M. HEFTER.

ELECTRICAL HEATER AND MANNER OF MANUFACTURING SAME IN THE FORM OF TEXTILES.

APPLICATION FILED FEB. 1, 1910.

975,358. Patented Nov. 8, 1910.

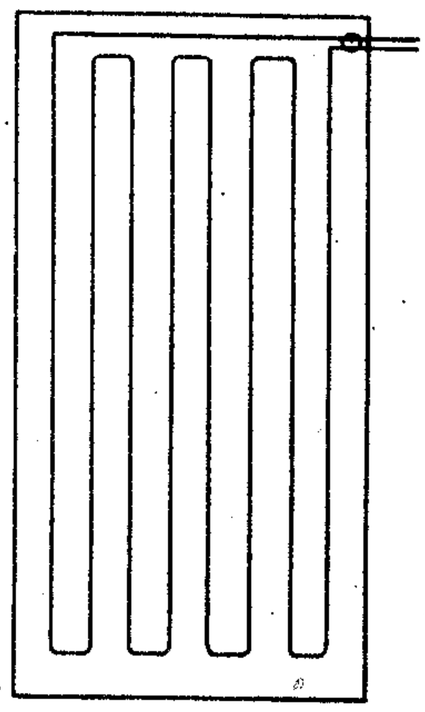

Fig. 1.

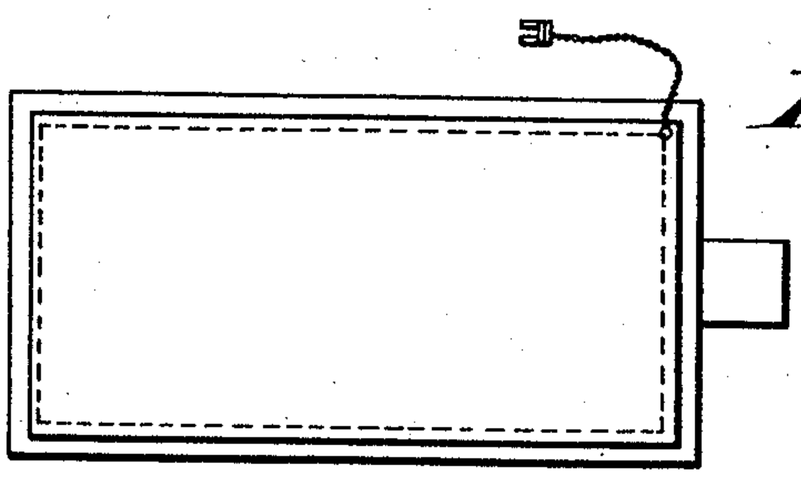

Fig. 2.

