(No Model.) 4 Sheets—Sheet 1.

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MECHANISM FOR SUPPLYING AIR TO BELLOWS OF CHURCH ORGANS.

No. 566,051. Patented Aug. 18, 1896.

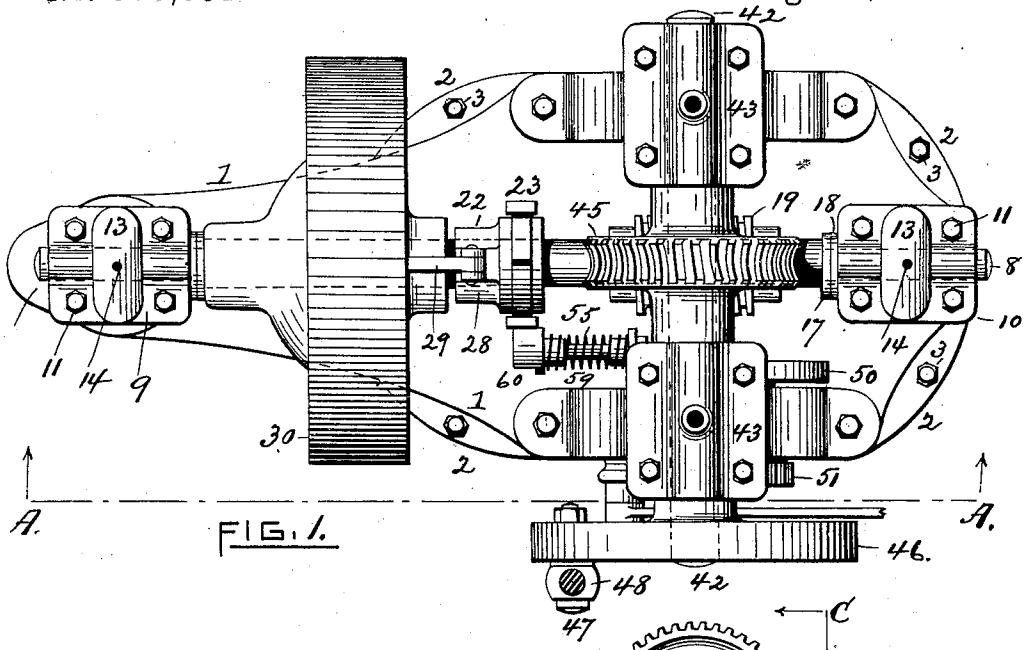

FIG. 1.

