F. W. WOOD & E. D. CARNEY.

MUSICAL INSTRUMENT.

APPLICATION FILED APR. 15, 1911.

1,067,958.

Patented July 22, 1913.

2 SHEETS—SHEET 1.

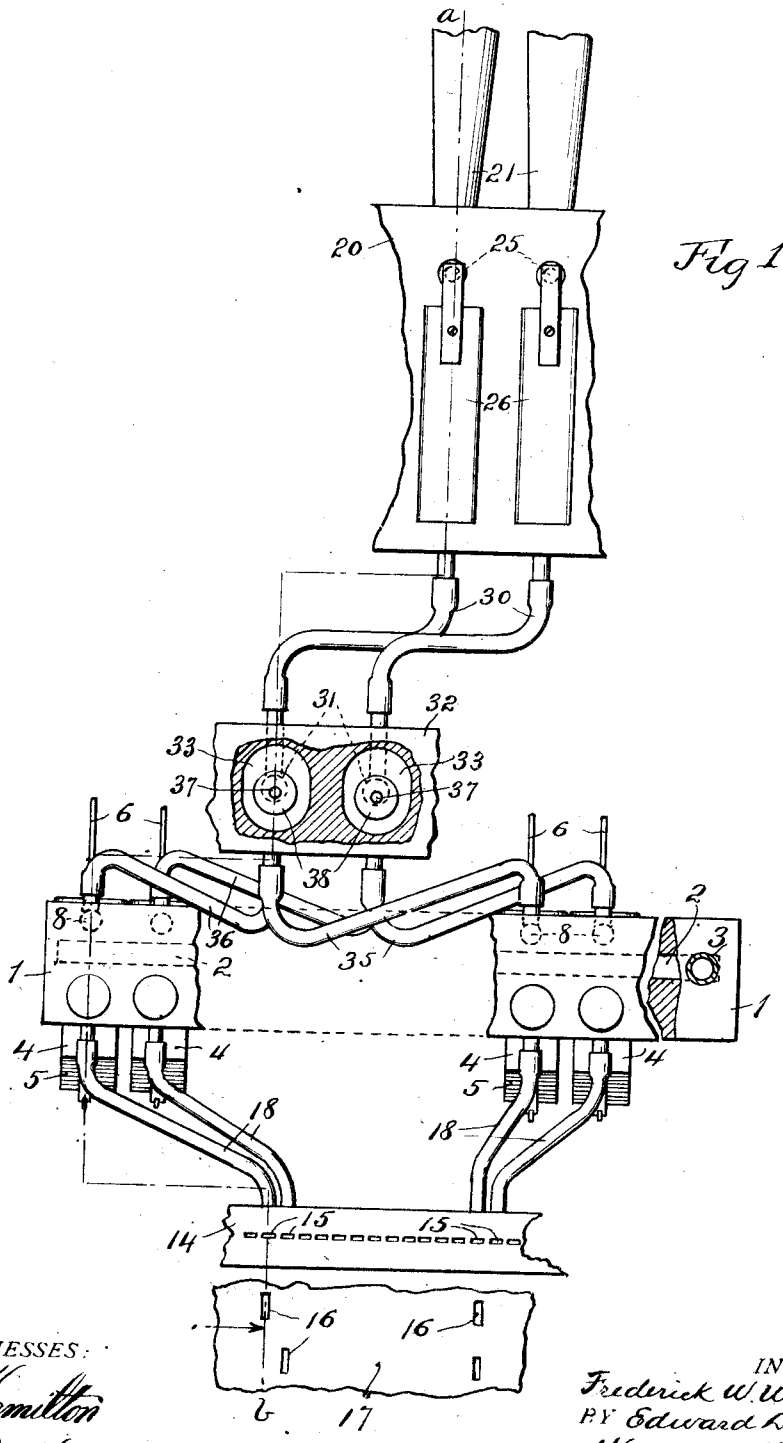


Fig 1

WITNESSES:

R. Hamilton

E. B. House

INVENTORS

Frederick W. Wood

BY Edward D. Carney

Warren D. House

Their ATTORNEY.

