

C. ROBINSON.
DEVICE EMPLOYING ELECTRIC RESISTANCE.

(Application filed Mar. 15, 1900.)

(No Model.)

Fig. 1.

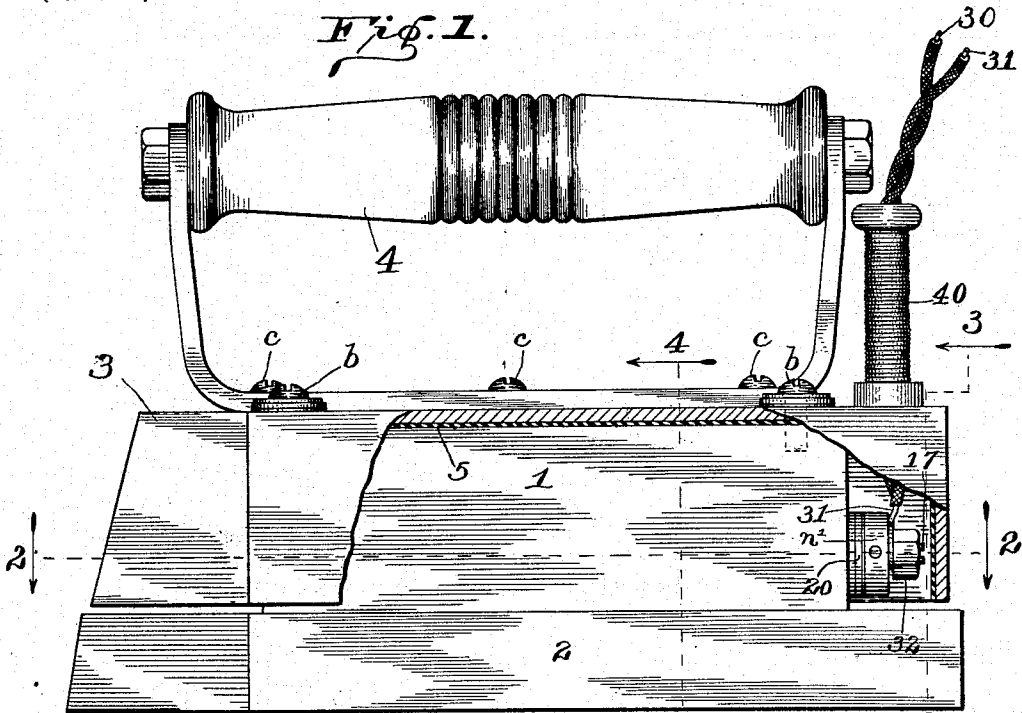


Fig. 2.

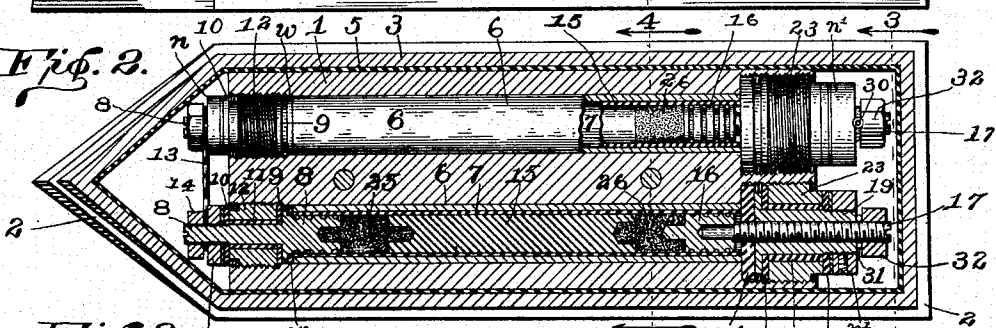


Fig. 3.