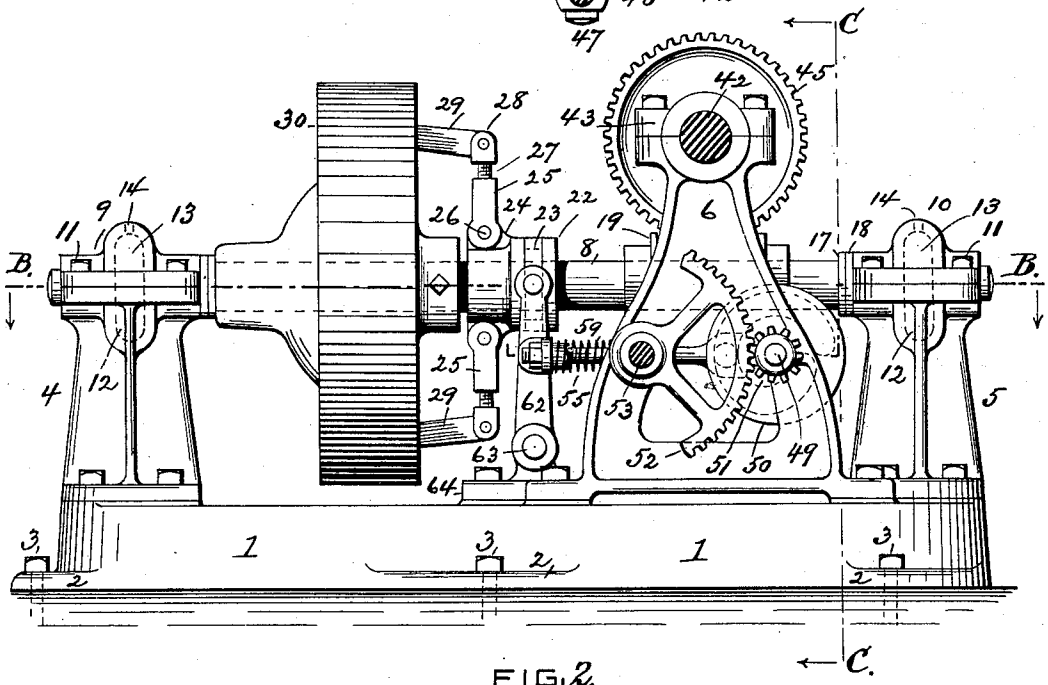

FIG. 2.

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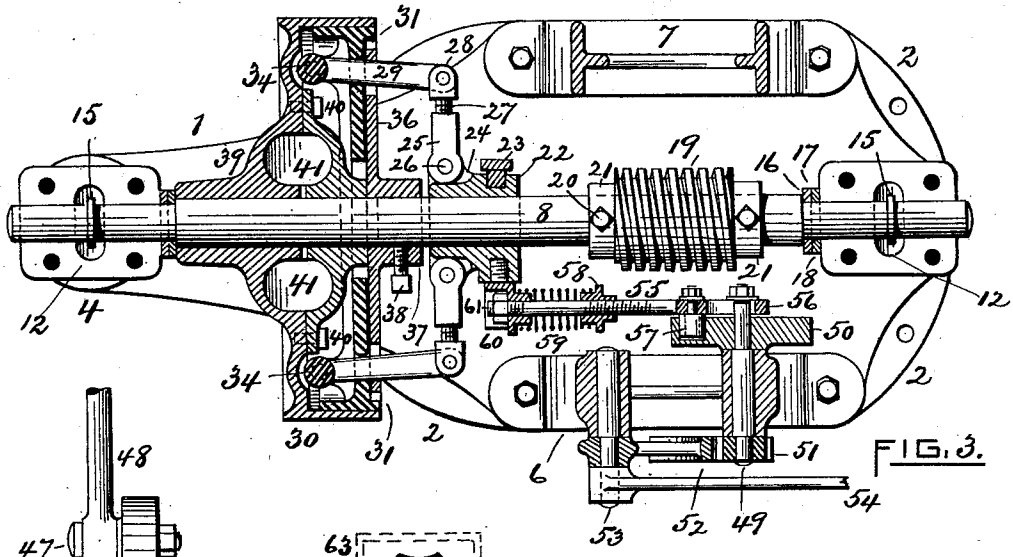

FIG. 3.

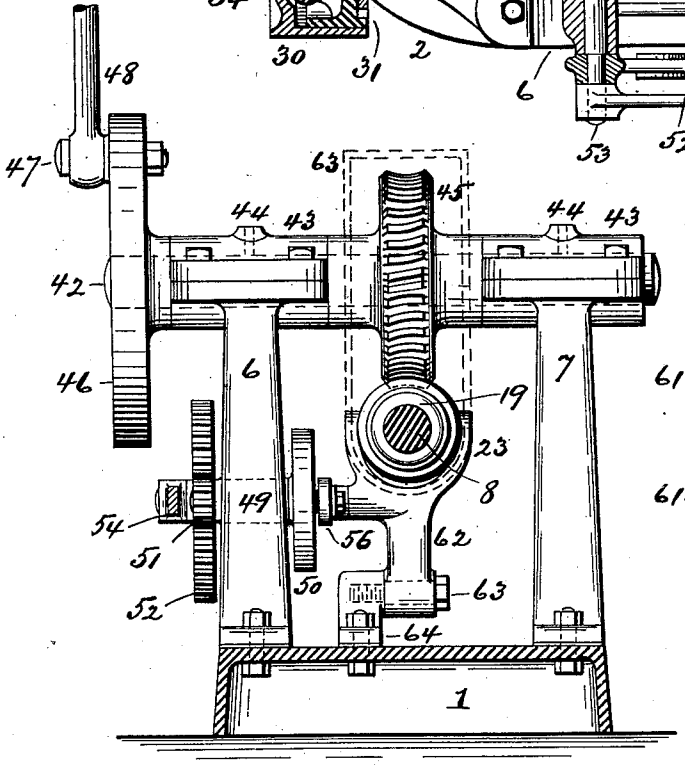

FIG. 4.

