

L. B. COUSANS.
 APPARATUS FOR BLOWING PIPE ORGANS, HARMONIUMS, OR LIKE MUSICAL INSTRUMENTS.
 APPLICATION FILED JAN. 3, 1910.

1,018,483.

Patented Feb. 27, 1912.

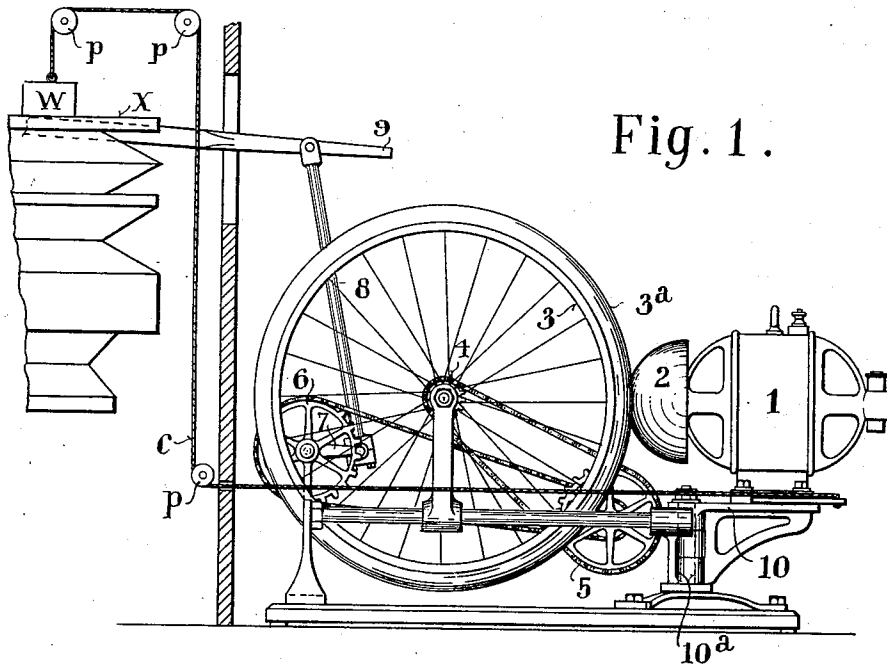


Fig. 2.

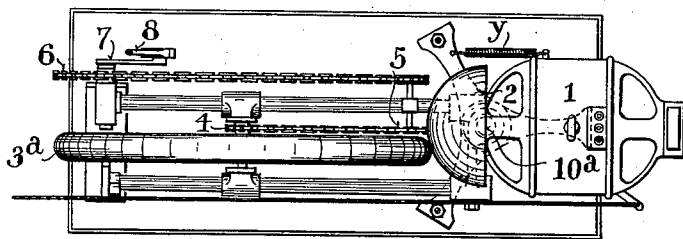


Fig. 3.

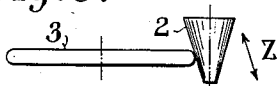


Fig. 4.

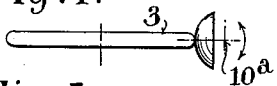


Fig. 5.

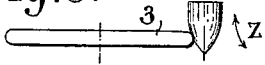


Fig. 6.

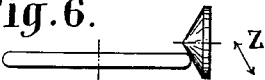


Fig. 7.

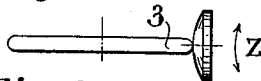


Fig. 8.

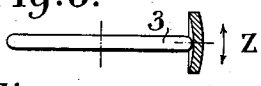


Fig. 9.

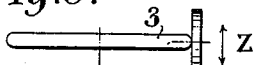


Fig. 10.

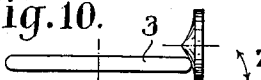


Fig. 11.

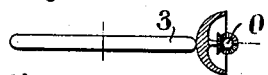


Fig. 12.

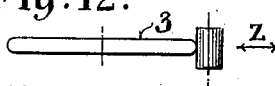
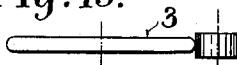


Fig. 13.



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APPARATUS FOR BLOWING PIPE-ORGANS, HARMONIUMS, OR LIKE MUSICAL INSTRUMENTS.

1,018,483.

Specification of Letters Patent.

