No. 887,998. PATENTED MAY 19, 1908.

P. YVER.

PUMP.

APPLICATION FILED OCT. 17, 1907.

FIG_1_

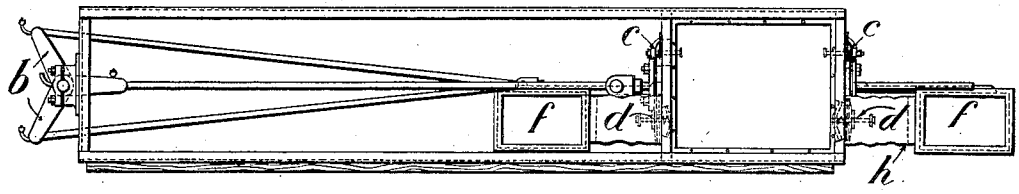


FIG_2_

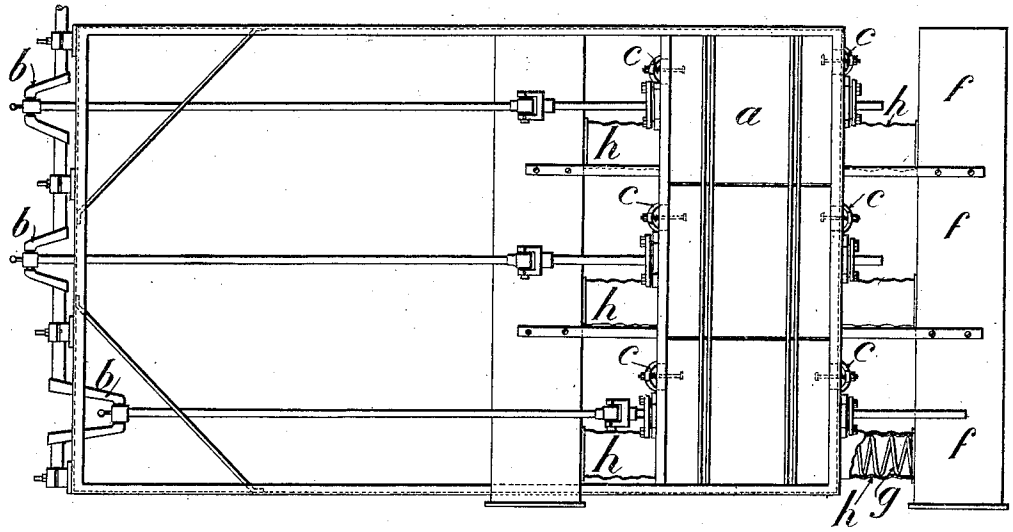


FIG_3_

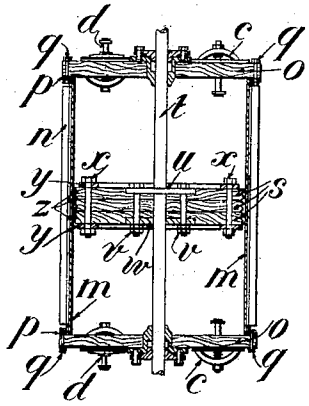


FIG_4_

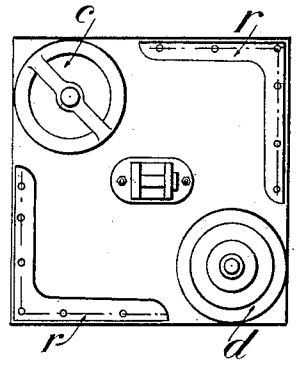
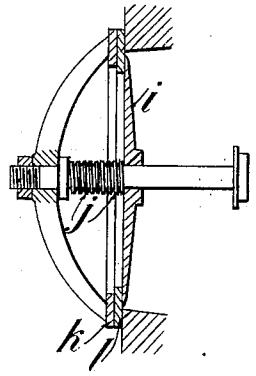


FIG_5_



Witnesses:-
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UNITED STATES PATENT OFFICE.

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PUMP.

No. 887,993. Specification of Letters Patent. Patented May 19, 1908.

Application filed October 17, 1907. Serial No. 397,815.

To all whom it may concern:

Be it known that I, PROSPER YVER, citizen of the Republic of France, residing at 7 Place du Panthéon, Paris, France, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pneumatic pumps for organs, harmoniums and the like.

The motor bellows of an organ occupy a large space and require a comparatively large motive power. To avoid great bulk, it is necessary that they should work at sufficiently high speed (70 to 80 revolutions) which involves rapid wear of the hinges and leather forming the folds of the bellows. The same disadvantages are found in harmoniums and like instruments.

The invention consists in replacing in such apparatus the motor bellows by a plurality of pumps, each having a piston working therein without friction, by which all the above disadvantages are removed, the wear being reduced to a minimum and the speed being capable of considerable increase without inconvenience, and further allowing of greatly reducing the size and weight of the motor. This arrangement can also be perfectly well combined with high speed electric or petrol motors, which are generally used for operating organs.

