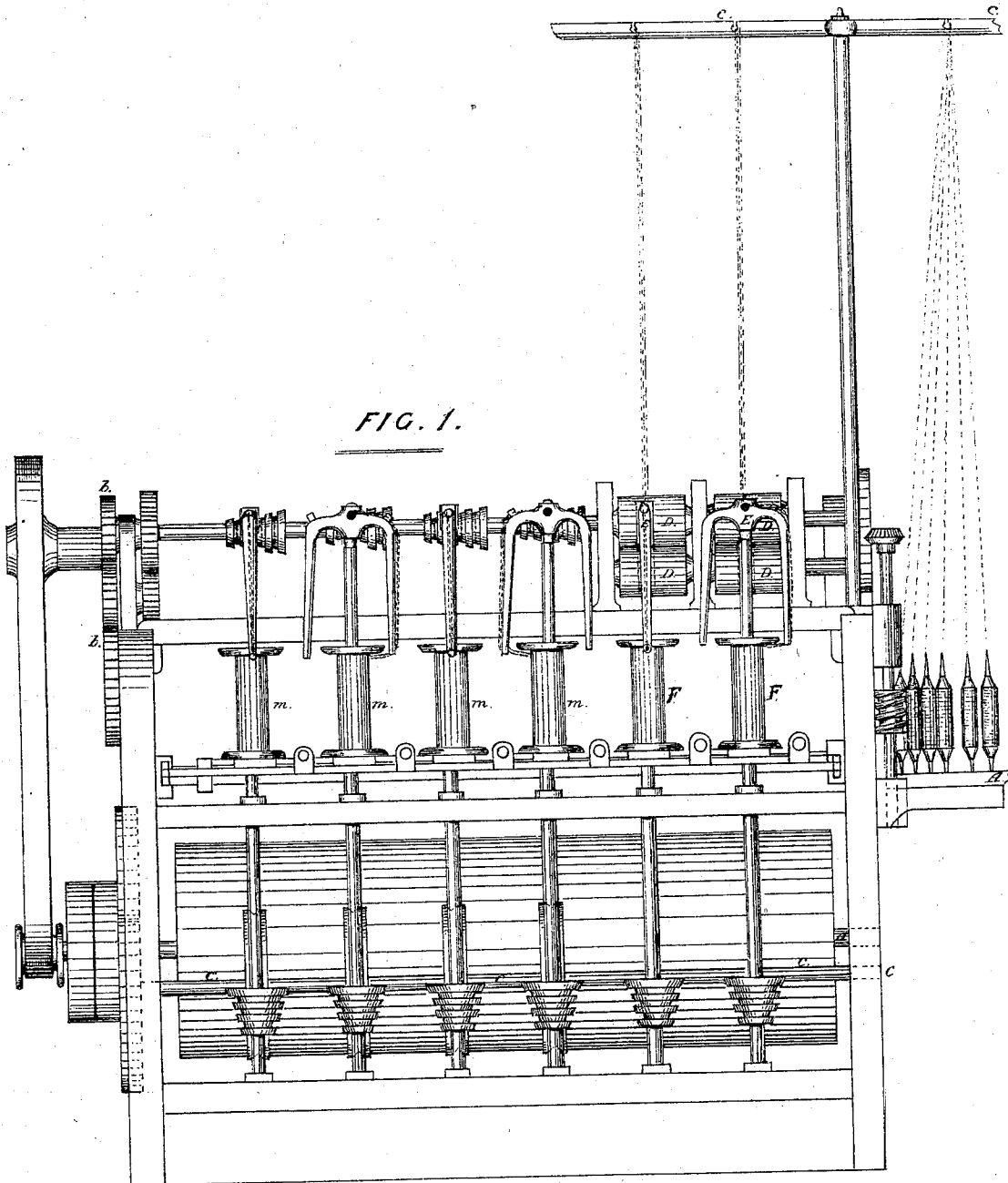


THOMAS UNSWORTH.
Method of Double Stretching Strands of Banding Cord.
No. 124,988. Patented March 26, 1872.



