W. F. CRADDICK AND C. M. UHLIG.

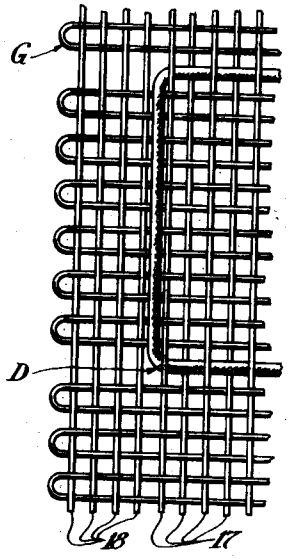
ELECTRICAL PAD AND THE LIKE.

APPLICATION FILED APR. 7, 1922.

1,436,384.

Patented Nov. 21, 1922.

Fig. 1.



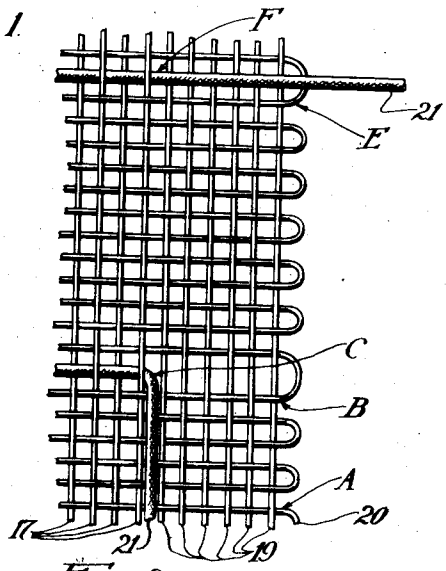


Fig. 2.

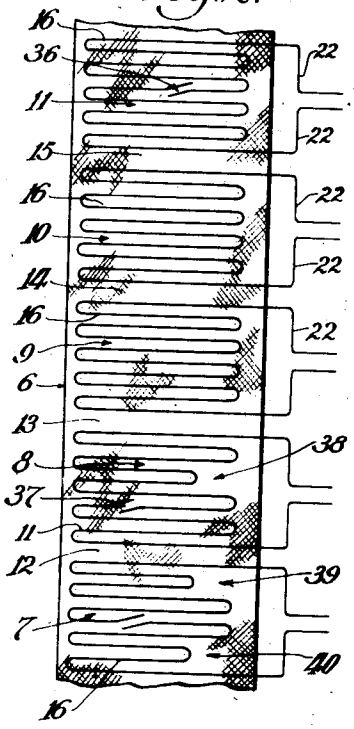


Fig. 3.

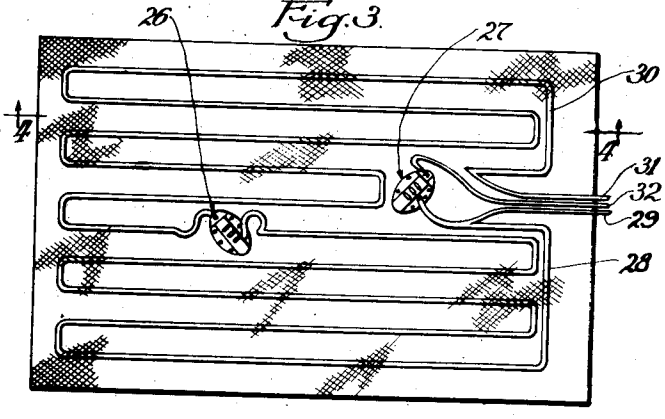


Fig. 4.

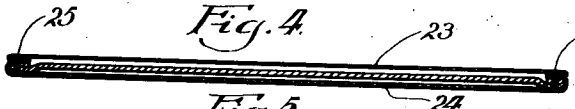
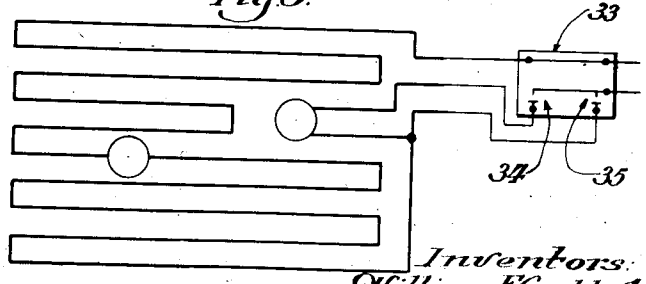


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL PAD AND THE LIKE.

