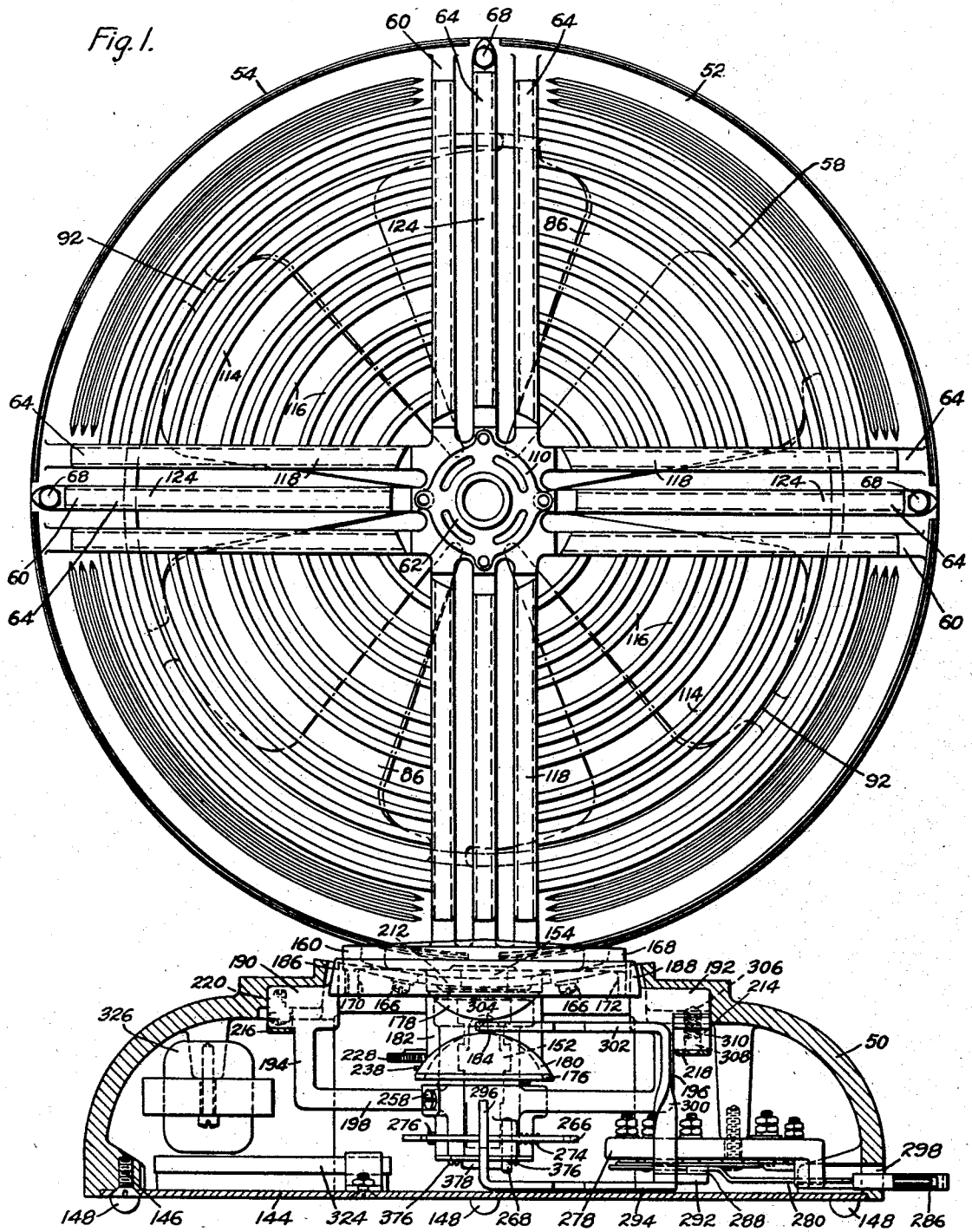
March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 1

Fig. 1.




WITNESSES:

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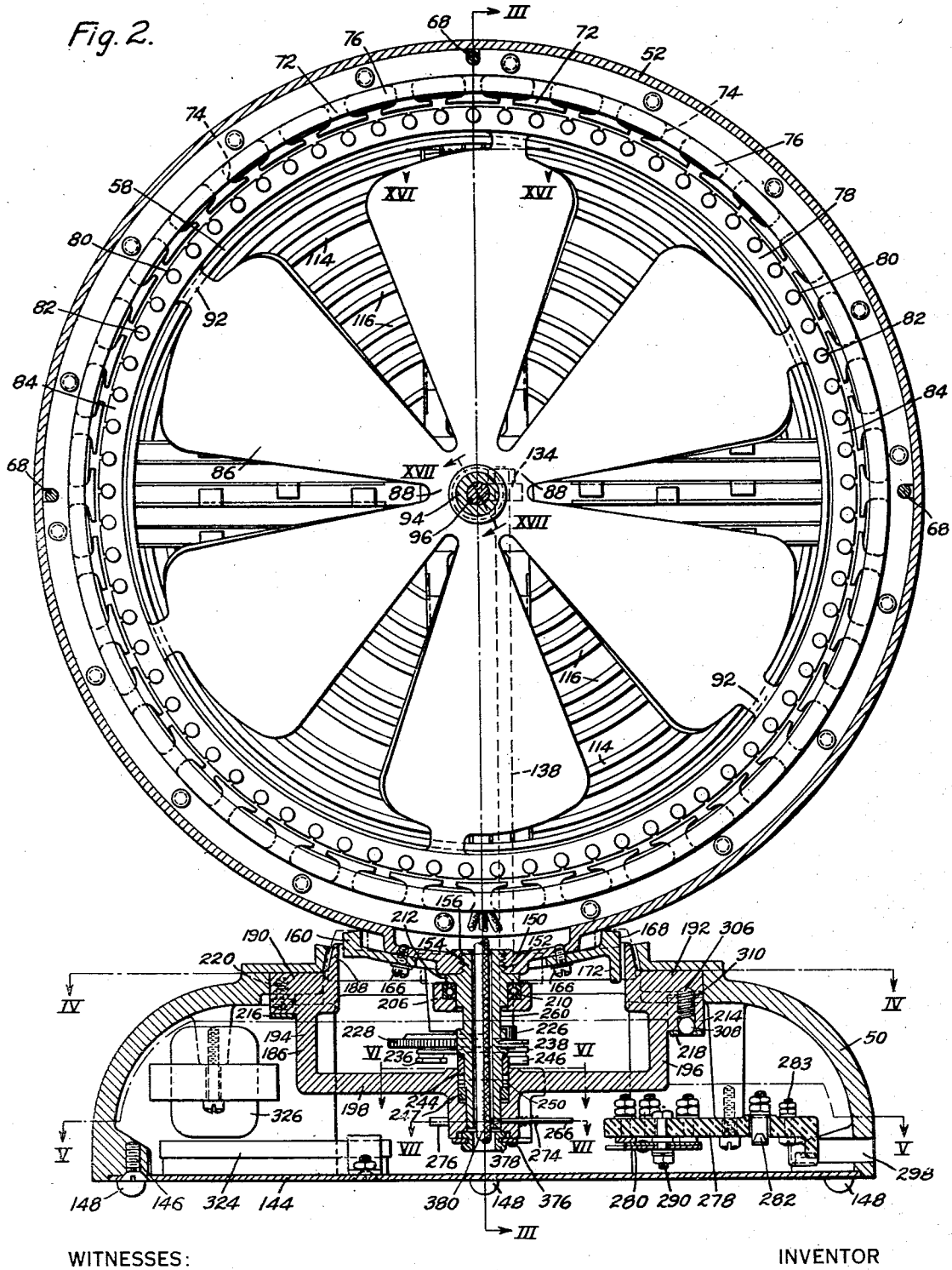
March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 2

Fig. 2.




WITNESSES:

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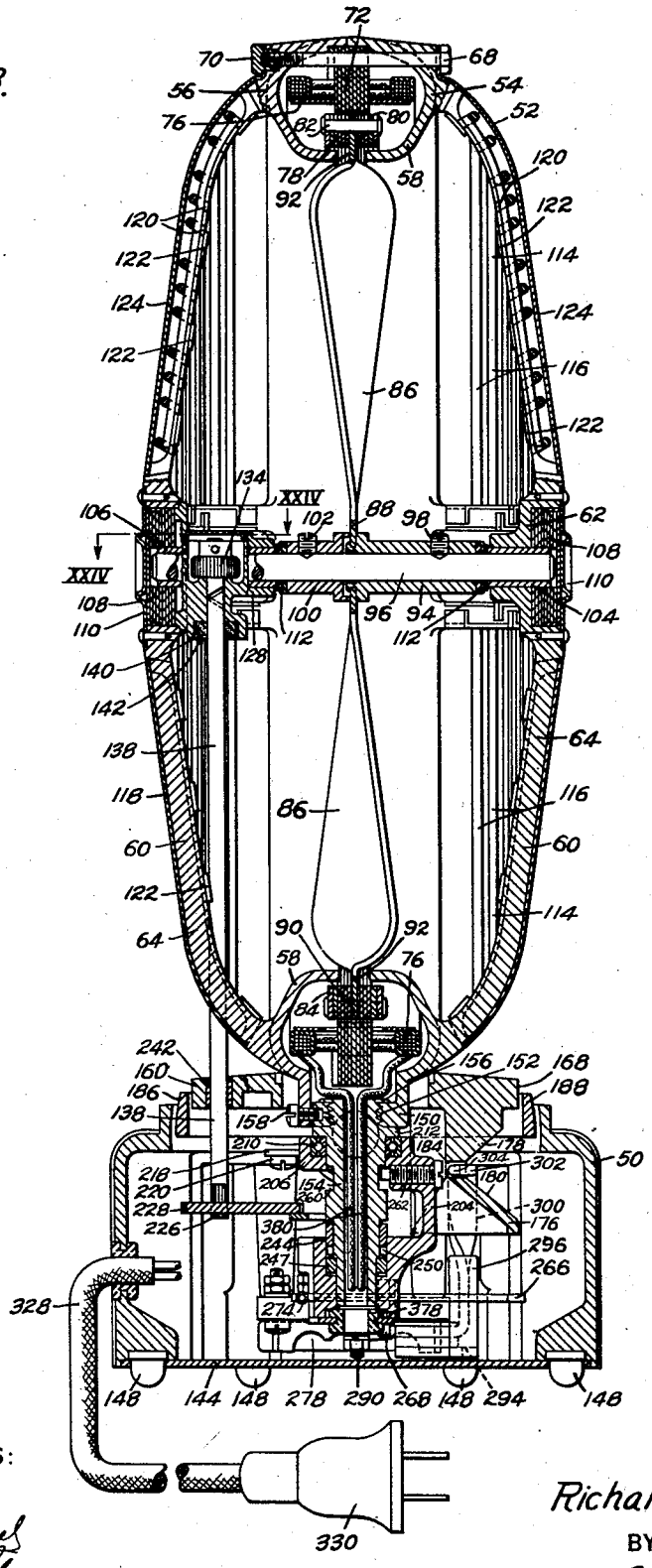
March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 3

Fig. 3.




WITNESSES:

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 4

Fig. 4.

