May 12, 1964 H. R. HARRIS 3,133,218

HOLDER FOR EXTRA-LONG CARBON BRUSHES

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Fig. 1

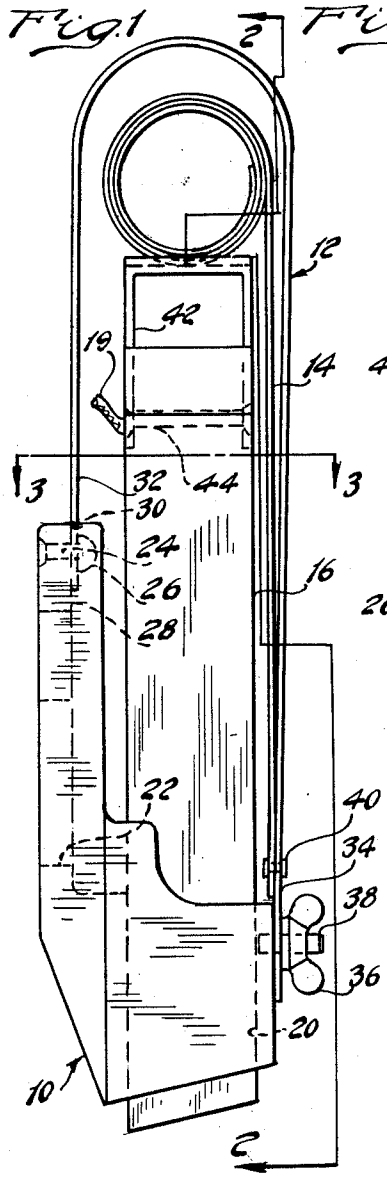


Fig. 2

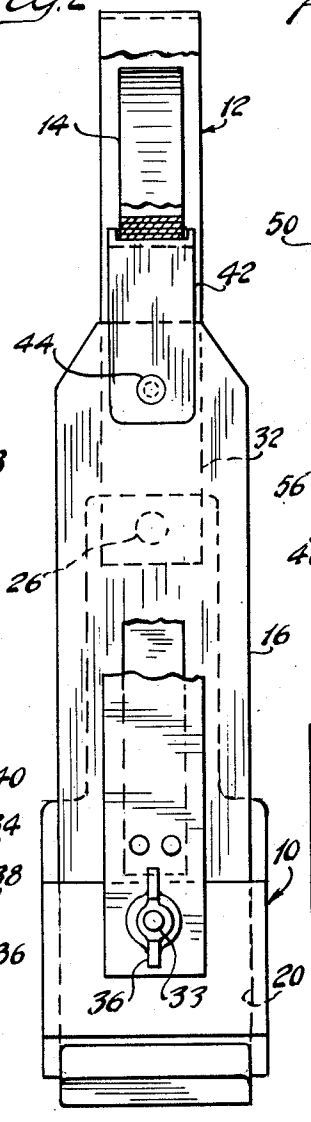


Fig. 4

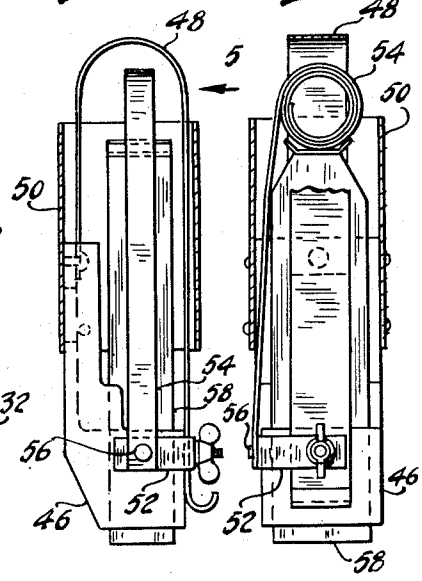


Fig. 5

Fig. 6A



Fig. 6

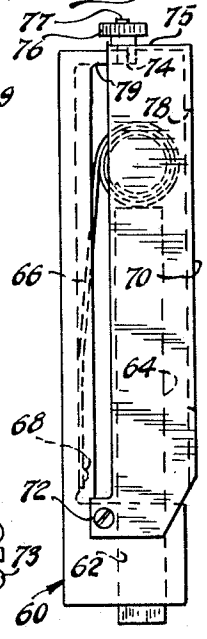
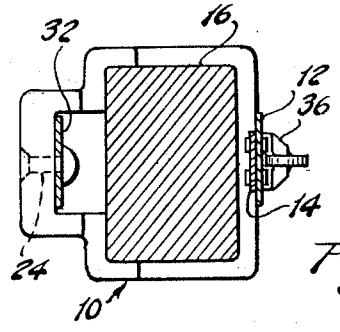