WITNESSES.
John Lewis
Edward Whalley

INVENTOR.
Thomas Unsworth

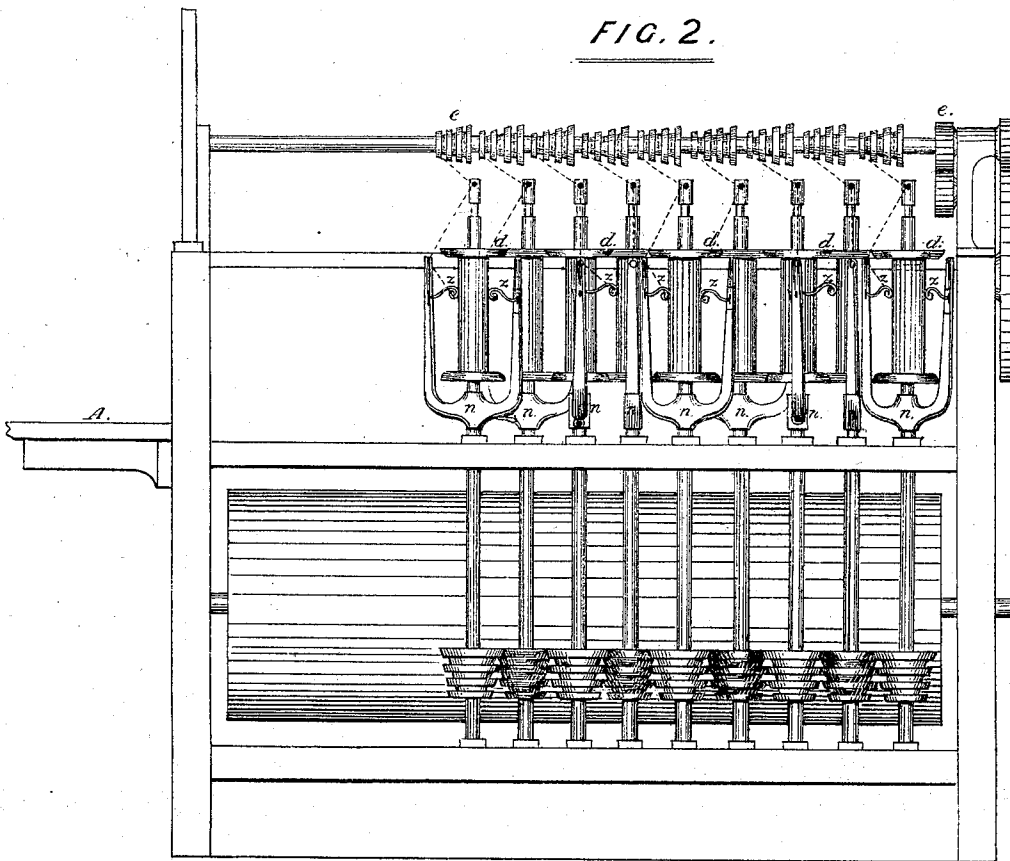
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FIG. 2.



WITNESSES.

John Lewis
Edward Malley

INVENTOR.