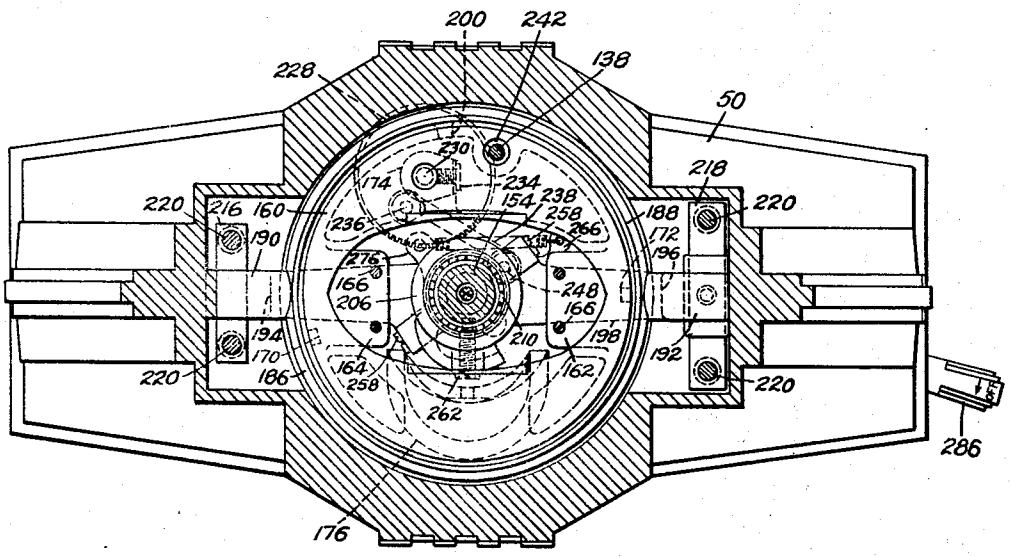
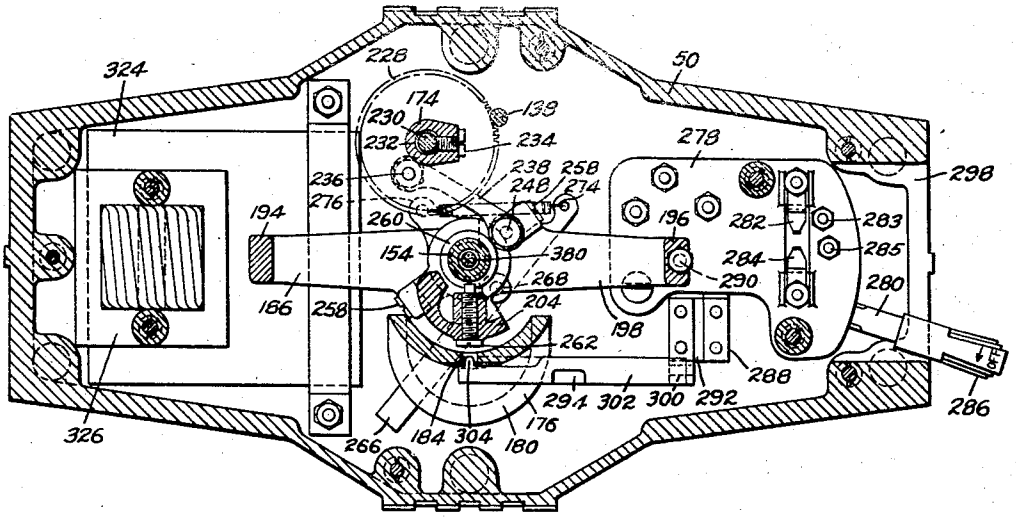



Fig. 5.




WITNESSES:

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 5

Fig. 6.

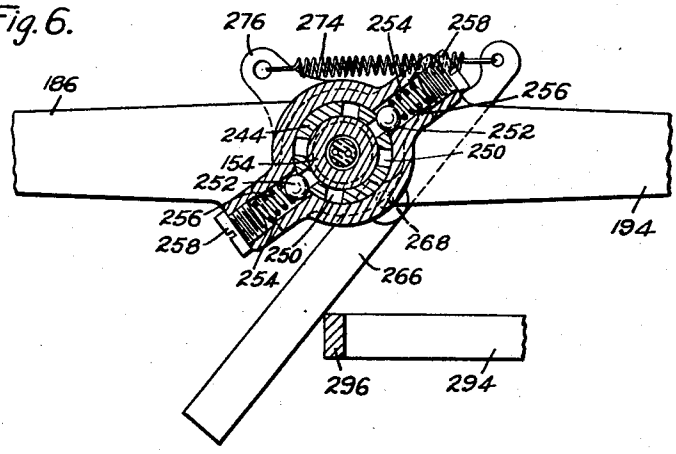



Fig. 7.

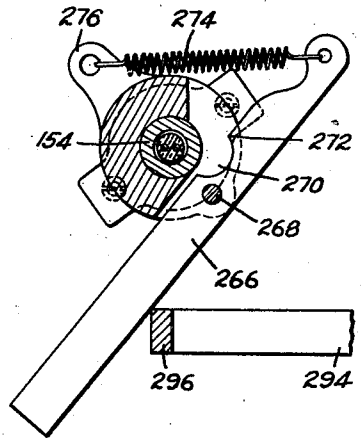
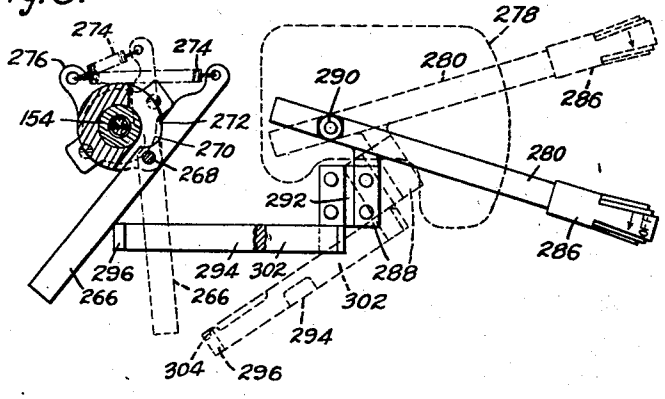



Fig. 8.

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 6

Fig. 9.

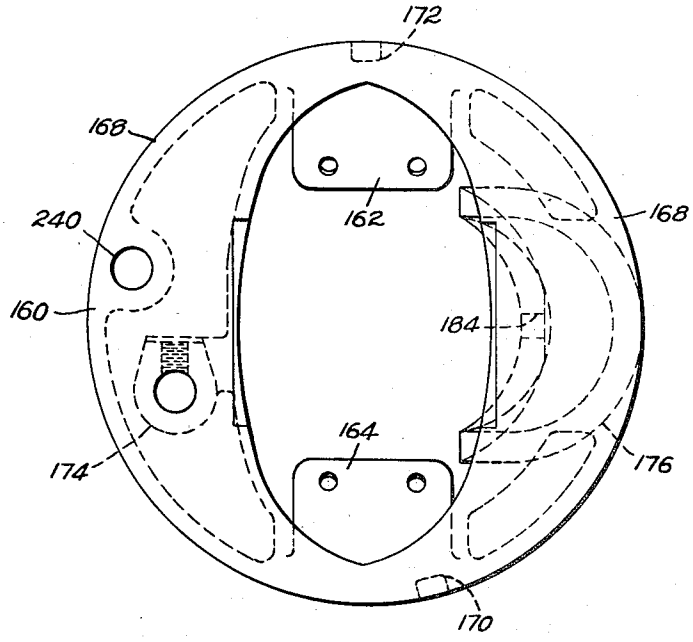



Fig. 10.

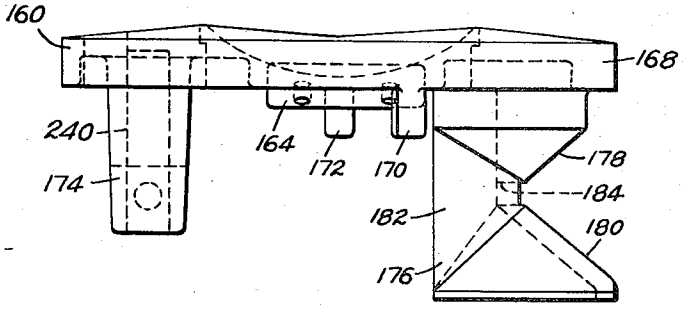
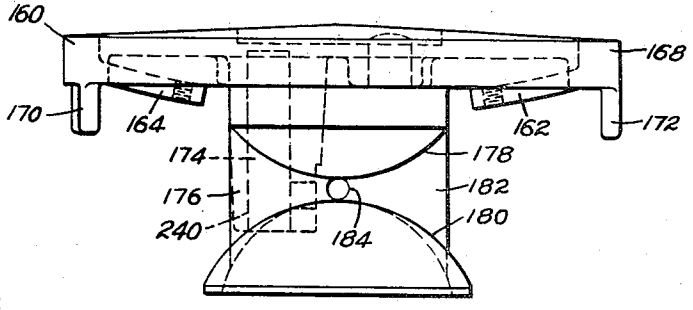



Fig. 11.

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 7

Fig. 12.

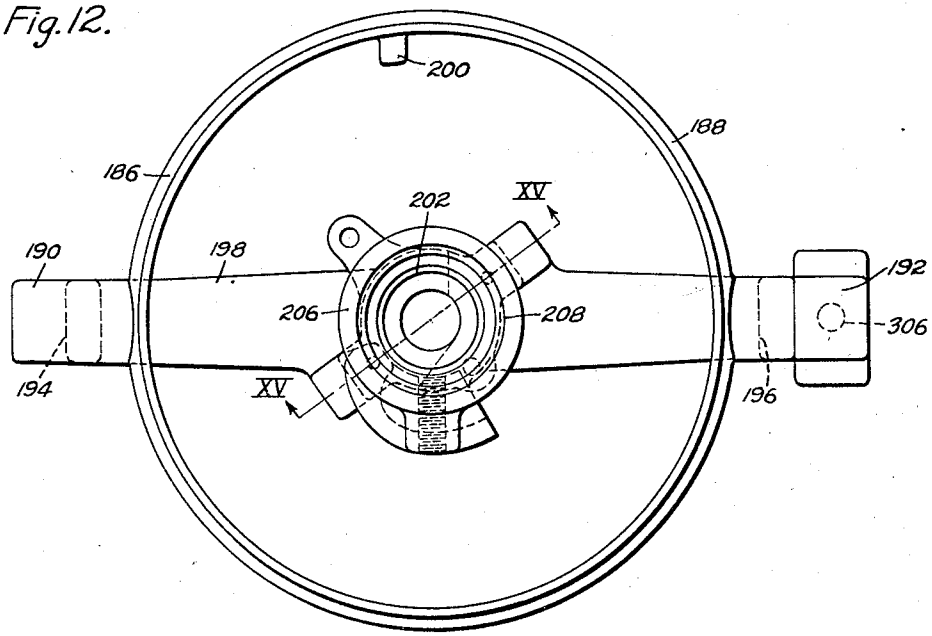



Fig. 13.

