W. R. CRIPPEN.

PLAYER PIANO MECHANISM.

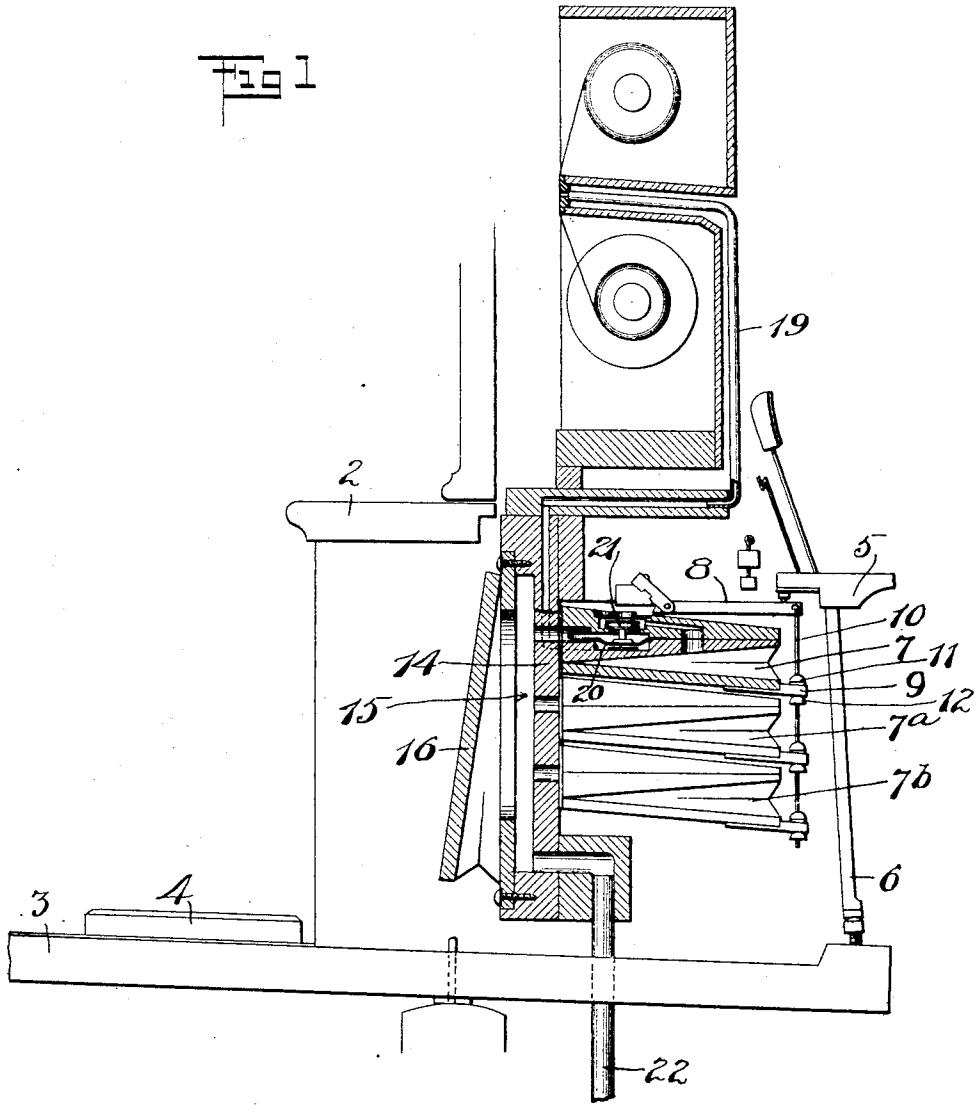
APPLICATION FILED DEC. 18, 1915.

1,182,981.

Patented May 16, 1916.

2 SHEETS—SHEET 1.

Fig 1



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2 SHEETS—SHEET 2.

