H. S. BROWN.

OSCILLATING ELECTRIC FAN.

APPLICATION FILED AUG. 10, 1905.

908,735.

Patented Jan. 5, 1909.

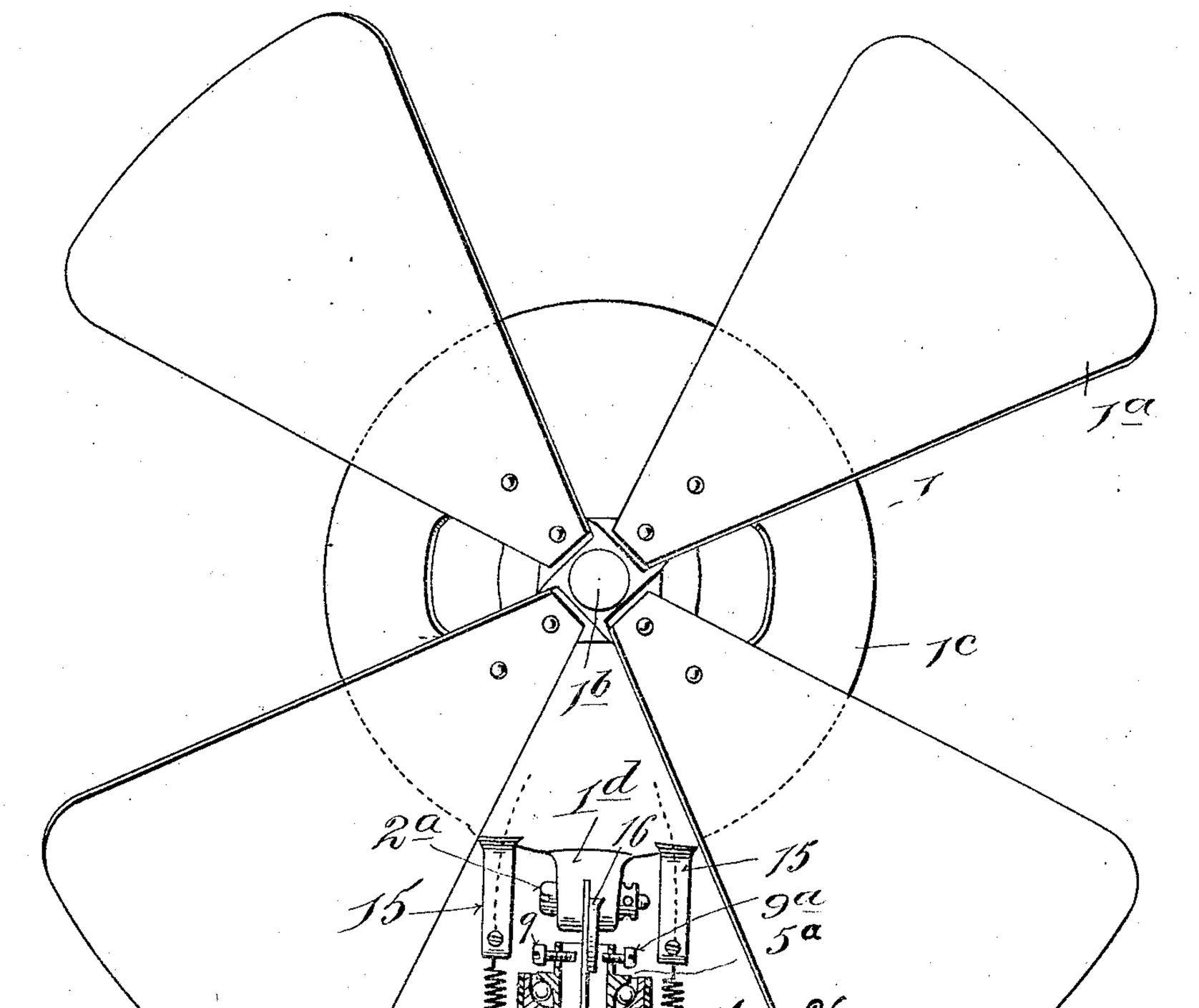

Fig. 1.

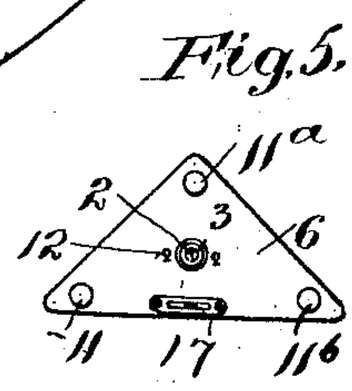

Fig. 5.

