Sept. 6, 1966

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3,271,605

BRUSH HOLDER ASSEMBLY

Filed Dec. 9, 1963

3 Sheets-Sheet 1

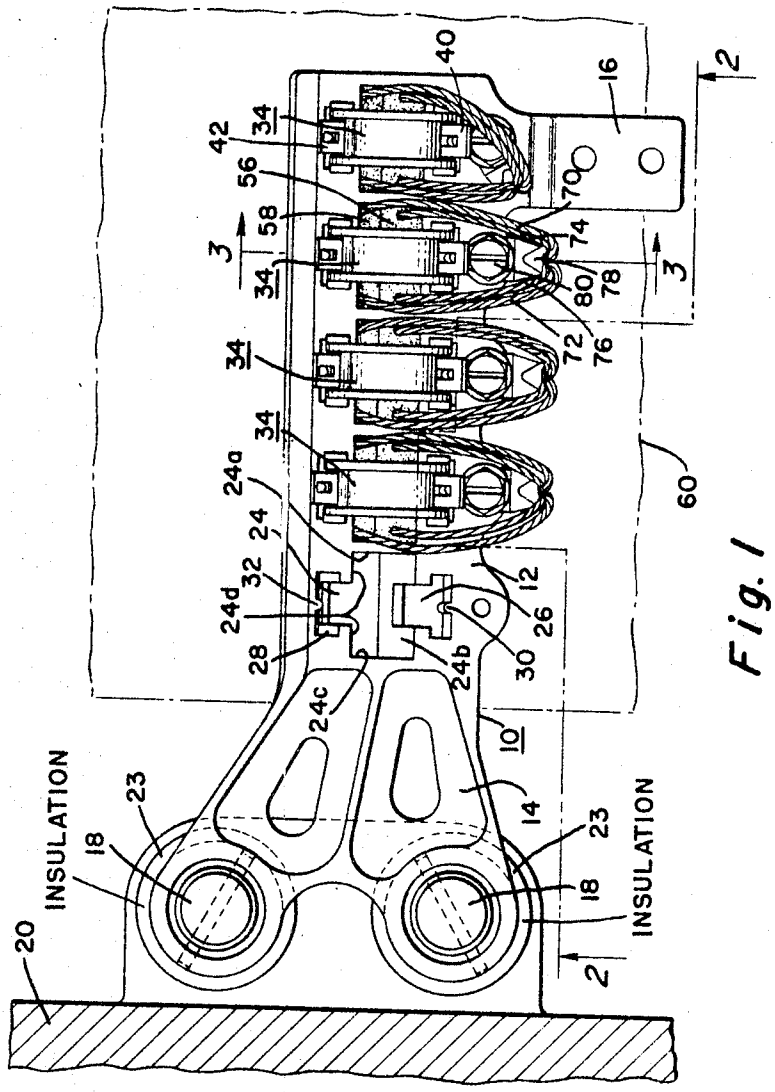


Fig. 1

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3 Sheets-Sheet 2

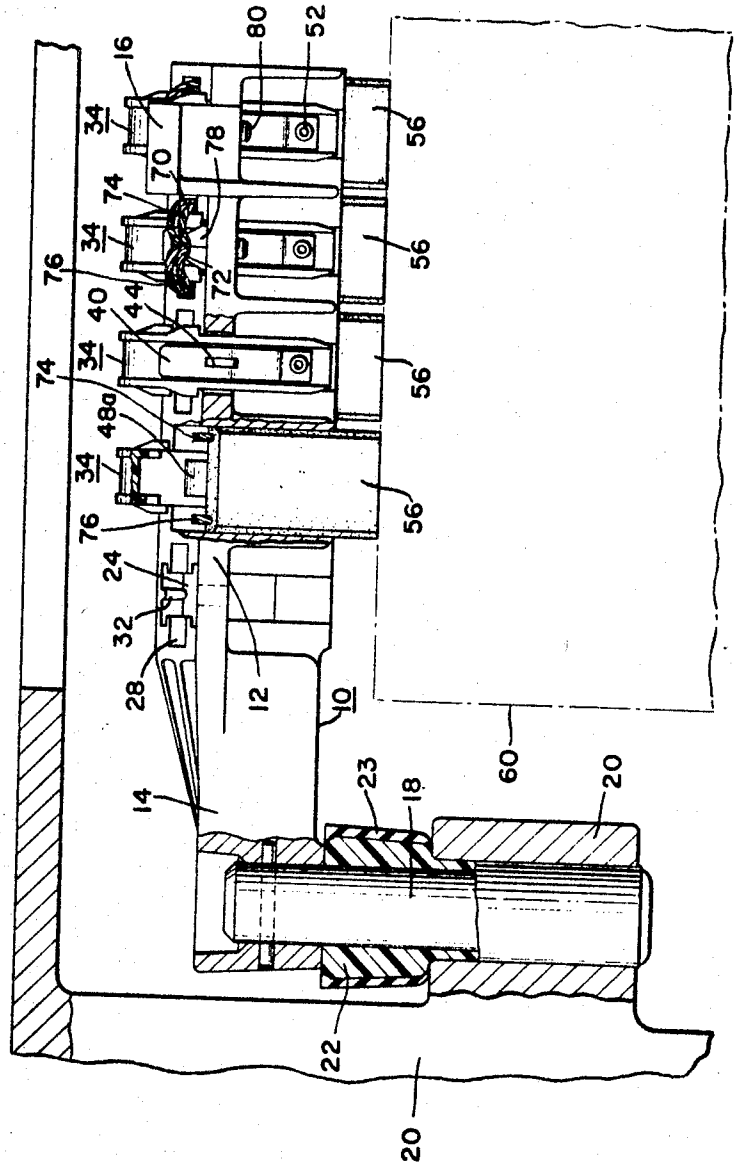


Fig. 2

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3 Sheets-Sheet 3

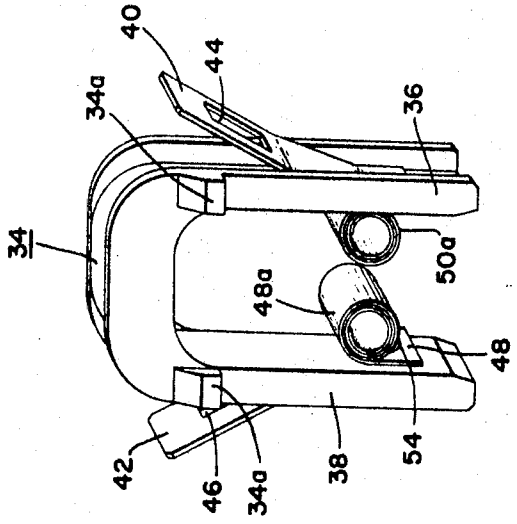


Fig. 4

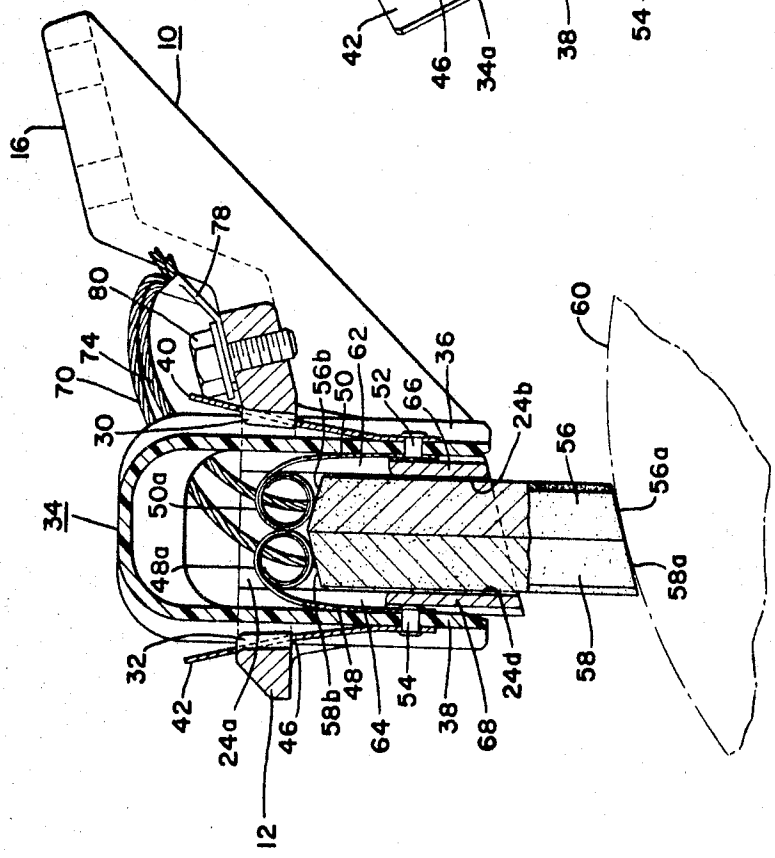


Fig. 3

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BRUSH HOLDER ASSEMBLY

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13 Claims. (Cl. 310—239)

This invention relates to a brush holder for dynamoelectric machines and more particularly to a brush holder of a type that utilizes a constant force spring of the type having a self-rewinding volute.

One of the objects of this invention is to provide a brush holder that can be formed of a die cast material such as brass that carries a plurality of brush spring assemblies that have constant force springs.

Another object of this invention is to provide a brush holder that is capable of carrying a plurality of brushes and to provide an arrangement wherein each brush is individually spring-loaded and where it is a relatively simple matter to change brushes.

Another object of this invention is to provide a brush holding arrangement wherein a pair of brushes are urged into engagement with a rotating conductor such as a commutator and wherein the pair of brushes are urged against the rotating conductor by constant force springs carried by a common support that can be snap-fitted to a brush holder.