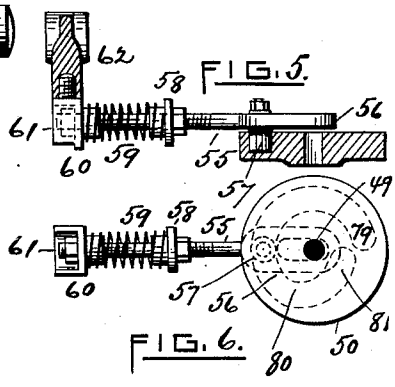

FIG. 5.

FIG. 6.

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FIG. 7.

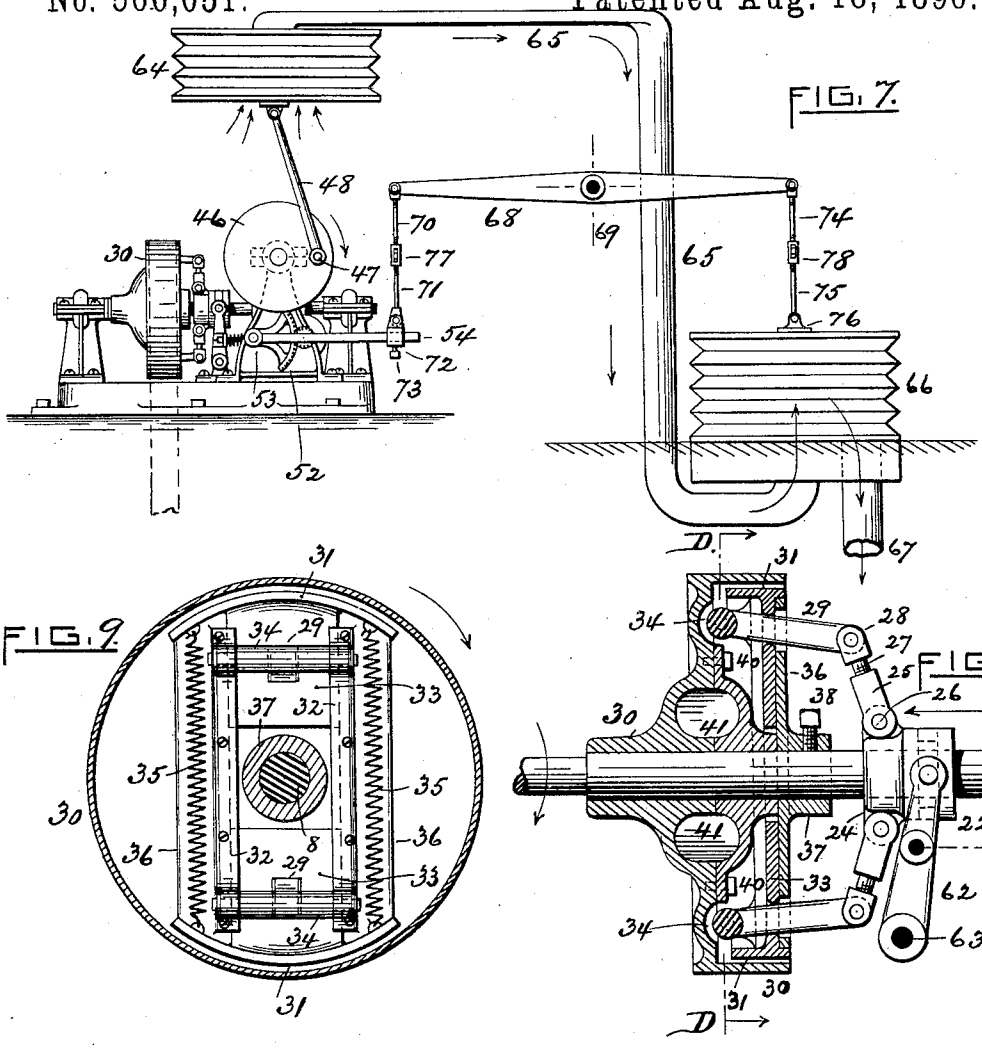

FIG. 9.