Patented Feb. 27, 1912.

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To all whom it may concern:

Be it known that I, LOUIS BERTRAM COUSANS, of 7 South Park, in the city and county of Lincoln, England, engineer, have
5 invented certain new and useful Improvements in Apparatus for Blowing Pipe-Organ, Harmoniums, or the Like Musical Instruments, of which the following is a specification.

10 The object of this invention is to provide a simple and silent apparatus for blowing pipe or reed organs or the like musical instruments by electric power and which may be placed by the side of the instrument and
15 attached to the ordinary blowing handle.

While my invention is primarily intended for application to small organs, it may be fitted to organs of any magnitude as size does not affect the principle. In machinery
20 of this description, silence in working is absolutely essential and as the ordinary speed of electric motors is over 1000 R. P. M. while the movement of the blowing handle varies from zero to the maximum required,
25 ordinarily 30 double strokes per minute, it has hitherto been impossible to provide a satisfactory variable speed reducing gear. Attempts have been made to solve this problem by interposing resistances to the
30 electric circuit and relying on these for varying the speed of the motor according to the demands on the wind, but the apparatus is clumsy and costly and the results are not satisfactory. In my invention the speed of
35 the motor may be constant, and the necessary reduction to the low speeds required is accomplished by a novel form of frictional drive which may be combined with chains and sprockets or a belt or both.

40 I find that the coefficient of friction between metal and wood and india rubber or leather is very high and it is in this direction that I find the result I seek. In order to insure a resilient contact between the surfaces I prefer to mount at least one of the
45 friction elements upon a pneumatic cushion.

An apparatus according to this invention comprises a frictional driving couple or variable speed gear with resilient or pneumatic surfaces coupled to and driven from
50 an electric motor, the one frictional member is mounted in adjustable relation to the other and adjusted by the movement of the bellows for the purpose of varying the speed
55 of the driven member from which the bel-

lows are operated, for example the electric motor may carry on its spindle a frictional driving head or member and the said driving head or member or the electric motor
60 together therewith may be adapted by the rise and fall of the bellows to be so moved that the relation between the driving and driven members is varied. The driving member will hereinafter be referred to as the "driving head."

The electric motor may be capable of a rotary or sliding movement on its base and fitted with a small driving head of part
70 spherical truncated conical or similar form where the frictional surface varies in radius at different parts of the head. The driving head is preferably of metal or wood. In contact with the driving head I provide a rubber or leather shod wheel of large diameter preferably fitted with a pneumatic
75 tire or cushion in the manner of a bicycle wheel which tire owing to its resilience possesses ideal properties when frictionally driven. It is obvious that this drive is perfectly silent, and moreover of extremely
80 high efficiency, slip being practically non-existent, while the reduction in speed may be very high. The speed may be still further reduced by suitable gear such as worm gear, a belt or ordinary chain and sprocket
85 gear, or a combination of both, the motion being finally transmitted to the blowing handle by a crank.

The demands on the wind from an organ vary from moment to moment, hence the
90 speed of the crank must vary accordingly and my method of control provides an automatic and infinitely variable gear within its range. In cases where the motor has a sliding movement and is fitted with a truncated
95 pulley I cause the rising and falling of the bellows to slide the motor in a horizontal plane, thereby allowing a larger or smaller diameter of the driving head to come in contact with the rubber or leather shod wheel,
100 thus varying the crank speed accordingly. In cases where the motor has a partial rotation on its base and is fitted with a disk or hemisphere of wood or metal, I cause the motion of the bellows reservoir to partially
105 rotate the motor in a horizontal plane thereby allowing a larger or smaller circular path of the hemisphere to come in contact with the rubber or leather shod wheel, thus
110 varying its speed accordingly. The appa-

ratus accordingly responds to all demands on the wind.

I am able to use the ordinary method of complete automatic control by resistance, while utilizing the property of the silent friction-drive for speed reduction, or I may employ a combination of my invention with resistance control. It is obvious that control may also be effected by arranging the driving head and drum wheel to separate and come in contact or a clutch may be employed but I do not consider these methods satisfactory.

In the accompanying drawings like reference figures apply to like parts throughout the specification.

