

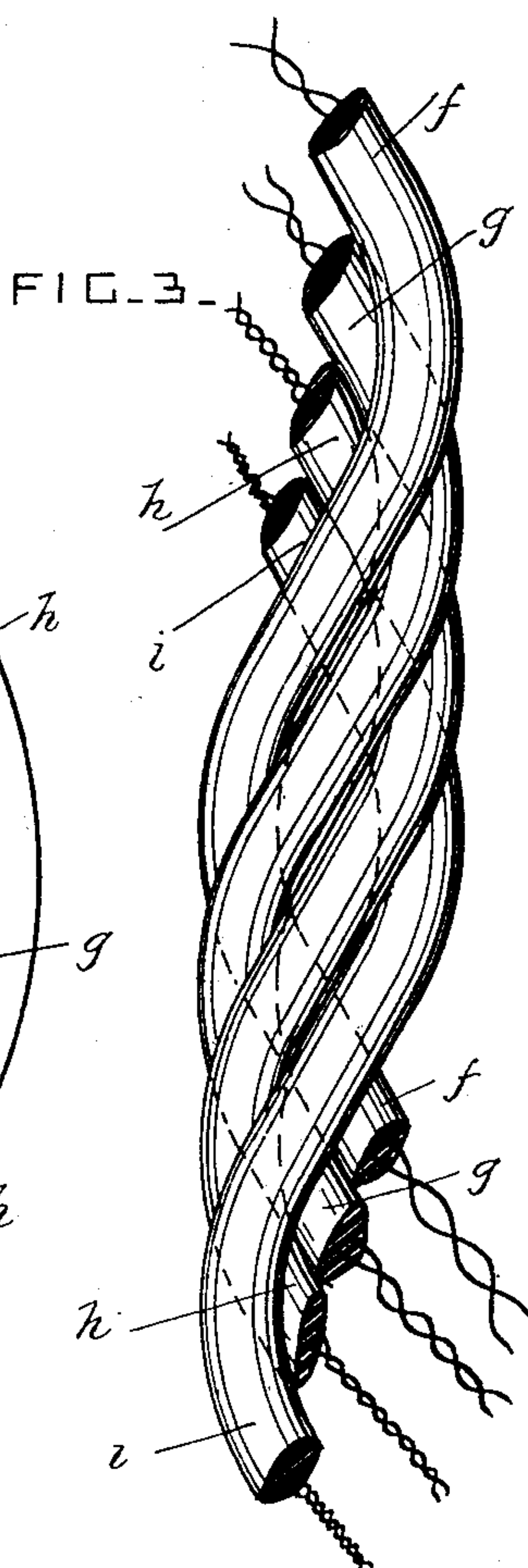
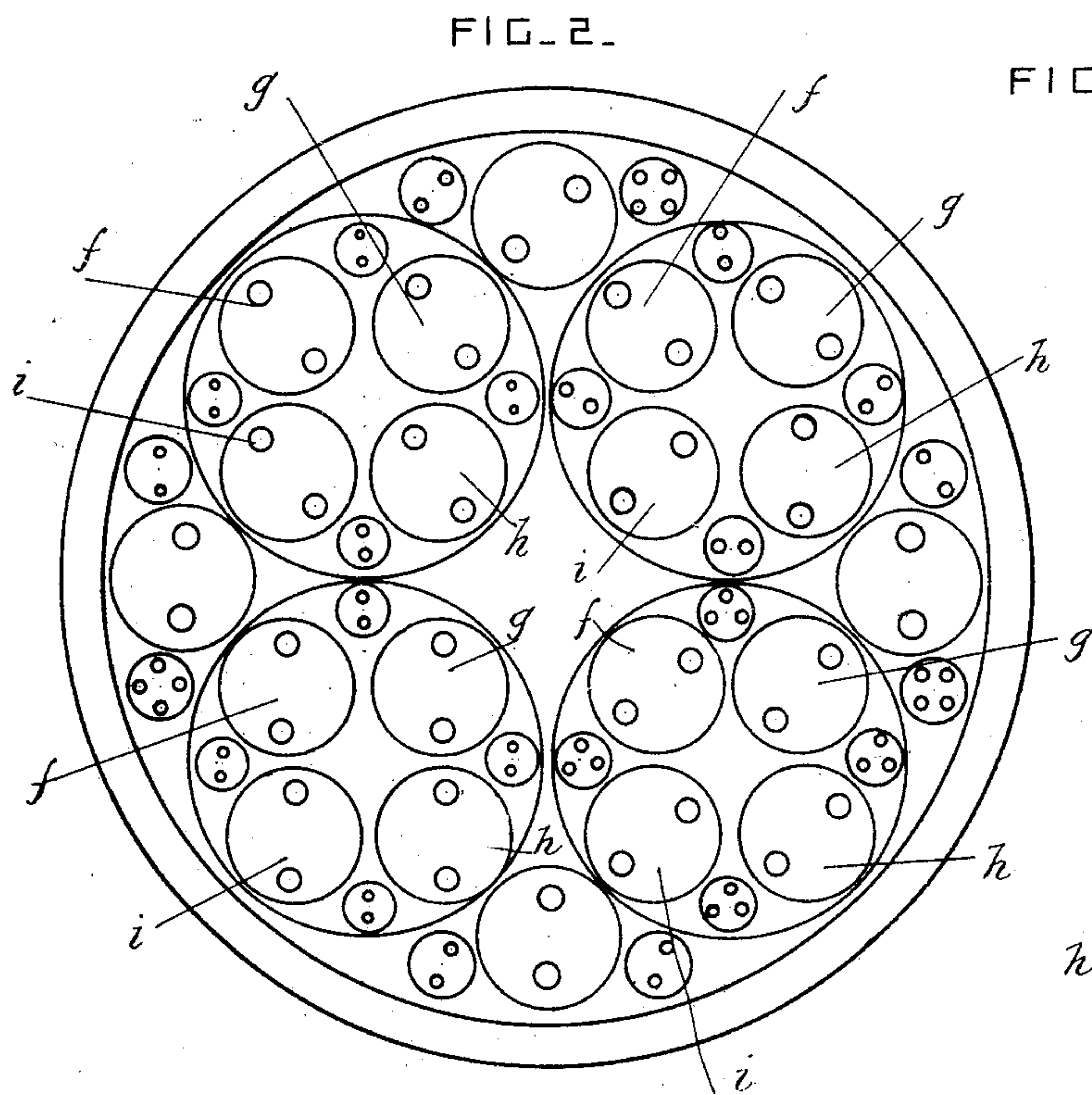
