Nov. 23, 1948. J. W. MOMBERG 2,454,471

SEWING MACHINE DRIVE

Filed Dec. 21, 1946 4 Sheets-Sheet 1

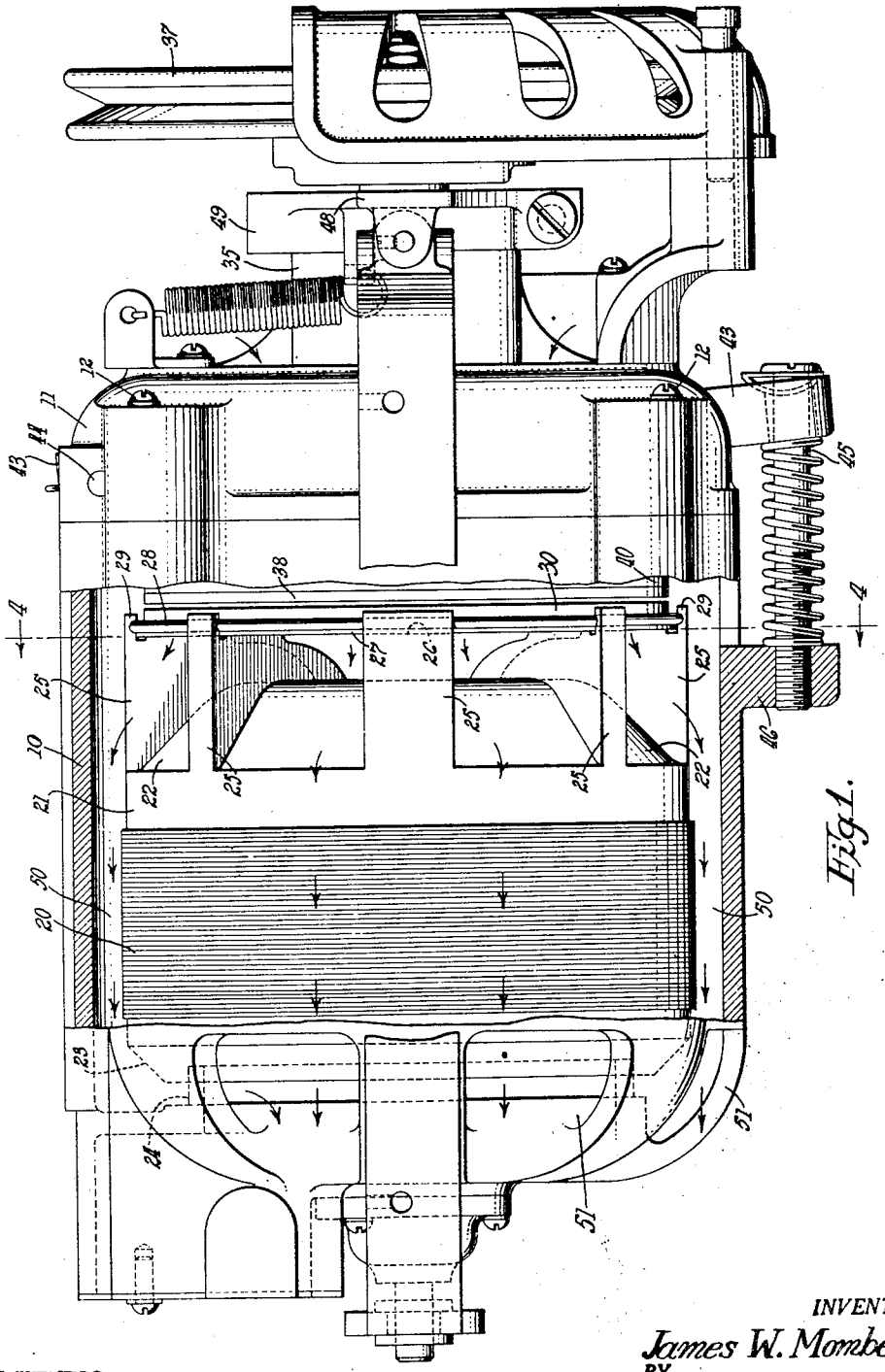

Fig. 1.

