A. POLLAK.

ELECTRICALLY HEATED GARMENT.

APPLICATION FILED MAR. 12, 1912.

1,073,926.

Patented Sept. 23, 1913.

2 SHEETS—SHEET 1.

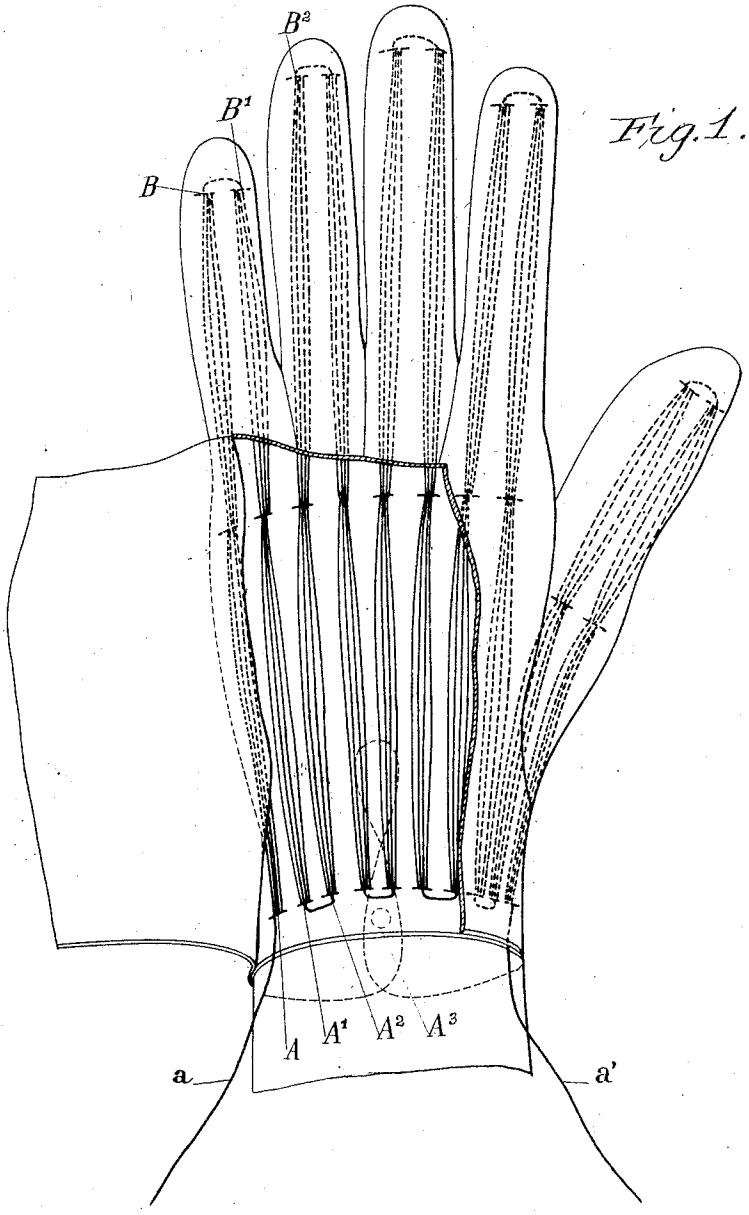

Fig. 1.

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2 SHEETS—SHEET 2.