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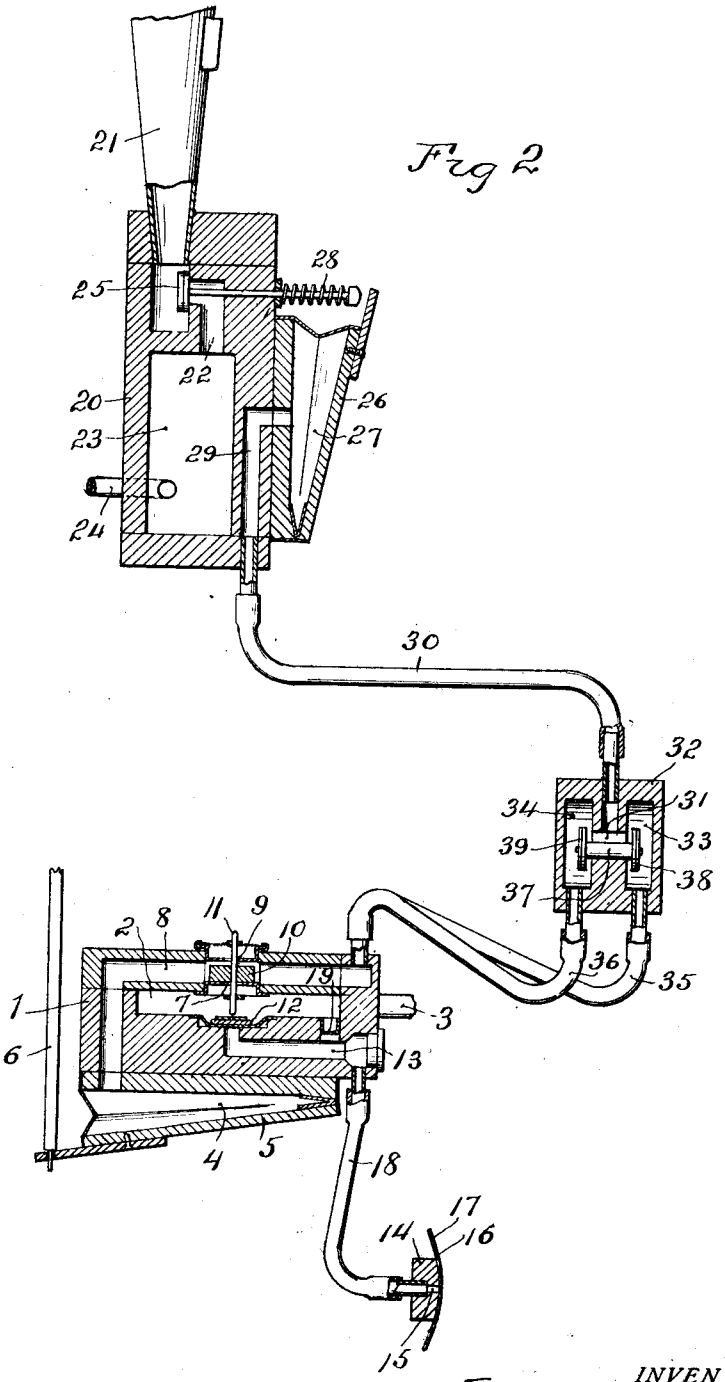
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2 SHEETS—SHEET 2.

Fig 2



WITNESSES:

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UNITED STATES PATENT OFFICE.

FREDERICK W. WOOD, OF KANSAS CITY, MISSOURI, AND EDWARD D. CARNEY, OF NEW YORK, N. Y., ASSIGNORS TO THE BERRY-WOOD PIANO PLAYER COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

MUSICAL INSTRUMENT.

1,067,958. Specification of Letters Patent. Patented July 22, 1913.