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SEWING MACHINE DRIVE

Filed Dec. 21, 1946 4 Sheets-Sheet 2

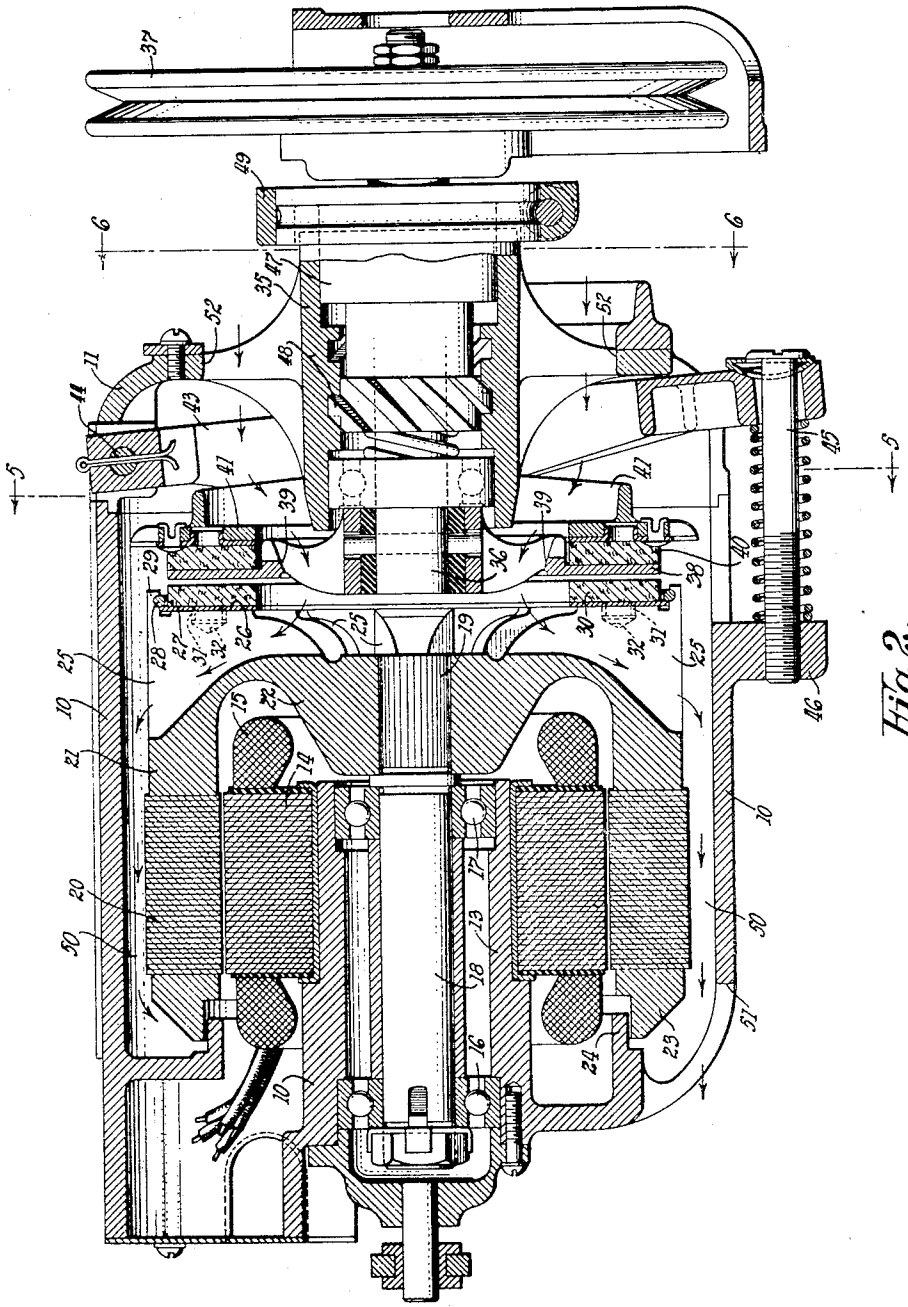

Fig. 2.

