(No Model.)

L. GUTMANN.

CURRENT COLLECTING DEVICE.

No. 599,781. Patented Mar. 1, 1898.

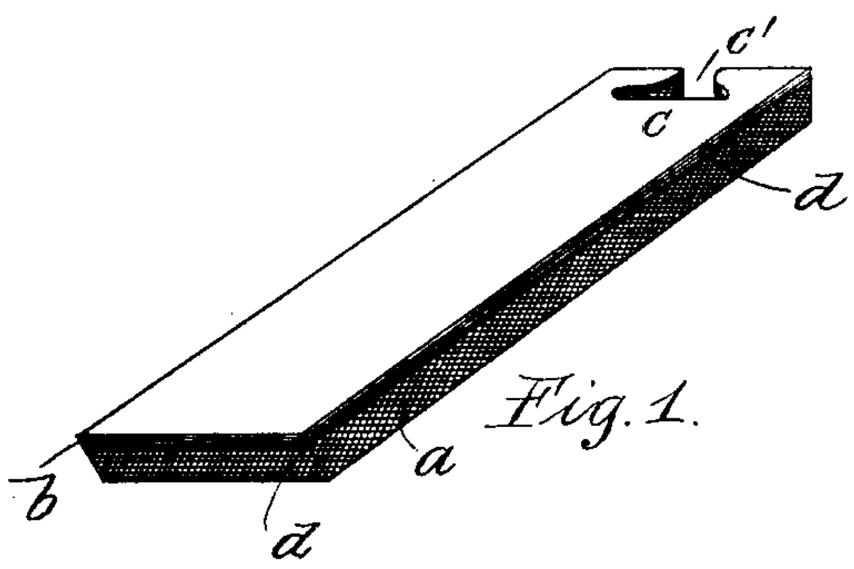

Fig. 1.