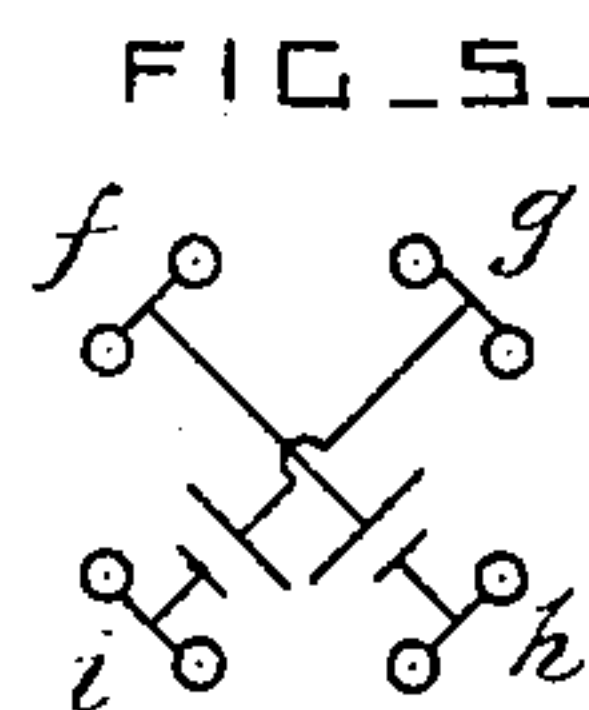
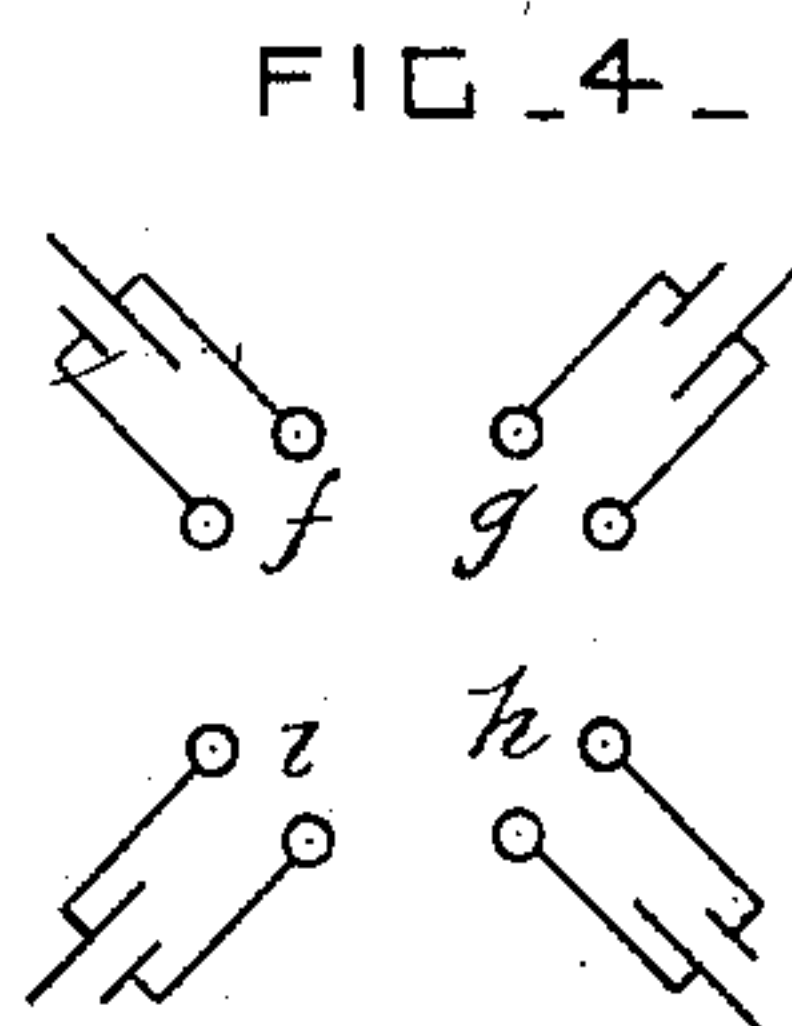
