C. A. PARSONS, J. H. GREAVES & A. R. HEMSTED.

PROCESS OF MANUFACTURING CABLES.

APPLICATION FILED APR. 9, 1909.

1,030,426.

Patented June 25, 1912.

3 SHEETS—SHEET 1.

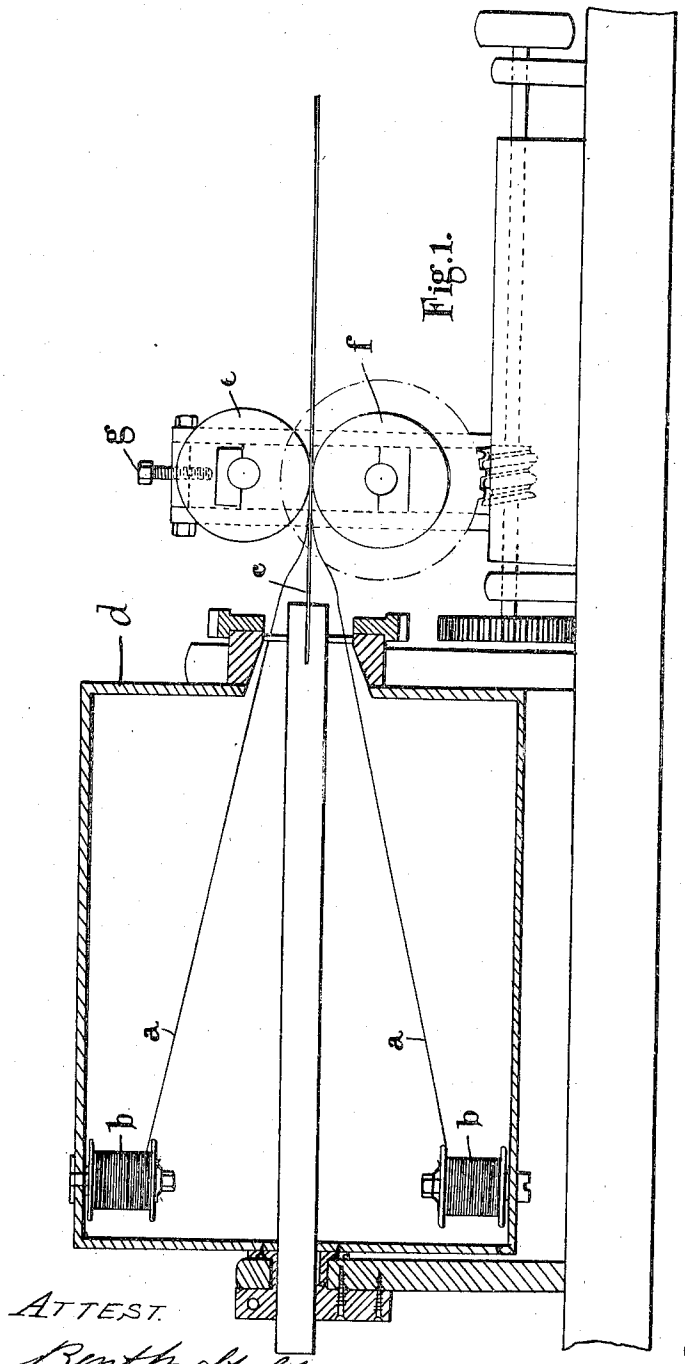


Fig. 1.

Fig. 10.

Fig. 9.

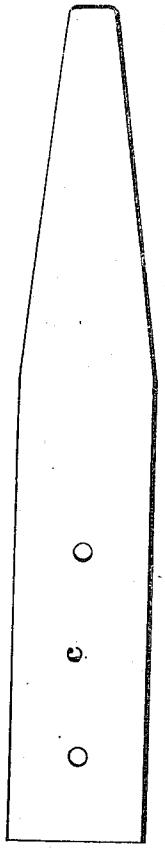


Fig. 3.

Fig. 4.

ATTEST.

Benth. Stahl

Edwd L. Tolson.

INVENTORS.

CHARLES A. PARSONS,

JOHN H. GREAVES, AND

ALFRED R. HEMSTED,

By Allen Middleton & Malsbary Allen

ATTY'S.

