

Dec. 15, 1931.

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1,836,385

METHOD AND APPARATUS FOR MAKING COLLECTOR BRUSHES

Filed May 18, 1928

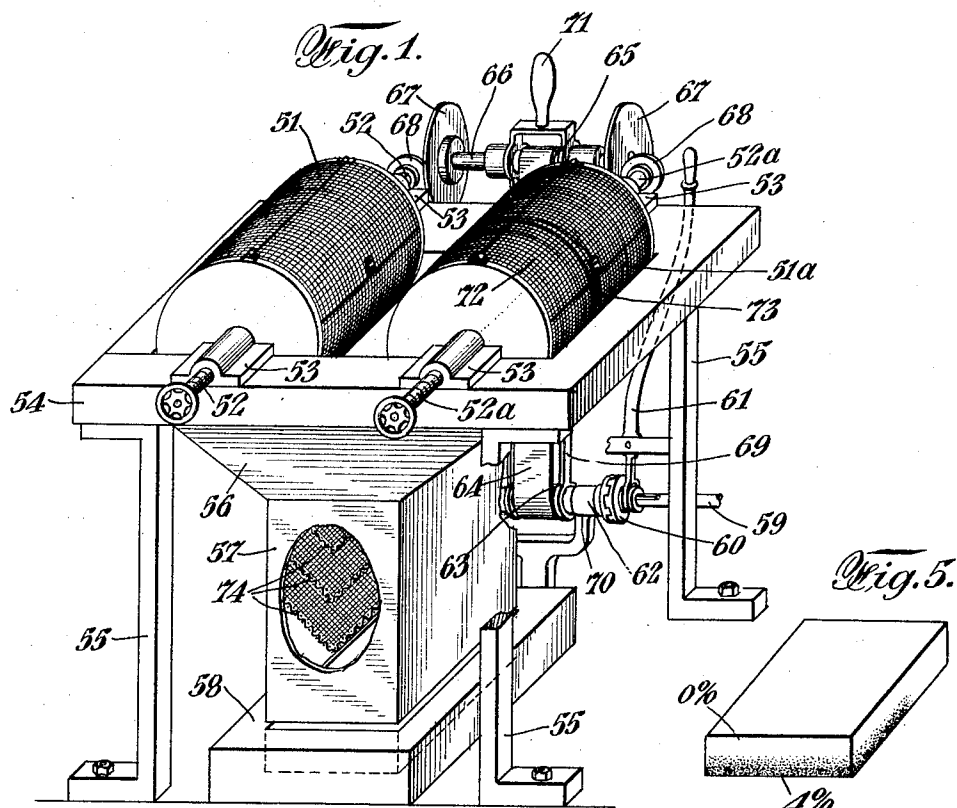
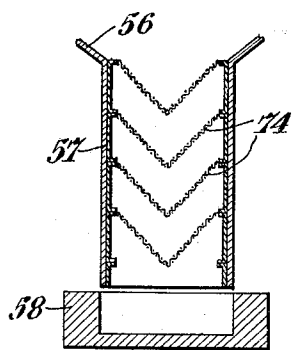


Fig. 2.

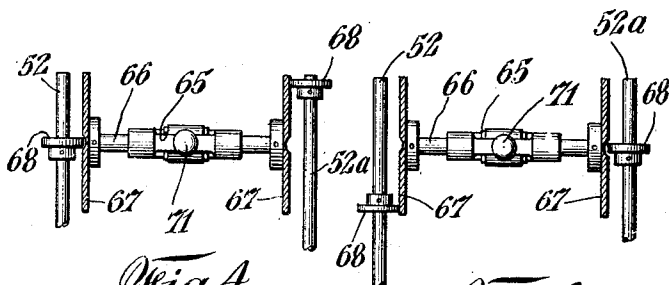


Fig. 4.

Fig. 3.

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METHOD AND APPARATUS FOR MAKING COLLECTOR BRUSHES

Application filed May 18, 1928. Serial No. 278,755.

This invention relates to the preparation of articles or bodies formed of consolidated granular or powdered material and particularly it relates to the preparation of brushes for commutators or current collectors. More particularly it relates to the preparation of a brush formed of material whose composition differs in different parts of the brush.

In preparing brushes having uniform composition, it has been customary to employ a mold into which are introduced the brush ingredients in the form of a mixed powder, and after molding to the desired shape, the contents of the mold are subjected to pressure and heat to consolidate the mass. One object of my invention is to provide an improved method and apparatus for preparing a brush of varying composition by molding, pressing and heating.