Application filed April 15, 1911. Serial No. 621,188.

To all whom it may concern:

Be it known that we, FREDERICK W. WOOD and EDWARD D. CARNEY, citizens of the United States, residing, respectively, at Kansas City, in the county of Jackson and State of Missouri, and at the city of New York, in the county of New York, borough of Bronx, and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

Our invention relates to improvements in musical instruments.

While our invention may be applied to various kinds of musical instruments, it is particularly well adapted for use in automatic pianos of the type provided with piano actions and organ pipes operated by a tracker bar controlled pneumatic mechanism. In such structures the conservation of space to afford compactness is very desirable.

One object of our invention is to provide a structure in which a comparatively small number of pipes may be employed to cooperate with a larger number of piano actions so as to increase the range of the organ pipe system. To effect such a result we have provided a structure in which a single organ pipe may be actuated by either of two air passages in the tracker bar. We have found that such double use of an organ pipe does not destroy the melody of the music, when the two air passages employed for the purpose represent similar notes of different octaves. By carrying this principle into effect, a structure may be provided in which the larger pipes required for producing the lower notes may be dispensed with without the elimination from the music of the pipe organ effect when the lower notes are sounded by the string mechanism.

A further object of our invention is to provide a structure having two pneumatics operable independently by a tracker bar and a third pneumatic operable when either of the other two pneumatics is operated.

Other features of our invention are hereinafter fully described and claimed.

In the accompanying drawings which illustrate one form of our invention, Figure 1 is a view partly in elevation and partly broken away showing a structure provided with a pneumatic system, two of the organ pipes, parts of four piano actions and the mechanism for operating the pipes and piano actions being shown. Fig. 2 is a section taken on the broken line *a*—*b* of Fig. 1.

Similar reference characters designate similar parts.

First will be described an ordinary type of pneumatic mechanism commonly employed to operate the piano actions of an automatic piano.

1 designates a wind chest provided with a vacuum chamber 2, from which air is exhausted through a tube 3 by any suitable pumping mechanism, not shown. Secured to the under side of the chest 1 are pneumatics 4, of the number required for operating the piano actions. These pneumatics are alike in construction, and may be the ordinary bellows form. Their lower swinging members 5 respectively support and are adapted, when the bellows are collapsed to lift extension bars 6 connected with the jacks, not shown, of the piano actions. The pneumatics 4 are operated by similar mechanisms. In the chest 1 above the vacuum chamber 2 and respectively connected therewith by inlets 7 are passages 8, which respectively communicate with the pneumatics 4. The passages 8 are provided respectively with inlets 9. The inlets 7 are respectively normally closed by valves 10 adapted to be raised to close the inlets 9 by valve stems 11, which are disposed respectively above horizontal diaphragms 12, which close the inner ends of passages 13 respectively located below the chamber 2, said chamber and the passages 13 being separated by the diaphragms 12.

An ordinary tracker bar 14 has the usual passages 15 which are adapted to register with perforations 16 in a music sheet 17. Conductors 18 respectively connect the passages 13 with the passages 15. Passages 19, which are smaller than the passages 15 of the tracker bar, respectively connect the passages 13 with the vacuum chamber 2, thereby permitting air to be withdrawn from the passages 13 into chamber 2, so diaphragms 12 will drop by gravity at such times as the music sheet 17 covers the passages 15. The valves 10 will then fall so as to close inlets 7 and to open inlets 9, whereby air may enter the passages 8 and pneumatics 4.

20 designates a wind chest upon which are mounted organ pipes 21 which respec-

tively communicate with air passages 22, which in turn communicate with a pressure chamber 23 to which air is supplied, for sounding the pipes 21, through a conductor 24, which may be connected to a suitable pressure air pump, not shown. The passages 22 are normally closed by valves 25, respectively, the stems of which are slidably mounted in the wall of the wind chest 20. The stems of the valves 25 are adapted to be forced to open positions by movable members 26 of pneumatics 27 mounted on the chest 20. Coil springs 28 mounted on the stems of the valves 25 normally force the valves to the closed position shown in Fig. 2.

