

April 21, 1942.

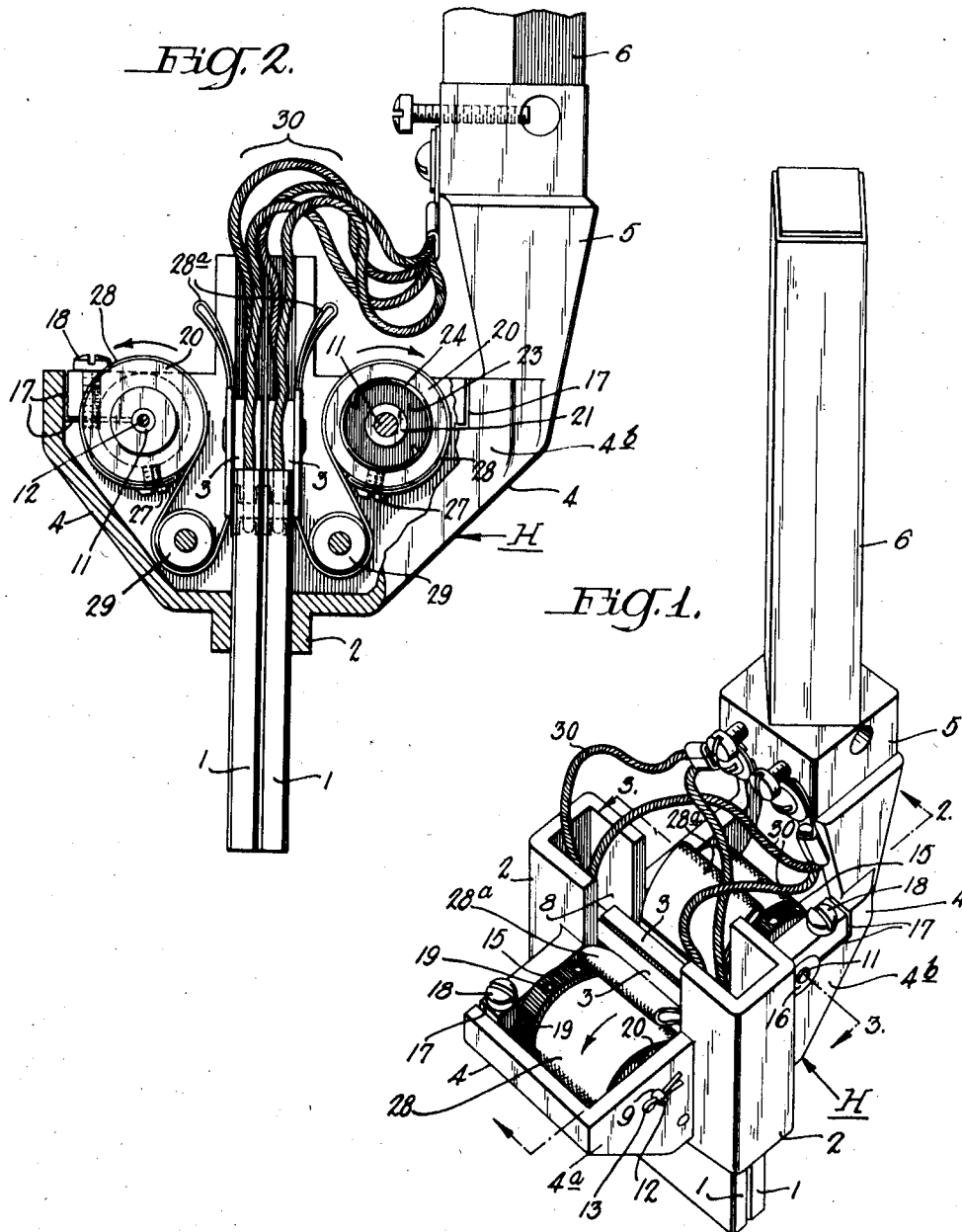
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2,280,735

BRUSH HOLDER AND TENSION DEVICE

Filed Sept. 23, 1941

2 Sheets-Sheet 1



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Fig. 3.