A further object is to provide an improved method and apparatus for forming a brush, the different parts of which vary in composition, which brush is of strong and rigid construction, without planes of cleavage.

A further object of my invention is to provide an improved method of filling the mold with the brush ingredients and in a manner that different parts of the completed brush will have the ingredients present in different proportions and wherein the proportions of the various ingredients in any part of the brush may be controlled or varied as desired.

A further object of my invention is to provide an improved method and means for mixing powder ingredients whereby mixing is easily, rapidly and continuously performed.

In the form of my invention herein disclosed my improved method and apparatus are employed for the manufacture of brushes composed of conducting material such as carbon or graphite and abrasive material such as carborundum or alundum. Such brushes may be employed to polish or true a commutator. In forming a brush of this composition, wherein part of the brush is to be abrasive and part non-abrasive, I employ for the non-abrasive part a dry powder consisting of carbonaceous material and a binder which

when pressed and heated will serve to unite the particles of carbonaceous material. For the abrasive part of the brush I employ a dry powder consisting of carbonaceous material, if such material is to be employed, abrasive material and in proper proportion the binder above referred to. To introduce these powders into the brush mold I produce two streams, one of the abrasive powder and the other of the non-abrasive powder, these streams being so directed that they may be caused to join and mingle in whole or in part and each of the streams being independently or simultaneously variable at the will of the operator from complete cessation to maximum. This control of the mixing and the volume of the streams permits the mold to be filled, the powder in one part of the mold being of different composition from the powder in some other part of the mold. The streams are preferably fed into the mold so that the material is deposited evenly over the bottom of the mold and the mold is filled up evenly in such a way that at all times the material in the mold is of uniform depth. After the deposit of the brush powder in the mold the powder is compressed in the mold and fired to produce the proper consolidation of the particles.

To generate a stream of a brush powder constituent, one of the brush powder constituents, say the non-abrasive, is placed in some receptacle such as a sieve or riddle; the other brush powder constituent, say the abrasive brush powder constituent, being placed in a similar sieve or riddle. The two sieves or riddles are then revolved or otherwise agitated to discharge the contents in two brush powder streams, the magnitudes of said stream being varied by the speed of rotation or degree of agitation of said sieves or riddles from complete cessation to the maximum possible. By gradually varying the speed of rotation of the sieves or riddles the magnitude of the two powder streams can be gradually varied in a similar way. Consequently the deposit of the combined brush powder streams in the brush mold will represent in a fixed form the intermingling of adjacent section of the two brush streams.

The force of gravity is preferably used to keep the brush powder streams flowing, but other means may be used, such as a blast of air or the momentum acquired when thrown off from some rotating or moving container. Preferable means are provided such as inclined screens or baffle plates or currents of air for effecting a complete mixing of the several ingredients of the moving streams which have joined to form a single stream.

By the use of the apparatus just described it is possible to deposit in one part of the mold a brush powder of one composition and in another part of the mold a brush powder of a different composition. By mixing streams of different powders and at the same time gradually increasing the volume of one stream and decreasing the volume of the other, it is possible to form a zone between two parts of the brush where the composition of the mixed powder varies gradually from the composition of one part to the composition of the other part. This avoids the formation of planes of cleavage in the brush which tends to weaken the brush structure.

Other objects and advantages of my invention will appear from the following description taken in connection with the accompanying drawings wherein:—

Figure 1 is a general perspective view of a mixing machine, a part of the casing of the discharge spout being broken away to show the mixing sieves therein;

Figure 2 is a sectional view of the discharge spout and brush mold;

Figure 3 is a plan view of the friction drive in one extreme position;

Figure 4 is a plan view of the friction drive in the other extreme position and

Figure 5 is a perspective view of a brush made by employing the apparatus shown in Figures 1 to 4.

