P. J. RAY.

ELECTRICAL COMPRESSION RESISTANCE UNIT.

APPLICATION FILED DEC. 2, 1915.

1,199,039. Patented Sept. 19, 1916.

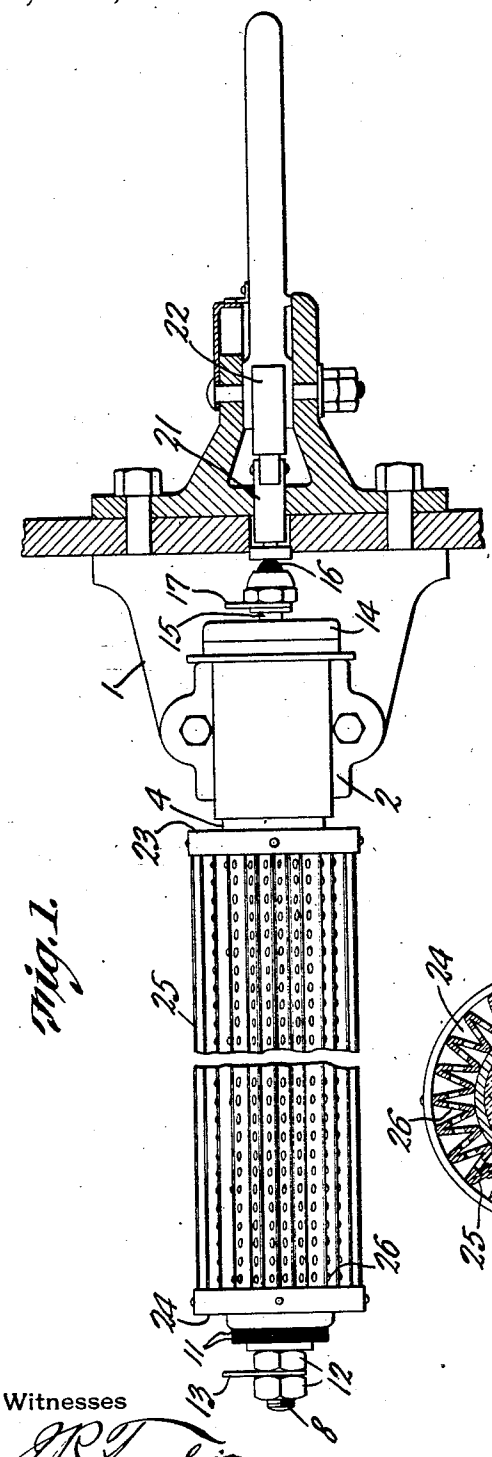


Fig. 1.

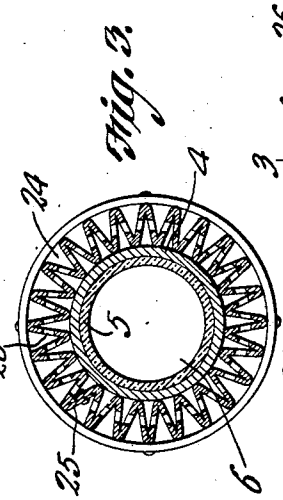


Fig. 3.

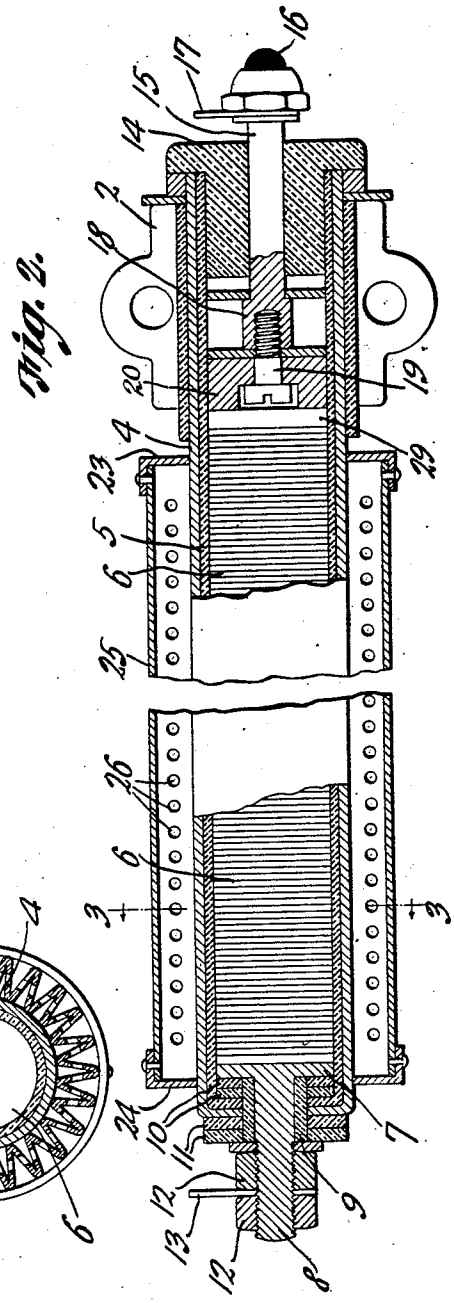


Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

PAUL J. RAY, OF LAKEWOOD, OHIO.

