To all whom it may concern:

Be it known that I, Oliver E. Becker, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric-Current Brush Structures, 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 those electric current brush structures that include contact elements formed of comminuted material such as carbon or a combination of carbon and copper, etc. It is the main object of my invention to afford more intimate contact between the contact elements of comminuted material and the conductors that include them in circuit. By means of my invention the conducting wire and the means for effecting its electrical connection with the contact element, frequently the more cosily part of the brush structure, may be removed from the contact element when such contact element has been sufficiently consumed thereafter to be transferred into connection with an unused contact element.

The conducting wire which includes the contact element in circuit is formed of a multiplicity of strands to afford flexibility which is particularly desirable at that point where electrical connection is effected between the conducting wire and the contact element.

The end of the stranded wire which is to have connection with the contact element is provided with a terminal sleeve whose bore is preferably smooth freely to receive the wire and whose exterior is threaded to have engagement with the threads that are formed in a terminal receiving bore which is made in the contact element. Intimate electrical connection is afforded between the stranded wire and its threaded terminal by means of solder which is passed in liquid form into the bore of the terminal sleeve so as to effect extended connection between the wire and terminal sleeve longitudinally of such sleeve.

I will explain my invention more fully by reference to the accompanying drawing showing one embodiment thereof and in which Figure 1 is a side elevation, partially in section, of an electric current brush structure made in accordance with the invention, one form of conducting wire being shown in electrical connection with the contact element and being broken away owing to the lack of space for showing its complete length; Fig. 2 is a view of a part of the structure shown in Fig. 1, the conducting wire and its threaded terminal being absent; and Fig. 3 is a sectional view on line 3-3 of Fig. 1.

Like parts are indicated by similar characters of reference throughout the different figures.

The contact element a is shown as being rectangular in transverse section, though the invention is not to be limited to such a shape. A bore b is formed in that part of the contact element a where electrical connection with the conducting wire c is to be effected. Threads d are formed within the bore b, the extent to which these threads approach the bottom or inner end of the bore varying with the degree of hardness of the contact element, the threads closely approaching the bottom of the bore in the hardest contact elements and terminating near the outer end of the bore in the case of the softest contact elements and extending varying degrees within the bore according to the degrees of hardness or softness between the hardest and softest materials forming the contact element, such contact element being of comminuted material such as molded carbon, a molded mixture of carbon and copper, etc. The conducting wire c is desirably formed of a number of lighter strands of copper wire, that end of the conductor c which is to be received within the block a, being placed initially within the bore of a terminal sleeve e, thorough mechanical and electrical connection being afforded between the sleeve e and conductor c by means of solder (some of which is indicated at f) which is applied at the inner end of the sleeve and is caused to flow as far as possible through the bore of the sleeve without issuing from the sleeve at its opposite end. This union between conductor c and sleeve e is effected before the electrical juncture between the sleeve and contact element a. The exterior of the sleeve e is threaded as indicated in Fig. 1 with a thread which corresponds in pitch and size to the thread chased or tapped in the bore b of the contact element a, such threads having pitch, shape and diameter according to the size of the contact element a and conductor c. If the material of the contact element a is comparatively soft the
thread \( d \) is only started in the bore \( b \), the
threads upon the element \( a \) forming the re-
mainder of the threads in the bore \( b \) as the
element \( a \) is turned to be sufficiently re-
ceived in said bore. If the material of the
element \( a \) is very hard the threads \( d \) termi-
nate close to the bottom of the bore \( b \) but
preferably sufficiently short of the bottom
of the bore \( b \) to enable the threaded sleeve \( e 
\) in its turning movements to form a few
threads in the bottom of the bore thereby
further to assure electrical and mechanical
connection between the terminal and contact
element. The sleeve \( e \), when driven home, ex-
tends a sufficient distance out of the contact ele-
ment \( a \) to enable it to be grasped by a suitable
tool for the purpose of being unscrewed from
the element \( a \) when such element has been
sufficiently consumed, this feature of con-
struction enabling me to remove the conduc-
tor \( c \) and its terminal without applying tor-
sonal strain to the conductor so that when the
conductor is removed its electrical and mecha-
nical connection with its threaded
sleeve terminal is not impaired. I do not
limit myself, however, to the projection of
the sleeve \( e \) beyond the element \( a \) as other
means may be provided for rotating the
sleeve without the aid of the conductor \( c \) or
if no means are provided for turning the
sleeve \( e \) the remaining portion of the suf-
ciently consumed element \( a \) may be broken
away from the sleeve.
By means of the threaded engagement be-
tween the terminal \( e \) and the contact ele-
ment \( a \) the area of electrical contact between
such terminal and element is not only
greatly increased but relative motion be-
tween such terminal and element is posi-
tively prevented, particularly where the
threads of the sleeve form a part of the
threads \( d \), whereby there is no heating at the
place of engagement of the terminal and
contact element and no consequent softening
of the solder joining said terminal and the
conductor \( c \), these results not only being due
to the positive elimination of relative move-
ment between the terminal \( e \) and contact ele-
ment \( a \) but also to the greatly amplified area
of contact between the terminal \( e \) and con-
tact element \( a \) afforded by the threads. By
means of this construction the consumer
needs only to re-supply himself with the
contact elements \( a \) since the metallic por-
tions \( c \) and \( e \) may be transferred from con-
sumed contact elements \( a \) to new contact ele-
ments with which they may have firm elec-
trical connection as described.
While I have herein shown the threads \( d 
\) in the contact element \( a \) of uniform depth
and terminating sufficiently short of the
inner end of the bore \( b \) to enable the threads
in the sleeve \( e \) to form a termination of the
threads \( d \), I do not wish to be limited to this
formation of the threads \( d \) that permits the
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threads of the element \( a \) to take part in the
formation of the threads \( d \).
Having thus described my invention I
claim as new and desire to secure by Letters
Patent the following:—
An electric current brush structure includ-
ing a contact element having a threaded
bore; a conducting wire formed of strands
for including said contact element in cir-
cuit; and a threaded sleeve whose bore re-
serves one end of the conducting wire and
whose threads are greater in extent than the
threads in the bore of the contact element
whereby the threads of the sleeve complete
the formation of the threads in the threaded
bore of the contact element as the threaded
sleeve is turned home in the contact ele-
ment.
In witness whereof, I hereunto subscribe
my name this twenty-fourth day of October 85
A. D., 1918.

OLIVER E. BECKER.

Witnesses:

ETTA L. WHITE,

G. L. CARR.