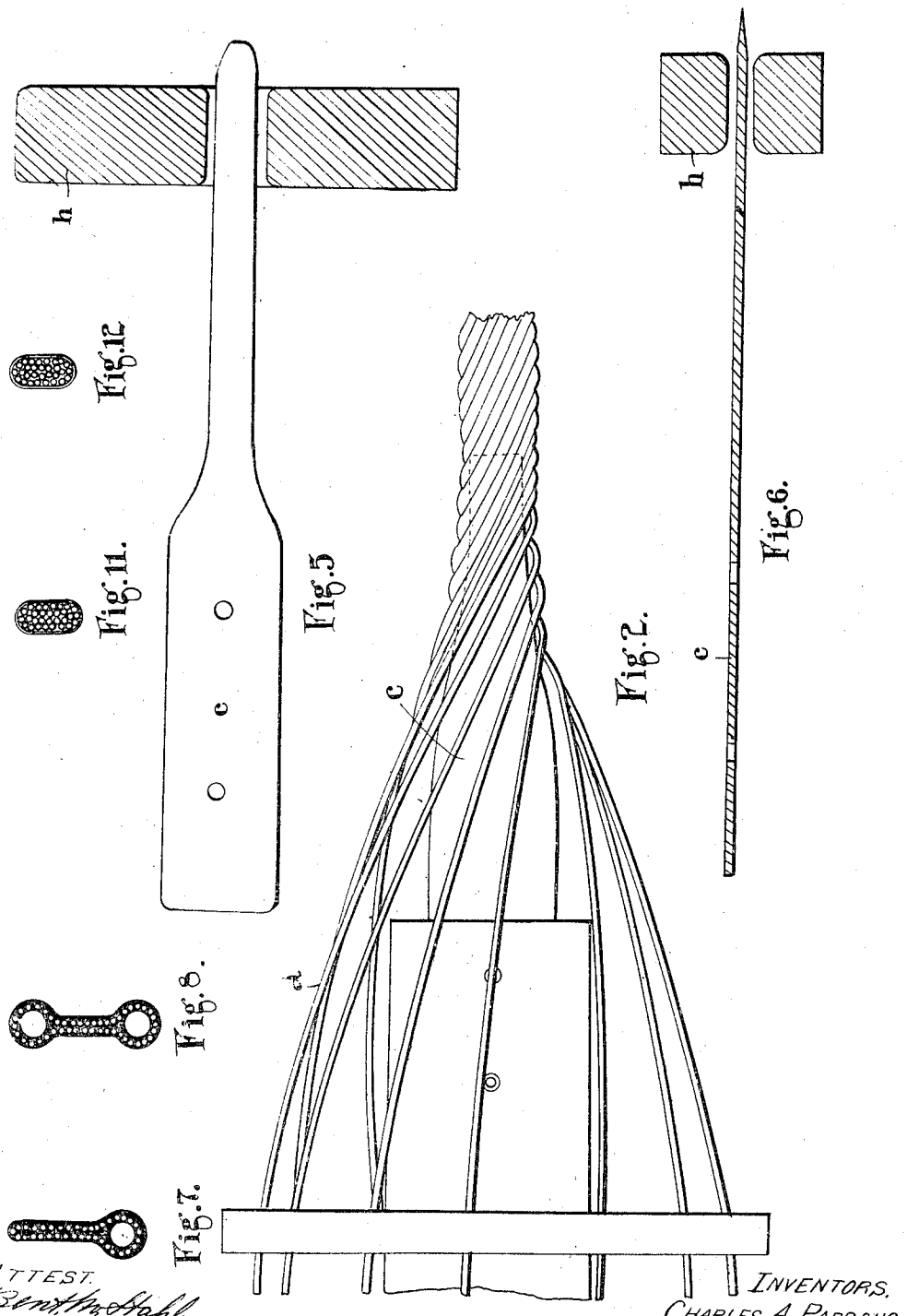
C. A. PARSONS, J. H. GREAVES & A. R. HEMSTED.

PROCESS OF MANUFACTURING CABLES.

APPLICATION FILED APR. 9, 1909.

1,030,426. Patented June 25, 1912.