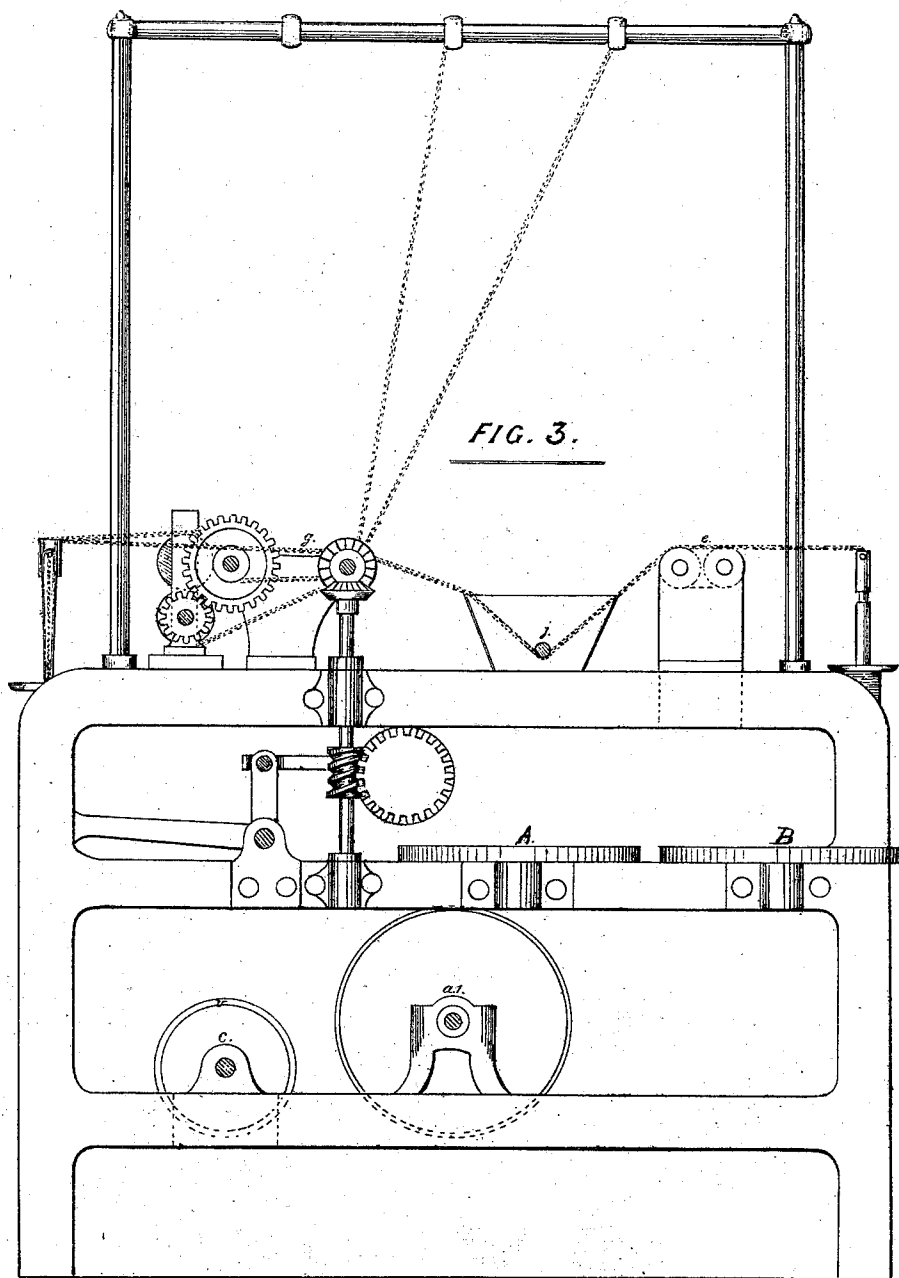
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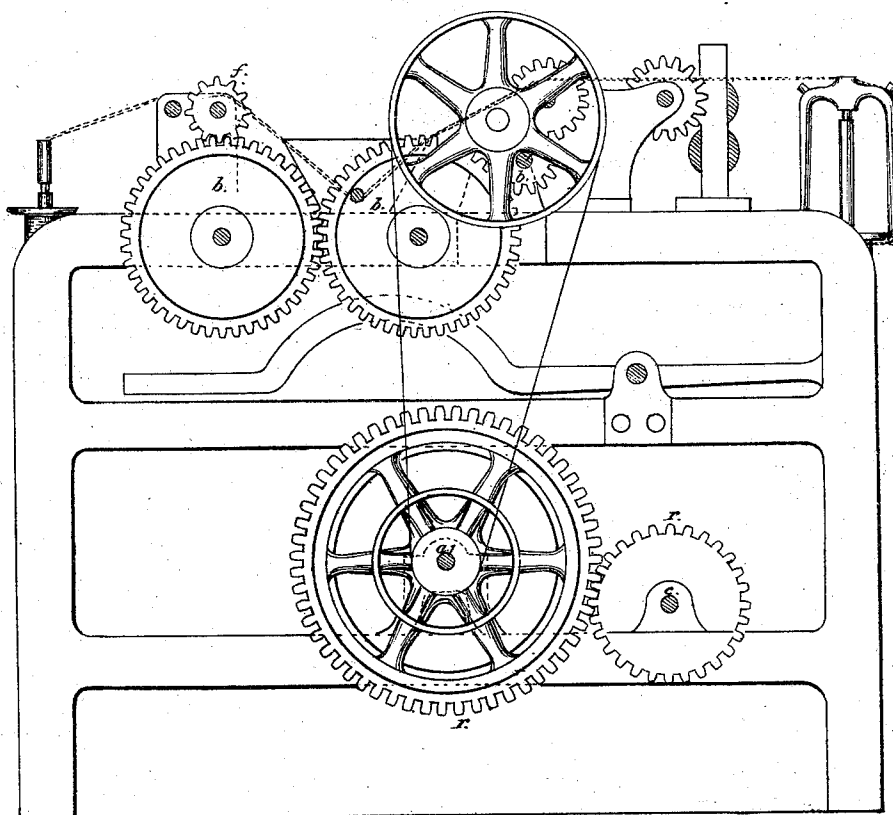
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FIG. 4.