Figure 1 is a side elevation; Fig. 2 is a plan of a complete apparatus; Figs. 3 to 13 inclusive are diagrams showing various modifications.

Referring to Figs. 1 and 2, 1 is an electric motor, 2 is a frictional driving head of hemispherical shape fitted to the motor shaft and driving by friction a wheel 3 preferably fitted with a pneumatic tire 3^a shod with rubber, leather or analogous material. The wheel 3 is of large diameter to reduce the speed and the speed is further reduced by means of chains and sprocket wheels 4, 5 and 6 the energy being finally transmitted through the crank 7 and connecting rod 8 to the bellows handle 9. The motor 1 is mounted on a swiveling base 10 describing a partial revolution about a vertical axis 10^a so arranged that an imaginary line passing through it would if prolonged, pass through the center of the hemispherical driving head. The motor 1 and head 2 are set to one side of the plane in which the driven wheel 3 revolves. It will be observed that the hemisphere is not in contact with the driven wheel 3 at the greatest diameter of the latter, but a little to one side in a somewhat similar position to that which bevel gear would occupy if employed and in practice the device is a bevel gear of infinite pitch. When what may for convenience be termed the "pole" or summit of the hemisphere is in contact with the periphery of the driven wheel, no motion is transmitted to the latter but if the motor and hemisphere are swiveled on the axis 10^a the speed of the driven member increases until the maximum is reached at that point where the extreme periphery of the hemisphere with the driven wheel is in contact. In order to prevent undue wear on the driven member it is imperative that the apparatus be so arranged that an imaginary line passing through the axis of the driver would intersect an imaginary line drawn through the center of the axis of the driven member.

The demand on the wind of an organ is never constant and varies from moment to moment and in order that the supply shall

be automatic I attach a cord or chain *c* to the swiveling base of the motor to adjust the same, the said chain running over pulleys *p p* to the top of the bellows *x* or to a weight *w* resting on the bellows itself to control the speed of the driven member, so that as the bellows rise or fall the motor and driving head are pulled around in order that a greater or less pitch circle of the hemisphere shall be caused to come in contact with the driven wheel thus automatically varying the speed of the bellows-feeders, compressors or their equivalents.

I prefer to cause the swiveling table to return to its neutral position by means of a spring or weight, but obviously any other mechanical pneumatic or fluid pressure means may be employed. In the form illustrated a spring *y* is employed. A chain or cord forms a convenient method of connecting the swiveling table of the motor with the bellows, but obviously any other mechanical pneumatic or fluid pressure means may be employed, the principle of my method of control not being affected.

In cases where the reservoir is small and the weight of the motor considerable in proportion I may cause the motor to provide the energy required to move itself by means of an auxiliary driven member or its equivalent, but in every case the reservoir or its equivalent is immediately arranged to actuate the auxiliary device for swiveling it and thereby controlling the speed of the driven member.

Where extreme silence is required I may introduce any of the well known forms of resistance in circuit with the motor in combination with any of the apparatus described and forming the subject of this specification. Where feeders, compressors, or their equivalent are driven with a wheel and cranks I connect my invention to the actuating mechanism by a belt and pulley wheels and chains, or worm gear.

Referring now to the modified forms of driving head shown in Figs. 3 to 13: In Fig. 3 the driving member 2 is in the form of a cone mounted on the motor shaft which is disposed at right angles to the plane of the wheel 3, the adjustment to vary the speed being obtained by sliding the motor and driving head as indicated by the arrow *z* parallel to the surface in contact with the driven wheel 3. In Fig. 4 a part spherical head in which the swiveling axis 10^a is coinciding with the plane in which the wheel 3 revolves. Fig. 5 shows a driving head of hyperboloid form when for varying the speed the motor and head are moved along a path indicated by arrow *z* corresponding with the hyperboloid surface in contact with the driven member. Fig. 6 shows a construction similar to Fig. 1 wherein the driving head is of conical form the motor and