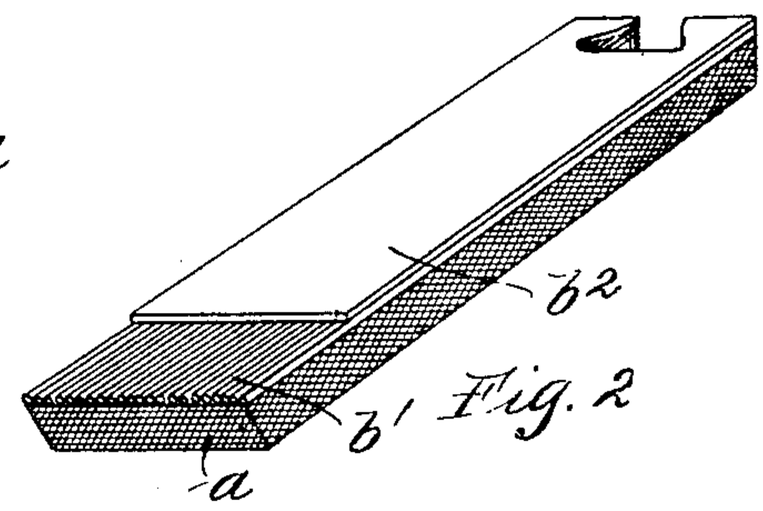

Fig. 2

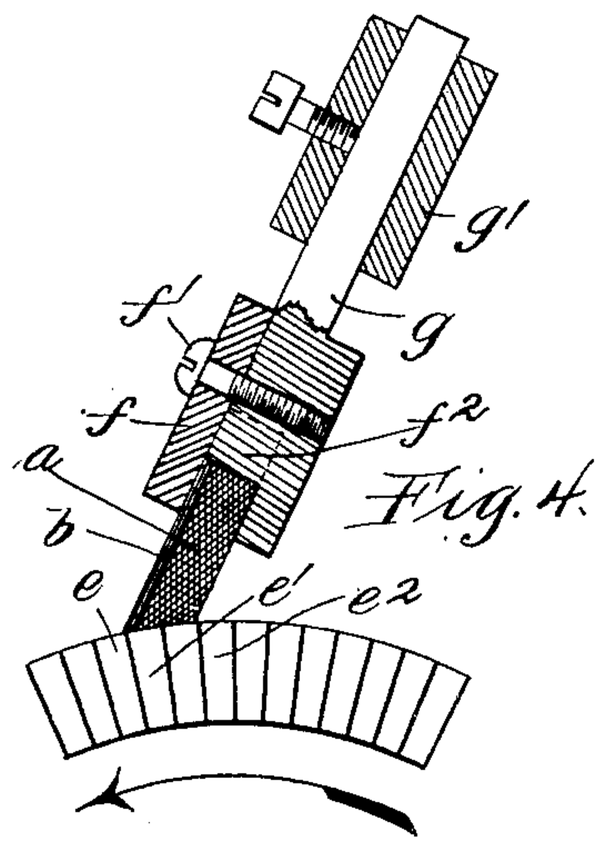

Fig. 4.

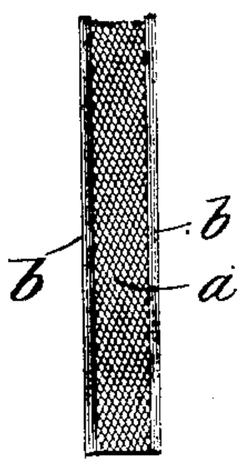

Fig. 3.

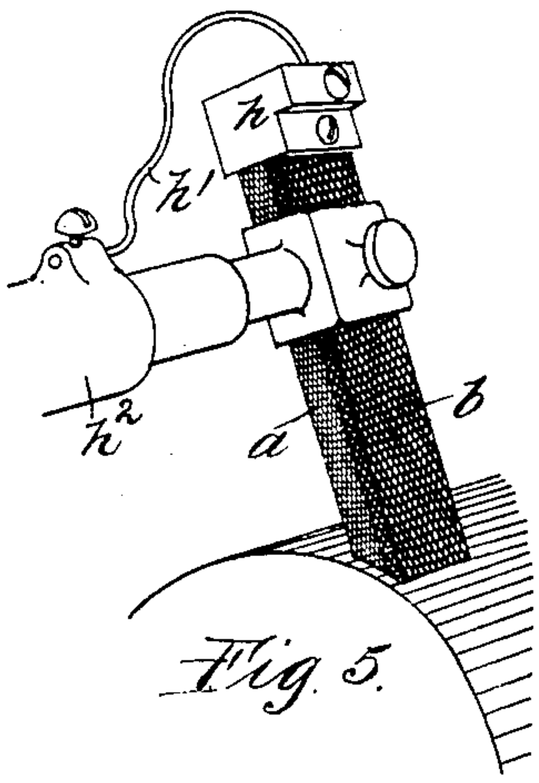

Fig. 5.

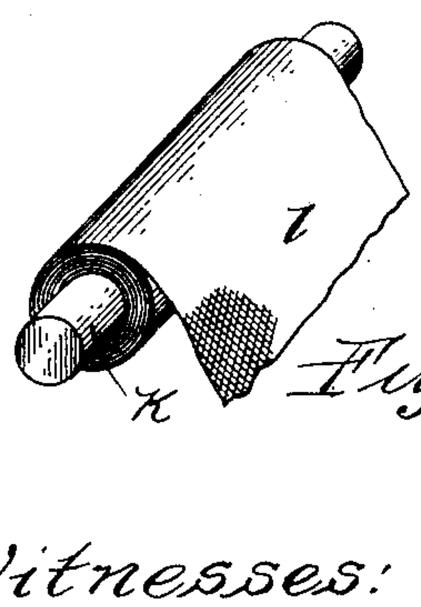

Fig. 6.