Application filed April 7, 1922. Serial No. 550,448.

To all whom it may concern:

Be it known that we, WILLIAM F. CRADDICK, a citizen of the United States, and CHARLES M. UHLIG, a citizen of Austria (having declared my intention of becoming a citizen of the United States), both residing at Chicago, Cook County, Illinois, have invented certain new and useful Improvements in Electrical Pads and the like, of which the following is a specification.

This invention has to do with certain improvements in electrical pads or the like, that is, pads or like articles which are heated electrically by an electric current passed through them. We will state in the first place that the features of the invention herein disclosed may be used either in connection with articles of relatively small size such as pads, or articles of relatively large size, such as blankets, and certain of said features may also be used to advantage in connection with electrically warmed robes, dressing gowns, etc. For purposes of convenience in description and explanation however, and in order to simplify the specification, drawing and claims, we have herein illustrated and will describe the features of our invention as being incorporated within a pad, but in so doing we wish it clearly understood that we do not intend to limit the application or usefulness of the features of our invention to pads or any other particular article of manufacture except as we may do so in the claims.

Bearing the foregoing in mind, we will first state that one of the main objects of the invention is to provide a pad or the like in which the electric conductors are woven into the body of the fabric so that they become and constitute an integral portion of the weave of the fabric. By so doing an unusually satisfactory electrically conducting fabric is produced through which may be flowed the electric current to supply its heat. By so doing also the smoothness and uniformity and regularity of the completed fabric is greatly improved, since the creation of double thicknesses and other objectionable elements is practically eliminated.

In connection with the foregoing, it is to be observed that in order to be able to weave the pads in the most satisfactory and economical manner, it should be possible to weave them by a continuous weaving process in which the warp threads are continuously drawn through, the weft threads being thrown back and forth in the proper weave. In order, therefore, to make it possible to produce the pads to the best advantage, the weaving process should be so conducted that during the weaving operation the wire will be properly woven into the fabric along with the regular weft threads, the use of the wire in this process being so conducted that after a proper amount of material has been woven to constitute one pad, there will be a pause in the weaving of the wire so as to weave a certain section without wire, after which the inweaving of the wire may be resumed and carried forward during the weaving of the next pad section. In this way the weaving operation may proceed practically continuously, and when a long section has been fabricated it may be cut up into the proper lengths for the individual pads.

One of the objects of the present invention is to provide a weaving process in which the foregoing operation and desirable results may be conducted and secured.

Another feature of the invention relates to the manner in which the weaving of the wire is conducted for each of the individual pad sections. In this connection, it is to be remarked that the presence of sharp bends of wire at the very edges of the pad is objectionable, since these edges are naturally subjected to more or less wear and hard service and therefore the insulation on the wire would rapidly become worn and possibly broken through, thus subjecting the user of the pad to danger and also so increasing fire hazards. Furthermore, the presence of the sharp bends of wire at the very edge of the pad is also objectionable since the tendency for the wire conductor to become broken is thus enhanced, with corresponding danger of opening the circuit and thus not only making the pad useless, but also sometimes bringing about sparks or short circuits with the attendant dangers and fire hazards.

One of the objects of the invention is to provide a weave for the wire and other elements of fabric such that the cross weaving of the wire itself stops short of the edge of the fabric, the weaving of the weft and warp threads themselves continuing to the edges of

the pad, so that in the completed work there will remain at each side a strip of fabric adjacent to the selvage within which however there is no wire but only threads or the like. Another object in this connection is to attain this result by the use of a more or less continuous weaving process.