In the mixing apparatus shown in Figures 1 to 5 there are two cylindrical sieves 51 and 51a secured to shafts 52 and 52a mounted in bearings 53, 53 attached to the frame 54 secured by the legs 55 to the top of a bench or other support. Under the two cylinders is the hopper 56 having side walls which are inclined laterally of the cylinders 51 and 51a and terminate in a discharge spout 57 which leads to the brush mold 58. Power to rotate the cylindrical sieves is received from the driving shaft 59 through the clutch 60 operated by the arm 61, then through the shaft 62 the pulley 63 the belt 64 the pulley 65 the shaft 66, the friction discs 67 the friction wheels 68 to the shafts 52 and 52a. The friction discs 67 are mounted in the upper and movable end of a swinging standard 69 swivelly secured to the bearing housing 70. The handle 71 serves for manual manipulation of the standard 69 from the position indicated in Figure 3 to that indicated in Figure 4, or the reverse. Doors 72 are provided

in the cylindrical sieves 51 and 51a so that the brush powder—abrasive and non-abrasive—may be placed therein preparatory to mixing. A disc partition 73 may be provided in one or both of the cylinders about midway of its length; and if desired an abrasive brush powder may be placed on one end of one cylinder and a non-abrasive brush powder in the other end of this cylinder, and only a non-abrasive brush powder in the other cylinder. The inclined sieves or screens 74 arranged in the discharge spout 57 are for the purpose of more thoroughly intermingling the two powder streams discharged from the two cylinders; there being however little tendency for the brush powder streams discharge from the two halves of a divided cylinder to intermingle, except at their boundary line.

In filling the mold by means of the apparatus shown in Figures 1 to 4 with a view to forming the brush shown in Figure 5 one part such as one ounce of abrasive brush powder of the desired composition is placed in the front compartment of the cylindrical sieve 51a, one part of non-abrasive brush powder in the rear compartment of cylinder 51a, and two parts of non-abrasive brush powder in cylinder 51. The initial position of the friction discs and friction wheels will be as shown in Figure 4. Power to rotate the cylinders is applied by operating the clutch 60. When nearly all the abrasive brush powder is out of the front compartment of cylinder 51a the standard 69 is swung backwards until friction discs and friction wheels are in the position shown in Figure 3; this position being maintained until all the non-abrasive powder has escaped from cylinder 51.

When sufficient powder has been introduced into the mold to form a brush of the desired thickness, the mold is transferred to a press and by means of a plunger the powder is compressed. The brush is then removed from the mold and fired.

In order to vary the speed of rotation of one of the cylinders 51 and 51a independently of the other the friction wheels 68 may be mounted on their respective shafts so that they may be adjusted longitudinally of the shafts, thus the wheels 68 may be keyed to the shafts and adjustable means provided for rigidly securing the wheel to the shaft, after it has been adjusted to the desired position along the shaft.

I claim:

1. In a mixing and delivering apparatus, receptacles for containing divided materials, means for causing said materials to be delivered from said receptacles in the form of streams, means for causing said streams to join to form a combined stream and means for varying, independent of the quantities of material in said receptacles, the relative rate in which material of the said streams enter

the combined stream and consequently the percentage of the material in successive cross sections of the combined stream.

2. In a mixing and delivering apparatus, 5 receptacles for containing divided materials, means for causing said materials to be delivered from said receptacles in the form of streams, means for causing said streams to join to form a combined stream, means for 10 varying independent of the quantities of material in the said receptacles, the relative rate at which materials of the several streams enter the combined stream and consequently the percentage of the material in successive cross 15 sections of the combined stream and means for mixing the material of the stream so as to produce a combined stream of homogeneous cross-sectional composition.

3. In a mixing and delivering apparatus 20 for divided materials, a plurality of perforated cylinders for containing the materials to be mixed, means for rotating the cylinders to cause the materials to be delivered therefrom in the form of streams, means for vary- 25 ing the speed of rotation of said cylinder so as to control the volume of the streams delivered and means for causing stream from a plurality of cylinders to join so as to form a combined stream.

4. In a mixing and delivering apparatus 30 for divided materials, a plurality of perforated cylinders for containing the materials to be mixed, means for rotating the cylinders to cause the materials to be delivered therefrom in the form of streams, means for vary- 35 ing the speed of rotation of said cylinders so as to control the volumes of the stream delivered therefrom, mean for causing streams from a plurality of cylinders to join so as to 40 form a combined stream and means for mixing the moving materials of said combined stream.

5. In a mixing and delivering apparatus 45 for divided materials a plurality of perforated cylinders for containing the materials to be mixed, means for rotating the cylinders to cause the materials to be delivered therefrom in the form of streams, means for vary- 50 ing the speed of rotation of said cylinders so as to control the volumes of the streams delivered therefrom, means for causing streams from a plurality of cylinders to join so as to form a combined stream and screens inter- 55 posed in the path of said combined stream for mixing the moving material of said combined stream.

