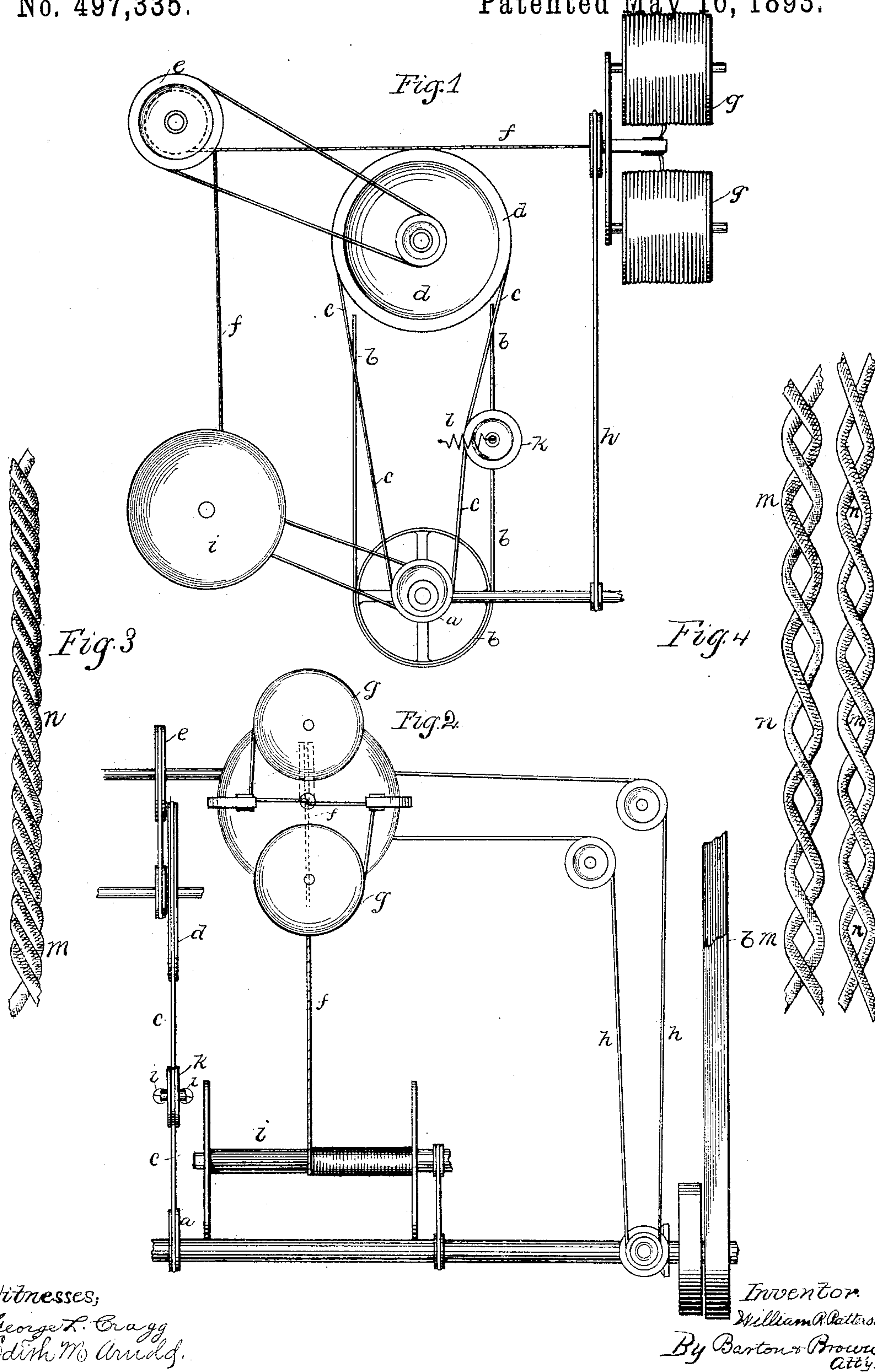


W. R. PATTERSON.
MANUFACTURE OF TELEPHONE CABLES.

No. 497,335.

Patented May 16, 1893.