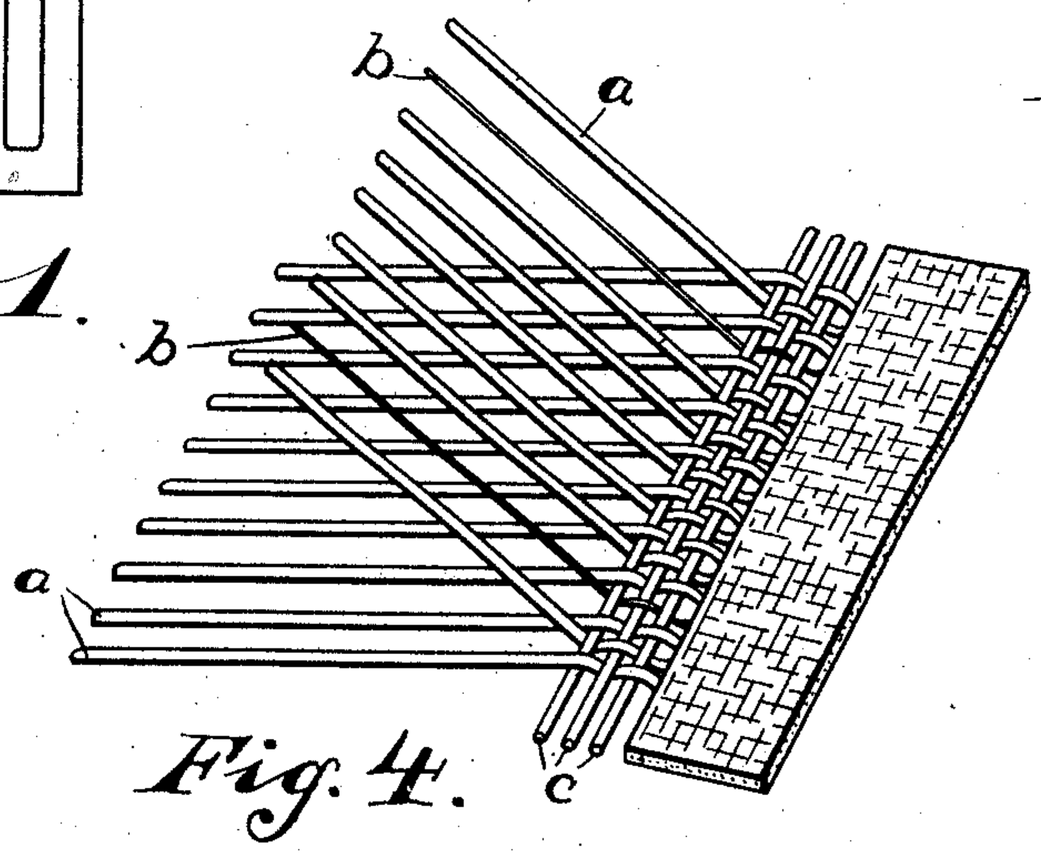

Fig. 4.

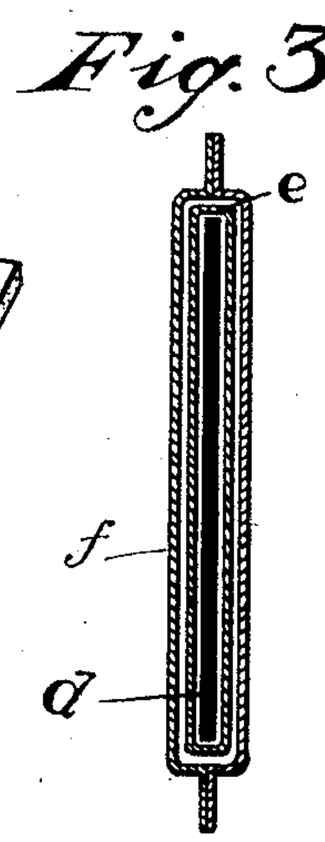

Fig. 3.

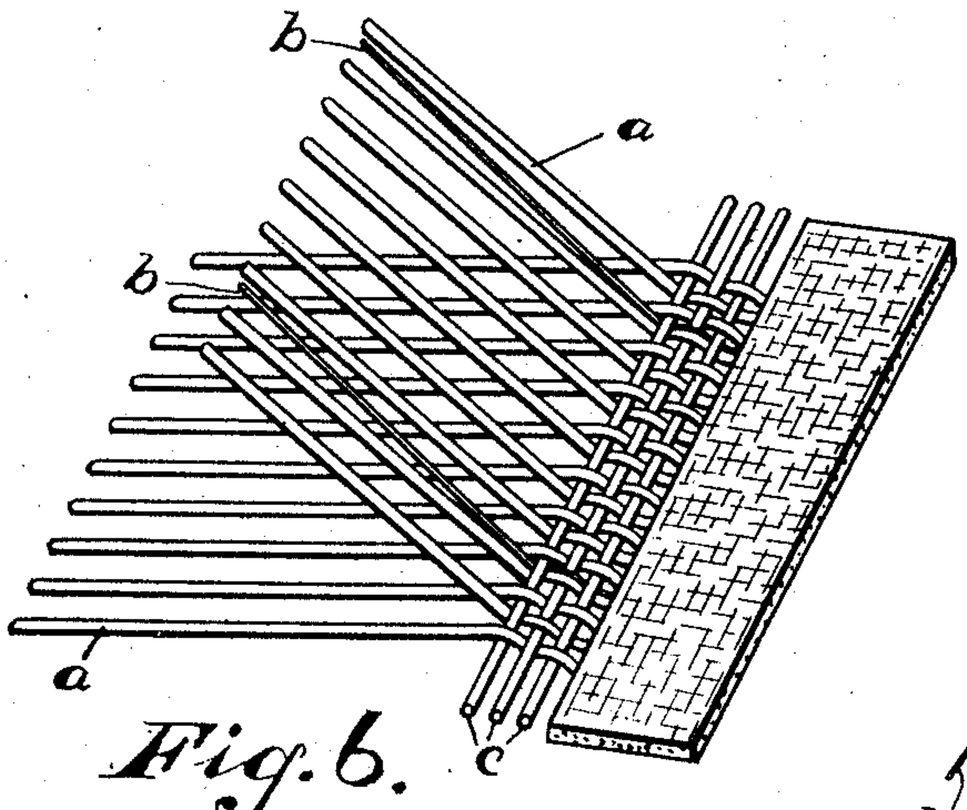

Fig. 6.