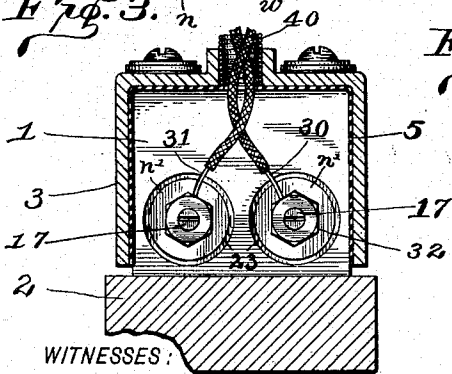
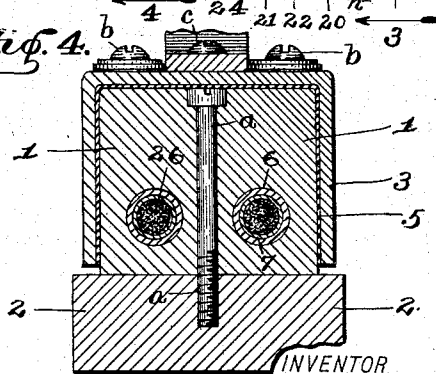


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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DEVICE EMPLOYING ELECTRIC RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 673,476, dated May 7, 1901.

Application filed March 15, 1900. Serial No. 8,830. (No model.)

To all whom it may concern:

Be it known that I, CONWAY ROBINSON, a citizen of the United States, residing at Elwood, in the county of Madison and State of Indiana, have invented certain new and useful improvements in Devices Employing Electric Resistance, of which the following is a specification.

The object of my present invention is to provide a superior electric resistance of simple and inexpensive construction and high efficiency.

While suitable for any of the purposes for which such devices are commonly used, I have designed my improved resistance more especially for use in electrical heaters or electrically-heated tools and apparatus.

There are types of electrical resistance which are well known and in common use in electrical heaters, rheostats, &c. The older and best known consists of coiled wire of a material offering a resistance to the electric current properly supported in a frame and arranged to allow for thorough ventilation to conduct away the excess heat. Another consists of wire laid against an enameled surface and attached to it by means of enamel covering the wire, the body to which it is attached being usually cast-iron, and preferably corrugated, so as to dissipate the heat. My invention is an improvement upon both of these, its chief merit being its much greater capacity for transforming electrical energy into heat per relative unit of resisting substance and without endangering the durability of the device.

My invention may, as will be readily understood, be applied to numerous pieces of apparatus and by suitable mechanical changes be adapted to many uses. I have illustrated and will particularly describe it as applied to a tailor's "goose," (which, as is well known, is a very simple device;) but I desire to be understood as claiming the invention described in connection with all apparatus, tools, appliances or devices to which it may be applicable.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a side elevation of a tailor's goose to which my invention is applied, a

portion of the covering-shell being broken away to show the parts underneath; Fig. 2, a horizontal sectional view of the same as seen when looking downwardly from the dotted line 2 2 in Fig. 1; and Figs. 3 and 4, transverse sectional views as seen from the dotted lines 3 3 and 4 4, respectively, in Figs. 1 and 2.

This device as I prefer to construct it consist of a body 1, a separable base or operative face-piece 2, an inclosing shell 3, and a handle 4. I prefer to make the operative portion or face 2 separable, so that as the same becomes worn or rough it may be easily renewed, being held to the body 1 by ordinary machine-screws *a*. The covering-shell 3 is placed over the body 1 and should have a layer 5 of some heat-insulating substance interposed and is for the purpose of retaining and holding the heat, and thus economizing the same. It is held to the body 1 by machine-screws *b*. The handle is held in place by machine-screws *c*.

Within the heater-body or heat-diffusing body 1 I form one or more cavities. In the device shown there are two of these in the form of longitudinal perforations extending through said body from end to end, as best shown in Fig. 2. The cavity or cavities have insulating-covering on the walls, and such covering may be either applied to the wall directly in the form of an insulating-enamel (especially where the cavities are straight perforations, as shown in the drawings, and which is the preferable form) an insulating sleeve or tube can be slipped in, fitting and lining the hole. This tube is preferably constructed as a metal cylinder or bushing 6, having a lining 7 of insulating material, which lining may be either in the form of enamel applied to its inner surface or an insulating-tube formed separately and fitted inside of the bushing, where it may be secured by any desired means.