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SEWING MACHINE DRIVE

Filed Dec. 21, 1946 4 Sheets-Sheet 3

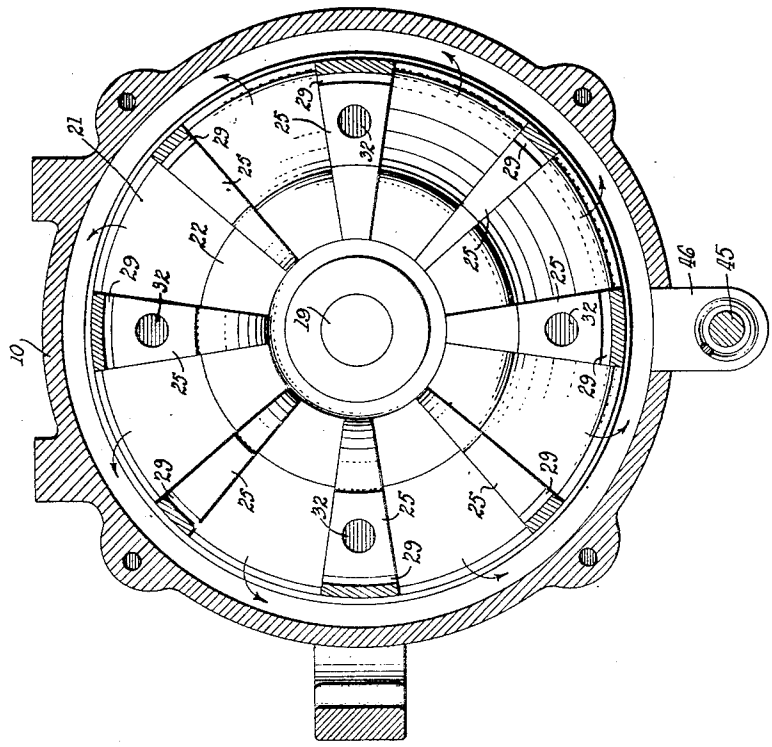

Fig. 4.

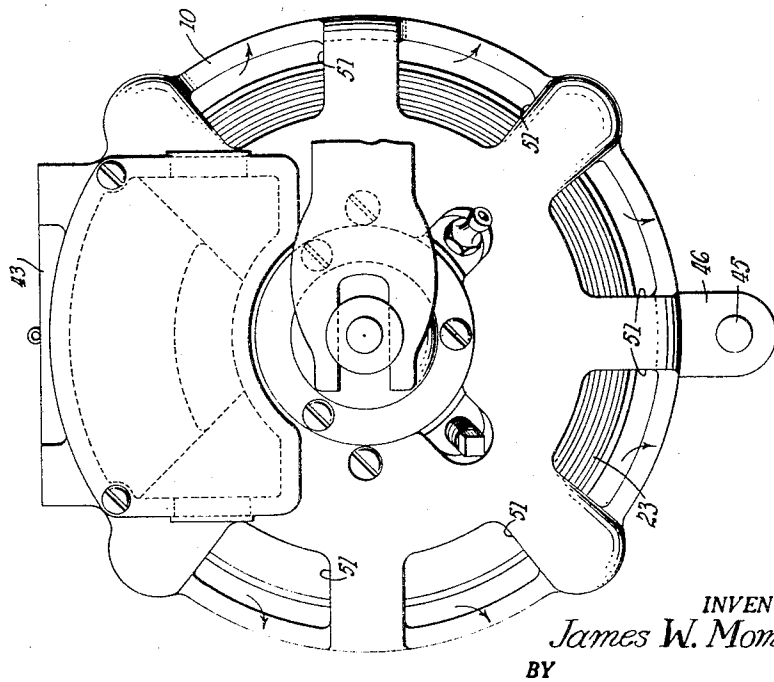

Fig. 3.

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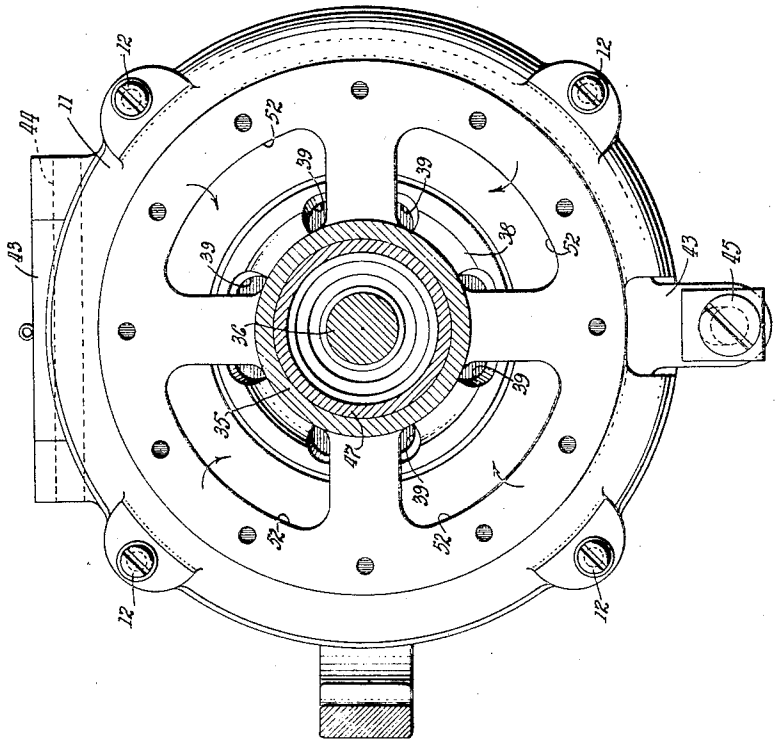

