No. 867,914. PATENTED OCT. 8, 1907.

F. DIEHL & A. F. BECKER.

ELECTRIC FAN.

APPLICATION FILED APR. 22, 1907.

2 SHEETS—SHEET 1.

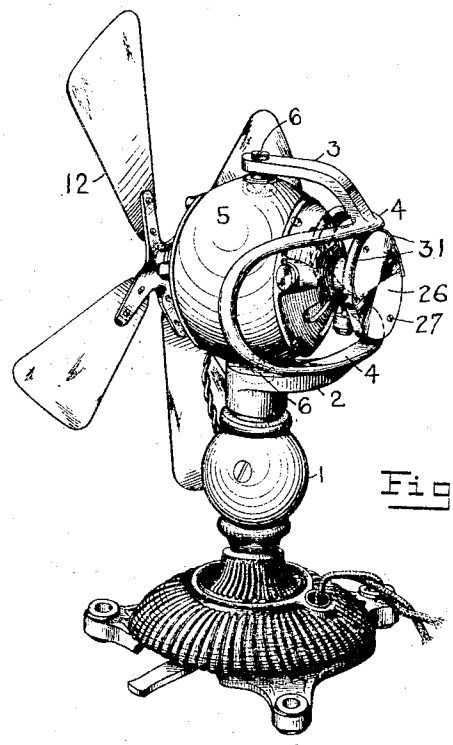

Fig. 1.

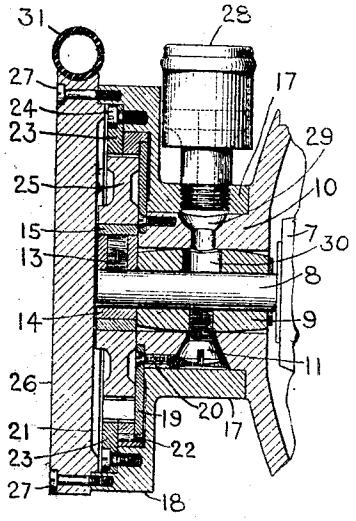

Fig. 2.

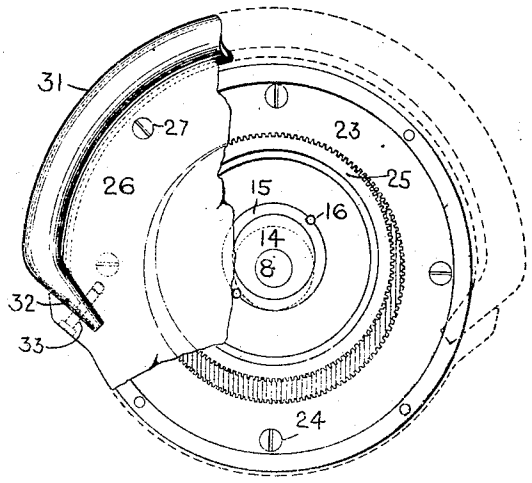

Fig. 3.

WITNESSES:

Geza Fernay

H. A. Kommann.

INVENTORS

Fred'k Diehl & Adolph F. Becker,

BY

Henry J. Miller

ATTORNEY

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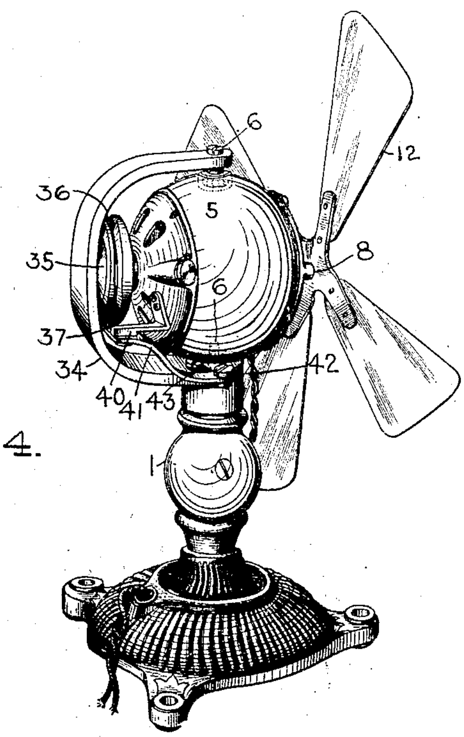

Fig. 4.

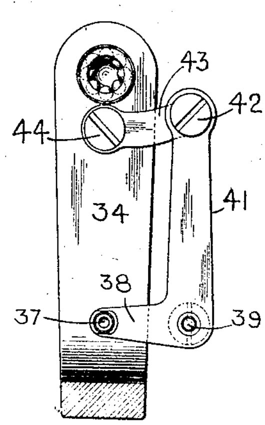

Fig. 5.