FIG. 8.

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MECHANISM FOR SUPPLYING AIR TO BELLOWS OF CHURCH ORGANS.

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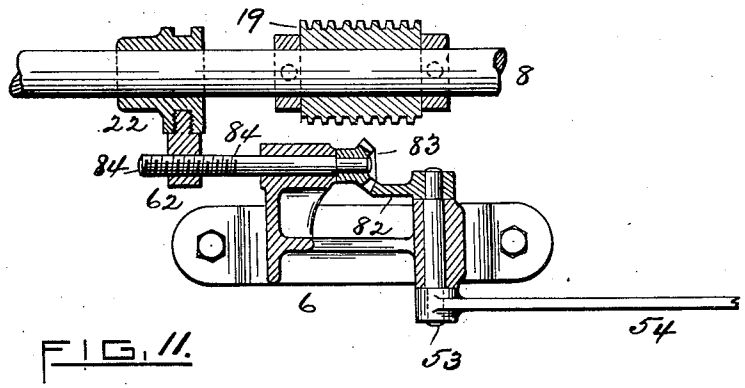

FIG. 11.

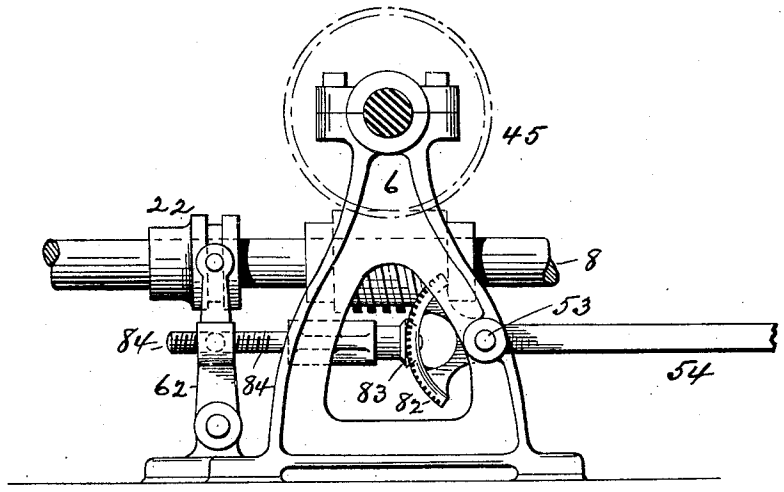

FIG. 10.

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UNITED STATES PATENT OFFICE.

CHARLES E. ANGELL, OF PROVIDENCE, RHODE ISLAND.

MECHANISM FOR SUPPLYING AIR TO BELLOWS OF CHURCH-ORGANS.

SPECIFICATION forming part of Letters Patent No. 566,051, dated August 18, 1896.

Application filed December 20, 1895. Serial No. 572,806. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ANGELL, of the city and county of Providence, in the State of Rhode Island, have made a certain new and useful Improvement in Mechanism for Working the Bellows of Church-Organs; and I declare the following to be a specification thereof, reference being had to the accompanying drawings.

Like numerals indicate like parts.

Figure 1 represents a top view of the machine. Fig. 2 is a side sectional elevation of the same, taken on line A A of Fig. 1. Fig. 3 is a top sectional view taken on line B B of Fig. 2 with the worm and shaft in elevation. Fig. 4 is an end sectional view taken on line C C of Fig. 2. Figs. 5 and 6 are detail views of the cam and its connection for operating the fork-shaped lever of the clutch. Fig. 7 represents the general arrangement of the machine as applied for working the bellows. Fig. 8 is a central section of the clutch. Fig. 9 is section on D D of the same. Fig. 10 represents a modification whereby a screw may be substituted for the cam, as shown in Figs. 5 and 6. Fig. 11 is a top sectional view showing the arrangement of the parts for same.

My invention is an improved mechanism for supplying air to the bellows of church-organs, and is adapted to be operated by an electric motor.

It consists of the combination of the several parts arranged and operating as hereinafter particularly specified.

