June 26, 1923. 1,460,245

H. E. HOOVER

SUCTION CLEANER

Filed Sept. 4, 1917 3 Sheets-Sheet 1

Fig. 1.

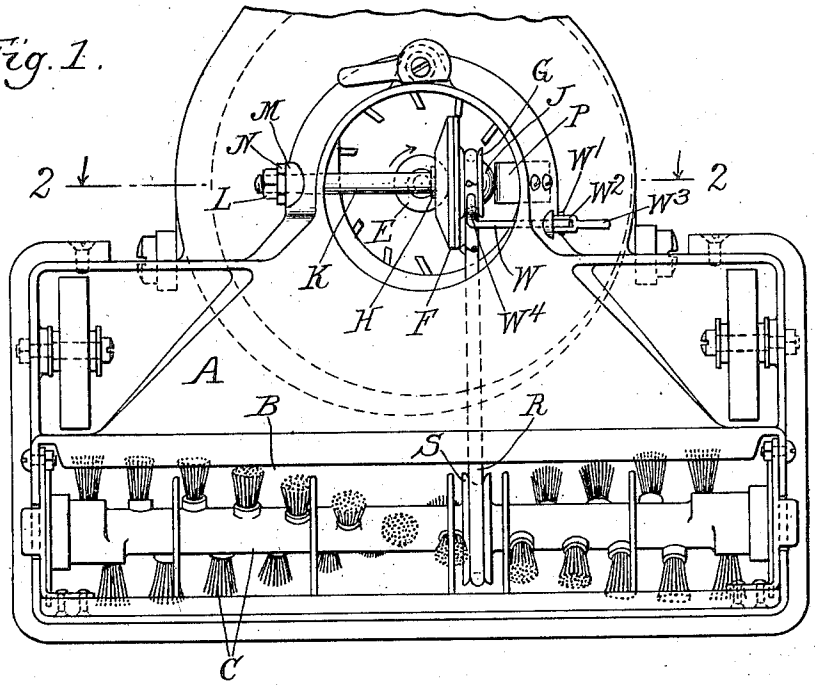
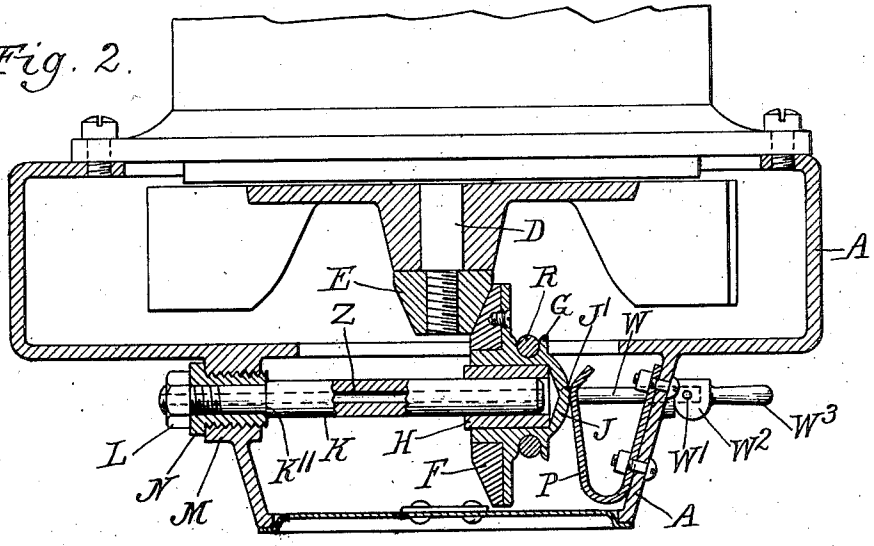


Fig. 2.



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SUCTION CLEANER

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Fig. 3.