WITNESSES:

Géza Ternaß

HAKornemann.

INVENTORS

Fred'k Diehl & Adolph F. Becker

BY

Henry J. Miller

ATTORNEY

UNITED STATES PATENT OFFICE.

FREDERICK DIEHL AND ADOLPH F. BECKER, OF ELIZABETH, NEW JERSEY.

ELECTRIC FAN.

No. 867,914. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed April 22, 1907. Serial No. 369,526.

To all whom it may concern:

Be it known that we, FREDERICK DIEHL and ADOLPH F. BECKER, citizens of the United States, and residents of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electric Fans, of which the following is a specification.

This invention relates to an improvement in that class of electric fans having a stationary base or standard upon which is pivotally mounted the motor-frame, and provided with means for communicating a continuous or reciprocating rotary motion to the motor-frame whereby the current of air from the fan-blades is constantly varied; and the invention has for its object to render more simple in construction and compact in arrangement the mechanism for producing the described circular motion of the motor-frame.

In its preferred form, the fan is provided with a base portion or standard upon which the motor-frame is pivotally mounted to turn upon a vertical axis, the standard having a lateral yoke member affording parallel ways embracing a rotary actuating member carried by the motor-frame in axial relation with the armature-shaft and provided with a segmental peripheral facing adapted to establish rolling contact relation alternately with each of said parallel ways to produce an oscillatory movement of the motor-frame. The rotary actuating member referred to may be operatively connected with the motor-shaft by any usual or suitable form of differential gearing adapted to convert the rapid rotary movement of the shaft into a comparatively slow movement of the actuating member.

In practice the differential connection is effected by two concentrically arranged overlapping internal gears, one of which is fixed to a bearing hub of the motor-frame surrounding the armature-shaft and the other is fixed to the actuating member, one of such gears having one or more teeth in excess of those of the other, while an externally toothed gear intermeshing with both internal gears is mounted upon an eccentric bushing carried by the motor-shaft, the revolution of the latter upon said shaft inducing a slight relative movement of the internal gears proportionate to the difference in the numbers of their respective teeth. Inasmuch as these gears and their supports are arranged upon the same axis, the driven internal gear is carried by a sleeve fitted loosely to the said hub of the motor-frame and provided with a circular cavity for the gears which is closed by a circular cap-plate which in practice carries the segmental contact member, in the form of a rubber tube to afford yielding and elastic qualities in the rolling contact with the parallel ways, which produces the oscillation of the motor-frame.

The invention will be understood by reference to the drawings annexed, in which

Figure 1 is a perspective view of an electric fan constructed in accordance with the present improvement. Fig. 2 is an enlarged sectional view of the mechanism for producing the oscillation of the motor-frame, and Fig. 3 a rear face view of the same with a portion of the cap-piece removed to expose the parts within the gear cavity. Fig. 4 is a perspective view of an electric fan embodying the present invention in a modified form, and Fig. 5 a detail sectional plan view of a portion of the motor-frame oscillating mechanism.

As represented in Figs. 1, 2 and 3, the fan is constructed with the usual base or standard 1 having the lateral arms 2 and 3 connected at the outer ends with the parallel members or ways 4 of a rigid yoke of substantially oval shape. One end portion only of the yoke is shown completely in full lines in Fig. 1, the opposite end portion partially hidden by the motor-frame being represented in dotted lines; but it is to be understood that the yoke is symmetrical in form, with parallel upper and lower members united at the ends by substantially semi-circular connecting members. The motor-frame 5 is shown pivotally mounted at the inner ends of the arms 2 and 3 of the standard 1 by means of the conical bearing screws 6.

The motor is provided with the usal rotary armature 7 having its shaft 8 journaled in suitble bearings in the armature-frame, one of which is shown as a bushing 9 disposed within a lateral bearing hub 10 of the motor-frame in which it is securely locked from endwise movement while allowing a slight rocking movement for accommodation to the armature-shaft 8, by means of the locking screw 11. The armature-shaft carries at the forward end the usual fan-wheel 12 and has fixed thereon at the opposite end by means of a set-screw 13 an eccentric 14 encircled by a wearing-ring 15 secured within the hub of the gear-wheel 25 by means of the pins 16.

