

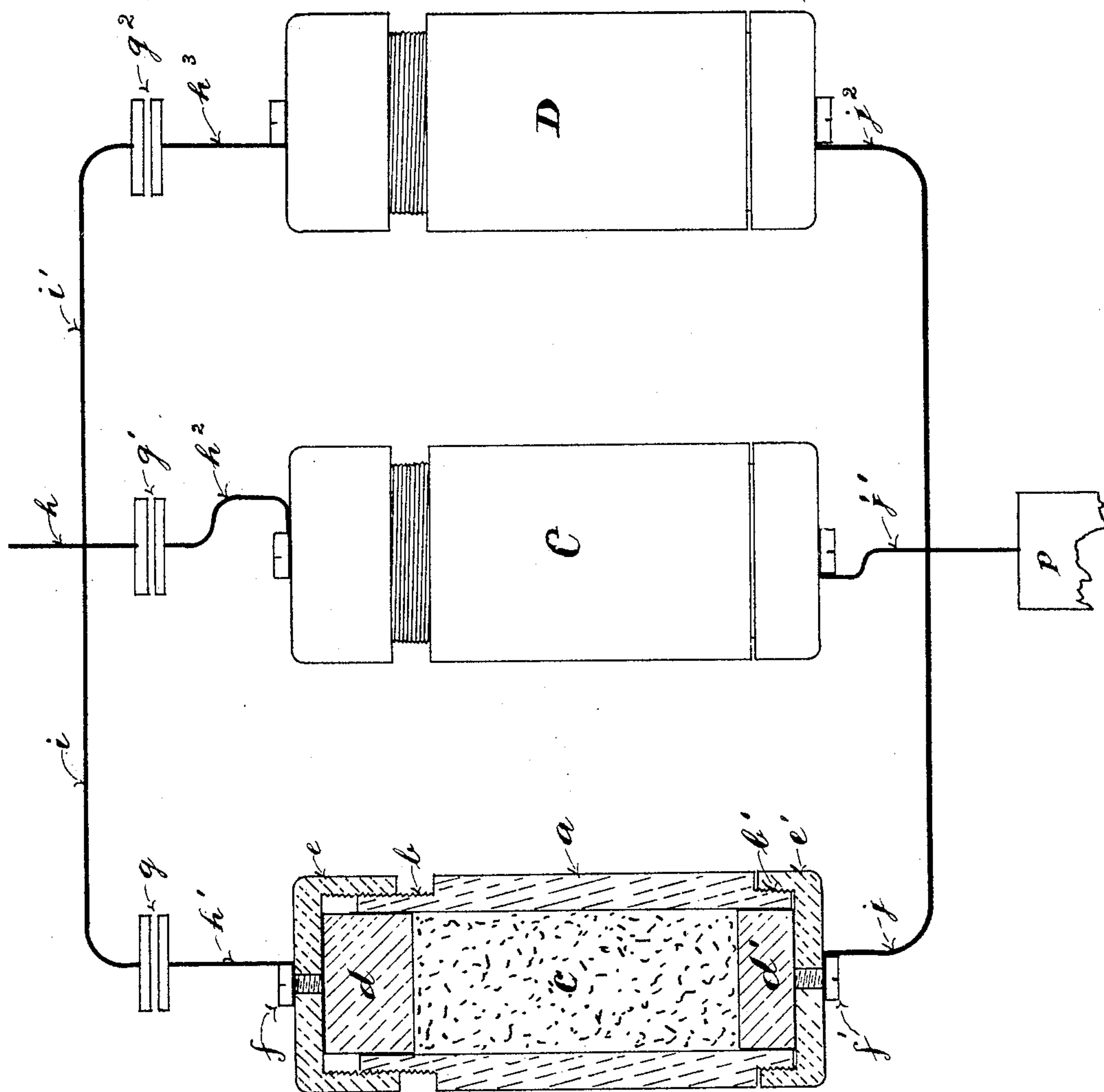
(No Model.)

S. P. BLACKMORE.

NON-INDUCTIVE ADJUSTABLE CARBON RESISTANCE.

No. 580,657.

Patented Apr. 13, 1897.



B

Witnesses

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# UNITED STATES PATENT OFFICE.

SIDNEY PRATT BLACKMORE, OF JOHANNESBURG, SOUTH AFRICAN  
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## NON-INDUCTIVE ADJUSTABLE CARBON RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 580,657, dated April 13, 1897.

Application filed September 23, 1896. Serial No. 606,895. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY PRATT BLACKMORE, a British subject, residing at Johannesburg, South African Republic, have invented  
5 a new Non-Inductive Adjustable Carbon Resistance, of which the following is a specification.

My invention relates to the class of devices and instruments employed to control the flow  
10 of electricity, and is especially applicable to lightning-arresters for use with electric-light and transmission - of - power conductors, in which it can be used with manifold advantages.

15 Hitherto it has been the object of electricians and others interested in electrical science to construct a device which will permit of the passage of any undue static or high-potential induced atmospheric charge to earth without  
20 permitting the passage of any generated current from a dynamo or transformer through the passage traversed by such undue static or high-potential induced atmospheric charge. Various methods have hitherto been proposed  
25 and employed for accomplishing this end, as, for example, the interposition in the earth of a water resistance. Such method has many disadvantages, the chief of which is loss of power by partial short circuit. It is not self-  
30 contained and requires a very considerable amount of personal attention, added to other troubles.