WITNESSES.

John Lewis
Edward Malley

INVENTOR

Thomas Unsworth

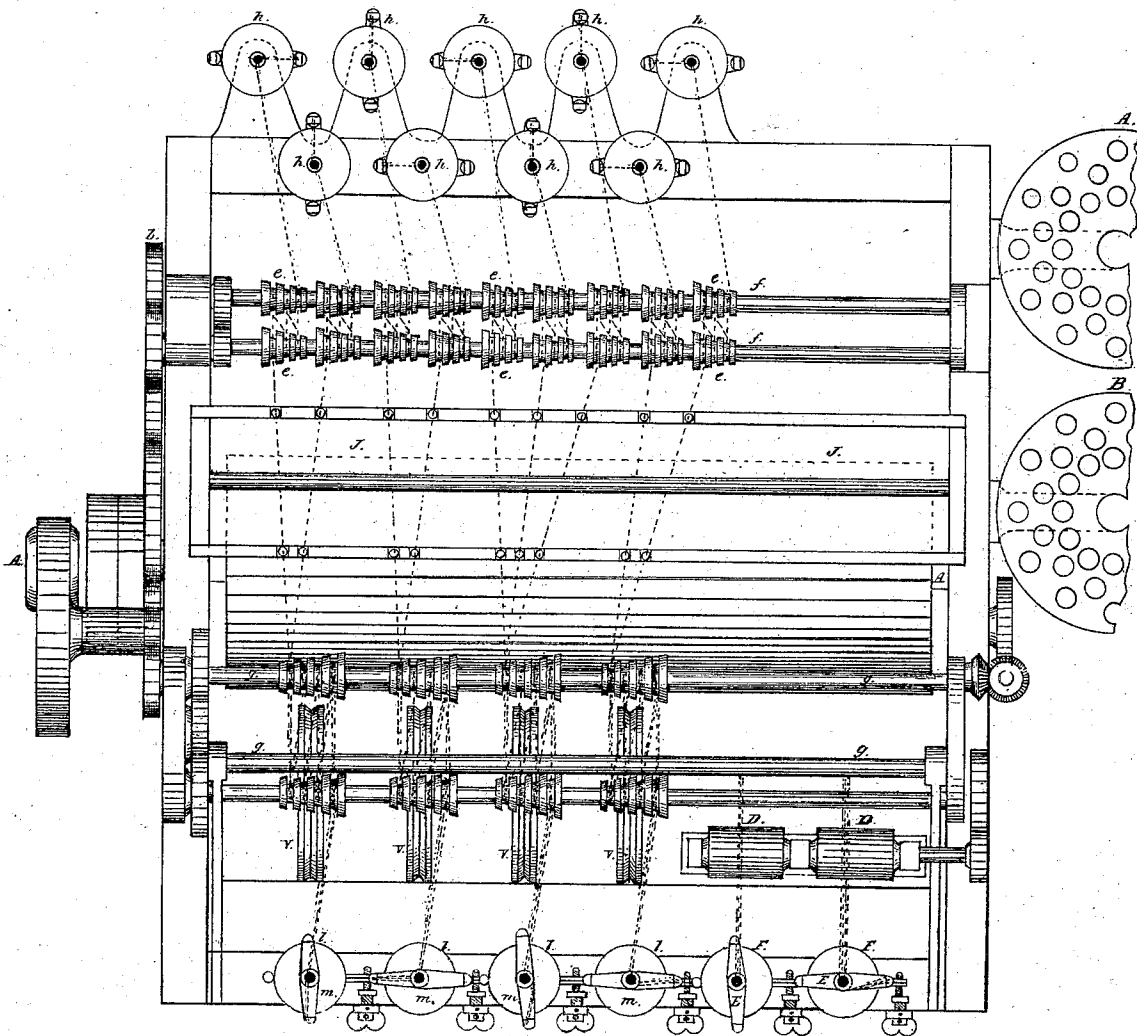
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FIG. 5.