Fig 2

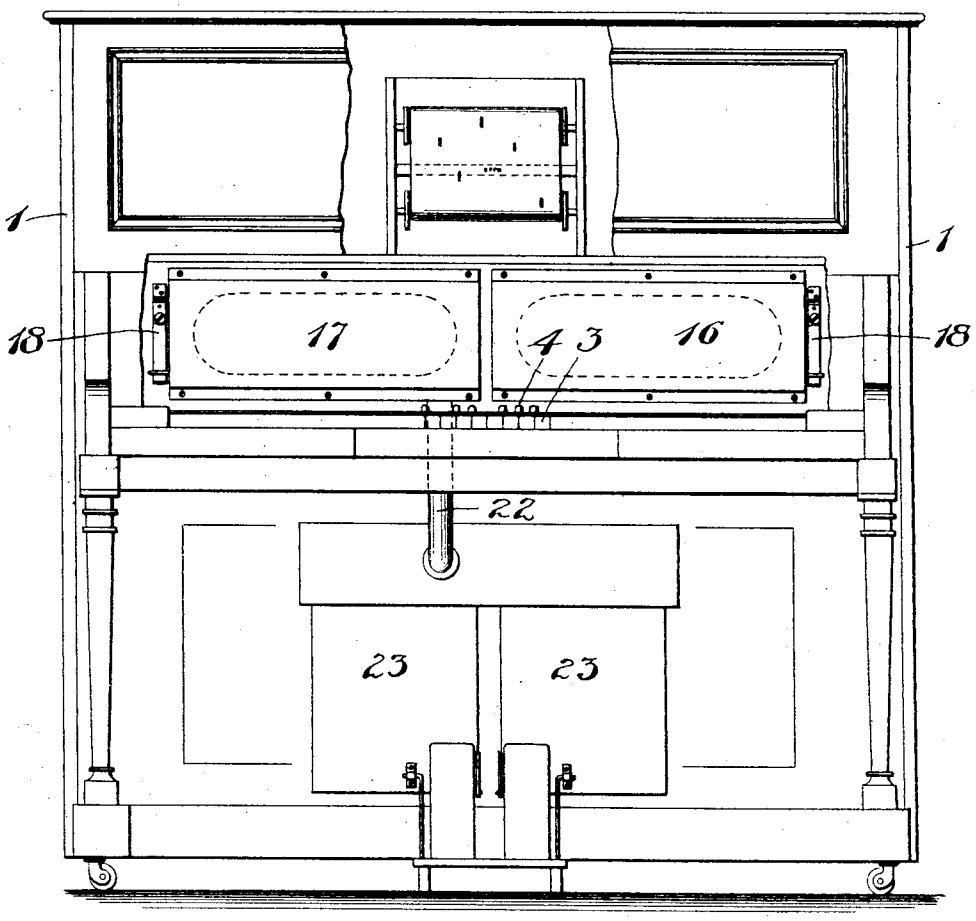
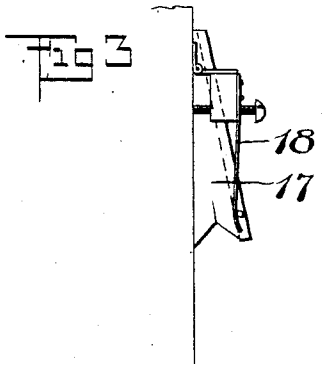


Fig 3



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UNITED STATES PATENT OFFICE.

WALTER R. CRIPPEN, OF NEW YORK, N. Y.

PLAYER-PIANO MECHANISM.

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To all whom it may concern:

Be it known that I, WALTER R. CRIPPEN, a citizen of the United States of America, residing at New York city, New York, have invented a new and useful Player-Piano Mechanism, of which the following is a specification.

My invention relates to improvements in player piano mechanism.

Among the main objects of the invention are simplicity of construction, ease and accessibility of parts, compactness and an increased sensitiveness of operation.

In the present instance I am able to do away with the ordinary so-called "storage reservoir" or "equalizing reservoir," substituting in lieu thereof means which serves the same purpose, and which further performs the function of tempering the action of the striker pneumatics, so as to permit the highest degree of artistic rendition of music.

My invention will be best understood from a reading of the following description, and an examination of the accompanying drawings, in which:

Figure 1 is, in the main, a sectional view of part of a player piano and player piano action, constructed to embody my invention. Fig. 2 is a front elevation of a piano partly broken away to show my invention.

My invention is applicable to either upright or grand pianos, but for convenience sake, I have shown the same in this particular instance associated with a piano of the upright type.

In the drawings, 1—1 represent the sides of a piano case.

2 represents the usual shelf under which is located the usual fall board arranged to cover the keys.

3—4 are the usual keys for manual operation, whereby the piano may be operated in the usual manner by hand. I have not deemed it necessary to show herein the strings and hammers, but I have shown a portion of the hammer action at 5, the same being the outer end of the so-called wippen.

6 represents an abstract.