Mounted loosely upon the bearing-hub 10 is a sleeve 17 formed with a flanged portion 18 having in its rearward face a cavity embracing the eccentric 14. Within the bottom of this cavity is fitted the annular plate 19 having its apertured inner portion fitted to the annularly cut-away end portion of the bearing-boss 10 and secured to the same by means of fastening-screws 20. To the outer periphery of the plate 19 is fitted the correspondingly recessed adjacent face of a ring 21 locked from turning in respect of the same by means of one or more transverse-pins 22. This ring 21 is provided with an annular series of gear-teeth to form an internal gear-wheel. The annular plate 19 thus constitutes a rigid connection between the bearing hub 10 and the internal gear-wheel 21 which latter is thus held in fixed relation.

with the motor-frame, of which the hub 10 is shown as an integral part.

Overlapping the internally toothed ring 21 is a second internally toothed ring or internal gear 23 having teeth of substantially the same pitch but differing slightly in number from those of the internal gear 21, the gear 23 having a flange extending outwardly beyond the periphery of the gear 21 and being secured by fastening-screws 24 to a seat provided therefor in the flanged portion 18 of the sleeve 17.

The teeth of both internal gears 21 and 23 are engaged upon one side of the armature-shaft by a common intermeshing externally-toothed planet-gear-wheel 25 with the wearing-ring 15 mounted upon the eccentric 14, the face of the gear 25 having a width equivalent to the aggregate of the widths of the other two gears. While the gears of this differential train are preferably of the forms and arrangement represented herein, it is evident that such matters are not essential to the differential driving connection between the armature-shaft and the actuating member 17.

The gear-cavity within the loose sleeve 17 is closed and made dust- and oil-tight by a cap-plate 26 fitted with broken joints to a suitable seat upon the rear face of the flanged portion 18 and secured thereto by means of fastening-screws 27. The gear-cavity thus affords a lubricant-holding chamber adapted to confine a quantity of a heavy oil or vaseline to insure the proper lubrication of the differential gearing within the same for a considerable length of time without the attention of an attendant. The reduced portion of the sleeve 17 also carries an oil-cup 28 screwed into a suitably threaded lateral aperture therein, and oil is communicated from such oil-cup to the surface of the shaft 8 through the alined oil holes 29 and 30 in the bearing hub 10 and the bushing 9, respectively.

Upon one side, the periphery of the cap-plate 26 is grooved to receive the adjacent side of a segmental facing, represented as a piece of rubber tubing 31 having its ends flattened and secured in V-shaped notches 32 in the edge of the plate 26 by means of screws 33. The axis of the main-shaft and the gears 21 and 23 being equidistant from the wearing-faces of the ways 4, which are curved concentrically with the axis of oscillation of the motor-frame 5 and are spaced apart slightly in excess of the diameter of the cap-piece 26, the facing 31 in the rotation of the sleeve 17 and cap-piece 26 serves to establish rolling contact with first one and then the other of the ways 4. As the ways are fixed in position, it results that the motor-frame is moved in one direction while the facing 31 rolls in contact with one of the ways 4 and in the opposite direction during the engagement of the facing with the other of the ways. As represented in Fig. 3, partially in dotted lines, the facing 31 occupies a segment of the rim of the cap-piece 26 slightly more than a semi-circumference, so that while contact is still maintained with one of the ways at the end of a movement of the motor-frame in one direction, contact is established with the other way preparatory to the reverse movement of the motor-frame. In this action a certain slippage takes place while one end of the facing 31 is becoming disengaged from its respective way 4, but this is provided for in the embodiment represented in the drawings by the yielding and elastic character of the facing, although it is evident that other provision might be made for compensation for such slippage, or the length of the segmental facing 31 might be reduced to avoid the action referred to.

While other yielding material would perform the required function in a manner more or less satisfactory, the rubber tubing is preferable, not only because of its yielding quality, but by reason of its cushioning action and its elasticity which enables it to compensate for wear by reason of long service so as to insure not only durability but uniformity of operation.

The operation of the device as thus described is as follows: The throwing of the usual switch in the base of the standard 1 starts the motor, which rotates the propeller 12 in a wellknown manner regardless of the motor-frame oscillating mechanism above described. The rotation of the shaft 8 and its eccentric 14 causes the successive engagement of the peripheral teeth of the gear-wheel 25 circumferentially with those of the internal gears 21 and 23, but as the teeth of the latter differ slightly in number, the teeth of the gear 25 act as wedges to bring the portions of both internal gears progressively into register at the successive common points of tangency, and as the internal gear 25 is connected with the bearing 10 in which the shaft 8 rotates, the other internal gear 23 is given a differential motion in one or the other direction, dependent upon whether the number of teeth in the loose gear-wheel is greater or less than those of the fixed gear-wheel. By this means, the loose gear-wheel 23 communicates a comparatively slow rotating movement to the cap-plate 26 through the connected member 18, and the segmental facing 31 is thus enabled to roll alternately in contact with the opposite parallel ways 4 of the yoke carried by the standard 1. As the yoke is maintained stationary, the member 26 is caused by the rolling connection with the latter established by means of the facing 31 to move to-and-fro so as to produce the described oscillation of the motor-frame by which it is carried upon its bearing centers 6.