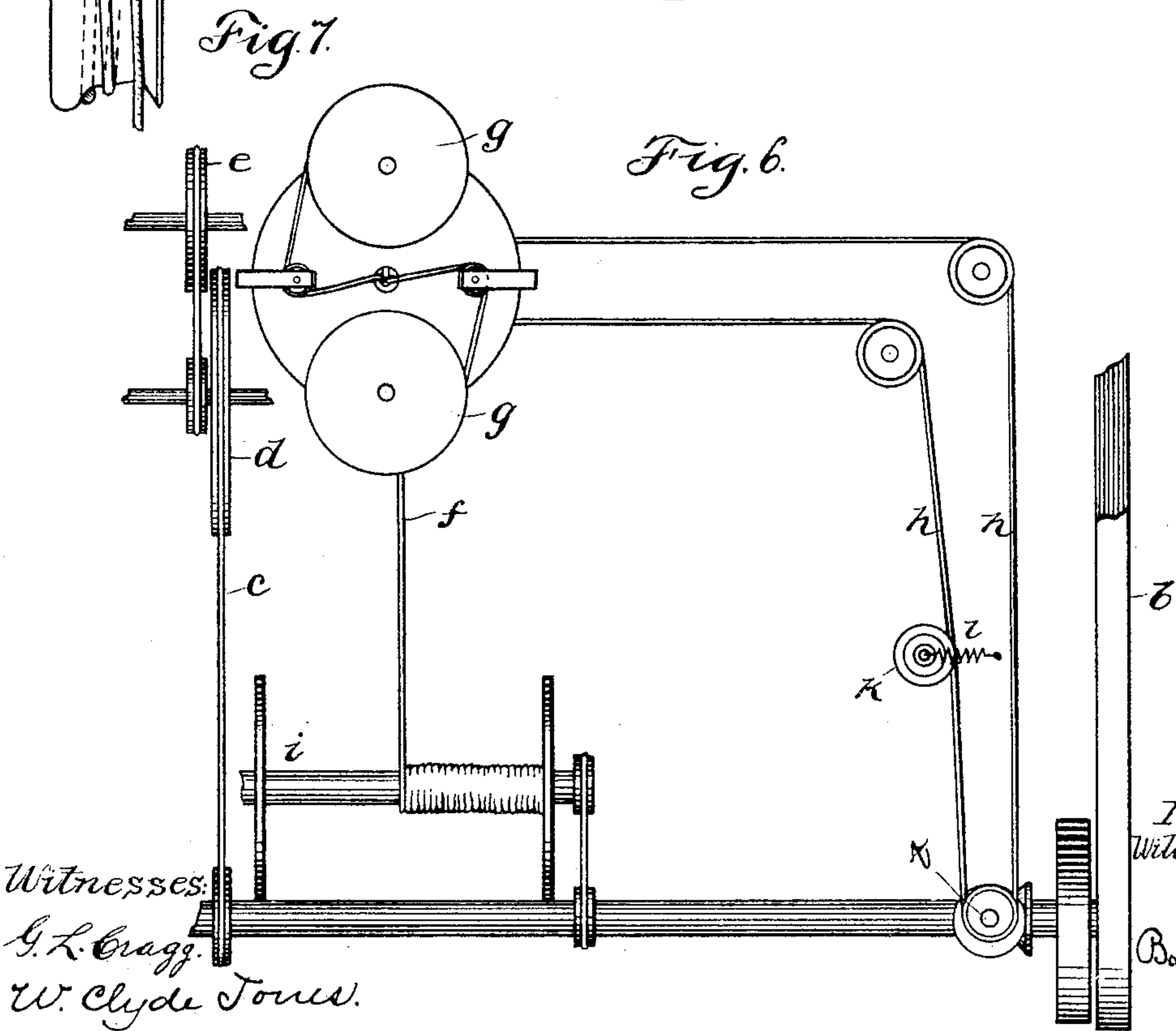
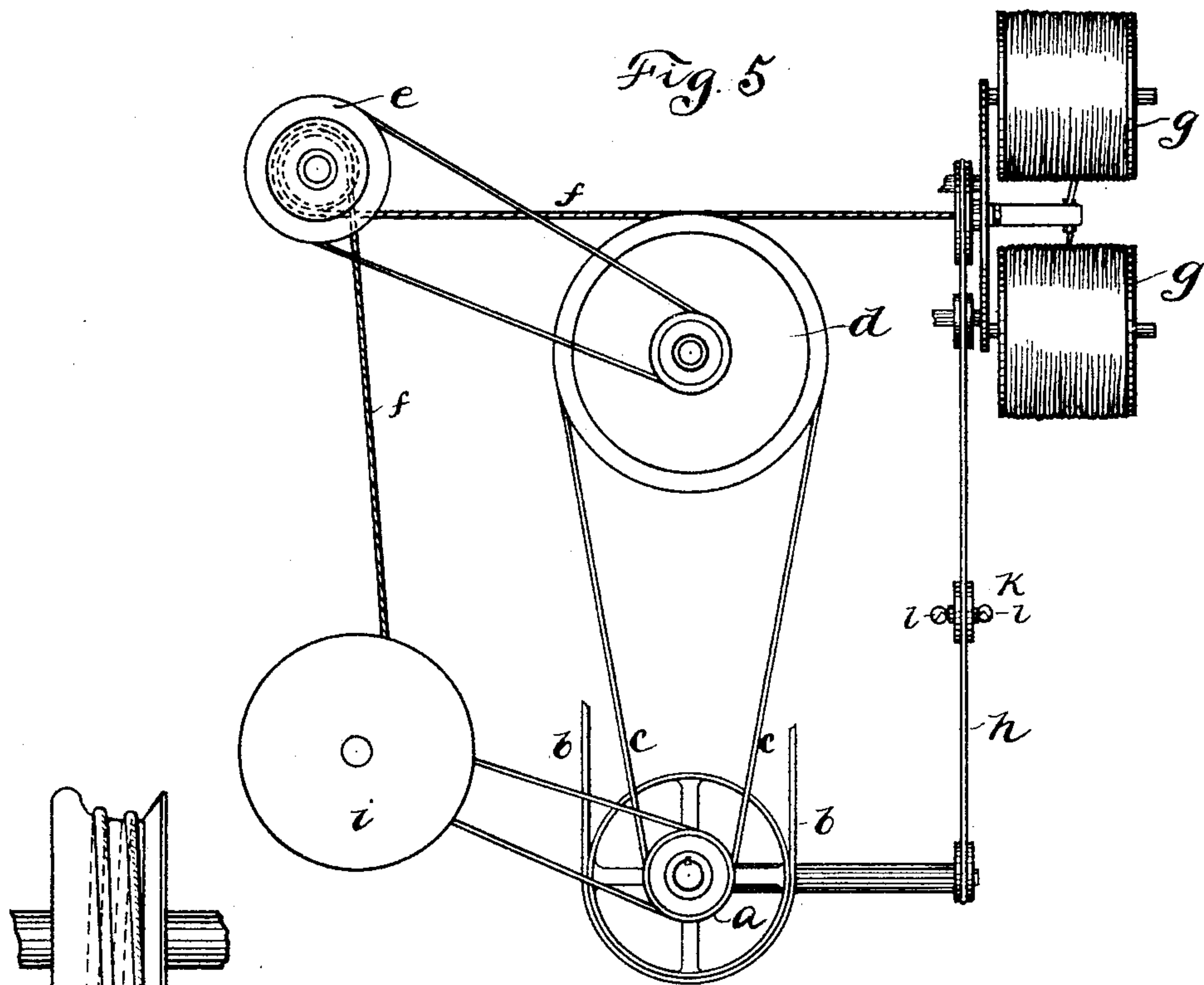
Witnesses,
George L. Cragg
Edith M. Arndt.