WITNESSES.

John Lewis
Edward Whalley

INVENTOR.

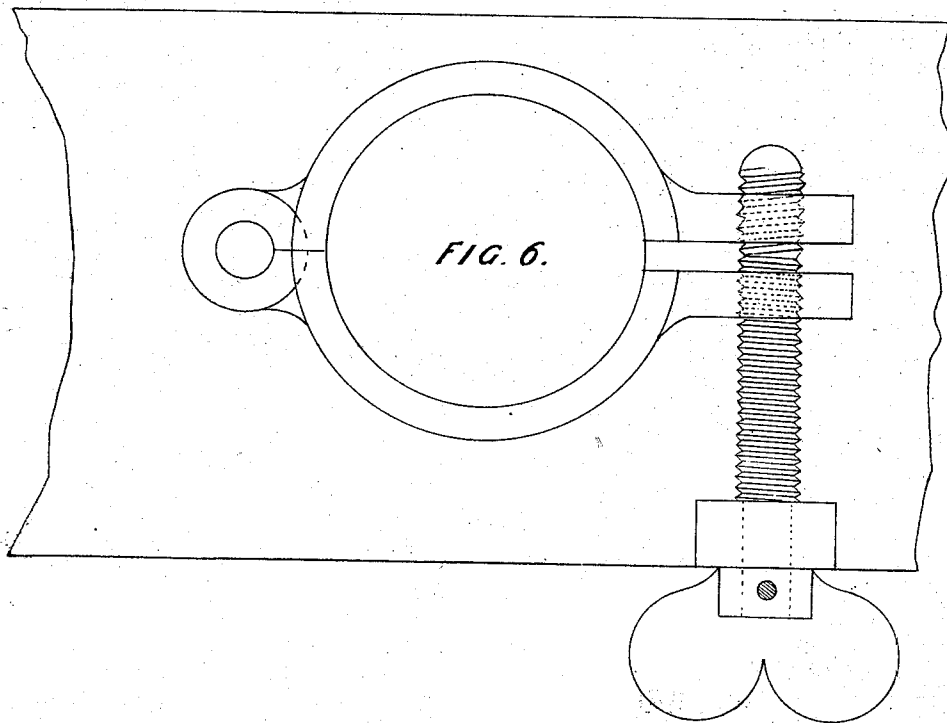
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Patented March 26, 1872.



WITNESSES.

John Lewis

Edward Whalley

INVENTOR.

Thomas Unsworth

UNITED STATES PATENT OFFICE.

THOMAS UNSWORTH, OF MANCHESTER, ENGLAND.

IMPROVEMENT IN METHODS OF DOUBLE-STRETCHING STRANDS OF BANDING-CORD.

Specification forming part of Letters Patent No. 124,988, dated March 26, 1872.

To all whom it may concern:

Be it known that I, THOMAS UNSWORTH, of Manchester, England, have invented new "Improvements in Machinery for Making Banding-Cord, or other such like articles; and I do hereby declare the following, when taken in connection with the accompanying drawing and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawing constitutes part of this specification.