In order that an organ pipe 21 may be sounded when a note corresponding to the pipe or a similar note of a different octave is played, the following described mechanism is preferably provided: In the chest 20 are provided passages 29 which communicate respectively with the pneumatics 27 and also communicate respectively with conductors 30, which in turn communicate with inlets 31 provided in a wind chest 32. The wind chest 32 is provided with a plurality of pairs of chambers 33 and 34, the chambers of each pair being connected by an inlet 31. The chambers 33 are connected by conductors 35 with passages 8 corresponding respectively to the notes represented by the pipes 21. The chambers 34 are connected respectively by conductors 36 with passages 8 which correspond respectively to the notes represented by the pipes 21, but which are in a different octave. In order that a chamber 33 or a chamber 34 may be closed from communication with the inlet 31 and from communication with the other chamber of the pair when air is passing through said other chamber, there are horizontally slidably mounted in said inlets 31 respectively valve stems 37 having secured on one set of ends heads 38 which are located in the chambers 33 respectively. Located respectively in the chambers 34 and secured respectively to the other set of ends of the stems 37 are heads 39. The length and diameter of each stem 37 is such that when in the neutral position shown in Fig. 2, the inlet 31 will communicate with both chambers 33 and 34, and air may then pass to and from each of the chambers by way of inlet 31.

In the operation of the invention when a perforation 16 in the music sheet 17 registers with an air passage 15 in the tracker bar 14, the air will pass from the atmosphere through the perforation 16, air passage 15, and connecting conductor 18 into the adjacent passage 13, thus lifting the diaphragm 12 which will lift the valve 10 by means of its stem 11, thereby closing inlet 9 and opening the adjacent inlet 7. Air pressure of the atmosphere will then collapse the pneumatic 4 communicating with the particular passage 8 which has just been placed into communication with the vacuum chamber 2 by the lifting of the valve 10. The collapsing of the pneumatic 4 will actuate the adjacent piano action in the usual manner. If the passage 8 which has been connected, as just described, with the vacuum chamber 2 is one to which is connected a conductor 35, atmospheric pressure will collapse the pneumatic 27 communicating with the conductor 35, thereby opening the adjacent valve 25 against the pressure of the spring 28, upon which compressed air from the chamber 23 will pass through the passage 22 and will sound the pipe 21 into which the air is discharged. When the pneumatic 27 collapses air will pass therefrom through the passage 29, conductor 30 and air inlet 31 into chamber 33, thereby forcing the valve head 39 in chamber 34 to close communication between the inlet 31 and the chamber 34. The air will then pass from chamber 33 through conductor 35 into passage 8 and thence into the vacuum chamber 2. If the passage 8 which has been placed in communication with the vacuum chamber 2, as described, is one to which is connected a conductor 36, the operation will be as just described, excepting that the air from the pneumatic 27 which has been operated will pass from the inlet 31 into chamber 34, thus closing communication between chamber 33 and the inlet 31 by moving the valve head 38 to the closed position. The air from chamber 34 will then pass through conductor 36 into passage 8 and thence into the vacuum chamber 2. As soon as the music sheet 17 passes to a position closing the air passage 15 which has been opened, as above described, air will pass from the passage 13 through the passage 19 into the vacuum chamber, thus permitting diaphragm 12 to fall and with it the valve 10, the said valve falling to a position closing the inlet 7 and opening the inlet 9, thus permitting air to enter passage 8 through the inlet 9, upon which the pneumatic 4 will expand to the position shown in Fig. 2. If the passage 8 into which the air enters through the inlet 9 is one connected to a conductor 36, air will pass from said passage through conductor 36, chamber 34, inlet 31, passages 30 and 29 to pneumatic 27, which will expand, after which the coil spring 28 will move the valve 25 to the closed position shown in Fig. 2. If the passage 8 into which the air passes from inlet 9 is one connected to a conductor 35, the air will pass through said conductor and chamber 33 to inlet 31 and thence as described to the pneumatic 27.