head being slid for adjustment in a parallel direction with the coned surface as indicated by arrow z . Figs. 7 and 8 show modified constructions wherein the frictional surface of the driving head is convex and concave respectively, the axes being at right angles to the driven wheel 3. The direction in movement to obtain the variation in speed is indicated by arrows z . Fig. 9 shows a similar construction wherein the driving head is in the form of a flat disk which is adapted to move parallel to the axis of the wheel 3 as shown by arrows z . Fig. 10 shows a cusp shaped head the adjusting movement being made as indicated by the arrows z parallel to the curvature of the contacting surfaces. Fig. 11 shows a similar driving head to Fig. 1 but mounted not on the spindle of the motor but upon an intermediate driven shaft o , the adjusting swiveling movement taking place around the axis of the intermediate shaft o . Fig. 12 shows a modification where the head is of plain cylindrical shape and is parallel with the axis of the driven wheel. In this case the speed is varied by the driven head being moved into and out of engagement with the wheel 3 as indicated by the arrow z . The speed of the motor may be varied by resistance if required. Fig. 13 shows a modification where the motor is stationary and the speed is varied solely by a resistance inserted in the circuit of the motor and controlled by means of the bellows or their equivalent. This forms an excellent silent drive, inexpensive to construct when a pneumatic tire or cushion is provided on the member or members of the driving couple.

What I claim and desire to secure by Letters Patent is:—

1. In apparatus for blowing pipe organs, harmoniums and like musical instruments, the combination of an electric motor rotating at constant speed and so mounted as to swivel, a frictional driving head of part spherical formation mounted on the spindle of said motor, a driven wheel provided with a resilient peripheral surface adapted to engage said driving head, a bellows and a bellows reservoir, means whereby said driven member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to swivel the motor for the purpose of adjusting the position of the driving head to vary the speed of the driven member for the purpose set forth.

2. In apparatus for blowing pipe organs, harmoniums and like musical instruments, the combination of an electric motor rotating at constant speed and so mounted as to swivel, a frictional driving head of part spherical formation mounted on the spindle of said motor, a driven wheel provided with a pneumatic periphery, a bellows and a bel-

lows reservoir, means whereby said driven member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to swivel the motor for the purpose of adjusting the position of the driving head to vary the speed of the driven member for the purpose set forth.

3. In apparatus for blowing pipe organs, harmoniums and like musical instruments, the combination of an electric motor rotating at constant speed and so mounted as to swivel, a frictional driving head of part spherical formation mounted on the spindle of said motor, a driven wheel provided with a convex resilient peripheral surface adapted to engage said driving head, a bellows and a bellows reservoir, means whereby said driven member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to swivel the motor for the purpose of adjusting the position of the driving head to vary the speed of the driven member for the purpose set forth.

4. In an apparatus for blowing pipe organs, harmoniums and like musical instruments, the combination of a frame comprising end posts or uprights, bars between said uprights, a motor support swiveled on one of the end uprights, an electric constant speed rotary motor mounted on said support, a frictional driving head mounted on the spindle of said motor, a driven wheel adapted to engage said driving-head, provided with a resilient peripheral surface, a support for said driven-wheel adjustably mounted on the bars of the frame, a bellows and a bellows reservoir, means whereby said driven-member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to rotate said swiveled motor-support, carrying with it the motor and driving-head, to vary the speed of the driven member.

5. In an apparatus for blowing pipe organs, harmoniums and like musical instruments, the combination of a rotary motor rotating at constant speed and so mounted as to swivel, a frictional driving head mounted on the spindle of said motor, a driven wheel provided with a resilient surface adapted to engage said driving head, the spindle on which said driving head is mounted being out of alinement with said driven wheel, a bellows and a bellows reservoir, means whereby said driven-member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to swivel the motor for the purpose of adjusting the position of the driving head to vary the speed of the driven member.

6. In apparatus for blowing pipe organs, harmoniums, and like musical instruments,

the combination of a swiveled constant speed electric motor, a friction driving-head of part spherical form mounted upon the spindle of said motor, a driven wheel of
5 large diameter with relation to the diameter of said driving head, a pneumatic tire upon the circumference of said driving wheel adapted to engage said driving-wheel, a bellows and a bellows reservoir, means where-
10 by said driven member is coupled to and operates the bellows and means whereby the rise and fall of the bellows reservoir is adapted to swivel the motor for the purpose of adjusting the position of the driving head to vary the speed of the driven member for 15 the purpose set forth.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

LOUIS BERTRAM COUSANS.

Witnesses:

HENRY A. PRYOR,

HENRY S. BAKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
