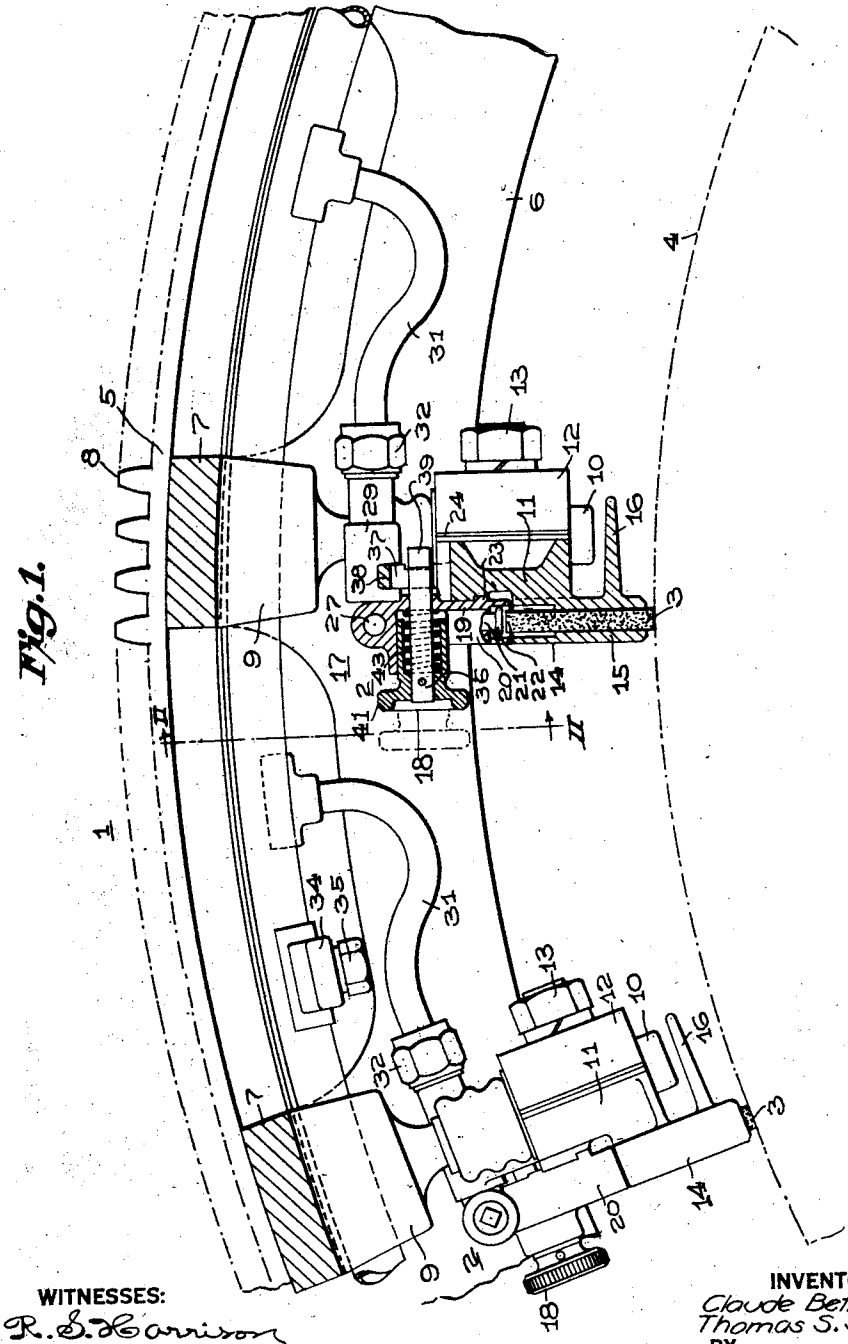
Mar. 13, 1923. 1,448,377

C. BETHEL ET AL.

CURRENT COLLECTING DEVICE

Filed July 5, 1922 2 sheets-sheet 1

Fig. 1.



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Fig. 2.