Fig. 3



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Fig. 7

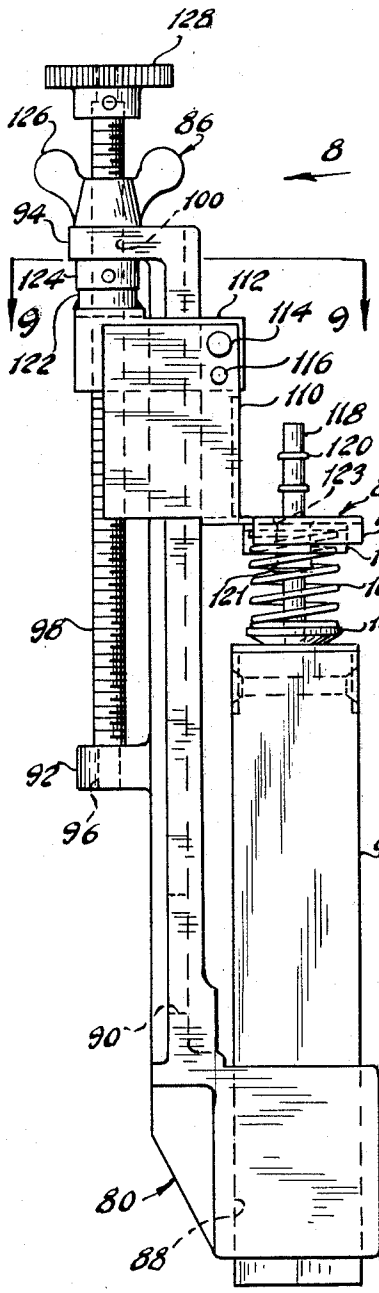


Fig. 8

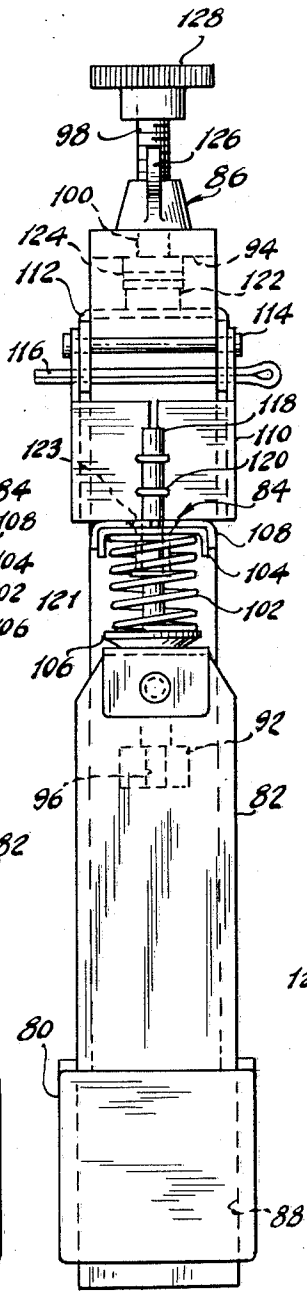


Fig. 10

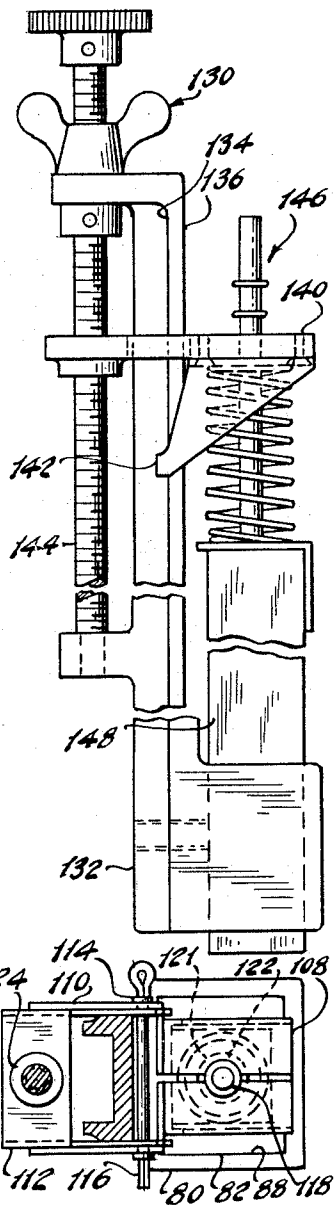


Fig. 9

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Fig. 11

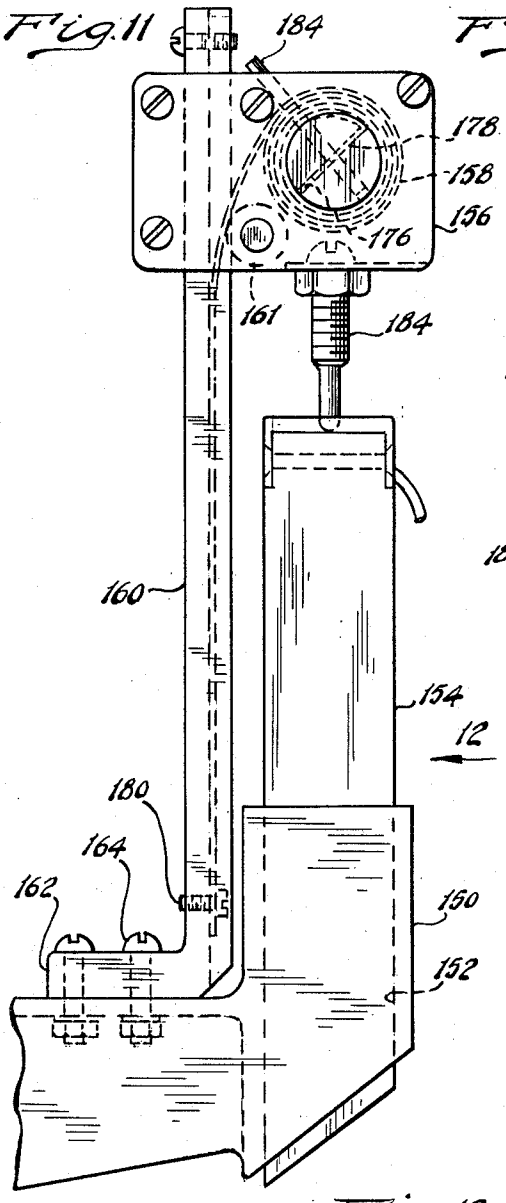


Fig. 14

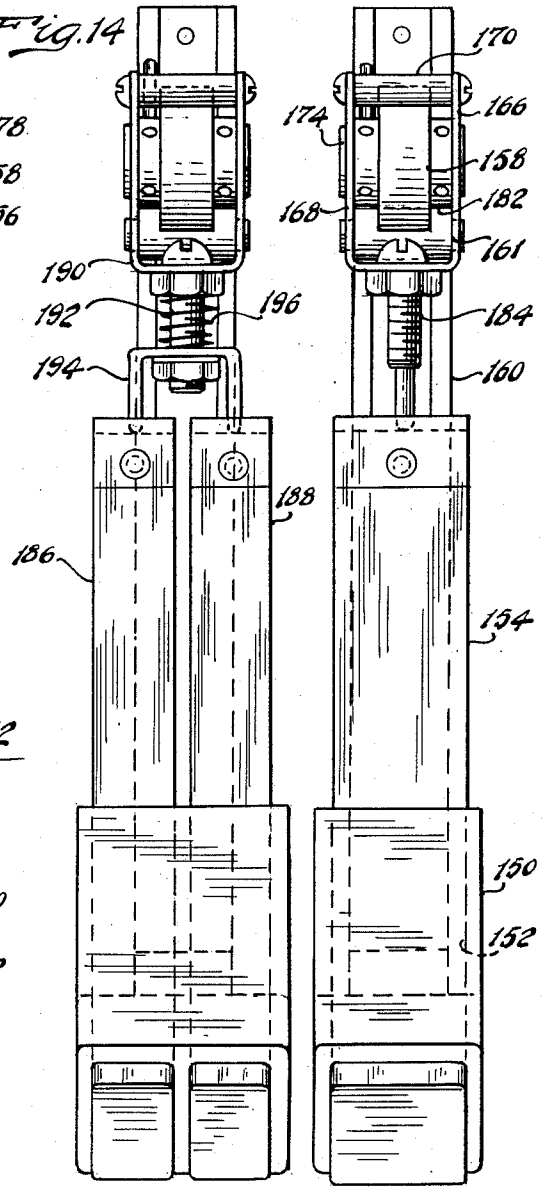


Fig. 13

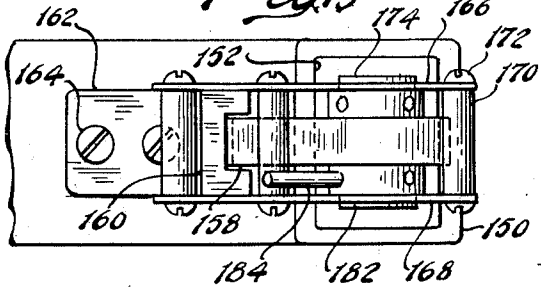


Fig. 12

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HOLDER FOR EXTRA-LONG CARBON BRUSHES

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Filed Feb. 13, 1961, Ser. No. 88,930
1 Claim. (Cl. 310—246)

The invention refers to brush holders and relates more specifically to improved means for holding and applying regulated pressure to extra long conductive brushes during the entire life thereof while the brushes are in use.

In the past brushes used in conjunction with collector rings, exciters and similar electric apparatus in conjunction with power generation and transfer have been relatively short so that they are completely used up in a period shorter than that required between maintenance and inspection shut-down of apparatus, such as boilers, with which they are associated. The periods between shut-downs of the apparatus has in the past therefore been determined by the life of the brushes. Since shutting down of the apparatus with which the brushes are associated is a relatively expensive procedure and may damage apparatus such as boilers, it is desirable to use brushes which have at least as long a useful life as the normal maintenance and inspection period determined by the apparatus with which they are associated.