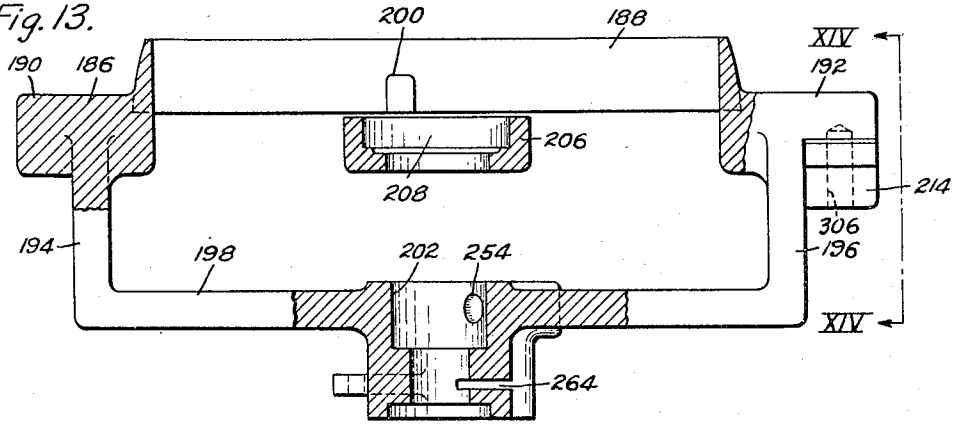



Fig. 14.

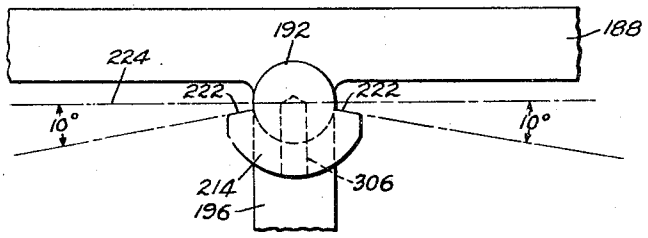
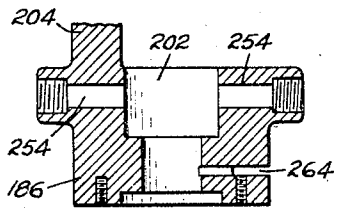



Fig. 15.




WITNESSES:

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 8

Fig.16.

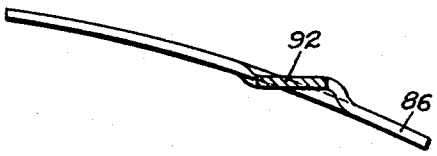



Fig.17.

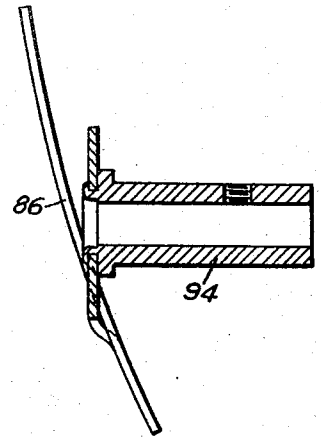



Fig.18. Fig.19. Fig.20.

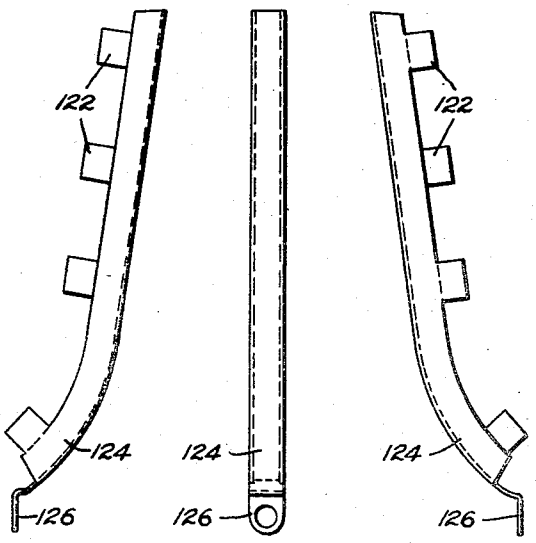



Fig.21. Fig.22. Fig.23.

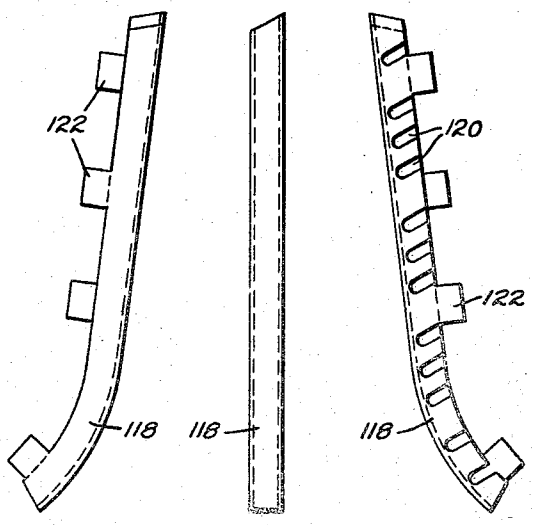
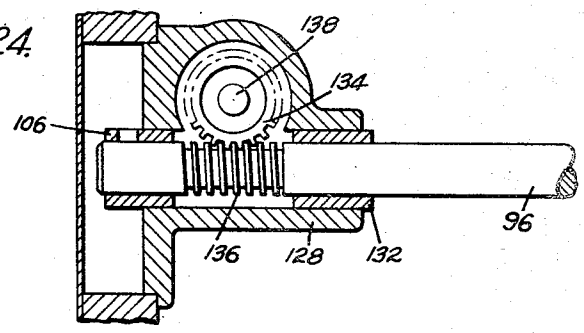



Fig.24.




WITNESSES:

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 9

Fig. 25.

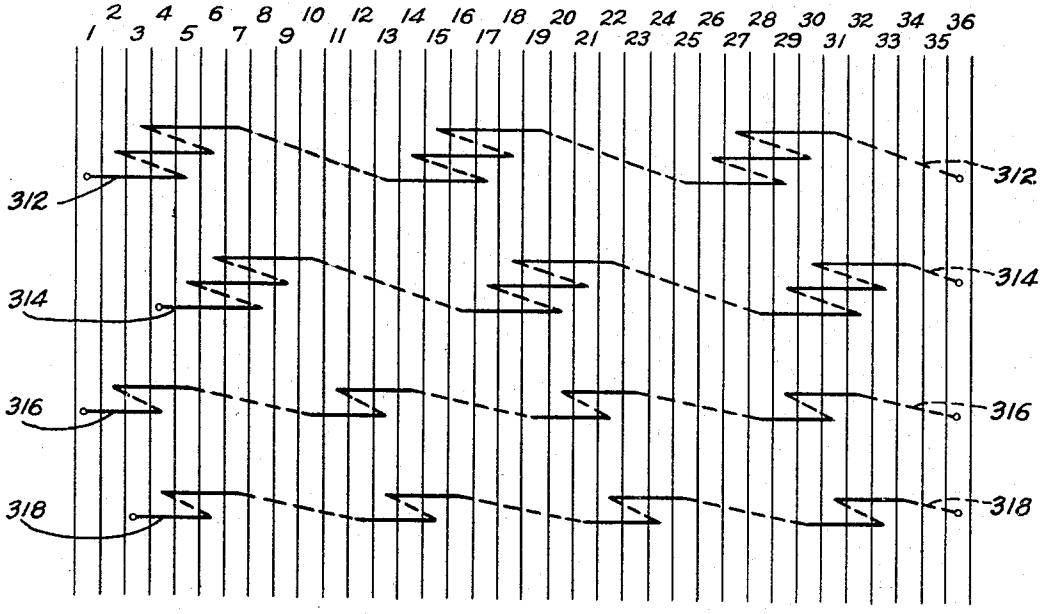
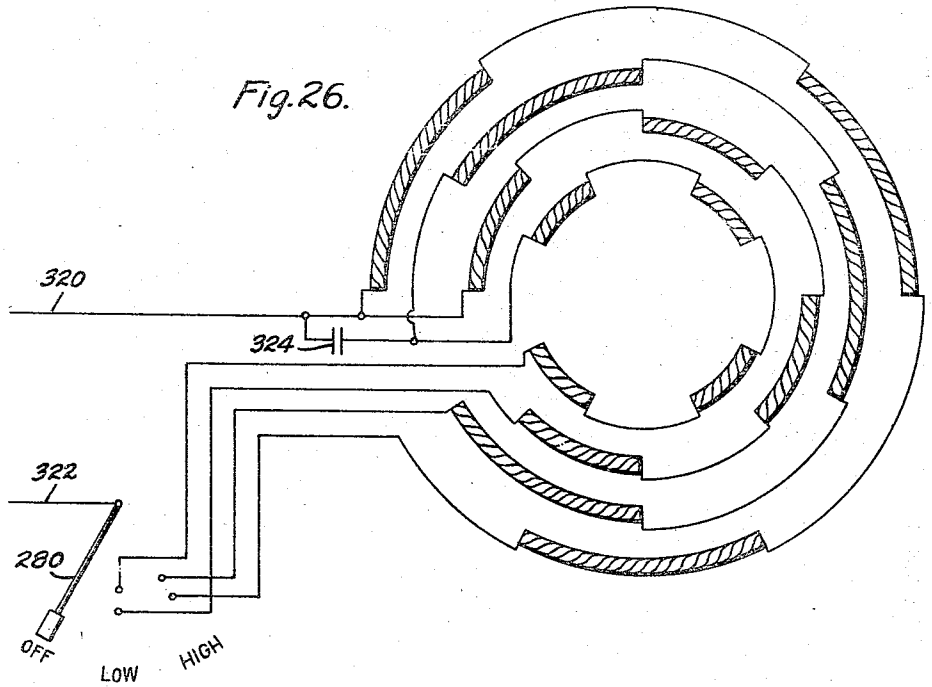



Fig. 26.




WITNESSES:

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March 19, 1935. R. H. JORDAN 1,994,914

FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 10

Fig. 27.

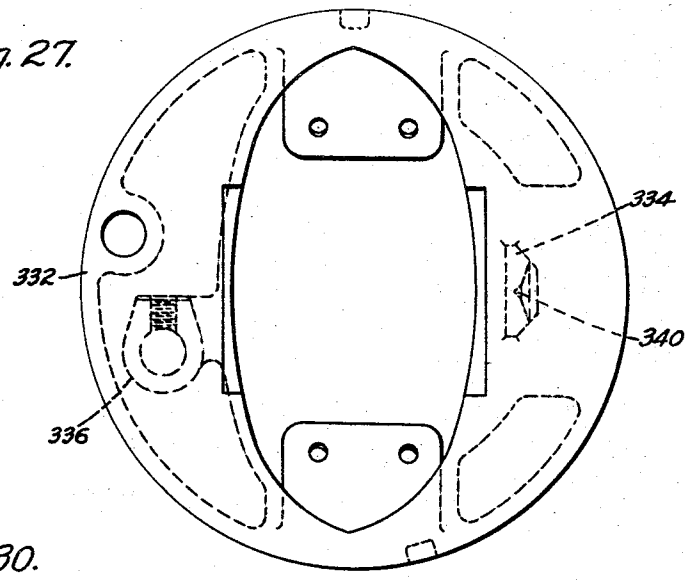



Fig. 30.

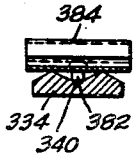



Fig. 31.

