(No Model.)

F. W. HEDGELAND.

PNEUMATIC COUPLER.

No. 590,545. Patented Sept. 21, 1897.

FIG. 2.

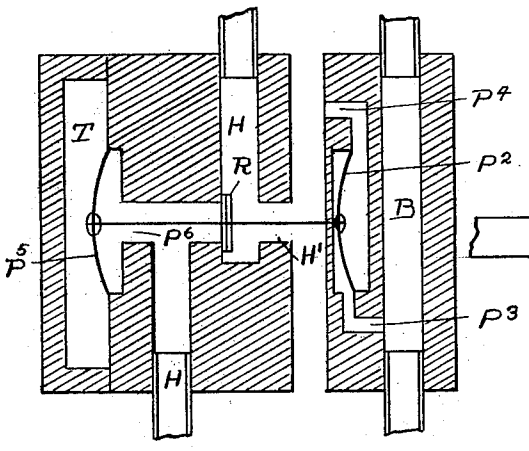


FIG. I.

WITNESSES:
Sew. E. Curtis
H. W. Munday.

INVENTOR:
FREDERICK W. HEDGELAND
BY Munday, Evarts & Adcock.
HIS ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK W. HEDGELAND, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE W. W. KIMBALL COMPANY, OF SAME PLACE.

PNEUMATIC COUPLER.

SPECIFICATION forming part of Letters Patent No. 590,545, dated September 21, 1897.

Application filed May 10, 1897. Serial No. 635,851. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. HEDGELAND, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pneumatic Couplers, of which the following is a specification.

This invention relates to improvements in the class of pneumatic couplers for the pneumatic actions of organs of which the coupler shown in the patent to me, No. 566,314, dated August 25, 1896, is a type. In my patented coupler the motor-channels B and H to be coupled are provided with a communicating port and with a valve controlling such port, and the channel H exhausts into the channel B, the key of which is played. I have found in the use of my said patented construction that the valve controlling the connecting-port is not always as quick in its action as could be desired, and especially so where a series of the couplers are employed in the same organ. While this sluggishness is wholly immaterial where only a few of the couplers are to be used in the series, it prevents the use of such numbers of the couplers as are sometimes needed in large organs. I account for the sluggishness by the fact that the air in channels H exhausts into channels B opposite the membrane-motors in the latter, and while it is passing said motors maintains some pressure thereon, and thereby delays the deflation of the motors, and by reason thereof also delays the movements of the valves; also, by the fact that while the valves which control the openings between the two channels are shifting to their seats at the opening the compressed air in the channels H from below the valves flows over and around the valves and into the channels B, thereby increasing the supply of air in the latter and also creating a slight degree of back pressure on the valves, so that they move more slowly in closing than they would were it not for such back pressure. I obviate these objections in my present invention, in which the channels have no connecting opening, so that the air does not pass from one to the other, and consequently the membrane-motors which shift the valves are not slowed, as in the other construction. The coupled channels, corresponding to channels H of the patent, exhaust at the same ports as before, but those ports open to the outer air instead of into the other channels, so that any air which may pass over and around the valves while closing and which may come from that portion of the channels retaining the compressed air is so quickly dissipated in the outer air as to obviate the back pressure upon the valves above referred to.

The nature of my improvement is fully illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a portion of an organ-action embodying my invention, and Fig. 2 is a like view showing a modification.

Referring to Fig. 1 of the drawings, A represents one of the keys of the great-organ series, B the air-channel corresponding to said key and leading to the motor (not shown) controlling the speaking-pipe of said key, and C and D the valves controlling said channel and connected by their stem E to the key. The valve C is an exhaust-valve and is normally closed, while the valve D is normally open and is located in the chamber F, whereby compressed air is supplied to the channel B, and when closed it shuts off the air from said chamber.

G is one of the keys of the swell-organ series; H, its corresponding action-channel, leading to the motor controlling the pipe of key G; J and K, the controlling-valves corresponding to the valves C and D of the other channel, and M is the compressed-air chamber corresponding to the chamber F of channel B.

In one side of the channel H is a port H′, opening directly to the outer air and controlled by valve O, mounted upon the stem O′, supported in and operated in one direction by the membranes P and P′, located the first in the side wall of the channel B and the other outside of both channels and operated by air from the trunk T. The membrane P′ is normally inflated by said trunk, and consequently tends to keep the valve O against the port H′, as shown in the drawings. In the channel H, I also provide an offset in which a valve-seat is formed at Q′, and

a valve Q, also mounted on the stem O', is adapted when forced against said seat to shut off that part of the channel II above said valve Q from the chamber M. The normal position of valve Q is that shown, and being mounted upon the same stem with valve O it necessarily closes whenever the valve O opens.