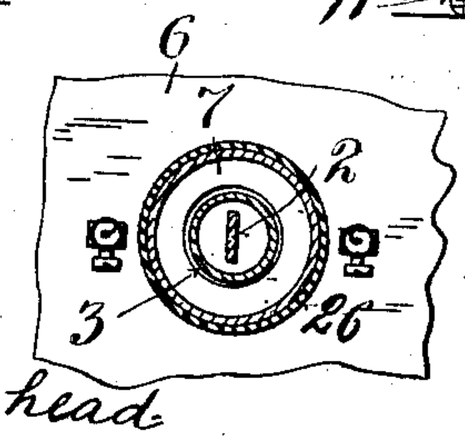

Fig. 2.

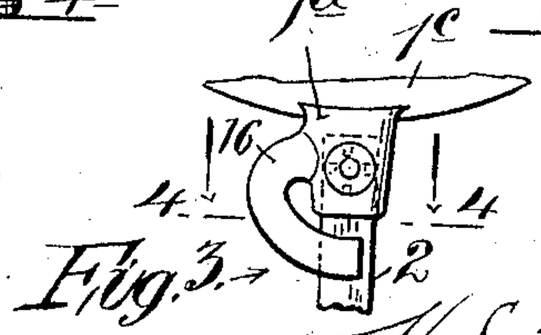

Fig. 3.

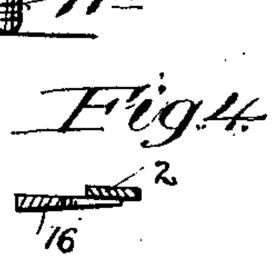

Fig. 4.

Witnesses
C. M. Benjamin
M. Hollingshead

Inventor
H. S. Brown.
By his Attorney
P. F. Bourn

UNITED STATES PATENT OFFICE.

HERBERT STANLEY BROWN, OF NEW YORK, N. Y.

OSCILLATING ELECTRIC FAN.

No. 908,785 Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed August 10, 1905. Serial No. 273,550.

To all whom it may concern:

Be it known that I, HERBERT STANLEY BROWN, a citizen of the United States, residing in New York city, borough of Manhattan, New York, have invented certain new and useful Improvements in Oscillating Electric Fans, of which the following is a specification.

The object of my invention is to provide simple and efficient means for causing oscillation of an electric fan of the class wherein the oscillation is caused mainly by reason of back pressure produced by the air currents propelled by the rotative blades.

In carrying out my invention I provide an electric fan having a motor and rotative blades, and attach the fan to a flexible support that is pivotally carried, and I provide means for tilting said support more or less with respect to the vertical, whereby as the fan blades rotate said support will oscillate by reason of the support bending from side to side as will be more fully hereinafter explained. I may also provide means for limiting the amount of side movement of the flexible support, thus regulating the distance the fan will travel in each direction during oscillation. Where it is desired that the axis of the fan blades be tilted from a substantially horizontal position as in a downward direction I provide means for compensating the leverage action of the fan blades upon the air with respect to the bending movement of the flexible support to compensate for the gyroscopic and "paddle wheel" action of the fan that occurs under such circumstances.

My invention further contemplates certain novel details of improvement and arrangement of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein, Figure 1 is a front elevation, partly in section, of an oscillating electric fan embodying my invention, Fig. 2 is a horizontal section on the line 2, 2, in Fig. 1, Fig. 3 is a detail side view showing the connection between the fan casing and the flexible support, Fig. 4 is a section on the line 4, 4, in Fig. 3, and Fig. 5 is a detail plan view of the base for the fan.

Similar numerals of reference indicate corresponding parts in the several views.