In the modification represented in Figs. 4 and 5, the standard 1 is provided with a U-shaped supporting yoke 34 carrying the pivotal center-screws 6 upon which is journaled the motor-frame 5 provided with the armature-shaft 8 carrying at the forward end the fan-wheel 12. At the rearward end the motor-frame carries a rotary actuating member 35 which is or may be mounted thereon similarly to the corresponding member in the form of the improvement previously described and may be similarly actuated by differential gearing driven by the armature-shaft. In this form of the improvement, the member 35 is shown provided with a peripheral cam-groove 36 which is entered by a roller-stud 37 upon the shorter arm 38 of a bell-crank lever 41 pivotally mounted at its angular portion by means of a screw-stud 39 upon a bracket-member 40 secured to the rear of the motor-frame, and having its longer arm connected by means of a screw-stud 42 with one end of a link 43 having its opposite end connected by means of a pivotal screw 44 to the base of the supporting yoke 34 near the motor-frame bearing. As the actuating member 35 rotates, it causes the rocking of the bell-crank lever 38 41, which through its connection with the stationary member 34 causes the motor-frame 5 to oscillate upon its center-screws. While this form of the improvement has the advantage of a positive connection between the actuating member car-

ried by the motor-frame and the stationary motor-frame support, to insure a uniform timing of the parts, the previously described form of the improvement is considered preferable, in that it avoids the use of a can and contains less parts and is less liable to get out of order by the loosening of screws or otherwise.

In the form of the improvement represented in Figs. 1, 2 and 3, the facing 31 is very easily renewed, and the removal of the cap-piece 26 not only serves to free the motor-frame from its stationary supporting member to enable the same to swing freely upon its bearings, but uncovers the gear-cavity for access to the differential gearing for lubrication or other purposes.

While I have shown and described herein two of the more desirable forms of the present improvement, it is evident that the invention is susceptible of considerable modification in other ways, without departure from the scope of the same.

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

1. In an electric fan, in combination, a motor-frame, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled in said motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, differential gearing intermediate the armature-shaft and said actuating member, and an operative connection between the standard and said actuating member whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

2. In an electric fan, in combination, a motor-frame, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled in said motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, differential gearing intermediate the armature-shaft and said actuating member provided with a closed dust-proof casing, and an operative connection between the standard and said actuating member whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

3. In an electric fan, in combination, a motor-frame, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled in said motor-frame, concentrically arranged gear-wheels having different numbers of peripheral teeth, both being carried by said motor-frame, the one being adapted to rotate and the other stationary in respect of the same, a planet-wheel mounted to revolve around and free to rotate in respect of said armature-shaft and meshing with said concentric gear-wheels, and an operative connection between said standard and the rotating gear-wheel carried by said motor-frame whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

4. In an electric fan, in combination, a motor frame, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled in said motor-frame, a rotary actuating member carried by said motor-frame concentrically with said armature-shaft, concentrically arranged gears having different numbers of peripheral teeth, the one carried by and stationary in respect of the motor-frame and the other carried by and movable with said actuating member, a planet-wheel mounted and free to rotate upon said shaft and adapted to mesh with said concentric gear-wheels, and an operative connection between said standard and the actuating member, whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

5. In an electric fan, in combination, a motor-frame, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled in said motor-frame, a rotary actuating member carried by said motor-frame concentrically with said armature-shaft, concentrically arranged internal gear-wheels having different numbers of peripheral teeth, the one carried by and stationary in respect of the motor-frame and the other carried by and movable with said actuating member, an eccentric fixed upon said armature-shaft, a planet-wheel loosely mounted upon said eccentric and adapted to mesh with both of said internal gear-wheels, and an operative connection between said standard and the actuating member, whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

6. In an electric fan, in combination, a motor-frame having a bearing-boss, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary sleeve loosely mounted upon the bearing-boss of said motor-frame and provided with a gear-cavity, internal gears having different numbers of peripheral teeth disposed within said gear-cavity concentrically with the armature-shaft, the one being fixed to and stationary in respect of said bearing hub and the other being carried by and movable with said rotary sleeve, an eccentric fixed upon said armature-shaft, a planet-wheel loosely mounted upon said eccentric and adapted to mesh with both of said internal gear-wheels, and an operative connection intermediate said standard and said sleeve whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

