

1,064,575.

Fig. 1.

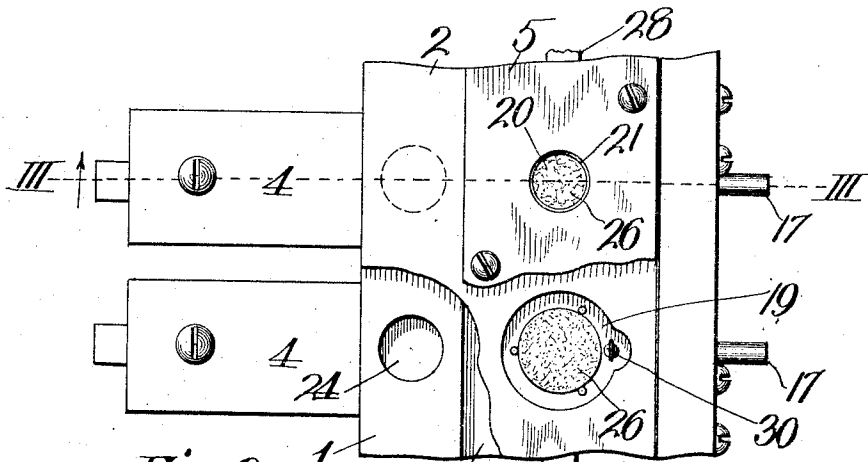


Fig. 2.

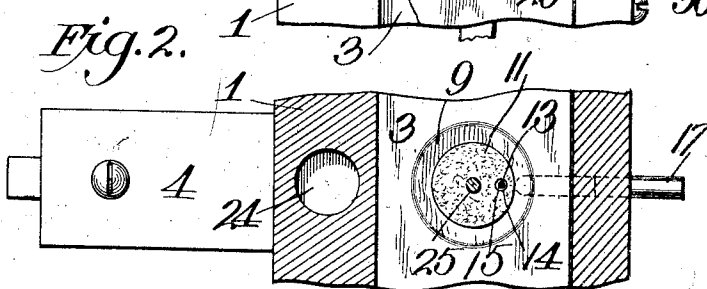


Fig. 3.

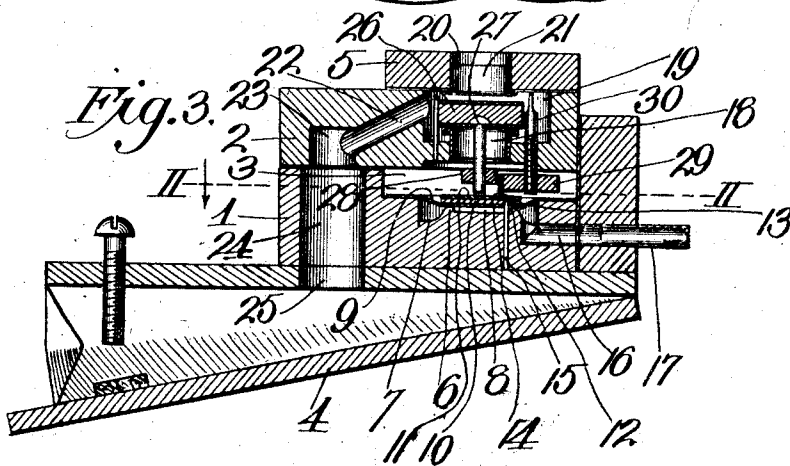
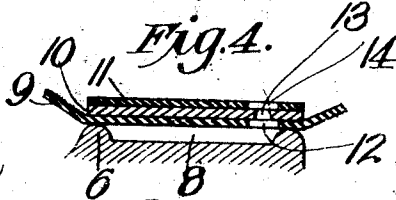


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM T. WAITE, OF KANSAS CITY, MISSOURI, ASSIGNOR OF ONE-THIRD TO S. M. HENLEY AND ONE-THIRD TO A. STEINMETZ, OF KANSAS CITY, MISSOURI.

PIANO-PLAYER MECHANISM.

1,064,575.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed August 29, 1912. Serial No. 717,743.

To all whom it may concern:

Be it known that I, WILLIAM T. WAITE, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Piano-Player Mechanism, of which the following is a specification.

This invention relates to piano-player mechanisms, and has for its object to produce a mechanism of such character that but little foot power is required to effect the operation of the pedals, so that a child may easily operate the same irrespective of the character of the music being produced.

Specifically the object is to provide means for preventing leakage of air through the tracker bar into the vacuum chamber when one or more holes of the former are uncovered by registration therewith of one or more perforations of the note sheet passing over the tracker bar.

More specifically, the object is to produce a valve for closing each vent or bleed opening when the associated diaphragm is raised for the purpose of causing another valve to close communication between the atmosphere and a hammer-operating pneumatic whereby the collapse of the pneumatic is effected to cause the hammer to effect the operation of the associated key of the piano; said first-named valve holding said bleed opening closed until the other valve starts to return the diaphragm to its original or normal position.