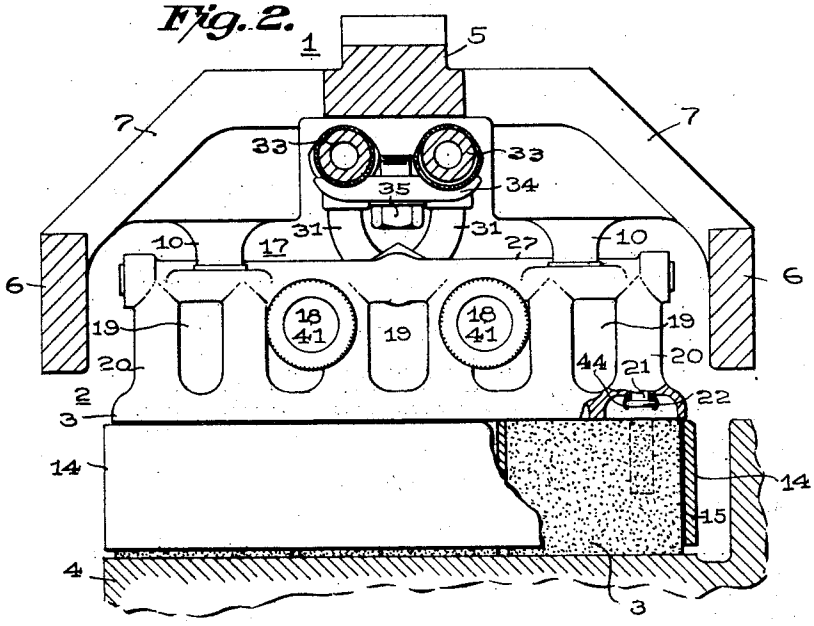


Fig. 3.

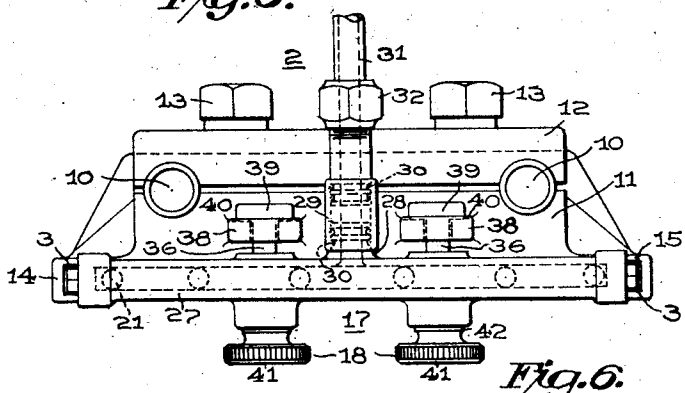


Fig. 4.

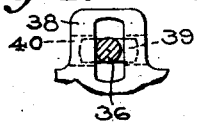


Fig. 5.

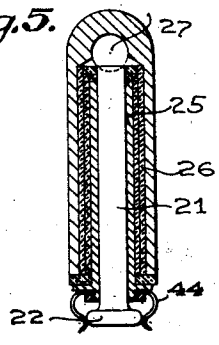
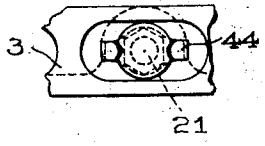


Fig. 6.



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Patented Mar. 13, 1923. 1,448,377

UNITED STATES PATENT OFFICE.

CLAUDE BETHEL, OF WILKINSBURG, AND THOMAS S. SCOTT, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

CURRENT-COLLECTING DEVICE.

Application filed July 5, 1922. Serial No. 572,859.

To all whom it may concern:

Be it known that we, CLAUDE BETHEL, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, and THOMAS S. SCOTT, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Current-Collecting Devices, of which the following is a specification.

Our invention relates to current-collecting devices and it has particular relation to brush holders for electric railway motors, and the like.

One of the objects of our invention is to provide a brush holder, of the character described, which embodies fluid-pressure mechanism by means of which substantially uniform pressure will be exerted upon the several brush elements, whereby a more positive and efficient electrical contact will be effected between the brush members and the commutator cylinder and the uneven wear of the various parts materially reduced.

Another object of our invention is to provide a device, of the character described, which embodies a fluid-pressure device that is removably secured in position for convenient access to the brush members and which not only substantially encloses the upper portion of the brush boxes, to exclude dust and foreign matter therefrom, but permits of the employment of brush boxes having continuous side walls, thereby providing greater contact surface for the brush members.

A further object of our invention is to provide an efficient air-tight slip-joint connection between the compressed air pipes and the manifold elements of the pressure device, by means of which the manifold and its associated parts may be quickly and easily removed from the machine, as an entirety, to provide access to the brush members for the purpose of replacement or repairs.

A still further object of our invention is to provide a brush holder, of the character set forth, in which the various pipes that supply compressed air to the several manifolds and brush-pressure pistons, also function as electrical conductors, whereby the construction of the entire device is materially simplified and strengthened.

Another object of our invention is to provide a brush holder which is provided with means for preventing the displacement of the brush-pressure pistons or plungers when the manifold is detached.