The brushes to function efficiently must, however, have a substantially constant pressure exerted thereon. In the past it has been found extremely difficult to exert such constant pressure on brushes of sufficient length to have a useful life equal to the maintenance time of the other apparatus with which the brushes are associated. Where devices capable of applying the required constant pressure to extra long brushes have been provided they have been relatively complicated whereby the expense and reliability thereof have prevented their general use.

It is therefore one of the purposes of the present invention to provide an improved brush holder for extra long brushes whereby substantially constant pressure may be applied to the brush during the entire useful life thereof.

Another object is to provide a brush holder for extra long conductive brushes including improved automatic means for exerting substantially constant pressure on the brushes for the entire useful life thereof.

Another object is to provide a brush holder for extra long conductive brushes including a holder box for guiding a brush during use thereof including means for attachment to the apparatus with which the brush is used, a spring holder releasably secured to the holder box and a constant pressure spring secured to the spring holder for exerting a constant pressure on a conductive brush passing through the holder box.

Another object is to provide a brush holder as set forth above and further including a guard member secured to the holder box and surrounding the spring and spring holder which guard permits ventilation and visual inspection of the position of the brush.

Another object is to provide a brush holder as set forth above wherein the spring is positioned at right angles to the spring holder whereby the spring is better positioned to exert a constant pressure on a brush used with existing holder boxes as the brush is worn away.

Another object is to provide a brush holder for extra long conductive brushes comprising a holder box for guiding a brush passed therethrough toward the apparatus with which it is associated, means for mounting a spring on the holder box for exerting regulated pressure on the brush, and means for periodically adjusting the regulated pressure applied to the brush while the apparatus associated with the brush is in operation.

Another object is to provide a brush holder as set forth above including means for visually indicating the regulated pressure applied to the brush.

Another object is to provide a brush holder as set forth above wherein the means for adjusting the regulated pressure applied to the brush may be manually actuated with one hand.

Another object is to provide a brush holder as set forth above including means for pivoting the spring for applying pressure to the brush out of its operating position to permit easy installation of a new extra long brush in the holder box.