The operation of the invention shown at Fig. 1 is as follows: The player when he desires to couple the great and swell organs, so that he can sound both by playing the keys of one, pulls the stop controlling the trunk T, thereby relieving the air-pressure in the trunk and upon the inside of membrane P' and leaving the valves O and Q at liberty to shift whenever the keys of the great organ are struck. If he now strikes key A, he relieves the pressure in the channel B, so that membrane P is deprived of internal pressure, and consequently the air-pressure in channel II, acting upon valve O, instantly shifts valves O and Q, opening the former and closing the latter and relieving the pressure in the channel II above valve Q. That portion of channel II between the valve Q and the chamber M is, however, unaffected, because valve Q by closing upon its seat Q' prevents any change of conditions there. The release of the pressure in the channel II by the opening of valve O causes its motor to act in unison with the motor of channel B, and consequently the pipes controlled by both motors speak together. When the player releases the key A, the pressure is at once restored in the channel B and the membrane P is inflated and forces the valves O and Q back to their normal positions shown in the drawings and both pipes cease speaking. No change in the position of these valves can occur, of course, so long as the membrane P' is inflated, and hence the channels can then be used separately.

In the modified construction shown at Fig. 2 the principal change consists in the substitution of a single valve for the two valves of Fig. 1 and the provision of motors at both ends of the valve-stem, so it may be shifted in both directions by the motors instead of shifting it in one direction only by motor-power, as in the other construction. The single valve is shown at R, and it seats at both sides of the channel II, closing the port II' in one position and shutting off the air from the source of supply of channel II in the other position. The membrane-motor P^2, which corresponds to the motor P of Fig. 1, is located in the wall of channel B adjacent to the valved opening in the channel II, and the air is admitted to it from channel B by the passage P^3 and operates it in the direction necessary to close the valve R against port II'. A passage P^4 leads from the outer air to the other side of this membrane. The membrane P^5 corresponds to the membrane P' of Fig. 1, except that the pressure of the wind-box T is exerted upon its outer side and that an opening P^6, leading from the channel II, is provided, so that it may be inflated by the pressure in channel II acting upon its inner surface. The operation of this single valve is as follows: When the air is exhausted from channel B, the motor P^2 will cease to act and the pressure in the channel II will, through the motor P^5, throw the valve R over so as to uncover the outer-air opening and shut off the lower part of channel II, the motor P^5 being sufficiently powerful to overcome the resistance to this movement caused by the pressure of the air upon the face of the valve. The two motor-channels will now operate together and continue to do so until the pressure is restored in channel B, when the pressure comes again upon the motor P^2 and, assisted by the pressure in channel II acting on the face of the valve, shifts the latter against the port II'.

It will be noticed that in both the constructions I have passed the stem of the valve through the wall of one of the channels; but in each case this is done near one end of the stem, so that the wood is not likely to interfere with the movements of the stem or deflect it from its proper line of movement.

The invention is adapted to be used for coupling octaves or pedals and may be employed in place of any pneumatic couplers now in use. The couplers may be used in any number desired without affecting the quickness of their action. The channels are shown in Fig. 1 as uncoupled and in the other figure as coupled.

I claim—

1. The combination with the motor supply-channels of two different notes or pipes adapted to be sounded together, one of said channels having an opening to the outer air in its side through which its motor may be exhausted, of a valve controlling said opening, and a motor in communication with the other channel and acting to close said valve, substantially as specified.

2. The combination with the motor supply-channels of two different notes or pipes adapted to be sounded together, said channels having no air communication with each other, and one of them having an opening to the outer air in its side through which its motor may be exhausted, of a valve controlling said opening, and a motor in communication with the other channel and acting to close said valve, substantially as specified.

3. The combination with the motor supply-channels of two different notes or pipes adapted to be sounded together, one of said channels having an opening to the outer air in its side through which its motor may be exhausted, of valve devices located in said channel and acting both to control said opening and to shut off the escape of air from the source of supply of said channel when said opening is uncovered, and a motor in communication with the other supply-channel and acting to control said valve devices, substantially as specified.

4. The combination with the motor supply-channels of two different notes or pipes adapted to be sounded together, said channels having no air communication with each other, and one of them having an opening to the outer air in its side through which its motor may be exhausted, of valve devices located in said channel and acting both to control said opening and to shut off the escape of air from the source of supply of said channel when said opening is uncovered, and a motor in communication with the other supply-channel and acting to control said valve devices, substantially as specified.

5. The combination with the motor supply-channel B, and the motor supply-channel H, the latter having an opening to the outer air in its side and also having an offset, as shown, of valve devices acting to control said opening and also acting to close said offset and prevent loss of air from the source of supply, and a motor controlled by channel B connected to said valve devices and serving to retain them normally in position to close said opening, substantially as specified.

6. The combination with the motor supply-channels of two different notes or pipes adapted to be sounded together, one of said channels having an opening to the outer air in its side through which its motor may be exhausted and also having an offset as shown, of valve devices located in said channel and acting both to control said opening and to close said offset when the opening is uncovered, and a motor in communication with the other supply-channel and acting to control said valve devices, substantially as specified.

FREDERICK W. HEDGELAND.

Witnesses:
H. M. MUNDAY,
EDW. S. EVARTS.