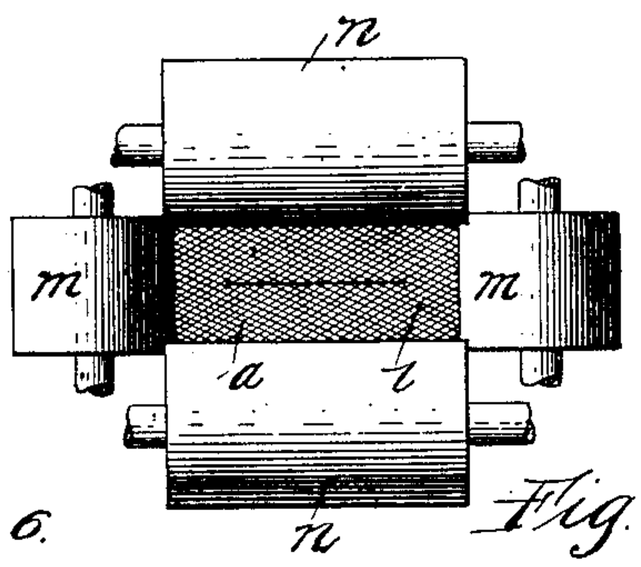

Fig. 8.

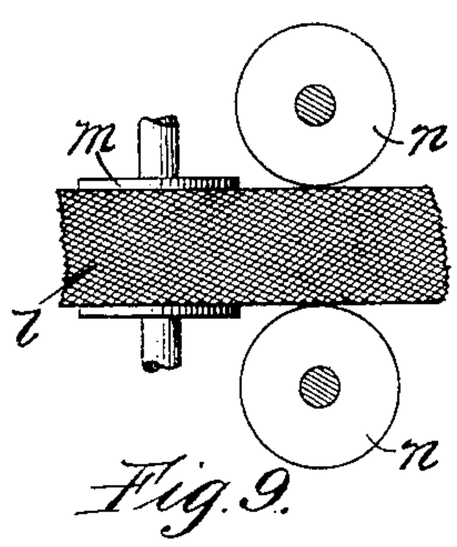

Fig. 9.

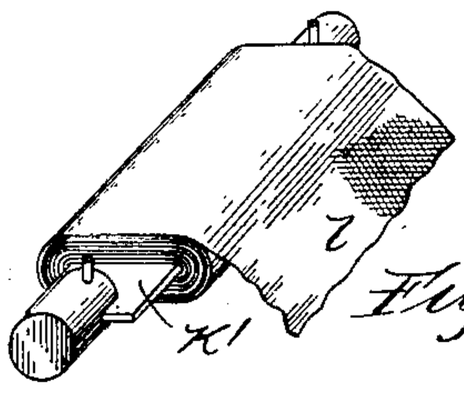

Fig. 7

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Attorneys.

UNITED STATES PATENT OFFICE.

LUDWIG GUTMANN, OF PEORIA, ILLINOIS.

CURRENT-COLLECTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 599,781, dated March 1, 1898.

Application filed April 26, 1897. Serial No. 633,870. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG GUTMANN, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented a certain new and useful Improvement in Current-Collecting Devices, (Case No. 94,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to current-collecting devices, and more particularly to improvements in gauze brushes for dynamo-electric machines, the object of my said invention being to increase the efficiency and durability of said brushes.

It is the common experience that gauze brushes admirably serve the purpose of collecting current when the machine operates in a faultless manner. If, however, an open circuit develops or the pole-pieces of the dynamo or motor are very close together, sparking is liable to occur at the least irregularity in the operation of the dynamo, which frequently destroys the commutator and rapidly consumes the brushes. Owing to the small sizes of wire employed in gauze it is evident that gauze brushes are quickly destroyed when used with a defective armature, since immediately upon the occurrence of an open circuit or defective commutation violent sparking at the segments takes place and the edges of the brushes are instantly fused. The fine wire of the gauze is thus changed at the contact-surface into hard globular masses of copper and the brush loses its flexibility. In consequence of this the life of the brush is considerably reduced, since the fused portions must necessarily be removed in order to secure the requisite pliability in the brush and provide good metallic contact. The improved brush of my invention, which avoids these difficulties, is provided with a gauze body having an external covering or coverings formed of laminæ or leaves, preferably of metal having a high melting-point and offering comparatively great resistance to the flow of current. In many forms of brushes it is found desirable to insulate the gauze from the external leaves, which also is contemplated by my said invention.