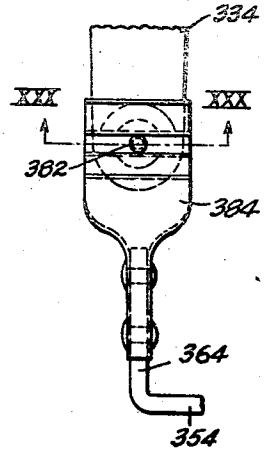



Fig. 28.

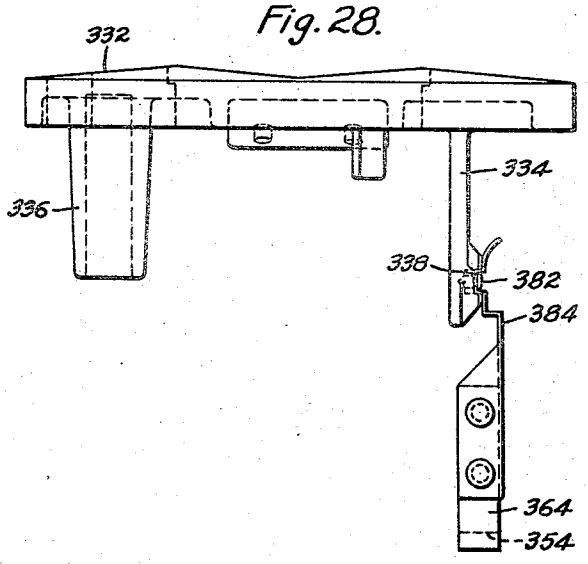
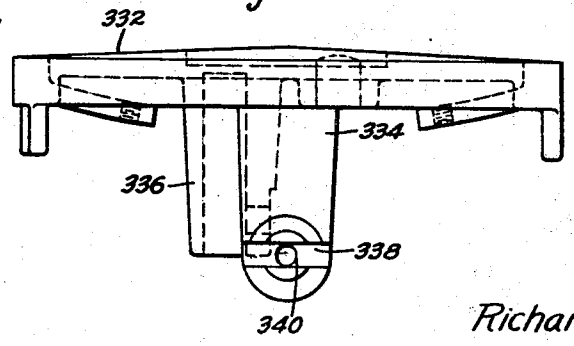



Fig. 29.




WITNESSES:

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FAN MOTOR

Filed Sept. 10, 1932 11 Sheets-Sheet 11

Fig.32.

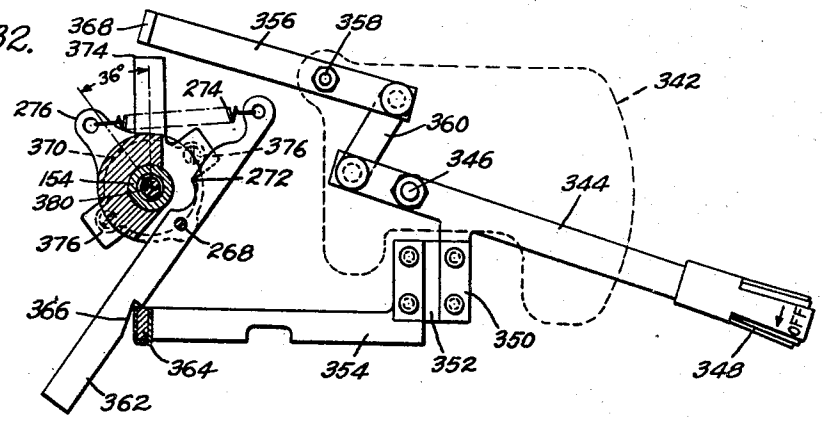



Fig.33.

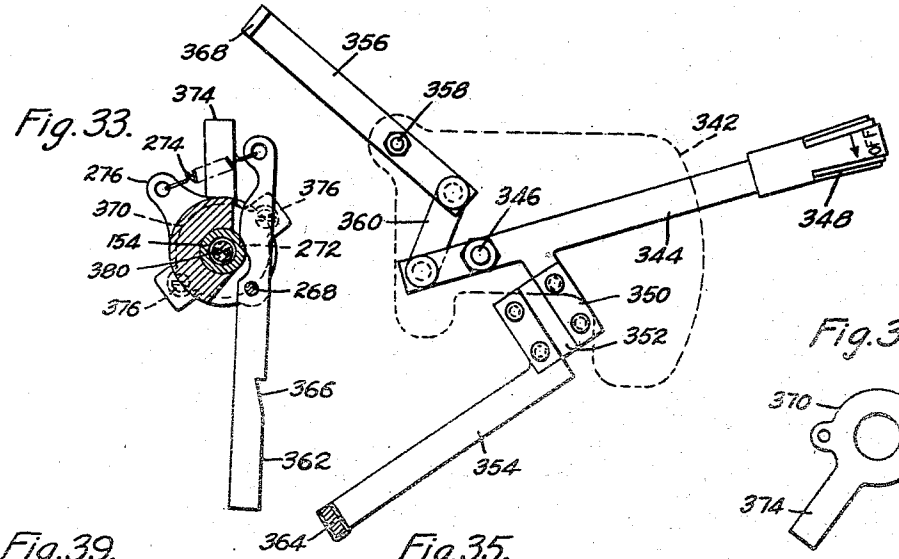



Fig.34.

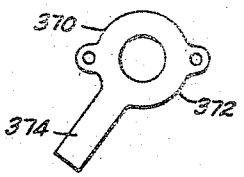



Fig.39.

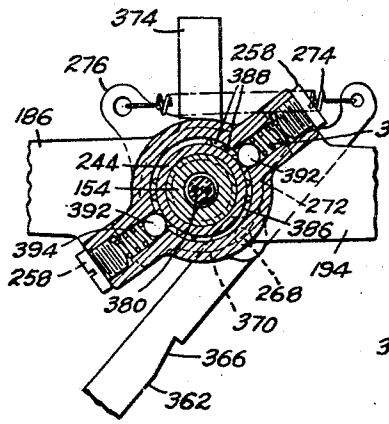



Fig.35.

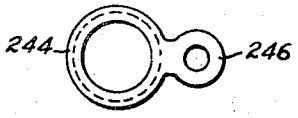



Fig.36.

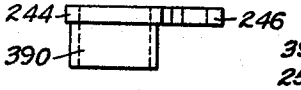



Fig.37.

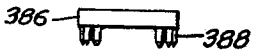



Fig.38.

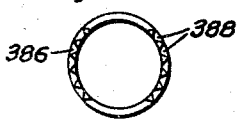
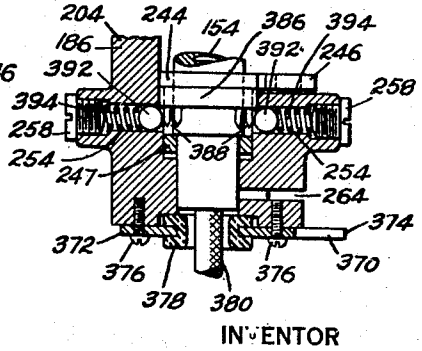



Fig.40.

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Patented Mar. 19, 1935 1,994,914

# UNITED STATES PATENT OFFICE

1,994,914

## FAN MOTOR

Richard H. Jordan, Springfield, Mass., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application September 10, 1932, Serial No. 632,491

14 Claims. (Cl. 230—256)

My invention relates to fans and particularly to motor-driven fans.

Among the objects of my invention are the following:

To provide a motor-driven fan embodying an alternating-current stator, a rotor therein and fan blades within the rotor constituting a part thereof and directly supporting the same;

To provide a combined bearing bracket and rotor support and fan guard;

To provide a tiltable and oscillatable fan structure of novel and simple design in which the tilting and oscillating mechanism shall be located within the hollow supporting base and below the pivot point thereof;

To provide a motor-driven fan that shall always stop in a predetermined position relatively to the base; regardless of whether the fan was oscillating or not.

To provide a fan having aligned oscillating and non-oscillating positions;

To provide a motor-driven fan embodying manually-operable means to return the fan to a central upright position relatively to the base when the motor is deenergized;

To provide a motor-driven fan of pleasing and ornamental design.

Other objects will either be apparent from the description of the device or will be pointed out hereinafter.

In practicing my invention, I provide a hollow base and a motor-driven fan structure supported thereby and having an annular casing, an alternating-current stator structure and a rotor therein, the annular casing having bearing brackets of skeleton form and a fan guard associated therewith. The base has a tilting frame and a swivel frame therein, the fan assembly having a hollow swivel pin secured thereto, which pin extends into the tilting frame to support the assembly on the base.

An oscillating mechanism is associated with the base and the fan assembly to effect oscillation of the latter around any one of a plurality of centers of oscillation, and a manually actuable motor circuit control lever effects the return of the fan assembly to its central and upright position on the base when the motor is deenergized. I provide also means for holding the fan assembly in its non-oscillating position, which means is actuable by the motor-control switch when the same is moved to its "off" position to effect return of the fan assembly to its oscillating position.

In the drawings,

Figure 1 is a view mainly in front elevation, of a motor-driven fan embodying my invention, the base being shown with the front wall thereof removed to show the parts located therein;

Fig. 2 is a vertical longitudinal section through a device embodying my invention;

Fig. 3 is a vertical lateral sectional view thereof taken on the line III—III of Fig. 2;

Fig. 4 is a horizontal sectional view thereof taken along the line IV—IV of Fig. 2;

Fig. 5 is a longitudinal sectional view taken on the line V—V of Fig. 2;

Fig. 6 is a horizontal sectional view taken on the line VI—VI of Fig. 2;

Fig. 7 is a horizontal sectional view taken on the line VII—VII of Fig. 2;

Fig. 8 is a top plan view of the motor control switch shown in its proper operative relation to the parts shown in Fig. 7;

Fig. 9 is a top plan view of the swivel housing forming a part of my new fan motor;

Fig. 10 is a view in side elevation of the swivel housing;

Fig. 11 is a view in end elevation of the swivel housing;

Fig. 12 is a top plan view of a tilting housing forming a part of my new fan motor;

Fig. 13 is a view in lateral section of the tilting housing shown in Fig. 12;

Fig. 14 is a sectional view of a part of the tilting housing taken on the line XIV—XIV of Fig. 13;

Fig. 15 is a fragmentary sectional view of the tilting housing taken on the line XV—XV of Fig. 12;

Fig. 16 is a sectional view of a fan blade taken on the line XVI—XVI of Fig. 2;

Fig. 17 is a fragmentary sectional view of a fan blade showing the method of mounting the fan blade assembly on a hub, taken on the line XVII—XVII of Fig. 2;

Figs. 18, 19 and 20 are views in side, front, and side elevation, respectively, of one form of guard shoe;

Figs. 21, 22 and 23 are views in side, front and side elevation of a second form of guard shoe;

Fig. 24 is a partial enlarged sectional view of a worm-gear drive, taken on the line XXIV—XXIV of Fig. 3;

Fig. 25 is a diagrammatic view of the stator winding;

Fig. 26 is a schematic diagram of connections of the motor-energizing circuit;

tor side thereof. If the press is of a type which requires an operator to stand at the end of the press the guard rail 52 may also be extended across that end of the press. The guard or guard rail 52 is mounted on supporting arms 54 which are pivotally mounted at 55 on a bracket 56 which is attached to the pressing machine frame 14. Each spring 58 is secured at one end to the pressing machine frame and at the other end with one of the supporting arms 54. These springs 58 normally hold the guard rail 52 and supporting arms 54 in position close to the press as shown in full lines in Figure 4. Guide members 60 are pivotally connected at 62 with each of the supporting arms 54 and these guide members 60 are provided with end portions 64 of reduced cross section which are slidable in bearings 65 which are oscillatively mounted on brackets 66 carried on the pressing machine frame 14. The movement of the supporting arms 54, toward the pressing machine, is limited by the portion of the guide members 60, which is of large cross section, striking against the end of the bearings 65, as shown in Figure 4. The supporting arms 54 may be moved about the pivotal connections 55, to move the guard 52 away from the pressing machine as shown in dot dash lines in Figure 4. This movement of the supporting arms 54 is limited by stop members 68 which are mounted on the guide members 60 and which contact with the end of the bearings 65 when the guard rail 52 reaches its outer limit of travel. The mechanism supporting the guard 52 provides a guard which is movable towards and from the press and any mounting having this function is contemplated.