Another object is to provide a brush holder for extra long conductive brushes comprising a holder box for guiding a brush into engagement with electrical apparatus associated therewith, a post secured to the holder box, a carriage guided on and movable longitudinally of the post axially of a brush passed through the holder, resilient means for engaging the top of the brush secured to the carriage, and a substantially constant pressure spring mounted on the carriage and secured to the post for exerting a constant pressure through the carriage on the brush.

Another object is to provide a brush holder as set forth above wherein a signle post, carriage and constant pressure spring is utilized to produce substantially constant pressure automatically on a pair of brushes.

Another object is to provide a brush holder as set forth above wherein the carriage includes means for initially adjusting the constant spring pressure.

Another object is to provide a brush holder as set forth above which is simple in construction, economical to manufacture and efficient in use.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, illustrating preferred embodiments of the invention, wherein:

FIGURE 1 is an elevation view of a brush holder for extra long conductive brushes constructed in accordance with the invention.

FIGURE 2 is a view of the brush holder shown in FIGURE 1 taken on the line 2—2 in FIGURE 1.

FIGURE 3 is a cross section of the brush holder shown in FIGURE 1 taken on the line 3—3 in FIGURE 1.

FIGURE 4 is a partly broken away elevation view of a modification of the brush holder shown in FIGURE 1.

FIGURE 5 is a partially broken away elevation view of the brush holder shown in FIGURE 4 taken in the direction of arrow 5 in FIGURE 4.

FIGURE 6 is an elevation view of a further modification of the automatic brush holder shown in FIGURE 1.

FIGURE 6–A is an elevation view of still another modification of the brush holder of FIGURE 1.

FIGURE 7 is an elevation view of a manually adjustable holder for extra long conductive brushes constructed in accordance with the invention.

FIGURE 8 is an elevation view of the brush holder shown in FIGURE 7 taken in the direction of arrow 8 in FIGURE 7.

FIGURE 9 is a cross section of the brush holder shown in FIGURE 7 taken on the line 9—9 in FIGURE 7.

FIGURE 10 is an elevation view of a modification of the brush holder illustrated in FIGURE 7.

FIGURE 11 is an elevation view of another automatically adjustable brush holder for extra long conductive brushes constructed in accordance with the invention.

FIGURE 12 is an elevation view of the brush holder illustrated in FIGURE 11 taken in the direction of arrow 12 in FIGURE 11.

FIGURE 13 is a top view of the brush holder illustrated in FIGURES 11 and 12.

FIGURE 14 is an elevation view of a modification of the brush holder illustrated in FIGURES 11–13.

With particular reference to the figures an embodiment of the present invention will now be disclosed.

The brush holder of FIGURES 1–3 comprises a holder box 10, spring holder 12 and constant pressure spring 14. In operation the holder box 10 is secured to electric apparatus, such as a generator (not shown) with the extra long conductive brush 16 passed therethrough to make contact with the collector rings, exciter commutator or similar part (not shown) of the electric apparatus. A constant pressure is exerted on the brush during the entire useful life thereof by means of spring 14 so that the electric contact resistance provided through electric conductor 18 does not vary due to wear of the brush 16 in use.

More specifically the holder box 10 which may be shaped substantially as shown in FIGURES 1–3 includes the passage 20 therethrough through which the brush 16 is passed for guided movement toward the electric apparatus (not shown) from which it is desired to conduct an electric current with the brush 16. The holder box 10 is further provided with an elongated opening 22 through which a bolt may be passed to adjustably secure the holder box to rigid mounting means, such as the electric apparatus with which the brush holder is associated. A button rivet 24 is secured to the holder box 10 by convenient means such as silver solder so that the head 26 thereof is in spaced relation to the surface 28 of the holder box.

The U-shaped spring holder 12 is provided with an elongated slot 30 in end 32 thereof through which the head 26 of the button rivet 24 extends to removably secure the end 32 of the spring holder 12 to the holder box 10. The other end 34 of the spring holder 12 is secured to the holder box 10 by means of the removable wing nut 36 threaded on the stud 38 carried by the holder box 10.