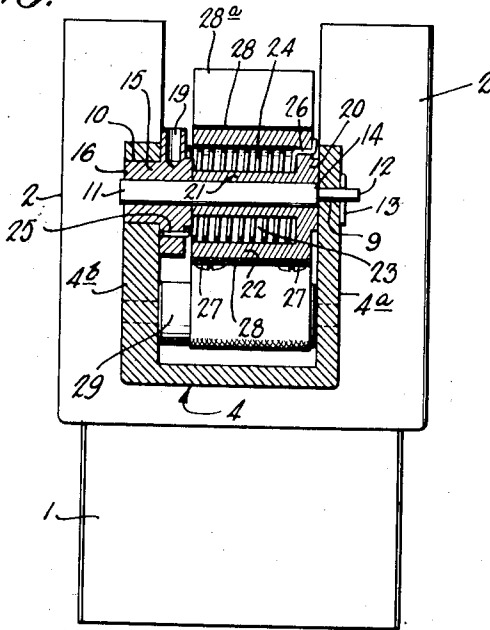


Fig. 4.

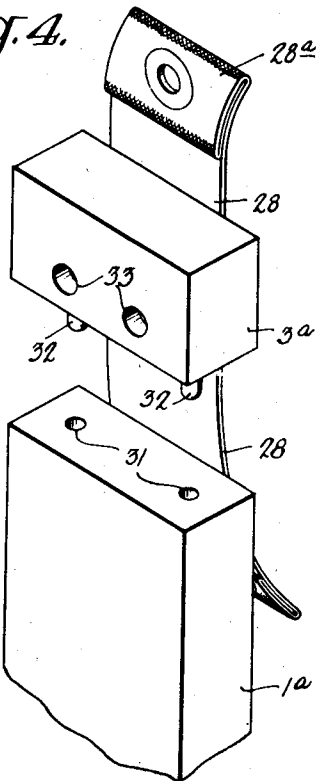
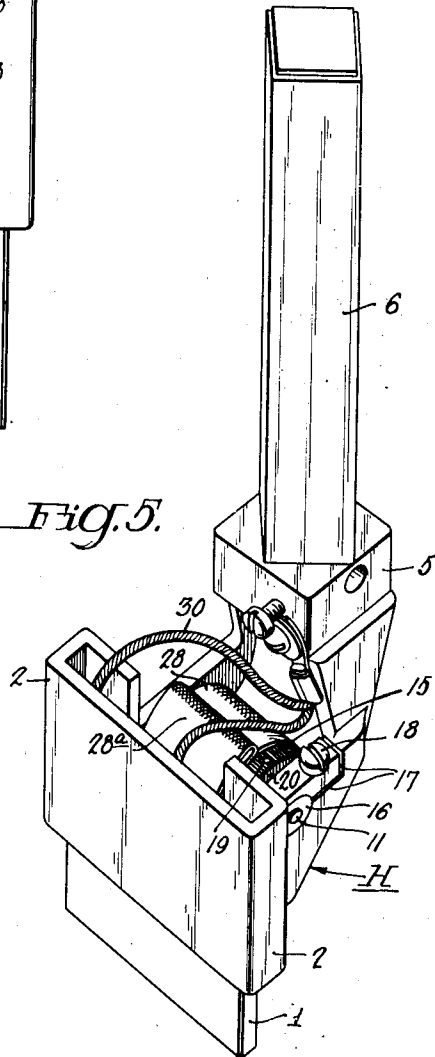


Fig. 5.



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UNITED STATES PATENT OFFICE

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BRUSH HOLDER AND TENSION DEVICE

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11 Claims. (Cl. 171—324)

This invention relates to new and useful improvements in electric brush holders and more particularly to holders embodying mechanism for tensioning or urging the brush or brushes into contact with the commutator of a motor, generator or the like.