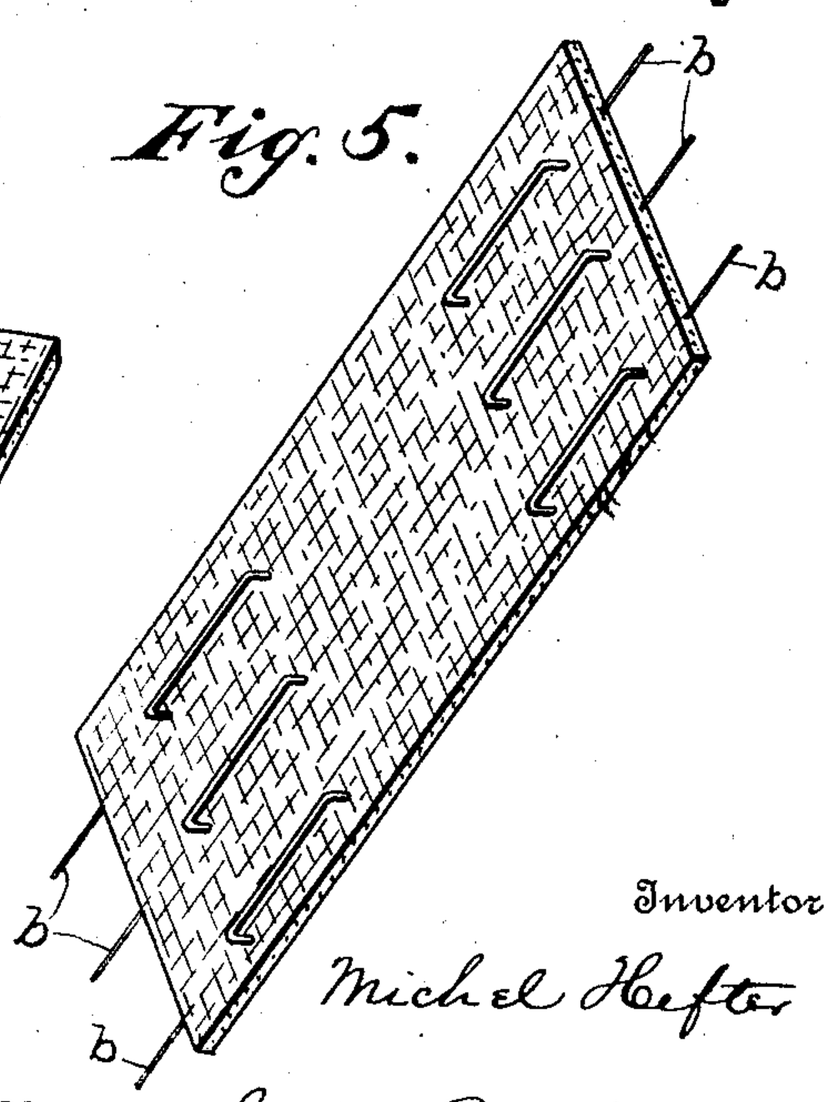

Fig. 5.

Witnesses

J. Milton Jester.

L. C. Brady.

Inventor

Michael Hefter

By J. S. Barker

Asst. Attorney

UNITED STATES PATENT OFFICE.

MICHEL HEFTER, OF ST. PETERSBURG, RUSSIA, ASSIGNOR TO LEONARD J. LEWERY, OF NEW YORK, N. Y.

ELECTRICAL HEATER AND MANNER OF MANUFACTURING SAME IN THE FORM OF TEXTILES.

975,358. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed February 1, 1910. Serial No. 541,399.

To all whom it may concern:

Be it known that I, MICHEL HEFTER, engineer, subject of the Czar of Russia, residing at St. Petersburg, Russia, have invented certain new and useful Improvements in Electrical Heaters and Manner of Manufacturing Same in the Form of Textiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electrical heaters and to a method of manufacturing the same in the form of a textile fabric from which can be produced articles of various kinds.

The invention is especially valuable for medical and other purposes where it is desirable to be able to apply a gentle heat to a particular spot, as to some portion of the body.

Among the uses to which the invention may be put is the manufacture of warming bandages, compresses, knee caps, sheets and blankets, and the like. The use of such textiles is not necessarily limited to medical purposes and they may with equal advantage be used for every day purposes in the shape of different kinds of warmers, tapestry carpets, pillows and the like.

Generally speaking, various warming bodies in the form of textiles have been suggested prior to this invention, and have been made the subject of Letters-Patent in various states. The present invention, however, differs from those hitherto known or described, and its main feature is that a conducting wire, for instance, a nickel wire, which may be uncovered, takes the place of some of the threads of the warp, or is placed next to some of them, such wires being periodically brought to the surface of the fabric and floated over parts of the fabric.