In the drawings, 1 is the bed of the machine, having earpieces 2, by which it is secured by bolts 3 in the desired position. Standards 4, 5, 6, and 7 extend upward from said bed to furnish bearings for the shafts.

The main shaft is shown at 8 and has its bearings on the standards 4 and 5. It is made of smaller diameter at its ends, and said ends are covered by the cap-pieces 9 and 10. Said cap-pieces are bolted to the standards by bolts 11, as shown.

The standards 4 and 5 have each an oil-chamber 12 cupped out therein, as shown in full lines in Fig. 3 and in dotted lines in Fig. 2, and a similar oil-chamber 13 is made in each of the cap-pieces 9 and 11, as indicated in dotted lines in Fig. 2. The chambers 12 and 13 are arranged to be continuous with each other, so as to hold a suitable quantity of oil, which is poured in through the oil-holes 14 in the cap-pieces 9 and 10.

As seen in Fig. 3, a collar 15 is placed on the main shaft 8 near each end, so as to revolve with the shaft, and dipping into the oil in said oil-chamber to distribute the oil upon the said shaft and bearings, as said shaft is very rapidly turned and therefore requires much lubrication.

The shaft 8 is provided with a shoulder 16, (see Fig. 3,) and washers 17 and 18 between said shoulders 16 and the bearing and cap-pieces receive the end thrust of said shaft 8. Of these two, 17 is a metal washer and 18 is a fiber washer.

The shaft 8 carries a worm-gear 19, secured by bolts or screws 20 to said shaft through hubs or collars 21.

A sliding collar or hub 22 is mounted on the shaft 8 and carries the clutching mechanism. Said collar or hub 22 is circumferentially grooved, (see Fig. 3,) and in said groove is a yoke 23. The sliding collar or hub 22 has the earpieces 24 diametrically opposite, and to each of the earpieces 24 an arm 25 is connected by a pivot 26. Each arm 25 is tapped to receive the screw-threaded rod 27, which has a bifurcated head or ears 28. A lever-arm 29, pivoted at its inner end, is pivotally connected at its outer end with the head or earpieces 28 of the rod 27.

The shaft 8 has movably mounted thereon the friction wheel or pulley 30, which by a bolt or otherwise receives power from an electric or other motor. Within this pulley 30 is a clutch mechanism having two shoes 31 diametrically opposite, and adapted, when moved into contact with the inner surface of the rim of the pulley 30, to engage the same by friction.

32 32 indicate gibs in and between which the shoe-supports 33 are movable, and in which also are mounted cross-shafts 34. Spiral springs 35 connect the shoes with each other at their ends. The lever-arms 29 are mounted on said cross-shafts 34.

36 is the disk or plate on which the clutching-shoe is mounted, and it has a hub 37, which is held fast upon the shaft 8 by a set-screw 38.

The hub of the pulley 30 is shown in section at 39, Fig. 8, where it is seen that it is in two parts, fastened together by bolts 40. Each part is cupped out to form the oil-chambers 41 for the purpose of lubrication.

Upon the standards 6 and 7 is mounted the cross-shaft 42 on bearings at the top of said standards and having its ends covered by the cap-pieces 43, which are provided with oil-holes 44 for lubrication. The cross-shaft 42 carries the gear-wheel 45, which meshes with the worm 19 of the main shaft 8. At the end of the shaft 42 is the crank-disk 46, on the crank-pin 47 of which the link-bar 48 is mounted.

Through the standard 6 is mounted a shaft 49, having on its inner end a cam 50. As shown in dotted lines in Fig. 6, this cam has a channel of the peculiar form there illustrated. The cam 50 is made fast to the shaft 49. At the outer end of the shaft 49 is a pinion 51. This pinion meshes with a segmental gear 52, which is fastened to a rock-shaft 53, and a lever-arm 54 extends at a right angle from said rock-shaft 53 and is fastened to it. Said rock-shaft is mounted in the standard 6.