Holders embodying tensioning devices for the brushes of electric motors and generators as heretofore made embody tensioning arms or levers which are pivoted to the holder with the result that the tension exerted by such levers or arms upon a brush is angular with respect to the brush and not in a direction longitudinally of the brush. Furthermore, these pivoted lever types of brush tension devices are limited to use with brushes of relatively short length due to the fact that it is possible only for the levers to engage the upper ends of such brushes through a limited portion of the circumference of their pivotal movement.

With the foregoing observations in mind, the principal object of the present invention is to provide a novel brush holder and tensioning device wherein the tension is exerted upon the brush longitudinally in the plane thereof and in the direction of its contact with the motor or generator slip-ring or commutator.

Another object of the invention is to provide a brush holder and tensioning device of the character set forth which is constructed and arranged to permit of the easy and quick removal and replacement of brushes and which is capable of use with brushes of substantial length.

Another object of the invention is to provide a novel brush holder and tensioning device of the type described embodying means for effecting controlled adjustment of the tension or pressure exerted upon the brush to the exact degree desired and without restriction to certain fixed adjustments because of any limitation in the particular position or positions to which the tensioning means may be adjusted.

A further object of the invention is to provide a novel brush holder and tensioning means of the character described which is of relatively simple, rugged construction, and entirely fool-proof in use and operation.

These and other objects of the invention and the various features and details of the construction and operation thereof are hereinafter fully set forth and shown in the accompanying drawings, in which:

Figure 1 is a view in perspective of a double brush holder and tensioning means embodying the present invention.

Figure 2 is a view in section taken on line 2—2, Figure 1.

Figure 3 is a view in section taken on line 3—3, Figure 1.

Figure 4 is a view in perspective of a modified

construction whereby the tensioning means may be connected to and exert pressure upon a brush; and

Figure 5 is a view in perspective of a single brush holder and tensioning means made according to the invention.

Referring now to the drawings, and particularly Figures 1 to 3 thereof, reference numerals 1, 1 designate a pair of electric motor or generator brushes mounted side by side in a brush box 2 and arranged to reciprocate or slide vertically therein independently of each other, the said brushes 1, 1 being independently urged downwardly toward the rotary contact surface of a motor or generator by means of blocks 3, 3 which engage upon the upper ends of said brushes and are tensioned downwardly longitudinally in the plane of the brushes as indicated by the arrows (see Figure 2).

The aforesaid brush box 2 forms or comprises the central part of a holder structure H which is formed to provide at opposite sides of said brush box 2 housing portions 4, 4 for the brush tensioning mechanisms, and projecting upwardly from the outer end of one of said housing portions 4 is a bracket or supporting portion 5 having a stud (not shown) extending upwardly therefrom to receive thereon a supporting member 6. As shown in Figure 1, the central brush box 2 is of greater width and height than the adjacent housing portions 4 and the latter are in open communication with said brush box through openings 8 which are the full width of said housings and extend entirely to the bottom thereof.

The opposite side wall portions 4a, 4b of each housing 4 are provided with suitable axially aligned bores 9 and 10 respectively, and in these bores of each housing 4 is mounted a shaft 11 arranged, as indicated, to extend transversely across said housings 4, 4. One end of each of the shafts 11 is of reduced diameter as indicated at 12 and this end projects outwardly through the bore 9 in the housing wall portion 4a and has a cotter pin 13 passed and secured through its projecting end portion. The reduced diameter 12 of the one end portion of each shaft 11 provides a shoulder 14 which is adapted to abut against the interior surface of the wall portion 4a which thereby acts as a stop against lateral displacement of said shafts in that direction.

The other end of each shaft 11 is journaled in an adjusting element or wheel 15 and the latter in turn is provided with an outwardly projecting smaller hub portion 16 which is journaled in the bore 10 of the wall portion 4b of each housing 4 as best shown in Figure 3 of the drawings. This wall portion 4b of each housing is split or severed to the bore 10 as indicated at 17 so that the hub portion 16 of each adjusting wheel may be rigidly clamped in any

desired rotary position with respect to its wall portion 4b by means of a screw or like element 18. The adjusting element 15 has in its peripheral surface a series of sockets or recesses 19 for receiving a nail or other instrument to turn or rotate said element 15 as desired.