*Mounting of controls on guard*

The operator operated means for controlling the operation of the press are preferably mounted on the supporting arms 54. As shown in Figure 1 two control handles 70 and 72 are mounted on the right hand supporting arm 54 and a third control handle 74 is mounted on the left hand supporting arm 54. The mounting of the control handles 70 and 72 is shown in detail in Figure 2. The supporting arm 54 on the right (Figure 1) is formed with a bracket 90 which provides a pivotal mounting 76 for the control handle 70, and a pivotal mounting 78 for the control handle 72. One end of the control handle 72 extends into the hollow interior of the supporting arm 54 and a roller 80 is mounted on this end of the control handle 72. The roller 80 contacts with the upper end of an operating or push rod 82 and a guide piston or bushing 84 is secured to the upper end of the operating rod 82 to hold the same properly centered in the supporting arm 54.

One end of the control handle 70 is provided with a roller 86 which contacts with the upper end of an operating or push rod 88 which is slidably mounted in the bracket 90 formed on the supporting arm 54. From the structure thus far described it will be apparent that movement of the control handle 70 in a counterclockwise direction will cause the operating rod 88 to be moved downwardly, and a movement of the operating handle 72 in a clockwise direction will cause the operating rod 82 to move downwardly. The connections at the lower end of the operating rods 82 and 88 will be described later in connection with the valve operating mechanism.

The control handle or operator actuated means 74 is pivotally mounted at 92 on a bracket formed at the upper end of the left hand supporting arm 54 and one end of the control handle 74 extends into the hollow interior of the supporting arm 54. The end of the control handle 74 which extends into the supporting arm 54 is provided with a roller 94 which contacts with the upper end of an operating or push rod 96. A guide piston or bushing 98 is formed on the upper end of the operating rod 96 to hold the operating rod 96 properly centered in the supporting arm 54. A set screw 99 is mounted on the supporting arm 54 and extends into a slot 100 which is formed in the guide piston 98. This set screw 99 serves to keep the guide piston 98 and operating rod 96 from turning. Similar means may be used in connection with the guide piston 84 and operating rod 82 previously described.

The control handles 70, 72 and 74 are shown as being carried preferably upon the guard supporting arms 54. It is desirable to have these handles movable with the guard 52 and any mounting for the handles is suitable provided the handles move with the guard. In the broader aspect of the invention, the operator-operated means need not be movable with the guard.

*Valve operating mechanism*

The valve operating mechanism controlled by the control handle 74 is shown in detail in Figure 6. The supporting arm 54 is pivotally mounted at 55 on the bracket 56 as previously described. The operating or push rod 96 extends down the interior of the supporting arm 54 and through the lower end of the supporting arm 54 as shown in Figure 6. The lower end of the operating rod 96 may be threaded as at 102 for attachment to an end member 104. The operating rod 96 is normally held in raised position, with its end member 104 in contact with the lower end of the supporting arm 54, by a spring 105. This spring 105 is compressed between a washer 106, which abuts against a pin 108 secured to the operating rod 96, and a lower abutment member 110 which is secured within the supporting arm 54 by suitable means such as a screw.

A coupling member 112 is pivotally connected at 114 with the end member 104 and is normally held in the position shown in Figure 6 by a spring 115. Movement of the control handle 74 in a clockwise direction about its pivotal connection 92 will cause the operating rod 96 to move downwardly, against the compression of the spring 105 and the coupling member 112 will also move downwardly but this movement will have no effect on the operation of the pressing machine since the coupling member 112 is not in contact with or is separated from the valve operating mechanism. The handle or operator actuated means 74 is, therefore, normally disconnected from operative relation with the valve operating or control mechanism.

The valves operated by the control handle 74 are contained in a valve casing 118 and are operated by a rocker arm 119 which is pivotally mounted at 120 on the valve casing 118. These valves are operated through a valve stem 122 when the rocker arm 119 is rocked in a clockwise direction about its pivotal connection 120. Movement of the supporting arm 54 into the dot dash position shown in Figure 4 will cause the coupling member 112 to be moved into the position shown by dot dash lines in Figure 6. Thus movement of the guard rail 52 away from the pressing machine brings the coupling member 112 into operative position with respect to the rocker arm 119 or operatively connects the operator actuated means with the control means. With the

coupling member 112 in the position shown in dot dash lines in Figure 6 actuation of the control handle 74 will cause the operating rod 93 and coupling member 112 to move downwardly to move the rocker arm 119 in a clockwise direction about its pivotal connection 120 and thus actuate the valve stem 122 to operate the valves in the valve casing 118.

The pivotal connection 114, previously described, is for the purpose of allowing the coupling member 112 to yield away from the rocker arm 119 if it is depressed before moving into the dotted line position. If it were so depressed it would strike against the end of the rocker arm 119 and if the spring 115 did not permit this yielding action the mounting of the rocker arm 119 might be broken due to the great leverage that an operator has with the supporting arms 54.

The operating or push rod 82, which is mounted in the right hand supporting arm 54, is provided with a coupling member 124 at its lower end which is of similar construction and operated in a manner similar to that described in connection with the structure shown in Figure 6. The coupling member 124 operates a rocker arm 125 which is pivotally mounted at 126 on a bracket formed on the valve casing 128. The valve in the valve casing 128 is operated through a valve stem 130 which contacts with the rocker arm 125. The rocker arm 125 also operates a rocker arm 132 which is pivotally mounted at 133 on a valve casing 134. The valve in the valve casing 134 is operated through a valve stem 136. A resilient contact member 138 is provided between the rocker arms 125 and 132 which compensates for the fact that the valves operated through the valve stems 130 and 136 will probably require slightly different amounts of travel before they will seat.

The operating or push rod 88 is slidably mounted in a bracket 140 which is formed near the lower end of the right hand supporting arm 54 and this operating rod 88 is normally held in raised position by a spring 142 which presses at its lower end against the bracket 140 and at its upper end against a washer 144 which is held against upward movement by a pin 145 inserted in the operating rod 88. The operating rod 88 is secured at its lower end to an enlarged end portion 148 which abuts against the bracket 140 to limit upward movement of the operating rod 88. The end portion 148 is provided with a grooved roller 150 which runs on one arm of a bell crank 152. A spring 154 normally holds the bell crank 152 in the position shown in Figure 3. The bell crank 152 is pivotally mounted at 155 on the bracket 56 at a point spaced from the supporting arm pivot 55 and the downwardly extending arm of the bell crank 152 is provided with a contact member 156 which operates against a rocker arm 159 which actuates a valve stem 160 to operate the valves in a valve casing 162. When the supporting arm 54 is in the position shown in Figure 3 downward movement of the operating rod 88 will rock the bell crank or pivoted rod 152 about its fixed pivotal connection 155 and this movement will bring the contact member 156 close to the valve stem 160 but will not be sufficient to move the contact member 156 into contact with the valve stem 160 to operate the valves in the valve casing 162. When the supporting arm 54 is moved about its pivotal connection 55, when the guard rail 52 is moved away from the machine, the bell crank 152 will be rocked about its pivotal connection 155, as indicated in dot dash lines in Figure 3. This movement of the bell crank or pivoted rod 152 is due to the fact that the pivoted rod or bell crank extends at an angle or tangent to the circular path of movement of the roller 150 and the distance between the centers of the pivotal connections 55 and 155. This position of the pivoted rod 152 enables the operator actuated means and particularly the roller 150 thereof to engage the rod throughout the shifting movement of the movable member 52. The shifting of the movable member 52 is sufficient to bring the contact member 156 substantially into contact with the valve stem 160. Operation of the control handle 70, when the bell crank 152 is in this position, will move the operating rod 88 and roller 150 downwardly to rock the bell crank 152 about its pivotal connection 155 and move the valve stem 160 to operate the valves in the valve casing 162.

*Connections between valves and motors*

Figure 7 shows the valve casings in section and the connections between the valve casings and the motors. Working fluid is supplied through a fluid supply line 165 which is connected by a branch pipe 166 with the valve casing 118.

The valve casing 118 contains a normally closed intake valve 168 and a normally open exhaust valve 169 which are connected together by a spacer rod 170 so that they operate as a unit. A spring 171 holds the valves 168 and 169 in normal position as shown in Figure 7. The valve stem 122, which is formed on the exhaust valve 169, extends through the end of the valve casing 118 and is actuated by the rocker arm 119 to operate the valves 168 and 169. The operation of the rocker arm 119 from the control handle 74 has been previously described. The valve casing 118 is provided with a diaphragm chamber 172 which contains a diaphragm 173. A plunger 174 extends through the end of the diaphragm chamber 172 and when pressure is applied behind the diaphragm 173 the plunger 174 will move into contact with the rocker arm 119 to hold the rocker arm 119 in operated position against the compression of the spring 171. The fluid supply line 165 connects with the valve casing 162. The valves in the valve casing 162 are identical in construction with those in the valve casing 118 and are designated by the same reference characters. The valve casing 162 is provided with a diaphragm chamber 175 which is identical in construction and operation with the diaphragm chamber 172 of the valve casing 118.

The valve casing 118 is connected, at a point midway between the valves 168 and 169, by pipes 176 and 178, with the fluid motor 44. When the valves in the valve casing 118 are in operated position with the intake valve 168 open and the exhaust valve 169 closed working fluid may flow from the fluid supply line 165, through the pipe 166, around the open intake valve 168, through the valve casing 118, and pipes 176 and 178 to the fluid motor 44.

The pipe 176 is connected by a pipe 180 with the valve casing 128 which contains an exhaust valve 182 and it is necessary that this exhaust valve 182 be closed in order to have sufficient pressure build up in the pipes 176 and 178 to operate the fluid motor 44.

The exhaust valve 182 is moved into closed position by the rocker arm 125 which is operated from the control handle 72 as previously described. It is necessary therefore, in order to operate the

other. Integral with the two bearing portions are depending portions 194 and 196 which are united, at their bottom ends, by a diametrally extending bridging portion 198. It may here be noted that the swivel housing 160 fits loosely within the annular portion 188, and that the two lugs 170 and 172 cooperate with an inwardly extending lug 200 on annulus 188 to limit the turning movement of the fan assembly and of the swivel housing, relatively to the tilting housing and the base.