3 SHEETS-SHEET 2.



ATTEST.
Bentley Hahl,
Edwd C. Tolson.

INVENTORS.
CHARLES A. PARSONS,
JOHN H. GREAVES, AND
ALFRED R. HEMSTED.
BY Munn Middleton Donaldson & Munn
ATTY'S.

C. A. PARSONS, J. H. GREAVES & A. R. HEMSTED.

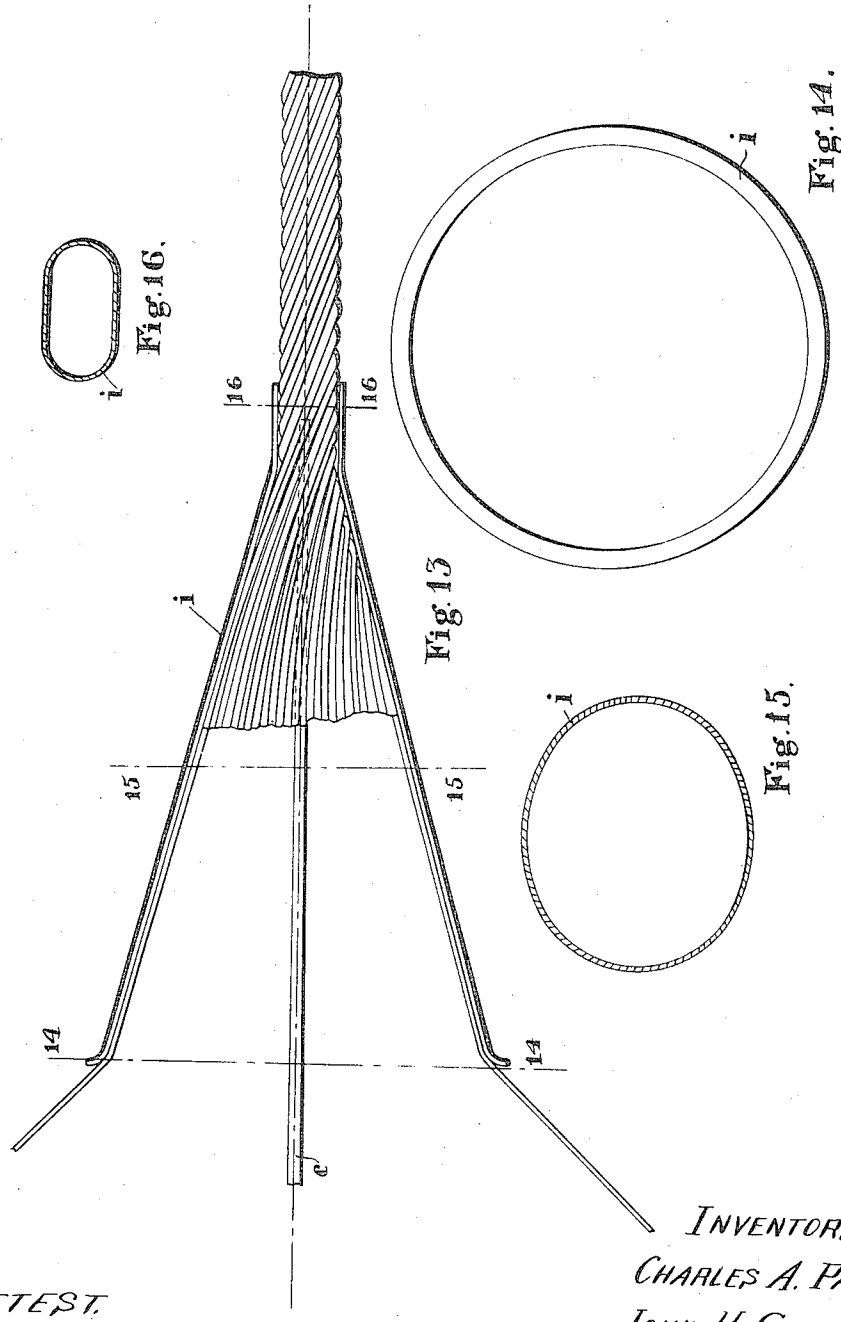
PROCESS OF MANUFACTURING CABLES.