In the accompanying drawings, Figure 1 shows a diagram of the arrangement of the conductors in the finished fabric. Figs. 2 and 3 are respectively a plan view and a cross section of the finished fabric. Fig. 4—a diagrammatic view of the fabric with the conducting wire replacing some, say, every eighth of the threads of the warp. Fig. 5 a view of the fabric with the wire exposed in several places. Fig. 6 is a diagrammatic view of the fabric with the wire placed next to some of the threads of the warp.

The textile heaters made according to my invention may be woven on the usual weaving looms in the following manner, namely: In the first place the warp is prepared out of threads of a fire proof and non-conducting material preferably from asbestos. During the weaving of the warp some of the threads of the latter, for instance every eighth thread is replaced by a fine wire which may be formed of nickel and the weaving continued, asbestos threads being employed also for the threads of the woof, and the woven article at this stage of the weaving process has the appearance, represented by Fig. 4 of the drawings, where *a* shows the asbestos thread of the warp; *b* the wires, and *c* the asbestos threads of the woof. Having woven, in the above described manner, a certain part of the fabric, say, one foot length, the wires are then slightly lifted and floated over the fabric, the weaving continued without the wires taking part in the weaving process for some time, after which the wires are again woven into the fabric, as first described. Having repeated the above procedure several times a long piece of fabric (Fig. 5) is obtained having several rows of exposed wire, placed at a certain distance from each other. This long piece of fabric is then cut across in several places, as indicated by the dotted line; and thus, several separate pieces of this fabric are obtained, each having several parallel wire rows with their ends freely projecting out of the fabric. These projecting ends of the wires may then be connected in whichever manner it may be desired, in series, or parallel connections, or in any desired groups; and in, whichever manner the wires are connected, some of them may, if required, not be included in the circuit. Out of the long piece of fabric prepared according to the above described process may then be cut off a piece of any width and of such length, as to have the section taken from that portion of the fabric where the wires were lifted during the weaving process, as mentioned above, and where, consequently, the wires are exposed; and thus, out of one long piece of fabric prepared according to this invention may be obtained textile electrical heating bodies of any de-

sired size and for any desired heating power without having to alter the thickness of the wires or their distribution in the fabric. A more uniform fabric may also be obtained if an asbestos or other fibrous thread or threads accompany the wire every time the latter is introduced in the warp, as shown in Fig. 6. In the latter instance the projecting of the ends of the wires is obtained by lifting the wires only, while the asbestos thread accompanying the wire is allowed to continue to take part in the weaving process. The finished pieces *d* (Fig. 3) of the fabric are then inclosed in an insulating wrapper *e* of a fire proof material, preferably of asbestos, and this wrapper may then be placed in a waterproof cover and thus be made to serve as a compress, if desired.

Having, thus, described and ascertained the nature of my said invention and the manner in which the same is to be carried out, what I claim is:—

1. An electric heater consisting of woven filaments, the major part of the filaments being of non-conducting material while the balance are conductors of electricity adapted to be heated by the passage of an electric current along them, such conducting filaments being periodically brought to the surface of the fabric and floated over parts thereof.

2. An electrical heater comprising a woven fabric in which certain of the warp filaments are formed of conducting material, such filaments being brought to the surface of the fabric at intervals and floated over parts thereof.

3. An electric heater consisting of a woven fabric, certain of the warp filaments of which are conductors of electricity, such conducting filaments being periodically brought to the surface of the fabric and floated over parts thereof, and such floated over portions of the several conducting filaments being in the same transverse sections of the fabric.

4. An electric heater consisting of a textile fabric, certain of the warp filaments of which are formed of wire, such wires being periodically brought to the surface of the fabric and floated over parts thereof, and each wire being accompanied by a warp thread or filament of non-conducting material, such accompanying thread being woven into the fabric continuously.

5. The herein described process of making an electric heater consisting in weaving a fabric out of non-conducting threads and introducing into such fabric by the weaving process as part of the warp, conducting wires, and periodically floating over the fabric said conducting wires.

6. The herein described process of making an electric heater which consists in weaving a fabric of non-conducting threads and conducting filaments, the conducting filaments being each accompanied by a non-conducting warp thread, periodically floating over the surface of the fabric the conducting filaments and continuously weaving the warp threads that accompany the said conducting filaments.

In testimony whereof, I affix my signature, in presence of two witnesses.

MICHEL HEFTER.

Witnesses:
H. A. LOVIAGUINE,
M. L. LUISARENKO.