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PNEUMATIC COUPLER FOR AUTOMATIC MUSICAL INSTRUMENTS.

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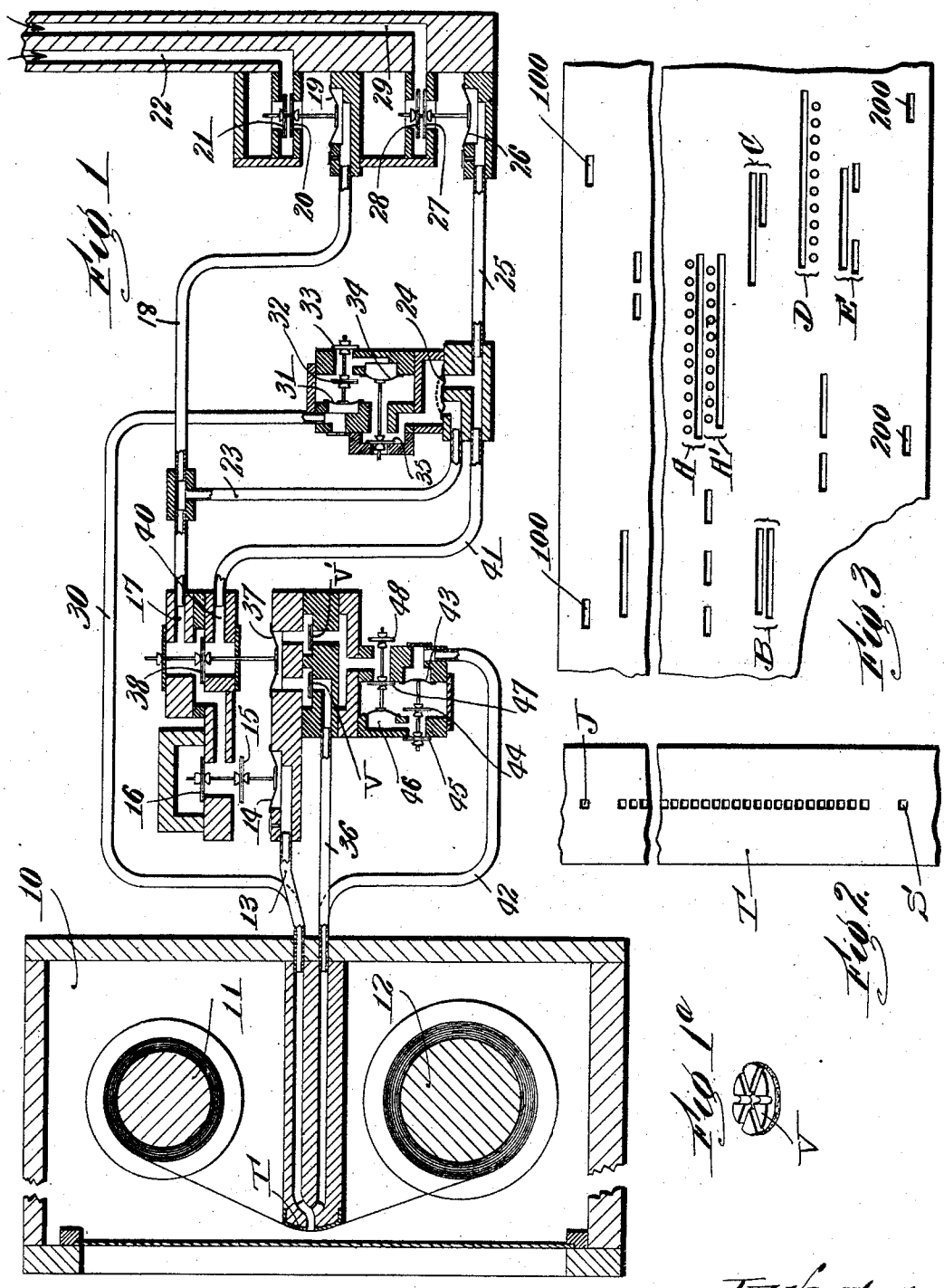

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 1a.