Still another feature of the invention relates to the provision of a weave in which there shall be provided all the way around the pad a section of wireless fabric, the wires being confined to the space inside of said section, so that the completely woven article may be sewed or stitched clear around its edge without meeting or crossing any wires whatsoever. This will make it possible to apply to one or both faces of the pad suitable facing of cloth or other material so as to give the pad a completed and finished appearance and condition, such facing being sewed all the way around the edge of the pad without any interference by the presence of the wires. In this connection, another object is to produce a completed pad of this type having the aforesaid facings on one or both faces.

Still another feature of the invention relates to the provision of pads in commercial form which shall be properly related and designed for the attainment and maintenance of a proper temperature in their normal operation and use. In this connection, it is to be remembered that as long as an electric current is passed through the wire heat is generated at a substantially constant rate, and the temperature which the pad will ultimately attain will be that temperature at which the heat is being radiated or otherwise given off at the same rate as new heat is being generated. Naturally, for an article of this kind to be safe in use, it must be so arranged that it will never ordinarily exceed more than a certain desired temperature when used in the proper manner.

These pads may be used in any convenient manner largely according to the wishes of the patient, but they will frequently be placed under the covers of the bed or under the garments of the patient, so that the radiation of heat is correspondingly impeded. As a result of this fact there will frequently be times when the heat generated by the electric current is not dissipated as rapidly as it is generated, so that the temperature will continue to rise and might reach a point beyond a safe limit.

One of the objects of the invention is to provide one or more thermostats in conjunction with the pad which will serve to limit the rise of temperature by opening the circuit as soon as the desired limit is reached. Another object in this connection is to make provision in the original weaving of the pad, including the weaving of the wire therein, for the satisfactory accommodation of such thermostat or thermostats without the necessity of substantially rearranging the wiring after the weaving operation is completed.

In conjunction with the use of thermostats another feature of the invention relates to the provision of two or more thermostats so connected into the circuit that either or both of them may be made operative for limiting the temperature. In this connection, a further object is to provide two or more thermostats operable at different temperatures, and to so connect them into the circuits that the electric current will be cut off either at a low temperature or at a high temperature according to the position into which the user may throw the switch.

Still another object of the invention is to provide a weave of such character that the maximum strength thereof will be provided in those portions which are normally subjected to the most severe usage and the greatest strains.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction and combinations of parts hereinafter described and claimed.

In the drawing:

Figure 1 shows a fragmentary face view of a portion of a pad weave embodying certain of the features of the present invention, the section of weave illustrated in this figure having its central portion cut away so as to make the figure narrower;

Fig. 2 shows a face view of a section of completed weave as the same comes off of the loom, illustrating a section of weave containing five complete pads joined together;

Fig. 3 shows a face view of a completed pad on enlarged scale as compared to Fig. 2, the pad of Fig. 3, however, not being provided with any covering of facing material;

Fig. 4 shows a section taken on the line 4—4 of Fig. 3, looking in the direction of the arrows; and

Fig. 5 shows a typical wiring diagram such as may be used in conjunction with two thermostats adapted to cut out at the same or different temperatures.

Referring first to Fig. 2, we will state that the strip of pad material in its entirety is designated by the numeral 6. It may be woven as a continuous strip so as to provide a series of consecutive pads 7, 8, 9, 10 and 11 between them being the spaces 12, 13, 14 and 15. Each of the pads has woven into it a conductor wire through which the electric current may be passed. It will be understood that the warp threads extend lengthwise of Fig. 2, and the weft

threads extend across the same, the material traveling lengthwise of Fig. 2 as it comes off the loom.

Referring now to Fig. 1, we will explain more in detail the weave illustrated. The same includes three groups of warps designated respectively 17, 18, and 19. The warp threads 17 are for the body of the pad and the groups of warp threads 18 and 19 are for the two borders respectively.

The weft thread is designated by the numeral 20. It extends back and forth with respect to the warp threads, over and under the different ones as desired and as dictated during the weaving operation. The wire is designated by the numeral 21. It likewise is woven back and forth through the fabric, over and under certain of the warp threads in the proper and desired manner.