FIG. 2

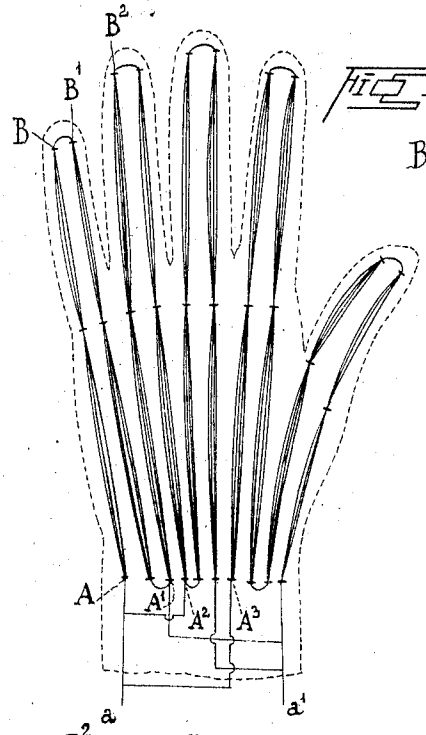


FIG. 3

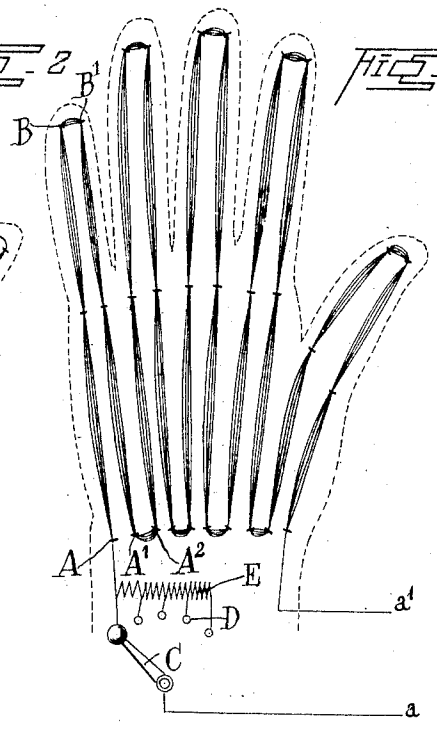


FIG. 5

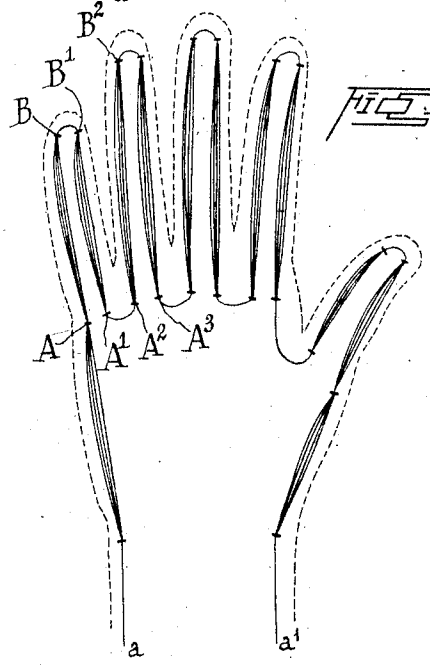
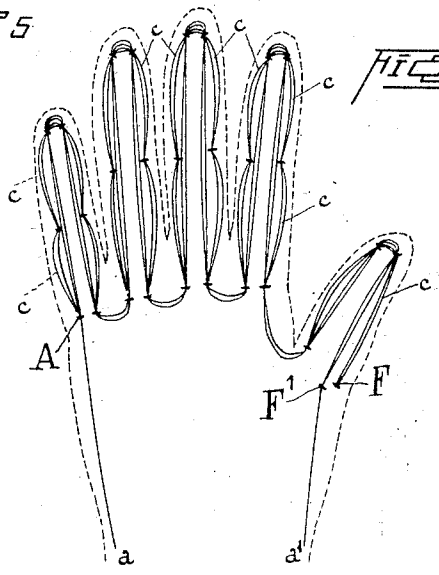


FIG. 4



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UNITED STATES PATENT OFFICE.

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ELECTRICALLY-HEATED GARMENT.

1,073,926. Specification of Letters Patent. Patented Sept. 23, 1913.

Application filed March 12, 1912. Serial No. 683,401.

To all whom it may concern:

Be it known that I, ANTON POLLÁK, a subject of the King of Hungary, residing in Paris, France, have invented certain new and useful Improvements in Electrically-Heated Garments, of which the following is a specification.

The object of the present invention is to provide a fabric or an article of clothing having elasticity, pliability and durability, and which can be safely and economically heated by electricity so as to afford protection against cold and thereby assure their greater efficiency to aviators, chauffeurs, helmsmen, or other persons who are greatly exposed to cold and also to the wind, and who, therefore, suffer especially in their hands and feet from the cold, and consequently cannot use the full power of these portions of the body. This is attained in the most complete manner by means of clothing made in accordance with the present invention, and these are not inferior to ordinary clothing, as regards shape, pliability, elasticity, and durability; but in fact can be lighter and more comfortable. They afford protection against cold, and permit an unimpeded use of the respective bodily organs.

The invention comprises the employment as electric heating resistance, wires of a material of low specific electrical resistance and of very small diameter, which, consequently, are perfectly pliable. To these wires there is imparted, in an advantageous manner, by multiple winding with silk or other insulating material, possibly by combination with other kinds of insulation, greater mechanical strength and as complete insulation as possible. Several wires are loosely interposed parallel between two fabrics, laid in in groups, and fastened only at single points, in such a way that on stretching of the fabric, they slide in the fastening eyelets, and therefore are not strained in pulling; they can, however, also spread out between the two materials and distribute the heating effect. The wires are laid between two garments or pieces of clothing, for example between two gloves, stockings, and so forth, which fit into each other, and accommodate themselves to the respective bodily organs, and thereby is attained a practical and economical heating of the respective bodily organs by means of an electrical current controllable at will. The economy can be further increased if the inner or thinner garment is very thin and the outer stronger and thicker and of a greater heat insulating capacity.

The accompanying drawings illustrate embodiments of the invention.

Figure 1 is a back elevation of a glove with the outer layer of material or covering partly turned back to show the inside construction. Figs. 2, 3 and 4 are similar views of other embodiments of the invention, the outline of the glove being indicated in dotted lines and the electrical heating apparatus in full lines. Fig. 5 is a similar view of the construction shown in Fig. 1.