I likewise show an improved brush-holder extension adapted to be inserted in the brush-holder of the dynamo and receive short lengths of the brush, which consists in an extension adapted to be inserted within the dynamo brush-holder and a clamp attached thereto wherein the short lengths of brush are held for use.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figures 1, 2, and 3 illustrate different forms of my improved gauze brush. Fig. 4 is a view, partially in section, of the brush-holder extension. Fig. 5 illustrates means for securing direct connection between the brush and brush-holder arm. Figs. 6, 7, 8, and 9 indicate the preferred mode of forming the gauze body portions of the brushes.

Like lettters indicate like parts throughout the different views.

In Fig. 1 is shown one form of my improved brush, consisting of a body portion *a*, formed of wire-gauze, upon which are disposed a number of supplemental strips or leaves *b*, of conducting material, connected with the gauze at the upper end of the brush *c*. A strip of insulating material *d* may be placed between and electrically separate the said body portion and supplemental leaves for the greater portion of their length. I preferably employ a gauze formed of fine copper wire for the body of my brush and a resistance metal, such as German silver or phosphor-bronze, for the supplemental leaves, although other conducting material, such as iron or copper, may be found desirable. The body and supplemental portions of the brush are secured together by immersing the upper ends thereof in a bath of solder, which firmly unites the same, making the end of the brush solid and adapting it to be clamped in the brush-holder or extension.

A recess *c'* may be provided in the end of the brush, as shown in the drawings.

A modification of the brush described is illustrated in Fig. 2, wherein wires *b'* of comparatively large cross-section are substituted for the leaves or strips *b*, and a reinforcing-plate b^2, preferably of brass, is superposed upon the wires, which extends to within a

short distance of the lower end of the brush, the said wires answering the purpose of the leaves or strips of resistance metal.

A third form of modification of my improved brush or current-collector is shown in Fig. 3, differing from the one first described only in the provision of supplemental leaves of conducting material upon both the front and back of the brush, one or both of which may either be partly insulated or in contact with the gauze body portion.

By the use of the composite conductors above described a high degree of conductivity and great flexibility are secured in the brush, while sparking is materially reduced at the commutator, since the armature-coil connected with the brush at its leaving edge has the resistance of the superposed strips of resistance metal connected in circuit therewith, and, furthermore, the life of the brush is greatly lengthened by reason of the fact that all sparking is transferred from the gauze to the supplemental leaves of the brush, which are less likely to be fused. Thus, referring to Fig. 4, current from segment *e* of the commutator, which is represented as passing from beneath the brush, must flow through the leaves of resistance metal *b*, while the current from the segments *e'* and e^2 is conducted through the copper-gauze portion *a*, the gauze being protected by the resistance metal from the destructive effect of any sparking which may arise at the leaving edge of the brush. In the above figure the brush is shown clamped between the jaws *f* of a brush-holder extension by means of screw *f'*, a shank *g* of the extension being adapted to be inserted in the brush-holder *g'* of the dynamo-electric machine, wherein it is adjustable, and a knub f^2 may be provided upon one of the jaws, adapted to receive the recess *c'* in the end of the brush and hold said brush securely in position.

Fig. 5 illustrates a clamp *h* attached to the upper end of the brush, the said clamp having a flexible conductor *h'*, adapted to be connected directly with the brush-holder arm h^2. By employing this construction I am enabled to secure perfect connection between the brush and brush-holder arm, which frequently is found to be poor by reason of an intervening film of oil or loosely-fitting parts.