One end of the longitudinal perforation or cavity in the heater-body 1 is filled with an insulating-plug through which electrical connection can be made. The plug shown is constructed as follows: The central portion 8 is of metal, and its inner end is formed of sufficient size to fit within the insulating-sleeve 7 and should have a series of annular grooves, as shown in Fig. 2, for the purpose

of preventing leakage of the powdered or otherwise subdivided substance forming the packing, which will be presently described. This central portion 8 has an annular flange constituting a shoulder which bears against the end of the insulating-sleeve 7 or against a small washer *w* at the end of said sleeve, as shown. Insulating-washers 9 and 10 and an insulating-sleeve 11 complete the insulation of this portion 8. Surrounding the sleeve 11 and positioned between the washers 9 and 10 is a cylindrical nut 12, which screws into a thread tapped into the outer end of the perforation in the heater-body and by means of which the part 8 is driven into position and held firmly in place. A nut *n* screws onto the part 8 against the washer 10 and holds the several parts of the insulating-plug together, making it a complete structure. A wire, making suitable electrical connection, as the wire 13, is connected to the part 8 by a binding-nut 14.

Centrally arranged within the insulating sleeve or bushing 7 is the main resisting part or body 15, which, as will be seen in the drawings, is in my invention of comparatively small size. It may be in powdered, granulated, or solid form; but preferably it is in the form of a rod and so formed at the ends that it will "break joints" between the cushions and itself. This rod is preferably formed of graphite or carbon, which may be pure, but which preferably has a sufficient amount of a substance which is refractory and a poor conductor of electricity mixed therewith to obtain the resistance desired, and which substance will not combine with the carbon when subjected to the temperatures used in practice. The substance known in the trade as "carborundum" (SiC) is an example. Varying degrees of heat, and consequently varying degrees of resistance, are required in various kinds of apparatus, and I am enabled by varying the mixtures to secure these varying degrees of resistance within the same small compass, thus avoiding excessive size, and consequently increased expense, where the greater quantities of resistance or heat are desired. The resisting portion of the device may thus be of very small dimensions and be run at a very high temperature, thus making the expensive portion of the apparatus as small a factor as possible, while the body constituting the conducting or heat-radiating portion may be of common cast-iron, which is comparatively cheap. At the opposite end of the resisting portion 15 is a follower 16, which like the inner end of the portion 8 is placed within the insulating-tube 7 and has annular grooves to prevent the leakage of the powdered substance forming the packing. Working against this follower and supported by an insulated plug is a screw 17, which serves to make electrical contact with the resisting-body through the cushion and follower and to compress the cushions and resisting-body together in good electrical mechanical

contact. The insulating-plug is composed of a central portion 19, insulating-washers 20 and 21, an insulating-sleeve 22, a nut *n'*, and a cylindrical screw-plug 23, which drives the whole structure forward against an insulating-plate 24, the central part 19 having an annular flange similar to the annular flange on the part 8.

Interposed between the parts 8 and 15 and 16 and 15 are the cushions 25 and 26, which consist of some suitable substance in subdivided form, preferably powdered graphite or carbon, which is a conductor of electricity, but a poor conductor of heat. These cushions must be refractory. They serve the purpose of making connection between the resisting substance and the metallic connections better than would be the case if two solid substances were brought together in contact. They further serve the purpose of an elastic cushion, allowing for any difference in expansion between the different portions without injuring the quality of the contact. They further prevent the high temperature generated in the resisting-body from reaching the metallic connections in such a degree as to injure them. The construction shown also excludes the air from the resisting-body and cushions within the cavity, which is very important and essential to the practical success of the apparatus. To insure that the joints shall be perfectly air-tight, the screw-plugs are cemented into the iron heater-body, the washers are mica securely clamped and cemented together, and the threads are treated with glycerin and litharge to prevent any possible leak. Such construction I have found to be absolutely air-tight, and this or some other air-tight construction is a leading feature of the invention.

I have described a single resisting structure and its connections. I have, however, shown in the drawings a pair of such structures arranged side by side and connected together by the wire 13. The description, as will be readily understood, applies equally to both, the two being preferably similar in construction when two are used. Where but one is used, the connecting-wire would become one of the line-wires. In the construction shown the line-wires 30 and 31 lead to the screws 17, to which they are connected by binding-nuts 32. These line-wires are carried out through the flexible guard 40, which is formed of two suitable ends united by a coil or spring wire of a good degree of stiffness.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a device employing electric resistance, of a heat-conducting body having a cavity therein, a resisting-body within said cavity and insulated from the heat-conducting body, suitable electrical connections, and cushions composed of a refractory substance which is a conductor of electricity but a poor conductor of heat interposed be-

tween the electrical connections and the resisting-body, whereby injury from strains or expansion or contraction is prevented, good electrical contact maintained, and the metallic connections protected from excessive heat.