Referring now to the embodiments of the invention illustrated and first to Fig. 1, the wire a is loosely fastened upon the inner layer of fabric at A and conducted back and forth several times between the points A and B, and then to B′ and back and forth several times between B′ and A′, and then to A^2, etc.

In the form shown in Fig. 2, the wiring is arranged in parallel groups, a connection being shown from a to the several points a, a^2 etc., and from the wire a' to the points A′ and the like. The first group runs from A to A′, the second commences at A^2 and the third at A^3.

According to Fig. 3 the multiple wires run continuously from A, B, B′, A′, A^2, etc., to a'; and a greater or smaller number of these circuits may be communicated into the line by means of the switch C connected with the line a and adapted to contact with any one of the contacts D of the rheostat E.

It is advantageous to provide a larger number of wires connected in parallel than is necessary for attaining the desired heating effect. Such an arrangement is shown in Fig. 4. The wires are all connected to the main a while the main a' is connected only to so many wires as are necessary for attaining the desired heating effect. The superfluous wires have their ends isolated as at F and, upon breaking of any one of the regular wires, these extra wires c may be connected at F′ to the main a'. These wires c can also be led out of the material by themselves, in order to be able to increase the heating effect in extraordinary cases by connecting them with the main a', without increasing the potential of the current.

The wires are preferably fixed loosely in

groups and only at certain points. The length of the separate groups is so proportioned that the wires of the groups can also follow the greatest expansion of the fabric between the points A, B, B′, A′, and also between the points B, B′, A′, A^2. If the fabric is not stretched, then the wire groups, along the width, lie divided over a given surface between the fabrics. Thereby it is insured that the clothing or clothes retain their full elasticity, pliability and durability and, therefore, can be light and allow every bodily motion, without the wires becoming broken.

By the parallel connection of several very thin wires it is brought about that the current strength in each separate wire remains small, and thereby the terminal potential of the current can be very low, so that all danger is excluded; furthermore, by the fact that the specific electric resistance of the same, in contradistinction to the material of greater electric resistance generally employed as a heating body, can be chosen very low, there results a relatively great length of the wires. The wires, moreover, are so led that the two poles are always found on the opposite sides of the respective garments. If, for example, the palm-side of the glove illustrated is also to be provided with wire, then another wire group, parallel to the outer one shown would have to be laid also from *a* to *a′*, in such a manner that the creation of a short circuit would not be possible.

In many garments the distribution of the wires can be non-uniform, according as the respective bodily organs, which are covered by separate portions of the garments, are more or less exposed to the cold. In a glove, for example, the palm side will be only slightly armored or not at all. Fig. 5 shows this construction, the circuits being similar to those in Fig. 1 and only the fingers being provided with wires, since the remaining portions of the hand suffer less from the cold.

The necessary current can be produced by a small dynamo machine, which is driven by the engine of the aeroplane, automobile, etc., and the potential of which can be controlled in the well known manner. There can also, however, be employed any other current source whatever.

I claim as my invention:—

1. An article of clothing which for the purpose of electrical warming is provided with insulated flexible conductors serving as heating bodies, said conductors being arranged loose alongside of each other and fastened at only a few points, to one of the layers of the article so that their freedom of movement is preserved as far as possible and the extensibility of the article is substantially undiminished.

2. An article of clothing which for the purpose of electrical warming is provided with flexible conductors serving as heating bodies, said conductors being of a material of low specific electrical resistance and of very small cross-section, and a plurality of insulating layers imparting to each of said conductors greater mechanical strength and high insulation, in order with complete pliability, lightness and comparatively great length to be able to employ a current of low electric potential.

3. An article of clothing formed in a plurality of layers and which for the purpose of electrical warming is provided with insulated flexible conductors serving as heating bodies, said conductors being arranged in groups and being attached only at a few points loosely to one of said layers, so that the conductors, on stretching the garment, can slide in the direction of the stretching and thereby not be strained in the pulling, but can spread out between the two portions.

4. An article of clothing which for the purpose of electrical warming is provided with flexible conductors, serving as heating bodies, said conductors being connected in parallel groups, and in greater number than is necessary for attaining the designed heating effect, in order to be able to employ the superfluous conductors as substitutes for the conductors which become useless.

5. An article of clothing which for the purpose of electrical warming is provided with insulated flexible conductors serving as heating bodies, said conductors being arranged loose alongside of each other and fastened at only a few points, to one of the layers of the article so that their freedom of movement is preserved as far as possible and the extensibility of the article is substantially undiminished, the distribution of the wires being un-uniform, so that those portions of the organs covered by the garment which are less exposed to the cold, are less heated.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ANTON POLLÁK.

Witnesses:

GEORGE E. LIGHT,

LUCIEN MEMMINGER.