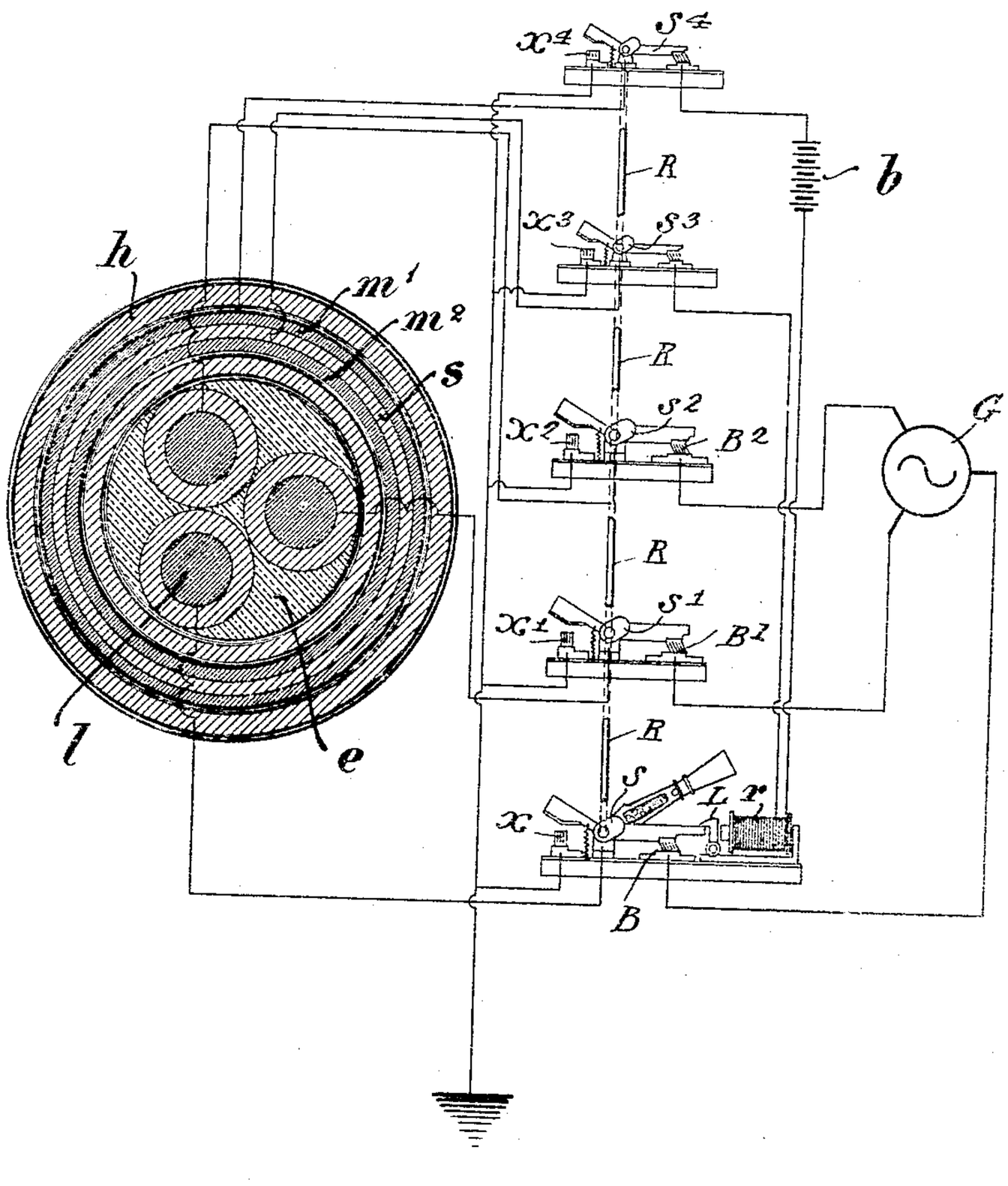
G. BARTELS.

ELECTRIC CABLE.

APPLICATION FILED AUG. 26, 1908.

966,644.

Patented Aug. 9, 1910.



Witnesses

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UNITED STATES PATENT OFFICE.

GEORG BARTELS, OF NIPPES, NEAR COLOGNE, GERMANY, ASSIGNOR TO COMPANY LAND UND SEEKABELWERKE, AKTIENGESELLSCHAFT, OF NIPPES, NEAR COLOGNE, GERMANY, A CORPORATION.

ELECTRIC CABLE.