A further object of this invention is to provide a brush holding arrangement wherein the brush holder is formed with a plurality of chambers or openings which can receive brushes and wherein the brush holder is provided with means for receiving a constant force spring assembly that has spring arms that become snap fitted with the brush holder body for easy removal and assembly of the spring assembly to the brush holder.

Still another object of this invention is to provide a brush holder which is lighter in weight, requires less parts and requires less machining than heretofore known comparable brush holders.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a top plan view of a brush holder made in accordance with this invention.

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1.

FIGURE 3 is a sectional view taken along line 3—3 of FIGURE 1.

FIGURE 4 is a perspective view of a constant force spring assembly which is used to urge the brushes of the brush holder shown in FIGURE 1 against the commutator.

Referring now to the drawings, the reference numeral **10** generally designates a brush holder which is formed of a die cast material such as die cast brass. The brush holder **10** has an elongated brush supporting section **12**, a bracket section **14** and a section **16**. The bracket section **14** is secured to a pair of steel posts **18** which are supported by a support **20**. The posts **18** are insulated from the support **20** by insulating material **22**. A rubber sleeve **23** fits on each insulator **22**. The section **16** of the brush holder is adapted to be connected with a terminal of a high current capacity and this terminal is connected with a heavy copper conductor not illustrated.

The brush receiving section **12** is slightly off-set from the bracket section **14** and has a plurality of openings or chambers **24** for receiving brushes. To be more specific,

the section **12** has five chambers **24** which are identical in configuration and therefore only one of the chambers will be described in detail.

Each chamber **24** is defined by inner walls **24*a***, **24*b***, **24*c*** and **24*d***. A pair of slots **26** and **28** are located adjacent each chamber or opening **24**. A pair of projections **30** and **32** extend respectively into the slots **26** and **28** and these projections as is more fully described hereinafter, snap into openings formed in the brush spring assembly shown in FIGURE 4.

Referring now to FIGURE 4, a brush spring retainer assembly is illustrated which is used in the assembly shown in FIGURE 1. This assembly includes a U-shaped part **34** which is formed of a plastic material. The part **34** has four integral lugs **34*a*** two of which are shown in FIGURE 4. The other two lugs are on the opposite side of part **34**. The legs **36** and **38** of the U-shaped part **34** carry flat springs **40** and **42** which due to their own resilience, take the position shown in FIGURE 4. The spring **40** has a slot **44** while the spring **42** has a slot **46**.