The fan 1 may be of any well known type of electric fan provided with a motor and having blades 1^a carried by the motor shaft 1^b, the fan illustrated in the drawing having propeller-like blades. At 2 is a flexible support which may be made of steel, brass, or the like, preferably spring-like, which is attached at its upper end to the lower part of the motor casing 1^c, and is pivotally supported at its lower part so as to be free to bend between its pivot and the motor casing. In the drawing I have shown the flexible support 2 attached at its lower end to a rotative tube 3 supported upon ball bearings indicated generally at 4, 5, carried by a base 6. As shown, the tube 3 has a plug 3^a detachably connected therewith, as by screw threads, the lower end of the support 2 being secured to said plug, whereby said support may be readily detached from its bearings, the cones 4^a, 5^a being shown attached to the tube 3 and the cups 4^b, 5^b being shown attached to a tube 7 that is removably attached to the base 6, as by means of screw threads 8. The tubes 3 and 7 and the ball bearings as shown are a convenient means for rotatively supporting the flexible support 2 at its lower part while giving freedom to said support to bend laterally, and the tube 3 is also a convenient means for supporting adjustable stops or screws 9, 9^a on opposite sides of support 2 to limit the lateral bending of the latter during operation.

The base 6, which may be in the nature of a flat plate or frame, is provided with adjustable feet or screws 11, 11^a, 11^b which are preferably set at the angles of an equilateral triangle, the support 2 being preferably located at the center of such triangle, and said base may be tilted with respect to the horizontal by operating the rearward screw, whereby the support 2 may be tilted with respect to the vertical to move the vertical or pivotal line of rotation of support 2 more or less at an angle to the vertical.

At 12 are electric conductors preferably in the form of a coiled spring wire, serving the double function of conveying the electric current to the motor and acting as springs to assist in regulating the oscillation of the fan, which conductors 12 are shown attached at one end to the base 6, as to binding posts or the like 13, to which line wires 14 lead, and at the other ends said conductors 12 are to be connected with the field magnets and armature of the motor, and are shown

connected with extensions or binding posts 15 attached to the motor casing 1^c, preferably vertically in line with the binding posts 13, when the fan is at rest, whereby as the fan oscillates said springs will be wrapped partially around the tube 7 first on one side and then on the other. At 26 is insulation inclosing the tube 7 to prevent short circuiting of the conductors 12 through the metal parts.

From the foregoing description it is to be assumed that the plane of the fan blades is substantially parallel with the slightly tilted vertical axis of support 2. If it is desired to direct the air currents from the fan blades downward by further tilting the blades with respect to the vertical the fan may be adjusted upon the screw 2^a that connects the lug 1^d of the fan casing with the flexible support 2, thus tilting the axis of shaft 1^b with respect to the vertical axis of support 2, but in such case a new force is introduced tending continuously to cause the fan to revolve in one direction and interfering with the reaction alternately to one side and to the other of the vertical pivot, strengthening the reaction on one side and weakening it on the other. To compensate such action the screw 9^a could be adjusted nearer toward the support 2, but as a convenient means and to avoid the necessity of adjusting said screw each time the fan is adjusted with respect to the support 2 I provide a curved finger 16, shown projecting from lug 1^d into the path of screw 9^a, which finger is tapered or cam-like as shown in Fig. 4, whereby as the fan is tilted forwardly on its supporting screw 2^a the increasing thickness of the finger 16 will be presented in line with screw 9^a to a degree corresponding to the amount of tilting of the fan, whereby the amount of bending of the support 2 to one side of the vertical will be regulated and limited as more fully hereinafter explained.

The operation of the fan above described is as follows:—In the first place if base 6 were placed in a horizontal position and the axis of shaft 1^b were horizontal and in the same vertical plane with the axis of the pivot and the fan blades caused to rotate, the air currents from the fan would be projected substantially horizontally and oscillation of the fan would not occur. To cause the fan to oscillate the rearward screw, as 1^a, would be turned so as to tilt the base 6 whereupon the vertical axis of support 2 would be inclined slightly forward, thus tilting the axis of the shaft 1^b downwardly slightly. The current now being turned on, the fan will next move slightly, to, say, the right by reason of gyroscopic action more fully hereinafter explained, or the fan may be moved to one side manually, and, because of the inclination of the supporting pivot 2 with respect to the vertical, the center of gravity of the pivoted structure moves to the left of the pivotal axis, carrying the fan shaft slightly to the left of said pivot by reason of the flexibility of support 2. Back pressure of the air currents thus exerted to one side of the pivot, plus gravity tending always to pull the center of gravity to the lowest point in the arc of oscillation, now causes the fan to move back toward the center and up the incline to the left (which incline is caused by the tilting of base 6), but as soon as the structure passes the center gravity acts to pull the motor over to the right on the flexible support 2; the fan shaft then moves to the right of the pivotal axis and the orbital movement is reversed, the fan next moving in the reverse direction, and so on back and forth. The two adjusting screws 9, 9^a are shown to limit the lateral movements of the flexible support 2, but these screws are not essential to the operation of the fan as the support 2 can be made sufficiently stiff in itself to limit the extreme lateral movements of the support. However, I find it advantageous to make the support less rigid and prevent excessive sidewise movement of the support by the limiting screws 9, 9^a which screws may be adjusted with respect to the support 2 to control the distance to which the fan will oscillate in opposite directions. While I have illustrated the flexible support 2 in the form of a relatively thin strip, it will be understood that the particular cross section of such support is not essential to the operation of the fan, as said support could be round or of other cross section, provided the support be sufficiently flexible to permit it to bend from side to side under the influence of gravity. The oscillation may be limited or further controlled by tilting the base 6 more or less forwardly by operating the screw 11^a, for the farther forward from the vertical the longitudinal axis of support 2 is adjusted the less will be the range of oscillatory movement of the fan due to the increasing incline up which the fan structure is caused to travel.