A still further object of our invention is to provide a brush holder which, in addition to the features hereinbefore enumerated, embodies relatively few parts, is of less weight and occupies less space than devices of the general type previously employed for the purpose, has a minimum amount of overhang, is of very rugged construction and by means of which brush members of less width than has heretofore been practicable may be utilized.

In the accompanying drawings:

Figure 1 is a view, partially in side elevation and partially in vertical section, of a portion of the current-collecting elements of a dynamo-electric machine embodying brush holders constructed in accordance with our invention.

Fig. 2 is a vertical transverse sectional view, taken on the line II—II of Fig. 1 and illustrating the brush holder and pressure device in front elevation.

Fig. 3 is a plan view of the brush holder illustrated in Figs. 1 and 2.

Fig. 4 is a fragmentary elevational view of the bolt or latch member which detachably secures the brush pressure device of the brush holder in operative position.

Fig. 5 is a vertical sectional view, on a larger scale, through one of the compressed air cylinders and illustrates the spring clip by means of which the respective brush-pressure pistons are prevented from becoming displaced when the pressure device is removed from the machine.

Fig. 6 is an end view of the compressed air cylinder shown in Fig. 5.

Referring to the drawings, a portion of a dynamo-electric machine is illustrated as comprising, in general, a rocker ring 1 which supports a plurality of brush holders 2 and brush members 3 carried thereby, for cooperation with a commutator cylinder 4.

The rocker ring 1 preferably consists of a centrally disposed annular member 5 and a plurality of outer reinforcing ring portions 6,

of slightly less diameter, which are secured thereto at intervals, and in spaced relation thereto, by means of arms or web portions 7 which are preferably formed integral with the member 5 and rings 6. The periphery of the member 5 is provided with gear teeth 8 by means of which the ring 1 and the current-collecting devices 2 may be shifted circumferentially, by any suitable mechanism, not shown, in order to adjust the brush members 3 with respect to the axis of commutation of the machine.

The arms 7 are provided with lugs or bosses 9 to which brush-holder-supporting studs 10 are suitably secured. Each of the brush holders 2 comprises a bracket portion 11, which is adapted to be secured to the studs 10 by means of a transverse clamping bar 12 and bolts 13. The forward side of the bracket portion 11 is provided with a substantially rectangular housing 14, which is subdivided into a plurality of compartments or brush boxes 15 in which the brush members 3 are slidably mounted. An arc shield 16, in the form of a relatively thin flange, is provided adjacent to the lower portion of the housing 14 and extends rearwardly between the commutator cylinder 4 and the lower extremity of the stud 10 for the purpose of minimizing any tendency for an arc to become established therebetween.

A pneumatic brush-pressure device, indicated as a whole at 17, is detachably secured to the bracket 11 directly above the housing 14, by means of a plurality of bolt or latch members 18. The pressure device 17 preferably comprises a transversely extending rear wall or flange 19 which is provided with a plurality of radially extending cylinders 20, each of which is disposed substantially in line with one of the brush boxes 15 and within which plungers 21 are slidably mounted.

The lower extremities of the plungers 21 are provided with head portions 22 which are adapted to bear against the upper edges of the brush members 3 to maintain them in yieldable engagement with the surface of the commutator cylinder 4, as will be hereinafter set forth. The rear surface of the wall 19 is provided with a tranversely extending rib 23, which engages a channel 24 that is provided in the forward face of the bracket 11 and prevents the pressure device from turning about the latch members 18. The pressure device is thus securely maintained in proper position with respect to the brush holder.

The cylinders 20 are each provided with a sleeve or bushing 25, which is spaced therefrom by means of a sleeve 26, of insulating material, (Fig. 5) for the purpose of diminishing the tendency for eddy currents to be set up within the walls of the cylinders.

Communication is established between the several cylinders 20, adjacent to the upper portions thereof, by means of a transversely extending header member or manifold 27 which is provided with a rearwardly extending nipple 28. The nipple 28 extends within and slidably engages a tubular connection or socket 29 that is provided on the upper portion of the bracket 11. The nipple 28 is preferably provided with a plurality of circumferential grooves 30, which function as a seal to prevent the leakage of air in the vicinity of the joint.

Compressed air, or other fluid under pressure, is supplied to the cylinders 20 through the manifold 27, nipple 28 and socket 29, from a pipe 31, which is secured to the socket 29 by means of a union 32. The pipe 31 is preferably of resilient construction to permit of a slight amount of relative movement between the parts in order to prevent the vibration of the machine from causing any of the connections to work loose. The pipes 31 of the pressure devices of the respective brush holders alternately communicate with annular pipes or conduits 33, which are disposed concentrically with respect to the rocker ring 1 and which are secured thereto by means of transverse clamping bars 34 and bolts 35. The conduits 33, in turn, communicate with a suitable source of fluid pressure, not shown.