The inner walls of the legs **36** and **38** carry constant force springs **48** and **50** which each have self-rewinding volute portions **48*a*** and **50*a***. These springs are well-known to those skilled in the art and are capable of applying a constant force to a brush or to other devices as the length of the device with which they are used shortens. Thus in the case of brushes, the volute portions **48** and **50** wind up as the brushes wear and a constant force is applied to the brushes regardless of the length of the brushes.

The spring **50** and one end of the flat spring **40** are secured to the leg **36** by a rivet **52** shown in FIGURE 3. In a similar fashion, the spring **48** and the flat spring **42** are secured to the leg **38** by a rivet **54**.

Referring now more particularly to FIGURE 3, it is seen that the legs **36** and **38** of the U-shaped member are disposed within the slots **26** and **28** of the brush holder. It is also seen that when the U-shaped part **34** is in place, the projections **32** and **34** fit into the openings **44** and **46** formed in the springs **40** and **42**.

The constant tension springs **50** and **48** urge the carbon brushes **56** and **58** into engagement with a rotating conductor which may be, for example, a commutator **60** of a dynamoelectric machine which can be a direct current generator. The brushes **56** and **58** are disposed within the chambers **24** and one wall of each brush engages the other wall of the other brush. The ends **56*a*** and **58*a*** of the brushes are inclined as shown to ride on the commutator **60**. The top ends **58*b*** and **56*b*** of the brushes are also inclined away from each other and these inclined ends are engaged by the self-rewinding volute portions **50*a*** and **48*a*** of the brush springs **48** and **50**.

The constant force springs **48** and **50** pass through slots **62** and **64** formed in sections **66** and **68** of the brush holder **10**. The legs **36** and **38** of the brush spring support are located outside of the walls **66** and **68** as is clear from FIGURE 3. The brushes **56** and **58** engage the inner walls **24*b*** and **24*d*** of the brush holder.

The top end of each brush is secured to copper conductors, for example, conductors **70** and **72** for the brush **58** and conductors **74** and **76** for the brush **56**. The opposite ends of these conductors are secured to a terminal **78** which in turn is secured to the brush holder **10** by a bolt **80**. These conductors serve to electrically connect the brushes with the die cast brass portion holder **10**.

The brush spring retainer assembly which is shown in FIGURE 4 can be readily removed from the brush holder **10** when it is desired to change brushes in any or all of the chambers **24** and is readily assembled to the brush holder following the change in brushes. Thus to remove the brush spring retainer, it is only necessary to grasp the flat springs **40** and **42** with the hand and push them toward each other. When the parts **40** and **42**

are pushed toward each other, the slots **44** and **46** will clear the projections **30** and **32** and the brush spring retainer can then be removed from the brush holder **10**. The brush can then be withdrawn from the chamber **24** and the bolt **80** loosened so that the brushes can be removed from the brush holder. After the brushes have been put into the chambers **24**, the terminal **78** is fixed in place and the brush spring retainer can then be pushed down into the brush holder until the projections **34** and **32** snap into the slots **44** and **46**. The projections **34***a* can engage a top end of the brush holder **10** to prevent part **34** from being pushed too far into chamber **24** when the part **34** is being assembled to the brush holder **10**.

In the final assembled position of the brush spring retainer, the lower edges of the slots **44** and **46** are pushed up against the lower edges or projections **30** and **32** by the reactive force of the constant force springs **48** and **50**.

It will be appreciated that current is transferred to the die cast brass brush holder **10** by the brushes and by the conductors connecting the brushes and the brush holder. The total current from the commutator **60** is taken by a heavy conductor connected to section **16** as pointed out hereinbefore.