2. The combination, in a device employing electric resistance, of a heat-conducting body having a cavity therein provided with an insulating-lining, a resisting-body within said lining, electrical connections leading toward the ends of said resisting-body, and cushions composed of a subdivided substance interposed between said resisting-body and said electrical connections, substantially as shown and described.

3. The combination, in a device employing electric resistance, of the outside body or shell having a longitudinal perforation therein, an insulating-lining within said perforation, a resisting-body within said lining, cushions composed of a subdivided substance at the ends of said resisting-body, and screw-plug connections outside of said cushions, whereby the several parts are compressed and held together, and air excluded, and good electrical connections, protected from excessive heat, provided, substantially as set forth.

4. The combination, in a device employing electrical resistance, of a good heat-conducting body having a perforation therethrough, a resisting-body mounted in said perforation but insulated therefrom, a suitable electrical connection with the opposite ends of said resisting-body, air-tight seals around said connections, a shell covering all but the working surface or heat-transmitting surface of the heat-conducting body, and a heat-insulating medium interposed between said body and said shell, substantially as set forth.

5. The combination, in a device employing electrical resistance, of a heat-conducting body formed with a longitudinal perforation, a metallic bushing therein, a resisting-body within said bushing and insulated therefrom, an electrical connection with each end of said resisting-body, air-tight seals around said connections consisting of screw-plugs and interposed packing of suitable material in the ends of said longitudinal perforation, all arranged substantially as set forth.

6. The combination, in a device employing electric resistance, of a heat-conducting body having a longitudinal perforation therethrough, a resisting-body within said perforation and insulated from the heat-conducting body, cushions composed of a subdivided substance at the ends of said resisting-body, suitable electrical connections making connections between the resisting-body through the cushions, and plugs which close air-tight the openings of the perforations and support but are insulated from said cushions.

7. The combination, in a device employing electric resistance, of a heat-conducting body having a cavity, a resisting-body within said

cavity but insulated from the heat-conducting body, suitable electrical connections embodying cushions and making contact with the resisting-body, and means for closing the entrances to the cavity air-tight and at the same time insulating the electrical connections from the heat-conducting body.

8. In a device requiring an electrical connection, the combination of a conductor, a cushion composed of subdivided substance which is a conductor, and means for holding the same in their relative positions, whereby close contact may be made, mechanical strains and shocks lessened, and expansion and contraction allowed without injury to said connections, substantially as set forth.

9. The combination of the containing body or frame, a conductor therein, connections therewith embodying cushions interposed between said conductor and connections, a follower forming part of one of said connections, and a screw mounted to press said follower against said cushion and cushion against the conductor, substantially as set forth.

10. The combination, in a device employing electrical resistance, of a conductor, a cushion formed of a subdivided refractory and poor heat-conducting substance but which is a conductor of electricity interposed between said conductor and another conductor having electrical connections, whereby close contact may be made, mechanical strains and shocks lessened, and contraction and expansion allowed without injury to the connections, and the passage of excessive heat from one conductor to the other prevented, and means for making and securing said connections, substantially as set forth.

11. In a device embodying electrical connections, the combination, of the conductors and electrical connections and cushions of compressible material which is a conductor of electricity interposed between said conductors, the connections between said cushions and conductors consisting of interengaging notches and projections, whereby said parts will always be in contact regardless of the degree of force with which they are held together, substantially as set forth.

12. In a device embodying a frame and conductor mounted therein, the combination of plugs sealing absolutely air-tight the chamber containing said conductor, and electrical connections through said plugs with said conductor, embodying cushions interposed between said plugs and conductor, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 5th day of March, A. D. 1900.

CONWAY ROBINSON. [L. s.]

Witnesses:

CHESTER BRADFORD,
JAMES A. WALSH.