ELECTRICAL COMPRESSION RESISTANCE UNIT.

1,199,039. Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed December 2, 1915. Serial No. 64,752. 201-51

To all whom it may concern:

Be it known that I, PAUL J. RAY, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a new and useful Electrical Compression Resistance Unit, of which the following is a specification.

The present invention appertains to electrical compression resistance units, and this application is a continuation in part of the application filed January 27, 1914, Serial No. 811,433 and includes additional matter.

The object of the invention is the provision of an electrical compression resistance unit, the conducting disks or members of which have their surfaces coated in such a manner, as to enhance the utility of the unit, thereby attaining a greater permanence of resistance, a better operating performance considering the various temperatures to which the resistance is subjected, a more desirable exactitude of the conditions desired when subjected to frequent operation, and a more perfect restoration of the unit when released, to restore the initial resistance value without shaking or jarring the unit.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the complete device constructed as a compression rheostat, the unit being broken away to foreshorten the same. Fig. 2 is an enlarged longitudinal sectional view through the resistance unit and radiator. Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Referring to the drawing, the numeral 1 designates a support which constitutes with the clamp 2, composed of two members, a proper bearing means for the resistance unit, which, as will presently appear is mounted in the sleeve 3 of insulation disposed within the clamp 2.

A metal tube 4 is lined with a tube 5 of insulating material and mounted within said insulating tube is a series or plurality of resistance disks or members 6, the same being so constructed as to have their resistance increased as the compression thereupon is released, and to have their resistance reduced as the same are compressed more closely together.

In one end of the insulating tube 5 is a metal disk 7 carrying the concentric stem 8 which projects through an insulating sleeve 9, several washers 10 of insulating material being disposed within the tube 4 about the sleeve 9 while several washers 11 of insulating material are disposed about the stem exteriorly of the metal tube 4, as clearly illustrated in Fig. 2. The outer end of the stem 8 is threaded to receive the terminal carrying nuts 12 to which is connected the terminal wire or conductor 13. Mounted in the other end of the sleeve 5 is an insulating bushing 14 in which is mounted for sliding movement, the stem 15 carrying the terminal conductor 17 and the button 16 of insulation. Upon the inner end of the stem 15 within the tube 5, as at 18, is attached a screw 19 which is connected to and carries the terminal disk 20 which acts as a means for compressing the compression disks 6 between it and the disk 7. A resilient compression transmitting member 21 abuts against the button 16 and is operated by the lever cam 22, the member 21 being so constructed as to normally hold the disks 6 in proper contact to prevent air gaps therebetween.

Each conductor disk 6 is preferably made of graphite or hard carbon, or any other equivalent material that will be of less resistance to an electrical current when compressed, and is subjected to a process which impregnates, coats or fills the surface with a mixture of a conductive crystalline abrasive material, such as crystalline carborundum, carborundum, amorphous carborundum, suitable grade of corundum, or any similar material, separately or combined, in granular or powdered form or both combined, or of any other by-products of the process of manufacturing crystalline carborundum, carborundum, suitable grade or corundum, or any other conductive crystalline abrasive material, combined with an adhesive compound, such as silicate of soda which may afterward be hardened by applying pressure and heat to the said surface. The individual use of either crystalline carborundum or amorphous carborundum is of ad-

CROSS REFERENCE EXAMINER

vantage to enhance the effectiveness of the unit, but when both forms of carborundum or equivalent material are combined, the advantages of each are derived, and furthermore the joint use of the two forms of carborundum lends additional effectiveness to the unit, due to the joint action of the constituent elements of the coating. It might be stated that the improved coated conducting members will withstand a higher temperature and retain their high resistance contact surface better than conductor members heretofore produced. As the resistance is obtained by the imperfect contact between the surfaces of the disks, and as the disks are formed by sawing sectional-wise plates or disks from a cylindrical piece of material, the saw marks in the surface of the disks are quite uniform and in instances where it is necessary to parallel the surfaces of the disks by grinding them, the conditions of the ground surface are more uniform than the sawed surfaces. Thus after the disks have been subjected to the process stated herein, the contact resistance is practically uniform throughout the length of the resistance unit. When corundum is used, it is preferably admixed with some suitable conducting material, and is generally used when a high maximum resistance is required.