Figure 1 is a front view of my machine. Fig. 2 is a back view of the same. Fig. 3 is a right-hand side view of my machine, showing ends of back stretching motion-shafts with course of strands (dotted) from back bobbins over back stretching motion *e* into water-trough J to front stretching motion *g*. Fig. 4 is left-hand side view, showing the gearing by which I drive my back stretching motion and counter-gearing *r*. Fig. 5 is a plan showing, by preference, a double row of back spindles, bobbins, and fliers, with the several strands dotted from back spindles and bobbins *h* to back stretching motion *e*, in single strands, thence, through water-trough J, to front stretching motion *g*, where it is doubled, thence to front spindles and fliers *l*. Fig. 6 is a plan of a pair of metal friction-clips to clip the friction-plates under each front bobbin to keep the strands and bands or cords tight during the process of winding on or filling such bobbins.

This invention relates to and consists of certain improvements in a machine patented by me and Edward Whalley in England on the 13th day of August, 1870, and in America on the 22d day of August, 1871, by which improvements I am enabled to make the articles therein enumerated of a better quality; but, in addition, spindle-banding and other cords, of a mixture of wire and any fibrous material, "fishing-lines," "fishing-net twine," "jacquard-machine twine," and all cords where great strength and durability are required.

I use the same means for winding my strands as in the before-mentioned machine, and for doubling I place the bobbins in a similar position at the back of the machine; but instead of having, as therein, the same number back as front, I place two, three, or more rows of spindles, as may be required, I likewise ap-

ply a spring tension-lever to one or both legs of my back fliers, which keeps tight the strands on leaving the bobbins for doubling. At the back of the machine I fix a stretching motion, similar to the one I use in front, as described in my former patent, herein referred to, but instead of doubling such strands before stretching I stretch each strand separately by passing several times round conical or other shaped pulleys, grooved. The strands then pass through a trough of water, if desired, thence to the front stretching motion, where they are doubled and again stretched over conical or other shaped pulleys, with flat-bottomed grooves turned in them. It is then twisted and finished by front spindles and fliers, and wound onto front bobbins.

For fine cords, sewing cotton or thread, where great speed is required, I use a counter-shaft, driven from main shaft, on which I fix any number of grooved pulleys, from which I drive my spindles. In place of the cop-board I use two circular cop-tables, placed in any convenient position, which I make to revolve at the will of the minder.

I will now proceed to describe the drawing hereunto annexed, in the several figures.

Similar parts are marked by corresponding letters of reference.

A and B are the revolving cop-tables; C, guide-bars; D, rollers; E, front fliers and spindles; F, front bobbins; J, water-trough; V, grooved pulleys on counter-shaft; *b*, gearing by which I drive back stretching motion; *c*, counter driving-shaft, on which are keyed pulleys V; *e*, back stretching motion; *f*, bar in water-trough J; *g*, front stretching motion. *h* are back bobbins; *n*, back fliers; *m*, front finishing-bobbins. *r* is the gearing by which I drive my counter-shaft *c* from main shaft A¹. *z* is a spring tension-lever on one or both legs of back fliers. *l* is the front finishing-spindles and fliers.

The strands are first wound from cops on tables A and B, over top guide-bars *c*, to rollers D, from thence to fliers E and bobbins F, as in my former machine mentioned herein. The bobbins F, when full, are moved to back spindles, and are then called bobbins *h*. Each strand from such bobbins is then passed through "eyelet"-hole in the end of spring tension-lever *z* on the leg of back flier *n*, through eye of

flier-leg and end of spindle, and from thence to back stretching motion *e*. Each single strand is passed several times round the conical or other shaped pulleys, and is stretched singly to any required tension before doubling. It is then passed across the machine to front stretching motion, where it is doubled, and again stretched, twisted, and passed to bobbins *m* finished cord.

It will thus be seen that by my present invention I obtain quite a double, and, I may say, almost a treble process of stretching—first, by the “tension-lever on flier-leg” *z*; second, by “back stretching motion” *e*; and third, by “front stretching motion” *g*—consequently, a

regular, tight, and evenly-twisted band or cord; and, by the conical pulleys, a gradually-increasing power is exercised on the strands before they become finally twisted into cord. And now—

Having described my invention, I claim as my invention—

The method of double-stretching by and over conical or other shaped pulleys, of the strands before doubling and then after doubling, substantially as and for the purposes hereinbefore set forth.

THOMAS UNSWORTH.

Witnesses:

JOHN LEWIS,

EDWARD WHALLEY.