Fig. 6.

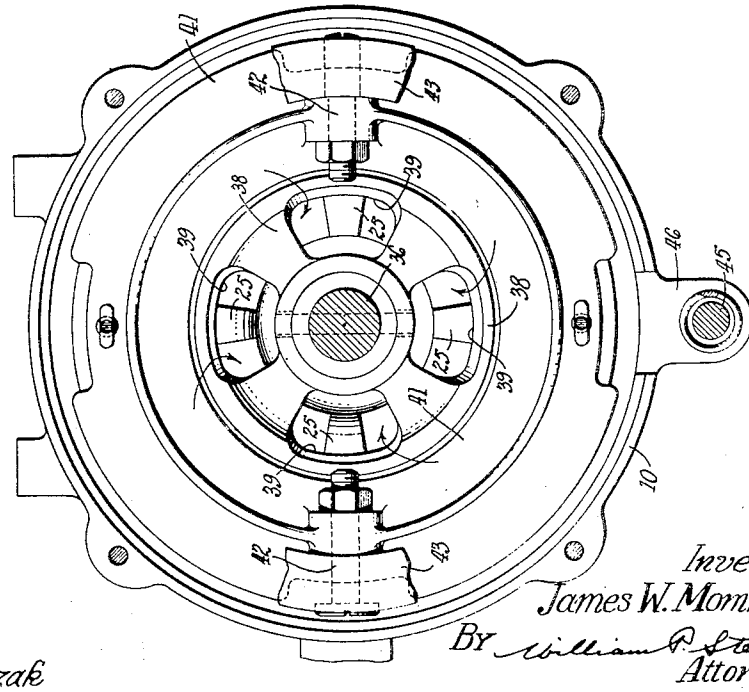

Fig. 5.

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2,454,471

UNITED STATES PATENT OFFICE

2,454,471

SEWING MACHINE DRIVE

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Application December 21, 1946, Serial No. 717,791

9 Claims. (Cl. 172—36)

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This invention relates to electric power transmitters or unitary electric motor and clutch devices such as those used as individual drives for industrial sewing, or similar machines, which require frequent starting and stopping by the operator.

In manufacturing establishments where sewing machines are used, there are large quantities of lint and other foreign material in the air, and when motors of the open type are used the internal parts become covered with lint which acts as an insulator and prevents the proper cooling of the motor parts.

In most instances, the unitary power transmitter is located beneath the table top which carries the sewing machine and its bulk must be reduced to a minimum in order to conserve space and not interfere with the legs of the sewing machine operator.

One of the objects of the present invention is the provision of a unitary electric motor and clutch having a construction which excludes from the vital internal parts of the motor lint and other foreign material which may be contained in the surrounding atmosphere and in which cooling air is forced directly over the rotor of the motor.

A further object of the invention is the provision of a motor having an external rotor which also acts as the driving element of the clutch and through a portion of which cooling air is drawn for the purpose of cooling both rotor and also directly cooling the driving clutch face.

A still further object of this invention is the provision of a motor frame and an external rotor which cooperate to form a chamber in which the stator is enclosed.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawing:

Fig. 1 is a side elevation of an electric transmitter embodying my invention, part of the frame being broken away to show the rotor in elevation.

Fig. 2 is a longitudinal vertical section taken through the center of the transmitter shown in Fig. 1.

Fig. 3 is a left end elevation of the transmitter shown in Fig. 1.