7—7^a and 7^b are striker pneumatics. In this instance, the striker pneumatics are preferably arranged in banks of three, extending across the front of the piano above the keys and to the rear of the fall board (not shown). In the drawings, the striker pneumatic 7 is designed to coöperate with the particular wippen shown at 5. This cooperation is effected in any well known manner, as by a pivoted finger 8, connected at its free end with a lug 9 on the movable backboard of the striker pneumatic 7. This connection is effected by means of a rod 10 which may have the usual adjusting buttons 11—12 thereon. The balance of the striker pneumatics, two of which are indicated at 7^a—7^b, are connected in a similar manner with their respective wippen engaging fingers.

From the foregoing, it will be observed that the collapse of any one of the striker pneumatics will operate the hammer action by lifting the wippen element thereof. The striker pneumatics 7—7^a—7^b, are mounted upon what I may term a channel board or fixed back 14 of an action chest. The action chest is the means with which the striker pneumatics are directly associated, and the tension of air in said chest determines the effective striking power of the striker pneumatics when the interior of the striker pneumatics is put in communication with the interior of the action chest. In this particular instance, one side wall of the action chest is fixed or rigid while the opposite side wall is movable. In fact, in the preferred form, the opposite side wall includes two movable backboards 16—17 of relatively large pneumatics or bellows, each of which is normally distended by means of a suitable adjustable spring 18. One of these springs is preferably adjusted to apply a greater expanding force to its back board than the other, for the purpose hereinafter described.

It will be observed that the interior of the last mentioned bellows is in direct and immediate communication with the channel board 14, upon which the pneumatics are mounted. Indeed, it may be said that the action chest is formed with one movable side or wall. The action pneumatics 7—7^a—7^b, are of course, normally expanded, as shown, and may be collapsed in the usual manner and by the usual means. The moment of collapse of the striker pneumatics is controlled from a tracker board by a perforated note-sheet in the usual way. When a note perforation is uncovered, air is admitted through a duct 19 into a pouch pneumatic 20, which reverses a valve 21 which normally stands in a position to cut off com-

munication from the interior of the action chest to the interior of its respective striker pneumatic, and at the same time permits air, at atmosphere, to enter said striker pneumatic, all as shown in section in Fig. 1. The admission of air under the pouch pneumatic 20 and the reversing of the valve 21 shuts off the passage to atmosphere and puts the pneumatic 7 in direct communication with the vacuum in the aforesaid action chest, so that the striker pneumatic 7 will be collapsed. The vacuum in the action chest may be effected by any suitable exhauster, such as the usual foot pedal operated bellows, indicated conventionally at 23—23.

22 represents the exhaust pipe which leads from the action chest down to the trunk of the pedal operated bellows or exhauster means.

When air is exhausted from the action chest, it causes the movable wall or walls thereof to collapse to a greater or less extent against the tension of the springs 18. The moment one of the striker pneumatics is put in communication with the space within the action chest, it will be collapsed with a force determined by the degree of vacuum within said action chest. I have found that by providing the action chest, which is in immediate and direct communication with the striker pneumatics, with a movable side or wall, such as shown and described, said collapse of the strikers will be most advantageously effected by reason of the very close proximity of the collapsible and expansible action chest thereto. In this connnection, and at this time, I may state that while an action chest of this improved and novel construction will guarantee the exceeding sensitiveness of operation of the action pneumatics required for the highest degree of musical interpretation, the said collapsible action chest will also absorb the fluctuations or pulsations of the feeder bellows thereby performing in addition to its main function the added function required of a storage reservoir, thus obviating the necessity of a separate equalizer. Heretofore it has been common to employ an action chest with rigid walls and to employ an equalizer or a storage bellows in close proximity to the two foot operated feeder bellows. In such cases, the storage reservoir is connected by a long pipe to the action chest having rigid walls. By this old arrangement, the storage reservoir is so far removed from the action pneumatics that it cannot effectively operate to control the operation of the striker pneumatics. By my arrangement, however, the striker pneumatics are placed under the most delicate control at all times. I prefer to employ a plurality of back boards such as indicated at 16—17 for the yielding side wall of the action chest, there being several advantages attained, for example, I am thereby enabled to use a lighter board, which by reason of its lightness will more readily respond to slight variations in tension. Again, by using a plurality of such boards, I am enabled to adjust one so that it will respond more readily to low tension, whereas the other may be controlled by a stiffer spring to take care of the higher tensions. Again, by employing a plurality of boards, I am enabled to cut down the degree of movement required of such boards because it is obvious that with a single board it would have to have a relatively greater motion to take care of both high and low tension conditions, whereas by having a plurality of such boards of comparatively short stroke or movement, the one adjusted to the lower tensions will operate chiefly during the period when low tension is on, while the other will operate chiefly when higher tension is on. Of course, it will be understood in actual operation that the pulsations may be felt at the same time on both of the back boards, even though one may be weaker than the other, owing to the difference in tension. By this arrangement, I am enabled to make the action chest more compact than otherwise would be possible, which, in many instances, is highly desirable.