APPLICATION FILED APR. 9, 1909.

1,030,426.

Patented June 25, 1912.

3 SHEETS—SHEET 3.



ATTEST.

Benj. Mc Stahl.

L. B. Middleton

INVENTORS.

CHARLES A. PARSONS.

JOHN H. GREAVES.

ALFRED R. HEMSTED.

By Spear, Middleton, Donald & Spear

ATTYS.

UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS, JOHN HENRY GREAVES, AND ALFRED RUSTAT HEMSTED, OF NEWCASTLE-UPON-TYNE, ENGLAND; SAID GREAVES AND HEMSTED ASSIGNORS TO SAID PARSONS.

PROCESS OF MANUFACTURING CABLES.

1,030,426. Specification of Letters Patent. Patented June 25, 1912.

Application filed April 9, 1909. Serial No. 488,956

To all whom it may concern:

Be it known that we, CHARLES ALGERNON PARSONS, C. B., JOHN HENRY GREAVES, and ALFRED RUSTAT HEMSTED, subjects of the King of Great Britain and Ireland, and residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented a certain new and useful Process of Manufacturing Cables, of which the following is a specification.

This invention relates to electrical conductors or cables of the flattened stranded type. These flattened cables are of considerable importance both for direct current high speed armatures of the surface wound type and also for slotted armatures for example as used in alternators. Especially in the former instance accuracy in the lay of the cable, that is the distance in which one wire makes one complete revolution, is of considerable importance, and to fulfil the necessary practical conditions flattened stranded cables have heretofore been made on a solid non-conducting core. This has many disadvantages among them being the creation of a low space factor of active material and another being that when a cored stranded cable is bent on edge its section becomes practically circular whereby all the advantages of flat cables are lost. It has also been proposed to form stranded conductors solid or in the form of a hollow circular tube and then to compress them until they are flat. Such treatment is ruinous to the cable, injuring the individual wires, forcing them out of place and breaking down any insulation that may be on them. In an electrical plant in which it is desired to have every strand carefully insulated from the others, it will be quite clear that a cable formed in this way would be altogether worthless. It is not possible to put a large amount of insulation on each individual strand, as, were this done, valuable space would be wasted, and we have found by experience that a very small amount of flattening by compression has the effect of bringing practically every wire into contact with its neighbors. The effect of this in a continuous current armature is to cause very severe eddy currents to flow, causing the armatures to over heat, and the efficiency of the machine to be seriously impaired. Braided cables have also been made in a like manner, and the same objections apply in that case together with the further electrical objections through having the cable with so short a lay as a braided cable. It has also been proposed to use various forms of throat pieces, dies and rollers in a number of ways for the production of electrical cables, but although some are utilized in certain forms of the present invention they do not broadly constitute or form part of this invention.

The object of this invention is to provide an improved process for producing stranded cables for electrical purposes free of the disadvantages referred to above.

The invention consists in a process for manufacturing flattened coreless stranded cables, made entirely or in part initially flat without compression or in the form of a flat tube which is then slightly flattened.

The invention also consists in a process for producing a cable of this kind made on a flat dummy or temporary core which does not form part of nor leave unfilled space in the completed cable.

Referring to the accompanying diagrammatic drawings, Figure 1 indicates a machine for the production of wires or cables according to one form of this invention. Fig. 2 shows a detail of Fig. 1, to an enlarged scale. Figs. 3 and 4 show in plan and elevation respectively a form of dummy core. Figs. 5 and 6 illustrate like views of a modified form with a throat piece. Figs. 7 and 8 show cables with parts with fixed cores in addition to the flattened coreless parts which can be produced according to this invention. Fig. 9 shows a section of a cable of 30/17 gage wires built around a non-conducting core. The sectional area of conducting material is 0.08 sq. ins. Fig. 10 is a section through this cable showing the actual cross-sectional shape taken when bent double around a $\frac{3}{4}''$ diameter bar. Fig. 11 shows a section of a cable of 30/17 gage wires made up according to the present invention without a core. The sectional area of conducting material is 0.08 sq. ins. Fig. 12 is a section through this cable after being bent double around a $\frac{3}{4}''$ diameter bar. Fig. 13 indicates a manner in which a cable is formed inside a tube, Figs. 14 to 16 being sections of the same on the lines 14—14, 15—15 and 16—16 respectively.