The spring 14 is secured to the end 34 of spring holder 12 by convenient means such as rivets 40. The spring 14 may be of steel or other suitable material and is of the constant pressure type. That is to say that spring 14 exerts a constant pressure on the holder 42 which is secured to the brush 16 by convenient means, such as the rivet 44. Such springs are known per se and will not therefore be considered in detail herein. Conductor 19 is secured to rivet 44 and serves to transfer electric energy from the brush 16 which may be the usual carbon brush or which may be constructed of other suitable electrical conductive material such as graphite or copper.

In operation of the brush holder shown in FIGURES 1–3 it will be assumed that a new extra long brush, for example one six inches long is installed in the brush holder of the invention. During usage of the electric apparatus with which the brush holder is associated the brush 16 will be gradually worn away as is well known. As the brush 16 is worn away the constant pressure spring 14 coils automatically and approaches the opening 20 through the holder box 10. Due to the nature of the constant pressure spring 14 a force of the same magnitude is applied axially of the brush 16 until the brush is substantially entirely worn away by the electric apparatus associated with the brush holder.

Thus it can be seen that through the provision of an extremely simple brush holding device an extra long brush may be used in conjunction with electric apparatus from which it is desired to conduct electric energy which brush need not be changed between maintenance of the electric apparatus with which it is associated and which brush conducts a constant electric current from the electric apparatus due to the constant pressure applied to the brush regardless of the length thereof automatically by the spring 14.

A modification of the brush holder shown in FIGURE 1 is illustrated in FIGURES 4 and 5. The brush holder illustrated in FIGURES 4 and 5 comprises a holder box

46 similar to the holder box 10 and having the spring holder 48 and ventilated guard 50 secured thereto. The spring holder 48 includes the L-shaped bracket 52 secured thereto and extending transversely thereof as shown.

The constant pressure spring 54 similar in all respects to the constant pressure spring 14 is secured to the bracket 52 by convenient means, such as rivet 56 so that the spring holder 48 and spring 54 are positioned at right angles to their position in the brush holder illustrated in FIGURES 1–3. Such positioning of the spring 54 has distinct advantages when the constant pressure spring 54 is used in conjunction with standard box holders 46 in that with such positioning the spring 54 provides a constant pressure on the brush 58 without interference therewith of the box holder 46 when the brush is worn away. Guard 50 is provided to protect the spring 54 from contact with objects which might destroy the constant pressure exerted thereby.

Another modification of the extra long brush shown in FIGURE 1 is illustrated in FIGURE 6. The brush holder illustrated in FIGURE 6 includes the holder box 60 having the opening 62 therethrough through which the brush 64 is guided as before. The constant pressure spring 66 is secured to the holder box 60 by convenient means 68 so that the spring 66 exerts a constant axial pressure on the brush 64 during use thereof as the brush 64 is worn away by the electric apparatus with which it is associated.

The ventilated guard and spring guide 70 which extends around three sides of the carbon brush 64 is pivotally secured to the holder box 60 at 72. A slot 74 is provided in the upper portion 75 of guard 70. The periphery of the slot 74 may be clamped between the lock nut 76 on threaded stud 77 and the flange 79 of holder box 60 to lock the guard 70 in the position shown in FIGURE 6.

The spring guide and guard 70 is further provided with an elongated slot 78 therein through which the length of the brush 64 may be observed. When it is desired to change the brush 64 the lock nut 76 is loosened, the guard 70 is pivoted about pivot 72 to provide access to the constant pressure spring 66 which may be held in an uncoiled extended position while a new brush 64 is placed in the passage 62.

FIGURE 6–A illustrates a brush holder including many of the more desirable features of the brush holders of FIGURES 1 and 6. The brush holder of FIGURE 6–A comprises the holder box 61 similar to holder box 60 and an L-shaped spring holder and spring guide 69 similar to spring holder and guide 12. Spring holder and guide 69 is secured to the holder box 61 at the top by lock nut 71 and at the bottom by wing nut 73 similar to lock nut 76 and wing nut 36. Operation of the brush holder of FIGURE 6–A is similar to the operation of the brush holder of FIGURE 1.