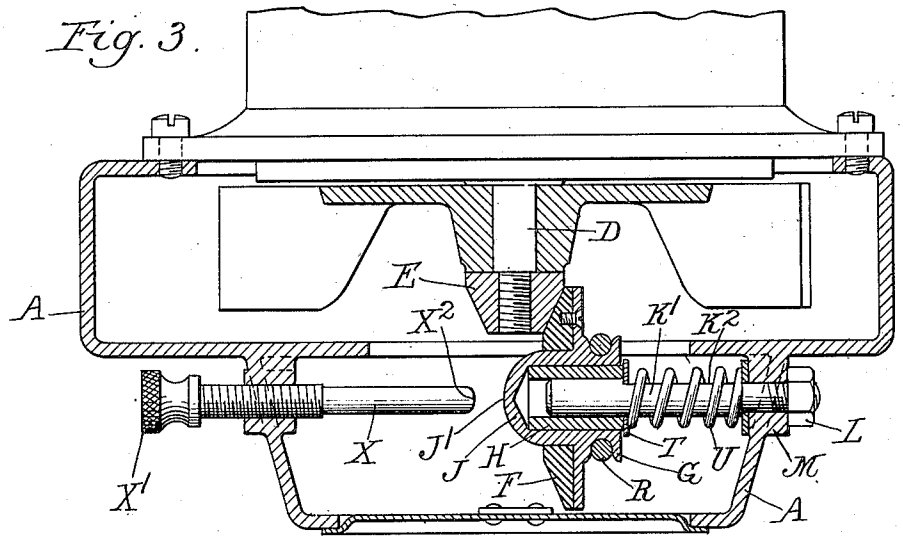
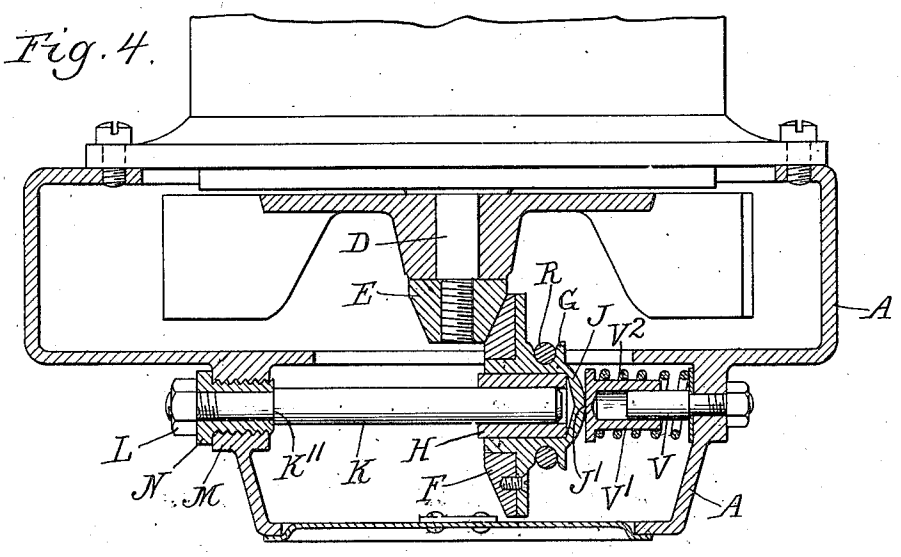


Fig. 4.