The remainder of the figures of the drawings indicate the preferred manner of manufacturing my improved gauze brush. This consists in winding upon a mandrel *k* or *k'*, of suitable size and shape, sufficient wire-gauze to form, when properly compressed, a brush of the desired size. The gauze thus employed may be of the necessary width to form one or a number of brushes, the width of the gauze representing the length of the brush or brushes manufactured therefrom. When the gauze is thus formed in coils or rolls of suitable size, it is passed between rollers which shape it to the required cross-section of the brush, the gauze thereafter being cut to the desired length. For example, the gauze *l* is wound upon a round mandrel *k* to the thickness of one-quarter of an inch if it be desired to manufacture a brush one inch in width by one-half inch in thickness, the width of the gauze in this instance representing the length of the completed brush. When thus wound, the roll of gauze is passed between horizontal and vertical rollers *m m* and *n n*, as shown in Figs. 8 and 9, which serve to compress the roll of gauze somewhat and give it the desired cross-section. The plate or mandrel shown in Fig. 7 with gauze wound thereon is adapted for the manufacture of a brush much wider and thinner than the one above considered, it being desirable to proportion the mandrel to the cross-section of the brush.

Gauze brushes manufactured in this manner are compact and admirably adapted to the uses for which they are intended. The gauze body portions are cut to the requisite length and, when desired, are provided with the supplemental leaves or strips of resistance metal and insulating material, and one end of the composite brush is dipped in molten solder, which secures the parts together, as previously described.

I do not desire to be understood as limiting myself to the precise constructions shown or to the materials specifically mentioned in the above specification; but,

Having now described means for practicing my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a brush for dynamo-electric machines, with a gauze body portion *a* formed of conducting material, of a superposed stratum of supplemental conducting leaves or laminæ *b*, and an electrical union *c* joining said conductors at one extremity of the brush, substantially as described.

2. In a brush for dynamo-electric machines, the combination with a body portion of gauze conductor, of a strip of insulating material, and a superposed stratum of conducting material electrically connected with the gauze at one extremity of the brush, substantially as described.

3. In a brush for dynamo-electric machines, the combination with a gauze body portion *a*, of a strip of insulating material *d*, and supplemental leaves or strips *b* formed of conducting material of comparatively high resistance superposed upon the gauze and an electrical union *c* joining the conductors at one extremity of the brush, substantially as described.

4. In a composite brush for dynamo-electric machines, the combination with a gauze body portion formed of low-resistance conducting material, of a strip of insulating material extending for a portion of the length thereof, and supplemental leaves or strips of conducting material of comparatively high resistance

superposed thereon and electrically united to the gauze at one extremity of the device, substantially as described.

5. In a brush for dynamo-electric machines, the combination with a body portion formed of copper gauze, of an insulating-strip covering said gauze for a portion of its length, a supplemental strip or strips formed of a metal of comparatively high resistance disposed thereon, and a metallic connection uniting the supplemental conductor or conductors and the gauze at one extremity of the brush, substantially as described.

6. In a brush-holder extension, the combination with a shank adapted to be inserted in the brush-holder of the dynamo and adjustably secured therein, of jaws or clamps adapted to receive the brush, a knub provided within said jaws fitting a recess or opening formed in the brush, and means for clamping the brush between the jaws, substantially as described.

7. In a brush-holder extension, the combination with a shank g adapted to be removably adjusted within the brush-holder of the dynamo, of jaws or clamps f adapted to receive the brush, and a knub f^2 or equivalent part provided upon said extension adapted to fit a recess or opening formed in the brush, and means for clamping the brush between the jaws, substantially as described.

In witness whereof I hereunto subscribe my name this 21st day of April, A. D. 1897.

LUDWIG GUTMANN.

Witnesses:
L. J. CARLOCK,
G. T. NICHOLS.