The arm 198 is provided with a central opening 202 to receive a slip clutch, the details of which will be set forth hereinafter, and also has an upwardly extending portion 204, which is enlarged at the upper end to provide a substantially annular member 206 having an opening 208 therein to receive a ball bearing 210. This ball bearing cooperates with a flange 212 on the swivel pin 154 to rotatably support the swivel pin, the swivel housing, and the motor-driven fan assembly in proper operative position relatively to the tilting housing and to the base.

The bearing portions 190 and 192 are provided with arcuate surfaces, portion 192 being provided with an extension 214, shown more particularly in Fig. 14 of the drawings, and cooperating clamping straps 216 and 218, extend around the substantially circular surfaces of members 190 and 214, the end portions thereof being secured against integral portions on the inside of support 50 by short machine screws 220, shown in Figs. 1, 2 and 3 of the drawings.

Referring to Fig. 14 of the drawings, I have there illustrated how the portion 214 of bearing member 192 is shaped and constructed to provide means for limiting the amount of tilting of the fan structure which can be effected. The portion 214 extends through an arc of substantially 160°, each end portion terminating 10° short of the horizontal plane. These two end surfaces 222 at each side of a vertical plane engage a horizontally extending lower surface 224 of the hollow casing so that the angle of tilt is limited to 10° from a vertical plane.

The lower end of worm shaft 138 is provided with a plurality of teeth 226 to constitute a pinion, which pinion meshes with the teeth on a spur gear 228, which spur gear is rotatably supported in extension 174 (see Fig. 10 of the drawings), the spur gear being fixedly mounted on a spindle 230, extending into an opening 232 in extension 174. The spindle 230 is provided with a reduced portion as shown in Fig. 5 of the drawings, into which fits the end of a short machine screw 234 which allows the spindle 230 to turn freely and at the same time will securely hold the spindle in its bearing.

A short machine screw 236 extends into spur gear 228 and is of such design and construction as to receive one end of a connecting rod 238 which is loosely pivotally mounted on the machine bolt 236. This assembly constitutes a part of the oscillating mechanism and is supported by the swivel housing 160, and therefore turns therewith. It may be noted that the swivel housing 160, and particularly the annular portion 168 thereof, has an opening 240 extending therethrough, in which is located a bushing 242 constituting a bearing for the lower part of worm gear shaft 138, as is shown more particularly in Fig. 3 of the drawings. The bushing 242, therefore, constitutes a guide member for the lower end of the shaft 138, so that the pinion end 226 thereof will always be in operative engagement with spur gear 228.

A slip clutch is operatively associated with the tubular swivel pin 154 and includes an annular member 244, one form of which is shown in Fig. 35, having a radial extension 246 thereon, and I may call this element a swivel ring. It is adapted to be pivotally mounted on swivel pin 154 intermediate its ends but can not move in an axial direction thereof. A thrust collar 247 (see Fig. 2) fixes the location of swivel ring 244 on pin 154. It may here be noted that the other end of connecting rod 238 is pivotally mounted on and connected with extension 246 by means of a short machine bolt 248, shown in Figs. 4 and 5.

Means for adjustably and yieldingly connecting or locking the swivel ring 244 to the walls of opening 202 are constituted by the following elements. The swivel ring 244 is provided with a plurality of radial openings 250 therein which, in the design shown in Fig. 6 of the drawings, are spaced substantially 43° apart, and I prefer to employ either three such openings, as shown in Fig. 6 of the drawings, or five such openings, in a modified form to be described hereinafter. I provide two sets of such openings or recesses, which are adapted to receive a metal ball 252, shown more particularly in Fig. 6 of the drawings, and adapted to be located in a radial opening 254, shown in Fig. 13 of the drawings as being provided in the central portion of bridging member 198. A helical spring 256 is pressed against the ball 250 by a short machine bolt 258. As the steel balls 252 extend into the recesses 250 a relatively small amount only, it is obvious that a turning movement of the fan structure will permit of selectively locating the fan structure relatively to the base, such position being determined by the balls 252 fitting in the one of the recesses.

It is therefore possible to cause oscillation of the fan assembly around a plurality of centers of oscillation, each center being spaced by 43° from an adjacent center. It may be here noted that the arcuate extent of an oscillation is through substantially 96°, this angle of oscillation being fixed by reason of the design and construction of the cooperating parts of the oscillating mechanism. It is, of course, obvious, also, that oscillation of the fan assembly will occur only when one of the balls 252 is fitted into one of the three recesses 250 in the swivel ring. When this interfitting of ball and recess is present, it is obvious that the swivel ring is locked to the tilting housing so that, as long as connecting rod 238 is moved by reason of the rotation of spur gear 228, the fan assembly will be oscillated. It is also immaterial whether the fan is located in its upright position or whether it has been moved to a forward or to a backward tilted position.

Referring particularly to Figs. 6, 7 and 8 of the drawings, I have there illustrated means for maintaining the motor-driven fan assembly in its non-oscillating position, which position is that in which the entire motor-driven fan assembly, and including, particularly, the swivel pin which is fixed axially of the swivel housing, as explained heretofore, are moved a short distance away from the base or support. Reference to Fig. 3 of the drawings will show that the pivot pin 154 has an annular recess 260 therearound into which there fits the reduced end of a short machine screw 262. The axial width of recess 260 is sufficient to permit the swivel pin to be moved through about ⅛ in. vertically upwardly from the position shown in Fig. 3 of the drawings. When this happens, the

balls 252 will move out of the recesses 250 and will then ride upon a smooth annular surface portion of the swivel ring. It is, therefore, evident that no oscillation of the fan structure will result because the swivel ring is not locked to the stationary tilting housing but a reciprocating annular movement will be given to the swivel ring.

Referring to Fig. 13, it will be noted that the central enlarged portion of bridge 198 is provided with a slot or recess 264, extending into it from one side thereof. A lever arm 266, shown in Figs. 6, 7 and 8 of the drawings, is pivotally mounted to move radially into and partially out of the slot 264, being pivotally mounted on a pin 268, shown in Figs. 7 and 8. The lever arm 266 is provided with an arcuate recess 270 in its inner edge and the sharp corner 272 thereof away from the pivot point is adapted to move into the path of the lower end of swivel pin 154. Therefore, if the motor-driven fan assembly is lifted bodily upwardly, in the device shown in these drawings, the lower end of the swivel pin will move beyond the plane of the upper surface of supporting lever 266, and a tension spring 274, connected to one end of lever 266 and having its other end connected to an integral lug 276 on bridge 198, will pull the sharp corner 272 below the lower end of the swivel pin and maintain the fan assembly in its upper position where it will not oscillate, even though the oscillating mechanism is continually operative.

In the non-oscillating position of the fan parts, the friction of the balls 252 on the reciprocating swivel ring will tend to oscillate the fan because this friction acts the same as a slight friction lock between the swivel ring and the tilting housing. However, the friction caused by the weight of the whole upper structure on the sharp point 272 of lever 266 is so much greater that the fan is held stationary.

Another object of the sharp point 272 on lever arm 266 is that only a relatively small turning or swinging movement of lever 266 around its pivot 268 is necessary to withdraw the point 272 from under the swivel pin, the necessity of which movement will be explained later. If the arcuate recess 270 were omitted a much larger turning movement of lever arm 266 around its pivot point 268 would be necessary to withdraw the lever arm from under the pin.

Referring now to Figs. 4, 5 and 8, particularly, the latter two figures, I have there illustrated a motor-circuit control switch including a base 278 of electric-insulating material having a manually operable switch lever 280 pivotally mounted thereon to control the motor circuit. It may be here stated that the method of control which I have included in the present embodiment of my invention includes the use of a six-pole and of an eight-pole stator winding, so that I need provide only four single-contact members 282, 283, 284 and 285, of which 282 and 283 are connected to the eight-pole stator main and auxiliary winding and 284 and 285 are connected to the six-pole stator main and auxiliary winding, to obtain motor-starting and motor-speed control conditions. While I have not shown the other fixed contact, it is to be understood that such is provided, and it is to be further understood that contact members 282, 283, 284 and 285 are suitably supported on the base 278, so that good operative engagement between the conducting portion of lever arm 280 and these two pairs of contacts will be established. As shown, I provide an insulating portion 286 on the outer end of lever 280, so that an operator will be protected against danger of shock during the operation of the control lever.

The lever arm 280 has a lateral extension 288 thereon, intermediate its ends and located relatively closely to the pivot point 290, as shown particularly in Fig. 8 of the drawings. A small piece of electric insulating material 292 has one end portion thereof secured to extension 288, and a bell-crank lever 294 is secured to the other end thereof, so as to extend substantially in the same direction as does lever 280, but beyond the pivot point 290 thereof. Arm 294 is provided with an upward extension 296, which extension is long enough to be in the path of lever arm 266.

Referring now to the positions of lever arm 280 and lever 294, if these parts are in the position shown by the broken lines it will be noted that the upward extension 296 will not be in mechanical engagement with one edge of arm 266. The position of lever arm 280 shown by the broken lines of Fig. 8 is the one that corresponds to the fully energized condition of the motor-energizing circuit, that is, the motor is operating when the lever arm 280 is in the position shown by the broken lines. If now the motor is deenergized by moving lever arm 280, the outer end of which projects suitably through a slot 298 in the casing (see Fig. 1), the extension 296 will engage arm 266 and cause it to move from the position shown by the broken lines in Fig. 8 of the drawings to the position shown by the full lines in that same figure. This means that lever arm 266 is moved in such direction that the sharp corner 272 is moved away from its operative engagement with the lower end of swivel pin 154, so that the entire fan assembly, including, of course, the swivel pin, will drop downwardly. Deenergization of the motor by movement of the motor circuit control lever from its "on" to its "off" position will, therefore, simultaneously effect movement of the fan from its non-oscillating position to the oscillating position. Thus, if the motor is again energized, the fan would oscillate, and if a non-oscillating position were desired, it would be necessary to raise the fan assembly bodily away from the base. It may here be noted, also, that, while it is possible to raise the fan assembly to its non-oscillating position when the motor circuit is deenergized, it is not possible to retain or maintain it in that position because of the fact that lever arm 266 will not be in position to move below the lower end of the swivel pin. It may also be noted here that I have shown the location of lever arm 266 in Fig. 8 with the fan in the oscillating position. Usually the fan will operate as an oscillating fan and, in this case, the sharp point 272 will not be under the swivel pin, but will merely engage the annular surface of the pin. The swinging movement of lever 266, caused by lever arm 294 would not result in any decisive change in the operation of the fan.

In addition to the arm 294 which is secured to switch arm 280 I provide also a second bell-crank lever or arm 300, whose general shape is shown in Fig. 1 of the drawings. This arm has a portion extending vertically upwardly, and a portion 302 extending horizontally and having a small lug 304 extending laterally thereof and adapted to fit into an opening 184 located on the swivel housing portion 176, as may be noted by reference to Figs. 9, 10 and 11.

As is shown in Fig. 1 of the drawings, the lug 304 on part 302 of the second bell-crank lever 300, extends into the opening 184 so that the fan as-

sembly cannot either be tilted or oscillated, and it is necessary to energize the motor by proper movement of the switch lever 280 before the fan can either be tilted or retained in its non-oscillating position, as has already hereinbefore been described.