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SUCTION CLEANER

Filed Sept. 4, 1917 3 Sheets-Sheet 3

Fig. 5

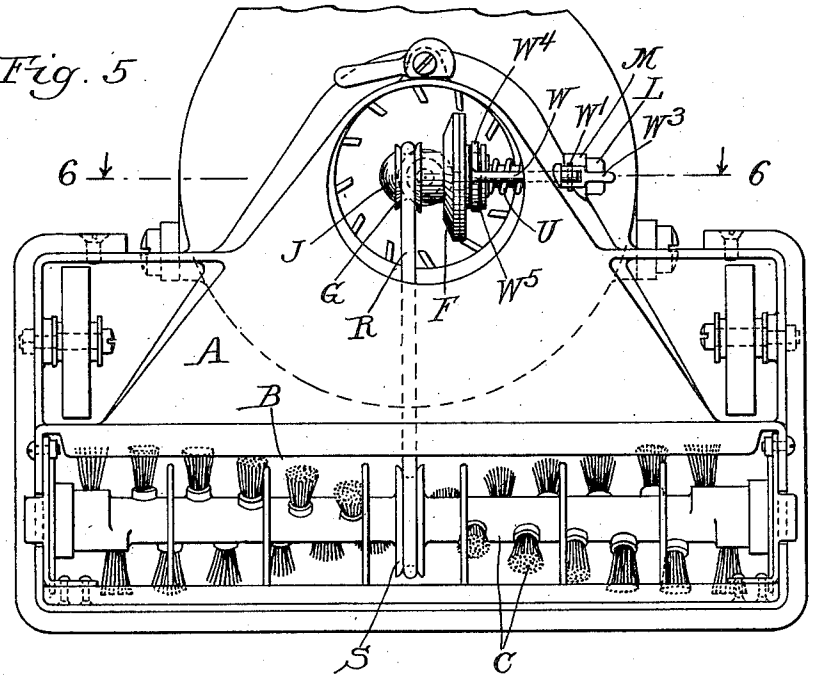
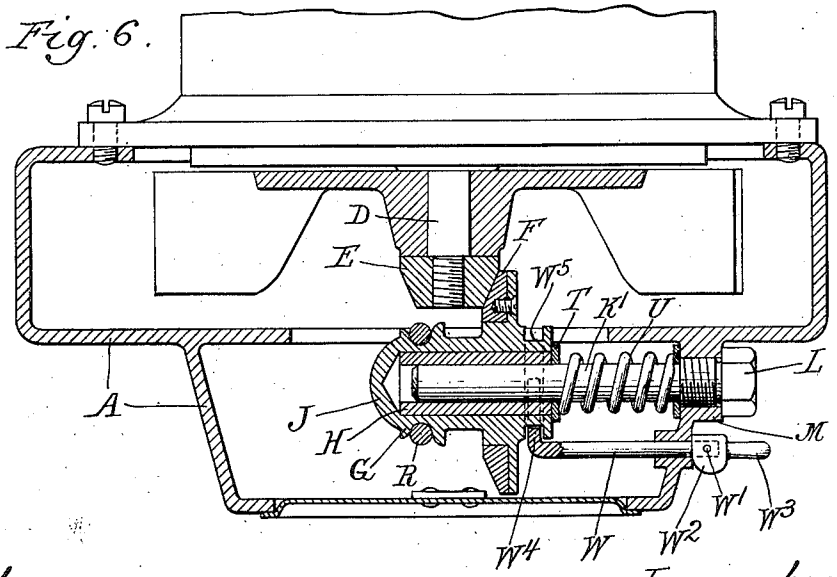


Fig. 6.



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Patented June 26, 1923. 1,460,245

UNITED STATES PATENT OFFICE.

HOWARD EARL HOOVER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HOOVER COMPANY, OF NORTH CANTON, OHIO, A CORPORATION OF OHIO.

SUCTION CLEANER.

Application filed September 4, 1917. Serial No. 189,431.

To all whom it may concern:

Be it known that I, HOWARD EARL HOOVER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Suction Cleaners, of which the following is a specification.

My invention relates to suction cleaners and particularly to means for driving the brush.

One of the objects of my invention is to provide convenient means for removing and restoring to operative position the brush driving belt. Another object of my invention is to utilize a friction drive having a convenient means for speed reduction. The object of this speed reduction is to increase the fan speed proportionally to the brush speed.

Another object of this invention is to combine a speed reduction device with an open belt thus diminishing the wear on the belt. Another object of the invention is to provide means for throwing out the brush driving mechanism when the converter is to be used thus avoiding unnecessary wear on the brush and at the same time securing an increased speed of the fan to increase the air induction in connection with the converter tools.

Another object of this invention is to provide a low machine having a vertical motor. This is accomplished by the use of an open belt and the parts projecting up into the fan casing.

Another object is to put the center line of the brush pulley in the center of the brush so that the brush can be inserted without regard to the position of its ends. Other objects of my invention will appear from time to time as the description proceeds.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a bottom view of a portion of the suction cleaner with parts removed so as to expose the interior drive mechanism;

Figure 2 is a detail section at line 2—2 of Figure 1;

Figure 3 is a detail cross section of a modification;

Figure 4 is a detail cross section of a further modification;

Figure 5 is a bottom view with parts removed showing a modification;

Figure 6 is a cross section on line 6—6 of Fig. 5;

Like parts are indicated by the same letter in all the figures,

A is the casing of a suction cleaner which it will be understood is properly supported, and is provided with a fan and means for driving the fan. The casing is provided with a nozzle B in which is rotatably mounted the brush C. The casing is also provided with a handle and dust collecting bag not here shown.

D is the driving shaft, preferably driven by the motor which drives the fan. It is provided at its lower end with the beveled friction cone or drive E engaging the beveled face of the friction pulley F which is secured to the belt pulley G. The two pulleys are on the same bushing H which is preferably of wood, and adapted to run without oil and mounted on a stud.