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PNEUMATIC COUPLER FOR AUTOMATIC MUSICAL INSTRUMENTS.

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To all whom it may concern:

Be it known that I, WILLIAM H. REES, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Pneumatic Coupler for Automatic Musical Instruments, of which the following is a specification.

This invention relates to an improved construction for automatically controlling a musical instrument having two sets of speaking devices, such for example, as a double manual organ, one set of speaking devices of which correspond with one key-board or manual, while the other set of speaking devices correspond with a second key-board or manual.

This application is a division of an application on an "automatic musical instrument" filed by me November 28, 1905, Serial No. 289,077.

The especial object of this invention is to provide a simple, compact and efficient pneumatic coupler for assisting in controlling the speaking devices of a double manual organ or similar instrument to produce automatically all variations and combinations which can be made in playing such an instrument by hand.

To these ends this invention consists of the construction for controlling an automatic musical instrument, and of the combinations of parts therein as hereinafter described and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a diagrammatic sectional view of sufficient parts of an automatic musical instrument to illustrate the application of this invention thereto. Fig. 1[a] is a detail view of one of the check-valves. Fig. 2 is a plan view partly broken away of the tracker board and Fig. 3 is a plan view partly broken away of the music sheet.

In playing a double manual organ by hand, it is possible to secure a wide range of effects; for example, a melody can be played on the upper manual, and an accompaniment on the lower manual; or a melody may be played on the lower manual, while the accompaniment is played on the upper manual. By means of couplers the melody may be sounded upon both manuals, while the accompaniment may be sounded upon either one of the manuals alone; or the melody may be sounded on either one of the manuals, while by couplers the melody may be sounded on both sets of manuals. Where loudest effects are desired, the melody and the accompaniment may both be sounded upon both manuals. In addition to these ordinary variations, a skilled organist will often produce more complicated effects, such for example, as can be done by "trilling" a note from the upper to the lower manual, or by other rapid changes from one manual to the other.

The especial object of the present invention is to provide a pneumatic coupler for a double manual organ or similar musical instrument which will not only be able to produce every possible variation which can be made by skilled organists, but which will also be capacitated to produce such effects with much more rapidity and certainty than can be done by even the highest degree of manual dexterity. To accomplish this result in an automatic musical instrument constructed according to this invention, the tracker board is provided with a set of note-channels which control pneumatics for sounding a set of such speaking devices which may be regarded as the normal or lower manual.

In addition to the note channels, the tracker-board is provided with a supplemental set of channels which operate an individual set of switches, one of these switches corresponding to each note-channel, serving to change the sounding of the note from a speaking device corresponding to the lower or normal manual to a speaking device of the upper or supplemental manual. These individual switches are of a delicate, quickly responsive construction permitting instantaneous changes from one manual to the other for "trilling" or rapidly shaded effects. The tracker-board is also preferably provided with a main switch channel corresponding to a single line of perforations of the music-sheet for controlling a main switch for causing all notes to be sounded upon the upper or supplemental manual without the use of the individual switches, and the tracker-board additionally is preferably provided with a single channel corresponding with a single

line of perforations of the music-sheet for actuating a coupler device for causing notes to be sounded in unison upon both manuals.

The accompanying drawings show in detail the application of this invention to a double manual organ operated by a pressure system.

Referring to Fig. 1 and in detail, 10 designates a pressure box, mounted in which is the usual paper-winding mechanism comprising the music-roll 11 and winding-roll 12 for drawing the perforated music-sheet over the tracker-board T.

Each channel of the tracker-board T which corresponds to a note is connected by a pipe 13 to operate a pneumatic 14 closing a valve 15 and opening a valve 16. The opening of the valve 16 admits pressure to an upper passage 17 which is connected by a pipe 18 to operate a pneumatic 19 which will open a valve 20 and close a valve 21. The opening of the valve 20 will exhaust the pressure from a channel 22 leading to one of the speaking devices of a set of such speaking devices corresponding to the lower manual.

