

# UNITED STATES PATENT OFFICE.

KILLINGWORTH WILLIAM HEDGES, OF WESTMINSTER, ENGLAND.

## COMPOSITION FOR BEARING-SURFACES.

SPECIFICATION forming part of Letters Patent No. 441,556, dated November 25, 1890.

Application filed July 17, 1890. Serial No. 359,083. (No specimens.) Patented in England July 15, 1889, No. 11,332.

*To all whom it may concern:*

Be it known that I, KILLINGWORTH WILLIAM HEDGES, electrical engineer, a subject of the Queen of Great Britain, residing at 5 25 Queen Anne's Gate, Westminster, in the county of Middlesex, England, have invented an improved material for the construction of bearing-surfaces, applicable also to the brushes and commutators of dynamo-electro 10 machines, (for which I have obtained a patent in Great Britain, No. 11,332, bearing date July 15, 1889,) of which the following is a specification.

My invention relates to the manufacture of 15 a new anti-friction material, consisting of a mixture of carbon and mica, or carbon and steatite, or carbon and soapstone, which material is applicable to the bearings and other rubbing-surfaces of all kinds of machinery, 20 or it may be employed for the purpose of collecting the electric currents from the revolving commutator of a dynamo.

In the manufacture of my improved material, I take of finely-powdered carbon, plum- 25 bago, or graphite seventy-five per cent., and add thereto twenty-five per cent. of powdered mica, steatite, or soapstone. The mass is then incorporated with tar or sugar that will carbonize with heat. The quantity of tar or sugar 30 depends upon the weather and other circumstances and cannot be definitely stated. I press the mixture into molds of the required form and bake the molded material in a manner similar to the manufacture of 35 carbon rods. The proportion of mica may be varied according to the density which it is desirable to make the block and according to the use to which the material is to be applied, whether as a conductor of electricity or other- 40 wise. When used as a step or bearing, a much larger proportion of mica is used than when the substance is to be used as a conductor of electricity, on account of the high insulating property of the mica.

45 When using the material for the brushes of dynamos, I prefer forming it into plates or rods, and in order to reduce the electrical resistance I insert metallic wires or strips in the material, or I electroplate the same. The 50 method which I employ to hold the rods or

plates is to pass each one through a tube or other suitable holder, the tubes or holders lying parallel to each other and being held in some frame of suitable shape which will allow each tube or holder a certain amount 55 of play, the object being to allow each rod or plate to be adjusted lengthwise independently of the others, and also at right angles to its length, so as to bear uniformly on the commutator. It is not necessary for the metal 60 to touch the commutator, but if it does so it will wear down with the carbon. A brush so formed may be employed in the same way as the ordinary copper brushes.

My invention also relates to the following 65 system of constructing brushes.

When several plates, rods, or strips are mounted side by side in the same frame or holder, I sometimes connect them all together 70 by wire-gauze passing through the body of each plate, rod, or strip, which may be very conveniently effected by embedding the metallic gauze in the material and baking the whole. By this means the brush is made 75 lighter and more accommodating and the conductivity is improved.

The arrangements above described are also applicable to brushes composed of carbon alone.

Although I have described the application 80 of my improved material to the brushes of a dynamo, it can be also applied by the above-described means of employing its conductivity to the plates or segments of the commutator, and used with ordinary copper 85 brushes or with brushes formed with the improved material.

As oil, which is, practically speaking, an insulator, is not used with bearings of this description, the shaft of a dynamo and the 90 bearing are in good electrical connection, and consequently the current coming from one end of the wire in the commutator may pass through the bearing to a terminal on any part of the machine in electrical connection with 95 the bearing.

My invention is especially applicable to the bearings and rubbing-surfaces of light machines, such as sewing-machines, bicycles, &c. The metal part may be fitted with a 100

movable brush which can be easily replaced when worn, and the advantages of obviating the use of oil are apparent.

I claim—

- 5 A baked compound for bearing-surfaces, applicable also to the brushes of commutators of dynamo-electric machines, consisting of finely-powdered carbon, powdered mica, and

carbonized adhesive material of tar or sugar, substantially as described.

Dated this 3d day of July, 1890.

KILLINGWORTH WILLIAM HEDGES.

Witnesses:

WALTER J. SKERTEN,

GEO. J. N. FRANKLIN,

*Both of 17 Gracechurch Street, London, E. C.*



Correction in Letters Patent No. 441,556.

It is hereby certified that in Letters Patent No. 441,556, granted November 25, 1890, upon the application of Killingworth William Hedges, of Westminster, England, an improvement in "Compositions for Bearing-Surfaces," an error appears in printed specification requiring correction, as follows: In line 1, page 2, the word "brush" should read *bush*; and that the said Letters Patent should be read with correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 21st day of April, A. D. 1891.

[SEAL]

CYRUS BUSSEY,  
*Assistant Secretary of the Interior*

Countersigned:

NATHANIEL L. FROTHINGHAM,  
*Acting Commissioner of Patents.*