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N. C. BASSETT & J. W. HILL.
BRUSH HOLDER.

(Application filed Aug. 31, 1900.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 14.

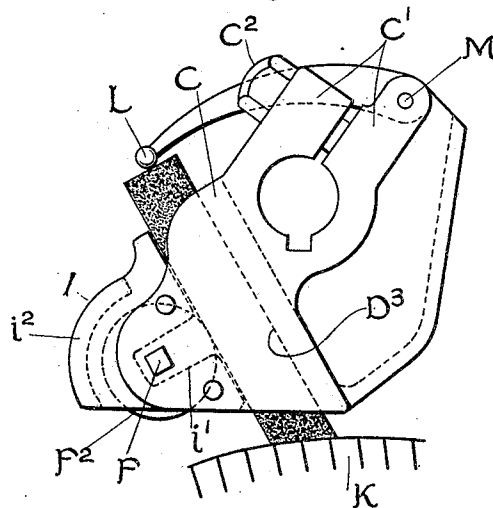
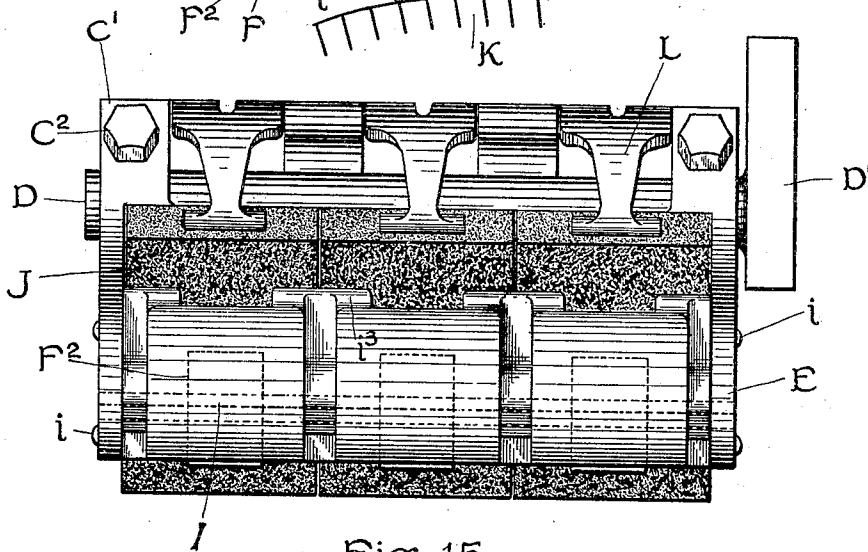


Fig. 15.

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BRUSH-HOLDER.

SPECIFICATION forming part of Letters Patent No. 697,432, dated April 15, 1902.

Application filed August 31, 1900. Serial No. 28,642. (No model.)

To all whom it may concern:

Be it known that we, NORMAN C. BASSETT, a citizen of the United States, and JOHN W. HILL, a subject of the Queen of Great Britain, both residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Brush-Holders, (Case No. 1,443,) of which the following is a specification.

The present invention relates to brush-holders, and has for its object to improve their construction.

It is customary with dynamo-electric machines employing carbon brushes to place them radially or tangentially, as desired. In the latter case the preferred arrangement is to drive the commutator against the brush. It is to holders suitable for the latter use that our invention more particularly relates.

In carrying out our invention we employ a spiral or clock spring, which engages with the front surface of the brush, and as the brush moves up and down slightly, due to irregularities in the surface of the commutator, this spring rolls or twists slightly. The spiral or clock spring may or may not turn about the central support or stud, as desired. So long as there is little or no independent movement between the carbon brush and the spring there is no liability of arcing at the point of contact, the friction is reduced to a minimum, and the operation is satisfactory.

In the accompanying drawings, which illustrate our invention, Figure 1 is a side elevation of a brush-holder yoke, showing one brush-holder in end elevation. Fig. 2 is a front elevation of a brush-holder. Fig. 3 is a perspective view of the brush-holder with one of the brushes removed and its actuating-arm turned back. Fig. 4 is a section view taken on line 4-4 of Fig. 2. Figs. 5, 6, 7, 8, and 9 are details showing the construction of the spiral or clock spring and its support. Fig. 10 is a side elevation of the sleeve employed for supporting the clock-spring. Fig. 11 is a detail view showing the clock-spring mounted on a rectangular stud. Fig. 12 shows a guard or hood which is provided to guard the spring from the arcing of the adjacent brushes. Fig. 13 is a front view of the hood. Figs. 14 and

15 are respectively a side and front elevation of a slight modification.

