April 18, 1933. L. W. RICHARDSON ET AL 1,903,794

BRUSH SHAFT HOLDING AND DRIVING MEANS FOR VACUUM CLEANERS

Filed June 8, 1931

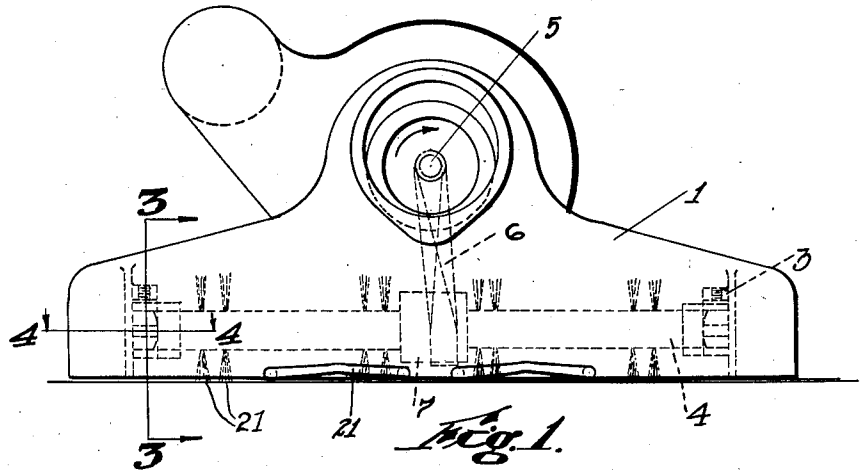


Fig. 1.

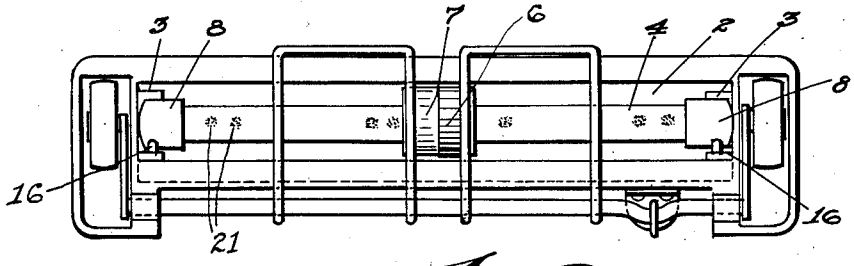


Fig. 2

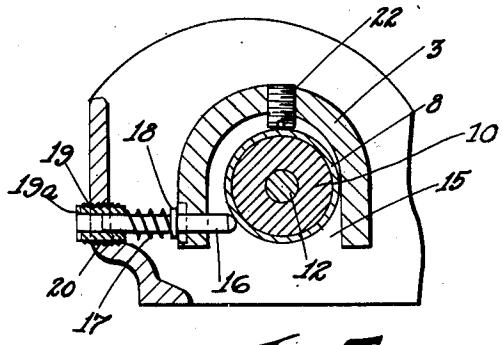


Fig. 3.

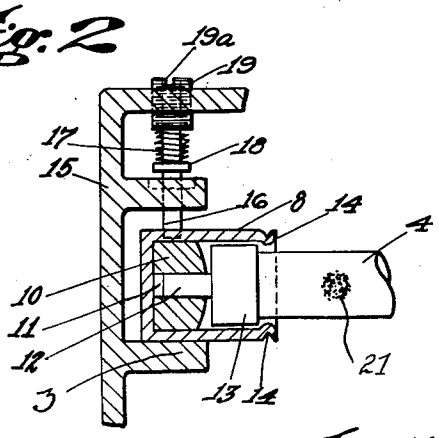


Fig. 4.

Inventors
Leon W. Richardson
Allen D. Wassall.
By Owen W. Kennedy
Attorney

Patented Apr. 18, 1933

1,903,794

UNITED STATES PATENT OFFICE

LEON W. RICHARDSON AND ALLEN D. WASSALL, OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO SWEEPER-VAC COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

BRUSH SHAFT HOLDING AND DRIVING MEANS FOR VACUUM CLEANERS

Application filed June 8, 1931. Serial No. 542,871.

The present invention relates to vacuum cleaners of the type in which a brush is rotatably mounted in the suction nozzle of the cleaner, and has for its object to provide an improved construction for holding and driving the brush shaft.

In prior constructions, in which the rotatable brush is driven by a belt from the same shaft that operates the suction fan, the usual pulley on the brush shaft is not mounted directly beneath the center of the driving shaft, but must be substantially centered beneath the surface on the driving shaft which is moving toward the brush shaft, in order for the twisted belt to remain on the pulley. And since the driving shaft is usually located centrally of the nozzle, the driving pulley must be offset somewhat from the middle of the brush shaft, with the result that the brush shaft is not reversible in the nozzle opening, and is liable to be positioned so that the belt will not stay on the pulley.

According to the present invention, the brush is provided with a pulley centrally mounted on the shaft, and of such width that the driving belt will engage the pulley and remain thereon regardless of the direction in the brush shaft extends in the nozzle, that is, the brush is made reversible. The brush shaft is further provided at its ends with bearing assemblies removably retained thereon, each bearing being so constructed as to prevent the entrance of hairs or threads. Since these bearings are removable from the brush shaft, the bearings can be readily cleaned and replaced on the shaft. The invention provides, in addition, improved means for holding the shaft within the nozzle, so as to permit ready removal and replacement of the brush shaft and bearing assembly. The shaft holding means is preferably made adjustable, so that the position of the brush may be varied in order to procure the desired relation between the brush shaft and the plane of the nozzle opening. Other and further objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawing, in which: —

Fig. 1 is a front elevational view of a vacuum cleaner nozzle embodying the invention.