With these objects in view, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed, and in order that it may be clearly understood, reference is to be had to the accompanying drawing, in which:—

Figure 1, is a top plan view of the vacuum chest and hammer-operating pneumatics of a piano-player mechanism, the said chest being broken away to expose the adjusting screw of a valve whereby the bleed-hole of the underlying diaphragm is closed to prevent the passage of air through the tracker bar to the vacuum chamber. Fig. 2, is a horizontal section taken on the line II—II of Fig. 3. Fig. 3, is a vertical section taken on the line III—III of Fig. 1. Fig. 4, is an enlarged section of the diaphragm taken in the same plane as in Fig. 3.

Referring to the drawing, 1 indicates the lower part, and 2 the upper part of the vacuum chest, and 3 is the vacuum chamber thereof, and underlying the vacuum chest is a series of hammer-operating pneumatics 4, and overlying the vacuum chest is the usual cap-bar 5.

The lower part of the vacuum chest is provided with a series of chambers, each divided by a circular up-standing wall 6, into an outer compartment 7 and an inner compartment 8, and each of said chambers is bridged by the customary flexible diaphragm 9, which normally rests upon said wall and closes communication between said compartments. Secured centrally upon each diaphragm 9, are superposed disks 10 and 11, of hard and soft material respectively, and said diaphragm and disks are provided with registering holes 12, 13 and 14, communicating with the compartments and constituting a vent or bleed-hole, the holes 12 and 14 being preferably larger than hole 13, in order that lint, which may be drawn up through said bleed-hole, shall be less liable to clog the same than if the holes in the soft or flexible material were the same size as the hole in the hard disk, it being understood that these disks 10 and 11, are to stiffen the diaphragm at its center for the purpose of positively raising a valve above it, hereinafter identified, and for incidentally preventing noise as the diaphragm strikes and raises the said overlying valve, and for closing said bleed-hole in the diaphragm when the same is depressed, as shown, a pin 15 is secured in the part 1 of the chest and projects upwardly therefrom.

16 is an air duct connecting each outer compartment 7 with a short metal tube 17, connected in the usual manner by a flexible tube, not shown, to one of the perforations in the tracker bar, not shown, over which the note sheet travels.

Vertically above the center of each diaphragm 9, is a short tube 18, which projects into a chamber 19 in the upper part of the vacuum chest, and chambers 19 are bridged by the cap-bar 5, provided with openings establishing communication between chambers 19 and the atmosphere, and secured in openings 20 are tubes 21. The upper part 2 of the vacuum chest is provided with a passage 22 leading from each cham-

ber 19 to a recess 23 in the bottom of said part, and each recess 23 communicates through an opening 24 in the lower part of the vacuum chest, and an opening 25 in the upper part of the pneumatic 4, with the interior of the latter.

26 are valves located in chamber 19 between the adjacent ends of tubes 18 and 21, and normally resting upon and closing the upper ends of the former, and said valves are provided with stems 27, depending vertically through tubes 18 and slidingly through a guide-bar 28 extending longitudinally of the vacuum chest and secured to the underside of the part 2 thereof, the lower ends of said stems 27 terminating just above the disks of the diaphragm, so that the raising of a diaphragm shall cause it to instantly engage the overlying stem 27 and raise the valve thereof until it engages the lower end of the overlying tube 21 and closes communication between the atmosphere and the chamber 19, the raising of said valve incidentally opening communication between said chamber 19 and the vacuum chamber 3 and consequently between the latter and the associated pneumatic 4, whereby the collapse of the latter is effected.

As thus far described, the construction is identical in all essentials with the piano-player mechanism upon which U. S. Letters Patent No. 1028163, was issued to me as inventor, and S. M. Henley of Kansas City, Missouri, as assignee of one-half interest, on June 4, 1912, which construction, like all piano-player mechanisms, as far as I am aware, is objectionable because when a particular diaphragm is elevated, there is a constant flow of air through the connected tracker bar opening and the bleed-hole of the said diaphragm, into the vacuum chamber, which flow of air through a number of the tracker bar perforations at the same time, as is commonly the case, makes it more difficult to maintain the vacuum in chamber 3 and increases the labor of operating the pedals to an appreciable degree.

As hereinbefore stated the chief object of this invention is to guard against this flow of air into the vacuum chamber for the purpose of enabling the operator to manipulate the pedals with greater ease and facility, and in accomplishing this purpose, I arrange in the vacuum chamber 3, a series of valves 29, one vertically above the bleed-opening of each diaphragm, each of these bleed-opening controlling valves, being so positioned that the underlying diaphragm will engage it immediately after striking the stem of the contiguous valve 26. Any suitable means may be employed for supporting each valve 29, my preferred means being a vertically-arranged screw 30 adjustable in the part 2 of the vacuum chest,

and projecting upward into a chamber 19, where it is inaccessible when the cap-bar 5 is in place.