Rotatably mounted upon each shaft 11 between the wall portion 4a and the inner end face of the adjusting element 15, which is journaled in the opposite housing wall portion 4b as aforesaid, is a roller member 20. As shown in Figure 3 of the drawings, each of these roller members 20 comprises a central hub sleeve portion 21 and an outer cylindrical portion 22 spaced concentrically with respect to said hub sleeve portion 21 thereby to provide an intermediate annular recess 23 lengthwise of said members 20 inwardly thereof from the end faces of the members 20 which are disposed adjacent the adjusting elements 15. These roller members 20 extend substantially entirely between the housing wall portions 4a and the adjusting element 15 and thus maintain the latter properly positioned with their hub portions journaled in the bores 10 in the opposite housing wall portions 4b.

A coiled spring 24 is disposed within the recess 23 of each roller member 20, as shown in Figure 3, and the opposite end portions of the springs 24 are inserted in or engage suitable openings 25 and 26 formed respectively in the adjusting elements 15 and the end portion of said roller members 20 disposed adjacent the housing wall portions 4a, said springs 24 being coiled and connected to said parts so that the roller members 20 are urged thereby, respectively, in the direction indicated by the arrows in Figure 2 of the drawings.

Suitably secured to the exterior surface of each roller member 20 by screws, rivets or the like 27, is one end of a tape or tape-like element 28 and an adjacent portion of the length of each such tape element 28 passes circumferentially its roller 20 in a direction opposite to that in which the said rollers 20 are urged or tensioned by their springs 24. From the inner side of the rollers 20 the tape elements 28 pass downwardly, then about an idler roller 29 suitably journaled in the lower portion of each housing 4 adjacent the brush box 2, and then upwardly from said idler rollers 29 where the other end portion of each of said tape elements is suitably secured to its corresponding brush contact block 3 previously described (see Figure 2).

As previously stated, the tape elements 28 extend about their rollers 20 in a direction opposite to the direction in which said rollers 20 are urged by their springs 24, and hence said springs 24 operate continuously to tend to cause the said tape elements to wind-up upon their rollers 20. Thus there is a constant pull exerted on said tape elements 28 which in turn exert a downward pull upon the brush contact blocks 3, 3 with the result that the brushes 1, 1 likewise are urged in a downward direction within the brush box 2, and, from the previous description, it will be seen that the tension of the springs 24, and consequently the downward thrust applied to the brushes 1, 1, may be adjusted to exactly the desired magnitude by rotation of the adjusting elements 15 about the shafts 11. It will be understood, of course, that prior to adjustment of element 15 as aforesaid, the screw 18 must first be loosened to reduce or release the "brake" action of the split portions 17 of walls 4b upon the hubs 16, and, 75

then, after adjustment of the elements 15, the screws 18 must be tightened in order to securely clamp the said elements 15 in the position to which adjusted.

5 The brush contact blocks 3, 3 may extend substantially the full width of the brush box 2, and, of course, must extend at least beyond the width of the openings 8 which provide communication between said box 2 and the housing portions 4. As previously pointed out, these blocks 3, 3 are not connected to the brushes 1, 1 but merely engage upon their upper end faces in the manner or relation shown in Figure 2 of the drawings. Thus the blocks 3, 3 are removable from the brush box 2, and for this purpose the adjacent end portions of the tape elements 28 are suitably formed to provide upwardly projecting tabs or handle portions 28a. Consequently, all that it is necessary to do in order to remove either or both brushes 1, 1, is to grasp the tab or tabs 28a and then pull upwardly thereon against the tension of springs 24 until the blocks 3, 3 clear the top edge of the brush box 2, after which they may be permitted to engage upon the upper edge of the walls of the housing portions. The brushes may then be removed and replaced with new brushes after which the blocks 3, 3 are reinserted downwardly into the brush box 2 and engaged upon the upper ends of the respective brushes, the tension of the springs 24 operating as before to urge the new brushes downwardly with an even uniform thrust into contact with the rotating element of the motor or generator.