In the drawings, A represents a metal yoke, which is adapted to be mounted in a groove in one of the bearings of the dynamo-electric machine to which the brush-holder is attached, or it may be mounted on an independent support. As shown in Fig. 3, the ring is provided with set-screws A' for clamping it in place. Extending radially from the ring are one or more projections A², and secured to these projections are pieces of insulation B, such as wood or fiber, for example. The pieces of insulation are provided at their ends with metal tips or caps B', to which the brush-holders proper are secured.

Preferably the brush-holders are made counterparts, so that they may be used either on the right or left hand side of the yoke. This is an advantage in that it simplifies the construction and prevents mistakes in ordering, shipping, &c.

The brush-holder proper consists of a main body or casting C, having flat parallel extending ends provided with an opening to receive the shaft or spindle D. The stud or spindle passes through the split ears C', which are clamped together by the bolts C², thus preventing the brush-holder from slipping endwise, but at the same time providing for adjustment. The stud is provided with an enlarged rectangular head D' and is arranged to move in the slot D⁴ of the metal cap B' when it is desired to adjust the position of the brush-holder with respect to the commutator. The stud D is slotted to receive a short key D², and this key prevents the main body of the brush-holder from rotating. The end plates of the brush-holder are parallel and are extended, as indicated at E, to form supports for the shaft or stud F and also to form the sides of the brush-receptacle. The shaft is preferably secured against rotation in the ears or projections E and extends parallel with the front face D³ of the holder. Mounted on the shaft F are spiral clock-springs F², and the construction of these springs is best shown in Figs. 5 to 9, inclusive, wherein F represents the fixed shaft, and sleeved thereon is a short tube-section F', and surrounding this

tube-section and secured thereto is a coil or clock spring F^2 . Under certain conditions of operation we permit the spring to engage directly with the carbon brush; but in certain other instances we prefer to place a ring or band F^3 around the spring. The band or ring F^3 may consist of a straight-sided cylinder with one end of the spring fastened thereto, or it may consist, as is shown on Figs. 7 and 8, of a straight-sided cylinder having its ends turned over at F^1 to form flanges and prevent the parts from moving endwise independent of each other. These constructions have the advantage of always presenting a smooth exterior to the carbon brush, and as the brush moves up and down, due to the slight irregularities in the commutator, the spring and band will follow its movements and always maintain the brushes against the brush-holder face D^3 . Owing to the flexibility of springs the band will twist or turn to the right or left, as well as move in and out, so as to permit using a brush that is not exactly true or one not of the proper shape. This arrangement also permits the brushes, when more than one are used in a holder, to move freely up and down independently of the other or others. In order to separate the springs one from the other when they are sleeved on the stud, spacers II are mounted on the stud and are located between them. If desired, we may make the sleeve F' and the spacer II out of insulating material, which prevents any current from passing through the spring. This also has the effect of deadening any sound which is produced by the vibrations of the machine.

In Fig. 11 we have shown a slight modification of the means employed for supporting the spring, which modification consists in making the shaft F' rectangular in form, in dispensing with the spacers II , and in mounting the spiral or clock spring F^2 directly on the stud or shaft instead of on a sleeve. In this construction the spring is not free to turn around the stud, but being made with a number of turns or spirals it is free to move up and down to a certain extent with the carbon brush, as well as to twist slightly to compensate for slight inequalities in the commutator and in the brush. With this construction we may or may not use a band or sleeve F^3 . It is preferable, however, to do so. This last-mentioned form of construction eliminates all noise due to the vibration of the parts, since they are rigidly secured together.

In Figs. 12 and 13 we have shown a hood or protector I , which surrounds each clock-spring on that portion remote from the commutator-brush. The object in placing this hood or protector around the spring is to prevent the arcing from an adjacent brush from roughening the band F^3 and to guard against taking the temper out of the spring F^2 .