Assuming that the parts of the mechanism are in the positions shown in Fig. 3, and that a perforation of the note sheet registers with the opening in the tracker bar in communication with the outer compartment 7, it will be apparent that the pull of the vacuum in chamber 3, will instantly raise the diaphragm, and produce the collapse of the pneumatic 4 in the customary manner, by causing valve 26 to close communication between the atmosphere and chamber 19. As the diaphragm moves upward, it opens communication between compartments 7 and 8 to permit the air entering the tracker bar to vent up through the bleed-opening into the vacuum chamber 3 as common in this class of mechanism, and as explained particularly in my aforesaid patent. This venting action is arrested as the valve 26 closes communication between the atmosphere and chamber 19, by the engagement of the diaphragm with valve 29, and the diaphragm remains elevated and with its bleed-opening closed by valve 29, until the note sheet in its travel, closes the tracker bar opening. As this occurs, atmospheric pressure on valve 26 depresses the same and thereby effects the reestablishment of communication between the atmosphere and the pneumatic to reexpand the latter, and at the same time closes communication between the pneumatic and the vacuum chamber, it being noted that in the descent of the valve, its stem engages and depresses the underlying diaphragm and that before the diaphragm is fully depressed the pull of the vacuum in chamber 3, effects the venting of the air confined or pocketed between the closed tracker bar opening and the diaphragm, up through the bleed-opening of the latter, the said opening being closed by the pin 15 as the diaphragm engages wall 6 and thereby closes communication between compartments 7 and 8. It will thus be seen that during the major portion of the period while a note sheet opening remains in communication with the tracker bar opening, communication between the vacuum chamber and the tracker bar opening is closed, and that consequently there is no flow of air into the vacuum chamber to make the operation of the pedals unnecessarily laborious.

From the above description, it will be apparent that I have produced a piano-player mechanism embodying the features of advantage enumerated as desirable in the statement of the object of the invention and which may be changed in minor particulars without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a piano-player mechanism, a vacuum chest having a vacuum chamber, an air duct, a diaphragm separating the vacuum chamber from the air duct, and provided with a vent or bleed-opening therethrough whereby air may vent into the vacuum chamber, and a valve for closing said vent or bleed-opening when the diaphragm has been raised through the pull of the vacuum in said vacuum chamber.

2. In a piano-player mechanism, a vacuum chest having a vacuum chamber, an air duct, a diaphragm separating the vacuum chamber from the air duct, and a vent or bleed-opening whereby air may vent into the vacuum chamber, a valve for closing said vent or bleed-opening when the diaphragm has been raised through the pull of the vacuum in said vacuum chamber, and means for closing said vent or bleed-opening when the diaphragm is in normal or depressed position.

3. In a piano-player mechanism, a vacuum chest, an air duct leading thereto, a movable diaphragm between the interior of the chest and the air duct, said diaphragm provided with a bleed opening, and means acting to close said bleed-opening each time the diaphragm is moved.

4. In a piano-player mechanism, a vacuum chest, an air duct leading thereto, a diaphragm between the interior of the chest and the air duct, provided with a bleed-opening, a valve adapted to close said bleed-opening each time the diaphragm is raised, and adjustable means carrying said valve whereby the latter may be positioned to close said bleed-opening at the proper time.

5. In a piano-player mechanism, a vacuum chest, an air duct leading thereto, a diaphragm between the interior of the chest and the air duct, provided with a bleed-opening, and an adjustably supported valve adapted to close said bleed opening at intervals.

6. In a piano-player mechanism, a vacuum chest, an air duct leading thereto, a diaphragm between the interior of the chest and the air duct, provided with a bleed-opening, a valve within the chest adapted to close said bleed-opening at intervals, and a screw mounted in the chest and carrying said valve.

7. In a piano-player mechanism, a vacuum chest, having a vacuum chamber, an air duct,

a chamber above and communicating with the vacuum chamber, a cap-bar bridging said chamber and provided with an opening above the point of communication of the vacuum chamber with the other chamber, a valve normally closing the said point of communication between the vacuum chamber and the said other chamber, a pneumatic in communication with the said other chamber, a diaphragm under said valve and separating the vacuum chamber from the air duct, and provided with a bleed-opening, and a valve in the vacuum chamber above the bleed opening of the diaphragm.

8. In a piano-player mechanism, a vacuum chest, having a vacuum chamber, an air duct, a chamber above and communicating with the vacuum chamber, a cap-bar bridging said chamber and provided with an opening above the point of communication of the vacuum chamber with the other chamber, a valve normally closing the said point of communication between the vacuum chamber and the said other chamber, a pneumatic in communication with the said other chamber, a diaphragm under said valve and separating the vacuum chamber from the air duct, and provided with a bleed-opening, a valve in the vacuum chamber above the bleed-opening of the diaphragm, and a screw mounted in the vacuum chest and extending from the vacuum chamber thereof to said other chamber and carrying said last-named valve at its lower end.

9. In a piano-player mechanism, a vacuum chest provided with a vacuum chamber and chambers at opposite sides of the vacuum chamber, one of said opposite chambers being provided with a circular wall projecting toward the vacuum chamber, a valve in the other of said opposite chambers and normally closing communication between the same and the vacuum chamber, a diaphragm between the vacuum chamber and the chamber provided with the wall and normally resting upon said wall and provided with a bleed-opening, and a valve above the bleed-opening of the diaphragm and adapted to close the same when the diaphragm is raised.

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

WILLIAM T. WAITE.

Witnesses:

FRANK R. GLORE,
G. Y. THORPE.