

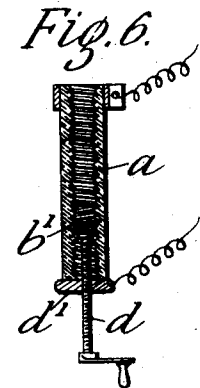
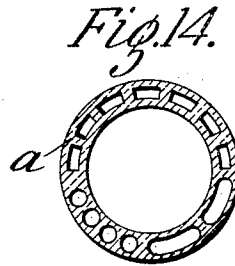
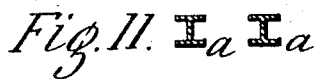
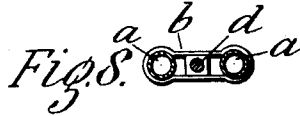
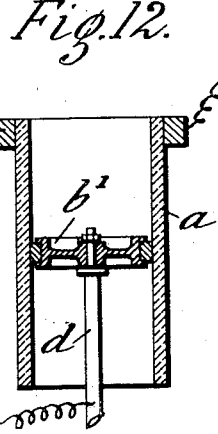
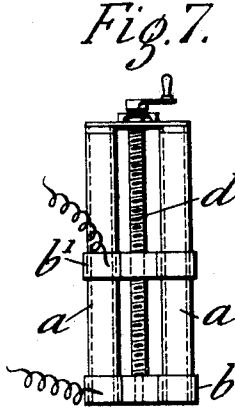
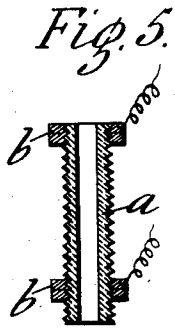
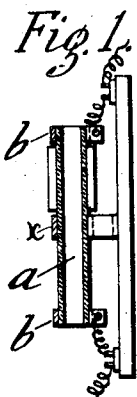
No. 686,245.

Patented Nov. 12, 1901.

J. F. BACHMANN & A. VOGT.
ELECTRICAL RESISTANCE.

(Application filed Nov. 22, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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ELECTRICAL RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 686,245, dated November 12, 1901.

Application filed November 22, 1898. Serial No. 697,192. (No model.)

To all whom it may concern:

Be it known that we, JOSEF FRANZ BACHMANN and ADOLF VOGT, subjects of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Electrical Resistances; and we 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to electrical resistances made of an artificial-stone compound, such as is described in our application of October 8, 1897, No. 654,560, which consists of a mixture of a conductor, such as carbon or metal, and a non-conductor, such as kaolin or oxids, such mixture being formed into a paste with water or other liquid, and after molding or running the mixture into molds and drying the same heating the body to a high temperature while it is either embedded in carbon powder or is surrounded by reducing-gases.

The present invention relates to the manufacture of resistances of tubular or cylindrical form of such artificial-stone compound, whereby the contact-surfaces between the said tubular resistances and the circuit-closing devices thereof, while being of a very compact form are rendered comparatively extensive, and thus any such inaccuracy of fit between parts of such surfaces that are liable to occur with resistance-bodies of this nature is compensated for. A still greater accuracy and compactness of contact is insured in some of the constructions of such tubular resistances by making the contact-surfaces both of the resistance-body and the circuit-closing device with screw-threads, so that the position of the contact-closing device relatively to the resistance-body is determined by screwing the one part upon the other part in one direction or the other, while such screwing action also insures a more ac-

curate fit and also affords a considerably-increased extent of the contact-surfaces.

On the accompanying drawings are shown, by way of example, various constructions of tubular resistance-bodies according to our invention.

Figure 1 shows a vertical section, and Fig. 2 a sectional plan, of a tubular resistance-body *a*, made of the before-mentioned artificial-stone compound, to the upper and lower ends of which are connected ring-shaped contact-clamps *b*, to which the wire-leads of an electric circuit are attached, so that the current has to pass from the one contact *b* through the resistance *a* to the other contact *b*. It will be seen that by means of its tubular form this resistance-body is made to afford a comparatively large amount of contact-surface for the contact-clamps *b* in a very compact form; also, that the degree of resistance offered to the current can be readily adjusted to any required amount by shifting the one or other contact-clamp nearer to or farther from the other one. The resistance-body may be held in any suitable insulated manner, such as by the insulated clamping-bracket *x* shown.

The tubular resistance-body *a* may either be smooth externally and internally, as shown at Figs. 1 and 2, or it may be provided either internally, as at the cross-section, Fig. 3, or externally, as at Fig. 4, with ribs or other projections for facilitating the cooling of the resistance by radiation. The external projections would of course only be made on the parts of the resistance-body between the points where the contact-clamps *b* are attached.

Fig. 5 shows a vertical section of a tubular resistance-body having a screw-thread formed on its outer surface, and the ring-shaped contact-clamps *b* are in like manner formed with an internal screw-thread, so that they can readily be screwed toward or away from each other for adjusting the resistance offered to the current. The screw-threads on the resistance-body and contacts might be made right and left handed, so that by turning the former instead of the contact-clamps

the latter would be screwed nearer together or farther apart.