The various parts hereinbefore described, unless otherwise specified, are constructed of conducting material and, in addition to supplying compressed air to the brush-pressure devices, function to provide a current path to or from the several brushes.

The latch members 18 each comprise a shank portion 36 which extends rearwardly through an aperture 37 that is provided in a lug 38. The lug 38 is carried by the upper portion of the bracket member 11 and the shank 36 is provided with a transversely extending head portion 39, of substantially T-shape. The rear surface of the lug 38 is provided with a relatively shallow groove or recess 40, which functions as a seat for the head 39 of the latch member to prevent the accidental displacement thereof during the operation of the machine. The forward end of the shank 36 is provided with a knob or handle 41 that is provided with a substantially tubular hub portion 42 which surrounds the shank 36 in spaced relation with respect thereto.

A coil spring 43 embraces the shank 36 of the latch member and is disposed within the tubular hub portion 42 and between the rear wall 19 of the pressure device and the knob 41 of the latch member. The spring 43 functions to resiliently maintain the head portion 39 in engagement with the seat 40.

If it is desired to remove the pressure de-

vice from the brush holder, for the purpose of obtaining access to the brush members, the shank 36 of the latch 18 is forced rearwardly, against the action of the spring 43, sufficiently to disengage the head 39 thereof from the notch 40. The latch may then be rotated substantially 90° or sufficiently to cause the head 39 to register with the aperture 37 in the lug 38, in which position the head may be withdrawn through the aperture, and the pressure device removed from the machine as an entirety.

The lower extremity of each of the cylinders 20 is preferably provided with a resilient clip or leaf spring 44, the arms of which are adapted to grip the head 22 of the plunger when the same is pressed upwardly therebetween to prevent the displacement of the plungers when the pressure device is removed from the machine.

By means of the previously described construction, a very compact and efficient brush-holder mechanism is provided that not only insures uniform brush pressure but which embodies a very rugged and substantial system of electrical connections that are adapted to withstand the severe operating conditions incidental to electric railway service.

We claim as our invention:

1. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, and a fluid-pressure device carried by said brush holder for yieldingly maintaining said brush member in engagement with said rotating contact member.

2. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device removably carried by said brush holder for yieldably maintaining said brush holder in engagement with said contact member, and a latch mechanism for detachably securing said pressure device in operative position.

3. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device removably carried by said brush holder for yieldably maintaining said brush member in engagement with said contact member, a conduit for supplying fluid under pressure to said pressure device, a tubular extension carried by said pressure device for detachable engagement with said conduit to establish communication therebetween, and means for removably securing said pressure device in operative position.

4. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device removably carried by said brush holder for yieldably maintaining said brush member in engagement with said contact member, a conduit for supplying fluid under pressure to said pressure device, said conduit being provided with a socket portion at one end thereof, a nipple carried by said device and adapted to slidably engage said socket to establish communication between said conduit and said pressure device, and means detachably maintaining said pressure device in operative position and said nipple in engagement with the socket portion of said conduit.

5. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device removably carried by said brush holder for yieldably maintaining said brush member in engagement with said contact member, a conduit for supplying fluid under pressure to said pressure device, said conduit being provided with a socket portion at one end thereof, a pipe carried by said pressure device and adapted to slidably engage said socket to establish communication with said conduit, said pipe being provided with a circumferential groove adapted to coact with the inner surface of said socket to provide a fluid seal therebetween, and means for detachably maintaining said pressure device in operative position and said pipe in engagement with said socket portion.

6. In a current-collecting device comprising a plurality of brush holders adapted to support a brush member for co-operation with a rotating contact member, a plurality of fluid-pressure devices adapted to maintain said brush members in yieldable engagement with said rotating contact member and means for establishing fluid communication between said fluid-pressure devices and a common source of fluid pressure to maintain the pressure exerted by said devices upon said brush members substantially uniform.

7. A current-collecting device comprising a plurality of brush holders adapted to support a plurality of brush members for co-operation with a rotating contact member, a plurality of communicating cylinders disposed adjacent to said brush members, a piston disposed in each of said cylinders and in engagement with one of said brush members, and means for establishing fluid communication between each of said cylinders and a common source of fluid pressure to cause said pistons to exert substantially equal pressure upon said brush members.

8. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device for maintaining said brush member in yieldable engagement with said contact member and means for supplying fluid under pressure to said pressure device to actuate the same and

adapted to provide a current path for said brush member.

9. A current-collecting device comprising a brush holder adapted to support a brush member for co-operating with a rotating contact member, a fluid-pressure device for maintaining said brush member in yieldable engagement with said contact member, and a conduit of conducting material adapted to supply fluid under pressure to said pressure device and to provide a current path for said brush member.

10. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device for maintaining said brush member in yieldable engagement with said contact member and a yieldable conduit of conducting material adapted to supply fluid under pressure to said pressure device and to provide a current path for said brush member.

11. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a cylinder mounted adjacent to said brush holder, a piston disposed within said cylinder and adapted to exert a yieldable pressure upon said brush member to maintain said brush in engagement with said contact member, means for removably securing said cylinder in operative position and means for preventing the displacement of said piston from said cylinder when the cylinder is removed.

12. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a cylinder mounted adjacent to said brush holder, a piston disposed within said cylinder and adapted to exert yieldable pressure upon said brush member to maintain said brush in engagement with said contact member, means for removably securing said cylinder in operative position, and a spring clip adapted to engage said piston to prevent the displacement thereof when said cylinder is removed.

13. A current-collecting device comprising a brush holder provided with a brush box adapted to support a brush member for co-operation with a rotating contact member and a fluid-pressure device carried by said brush holder for yieldably maintaining said brush member in engagement with said contact member and adapted to substantially close said brush box to exclude foreign matter therefrom.

14. A current-collecting device comprising a brush holder adapted to support a plurality of brush members for co-operation with a rotating contact member, a plurality of fluid-pressure cylinders disposed adjacent to said brush members, a common header member adapted to support said cylinders and to establish communication therebetween, and means for supplying fluid under pressure to said header member.

15. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure cylinder mounted adjacent to said brush holder, a piston disposed within said cylinder and adapted to maintain said brush member in engagement with said contact member, means for supplying fluid under pressure to said cylinder and adapted to provide a current path for said brush member, and means for insulating said piston from said cylinder to prevent the production of eddy currents therein.

16. A current-collecting device comprising rocker ring, a plurality of brush holders carried thereby and adapted to support a plurality of brush members for co-operation with a rotating contact member, a fluid-pressure device carried by each of said brush holders and adapted to yieldably maintain said brush members in engagement with said rotating contact member, a conduit carried by said rocker ring and conforming to the curvature thereof, and a flexible connection adapted to establish fluid communication between each of said pressure devices and said conduit.

17. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device for yieldably maintaining said brush member in engagement with said rotating contact member, means for supplying fluid under pressure to said pressure device and a flexible conduit adapted to connect said fluid-supplying means to said pressure device and to permit a certain amount of relative movement therebetween.

18. A current-collecting device comprising a rocker ring, a plurality of brush holders carried thereby and adapted to support a plurality of brush members for cooperation with a rotating contact member, a fluid-pressure device carried by each of said brush holders and adapted to yieldably maintain said brush members in engagement with said rotating contact member, a conduit carried by said rocker ring and adapted to supply fluid under pressure to said pressure device, and a plurality of flexible connections adapted to establish communication between said conduit and said pressure device and to permit of a certain amount of relative movement therebetween.

19. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device detachably mounted on said brush holder and adapted to yieldingly maintain

said brush member in engagement with said rotating contact member, a bolt slidably mounted on said pressure device for detachable engagement with said brush holder and means for resiliently maintaining said bolt in engagement therewith.

20. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device detachably carried by said brush holder and adapted to yieldingly maintain said brush member in engagement with said rotating contact member, a lug carried by said brush holder, a bolt slidably mounted on said pressure device and provided with a head portion at one end thereof adapted to releasably engage said lug, an operating handle secured to the other end of said bolt, and a spring carried by said bolt and adapted to yieldably maintain the head portion thereof in engagement with said lug.

21. A current-collecting device comprising a brush holder adapted to support a brush member for co-operation with a rotating contact member, a fluid-pressure device removably carried by said brush holder for maintaining said brush member in engagement with said rotating contact member, a lug carried by said brush holder and provided with an elongated aperture therein, a bolt rotatably and slidably mounted on said pressure device and provided with a head portion of substantially T-shape adapted to be inserted through said aperture and be moved to a position transverse thereto for engagement with said lug, and means for yieldably maintaining said head portion in engagement with said lug to prevent the displacement of said pressure device.

In testimony whereof, we have hereunto subscribed our names this 23rd day of June, 1922.

CLAUDE BETHEL.
THOMAS S. SCOTT.