In the particular organ to which I have applied this invention the exhausting of the air from one of the channels 22 acts through an ordinary set of pneumatic controlling connections to sound a speaking device. These connections are of ordinary construction which it is not thought necessary to herein show or describe at length. The pipe 18 is also connected by a T-joint to a pipe 23 which opens below a cut-off diaphragm 24. The cut-off diaphragm 24 is normally held down by pressure so as to stop the passage of air through the pipe 23. The pressure which holds down the cut-off diaphragm 24 is exhausted, however, when a coupling action is desired, and in such case air pressure from the pipe 23 passes under the individual diaphragm 24 through a pipe 25 to a pneumatic 26 opening a valve 27 and closing a valve 28. The opening of the valve 27 exhausts the pressure from a channel 29. The exhausting of pressure from this channel 29 brings into action one of the speaking devices of a set of speaking devices corresponding to the upper manual. The pneumatic connections for doing this are of ordinary construction which it is not thought necessary to herein show or describe.

When air is exhausted from both the channel 22 and the channel 29, the same note will be sounded in unison upon speaking devices in each set of such speaking devices. The exhaustion of pressure to permit an automatic coupling action is preferably controlled from a marginal tracker-board channel J. This tracker-board channel J registers with a single marginal line of perforations of the music-sheet, and as shown in Fig. 1, the tracker-board channel J is connected by a pipe 30 to operate a pneumatic 31, closing a valve 32 and opening a valve 33. The opening of the valve 33 exhausts pressure from the pneumatic 34, shifting the switch valve 35 to exhaust the pressure upon the switching diaphragm 24 before referred to.

In practice I have found that this is an efficient automatic coupling device which is very sensitive in operation and which will permit the simultaneous sounding of a note on both manuals for various lengths of time, even down to the very shortest grace notes which could possibly be desired. Corresponding with the note channels of the tracker-board, the tracker-board is also preferably provided with a supplemental set of perforations, one of which corresponds with each note perforation, these supplemental channels preferably alternating with the note channels. As shown in Fig. 1, each of these supplemental or individual switch-channels is connected by a pipe 36 to admit pressure below a check-valve V to raise a pneumatic 37. The check-valve V as shown in Fig. 1[a] is of such form as to permit free passage of pressure when lifted. The pneumatic 37 raises a switch-valve 38 shutting off the admission of pressure to the upper channel 17 before referred to, and causing the pressure to pass through a lower channel 40 and through a pipe 41 admitting pressure directly to the pipe 25 before referred to. By means of this construction whenever an individual switch channel of the tracker-board is opened, it will permit the sounding of a note corresponding thereto on the upper manual alone unless the coupler has exhausted the pressure upon the shut-off diaphragm 24, in which case the note will be permitted to be sounded in unison on both manuals.

In addition to an individual set of switches, an automatic musical instrument constructed according to this invention is also preferably provided with a main switch mechanism controlling all notes simultaneously. For this purpose, the tracker-board as shown in Fig. 2, is preferably provided with a marginal channel S corresponding with a single line of perforations near the edge of the music sheet.

As shown in Fig. 1, the channel S is connected by a pipe 42 to operate a diaphragm 43 closing the valve 44 and opening the valve 45. The opening of the valve 45 exhausts pressure from the pneumatic 46, opening the valve 47 and closing the valve 48. The opening of the valve 47 admits pressure to a long channel common to a series of check-valves V', each check-valve V' of which corresponds to one of the note channels and is of a similar construction to the check-valve V shown in Fig. 1[a]. The lifting of each of the check-valves V' admits

pressure to the corresponding pneumatics 37 before referred to so that the entire set of switching pneumatics 37 will remain shifted so long as the main switch channel S of the tracker-board remains open.

