A. E. GRAPP.

FLEXIBLE ELECTRIC HEATER.

APPLICATION FILED DEC. 20, 1915.

1,257,339. Patented Feb. 26, 1918.

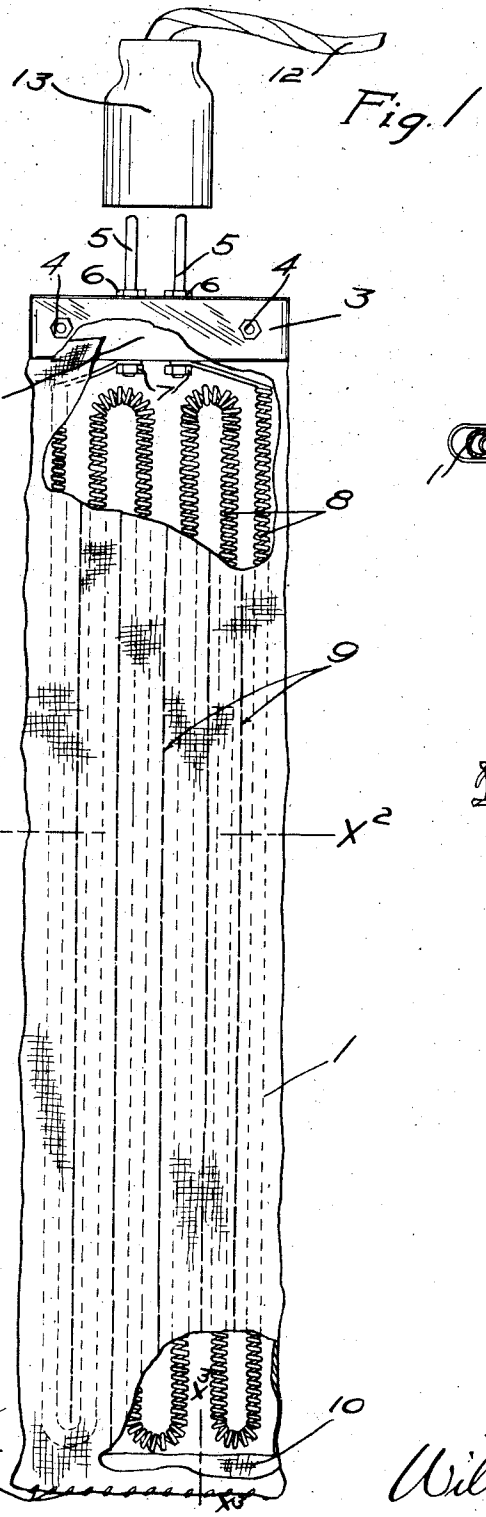


Fig. 1

Fig. 2

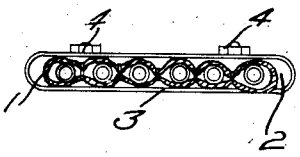
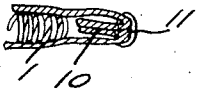


Fig. 3



WITNESSES

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UNITED STATES PATENT OFFICE.

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FLEXIBLE ELECTRIC HEATER.

1,257,339. Specification of Letters Patent. Patented Feb. 26, 1918.

Application filed December 20, 1915. Serial No. 67,779.

To all whom it may concern:

Be it known that I, ALBERT E. GRAPP, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Flexible Electric Heaters; 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.

My invention has for its object to provide an extremely simple and highly efficient portable and flexible electrical heater especially adapted for use for warming up various parts of an internal combustion engine, such as used in automobiles, but capable of more general use.

To the above ends, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings,

Figure 1 is a plan view with some parts broken away showing the improved heater;

Fig. 2 is a section taken on the line x^2 x^2 of Fig. 1; and

Fig. 3 is a fragmentary section on the line x^3 x^3 of Fig. 1.

The flexible body or casing 1 of the heater is in the form of a flattened flexible tube that is woven from asbestos yarn or similar non-combustible material. One end of the tube 1 is slipped over an elongated, or flat head 2 that is made from asbestos board, or other hard and tough material that is a non-conductor of electricity. An elongated metallic clamping collar 3 is placed around that end of the tube 1 which is telescoped over the said head 2, and is clamped thereto and to the said head by small nut-equipped screws or bolts 4. Circuit contacts in the form of pins 5 are passed through the head 2, in parallel arrangement, and are clamped to the said heads by nuts 6 and 7. The nuts 7 clamp the ends of the heating element to the respective contact pins 5. The said heating element 8 is in the form of a coiled wire that is bent into a zigzag parallel formation, and between the parallel portions of the said spring, the intermediate portion of the flattened tube 1 is united by longitudinal rows of stitches 9 that should be formed also by the use of asbestos yarn. The stitches 9 keep the folds or runs properly spaced apart, so that they cannot be short-circuited by contact. A coiled wire or conductor 8, of course has great flexibility, and, in fact, has as great flexibility as the casing 1, itself. The other end of the tube 1 has its edge folded in, as best indicated at 10 in Figs. 1 and 2, and the outer portions of these folds are held together by stitches 11, also of asbestos yarn. These folds project beyond the adjacent portions of the heating wire 8, and, as they are of a non-conducting material, they will never become very hot, and hence, can always be held in the hand, so that the flexible heater may be properly positioned or applied to or around a device or part to be heated. The other end of the heater may be held by taking hold of the clamping collar 3, for that element is not in the electric circuit, nor has it direct contact with the heating element. However, the current will usually be supplied through conductors inclosed in a cable 12 having a head 13 of insulating material, such as vulcanized rubber or wood fiber, and provided within with contacts adapted to engage with the contact pins 5 when the said head is forced frictionally onto the said pins. The construction of the said head 13 is well known, and for purposes of this case need not be further considered. When the said head is applied to the pins, however, it affords a convenient insulated knob adapted to be held in one hand while the other hand is applied to the end 10, to apply the heater where desired.

Aside from the purposes above particularly stated, this heater is adapted for many other uses, such, for example, as heating rectifier bulbs for storage batteries, or for thawing out frozen water pipes.

What I claim is:

1. In a flexible electrical heater, the combination with a flexible tube of noncombustible material, of a coiled heating wire bent into a tortuous form and contained within said tube, an elongated head of insulating material inserted into one end of said tube, a clamping collar surrounding the same end of said tube and provided with means for clamping the same onto said head, and circuit connections applied to said head and thereby insulated from each other, the ends

of said heating wire being attached, one to each of said contacts.

2. In a flexible electrical heater, the combination with a flexible tube of noncombustible material, of a coiled heating wire bent into zigzag parallel form and contained within said tube, the said tube being stitched between the parallel portions of said coiled wire to form compartments therefor, an elongated rigid head of insulating material inserted into the end of said tube, a clamping collar surrounding the same end of said tube and provided with means for clamping the same onto said head, and circuit contacts applied to the said head and thereby insulated from each other, the ends of said coiled wire being attached, one to each of said contacts, the other end of said tube being turned inward upon itself and stitched together forming a relatively cool electrically insulated portion beyond said heating coil.

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

ALBERT E. GRAPP.

Witnesses:
HARRY D. KILGORE,
F. D. MERCHANT.