55 is the clutch-operating rod, which has a looped end 56, through the opening of which the shaft 49 passes. Said rod 55 is provided with a suitably-mounted roller 57, which travels in the groove or channel of the cam 50. On the rod 55 is the collar or nut 58, adjustable upon a screw-thread thereon, and 59 is a spiral spring surrounding the rod 55. At the outer end of the rod 55 is the head 60, connected by a screw-threaded shank, Fig. 5, to a rocker-arm 62, which is pivotally mounted at 63 to a bearing 64 on the bed 1. The rod 55 is mounted loosely in a hole through said head 60, but is screw-threaded at its end to receive a nut 61, by which the inward movement of the rod is limited. The upper end of the rocker-arm 62 has the yoke 23, which, as before explained, enters the circumferential groove of the clutch-hub 22.

A hood 63, as shown in dotted lines in Fig. 4, may be used to cover the gearing 19 and 45.

The feed-bellows is shown in Fig. 7 at 64, having the usual folding and collapsing sides. Its under surface or disk has openings or holes for the entrance of air, as indicated by the arrows. The link or bar 48 is pivotally connected therewith. The conduit or air-pipe 65 conducts the air from the feed-bellows 64 to the reservoir-bellows 66, which is constructed similarly to the feed-bellows 64 and has a discharge-pipe 67, which conducts the air to the organ.

68 is a lever mounted upon a fulcrum 69. It is connected at one end by the rods 70 71 to a collar 72, which is adjustably secured by a set-screw 73 to the lever-arm 54 of the rock-shaft 53. Said lever 68 is connected at the opposite end by the rods 74 75 to an ear-piece 76 upon the top or disk of the reservoir-bellows 66. The rods 70, 71, 74, and 75 are respectively made with a right-hand screw-thread and a left-hand screw-thread, and by the nuts 77 78, respectively, are united and adjusted relatively to each other to obtain the desired length.

Having now described the several parts of my invention, I will explain its operation.

We will begin with the parts in the position shown in Fig. 3. There is now no wind in the bellows or reservoir. The shoes 31 are in frictional contact with the inner surface of the rim of the pulley 30. The roller 57 is at the end 79 of the channel in the cam 50. The revolution of the pulley 30 by the electric or other motor rotates the shaft 8, which turns the worm 19, which revolves the gear-wheel 45. The gear 45 turns the shaft 42 and with it the crank-disk 46. The crank-pin 47 of the crank-disk 46 moves the link-bar 48 up and down and so operates the bellows 64. As the bellows 64 feeds the reservoir 66 the top of said reservoir rises, thereby elevating that end of the lever 68 and depressing its opposite end. The latter end, by the rod connections 71 72, carries downward the end of the lever-arm 54, and slightly turns the rock-shaft 53. The turning of the shaft 53 moves the segmental gear 52 to the same degree, and the pinion 51 on the shaft 49 is moved in the direction opposite to that of the movement of the segmental gear 52. The shaft 49 is thus turned slightly by the pinion 5, and at the same time the cam 50, which is fast to the shaft 49, also turns, but as the channel of the cam is of the same radius from the end marked 79 to the point 80, Fig. 6, the working of the device is not interrupted, but the rod 55 remains in the same position as the roller 57, in contact with the inner end of the loop 56, and is always at the same radial distance from the shaft 49, notwithstanding the cam 50 has moved from its normal position; but when the reservoir 66 has been filled to its normal capacity the pulley 30 is automatically released by the motion of the clutch mechanism. This operation is effected when the lever-arm 54 by reason of the expansion of the union 66 and the lever connection between said union and the arm 54 has been moved to the requisite extent, say one hundred degrees. The segmental gear 52 is thereby correspondingly moved and by the pinion connection 51 therewith the cam 50 on the pinion-shaft 49 has been moved to the same degree, and now the roller 57 has reached the part of the cam-channel marked 80 in Fig. 6, from which point to the point marked 81 on said figure the radial distance of the channel-curve from the center regularly and rapidly diminishes. Hitherto the spring 59 has been compressed by the collar 58 of the rod 55 against the head 60, and this compression has, by the connection of the rod 55 to the rocker-arm 62 and the connection of said rocker-arm with the sliding collar 22, kept the latter forced toward the pulley 30. This pressure has caused the pivoted arms 25 27 to stand practically at a right angle with the shaft 8,