Inventor,
William R. Patterson
By Barton & Brown
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Witnesses:
G. L. Cragg.
W. Clyde Jones.

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UNITED STATES PATENT OFFICE.

WILLIAM R. PATTERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN
ELECTRIC COMPANY, OF SAME PLACE.

MANUFACTURE OF TELEPHONE-CABLES.

SPECIFICATION forming part of Letters Patent No. 497,335, dated May 16, 1893.

Application filed August 24, 1891. Serial No. 403,596. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. PATTERSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Telephone-Cables, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the manufacture of telephone cables, and its object is to so dispose the wires of the cable that cross talk between the different circuits may be prevented. Heretofore it has been usual to twist the wires together in pairs with a regular and uniform twist, and make use of the different pairs for metallic circuits. The object of twisting the wires in pairs, as heretofore employed, is to provide that the two limbs or sides of the same circuit may be placed as nearly as possible in the same position with respect to the other wires of the cable, in order that the currents induced in the two sides of the same pair may neutralize one another. It is evident that if the two wires constituting a pair are not in the same relative position with respect to the circuit from which the induced currents are received, the current in one wire of a pair will not be equal to the current in the other wire of the same pair, and hence there will be resulting cross talk. In cables laid up as heretofore such want of harmony as between the wires of a pair and the circuit from which the induced currents are received, may be occasioned by two adjacent pairs starting at the same relative positions of their twists, so that there will be a parallelism of the four wires constituting the two pairs throughout the entire length of the cable, the case being the same as using the two adjacent wires of a strand of four, instead of the two diagonally opposite wires of the same strand for the two branches of the circuit. It is evident that if the twist of one of the strands constituting a pair of wires were of a different pitch from that of the other parallel strand, there would not be that harmful parallelism, as between the two strands, which results in objectionable cross talk.