Figure 1 is a sectional elevational view of a pump and the piston which works therein without friction. Fig. 2 is a plan of the same. Fig. 3 is a longitudinal section of a pump body. Fig. 4 is an end view of a pump body. Fig. 5 is a section, on a larger scale, of a distributing vlave.

The arrangement shown in Figs. 1 and 2 comprises for example three wooden pump bodies *a* placed one next to each other in the same horizontal plane, the pistons of which are controlled by cranks *b* keyed at 120 degrees one from each other. Each cylinder end carries a suction valve *c* and a delivery valve *d*. On each side of the cylinder ends are placed wind-pipes or collectors *f* into which lead the delivery valves *d* by means of extensible pipes formed by a spiral spring *g* with leather *h* around it. Said suction and delivery valves *c* and *d* are formed by a valve shutter *i* (Fig. 5) pressed by a spiral spring *j* against a seat *k* lined with leather *l*.

Each pump body *a* is quadrangular in section, its side walls *m* are formed by sheet iron plates secured to each other by angle-irons *n* placed outside along the angles, one face of the cylinder projecting beyond each angle so as to be secured to the outer wing of the angle iron. The ends *o* of said cylinder are made of wood and are secured to the walls *m* by angle-irons *p* outside the pump body. These angle-irons *p* are secured in any known way to the walls, and are secured to the ends by bolts *q* which clamp a red lead joint, said bolts *q* bearing on the wooden end *o* of the cylinder, through the medium of a metallic part *r* which follows the contour of such pump body on the line of the bolts *q*. The longitudinal angle-iron *n* will be generally limited to the edge of the sides of the angle-irons *p* to which the ends are secured.

In each pump body *a* there is a movable rectangular wooden piston, formed by a series of wooden plates *s* which are mounted on a metallic rod *t*, passing through the ends of the pump body in stuffing-boxes, and are stopped by an abutment *u* which is rigidly fixed to such rod. This abutment, which is sunk in the wood, is secured by bolts *v*, with nuts and bolt-heads, to a movable metal plate *w* which is sunk in the wood on the other face of the piston. The edges of the wooden plates which form the piston are held together and clamped by bolts *x* bearing on metal parts *y* which follow the contour of the piston. Said piston is provided on its whole outside edge with grooves *z* preferably of triangular section. Such pistons have consequently no packing—and, on the contrary, do not make contact with the walls of the pump body, but there is as small a clearance as possible between the piston and the walls, the parts being thus as close as possible without friction. By operating the piston at a sufficiently high speed, there are produced in the grooves, during this movement, eddies which are sufficient to oppose the passage of air from one side of the piston to the other, and the pumps work as perfectly as if the piston made a tight fit with the walls of the pump bodies, but all friction is eliminated.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described, the combination with a plurality of pump bodies each of which is provided with suction and delivery valves, of a piston for each

pump body comprising a number of individual superposed peripherally grooved elements joined together means for tightly drawing and securing the said elements together face to face, and means for operating said pistons, substantially as described.

2. A pneumatic pumping device for organs, harmoniums and the like comprising three pump bodies placed one next to each other in the same horizontal plane, suction and delivery valves provided on said pump bodies, grooved pistons working in said pump bodies without friction, piston rods on which the grooved pistons are mounted, cranks keyed at 120 degrees one from each other, rods connecting said cranks to the piston rods, wind-pipes or collectors placed on each side of the cylinder ends and into which lead the delivery valves, and extensible pipes formed by a spiral spring with leather around it adapted to connect the delivery valves to the wind-pipes or collectors, substantially as described and for the purpose set forth.

3. A pneumatic pumping device for organs, harmoniums and the like comprising a series of pump bodies, quadrangular in section formed of sheet iron side walls *m* one edge of which projects beyond each adjacent wall and wood ends *o*, angle irons *n* adapted to secure the side walls to each other on the outside, angle irons *p* adapted to secure the ends of the pump body to the side walls, suction and delivery valves provided on the ends of the pump bodies, pistons working in the pump bodies without friction and formed by a series of grooved wooden plates *s*, a piston rod *t* on which are mounted said wooden plates, an abutment *u* rigidly fixed to said piston rod and sunk in the wood on one face of the piston, a movable metal plate *w* sunk in the wood on the other face of the piston, bolts *v* adapted to clamp the abutment *u* and movable plate *w* against the wooden plates, metal parts *y* following the contour of the piston, bolts *x* adapted to clamp said metal parts, and means adapted to actuate the pistons, substantially as described and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

PROSPER YVER.

Witnesses:

ANTOINE LAVOIX,

H. C. COXE.