The amorphous carborundum herein referred to is commercially known as carborundum fire sand and is a by-product of the process of manufacturing carborundum which is made by heating in an electrical furnace, coke, sand, salt and sawdust. In the process of manufacturing carborundum the mixture of materials is heated in a high resistance furnace for about thirty-six hours, after which the reaction is completed, and there is left a core of graphite and surrounding the core is a layer of crystallized carborundum, about approximately sixteen inches thick and outside of this is a shell of amorphous carborundum which contains a percentage of crystallized carborundum, the remaining materials being unchanged and being used for a new charge. The materials other than graphite, carborundum and the unchanged mechanical mixture in the foregoing process is known as carborundum fire sand or amorphous carborundum, and either the carborundum fire sand or the crystalline carborundum are used separately or mixed together in preparing the present disk. In nature, carborundum fire sand differs from carborundum in the respect that it is not as hard or as good an abrasive as carborundum, which is probably due to the lower temperature obtained in the part of the charge in which the fire sand is formed as compared to the temperature obtained in the part where carborundum is formed during the process. However, in the formation, carborundum fire sand is clearly allied to carborundum, as carborundum crystals appear throughout the shell of carborundum fire sand.

The use of the mixture of carborundum, as above set forth, with silicate of soda in the process results in a high resistance medium which is not affected by a high temperature, as has been found the case in other present types of compression resistance units. The disks as hereinafter set forth retain their high contact resistance.

In preparing the resistance disks 6, the process is carried out by hand or by machine, the pieces being sawed preferably from a cylindrical piece of graphite or hard carbon, thereby forming the disks, and the disks for certain conditions are subjected to the process without being surfaced off, while disks for other conditions are surfaced off smooth by grinding. To produce the best surface upon the disks they are rubbed with a mixture of carborundum, either crystalline or amorphous or both, although corundum or equivalent materials can be used, combined with an adhesive compound preferably silicate of soda. This is done in one way by first coating the disks with silicate of soda or water glass, and then placing the grains or powders of carborundum or other material upon the film and mixing and rubbing the same in contact with the surfaces of the disks until a desired smooth surface is effected. The excessive mixture is then removed and the disks are permitted to thoroughly dry before being placed in the tube 5. It is evident, therefore, that the contact surfaces of the various disks may be varied according to the amount of the mixture retained by the surface, the number of times the disks are subjected to the process, and the condition of the surfaces of the disks before being subjected to the process.

In order to provide a cooling or radiating means for the resistance unit, two disks 23 and 24 which are flanged are placed upon and about the tube 4 and have connected therebetween the corrugated cylinder 25 which is perforated, as at 26, to permit the proper circulation of air therethrough.

It will thus be seen that by positioning the corrugated member 25 about the unit, a proper circulation of air is afforded to properly maintain the unit against overheating, the heat being radiated therefrom through the apertures 26 so that the draft is created to assist in producing the desired cooling action.

Having thus described the invention, what is claimed as new is:

1. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of a conductive crystalline abrasive material and an adhesive compound.

2. An electrical compression resistance

unit having a plurality of conductor members whose surfaces are coated with a mixture of carborundum having crystalline properties, and an adhesive compound.

3. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of crystalline and amorphous carborundum combined with an adhesive compound.

4. An electrical compression resistance unit having a plurality of conductor disks whose surfaces are coated with a mixture of crystalline and amorphous carborundum, combined with silicate of soda.

5. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of crystalline carborundum, and an adhesive compound.

6. An electrical compression resistance unit having a plurality of conductor disks whose surfaces are coated with a mixture of crystalline carborundum and silicate of soda.

7. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of crystalline carborundum and another form of carborundum, combined with an adhesive compound.

8. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of amorphous carborundum and another form of carborundum combined with an adhesive compound.

9. An electrical compression resistance unit having a plurality of conductor members whose surfaces are coated with a mixture of different forms of carborundum combined with an adhesive compound.

10. An electrical compression resistance unit having a plurality of conductor disks whose surfaces are coated with a mixture of crystalline carborundum and another form of carborundum combined with silicate of soda.

11. An electrical compression resistance unit having a plurality of conductor disks whose surfaces are coated with a mixture of amorphous carborundum and another form of carborundum combined with silicate of soda.

12. An electrical compression resistance unit having a plurality of conductor disks whose surfaces are coated with a mixture of different forms of carborundum combined with silicate of soda.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

PAUL J. RAY.

Witnesses:
LILLIAN RYAN,
KATHRYN RAY.