The brushes J may be made of carbon, graphite, or other suitable material and are

held in place against the flat finished surfaces D^3 of the brush-receptacle by the clock-springs F^2 and are pressed against the commutator K by the spring-pressed arms L . These arms are supported on the small shaft M , which extends parallel with the stud D and is rigidly supported in the lugs or projections C' . Between these arms are bosses C^3 , which separate the arms from each other and also act as supports for the shaft. The arms are forced against the ends of the carbon brushes by the extension-springs N , and these springs are secured to the arms at their outer ends by the pins O' and at their inner ends are attached to a stud P , which extends from one end of the holder to the other. The pivoted end of the arm L is slotted in such a manner that the arm can be thrown back, as shown in Fig. 3, and the spring N will pass over the dead-center and retain it in place. In addition to holding the brush against the base of the holder the clock-spring prevents it from dropping out of the holder when the arm L is raised. Current is conveyed to and from the brush-holder by a cable Q , which is mounted in the socket Q' , formed on the back of the holder.

We may use one or more brushes in our holder, as desired. In event of using only one brush it is preferable to reduce the size of the holder and to provide one spring-pressed arm L and one clock-spring F^2 , the receptacle having an open front, as before. By making the brush-holder bases or bodies exactly alike and providing them with end plates having flat surfaces we are enabled to employ them either on the right or left hand side of the machine, as desired. This adds greatly to the simplicity of construction and decreases the cost of manufacture. Assuming that it is desired to reverse the position of the holder shown in Fig. 3, the bolts C^2 are loosened, the brush-holder body removed from the shaft D , after which it is turned, so that what is now the front face becomes the back face and is placed against the head of the stud D .

In a holder of the construction described the brushes are firmly held in contact with the surface D^3 , yet much less opposition is offered to the minor movements of the brush than in holders where a flat spring-plate is employed which engages with the brush and is located between it and the front of the holder. In order to increase the conductivity between the brushes and the cable Q , flexible cables may be employed and attached to the brush and to some fixed part of the holder.

In Figs. 14 and 15 we have shown a slight modification of our invention, in which the hoods I instead of being made separate are formed of a single piece and are secured to the side portions E of the brush-holder body. Extending across the front of the brush-holder and parallel with the brushes is a rectangular shaft F , upon which are mounted the clock-springs F^2 . These springs may or may not

be provided with the outside tubular sleeves F^2 . In Fig. 15 three brushes are shown, and the hoods or protectors I for the several brushes are made in a single casting, which is secured to the end pieces E by rivets i . The ends of the hoods or protectors I are slotted, so as to pass freely over the shaft F , as indicated by dotted lines i' , Fig. 14. Surrounding each clock-spring is a curved portion i^2 , forming a receptacle which protects the spring from the arcing of the adjacent brushes. This curved portion is located at some distance from the spring, so as to permit the latter to have freedom of movement. At points between the brushes the hood I is extended to form guides i^3 . These guides are not intended to engage with the brushes under ordinary running conditions, but are intended to prevent the brushes from jumping out of position, particularly when the dynamo-electric machine to which the brush-holder is attached is started. We have found that in certain instances the commutator becomes gummy, owing to the use of bad oil, and in other instances it becomes rough, due to the abuse of the machine, and under such conditions when the machine is started the starting friction is sometimes sufficient to move the brush against the guides i^3 , while the running friction is not sufficient to hold it there. The construction shown is somewhat simpler than that described in connection with the previous figures, since it involves less machine-work, and the structure as a whole can be much more readily finished than when composed of a number of smaller parts. In other respects the construction of the brush-holder is the same as that previously described, and the letters of reference indicate corresponding parts, so that further description is unnecessary.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. As an article of manufacture, a body for a brush-holder, comprising a casting consisting only of similar and parallel end pieces connected by an angularly-disposed back for the brush, so that it may be used either for a right or a left hand holder, the body being open at the top, bottom and front, and the space included between the end pieces and the back being unencumbered with any integral parts of the brush-holder body.

2. As an article of manufacture, a body for a brush-holder, comprising a casting having an open-front receptacle for receiving the brush, and parallel extending end pieces which form the sides of the receptacle the said end pieces being provided with clamping-ears which are bored out to receive the supporting-stud, whereby the holder may be retained in place.