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Fig. 4 is a section taken substantially along the line 4—4 of Fig. 1.

Figs. 5 and 6 are sectional views taken substantially along the lines 5—5 and 6—6, respectively, of Fig. 2.

In the embodiment of the invention selected for illustration, my improved electric power transmitter comprises a frame or casing made of two parts 10 and 11 and forming a hollow cylindrically shaped housing for the working parts of the motor and clutch. The part 11 is formed with a hub 35 and a series of ventilating openings 52, and the cup-shaped casing part 10 is formed with ventilating openings 51 and an inwardly extending centrally arranged tubular portion 13 on which is press fitted a stationary electro-magnetic element or stator 14 having the usual four-pole three phase windings 15.

Carried by the tubular portion 13 are the ball bearings 16 and 17 in which is journaled a motor-shaft 18 having a knurled portion 19 on its outboard end.

The rotary electro-magnetic member of the motor is disposed externally of the stationary member 14 and comprises a ring type squirrel-cage rotor 20 secured to a die-cast spider 21 having a hub 22 cast upon the knurled portion 19 of the motor shaft 18. The rim 23 of the cup-shaped rotary member extends over an annular inwardly extending lip or flange 24 formed on the part 10 of the casing. The clearance is small between the flange 24 and the rim 23 of the rotor, and as the rotor is operating at high speed any lint or other particle of foreign matter will be thrown outwardly by the centrifugal action of the rotor and, therefore, the above construction is, in effect, a motor with its operating parts totally enclosed.

In order to cool the operating parts of the motor, the base of the rotary electro-magnetic member is formed with a series of laterally extending fan blades 25 each having a flat seat 26 for receiving a sheet-metal ring 27 held against each seat by a split spring-ring 28 which enters a suitable semi-circular groove in the overhanging ledge 29 of each blade. Secured to one of the faces of the metal ring 27 is a ring shaped clutch-facing 30, made of cork or other suitable material, and extending from its opposite face is a series of projections 31 which are adapted to enter holes 32 formed in some of the blades 25. The function of the projections 31 is to prevent the metal ring 27 from turning relative to the rotor. It will be understood that when the motor is operating the fan blades 25 act to draw air from the center of the base of the rotor and force it outwardly over

the rotor and through the space 50 between the outer periphery of the rotor and the casing 10.

Journaled in and extending through the hub 35 of the casing part 11 is an endwise movable shaft 36 carrying a driving pulley 37 on its outboard end, and a driven clutch element 38 on its inboard end. The driven clutch element 38 is formed with ventilating openings 39 (Figs. 2 and 5) and is adapted for engagement with either the driving clutch element 30 or a brake 40. The brake 40 is carried by a brake supporting ring 41, pivoted at diametrically opposite points 42 to a member 43, hinged at 44 to the casing part 11. The member 43 is adjustable about its hinge 44 by means of an adjusting screw 45 threaded into a lug 46 formed on the casing 10. The means for shifting the shaft 36 endwise to cause the driven element 38 to engage either the driving clutch element or the brake comprises a sleeve 47 having threads 48 which cooperate with complemental grooves formed in the hub 35. The sleeve 47 is turned by means of a lever 48 having a split hub 49 which is clamped about the outboard end of the sleeve 47. For a more detailed description of the means for imparting an endwise movement to the shaft 36 and the brake mechanism reference may be had to the copending application of Edgar P. Turner, Serial No. 696,828, filed Sept. 13, 1946, for Electric transmitter.

In the operation of my improved motor cooling expedient, the rotation of the motor 21 causes the fan blades 25 to act as a center intake centrifugal fan and to draw cooling air through the openings 52 in the casing part 11 and through the openings 39 in the driven element 38. The air drawn through these openings is forced along the opening 50 between the casing part 10 and the outer periphery of the rotor and finally through the openings 51 in the casing part 10. It will thus be seen that cooling air is drawn from the right end of the transmitter, as viewed in Figs. 1 and 2, and discharged at the other end. It will be observed that the cooling air is drawn past the rear face of the metal ring 27, thereby keeping the clutch facing cool. Also the cooling air comes into direct contact with the (die cast) rotor and also the laminations 20 thereby rapidly conducting the heat away from the operating parts.

From the above description, it will be understood that the cooling air drawn through the electric motor and clutch serves to keep both the clutch mechanism and the motor cool and that foreign material will not find its way into the internal parts of the motor.