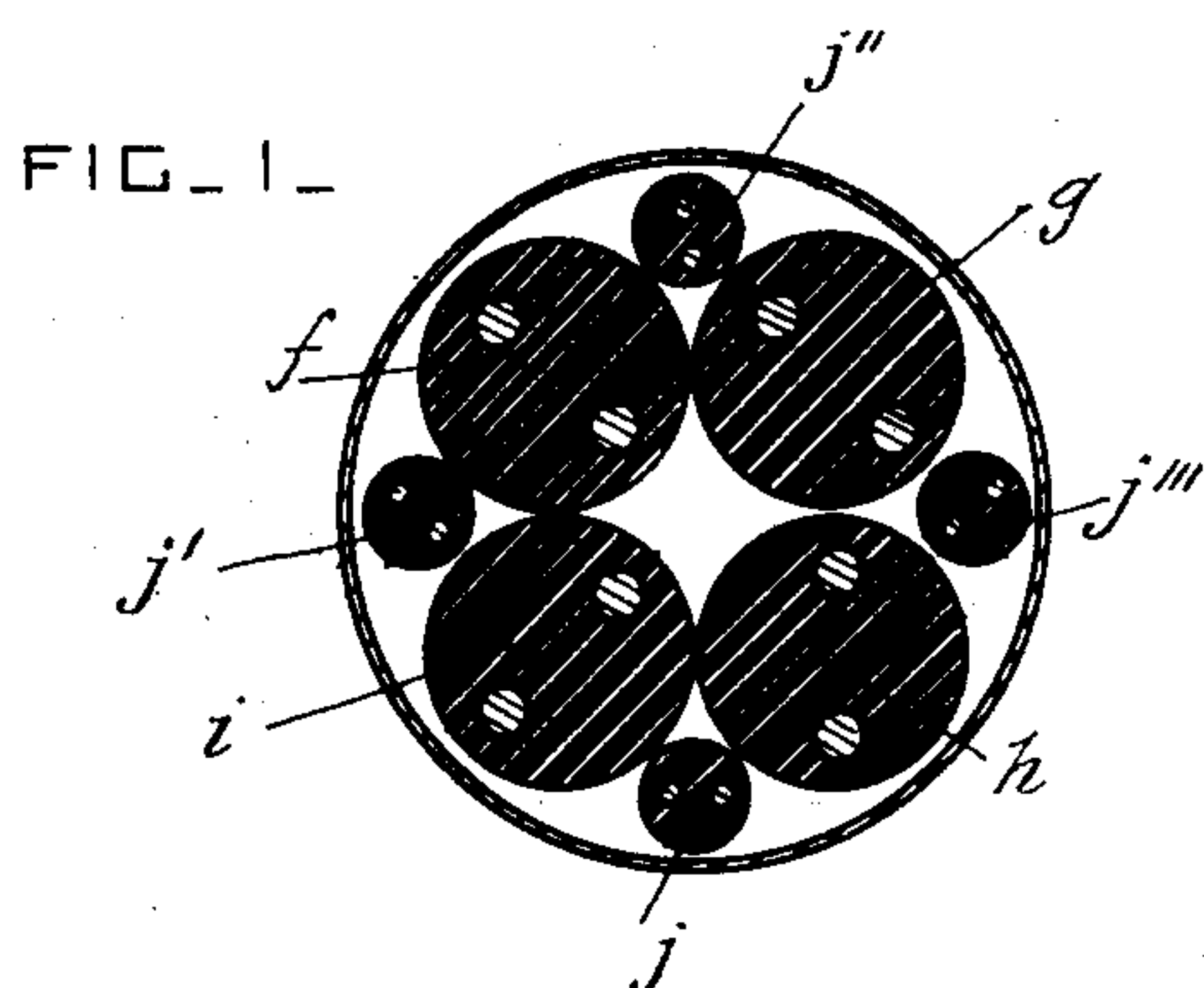
No. 747,515.