Referring to Figures 1 and 2 the bushing H is surrounded by the hub of the pulley which is provided with the outwardly projecting portion J having the friction point J^1 of any desired material. The bushing H is mounted on the stud K which in turn is secured to the casing A and properly supported by means of the exterior nut L, the bearing M, bushing N and shoulder K^{11} abutting the inner edge of the bushing. By this or any other convenient means the stud K may be secured in position on the casing. The length of the stud is such that an interval is always left between the end of the part J of the bushing H and the end of the stud.

P is a spring secured in any desired manner to part of the casing A and adapted to engage the end J^1 of the hub. The spring tends to push the hub and its pulley and friction wheel toward the left so as to keep the friction wheel F yieldingly in operative engagement with the drive cone E.

R is the belt on the pulley G adapted to run also on the pulley S of the brush C.

In the modification shown in Figure 3 the friction wheel and pulley with their hub H are mounted on the stud much as before, but the stud is provided with a washer T and between the washer and the casing is a spiral spring U which encircles the stud K^1 and tends to force the hub pulley and

friction wheel toward the left so as to keep the friction wheel yieldingly in operative engagement with the friction drive. The stud K^1 is flattened at K^2 to receive a corresponding flattened part of the washer T so as to prevent the same from rotating.

In Figure 4 I have shown a further modification where most of the parts are substantially as illustrated in Figure 1, but instead of the flat spring P I have substituted a spring mechanism which consists of the projecting pin V, a slidable bearing piece V^1 mounted on the outer end of the pin adapted to engage the end J^1 of the hub, and a spiral spring V^2 which surrounds the pin V and the sliding part V^1 and tends to force the latter toward the left so as to cause this spring device to perform the same function as the flat spring P.

In the modification shown in Figures 5 and 6 I have shown an arrangement whereby the belt pulley is free from the other parts so as to permit the belt to be applied thereto or removed therefrom without passing between the cone and friction pulley or passing between any other engaging parts. Referring now to this modification the belt pulley G is placed as illustrated in the drawings on the left hand side of the friction wheel so that the driving shaft axis lies between the friction wheel and the belt pulley. The spring mechanism is similar to that shown in Figure 3.

I have shown two devices which are in effect substantially the same whereby the cone and friction wheel can be supported and locked out of operative relation. This device consists of a rod W which passes through an aperture in the side of the casing and is pivoted at its outer end at W^1 to a cam device W^2 associated with a handle W^3. By rocking this handle downward the cam will draw the rod toward the right. The inner end of the rod is provided with a fork W^4 which in the structure shown in Figures 1 and 2 engages the belt pulley and in the structure shown in Figures 5 and 6 engages an annular slot W^5.

By the arrangement shown in Figures 5 and 6 the driving pulley may be locked at one side of the driving shaft so that the pulley on the brush may be placed in the middle of the brush thus avoiding the disadvantage incident in having the pulley at one side of the middle of the brush and obviating the necessity of care in inserting the brush or instructions to enable the user to place the brush properly in position.

The wearing parts of the friction device are automatically adjusted by the spring which keeps them always in proper position taking up for any wear.

The arrangement is such also that the dirt, dust and particularly larger particles such as matches, sticks, pins and the like following along with the current of air can pass between the driving parts, that is between the friction cone and the friction wheel without in any manner interfering with the action of the machine.

In each of the forms here shown the inner end of the stud is received in the hollow chamber or space and if desired the stud may be provided with a central aperture Z which is illustrated in Figure 2 though the same structure may be applied to any of the forms of the device. This permits the clean exterior air to enter and to pass into the chamber at the inner end of the stud and thence to move outwardly along the bearing between the hub and the stud so as to tend to keep the same clean.

By the arrangement here shown numerous advantages are obtained. The machine is a low machine with a vertical motor and this is accomplished by putting the driving parts partly within the fan chamber.

It is obvious that very material changes in size, proportion and arrangement of parts and very considerable modifications could be made without departing from the spirit of my invention. I wish therefore to have my drawings taken as in a sense diagrammatic or illustrative rather than as showing either a working drawing of an operative device or as showing any form of structure to which my invention must necessarily be limited.