My invention herein consists, speaking gen-

erally, in twisting the wires of the strands or pairs together at a different pitch, or at different degrees at alternate sections, and in combining two or more of such strands into a cable so that parallelism between the two wires of any two different strands may be avoided.

My invention further consists in the apparatus herein described for giving a strand or pair of wires a definite and predetermined variation in the pitch or degree of twist, as between the two wires constituting a pair of strands.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is an end view of the twisting machine, provided with an eccentric pulley, for imparting a variable motion to the pulley by which the wires of the strand are unwound from their bobbins. Fig. 2 is a front view thereof. Fig. 3 is a view of a portion of a strand having its wires at different sections twisted to a different pitch or degree. Fig. 4 is an enlarged view, showing two such strands thus twisted together and placed side by side, so that sections having different degrees of twisting will be opposite one another. Fig. 5 is an end view of the twisting machine provided with an eccentric pulley for imparting a variable motion to the bobbins. Fig. 6 is a front view thereof. Fig. 7 is a view of the edge of pulley *e*.

Like parts are indicated by similar letters of reference throughout the different figures.

Referring to Figs. 1 and 2, it will be seen that the eccentric pulley *a* may be mounted upon the shaft driven by the main belt *b*. By means of this eccentric pulley *a*, the band *c*, and, consequently, the pulleys *d* and *e*, are given a variable rate of speed. Thus the strand *f* is drawn at a varying speed from the bobbins *g*, which are driven at a uniform rate of speed by the band or sprocket chain *h*. The strand, after being twisted, is taken up by a reel *i*, in the usual manner. The belt *c* is kept taut by an idler *k*, which is held against the same with a yielding pressure by the springs *l*. I find that when the variable speed of the pulley *e* is such that the maximum rate of speed of unwinding would be

four inches while the bobbins were revolving once, and the minimum rate of speed of unwinding would be two and a half inches while the bobbins were revolving once, the strand is
 5 given the desired variation in the pitch or amount of twisting. The distance from one point of maximum rate of twist to the next point of maximum rate of twist may be say, three feet.

10 I do not deem further description of the twisting machine necessary, since such machines have long been used, the only invention claimed by me herein, relating to the means of varying the speed of the strand as
 15 unwound from the bobbins. It is evident that the result may be accomplished by giving the bobbins a varying speed of rotary movement, while the strands are drawn off at a uniform rate of speed.

20 It is evident that other devices may be used in place of the eccentric pulley, for imparting the desired definitely variable speed either to the bobbins or to the pulley by which the strand is unwound from the bobbins.

25 In Figs. 5 and 6 I show a modification of the device represented in Fig. 1. Instead of making the pulley *a* eccentric I may make the pulley *t* eccentric, thereby imparting the definitely variable speed to the bobbins.

30 Referring to Fig. 3, it will be seen that at the end or section *m*, the pitch or degree of twisting is greatest, with its pitch growing less toward the other end, until at section *n*, the pitch or degree of twisting is least. Thus
 35 the strand is given, so to speak, an undulatory twist throughout its entire length. In Fig. 4 two of such strands are shown, placed side by side, so as to break joints with respect to one another with respect to the de-
 40 gree of twisting as between oppositely placed parts or sections of the different strands. I

find that strands thus formed may be formed into cables, without giving special attention to the manner in which they are placed in the cable. The chance is remote that two adja- 45 cent strands should be cut off at exactly the same relative position of the three feet constituting an undulation with respect to the degree of twisting.

Having thus described my invention, I 50 claim as new and desire to secure by Letters Patent—

1. The method of twisting wires into strands, which consists in twisting the wires together and simultaneously giving to the wires a lon- 55 gitudinal motion and definitely varying the relation between the rates of twisting the wires together and the longitudinal motion thereof.

2. In a machine for twisting wires into 60 strands, the combination with a pulley rotating at a definitely varying rate of speed and causing the strand to move therewith, of a flier, carrying bobbins, adapted to be rotated, whereby a varying pitch is given to the wires 65 composing the strand, substantially as and for the purpose specified.

3. In a machine for twisting wires into strands, the combination with a rotating pulley causing the strand to move therewith, of 70 a flier, carrying bobbins, adapted to be rotated, and means for definitely varying the relative rates of motion of the said pulley and flier, whereby a varying pitch is given to the wires composing the strand, substantially as 75 described.

In witness whereof I hereunto subscribe my name this 18th day of July, A. D. 1891.

WILLIAM R. PATTERSON.

Witnesses:

EDITH M. ARNOLD,
 GEORGE L. CRAGG.