From the above it will be understood that an organ pipe will be sounded when a note corresponding to the pipe or a note an octave lower than the pipe is played by the stringed mechanism of the instrument.

The pipe will be sounded also when its note and one an octave lower are simultaneously played by the stringed mechanism. In the latter case, the valve heads 38 and 39 will be in the neutral position shown in Fig. 2, in which position air will pass through both chambers 33 and 34 and conductors 35 and 36 into two passages 8.

The function of the valve heads 38 and 39 is to prevent two pneumatics 4 being simultaneously operated when only one is to be operated. This function is effected by the valve carrying the heads 38 and 39 automatically closing communication between two passages 8, which, otherwise, would be directly connected through conductors 35 and 36, chambers 33 and 34 and inlet 31.

While we have described and illustrated a structure in which a pipe is sounded when either of two notes is played, one of which corresponds to the pipe and the other being a similar note of a different octave, we contemplate a structure in which the pipe will be sounded when either of two notes, which are not so related to each other and to the pipe, is played. To effect this the conductors 35 and 36 may be connected to such two passages 8 as may be necessary to produce the desired musical effect.

We do not limit our invention to the structure shown and described as we are aware that many modifications of our invention, within the scope of the appended claims, may be made without departing from its spirit.

Having thus described our invention, what we claim and desire to secure by Letters Patent, is:—

1. In a musical instrument, a vacuum chamber, a conductor having an inlet and having two branches communicating with said chamber, two valves respectively controlling said branches, a third valve, and means by which the third valve is movable by air pressure to a position closing one branch from said inlet when the valve controlling the other branch is opened, and movable by air pressure to a position in which both branches will communicate with said inlet when both of said two valves are opened.

2. In a musical instrument, an organ pipe, two devices provided with means for operating two piano action units respectively, means for operating independently said two devices, and means whereby the operation of either of said devices will cause the pipe to be sounded.

3. In a musical instrument, a sounding body, two devices for operating respectively two piano action units, means for independently operating said two devices, and means whereby the operation of either of said devices will cause the body to be sounded.

4. In a musical instrument, a sounding body, two devices for respectively operating two piano action units, a tracker bar having two air passages, means controllable by air passing through said passages for respectively operating said two devices, and means whereby the operation of either of said devices will cause the body to be sounded.

5. In a musical instrument, a sounding body, two devices for respectively operating two piano action units, means controllable by a music sheet for independently operating said two devices, ar l means whereby the operation of either of said devices will cause the body to be sounded.

6. In a musical instrument, a vacuum chamber, a tracker bar having two air passages, a sounding body, two pneumatics for respectively operating two piano action units, means actuated by the air passing through said two passages for independently placing said pneumatics into communication with said chamber, and means whereby when either of said pneumatics is in communication with said chamber the body will be sounded.

7. In a musical instrument, a vacuum chamber, a tracker bar having two air passages, a sounding body, two pneumatics for respectively operating two piano action units, means actuated by air passing through said two passages for independently placing said pneumatics into communication with said chamber, a third pneumatic, means actuated by said third pneumatic for controlling the sounding of said body, and means for placing the third pneumatic into communication with said vacuum chamber when either of the said two pneumatics is operated.

8. In a musical instrument, a vacuum chamber, three pneumatics, a tracker bar, means controlled by the tracker bar for independently connecting two of the pneumatics with the vacuum chamber, and means for connecting the other pneumatic with the vacuum chamber when either of the other two pneumatics is connected with said chamber.

In testimony whereof we have signed our names to this specification in presence of two subscribing witnesses.

FREDERICK W. WOOD.
EDWARD D. CARNEY.

Witnesses for Frederick W. Wood:
E. B. House,
Warren D. House.

Witnesses for Edward D. Carney:
Anna Eva Leitl,
J. C. Bridgewater.