Examining Fig. 1 more in detail, it will be noted that in the lower portion of said figure the weft thread commencing at the point A weaves over and under the various warps from one edge of the fabric to the other until the point B is reached at the right hand side of the weave. When this stage of the operation is reached, the wire is run through the body portion of the fabric, over and under the various body warps 17 from the point C to the point D and then the wire is held at the left hand side of the weave, while the weft thread is run through to the left hand side without shifting the warps. As a consequence, the wire and the weft thread lie side by side during their passage through the body portion of the pad, as is clearly indicated in Fig. 1, the weave in the border portions 18 and 19 being regular, except that a somewhat enlarged space is created in the border portions opposite to the position of the wire as is clearly indicated in Fig. 1. Thereafter the weft thread is run back and forth through the body and border warps a desirable number of times to establish the weave of fabric which it is desired to make, and during this time the wire is held at the left hand side of the weave.

After the desired length of weave has been made and the weft thread has been run through to the right hand side, it is held at the point E while the wire is sent through the body warps to the point F. The warps are then held without shifting and the weft thread is sent back to the left hand side at the point G, after which the weaving of the weft thread back and forth from side to side is continued in regular fashion.

After a complete pad has been woven, the wire is held at the initial side while the weft thread is woven back and forth in a regular fashion through the body and border warps until a length of fabric has been produced sufficient to provide the spaces 12, 13, 14 or 15, as the case may be, between two consecutive pads. The weaving of the wire together with the weft thread then proceeds in the proper manner to weave another pad. It will be noted, however, that a substantial length of wire 22 is left at the front end of each pad, sufficient to establish the electrical connections in a convenient manner. After a number of pads have been woven into a continuous strip they may be cut apart by severing the connecting sections 12, 13, 14, etc.

Examination of Fig. 3 in particular shows that there is a continuous border of fabric material around the entire periphery of each pad within which there are no wires. This border serves not only to protect the end portions of the wires, but also provides a fabric section to which the facings may be readily secured by sewing or otherwise without interference from the wires themselves and without danger of injuring either the wires or the insulating covering on them. As shown in Fig. 4 the facings 23 and 24 may be placed at the two sides of the woven pad. These facings are sewed onto the border portions of the pad by the line of stitching 25 which extends entirely around the periphery of the article.

It was previously explained that one of the features of the invention has reference to the provision of suitable thermostats within the pad for limiting the temperature by cutting off the electric current when the desired temperature is attained. One or more of these thermostats may be used, connected up in whatever manner may be desired. In the arrangement shown in Figs. 3 and 5 there are provided two thermostats 26 and 27 respectively. Ordinarily, the thermostat 26 will be the high temperature thermostat and the thermostat 27 will open at a lower temperature. The terminal wire 28 of the wire woven into the fabric leads directly to the terminal connection 29. The terminal wire 30 of the wire woven into the fabric leads directly to the terminal connection 31. The high temperature thermostat 26 is permanently connected into the wire circuit of the wire woven into the fabric so that the current always flows through this thermostat. The low temperature thermostat 27 is connected to the terminal wire 28 and also to a special low temperature connection 32. Consequently, when current is passed only through the terminal connections 29 and 31, the high temperature thermostat only is in circuit and will allow the temperature of the pad to rise to a relatively high temperature at which it cuts out. On the other hand when current is passed through the terminal connections 31 and 32 the thermostat 27 will open at the lower temperature for which it is set, and thus prevent the pad from attaining the relatively higher temperature. A convenient set of

circuits for these cut outs is shown in Fig. 5 in which there is indicated diagrammatically a switch block 33 having the two switches 34 and 35 for the low temperature and high temperature thermostats respectively.

In order to simplify the wiring within the pad itself, and in order to most conveniently accommodate the thermostats when the same are used, the wire may be so woven as to establish the proper places for the natural accommodation of the thermostats. In Fig. 2 the pads 9 and 10 are shown as being woven continuously without any special provision being made for the reception of thermostats. The pad 11 is shown as being woven with a space 36 for the accommodation of a single thermostat. This space may be established during the weaving of the wire by either providing a certain amount of slack in the wire at this point, which slack will provide enough free wire for conveniently establishing the thermostat connections. Or, the wire may be woven at this point so as to skip a number of body warp threads thus establishing a space within which the wire is free from the warps, so that upon cutting the wire the thermostat may be set into place and connected to the wire ends so established.