Assume now that the switch arm 280 has been moved to its energizing position, so that arm 302 and the lug 304 thereon have been moved away from the double-cam surfaces 178 and 180, it will be evident that it is possible to tilt the fan assembly either forwardly or backwardly of its upright position. The lug 304 will be clear of any engagement of the arcuate surfaces 178 and 180. Assume now that the motor is deenergized by moving arm 280 to the "off" position. Let it further be assumed that the fan assembly has been tilted forwardly during this period of operation. When the portion 302 is moved simultaneously with the movement of arm 280, the end thereof will ride upon the cam surface 178, the initial point of contact with this surface depending, of course, upon the point at which the fan assembly may be with regard to its arc of oscillation. Thus, if it is at one extreme end of its path of travel, the end-carrying lug 304 will not immediately engage the cam surface 178, but will engage it as soon as the assembly has turned through a small angular extent.

As the arm portion 302 represents a relatively strong spring which is rigidly held in the position shown in Fig. 5 by means of friction as well as by the action of main lever 280, this arm will remain in a substantially fixed position and therefore the fan assembly including the swivel housing will be moved back to its central upright position during the course of a maximum travel of one-half of the total arc of oscillation. When this has happened, the lug 304 will move into opening 184 to thereby hold the fan assembly against any further oscillation of the assembly itself. Inasmuch as the rotor has a relatively large moment of inertia, because of its large diameter, it is evident that it will continue to rotate for some time, and the hereinbefore described slip clutch will permit the continued operation of the oscillating mechanism hereinbefore described, the balls 252 jumping from one to the other of the recesses 250 and moving also, of course, upon the smooth outer surface of the swivel ring.

If the fan had been tilted in a backwardly direction the end of arm 302 would have engaged the surface of cam 180 and caused the fan assembly to be moved into its upright position in substantially the same manner as has just been described.

Reference to Figs. 9, 10 and 11 will show that cam-surface 180 is somewhat larger than cam surface 178, that is, it extends farther radially outwardly than the upper cam surface. This is for the reason that the same fan assembly straightening operation is effected whether the fan was operating as a non-oscillating or an oscillating fan. As has already been stated, the fan assembly is moved upwardly, in the construction shown in these drawings, to cause it to operate as a non-oscillating fan, and it is, therefore, necessary to make the cam surface 180 slightly larger axially of the swivel pin, and therefore slightly larger all around than the upper cam surface. It may here be pointed out that the return of the fan assembly to its upright position is not made immediately and simultaneously with the movement of switch lever to its "off" position, but this return to its upright position is effected within not over one-half of an entire cycle of oscillation, and that this return is effected by the momentum of the rotor, which continues its rotation for several minutes after deenergization of the stator.

In order to assist in holding the fan assembly in its upright position I provide member 214 with an opening 306, as is shown more particularly in Figs. 12, 13 and 14, and locate therein a steel ball 308 and a compression spring 310. The ball 308 may extend into a small recess in clamping strap 218, as is shown more particularly in Figs. 1 and 2 of the drawings. This construction provides a resilient means cooperating with the base and the tilting frame for yieldingly holding the fan assembly in its upright position.

Referring now to Figs. 25 and 26 of the drawings, I have there illustrated, more or less schematically, the stator windings which I now prefer to employ. I have shown thirty-six stator slots in Fig. 2 of the drawings, and have shown these diagrammatically in Fig. 25 of the drawings. I provide a distributed main energizing winding 312 and a distributed auxiliary winding 314, both of these windings being of the kind usually employed for such purposes and being so wound as to provide a six-pole magnetic structure in the stator. I have used a consequent-pole winding, that is, I have wound only every other pole of the entire assembly. Winding 316 indicates the main energizing winding for an eight-pole magnetic structure, and winding 318 indicates the auxiliary winding for an eight-pole structure, all of the same general kind as for the six-pole windings.

Referring to Fig. 26 of the drawings, I have there illustrated schematically a supply circuit including conductors 320 and 322, together with a capacitator 324 properly connected in circuit to permit of first energizing the eight-pole winding upon proper movement of switch arm 280, and of then energizing the six-pole winding in order to operate the fan at its maximum speed.

A transformer 326 shown in Figs. 1, 2 and 5, is provided to increase the effective capacitance for the auxiliary winding of the motor. An arrangement of this kind is well known in the art and is used to reduce the size of the condenser. A transformer and a suitable high-voltage condenser require less space than a low-voltage condenser. A main plural-conductor cord 328 extends through one wall of casing or base 50 and may have a contact plug 330 at its end which may be engaged with a suitable socket in a manner well-known in the art.

Referring now to Figs. 27 and 28 and 29, I have there illustrated a modified form of swivel housing 332, the general shape of which is substantially the same as that of the swivel housing 160, illustrated in Figs. 9, 10 and 11. The main difference, however, is that swivel housing 332 is not provided with the double arcuate cam surfaces of housing 160, but has only a substantially flat depending lug 334. It is provided with a lug 336 which is the counterpart of lug 174, and is utilized in the same manner and for the same purpose.

The lower end of lug 334 is provided with a groove 338 therein for a purpose to be hereinafter set forth, and has also a central opening 340, which corresponds to opening 184 in member 160, and which opening is utilized in the same manner.

Referring now to Figs. 32 and 33 of the drawings, I have there illustrated a modified form of

motor control switch including a base 342 of electric-insulating material, which is secured to lugs on the inside of the casing in the same manner as was the member 278. I locate on the base 342 a lever arm 344 which is pivotally mounted as by a bolt 346, and I provide a handle portion 348 of electric-insulating material on the outer end of arm 344. It may be noted that I have not illustrated the electric circuit contact points which are mounted on base 342, this having been done for the sake of clearness, as these contacts are shown in detail in Fig. 5 of the drawings.

Arm 344 is provided with a lateral extension 350 to which is secured a small plate 352 of electric-insulating material, to the other end of which is secured a compound bell-crank lever 354. A second bell-crank lever arm 356 is pivotally mounted intermediate its ends on a pivot bolt 358 and has the end of its shorter arm pivotally connected to a link 360, the other end of this link being pivotally connected to the short end of one arm of lever 344. The general arrangement of these parts is substantially that shown in Figs. 32 and 33 of the drawings, in which the parts are shown in their close-up positions with the switch lever in its "off" position, in Fig. 32, while the same parts are shown with the switch lever in the "on" position, in Fig. 33. The arms 354 and 356 constitute what may be called a scissors device which is operative for the following purpose.

Lever arm 362 is of substantially the same general shape as has hereinbefore been described for lever arm 266, and has not only the function of holding the fan assembly in its non-oscillating position, but is effective also, in cooperation with an upwardly extending arm portion 364 of arm 354, to move the fan assembly into its upright position simultaneously with the movement of arm 344 to its "off" position. For this purpose, arm 362 is provided with a notch 366 therein in such position as to be engaged by the upwardly extending portion 364 and cause a tilting movement of the fan assembly. If it be assumed that the fan has been operating as a non-oscillating fan, arm 362 will have been in the position shown in Fig. 33, and when arm 344 is moved to the "off" position, portion 364 will first engage an edge portion of arm 362 beyond the notch 366 and move it into the position shown in Fig. 32 of the drawings, whereby the fan is moved from its non-oscillating position to its oscillating position, because the sharp corner 272 of lever 362 will be moved out from under the swivel pin in a manner already described.

Upon further movement of arm 344, the upward extension 364 will engage the notch 366 and, as this is located to be in substantially radial position at right angles to the bearing portions of the tilting housing, the housing and the fan assembly will be moved to their substantially upright positions.

If, however, the fan was tilted in such manner that portion 364 did not engage recess 366, the second arm 356, and particularly its upwardly extending portion 368, will be effective to move the tilted fan assembly into its upright position. For this purpose, I provide a small plate 370, (Fig. 34) having a circular portion 372 and a radial extension 374 thereon, which plate is so located at the lower end of the central portion of arm 198 of the tilting housing shown in Fig. 13, as to extend substantially at right angles to a radial line through recess or notch 366. The end of etxension 374 is, therefore, engaged by portion 368, irrespective of its amount of tilt, when lever 344 is moved to its "off" position, so that the fan assembly is moved into its upright position.

The plate 370, and particularly the annular portion 372, are held against the lower end of the central portion of bridging member 198 by a plurality of small screws 376, and I provide, also, a bushing 378 of electric-insulating material, which interfits with member 372, as is shown in Fig. 40 of the drawings. The conductors 380, leading from the control switch to the motor field, extend upwardly through the tubular swivel pin, and are, therefore, protected where they leave the swivel pin by the bushing 378.

Means for stopping the fan assembly in its intermediate or central position include a spring-supported lug 382 mounted on a resilient member 384, which is secured to the upper end of portion 364. The lug 382 is adapted to fit into the opening 340 in depending lug 334. As shown in Fig. 30 of the drawings. I prefer to make the groove 338 of varying depth, and the recess 340 is of minimum depth, so that in case an operator should exert a relatively large pull in the attempt to turn the fan assembly even when in its locked position, such action will not cause damage to the locking means.

It will be noted that the swivel housing 332 is much simpler than the swivel housing 160, inasmuch as it does not include the plural cam surfaces. The use of the relatively simple depending lug 334 with its groove 338, recess 340, and the cooperating stop lug 382, has the result that these parts operate only to stop the oscillation of the fan assembly, but play no part in the return of the fan assembly from a tilted position to the upright position. It is obvious also that other means may be used to control the means for holding the fan assembly in its central position and for straightening the same when in its tilted position.

I have illustrated, in Figs. 39 to 40, inclusive, a modified form of slip clutch. I may use substantially the same type of swivel ring 244 as has already been described, and may locate thereon an annular member 386 whose axially upper surface is smooth while the axially lower surface is provided with a plurality of serrations 388. The ring 386 is fixedly mounted on the lower reduced portion 390 of swivel ring 244, as by being pressed thereon. While I have shown the serrations 388 as being provided in a separate member, I may make it integral with the swivel ring.

The recesses 388 are adapted to be engaged by balls 392 yieldingly urged into the recesses by springs 394, as shown in Figs. 39 and 40 of the drawings. It may be noted that in the modified form of slip clutch shown in Figs. 35 to 40 inclusive, I have provided five recesses which may be selectively engaged by the respective balls 392. This makes it possible to have the fan assembly oscillate about five different central planes of oscillation instead of three, as has been hereinbefore described for the structure shown in section in Fig. 6 of the drawings.

The advantage of the modified form of slip clutch shown in Figs. 35 to 40 over that shown in Fig. 6 lies in the greater ease with which a fan embodying the slip clutch of Figs. 35 to 40 can be changed from oscillating to non-oscillating position. In the device shown in Fig. 6 it was necessary to spring the balls out of the holes while in the slip clutch shown in Figs. 35 to 40 this is not necessary. Hence it is quite easy to raise the rotor and stator structure a small distance from the base, to move it into its non-oscillating posi-

tion, when using the slip clutch shown in Figs. 35 to 40.