The brush holder shown in FIGURE 7 comprises a holder box 80 for guiding the extra long brush 82 toward electric apparatus with which the brush holder is associated. Fulcrum plate means 84 for applying a regulated pressure to the brush 82 and adjusting and locking means 86 for manually adjusting the regulated pressure applied to the brush 82 and locking the adjusting mechanism in adjusted position are also provided in the brush holder illustrated in FIGURE 7.

The holder box 80 is provided with the passage 88 therethrough through which the brush 82 extends axially. An elongated slot 90 is provided in the holder box 80 to permit adjustably securing the holder box to the electric apparatus with which it is associated by convenient means (not shown). Holder box 80 further includes the brackets 92 and 94. Bracket 92 rotatably receives the end 96 of adjusting screw 98 therein. Bracket 94 is provided with a passage 100 therethrough in which the adjusting screw 98 is also rotatably received.

The fulcrum plate means 84 for applying a regulated

pressure to the brush **82** comprises the compression spring **102** secured to the U-shaped bracket **104** at one end and to the abutment **106** at the other. The U-shaped bracket **104** as shown is secured to the flange **108** of the pivotally mounted bracket **110**. Bracket **110** is secured to a carrier **112** by pivot pin **114** and locked in a fixed position by means of cotter pin **116**. Thus with the carrier **112** positioned along adjusting screw **98** as desired any predetermined pressure within the pressure range of the spring **102** may be exerted on the brush **82**.

The shaft **118** which extends vertically from the abutment **106** through the U-shaped bracket **104** and flange **108** is provided with annular ridges **120** thereon which indicate the compression in the spring **102**. Each visible ridge may represent a particular spring pressure, such as one pound. Thus, if two ridges are visible the spring in its compressed condition would indicate two pounds of pressure being applied to the brush **82**. The pressure exerted on the brush **82** may therefore be kept within required limits by periodic observation of the ridges **120** and resetting of the position of the carriage **112** as the brush is worn away. A tubular shaft guide **121** flared at each end and pressed into an opening **123** through brackets **104** and **110** is provided to prevent the ridges **120** from catching on the opening **123** and to insure axial movement of the shaft **118**.

The adjusting and locking means **86** for adjusting the regulated pressure applied to the brush **82** by the spring **102** comprises the adjusting screw **98** rotatably supported by the holder box **80**, the carriage **112** having feed nut **122** fixedly secured thereto, collar **124** rigidly secured to the adjusting screw **98** for rotation therewith, locking wing nut **126** and adjusting handle **128**.

In adjusting the position of the carriage **112** to adjust the regulated pressure applied to the brush **82** by the spring **102** the wing nut **86** is first loosened. The adjusting screw **98** is then rotated within the brackets **92** and **94** to cause the feed out **122** to travel along the adjusting screw **98** whereby the carriage **112** is positioned axially of the adjusting screw **98**. The wing nut **126** is then again tightened to lock the adjusting screw in position. It will be noted that the entire adjustment may be accomplished with one hand so that a safety feature is provided when the pressure exerted on the brush **82** is adjusted while the electric apparatus with which the brush is associated is operating.

When it is desired to replace the brush **82** the pin **116** is removed from the bracket **110** so that the bracket **110**, flange **108** and spring **102** may be pivoted about pivot pin **114** to provide room for easy insertion of a new extra long brush **82** into the passage **88**. The member **110** carrying the flange **108** and spring **102** is then pivoted back into the position shown and the cotter pin **116** is again secured through the aligned opening in the carrier **112** and bracket **110** as shown in FIGURES 7 and 8.

A modification of the manually adjustable holder for extra long rods, as shown in FIGURES 7–9, is illustrated in FIGURE 10. The modified brush holder illustrated in FIGURE 10 includes adjusting and locking means **130** similar to that of the brush holder of FIGURES 7–9 which will therefore not be considered in detail. Similarly the holder box **132** of the box holder shown in FIGURE 10 will not be described in detail except to indicate that a track **134** is provided on both sides of the upwardly extending portion **136** thereof along which the carriage **140** is guided by means of flanges **142** during adjustment of the adjusting screw **144**.

The means **146** for applying a regulated pressure to the brush **148** of the brush holder illustrated in FIGURE 10 has the advantage of being simpler in construction than that provided in FIGURES 7–9 but cannot be pivoted out of the way during replacement of the brush **148** as with the means **84** of the brush holder shown in FIGURES 7–9.