The pad shown at 8 in Fig. 2 is provided with a space 37 for the accommodation of one thermostat to be connected directly into wire circuit, being a high temperature thermostat, and also with a space 38 where another low temperature thermostat may be set without interference from the weave of the wire. The space 38 may be conveniently established by stopping the wire relatively short during its weave through the body warps instead of carrying it clear over to the right hand border warps. In the pad 7 we have shown two spaces 39 and 40 for the accommodation of two thermostats, said spaces being provided by stopping the wire short of the right hand border warps at two distinct points.

We wish to point out particularly the fact that in weaving the pads herein disclosed the wire is left entirely out of the entire border portion of the pad, so as to establish a very convenient and perfect border section to which the facings may be attached without interference from the wires, and to also protect the wires themselves against abrasion of their insulation or breakage of their conductors. We wish to also point out that we have made special provision in the weaving of the wire for the accommodation of the thermostats at the proper points without interference from the woven wire, and without the necessity of setting the thermostats down onto the wires woven into the fabric.

While we have herein shown and described only certain embodiments of the features of our present invention, still we do not limit ourselves to the same except as we may do so in the claims.

We claim:

1. As a new article of manufacture an electric pad or the like comprising a fabric and facings therefor, said fabric consisting of body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven throughout the entire width of the fabric from one extreme end to the other and from one extreme selvage to the other extreme selvage, and the wire being woven only within the body warps and in the same passes with the wefts, and terminating at points within both ends of the fabric, whereby there is produced a fabric consisting of a central portion containing insulated wire woven into the fabric together with an integral contiguous border of wireless fabric completely surrounding the wire containing body portion, the sheets of facing material lying against the faces of the fabric and reaching over the border portion, and a line of stitching joining the sheets of facing material to the wireless border portion, substantially as described.

2. As a new article of manufacture an electric pad or the like comprising a fabric and a facing therefor, said fabric consisting of body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven through the entire width of the fabric from one extreme end to the other and from one extreme selvage to the other extreme selvage, the wire being woven only within the body warps and in the same passes with the wefts and terminating at points within both ends of the fabric, whereby there is provided a fabric consisting of a central portion containing insulated wire woven into the fabric, together with an integral contiguous border of wireless fabric completely surrounding the wire containing body portion, the sheet of facing material lying against one side of the fabric and reaching over the border portion, and a line of stitching joining the sheet of facing material to the wireless body portion, substantially as described.

3. As a new article of manufacture an electric pad or the like consisting of a fabric, said fabric consisting of body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven throughout the entire width of the fabric from one extreme selvage to the other extreme selvage, and the wire being woven only within the body warps and in the same passes with the wefts, whereby there is produced a fabric consisting of a central portion containing insulated wire woven into the fabric, together with an integral border of wireless fabric at each side, substantially as described.

4. As a new article of manufacture an

electric pad or the like consisting of a fabric comprising body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven throughout the entire width of the fabric from one extreme selvage to the other extreme selvage with a regular weave, and the wire being woven with a regular weave during the same passes as the wefts, whereby there is produced a fabric consisting of a central portion containing insulated wire woven into the fabric together with an integral border of wireless fabric at each side, all portions of the fabric being established by a regular weave and with a maximum of strength and uniformity, substantially as described.

5. As a new article of manufacture an electric pad or the like consisting of a fabric comprising body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven throughout the entire width of the fabric from one extreme selvage to the other extreme selvage, and the wire being interwoven with the wefts but only in the body portion, and there being spaces in the body portion within which the weave of the wire is omitted to thereby establish suitable locations for thermostats or the like, substantially as described.

6. As a new article of manufacture an electric pad or the like consisting of a fabric comprising body warps, border warps at each side, wefts, and an insulated wire, the wefts being woven throughout the entire width of the fabric from one extreme selvage to the other extreme selvage, and the wire being interwoven in an appropriate section of the weave, there being locations where the wire is not interwoven for the purpose of accommodating thermostats or the like, substantially as described.

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