7. In an electric fan, in combination, a motor-frame having a bearing-boss, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary sleeve loosely mounted upon the bearing-boss of said motor-frame and provided with a gear-cavity, internal gears having different numbers of peripheral teeth disposed within said gear-cavity concentrically with the armature-shaft, the one being fixed to and stationary in respect of said bearing hub and the other being carried by and movable with said rotary sleeve, an eccentric fixed upon said armature-shaft, a planet-wheel loosely mounted upon said eccentric and adapted to mesh with both of said internal gear-wheels, a removable cap applied to and adapted to close the cavity of said sleeve, and an operative connection intermediate said standard and said sleeve whereby as the latter rotates it communicates to the motor-frame a to-and-fro movement relative to said standard.

8. In an electric fan, in combination, a standard provided with parallel ways, a motor-frame pivotally mounted thereon and having a bearing boss extending in a direction intermediate said ways, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft and having a rolling contact with said ways of the standard, and differential gearing intermediate the armature-shaft and said actuating member.

9. In an electric fan, in combination, a standard provided with parallel ways, a motor-frame pivotally mounted thereon and having a bearing boss extending in a direction intermediate said ways, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, a removable peripheral facing extending partly around said rotary member and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard, and differential gearing intermediate the armature-shaft and said actuating member.

10. In an electric fan, in combination, a standard provided with parallel ways, a motor-frame pivotally mounted thereon and having a bearing-boss extending in a direction intermediate said ways, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, a yielding facing extending partly around the

periphery of said actuating member and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard, and differential gearing intermediate the armature-shaft and said actuating member.

11. In an electric fan, in combination, a standard provided with parallel ways, a motor-frame pivotally mounted thereon and having a bearing-boss extending in a direction intermediate said ways, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, a yielding and elastic facing extending partly around the periphery of said actuating member and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard, and differential gearing intermediate the armature-shaft and said actuating member.

12. In an electric fan, in combination, a standard provided with parallel ways, a motor-frame pivotally mounted thereon and having a bearing-boss extending in a direction intermediate said ways, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, a yielding and elastic facing formed of rubber tubing extending partly around the periphery of said actuating member and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard, and differential gearing intermediate the armature-shaft and said actuating member.

13. In an electric fan, in combination, a motor-frame having a bearing-boss, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary sleeve loosely mounted upon the bearing-boss of said motor-frame and provided with a gear-cavity, internal gears having different numbers of peripheral teeth disposed within said gear-cavity concentrically with the armature-shaft, the one being fixed to and stationary in respect of said bearing hub and the other being carried by and movable with said rotary sleeve, an eccentric fixed upon said armature-shaft, a planet-wheel loosely mounted upon said eccentric and adapted to mesh with both of said internal gear-wheels, a removable cap applied to and adapted to close the cavity of said sleeve, and a segmental peripheral facing of yielding material applied to said cap and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard.

14. In an electric fan, in combination, a motor-frame having a bearing-boss, a standard upon which said motor-frame is pivotally supported, a motor comprising an armature-shaft journaled within said bearing-boss of the motor-frame, a rotary sleeve loosely mounted upon the bearing-boss of said motor-frame and provided with a gear-cavity, internal gears having different numbers of peripheral teeth disposed within said gear-cavity concentrically with the armature-shaft, the one being fixed to and stationary in respect of said bearing-boss and the other being carried by and movable with said rotary sleeve, an eccentric fixed upon said armature-shaft, a planet-wheel loosely mounted upon said eccentric and adapted to mesh with both of said internal gear-wheels, a removable cap applied to and adapted to close the cavity of said sleeve, and a segmental peripheral facing of yielding material and extending more than a semi-circumference around said cap and adapted to establish rolling contact relation alternately between the same and the parallel ways of said standard.

15. In an electric fan, in combination, a motor-frame, a standard upon which said motor-frame is pivotally supported and provided with a rigid yoke affording spaced parallel ways, and with an arm extending laterally from one of said ways to carry one of the pivotal supports of said motor-frame, a motor comprising an armature-shaft journaled in said motor-frame, a rotary actuating member carried by said motor-frame and mounted concentrically with said armature-shaft, a segmental facing applied to the periphery of said actuating member and adapted to establish rolling contact relation between the latter and the said ways, and an operative connection between the armature-shaft and said actuating member.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

FREDERICK DIEHL.
ADOLPH F. BECKER.

Witnesses:
HENRY J. MILLER,
HENRY A. KORNEMANN.