3. In a brush-holder, the combination of a base or body having a receptacle for receiving a brush, a means for moving the brush toward the commutator, and a coiled spring which presses directly against the brush.

4. In a brush-holder, the combination of a base having a brush-receptacle, a spring for forcing the brush against the commutator, and a spiral or clock spring which rests on one of the faces of the brush and forces it against the base.

5. In a brush-holder, the combination of a base having a brush-receptacle, a spring for pressing the brush against the commutator, and a second spring for forcing the brush into its proper place in the receptacle, which spring rests on the brush and is capable of an angular and also a twisting movement as the brush moves.

6. In a brush-holder, the combination of a base having a brush-receptacle, a spring for pressing the brush against the commutator, and a clock-spring which presses the brush against the base of the holder and is so arranged that it will move angularly to a greater or less extent as the brush moves up and down.

7. As an article of manufacture, a spring for a brush-holder, comprising a spiral of flat spring metal, which is surrounded by a tubular piece of metal that forms a bearing-surface.

8. As an article of manufacture, a spring for a brush-holder comprising a spirally-wound sheet of metal having a central sleeve and an inclosing tube, the ends of said tube being turned inwardly to prevent it from slipping endwise off from the spring.

9. In a brush-holder, the combination of a base having a brush-receiving receptacle, a shaft or stud extending parallel with said base, and a clock-spring which is mounted on the stud and presses the brush into engagement with the base.

10. In a brush-holder, the combination of a base-piece which is mounted on a suitable support and is provided with a brush-receptacle, a shaft, and a flat coiled spring which is sleeved on the shaft in such manner that it is free to rotate as the brush moves up and down.

11. In a brush-holder, the combination of a base having an open-front receptacle for receiving a plurality of brushes, a shaft which extends across the receptacle, a plurality of coiled springs mounted on the shaft and arranged to press the brushes against the base, each of said springs being capable of angular movement independent of the other or others.

12. In a brush-holder, the combination of a base having a receptacle for receiving a plurality of brushes, a stud extending across the front of the receptacle, a plurality of clock-springs coiled around said stud, each engaging with a brush and capable of a certain amount of angular movement, and spacers which are mounted on said stud for separating the springs.

13. In a brush-holder, the combination of a base having a brush-receptacle, a shaft or stud extending across the face of the receptacle, a coiled spring wrapped around the

stud for holding the brush in position, and a hood or guard which surrounds a portion of the spring and is secured to the stud.

14. In a brush-holder, the combination of an
5 insulating-support, a metal end piece for said insulating-support, which is provided with a slot or groove, a brush-holder stud having a rectangular head, which head is mounted in the groove or slot, a spring for pressing the
10 brush against the commutator, and a coiled spring which engages with and presses the brush against the base of the brush-holder.

15. In a brush-holder, the combination of a base having a receptacle in which the brush
15 is held in an angular position with respect to the commutator as distinguished from a holder in which the brush is radial, a clock-spring which at its periphery engages with and presses the brush against the base, and
20 a spring-pressed arm for forcing the brush against the commutator.

16. In a brush-holder, the combination of a brush-receptacle, a coiled spring which presses the brush against the face of the receptacle,
25 and a hood which surrounds a portion of the spring, and protects it from arcs formed at an adjacent brush.

17. In a brush-holder, the combination of a brush-receptacle, coiled springs for pressing

the brushes against the face of the receptacle, 30 and a hood or protector which incloses the springs and extends across the receptacle and is provided with guide-pieces which hold the brushes in place when they tend to jump, but at no other time. 35

18. In a brush-holder, the combination of a brush-receptacle designed to receive a plurality of brushes, a clock-spring for pressing each brush against the face of the receptacle, a hood or protector composed of a single casting 40 which is provided with a receptacle for each brush, and means for securing the hood or protector to the end piece of the brush-receptacle.

19. A brush-holder which comprises a casting 45 having similar and parallel end pieces connected by an angularly-disposed back for the brush, a support mounted on the two end pieces, and a spirally-coiled spring-strip mounted on said support, to press the brush 50 against the back of the casting.

In witness whereof we have hereunto set our hands this 29th day of August, 1900.

NORMAN C. BASSETT.

JOHN W. HILL.

Witnesses:

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HENRY O. WESTENDARP.