Referring to Fig. 3 for a clear understanding of the cutting of the music-sheet and of the variety of musical effects which can be produced thereby; as shown in Fig. 3, the music-sheet may be provided along one edge with a line of perforations 100 for operating the coupler mechanism to sound all notes in unison upon both manuals. Near its other margin the music-sheet may be provided with a set of perforations 200 controlling the main switch and causing notes to be sounded on the upper manual. Also a wide variety of elaborate effects may be secured by combination of the music-sheet perforations controlling the individual switch mechanism and the note perforations. For example, the set of music-sheet perforations A—A′ will produce "trilling" on two notes of the upper manual; the set of perforations B will produce a single note on the upper manual; the set of perforations C will sound a note first on the lower manual and then switch the latter part of the note to the upper manual; the set of perforations D will produce a "trill" in which the same note is sounded alternately upon the lower and upper manuals; and the set of perforations E will sound a note first on the upper manual which will be switched onto the lower manual and then switched back to the upper manual. These several groups of perforations are, of course, selected for purposes of illustration merely, it being understood that to produce any desired shifting or "trilling" from one manual to the other, it is simply necessary to select the required arrangement of perforations, and all possible switching actions can be produced by the action of the individual switches alone, although it is preferred to supplement the individual switches by a main switch. I regard this as desirable, because by controlling the main switch from a single line of perforations of the music sheet, it is possible to avoid multiple cuttings in the music-sheet which otherwise might be necessary if a general switching action was produced by the control of the switches individually. It is to be understood also that the particular design of music-sheet in which the switch perforations are alternated with the note perforations, and in which the main switch and coupler are controlled by the marginal perforations respectively may be departed from, the same effects being produced no matter on what part of the width of the music-sheet the required perforations are located.

Having thus fully described this invention and ascertained the manner in which the same is to be performed, what I claim as new and desire to secure by Letters-Patent is:—

1. A coupler for a pneumatic musical instrument, comprising a casing having two passages therein, means adapted to be operated by pressure for opening and closing the passages, a pressure chamber communicating with said means, an opening to the outer air, a valve controlling said opening and the communication between the pressure chamber and said means, a pneumatic for operating said valve located in the pressure chamber, and pneumatically controlled means for controlling the connection of said pneumatic with the pressure chamber and the outer air.

2. A coupler for a pneumatic musical instrument, comprising a casing having two passages therein, means adapted to be operated by pressure for opening and closing the passages, a pressure chamber communicating with said means, an opening to the outer air, a valve controlling said opening and the communication between the pressure chamber and said means, a pneumatic for operating said valve located in the pressure chamber, a second valve for controlling the admission of pressure from said pressure chamber to said pneumatic and the connection of the pneumatic with the outer air, a second pneumatic for operating the second valve, and means for admitting pressure to the second pneumatic to operate the same, whereby when pressure is admitted to the second pneumatic the second valve will be operated to allow air to be exhausted from the first pneumatic, and to move the first valve in such a way as to cut off communication between the pressure chamber and the first named means and allow the pressure between the same and the pressure chamber to be exhausted into the air.

3. A coupler for a pneumatic musical instrument, comprising a casing having two passages therein, a partition between said passages, a diaphragm covering said partition and passages, a tube leading to each of said passages, a third tube leading from one of the passages, a pressure chamber communicating with the opposite side of said diaphragm, an opening to the outer air, a valve controlling said opening and the communication between the pressure chamber and the diaphragm, a pneumatic for operating said valve located in the pressure chamber, a double valve for controlling the admission of pressure from said pressure chamber to said pneumatic and the connection of the pneumatic with the outer air, a second pneumatic for operating the double valve, and a tube leading to the second pneumatic for admitting pressure thereto to operate the same, whereby when pressure is admitted to the

second pneumatic the double valve will be operated to allow air to be exhausted from the first pneumatic, and to move the first valve in such a way as to cut off communication between the pressure chamber and the diaphragm and allow the pressure above the diaphragm to be exhausted into the air.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM H. REES.

Witnesses:
LOUIS W. SOUTHGATE,
ALBERT E. FAY.