966,644. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed August 26, 1908. Serial No. 450,329.

To all whom it may concern:

Be it known that I, GEORG BARTELS, of Nippes, near Cologne, a subject of the King of Prussia, and whose post-office address is Wilhelmstrasse 53, Nippes, near Cologne, Prussia, German Empire, have invented new and useful Improvements in and Relating to Electric Cables, of which the following is a specification.

This invention has for its object to provide an electric cable so constructed that in the occurrence of any mechanical damage to the cable, such as by squeezing, crushing, twisting, impact, &c., which may be so great as even to destroy the cable to its very core, contact will be made between two auxiliary conductors at an earlier moment than that at which the insulation of the conductor carrying the main current is injured with the result that a cut-out switch or equivalent device is set in operation, so that no sparking can take place at the point of injury to the cable.

In carrying out this invention the main conductors (of which there may be one or more) carrying the main or strong current are inclosed in strong highly elastic electrically insulating material, and are surrounded by two outer concentric auxiliary conductors for carrying the weak current. These two auxiliary conductors are separated from each other by a thin layer of pliable insulating material much less resistant to mechanical strain than the insulating material inclosing the main conductor or conductors. The whole is then surrounded by a covering of highly elastic electrically insulating material, with or without an outer casing of lead or other protecting covering.

The accompanying drawing illustrates by way of example one form of cable constructed according to this invention in cross section, with a diagram illustration of the arrangement of the main features of the external circuits of the several conductors.

l indicates the conductors carrying the strong current. There may be one or more of these conductors. Three are shown in the drawing. These conductors *l* are surrounded by a strong and highly elastic electrically insulating material *e*. Around the whole of the conductors *l* and material *e* there are arranged in the usual manner two concentric braided metal casings or windings m^1, m^2 which are separated from each other by a thin layer of pliable material *s* that is capable of being broken or damaged with comparative ease relatively to the material by which the main current conductors are insulated.

A layer *h* of highly elastic electrically insulating material is laid around the outermost of the auxiliary concentric conductors m^1, m^2. Around this layer *h*, there may be arranged as usual either an impregnated braiding or an armored lead casing.

The two outer auxiliary conductors are arranged in series in a circuit including a low tension current battery *b*, and an electromagnet *r*. This electromagnet when excited attracts the latch L, tripping the switches or cut outs S, S′, S^2, S^3, S^4, etc., all of which are mounted on one shaft R, partly broken away portions of which are diagrammatically represented in the drawing, or otherwise connected so as to operate in unison. The effect of the operation of the switches is to open the circuits between the generator G, and the cables *l* at B, B′, B^2 and to ground all the cables *l* and concentric conductors m^1, m^2, by closing the ground connection at X, X′, X^2, X^3 and X^4. Thus the current from the generator is shut off and all parts of the cable are grounded so that no arc can form at the point of rupture or elsewhere in its length. Now if the cable working say, in a mine, be subjected to an excessive mechanical strain, then before the electrically insulating covering of the conductors carrying the strong current, can yield the comparatively readily destroyed layer between the concentric auxiliary conductors will allow of a short-circuit being produced between these latter, which will operate the automatic cut-out device situated on the surface.

What I claim and desire to secure by Letters Patent of the United States, is:

1. An electric cable comprising one or more main conductors for strong current inclosed in highly elastic electrically insulating material, surrounded by two outer concentric auxiliary conductors for weak current that are separated from each other by a thin layer of pliable insulating material much less resistant to mechanical strain than the insulating material inclosing the main conductors, the whole being surrounded by

a covering of highly elastic electrically insulating material, substantially as and for the purpose hereinbefore described.

2. The combination with an electric cable having an inner conducting portion and insulating covering of relatively high tensile strength, and an outer covering comprising two conducting sections and intervening insulation of low tensile strength, of a source of heavy current connected to the inner conductors, and means operated by a current flowing through the two outer conducting sections when the same are short circuited to cut out the source of heavy current supply.

3. The combination with an electric cable having an inner conducting portion and insulating covering of relatively high tensile strength, and an outer covering comprising two conducting sections and intervening insulation of low tensile strength, of a source of heavy current connected to the inner conductors, and means operated by a current flowing through the two outer conducting sections when the same are short circuited to cut out the source of heavy current supply and simultaneously ground all the conducting portions of the cable.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORG BARTELS.

Witnesses:
CHARLES LE SIMPLE,
M. KÜPPERS.