It has been assumed in the above explanation that the plane of the fan blades was parallel to the slightly tilted vertical axis of the support 2. If, however, it is desired to throw the air current downward by further tilting the blades forwardly the new force introduced tending to continuously revolve the structure to one side as before explained, will be present. This disturbing force is a combination of the "paddle-wheel" reaction already familiar in the art, and a rotative force resultant from the composition of the armature rotation and gravity acting on this inclined rotating mass substantially in accordance with the principle of the composition of rotations familiarly exemplified in the gyroscopic top. It is to off-set this disturbing factor that the bending movement of the flexible support 2 is limited on that side

which is strengthened by said disturbing force, and thus as the fan is tilted forwardly upon its screw 2^a the inclined finger 16 presenting a wider or thickened part between support 2 and screw 9^a automatically shortens the space through which the structure may move on that side before striking the limiting screw, thus limiting the off center movement on that side proportioned to the extent of dip of the fan blades and the corresponding increase of the rotative force produced because of such dip. Thus the fan may be automatically confined to a substantially predetermined arc of oscillation independent of change in the force acting to produce such oscillation.

While I have illustrated and explained my improvements as operative while the base 6 is beneath the fan structure, it will be understood that the structure may be inverted so that the fan will hang suspended from the flexible support 2, the bearing for the support 2 being in such position that said support may be held in a line inclined to the vertical, in which case the oscillatory operation of the fan will substantially accord with the explanation first given.

The spirit level 17 may be provided on base 6 to indicate the horizontal position of base 6 between screws 11 and 11^b.

Having now described my invention what I claim is:

1. A device of the character described comprising a fan having a motor and rotative blades, a flexible support attached to the fan, means for pivotally supporting said support, and means for holding said support at an angle to the vertical, substantially as described.

2. A device of the character described comprising a fan having a motor and rotative blades, a spring-like support attached to the fan, and means for rotatively supporting said support, substantially as described.

3. A device of the character described comprising a fan having a motor and rotative blades, a spring-like support attached to the fan, means for rotatively supporting said support, and means for holding said support at an angle to the vertical, substantially as described.

4. A device of the character described comprising a fan provided with a motor and rotative blades, a flexible support attached to the fan, means for pivotally supporting said support, and means to limit bending of said support in opposite directions, substantially as described.

5. A device of the character described comprising a fan, a spring-like support for the fan adapted to bend from side to side under the influence of the bodily movements of the fan, and means for pivotally supporting said support, substantially as described.

6. A device of the character described comprising a flexible support pivotally supported to rotate on its longitudinal axis and capable of bending in opposite directions with respect to said axis, and a fan connected with said support, substantially as described.

7. A device of the character described comprising a flexible member, a pivot at one end of said member, and a fan and motor connected with the other end of said member, substantially as described.

8. A device of the character described comprising a fan and its motor, a member connected therewith capable of side movement in opposite directions, and a pivotal support for said member at a distance from the fan, whereby the fan and motor may oscillate on the longitudinal axis of said member and also move from side to side with respect to said pivotal support, substantially as described.

9. A device of the character described comprising a fan and motor, a movable member attached thereto and extending downwardly beneath the same, and a pivot for said movable member located at a distance beneath the fan, whereby said movable member and fan may have movement from side to side during operation with respect to a vertical line passing through the pivot and may also oscillate on said pivot, substantially as described.