PATENTED DEC. 22, 1903.

F. TREMAIN.  
TELEPHONE OR LIKE CABLE.

APPLICATION FILED NOV. 1, 1901.

NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANCIS TREMAIN, OF HIGHGATE, ENGLAND.

## TELEPHONE OR LIKE CABLE.

SPECIFICATION forming part of Letters Patent No. 747,515, dated December 22, 1903.

Original application filed January 25, 1901, Serial No. 44,674. Divided and this application filed November 1, 1901. Serial No. 80,747. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS TREMAIN, of Highgate, in the county of Middlesex, England, have invented certain new and useful Improvements in Cables for Telephone or other Circuits, of which the following is a specification.

This application is a division of the application filed by me on January 25, 1901, Serial No. 44,674.

This invention relates to compound non-inductive cables; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a cross-section through a small cable constructed according to this invention. Fig. 2 is a diagrammatic cross-section through a larger and more complex cable. Fig. 3 is a side view of a portion of a small cable. Fig. 4 is a diagram of the short-distance telephonic loops. Fig. 5 is a diagram of the long-distance telephonic loops.

The small cable consists, mainly, of four similar strands *f*, *g*, *h*, and *i*, which are arranged about a central space or core and which are twisted together in the usual manner. Each strand contains two similar wires, which are separated from each other by insulating material and are twisted together. The pitch of the twist of each pair of wires is preferably different. The pairs of wires of each two opposed strands are used as a telephonic loop or circuit. For instance, the two wires of the strand *g* form the outward conductor and the two wires of the opposed strand *i* form the return conductor of the telephonic circuit. The strands *g* and *i* are kept apart by the intervening strands *f* and *h*, the wires of which form a second telephonic circuit. When arranged in this manner, the cable may advantageously be used for long-distance communication. For short circuits the two wires of a single strand may be used as the outward and return conductors.

The spaces around and between the four strands *f*, *g*, *h*, and *i* may be filled in with smaller strands *j* *j'* *j''* *j'''*, each containing two wires.

In the cable shown in Fig. 2 four small compound cables similar to that shown in Fig. 1 are combined together to form one large com-

pound cable and the spaces between the small compound cables are filled in with smaller cables.

What I claim is—

1. In a compound cable, the combination, of four separate strands of insulating material *f*, *g*, *h*, and *i*, twisted together, each said strand containing two wires which are adapted to form a short-distance telephonic loop, the two wires in strand *g* forming also the outward conductor and the two wires of strand *i* forming also the return conductor of a long-distance circuit, and the said strands *g* and *i* being kept apart by the intervening strands *f* and *h* the wires of which form a second long-distance circuit, substantially as set forth.

2. In a compound cable, the combination, of four separate strands of insulating material *f*, *g*, *h*, and *i*, twisted together, each said strand containing two wires which are adapted to form a short-distance telephonic loop and which are twisted together and insulated by the said material, the wires in each strand being twisted with a different pitch, the two wires in strand *g* forming also the outward conductor and the two wires of strand *i* forming also the return conductor of a long-distance circuit, and the said strands *g* and *i* being kept apart by the intervening strands *f* and *h* the wires of which form a second long-distance circuit, substantially as set forth.

3. In a compound cable, the combination, of separate strands of insulating material twisted together, each said strand containing wires which are adapted to form a short-distance telephonic loop, the wires in one of the said strands forming also the outward conductor and the wires of the diametrically opposite strand forming also the return conductor of a long-distance circuit, and the two last said strands being kept apart by the intervening remaining strands of the cable the wires of which also form a long-distance circuit.

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

FRANCIS TREMAIN.

Witnesses:

LINDSAY RALFSLASEY,  
FREDERICK STORKEY.