In carrying the invention into effect in the form illustrated more particularly in

Figs. 1 to 4, the wire *a*, is carried on spools *b*, and twisted or laid around a fixed dummy core *c* by a revolving drum *d*. The core is so proportioned as to give a cable of the required dimensions which is dragged away from the dummy core *c*, and also slightly flattened by means of the rollers *e*, *f*, situate in front of the same and adjustable by tension screws *g*. One or both of these rollers may be power driven if desired in the form shown the lower *f*, being so driven. Also instead of or in addition to the rollers a throat piece *h* (Figs. 5 and 6) may be introduced at some suitable point so that the cable may be drawn off the core through the same. Instead of forming the cable about a dummy core it may be formed inside a tube so shaped as to allow the cable easily to be drawn up into the flat shape required and with this tube a dummy core may be used in addition if desired.

Figs. 13 to 16 indicate a manner of forming a cable of this kind. In this modification, the tube *i*, inside which the cable is to be formed takes the place of the throat piece, and instead of the cables being formed first around a dummy core, they are formed inside the circular orifice of the tube. This tube is circular at the end at which the cable is formed but gradually assumes an elongated shape so as to work the wires into their proper positions. In other words the tube is circular at the entrance end as shown more particularly in Fig. 14 and tapers gradually to the required section at the exit end as shown in Figs. 15 and 16. In the form illustrated a dummy core *c* is also included. Also suitably shaped rollers may be used one set for flattening and another for forming the cable.

By using suitably shaped dummy cores, rollers and throat pieces or combinations of the same, cables of various shapes may be formed and if desired parts of these may contain fixed cores, as shown by way of example in Figs. 7 and 8, of conducting or non-conducting material, but the thinner parts or the flat parts of the cables are made without permanent cores.

Cables made according to this invention may be laid with additional layers over the flattened cable in any suitable manner.

Wires used for the production of cables according to this invention may be of any practical kind and may be plain metallic wires or may be cotton covered or insulated with enamel or any other suitable insulating material.

Referring now to Figs. 9 to 12, these show more particularly one of the advantages of cables according to this invention over cored cables—the Figs. 9 and 10 referring to cored cables and Figs. 11 and 12 to improved cables, according to the present invention. In the case of Figs. 9 and 10 it will be seen that on bending, the cable has completely lost the flat shape necessary to get it into the available space at the end of an armature, while the cable according to Figs. 11 and 12 has not appreciably altered in section.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

1. A process for the production of flattened coreless stranded cables consisting in forming them initially as a flat tube and then slightly compressing them; as set forth.

2. A process for the production of flattened coreless stranded cables consisting in forming them initially on a flat mandrel and then slightly compressing them; as set forth.

3. A process for the production of flattened coreless stranded cables consisting in forming them initially on a flat temporary dummy core and then passing them between rollers whereby they are slightly compressed; as set forth.

4. A process for the production of flattened coreless stranded cables consisting in forming them initially on a flat temporary dummy core, passing them between rollers whereby they are slightly compressed and drawn off the temporary core; as set forth.

5. A process for the production of flattened coreless multi-wire cables consisting in forming them initially on a flat temporary core and then passing them through reducing means; as set forth.

6. A process for the production of flattened coreless multi-wire cables having an auxiliary part with a core therein which consists in laying the wires around a fixed core and a flat temporary core and withdrawing the cable and the latter core relatively to the temporary core; as set forth.

7. A process for the formation of flattened multiwire coreless cables having an auxiliary part with a core therein which consists in laying the wires around a fixed core and a flat temporary core withdrawing the cable and the first core relatively to the second core and slightly flattening the part of the cable which was formed around the flat temporary core; as set forth.

In testimony whereof, we affix our signatures in presence of two witnesses.

CHARLES ALGERNON PARSONS.
JOHN HENRY GREAVES.
ALFRED RUSTAT HEMSTED.

Witnesses:
FREDERICK GORDON HAY BEDFORD,
WILLIAM SHEARER.