10. A device of the character described comprising a motor driven fan, means for supporting the same so that it may oscillate, a plurality of coiled spring conductors connected to the terminals of the fan motor, and a stationary member comprised in said supporting means to which the opposite ends of said conductors are attached to assist in causing oscillation of the fan, substantially as described.

11. A device of the character described comprising a motor driven fan, a flexible support therefor, means for sustaining said support, a plurality of coiled spring conductors each attached at one end to the fan motor, and a stationary member to which the opposite ends of said springs are attached, substantially as described.

12. A device of the character described comprising a motor driven fan, means for supporting the fan so it may oscillate, a plurality of coiled spring conductors connected at one end to the terminals of the fan motor, and a stationary part to which opposite ends of said conductors are attached, substantially as described.

13. A device of the character described comprising a motor driven fan, a movable support therefor, a bearing for said support concentric therewith to permit the support to oscillate during operation, a support for said bearing, and means for holding said movable support at an angle to the vertical, substantially as described.

14. A device of the character described comprising a fan, a movable support for the fan, a bearing for said support to permit the support to oscillate, a base carrying said bearing and means for adjusting said movable support at a desired angle with respect to the vertical, substantially as described.

15. A device of the character described comprising a fan, a flexible support connected with the fan, a tube inclosing said support and rigidly attached to said support at a distance from the fan, and a bearing for the tube, substantially as described.

16. A device of the character described comprising a fan, a flexible support connected with the fan, a tube inclosing said support and rigidly attached to said support at a distance from the fan, a bearing for the tube, and means for holding said tube and support in an inclined position with respect to the vertical, substantially as described.

17. A device of the character described comprising a fan, a flexible support connected therewith, a tube inclosing said support, means to rigidly connect the tube with said support at a distance from the fan permitting the support to have side movement within said tube, substantially as described.

18. A device of the character described comprising a fan, a flexible support connected therewith, a tube inclosing said support, means to rigidly connect the tube with said support at a distance from the fan permitting the support to have side movement within said tube, a base, and means for pivotally supporting the tube upon the base, substantially as described.

19. A device of the character described comprising a fan, a flexible support connected therewith, a tube inclosing said support, means to rigidly connect the tube with said support at a distance from the fan permitting the support to have side movement within said tube, a base, means for pivotally supporting the tube upon the base, and means for adjusting said base at an angle with respect to the horizontal, substantially as described.

20. A device of the character described comprising a motor driven fan, a flexible support connected therewith, a tube inclosing said support, a base upon which said tube is pivotally supported, and a plurality of coiled spring conductors connecting said base with the terminals of the fan, substantially as described.

21. A device of the character described comprising a fan, a flexible support attached thereto, means for pivotally supporting said support, means for movably connecting the fan with said support so that the axis of the fan shaft may be adjusted with respect to the longitudinal axis of said support, and means for limiting the side movement of the fan and its support during operation, substantially as described.

22. A device of the character described comprising a fan, a flexible support attached thereto, means for adjustably connecting the fan with said support, means for pivotally supporting said support, a cam-like finger connected with the fan and located adjacent to said support, and a stop to co-act with said finger for regulating the side movement of the support to compensate for the adjustment of the fan shaft with respect to the support, substantially as described.

23. A device of the character described comprising a motor-driven electric fan and a pivoted flexible support therefor located at an angle to the vertical, and the fan-supporting end of said flexible support being constructed and arranged to move to one side or the other of the axis of rotation of said pivoted flexible support, whereby the fan is caused to oscillate, substantially as described.

24. A device of the character described comprising a fan, a base, means for pivotally supporting the fan upon the base, and a plurality of coiled springs making electrical connection between parts of the structure, one of which parts has movement relatively to the other said springs being firmly connected with a stationary part of the structure, substantially as described.

25. A device of the character described comprising a fan, a base, means for pivotally supporting the fan upon the base, and a plurality of coiled springs making electrical connection between a movable part and a stationary part of the structure said springs being connected with a stationary part of the structure, substantially as described.

26. The combination with an oscillating electric fan, and a base, of a spiral spring conductor connected with said fan and base, and another conductor connected with the fan.

27. The combination of a fan and its motor, and means for pivotally sustaining the same, with a spring connecting the pivoted structure with a stationary part for producing reaction to the movement of said structure upon its pivot said spring being included in the circuit of the motor.

HERBERT STANLEY BROWN.

Witnesses:

T. F. BOURNE,

M. HOLLINGSHEAD.