Having thus set forth the nature of the invention, what I claim herein is:

1. In an electric motor drive, a cylindrically shaped casing having ventilating openings in the ends thereof, an inwardly extending tubular support formed on one of the ends of the casing, a stator carried by said tubular support, a shaft journaled in said support and carrying a cup-shaped rotor at one end thereof, the sides of said rotor being spaced from said casing to form an air passageway and extending over said stator and cooperating with a portion of the casing to enclose the internal parts of the motor, and air impelling means formed on said rotor for drawing air through the openings in the casing and forcing it outwardly through said passageway.

2. In a motor and clutch drive, a casing, a stator carried by said casing, a cup-shaped rotor carried by said casing and having its rim portion encircling said stator, a series of fan blades

formed on and projecting from the base of said rotor, and a driving clutch facing secured to the projecting ends of said blades.

3. A unitary electric motor and clutch drive comprising a hollow cylindrical frame having ventilating openings in the ends thereof, a stationary motor member carried by said frame, a cup-shaped rotary member disposed within the frame externally of said stationary member, said rotary member cooperating with a portion of said frame to enclose the stationary member, fan blades formed on the base of said rotary member, and a clutch facing secured to said fan blades.

4. A unitary electric motor and clutch drive comprising a hollow cylindrical frame having ventilating openings in the ends thereof, a stationary motor member carried by said frame, a cup-shaped rotary member disposed within the frame externally of said stationary member, said rotary member cooperating with a portion of said frame to enclose the stationary member, laterally projecting fan blades formed on said rotary member, a clutch facing secured to the projecting ends of said blades, and a driven clutch element formed with openings and adapted to cooperate with said driving clutch facing whereby cooling air is drawn through the clutch elements and forced across the external walls of the rotary member when the motor is in operation.

5. A unitary electric motor and clutch drive comprising a hollow cylindrical frame having ventilating openings in the ends thereof, an inwardly extending flange and a tubular support carried by one end of said frame, a stator carried by said support, a cup-shaped rotor carried by said support and having its sides extending over said stator and its rim portion cooperating with said flange to totally enclose the stator, and means carried by said rotor for circulating cooling air over the outer periphery of the rotor.

6. A unitary electric motor and clutch drive comprising a hollow cylindrical frame having ventilating openings in the ends thereof, an inwardly extending flange and a tubular support carried by one end of said frame, a stator carried by said support, a cup-shaped rotor carried by said support and having its sides extending over said stator and its rim portion cooperating with said flange to totally enclose the stator, projecting fan blades formed on said rotor for circulating air over the periphery of the rotor, and a driving clutch element secured to said projecting blades.

7. A unitary electric motor and clutch drive comprising a hollow cylindrical frame having ventilating openings in the ends thereof, an inwardly extending flange and a tubular support carried by one end of said frame, a stator carried by said support, a cup-shaped rotor carried by said support and having its sides extending over said stator and its rim portion cooperating with said flange to totally enclose the stator, a driven clutch element and a brake carried by the other end of the casing, said driven clutch element including a disk shaped member having ventilating openings therethrough, a plurality of fan blades extending laterally from the base of said rotor, and a driving clutch element removably secured to said blades and adapted to be engaged by said driven clutch element.

8. A unitary electric motor and clutch drive comprising a hollow cylindrical casing having ventilating openings in its ends and provided with an internal flange, clutch mechanism located at one end of the casing, an electric motor

stator located at the other end of the casing, an imperforate cup-shaped rotor having its sides encircling said stator and its rim portion extending over said flange to totally enclose the stator, and a series of fan blades formed on the base of said rotor for drawing air through the openings in one end of the casing, and through the clutch and then forcing the air over the sides of the rotor and out through the openings in the other end of the casing.

9. A unitary electric motor and clutch drive comprising a hollow cylindrical casing having ventilating openings in the ends thereof and provided with an internal flange, clutch mechanism located at one end of the casing, an electric motor stator located within the casing, an imperforate cup shaped rotor having its sides encircling said stator and its rim portion extending over said flange to totally enclose the

stator, said rotor having a diameter less than the diameter of the casing thereby forming a space between the sides of the rotor and the cylindrical casing, and a series of fan blades for circulating air through the clutch and through the space between said rotor and said casing.

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