Let it be assumed that it is desired to operate the fan as a non-oscillating device. The operator first moves the motor control switch arm 344 to the "on" position (it being also assumed that the motor driven fan assembly includes the switch shown in Figs. 32, 33 and 39). The control parts will then be in the position shown in Fig. 33 and the rotor starts to rotate. The operator lifts the fan assembly upwardly so that spring 274 causes turning movement of arm 362 on its pivot pin 268 until the sharp corner 272 is moved under the lower end of swivel pin 154. He may also tilt the fan assembly in either a forwardly or a backwardly tilted position as desired. The rotor and the fan blades will now rotate at a speed determined by the design of the electric motor and the position of switch arm 344.

It may be pointed out that tilting of the fan assembly is permitted as soon as the arms 354 and 356 have been moved to the positions shown in Fig. 33; where the end 364 of arm 354 is out of engagement with the recess or notch 366 of arm 362 and portion 368 of arm 356 is out of engagement with the end of extension 374.

The assembly may also be turned angularly relatively to the base and will be held by friction in such position as set forth hereinbefore.

When it is desired to shut down the motor the arm 344 is moved to its "off" position. If, for example, the assembly was tilted so that extension 374 had been moved toward member 368 on arm 356, it will be engaged by extension 368 when the same is moved toward the swivel pin 154, to move the fan assembly into its normal upright position. If the fan assembly had been tilted in the other direction, portion 364 on arm 354 would have engaged the wall of recess 366 and caused not only a turning movement of arm 362 but also a movement of the fan assembly to its normal upright position.

If the operator had turned the fan assembly from its central position relatively to the base, it would be returned thereto by the oscillation mechanism which have become effective as soon as arm 362 is turned by extension 364 in such direction as to move shoulder 272 out of engagement with the lower end of swivel pin 154, whereby the fan assembly is permitted to move, by gravity, to its oscillating position. The steps by which the assembly is returned to and held in its central position are substantially as follows: as soon as the assembly is in its normal upright position, the lug 382 on spring 384 is alined with opening 340 in depending lug 334, and as soon as the assembly has been turned by the now operative oscillating mechanism to its central position, lug 382 enters recess 340 to hold the assembly and cause slipping of the clutch hereinbefore described.

If the fan assembly is to be oscillated during its operation, the operator merely moves arm 344 to the "on" position, after which he can tilt the fan assembly in the desired direction and may also turn the fan assembly relatively to the base to cause it to oscillate on both sides of a central vertical plane.

Should the fan assembly strike an obstacle near the end of an oscillation, the clutch would slip an amount equal to the uncompleted oscillation and would then oscillate on both sides of a new central plane.

Upon moving arm 344 to its "off" position the fan assembly is moved to its upright position in the same manner as has been described above for non-oscillating operation. The fan assembly will also be stopped in its central position by the engagement of the lug 384 in recess 340, as set forth above.

Substantially the same description of the different phases of starting, operating and stopping the motor driven fan applies to a structure embodying the motor control switch arm 280 shown in Figs. 6, 7 and 8, and the swivel housing 160 shown in Figs. 9, 10 and 11. When the motor is deenergized, the arm 280 is in the position shown in the full lines of Fig. 8 and lug 304 is in the opening or recess 184. As soon as lever arm 280 is moved to its "on" position, lug 304 is out of engagement with recess 184 and out of engagement with the arcuate surfaces 178 and 180 shown in Figs. 1, 10 and 11.

If, for example, the fan was operated in a forwardly tilted position and is shut down by moving the arm 280 to its "off" position, the lug 304 will engage the arcuate cam surface 178 and cause a return tilting movement of the fan assembly to its normal upright position and lug 304 will engage recess 184 when the assembly is in its central position relatively to the base. The engagement of extension 296 with arm 266 causes a turning movement of arm 266 in such direction as to move projection 272 out from under swivel pin 154, permitting the fan assembly to move from its non-oscillating position to its oscillating position in case it had been operated as a non-oscillating device.

The two different position-controlling means illustrated and described effect the same results by different mechanisms, that illustrated in Figs. 27 to 40 being simpler and less expensive.

It will be evident from the description hereinbefore given of the various parts of my improved fan motor structure that I have made a relatively great departure from the designs heretofore used commercially. Thus, I provide a relatively flat hollow housing or support which is located beneath the oscillatable fan assembly in the device shown in the drawings. It is obvious, however, that the fan motor may be utilized as a ceiling fan without appreciable change in the structure of the assembly or the base. It is also possible to mount the base against a vertical wall and the device will operate in substantially the same manner. The details hereinbefore described with regard to the bearing brackets of skeleton form indicate that not only the radial arms operate as a fan guard, but that fan guard members of sector shape are utilized which very effectively protect the rotating fan blades against interference by floating draperies. Because of the relatively great amount of energy stored in the rotor, which is located externally of the fan blades, it is evident that it must be made practically impossible for children to come in contact with the rotating blades, as the insertion of a child's finger in the path of the blades would probably result in serious injury thereto. The design adopted for the fan guards proper of sector shape cooperates very well with the rest of the design in providing an exterior of pleasing appearance, while at the same time, it lends itself to manufacture at relatively low cost.

It may be noted that, in contradistinction to the oscillating mechanisms now so commonly used, my oscillating mechanism is completely enclosed in the base so that it is relatively inconspicuous.

It may further be noted that a pivot point is

provided located within the hollow base or support and that the oscillating mechanism is located therebelow.

The fan embodying my device has two aligned positions, an oscillating position and a non-oscillating position, the fan assembly being easily and quickly movable from one such position to the other, and the non-oscillating position being the one in which the fan assembly is located farther away from the housing than it is when in the other position. It is thus easily possible for an operator to move the fan from the oscillating position to the non-oscillating position, in which connection it is to be noted that while the fan assembly can be moved to its non-oscillating position when the motor is deenergized, it will not remain in that position, and it is necessary that the motor be energized before the fan assembly can be moved to its non-oscillating position and remain there. The means for accomplishing this includes a spring-biased lever cooperating with the lower end of the fan assembly.

When using the swivel housing shown in Figs. 9 to 11, inclusive, the oscillating fan assembly is returned to its central upright position by the momentum of the rotor and the fan assembly is stopped in its central position by the means already described, and including, more particularly, arms on the switch lever and cooperating arcuate cam surfaces.

The slip clutch, already hereinbefore described, and including a plurality of recesses in a swivel ring, and cooperating balls resiliently pressed into the recesses, has a further result which will now be described. If the fan includes the slip clutch illustrated in Fig. 6 of the drawings, and if the oscillating assembly should strike an obstruction which would prevent its oscillation, within 5° after leaving the central position, the fan assembly would thereafter oscillate around a new central plane. This is made possible by reason of the fact that the half arc of oscillation is substantially 48°, while the distance between the recesses in the swivel ring is only 43°. When the oscillating fan assembly is therefore stopped shortly after leaving its central position, the balls will slip from one recess into the next recess, and thereafter the fan will oscillate around the new central plane. This operation will result irrespective of whether the fan is in its tilted position or is in its upright position.

While I have illustrated and described a six-pole and an eight-pole stator winding, I do not desire to be limited to such detail, as it is possible to utilize ordinary rheostatic control for the motor in a manner well-known in the art.

The motor control switch including a manually operable lever arm provides relatively simple and positive means for not only returning the fan assembly from its non-oscillating position to its oscillating position simultaneously with the deenergization of the motor, but provides also effective means for ensuring that the motor, and particularly the fan assembly, will stop in its central upright position relatively to the base.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire, therefore, that only such limitations shall be placed thereon as are set forth in the appended claims or as may be imposed by the prior art.

I claim as my invention:

1. A fan motor including a motor-driven fan assembly and a support having aligned and different oscillating and non-oscillating positions relatively to each other, a motor-control switch, and means for holding the assembly in one of its said positions, said means being controlled by said motor control switch.

2. A fan motor comprising a motor-driven fan, means whereby the fan may be tilted, a lever switch controlling the energization of the motor and having an "on" and an "off" position and means controlled by the lever switch for returning the fan to its untilted position when the lever switch is moved to its "off" position to deenergize the motor.

3. A fan motor comprising a motor driven fan having an oscillating and a non-oscillating position, a switch arm controlling the energization of the motor and means controlled by the switch arm for permitting return of the fan from its non-oscillating to its oscillating position upon movement of the switch arm to a position to deenergize the motor.

4. A fan motor including a support, a motor-driven fan assembly having aligned oscillating and non-oscillating positions relatively to the support, spring-biased means holding the fan assembly in its non-oscillating position, and a motor-control switch for rendering the spring-biased holding means ineffective when the switch is moved to its deenergizing position.

5. A fan motor comprising a bearing bracket of skeleton shape having a plurality of radial r.bs, fan guard members of sector shape engaging the radial ribs and shoes of substantially channel shape in lateral section engaging the guard members and the ribs to hold the guard members on the bearing bracket.

6. A fan motor comprising a base, a motor-driven fan assembly having a normal central position relatively to the base, oscillating mechanism for the fan assembly to oscillate it to both sides of the central position, and manually controlled means comprising a stop lever arm for stopping oscillation of the fan assembly in said central position only.

7. A fan motor including a motor driven fan assembly, means whereby the fan assembly may be tilted, a lever switch controlling the energization of the motor, and means controlled by the lever switch and including an arm engageable with the fan assembly to effect return of the fan assembly to its untilted position after the same has been tilted.

8. A fan motor including a support, a motor-driven fan assembly, an oscillating mechanism therefor, and manually controlled means including a stop lug and a recess in relatively movable parts adapted to stop oscillation of the fan assembly at one predetermined position relatively to the support and within a predetermined portion of a complete cycle of oscillation.

9. A fan motor including a support, a motor-driven fan assembly, means whereby the fan assembly may be tilted, oscillating means for the fan assembly and manually controlled means including a switch lever and an auxiliary arm moved thereby for deenergizing the motor, moving the tilted fan assembly to its untilted position and stopping oscillation of the fan assembly in one predetermined position relatively to the support.

10. A fan motor including a motor-driven fan assembly, means whereby the fan assembly may be tilted, manual means for controlling the energization of the motor and means actuated by the manual control means for returning the fan

to its untilted position after the same has been tilted.

11. A fan motor including a motor-driven fan assembly, means whereby the fan assembly may be tilted, manual means for controlling the energization of the motor and means controlled by the manual control means for returning the fan to its untilted position after the same has been tilted, when the manual control means is actuated to deenergize the motor.

12. A fan motor comprising a motor-driven fan and a support therefor, having alined different oscillating and non-oscillating positions relatively to each other, the motor driven fan being liftable to non-oscillating position, a manually-actuable switch arm controlling the energization of the motor, and means including interfittable but initially disengaged portions on the motor driven fan and on the support controlled by the switch arm precluding the fan remaining in the non-oscillating position until energization of the motor has been effected.

13. A fan motor including a base, a motor driven fan assembly, means to permit tilting of the fan assembly relatively to the base, an oscillating means for the fan assembly, a manually actuable switch arm controlling the energization of the motor and means moved by the switch arm and including an arm engageable with the fan assembly to cause the fan assembly to stop in a central upright position relatively to the base after oscillating in a tilted position.

14. A fan motor including a support, a motor driven fan assembly having aligned oscillating and non-oscillating positions relatively to the support, a manually actuable control switch for the motor, means holding the fan assembly in its non-oscillating position when the control switch is in its energizing position, said manually actuable control switch moving the holding means to permit return of the fan assembly to its oscillating position when the control switch is actuated to its deenergizing position.

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