Fig. 2 is a bottom plan view of the nozzle parts shown in Fig. 1.

Fig. 3 is an enlarged vertical sectional view along the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is an enlarged horizontal sectional view along the line 4—4 of Fig. 1, looking in the direction of the arrows.

Like reference characters refer to like parts throughout the drawing.

Referring particularly to Figs. 1 and 2, the nozzle structure 1 of a vacuum cleaner comprises a downwardly extending rectangular suction opening 2, the end walls of which provide opposed curved flanges 3 for rotatably supporting the ends of a brush shaft 4, in a manner hereinafter described. The brush shaft 4 is arranged to be driven from a shaft 5 by a belt 6; the drive shaft 5, in the construction shown being an extension of the armature shaft of the motor which operates the suction fan. The drive shaft 5 and brush shaft 4 are at right angles to each other, in spaced horizontal planes as shown in Fig. 1, and the axis of the shaft 5 is equidistant from the ends of the brush shaft 4. Therefore, the driving belt 6 does not pass around the brush shaft 4 midway between its ends, but at a point directly beneath the surface of the shaft 5 which is moving toward the brush shaft, and in order to make the brush shaft 4 reversible in the nozzle, a pulley 7, having a face of substantially greater width than the diameter of the driving shaft 5 is mounted midway between the ends of the brush shaft. As a result, the shaft may be removed and replaced with either end of the brush at either end of the suction opening 2, with the assurance that the belt 6 will always properly engage the pulley 7.

Each end of the brush shaft 4 is provided with a removably attached bearing construction, which as shown in Fig. 4, comprises a cup member 8, surrounding an end portion of the shaft 4. Each cup 8 provides in the base thereof a bearing sleeve or lining 10 of suitable anti-friction material having a central bore 11 to receive and to provide a bearing surface for a reduced trunnion portion

12 formed on the end of the brush shaft and extending axially therefrom. Each end of the brush shaft 4 is formed with an enlarged portion or collar 13 which extends within a cup 8 and ears 14 projecting inwardly from the surrounding rim of the cup are spaced apart a distance substantially equal to the diameter of the collar 13, so that each bearing can be pressed on an end of the shaft 4. The length of each bearing cup 8 is such that when a trunnion 12 is received in the bearing lining 10, the ears 14 overhang the inner edge of the collar 13 and tend to prevent the cup from falling off the shaft. The ears 14, being stationary, also serve to prevent hairs and threads wrapped around the shaft 4 from entering the bearing cups 8.

Referring now to Figs. 1 and 3, the flanges 3 within the nozzle for positioning the brush shaft, are substantially U-shaped, with the openings 15 between the sides thereof wide enough to freely receive the bearing cups 8, as assembled, on the shaft ends. Each cup 8 is yieldingly held in position within a flange 3 by a plunger 16 which is urged against the cup 8 by a spring 17 surrounding the plunger 16 between a collar 18 thereon and the end of a sleeve 19 into which the plunger passes freely. Inward movement of the plunger 16 is limited by the collar 18 engaging one of the legs of the flange 3 through which the plunger projects. The spring and plunger are inserted through a threaded opening 20 provided in the rear wall of the suction nozzle, and the externally threaded sleeve 19 is screwed into said opening for engagement with the outer end of the spring 17, the inner end of the spring 17 pressing against the collar 18 to urge the plunger 16 inwardly. The sleeve 19 is provided at its outer end with tool receiving notches 19*a*, so that it may be readily turned, so as to adjust the pressure which the spring 17 exerts on the plunger 16. The brush shaft assembly is accordingly releasably held within the flanges 3 by the plungers 16, and may be removed for cleaning at any time, as desired, by an outward pull. Furthermore, each bearing cup 8 can be removed from the shaft 4 by forcing its ears 14 over the collar 13 to permit cleaning the shaft bearing.

In order to set the brush shaft 4 within the nozzle opening so that bristles 21 on the brush may engage uniformly with the surface being cleaned, the entire length of the brush, a set screw 22 is provided in the base of each flange 3 to engage with the bearing cup 8 on the end of the brush shaft. Adjustment of the set screws 22 varies the position of the brush shaft 4 within the flanges 3 and accordingly determines the distance that the bristles project beyond the plane of the nozzle opening. It is evident from Fig. 3 that the plunger 16, the screw 22 and the wall of the flange 3 engage a bearing cup 8 at three substantially equidistant points around the periphery of the cup 8, thereby insuring proper alinement of the axis of the brush shaft 4 within the nozzle opening 2.

We claim,

1. In a vacuum cleaner construction, the combination with a nozzle and a brush shaft therein, said shaft having bearings assembled on opposite ends thereof, of holding means for each bearing, comprising a U-shaped flange formed in the nozzle and opening toward the nozzle opening, an adjusting screw in the base of the flange and adjustable in said flange for determining the position of said bearing therein, and a spring actuated plunger extending into the space between the arms of said flange to engage said bearing and yieldingly hold said bearing against the opposed arm of said flange and the end of said screw.

2. In a vacuum cleaner construction, the combination with a brush shaft removably mounted in the nozzle opening of said cleaner, supports in said cleaner to receive the ends of said brush shaft, a motor having a shaft extending at right angles to the axis of said brush shaft and midway between the ends of said nozzle opening and a flat belt adapted to connect said shafts, of a cylindrical pulley on said brush shaft for receiving said belt, said pulley being located centrally of the nozzle opening and having a width great enough to receive said belt, irrespective of the reversal of said brush shaft within said nozzle opening.

LEON W. RICHARDSON.
ALLEN D. WASSALL.