Fig. 6 shows a vertical section of a tubular resistance a formed with an internal screw-thread, into which screws a threaded piston b' of conducting material, which constitutes the one contact of the circuit, the piston b' being fixed on a screw-spindle d , screwing through a conducting-disk d' , to which the lead of the circuit is attached. The thread of the spindle d being made of the same pitch as that of the piston b' it will be seen that by turning it in one direction or the other the action of the resistance-body can be regulated with great accuracy. Also it will be seen that should the internal screw-thread of the resistance wear in course of time a reliable contact will always be maintained with the piston, the latter being always kept pressed against the one or other surface of the resistance screw-thread by the action of the screw-spindle d . Instead of the spindle d being made to screw up and down through the contact-plate d' this may be loose from the resistance a and arranged to act as a screw-nut—that is to say, when it is desired to shift the piston b' the nut d' is first screwed downward on spindle d and after then turning this so as to shift the piston the nut d' is screwed up against a so as, by tending to draw d downward, to cause the thread of b' to be pressed tightly against the thread of a , and thus insure reliable contact.

Fig. 7 shows an elevation, and Fig. 8 a cross-section, of an arrangement in which there are two tubular resistances a connected together, having the one double contact-clamp b attached to the lower end, while the other contact b' is formed so as to be shifted up or down upon the resistance-body by means of the screw-spindle d , which screws through a threaded hole in the middle part of the contact b' .

Instead of making the resistance-bodies a as cylindrical tubes they may of course also be made of a square or polygonal cross-section, as at Fig. 9, or they may be of a trough or H shaped section, as at Figs. 10 and 11, the contacts being of course made of a corresponding shape to fit the resistance-body. The two resistances may be connected together either in parallel or in series in the circuit.

For resistances of large dimensions, such as those required for theaters and the like, the resistance-body may be formed as a cylinder of comparatively large diameter relatively to its length, as shown in the vertical section at Fig. 12, where the cylindrical resistance a has a fixed contact b at its upper end, while the second contact is in the form of a piston b' , fitting the interior of a accurately and adjusted in position by means of the rod d , to which the second lead of the circuit is attached. For facilitating the cooling of the resistance a this may either be

formed with external ribs or projections, as shown at the cross-section, Fig. 13, or it may have passages formed longitudinally through it, as shown in the cross-section at Fig. 14. In this case air or suitable cooling liquid under more or less pressure can be made to flow through the said passages for effectually cooling the resistance, such liquid being conveyed to the said passages by conduits connected to the ends of the resistance in any suitable known manner. For the same purpose the cylindrical resistance at Fig. 12 may be provided with an external jacket through which cooling air or liquid is made to flow. The piston-contact b' may also be made with holes through it for the passage of cooling-air. Such cooling devices are of considerable importance for large resistances, such as are requisite in theaters and the like, in which a considerable amount of heat is developed, as by the above cooling means the danger of fire is effectually avoided.

In all the above constructions those parts of the resistance-bodies that do not serve as contacts or the channels formed therein can be coated with a suitable glaze.

Having thus described the nature of this invention and the best means we know of carrying the same into practical effect, we claim—

1. An electrical resistance, comprising a hollow, open-ended resistance-body, a circuit terminal contact at one end of the body and an annular or piston-like terminal contact shiftable within said body, for the purpose set forth.

2. An electrical resistance, comprising a hollow open-ended resistance-body, means for cooling said body, a circuit terminal contact at one end of the body and an annular or piston-like terminal contact shiftable within the body, for the purpose set forth.

3. An electrical resistance, comprising a hollow resistance-body provided with a screw-thread extending lengthwise thereof, a circuit terminal contact at one end of said body and a second circuit terminal contact fitting said screw-thread, for the purpose set forth.

4. An electrical resistance, comprising a hollow open-ended resistance-body provided with a screw-thread extending lengthwise thereof, a circuit terminal contact at one end of said body and a second circuit terminal contact fitting said screw-thread, for the purpose set forth.

5. An electrical resistance comprising a tubular internally-screw-threaded resistance-body, a circuit terminal contact at one end of said body and a second circuit terminal contact fitting the internal screw-thread of said body, for the purpose set forth.

6. An electrical resistance, comprising a hollow open-ended resistance-body of an artificial-stone compound, composed of a mixture of conductive and non-conductive substances, and provided with a screw-thread extending

lengthwise thereof, a circuit terminal contact at one end of said body and a second circuit terminal contact fitting said thread, for the purpose set forth.

5 7. An electrical resistance, comprising a tubular resistance-body of an artificial-stone compound, composed of conductive and non-conductive substances and having a screw-thread extending lengthwise thereof, and
10 heat-radiating ribs, a circuit terminal contact at one end of said body and a second circuit

terminal contact fitting said screw-thread, for the purpose set forth.

In testimony that we claim the foregoing as our invention we have signed our names in 15 presence of two subscribing witnesses.

JOSEF FRANZ BACHMANN.
ADOLF VOGT.

Witnesses:

ALVESTO S. HOGUE,
AUGUST FUGGER.