6. The method of forming an article of 60 plurality of ingredients which are to be present in different proportions in different parts of the article which method consists in form- 65 ing uniform mixtures of powdered ingredients, different mixtures having different composition and each of the mixtures containing a material which when pressed and heated will form a binder, introducing the

material of said mixtures into a mold by forming separate mixtures into separate streams, causing certain of said streams to join so as to form a combined stream and simultaneously varying the volume of said 70 certain streams, thereby varying the composition of said combined stream and pressing and heating the material so introduced into said mold.

7. The method of forming an article of 75 a plurality of ingredients which are to be present in different proportions in different parts of the article, which method consists in forming uniform mixtures of powdered ingre- 80 dients, different mixtures having different composition and each of the mixtures containing a material which when pressed or heated will form a binder, introducing the material of said mixtures into a mold by 85 forming said mixtures into separate streams, directing different streams to different parts of the mold, causing certain of said streams to join so as to form a combined stream and simultaneously varying the volume of said 90 certain streams whereby the composition of said combined stream is varied and pressing and heating the material so introduced into the mold.

8. A step in a method of forming a brush 95 of non-uniform composition by molding and firing, which step consists in forming a stream of granular or powdered material, the composition of the stream being different at different parts of the cross-section thereof and directing said stream into a mold 100 through the top thereof.

9. A step in the method of forming a brush 105 of non-uniform composition by molding and firing, which step consists in forming a stream of evenly falling granular or powdered material, the composition of the stream being different at different parts of the cross- 110 section thereof and directing said stream into a mold through the top thereof, whereby the material is continually deposited on the bottom of the mold as an even layer, different parts of which have different composition.

10. The method of forming a collector 115 brush of non-uniform composition which consists in forming a stream of evenly falling granular or powdered material, the composition of the stream being different at different parts of the cross-section thereof, directing said stream into a mold through the 120 top thereof, whereby the material is continually deposited as an even layer on the bottom of the mold, compressing the material so deposited from the top thereof and firing a compressed material.

11. The method of forming an abrasive 125 collector brush of non-uniform abrasive content which consists in forming uniform mixtures of powdered ingredients, different mixtures having different abrasive content and each of the mixtures containing a material 130

- which when pressed or heated will form a binder, introducing the material of said mixtures into a mold by forming separate mixtures into separate streams, causing certain of said streams to join so as to form a combined stream and simultaneously varying the volume of said certain streams, whereby the composition of said combined stream is varied, compressing the material in said mold and heating the compressed material.
12. The method of forming an abrasive collector brush of non-uniform abrasive content which method consists in forming uniform mixtures of powdered ingredients, different mixtures having different abrasive content and each of the mixtures containing a material which when pressed or heated will form a binder, introducing the material of said mixtures into a mold by forming said mixtures into separate streams, directing different streams to different parts of the mold, causing certain of said streams to join so as to form a combined stream and simultaneously varying the volume of said certain streams, whereby the composition of said combined stream is varied, compressing the material in said mold and heating the compressed material.
13. A mixing machine or apparatus, comprising means for holding separately two or more brush powder constituents, means of discharging from either or all holders or containers a brush powder constituent stream or streams, either at a rate of flow fixed in magnitude or continually or intermittently varying at the will of the operator, means of combining said streams into one stream, means of receiving and holding as in a mold said combined streams or one brush powder constituent stream, and means of evenly distributing the falling powder over the floor of said mold.
14. A mixing machine or apparatus, comprising two holders or containers for holding separately two brush powder constituents, means for discharging from said containers portions of the said constituents at separate time intervals and the remaining portions simultaneously, the latter portions at a controllably varying proportionality in the relative magnitude of the discharges or streams, means of combining the two brush powder streams into one brush powder stream, and means of receiving and holding the said one stream in a receptacle or mold, and means of evenly distributing the falling brush powder over the floor of the mold.
15. In a mixing and delivering apparatus, a plurality of perforated cylinders rotatably mounted side by side, a hopper located beneath said cylinders and adapted to receive materials passing from said cylinders through the perforations thereof, said hopper having side walls which are downwardly inclined in a direction lateral to said cylinder, a spout adapted to receive material from said hopper and means for mixing materials from separate cylinders, said means comprising an inclined screen located in the path of material passing through said spout.
16. A step in a method of forming a brush of non-uniform composition by molding and firing, which step consists in forming a stream of granular or powdered material, the composition of the stream being different at different cross-sections thereof and directing said stream into a mold through the top thereof.

Signed at New York, in the county of New York and State of New York, this 17th day of May, A. D. 1928.

HORACE D. MUNDAY.