The object of my invention is to dispense with such troubles, which I have done by the  
35 construction of a device which is absolutely self-contained, is small and compact and of large conductive capacity, and is capable of being adjusted so as to offer the least resistance to the passage of undue static charges  
40 to earth without permitting of any passage whatsoever of the generated current through the passage traversed by such undue static charge, and after once being adjusted to suit the pressure of the circuit upon which it is  
45 used needs no further attention whatsoever. To accomplish this end, I use, preferably, a tube of insulating material which is partly filled with powdered wood carbon, (made, preferably, from ordinary pine wood,) the ends of  
50 such tube being closed with loose-fitting hard carbon or metal blocks, which are made to pro-

ject and also to serve as terminals forming electrical connection with the powdered wood carbon. If the wood carbon be compressed, as the result of external pressure upon the  
55 projecting ends of the hard carbon or metal blocks, the resistance of the wood carbon will vary with the pressure brought to bear upon it, the resistance becoming lower as the pressure increases. A tube of .5 inch internal  
60 diameter and three inches long, containing two linear inches of powdered wood carbon and subjected to a pressure of one pound, was found to have a resistance of two thousand  
65 ohms. At a pressure of twenty-five pounds the resistance was found to be one hundred ohms and was found to become lower with greater pressures and to increase and decrease in a corresponding ratio with the amount of pressure employed.

70 The application of my invention is shown on the accompanying drawing. The figure generally shows the arrangement of apparatus in multiple for the purpose of presenting a low-resistance path to earth for any undue  
75 static charge, which at the same time will present an infinitesimal resistance to the passage of the generated current from a dynamo or transformer.

Referring to the drawing, apparatus B is  
80 drawn in section for the purpose of showing its general construction, being precisely similar to the apparatus C D, which are shown in plan for the purpose of facilitating description.

85 *a* is a tube or cylinder of insulating material, the outer ends of which are screwed externally at *b b'*.

*c* indicates the powdered wood carbon contained within the tube or cylinder *a*.

90 *d d'* are blocks of hard carbon which are made to fit easily within the cylinder *a*, which not only serve as buffers for compressing the wood carbon *c*, but serve also as electrodes for electrically connecting with the powdered  
95 wood carbon *c*.

*e e'* are brass caps which are made to screw onto the outer screwed ends *b b'* of the tube or cylinder *a*. It will be observed that the cap *e* is deeper than the cap *e'*, which is shallower and is screwed on and fixed so as not  
100 to be removable. The cap *e*, being made ad-



justable, is made deeper than the cap  $e'$  for the purpose of affording a greater range of adjustment for regulating the pressure upon the hard-carbon block  $d$  and thereby varying  
 5 the resistance of the powdered wood carbon  $c$ . The metal caps  $e e'$ , being in electrical contact with the hard-carbon blocks  $d d'$ , also serve as terminals for connecting therewith.  
 $f f'$  are screws for securing electrical con-  
 10 nection with the device.

$h$  is a "tap-wire," (from any ordinary lightning-arrester,) with branches  $i i'$ , which are connected with the "air-gaps"  $g g' g^2$ , which are of any ordinary construction and which  
 15 are connected to the apparatus B C D by means of wires  $h h' h^2$ , the apparatus B C D being connected to earth by means of the common earth-wires J J' J<sup>2</sup> and earth-plate P.

It will be observed that the drawing shows  
 20 the apparatus B C D connected, respectively, in series with air-gaps  $g g' g^2$ , which are of ordinary construction and may be considered as a portion of any known lightning-arrester, with the exception that I use three air-gaps  
 25 in the place of one, so that any static charge that may be thrust from the lightning-arrester will pass through wire  $h$ , distributing itself through branch wires  $i i'$ , through air-gaps  $g g' g^2$ , and thence through apparatus B C D  
 30 to earth by means of wires J J' J<sup>2</sup> and earth-plate P, so that by distributing static discharges through a multiple path in the manner described it will be readily understood that each of the apparatus B C D may be of  
 35 such high resistance as to render it impossible for a sufficient quantity of the comparatively low-potential generated current to pass as would maintain an arc across the air-gaps, while the combined arrangement of apparatus  
 40 in multiple will present a sufficiently low resistance to admit of an uninterrupted passage of static discharges to earth.

It will of course be understood that the arrangement shown in the figure is especially designed for use with lightning-arresters, but 45 other applications of my invention will readily occur to electricians wherein it can be used with advantage.

I wish it to be understood that my invention is not limited to use with lightning-arresters 50 only, but has manifold uses in the electrical industry.

I am quite aware of the fact, that is common knowledge, that the resistance of a great majority of substances may be varied with 55 the application of pressure. I do not claim to have discovered any new property pertaining to carbon in general or to wood carbon; but I claim to have invented a novel application and construction of adjustable carbon 60 resistance.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that what I claim is— 65

In combination, the casing  $a$  having screw-threads externally of the ends, the caps  $e e'$  fitting over the ends, one of said caps with its screw-threaded connection being deeper than the other, the loose carbon  $c$  in the cas- 70 ing, the hard-carbon blocks  $d$  contacting directly therewith and with the inner sides of the covers and the contact-screws passing through the caps, the deep cap with its screw-thread serving both as an adjustable com- 75 pressor and a cover, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

SIDNEY PRATT BLACKMORE.

Witnesses:

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 GEO. PEEL.