Fig. 3, and so to move outwardly the outer ends of the levers 29, thereby crowding the shoes 31 against the inside of the rim of the pulley 30, and so causing the pulley 30 to turn the shaft 8; but when the roller 57 has passed the point 80 of the channel in the cam 50 the spiral spring 59 is able to expand and to move its looped end 56 toward the opposite end of the device. The tension of the spring 59 is thus relieved and the shoes 31 are no longer in forcible contact with the pulley 30, but by the action of the springs 35 are drawn inwardly and away from the rim of the pulley 30, as shown in Figs. 8 and 9. The result of this disengagement is that the pulley 30 is then no longer connected with the shaft 8, and although it is still turned by the motor, as before, it does not rotate the shaft 8, and thus the working of the bellows ceases. As soon, however, as the wind has escaped from the reservoir 66 sufficiently so that the reservoir collapses the downward movement of the reservoir-bellows raises the opposite end of the lever 68, which pulls up the end of the lever 54. This rocks the shaft 49 and the segmental gear 52, which, moving the pinion 51, turns the shaft 49 and the cam 50. The roller 57 then travels backward, and as soon as it reaches the point marked 80 in its movement toward the end 79 of the channel of the cam the rod 55 is pushed toward the sliding collar 22 again and the tension of the spring 59 is stiffened by the compression and the collar 22 is moved by the rocker-arm 62 toward the pulley 30 again, and with this movement the levers 29 are spread apart, as before, thus throwing the shoes 31 into frictional engagement with the pulley 30. Then the bellows are again operated as already described. The device is thus seen to be wholly automatic. The operation of the feeding-bellows is kept up regularly until the reservoir-bellows is full, and then ceases; but as soon as the reservoir-bellows has begun to be exhausted the feeding-bellows resumes its work automatically.

The adjustability of the collar 72 by the set-screw 73 upon the lever 54 regulates the extent of the oscillation imparted to the rock-shaft 53. The nearer to said shaft the collar 72 is placed the more extended will be the arc of its oscillation and the more rapid the movement of the gears 51 52 and the cam 50.

The adjustability of the rod connections 70, 71, 74, and 75 allows a regulation of the capacity of the reservoir 66.

The adjustability of the spring 59 in the rod 55 by the collar 58 determines the amount of force exerted by the spring 59 to press the shoes 31 against the rim of the pulley 30.

In Figs. 10 and 11 I show a modified form of my invention in which the segmental gear 82 is differently attached to the rock-shaft 53, and is adapted to engage with a beveled gear 83 of a screw-threaded rod 84, which is mounted through a screw-threaded bore of the rocker-arm 62, and through a bearing in the standard said rod 84 is turned by the movement of the gear 82, and by the screw-thread connection-rod 84 rocks the arm 62, and thereby moves the sliding collar 22 of the clutching mechanism. The cam should be so adjusted in connection with the segmental gear that the release of the clutching mechanism shall be at the instant when the reservoir-bellows has risen to the desired height.

When, from the construction of the organ or from the surrounding conditions, it is impossible or impracticable to use the rigid courses above mentioned, the connection between the bellows and the lever operating the cam may be made by chains, ropes, or wires, passing over suitable pulleys, to move the lever in one direction, and a suitable weight or spring attached to the spring to move it in the opposite direction.

I do not wish to confine myself to the particular clutching mechanism described, as any other suitable clutching device may be used in the place of that specified.

Instead of having one pair of bellows, as shown, and a single crank to operate the same, there may be several feed-bellows to supply the reservoir, in which case a flanged coupling may be substituted for the crank and a direct line of shaft, said shaft to be provided with several cranks or bends, with link-bars therefrom to each of the feed-bellows, respectively.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In an organ-blower, the combination of a reservoir-bellows having a discharge-pipe, a feed-bellows connected with a reservoir-bellows, a lever mounted upon a suitable fulcrum and having one end connected with the top of the reservoir-bellows, a motor having a shaft, a pulley loosely mounted on the shaft, a clutch adapted to engage said pulley and shaft and provided with a sliding hub, a crank rotatable by said shaft, a link-bar pivotally mounted on said crank and feed-bellows, a rock-shaft, properly mounted having a lever-arm, and a segmental gear, a rod connecting said lever-arm with the bellows-lever, first aforesaid, a shaft properly mounted having a pinion engageable with the segmental gear and a cam, a pivotally-mounted rocker-arm, connected with the sliding hub of said clutch and adapted to operate the same and means intermediate between said cam and rocker-arm, adapted to engage or disengage said clutch with said pulley according to the angular direction of the lever-arm of said rock-shaft, all combined and operating substantially as shown and for the purpose specified substantially as set forth.