35 It will be noted, particularly in Figure 2 of the drawings, that the construction and arrangement of the device of the present invention is such that the thrust or tension exerted upon the brushes 1, 1 is substantially vertically downward in the plane of said brushes with the result that the contact ends of the brushes will wear evenly and as said brushes wear down upon continued use they will be maintained evenly in contact with the rotating part under uniform, constant pressure by means of the tensioning mechanisms described above.

With respect to the electrical details of the present invention, it is pointed out that connections to the brushes 1, 1 may be effected in numerous ways, and, in the drawings, suitable conductors 36 are led down past the ends of the brush contact blocks 3, 3 and are suitably connected to the brushes 1, 1.

In Figure 4 of the drawings there is shown a modified construction of brush and thrust block, wherein the brush 1a has its upper end face provided with suitably located sockets 31 arranged to receive pins 32 which depend from the underside of the brush contact thrust block 3a, the tape element 28 being secured to and acting upon said block 3a in the manner previously described in connection with the blocks 3, 3. By this construction and arrangement relative fixation of the blocks with respect to the brushes is obtained.

In Figure 5 of the drawings there is shown a slightly modified form of device from that previously described herein and embodying only a single brush 1 and associated tension mechanism. However, apart from this difference, the construction and operation of this form of the device is similar to that hereinabove described, and like reference numerals have been applied to parts of this form of device which are the same

as like numbered parts of the dual form of device illustrated in Figures 1 to 4 of the drawings.

From the foregoing it will be observed that the present invention provides a device of the type set forth wherein the tension is exerted upon the brush or brushes longitudinally in the plane thereof, and wherein the construction and arrangement permits of the ready and easy removal and replacement of brushes without the necessity for detaching from the device any part or parts of the tensioning mechanism. Too, the device of the invention is simple and fool-proof, and the tension may be adjusted to the exact degree desired without restriction to any certain fixed adjustments because of any limitation in the particular positions to which the tensioning means may be adjusted.

While certain particular embodiments of the invention have been herein illustrated and described, it is not intended that the invention be limited to this disclosure but that changes and modifications may be made therein and thereto within the scope of the annexed claims.

I claim:

1. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, a roller member rotatably mounted on said shaft, an idler roll rotatably supported by the housing adjacent the brush box and offset from the roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said pressure block and the roller member with its intermediate portion passing about said idler roll, and spring means constructed and arranged to urge said roller member in a predetermined direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box.

2. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, a roller member rotatably mounted on said shaft, an idler roll rotatably supported by the housing adjacent the brush box and offset from the roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said pressure block and the roller member with its intermediate portion passing about said idler roll, spring means constructed and arranged to urge said roller member in a predetermined direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, and means operable at will for varying and regulating the force of said spring means and consequently the pressure exerted by the block upon the brush.

3. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, a roller member rotatably mounted on said shaft, an idler roll rotatably supported by the housing adjacent

the brush box and offset from the roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said pressure block and the roller member with its intermediate portion passing about said idler roll, an adjusting element rotatable on the shaft, and spring means connected between said adjusting element and roller member constructed and arranged to urge said roller member in a predetermined direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring means and consequently the pressure exerted by the block upon the brush.

4. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, a roller member rotatably mounted on said shaft, an idler roll rotatably supported by the housing adjacent the brush box and offset from the roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said pressure block and the roller member with its intermediate portion passing about said idler roll, an adjusting element rotatable on the shaft, spring means connected between said adjusting element and roller member constructed and arranged to urge said roller member in a predetermined direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring means and consequently the pressure exerted by the block upon the brush, and means for securing the said adjusting element in any position to which adjusted.

5. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, an adjusting element mounted on said shaft for rotation, a roller member mounted on said shaft for rotation adjacent said adjusting element, said roller member having an annular recess extending longitudinally therein inwardly from the end face of the roller member adjacent said adjusting element, an idler roll rotatably supported by said housing adjacent the brush box and offset from said roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said block and the roller member with its intermediate portion passing about said idler roll, and spring means disposed in the annular recess of the roller member and having its opposite ends connected respectively to said roller member and the adjusting element so that said spring tends to

urge the roller member in a direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring and consequently the pressure exerted by the block against the brush.

6. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, a shaft supported by said housing, an adjusting element mounted on said shaft for rotation, a roller member mounted on said shaft for rotation adjacent said adjusting element, said roller member having an annular recess extending longitudinally therein inwardly from the end face of the roller member adjacent said adjusting element, an idler roll rotatably supported by said housing adjacent the brush box and offset from said roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said block and the roller member with its intermediate portion passing about said idler roll, spring means disposed in the annular recess of the roller member and having its opposite ends connected respectively to said roller member and the adjusting element so that said spring tends to urge the roller member in a direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring and consequently the pressure exerted by the block against the brush, and means for securing the adjusting element in any position to which adjusted.

7. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, said housing having spaced side wall portions provided with axially aligned bores therein, a shaft extending through said bores in the housing walls, an adjusting element mounted on said shaft for rotation and disposed inwardly adjacent one of said housing wall portions, said adjusting element having a projecting hub portion journaled in the bore of said one housing wall portion, a roller member mounted on said shaft for rotation and extending therealong between the adjusting element and the other wall portion of said housing, said roller member having an annular recess extending longitudinally therein inwardly from the end face of the roller member adjacent said adjusting element, an idler roll rotatably supported by said housing adjacent the brush box and offset from said roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said block and the roller member with its intermediate portion passing about said idler roll, and spring means disposed in the annular recess of the roller member and

having its opposite ends connected respectively to said roller member and the adjusting element so that said spring tends to urge the roller member in a direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring and consequently the pressure exerted by the block against the brush.

8. A brush holder comprising a frame structure including a brush box and a housing disposed at least at one side of said brush box, said housing having spaced side wall portions provided with axially aligned bores therein, a shaft extending through said bores in the housing walls, an adjusting element mounted on said shaft for rotation and disposed inwardly adjacent one of said housing wall portions, said adjusting element having a projecting hub portion journaled in the bore of said one housing wall portion, a roller member mounted on said shaft for rotation and extending therealong between the adjusting element and the other wall portion of said housing, said roller member having an annular recess extending longitudinally therein inwardly from the end face of the roller member adjacent said adjusting element, an idler roll rotatably supported by said housing adjacent the brush box and offset from said roller member in the direction of thrust to be exerted upon a brush positioned in the brush box, a pressure block slidable within said brush box and arranged to engage upon the end face of such brush, an elongated flexible element having its opposite ends connected respectively to said block and the roller member with its intermediate portion passing about said idler roll, and spring means disposed in the annular recess of the roller member and having its opposite ends connected respectively to said roller member and the adjusting element so that said spring tends to urge the roller member in a direction of rotation tending to wind the elongated flexible element thereon and thereby exert a pull on the latter urging the said pressure block against the brush in the brush box, the adjusting element being adjustable at will to regulate the force of the spring and consequently the pressure exerted by the block against the brush, and means for securing the adjusting element in any position to which adjusted.

9. A device as claimed in claim 1 wherein the pressure block is provided with a plurality of pin elements projecting from its brush contact face and arranged for engagement with correspondingly positioned sockets in the end face of a brush positioned in the brush box.

10. A device as claimed in claim 5 wherein the pressure block is provided with a plurality of pin elements projecting from its brush contact face and arranged for engagement with correspondingly positioned sockets in the end face of a brush positioned in the brush box.

11. A device as claimed in claim 7 wherein the pressure block is provided with a plurality of pin elements projecting from its brush contact face and arranged for engagement with correspondingly positioned sockets in the end face of a brush positioned in the brush box.

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