While the embodiments of the present invention as herein disclosed, constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A brush holding arrangement for a dynamoelectric machine comprising, a brush holder having at least one chamber, at least one brush disposed within said chamber, a spring support located outside of said chamber, a constant force spring having a self-rewinding volute engaging one end of the brush, said constant force spring passing through a slot connecting the exterior and interior of said chamber, a spring arm carried by said support, a slot formed in said arm, and means integral with said brush holder fitting within said slot when said support is assembled to said brush holder.

2. A brush holding arrangement for a dynamoelectric machine, a brush holder having at least one chamber, a pair of brushes slidably disposed within said chamber and engaging each other, a U-shaped support member, said U-shaped support member carrying a pair of constant force springs and a pair of spring arms, said constant force springs being located on the inside of said U-shaped member and said spring arms being located on the outside of said U-shaped member, said U-shaped support being located outside of said chamber with said springs passing through slots formed in said brush holder and engageable with one end of said brushes, said spring arms having slots which receive integral projections on said brush holder for locking said U-shaped member in place when said U-shaped member is assembled to said brush holder.

3. The brush holding arrangement according to claim **2** where the brush holder is formed of a conductive material and where the brushes are electrically connected with the brush holder by conductors.

4. The brush holding arrangement according to claim **2** where the U-shaped member is formed of insulating material and wherein the brush holder is formed of a die cast electrically conductive material.

5. A brush spring retainer adapted to be fitted to a brush holder comprising, a support member having first and second legs, first and second constant force springs each having a self-rewinding volute portion attached respectively to one wall of each of said legs, and first and second spring arms attached respectively to another wall of said legs, said arms each having a slot and being capable of being moved toward each other manually.

6. A brush spring support adapted to be secured to a brush holder comprising, a U-shaped member, a constant force spring having a self-rewinding volute attached to an inner wall of each leg of the U-shaped member, a spring arm attached to an outside wall of each leg of said U-shaped member, said spring arms each having a slot and being adapted to be grasped by the hand of the user to compress said spring arms toward each other for assembly and removal of said support to a brush holder.

7. The brush spring retainer according to claim **6** where the U-shaped member is formed entirely of insulating material.

8. The brush spring retainer according to claim **6** where the constant force springs and spring arms are secured to the legs of the U-shaped member by a common fastener.

9. A brush holder arrangement for a dynamoelectric machine comprising, a brush holder formed of die cast electrically conductive material, said brush holder having a plurality of brush holding chambers, a pair of brushes disposed in each of said chambers, said brushes engaging each other within each chamber, a brush spring support assembly for each pair of brushes, said assembly including a U-shaped member formed of insulating material, a pair of constant force springs carried by each support assembly and engageable with one end of said brushes for urging said brushes toward a rotating conductor and a pair of spring arms for each of said supports, each of said spring arms having slots which receive integral projecting portions of said brush holder, and conductor means connecting all of said brushes with said brush holder.

10. The brush holding arrangement according to claim **9** where the spring arms are disposed on the outside of the U-shaped member and the constant force springs on the inside of the U-shaped member.

11. The brush holding arrangement according to claim **9** where the legs of the spring support are located outside of the brush holding chambers.

12. A brush spring retainer adapted to be fitted to a brushholder comprising, a support member having first and second spaced legs, first and second constant force springs each having a self-rewinding volute portion attached respectively to one wall of each of said legs and positioned such that said constant force springs face each other, and first and second spring arms attached respectively to another wall of said legs, said arms each having means engageable with a brushholder for holding said support member fixed to said brushholder, said arms being capable of being moved toward each other manually to release said support member from a brushholder.

13. A brushholding arrangement for a dynamoelectric machine comprising, a brushholder, a brushholding chamber formed in said brushholder, said brushholding chamber slidably supporting a pair of brushes, a spring support member having spaced legs, said spring support member carrying a pair of constant force springs which respectively engage the ends of said brushes for urging said brushes in a direction to engage a conductor, and first and second spring arms supported respectively by said legs, said arms having means engageable with said brushholder for holding said support member fixed to said brushholder, said spring arms being positioned such that they can be manually moved toward each other to release said support member from said brushholder.

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