The brush holder for extra long carbon brushes illustrated in FIGURE 11 also includes a holder box **150** having a passage **152** therethrough adapted to receive the brush **154** for axial movement toward an electric apparatus (not shown) as before, a carriage **156** for supporting constant pressure means **158** operable to exert a constant axial pressure on the brush **154** and post **160** along which carriage **156** travels as the brush **154** is worn away.

Holder box **150** may be secured to the electric apparatus with which the brush holder is associated by convenient means (not shown). Post **160** is secured to the holder box **150** by convenient means such as the flange **162** and bolts **164**.

Carriage **156** comprises side plates **166** and **168** spaced from each other by sleeves **170** extending therebetween and assembled therewith by means of screws **172**. Two sleeves **170** are provided in vertically spaced relation on one side of the post **160** and a sleeve and roller **161** are provided in vertically spaced relation on the other side of post **160**, as shown best in FIGURE 11, whereby only vertical movement of the carriage **156** with respect to the post **160** is possible. Roller **161** also serves to guide spring **158**.

A further rotatable shaft **174** is provided between the plates **166** and **168** having an axially extending slot **176** therein through which the end **178** of the constant pressure spring **158** is inserted. The other end of the constant pressure spring **158** is secured to the post **160** in the position shown by convenient means such as the screw **180**. Thus in operation, as the brush **154** is worn away the carriage **156** is caused to move toward the holder box **150** as the constant pressure spring **158** coils about the shaft **174** to exert a constant pressure on the brush **154**.

The shaft **174** is further provided with radially enlarged portions **182** at the ends thereof having radial recesses therein into which pegs **184** may be inserted to initially adjust the tension of the spring **158** so that each spring in a multiple installation will provide the same pressure on the brushes **154** in the installation regardless of manufacturing imperfections in the springs and/or slight permanent set of the springs.

The force exerted by the spring is transferred from the carriage **156** to the brush **154** by means of the screw **184**.

FIGURE 14 illustrates a modification of the brush holder shown in FIGURES 11–13 wherein a pair of brushes **186** and **188** are provided with regulated pressure axially thereof by means of a brush holder, as shown in FIGURES 11–13, wherein the force is transferred from the carriage **190** to the brushes **186** and **188** by the bolt **192** having the U-shaped bracket **194** sleeved thereon and urged axially outwardly thereof by means of the spring **196**. The bracket **194** is loosely sleeved on the bolt **192** whereby slight tilting of the bracket **194** is possible in operation so that pressure on the brushes **186** and **188** will automatically be maintained equal.

While both automatically and manually adjustable brush holders constructed in accordance with the invention have been specifically disclosed together with particular modifications thereof it will be understood that many other modifications of the brush holder of the invention will readily suggest themselves to those skilled in the art. It is therefore the intention to include all such modifications within the scope of the invention.

The drawings and the foregoing specification constitute a description of the improved holder for extra long carbon brushes in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claim.

What I claim as my invention is:

A holder for an extra long carbon brush for use in maintaining controlled contact between the brush and electric apparatus with which the brush is used, comprising a substantially L-shaped holder box including a first portion having an opening therethrough adapted to receive a brush and guide the brush toward the electric apparatus

and a second portion substantially perpendicular to the first portion having a flange thereon with a threaded opening therein extending substantially parallel to the first portion and in the same direction, an L-shaped spring holder having openings through both ends thereof, a bolt extending through the opening in one end of said spring holder threadedly engaging the opening in the flange of said second portion of said holder box for securing said one end of said spring holder to said holder box, a threaded stud secured to the first portion of said holder box extending through the opening in the other end of said spring holder, a nut threadedly engaging said threaded stud for releasably securing the other end of said spring holder to said holder box and a constant pressure spring secured to said

spring holder adjacent said other end thereof for exerting a constant pressure on a brush guided by the holder box as the brush is worn away in use.

References Cited in the file of this patent

UNITED STATES PATENTS

1,994,502	Burnite	Mar. 19, 1935
2,602,100	McDonald	July 1, 1952
2,629,061	Swarthout	Feb. 17, 1953
2,695,968	Welch et al.	Nov. 30, 1954
2,769,107	Potter	Oct. 30, 1956
2,836,745	Gillie	May 27, 1958