2. In an organ-blower, the combination of a reservoir-bellows having a discharge-pipe, a feed-bellows connected with the reservoir-bellows, a lever mounted upon a suitable fulcrum and having one end connected with the top of the reservoir-bellows, a motor, having

a main shaft, provided with a worm, a pulley loosely mounted on said shaft, a clutch fastened to said shaft and having a sliding hub with means adapted to engage said pulley, a cross-shaft, properly mounted and having a cogged wheel engageable with the worm, a crank on said cross-shaft, a link-bar pivotally mounted on said crank and feed-bellows, a rock-shaft properly mounted, having a lever-arm and a segmental gear, a rod connecting said lever-arm with the bellows-lever first aforesaid, a shaft, properly mounted, having a pinion engageable with the segmental gear and a cam, a pivotally-mounted rocker-arm, connected with the sliding hub of said clutch and adapted to operate the same and means intermediate between said cam and rocker-arm adapted to engage or disengage said clutch with said pulley according to the angular direction of said lever-arm all combined and operating substantially as shown and for the purpose specified substantially as described.

3. In an organ-blower, the combination of a reservoir-bellows having a discharge-pipe, a feed-bellows connected with the reservoir-bellows, a lever mounted upon a suitable fulcrum and having one end connected with the top of the reservoir-bellows, a motor, having a shaft, a pulley loosely mounted on the shaft, a clutch having a sliding hub with means adapted to engage said pulley and shaft, a crank rotatable by said shaft, a link-bar pivotally mounted on said crank and feed-bellows, a rock-shaft, properly mounted, having a lever-arm and a segmental gear, a rod connecting said lever-arm with the bellows-lever, first aforesaid, a shaft, properly mounted, having a pinion engageable with the segmental gear, and a cam, in which is a channel or groove, having a true circular course for a certain distance and then turned on a diminishing radius, a rocker-arm pivotally mounted and connected with the sliding hub of said clutch and adapted to operate the same, a pusher-rod, having one end loosely mounted through said rocker-arm and its other end looped and adapted to surround the shaft of said cam and provided with a roller movable in the channel or groove of said cam, a collar upon said pusher-rod and a spiral spring surrounding said pusher-rod, having its bearing at one end against said collar and at the other end against said rocker-arm, all combined and operating substantially as shown and for the purpose specified substantially as shown.

4. In an organ-blower, the combination of a reservoir-bellows having a discharge-pipe, a feed-bellows connected with the reservoir-bellows, a lever mounted upon a suitable fulcrum and having one end connected with the top of the reservoir-bellows, a motor, having a main shaft provided with a worm, a pulley loosely mounted on said shaft and having a sliding collar with means adapted to engage said pulley, a cross-shaft, properly mounted and having a cogged wheel engageable with the worm, a crank on said cross-shaft, a link-bar pivotally mounted on said crank and feed-bellows, a rock-shaft, properly mounted, having a lever-arm and a segmental gear, a rod connecting said lever-arm with the bellows-lever first aforesaid, a shaft, properly mounted, having a pinion, engageable with the segmental gear, and a cam, in which is a channel or groove, having a true circular course for a certain distance and then turned on a diminishing radius, a rocker-arm, pivotally mounted and connected with the sliding collar of said clutch and adapted to move the same, a pusher-rod, having one end loosely mounted through said rocker-arm and its other end looped and adapted to surround the shaft of said cam and provided with a roller movable in said channel or groove of said cam, a collar upon said pusher-rod and a spiral spring, surrounding said pusher-rod, having its bearing at one end against said collar and at the other end against said rocker-arm, all combined and operating substantially as shown and for the purpose specified substantially as specified.

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