In the specific arrangement shown in the drawings it will be observed that the equalizer means is so associated with the action chest that the assembled device may be properly termed a combined unitary expansible equalizer action chest. That is to say, when constructed substantially as shown in the drawings, the action chest and equalizer are in effect one structural unit, my object being to so closely associate the equalizer with the action chest and the striker pneumatics that friction is reduced to a minimum, whereby, among other advantages, exceedingly compact and light equalizing means may be employed successfully. Obviously I contemplate that modifications may be made without departing from the spirit and scope of my invention.

What I claim is:

1. In a player piano, an action chest having one collapsible wall, with means for normally distending the same, a plurality of action pneumatics in direct communication with the interior of said action chest, with note sheet controlled valves for putting said pneumatics in communication with the interior of said action chest at will, with means for exhausting air from said action chest.

2. In a player piano, an action chest comprising one non-movable wall with a relatively large bellows having a backboard constituting a movable wall for said action chest, means for normally expanding said bellows, a series of striker pneumatics in direct communication with the interior of said

action chest with pneumatically controlled valves for opening and closing the line of communication from said striker pneumatics to said action chest, with exhauster means in communication with the interior of said action chest.

3. In a player piano, a pneumatic action including an expansible action chest, one wall of said chest being relatively stationary, another wall being relatively movable to vary the internal volume of the space within said chest, an exhauster tending to collapse said chest and means normally tending to expand said chest against the action of the exhauster, a plurality of striker pneumatics carried on the relatively stationary wall of said chest, the interior of said pneumatics being in communication with the interior of said chest, valves to open and close the communicating passages between said striker pneumatics and said chest.

4. In a player piano, a plurality of striker pneumatics, means for exhausting air therefrom, an expansible and collapsible action chest adjacent the said pneumatics and between the same and the means for exhausting air, and means for opening and closing communication between the action chest and said pneumatics.

5. In a player piano, an exhauster, a pneumatic action mechanism including an expansible and collapsible action chest, striker pneumatics pneumatically connected therewith and means to open and close the pneumatic connection between the interior of said action chest and said pneumatics.

6. In a player piano, a pneumatic action mechanism including an action chest, having two separately movable wall portions connected substantially air-tight with said chest, with means normally tending to move each of said walls yieldingly in a direction to expand the chamber of said chest.

7. In a player piano, a pneumatic action mechanism including an action chest having two separately movable wall portions connected substantially air-tight with said chest, with means normally tending to move each of said walls yieldingly in a direction to expand the chamber of said chest, said means being adjustable whereby different degrees of adjustment may be effected.

8. In a player piano, a pneumatic action mechanism including an action chest having two separately movable wall portions, and separate means for normally holding said portions in position, one of said means affording greater resistance to movement than the other of said means.

9. In a player piano, a plurality of striker pneumatics, an action chest in direct connection with a plurality of said pneumatics, said chest having a plurality of independently movable wall portions, exhauster means in communication with the interior of said action chest and means for opening and closing communication between said action chest and said pneumatics.

10. In a player instrument, a channel board, a plurality of striker pneumatics mounted on one face of said channel board, a movable member connected to the opposite face of said channel board and constituting in conjunction with the channel board an expansible and collapsible action chest, exhauster means in communication with the interior of said action chest and means for opening and closing communication between said action chest and said pneumatics.

11. In a player piano, a combined unitary expansible equalizer action chest, striker pneumatics associated therewith, valves therefor, an exhauster in communication with said chest.

12. In a pneumatic player piano apparatus, a key board, an exhauster means below said keyboard, a plurality of striker pneumatics above said keyboard, and means including an action chest and equalizing mechanism above said key board.

13. In a pneumatic player apparatus, a keyboard, an exhauster means, a plurality of striker pneumatics above said key board and means including a unitary expansible equalizer action chest also above said key board and adjacent to said striker pneumatics.

WALTER R. CRIPPEN.