In Fig. 3 is shown a further modified form of means for taking the friction pulley F out of contact with the driving pulley E when it is desired to put the brush out of operation. This consists in a screw-threaded rod X provided with a thumb screw X^1 which is screw-threaded in the casing, as indicated, and has a rounded end X^2 adapted to engage the curved or rounded end surface J^1 of the pulley hub J. A rotation of this rod will, of course, move it in against the pulley head and throw the pulley out of engagement with the pulley E, and even when this rod is moving up there is still sufficient space for the operator to move the pulley further back toward the spring so that he can pass the belt over the pulley F and disengage it.

Z is a channel in the stud K. When the pulley bearing of this stud is in any manner worn, the air will pass through the channel, through the bearing, and thus keep it clean.

The use and operation of my invention are as follows:—

Obviously any one of the structures here shown could be associated with any kind of a suction cleaner case provided the latter be designed to fit the particular form of mechanism intended to be used. It is also obvious that the driving shaft or motor shaft can occupy any desired position in the plane at

right angles to the driving shaft, or to the brush. It is also obvious that any convenient size of friction driving parts can be employed so as to secure any desired relation of speed between the shaft and the brush.

The belt can be easily inserted as for instance by passing it between the bearing surfaces of the spring and the end of the hub, and then on to the pulley, or by passing it between the two friction surfaces of the cone and driving wheel and then dropping it on to the belt pulley, or by simply passing it over the end of the belt pulley and dropping it into the belt pulley groove.

By the friction arrangement indicated, it is possible to get a speed reduction, and since the parts of the driving devices are separable, foreign substances can pass therethrough without causing any injury to the machine. These parts being yieldingly held in operative relation will immediately be restored to position.

When it is desired to operate the machine without driving the brush it can be accomplished by operating the cam thus separating and locking the friction wheel out of engagement with the friction cone.

By placing the pulley on the side away from the driving mechanism the belt can be placed on the driving pulley without passing between the friction or driving surfaces. By placing the pulley in the middle of the brush as it is illustrated in Figure 5, the brush can be easily put in position. The cap or washer at the end of the hub protects the bearings at that point. By making the driving connection between the motor shaft and the friction wheel up in between the blades of the fan I reduce the height of the casing. In other words the driving mechanism is partly within the fan casing and between the inner ends of the blades of the fan.

By this apparatus and by having two speed reduction devices I can run from one motor shaft both the fan and the brush at different speeds. This permits me to use a relatively high speed fan with a relatively low speed brush.

As previously explained the motor shaft can be set at any position so long as its axis is vertical to the axis of the brush because the engagement between the two shafts is effected by the beveled surfaces of the cone drive and the friction pulley.

I claim:—

1. In a suction cleaner the combination of a casing having an inlet mouth with a brush, a driving shaft, a friction driving pulley thereon a fan driven by the shaft, a speed reduction driving connection between the shaft and the brush containing a frictional pulley and a belt pulley connected together and a stud on which the two pulleys are slidably and rotatably mounted and a cap to enclose the end of the stud adjacent the pulleys and yielding means engaging the cap to hold the friction pulley in operative position.

2. In a suction cleaner the combination of a motor with a brush, an intermediate mechanism whereby the brush is driven by the motor, said mechanism including a stud secured at one end to the casing and at the other provided with a hub and cap said stud provided with a channel leading from outside of the casing to the interior of the cap and hub bearing.

3. In a suction cleaner the combination of a motor with a brush, an intermediate speed reducing transmission mechanism and separate driving connections between the motor and the transmission mechanism and the brush and the transmission mechanism, a stud upon which such mechanism is mounted secured at one end to the casing said stud being provided with a channel leading from the outside of the casing to the interior thereof at the transmission mechanism.

4. In a suction cleaner the combination of a motor with a brush, an intermediate speed reducing friction pulley located between the motor and the brush, a stud secured in the casing and carrying the pulley the stud being provided with an air channel leading from the outside of the casing to the interior thereof at the pulley.

5. In a suction cleaner the combination of a motor with a brush, an intermediate mechanism whereby the brush is driven by the motor said mechanism including a shaft mounted on the casing and a pulley mounted on the shaft the shaft being provided with a channel leading from the outside of the casing to the interior thereof adjacent to the pulley.

In testimony whereof, I affix my signature in the presence of two witnesses this 22nd day of August, 1917.

HOWARD EARL HOOVER.

Witnesses:

MINNIE M. LINDENAU,

LYDIA M. SYLVANUS.