

(No Model.)

2 Sheets—Sheet 1.

A. H. HAMMOND.
MECHANICAL MUSICAL INSTRUMENT.

No. 254,645.

Patented Mar. 7, 1882.

Fig 2.

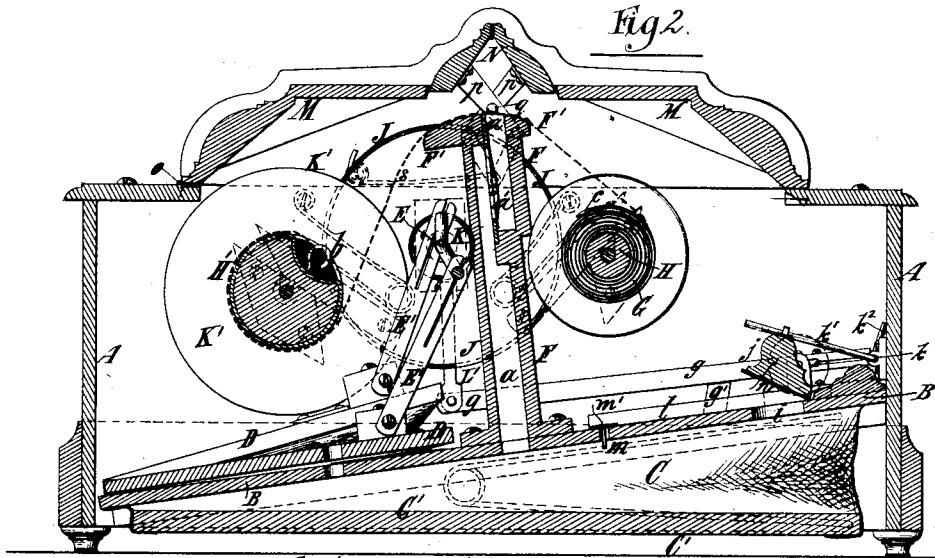
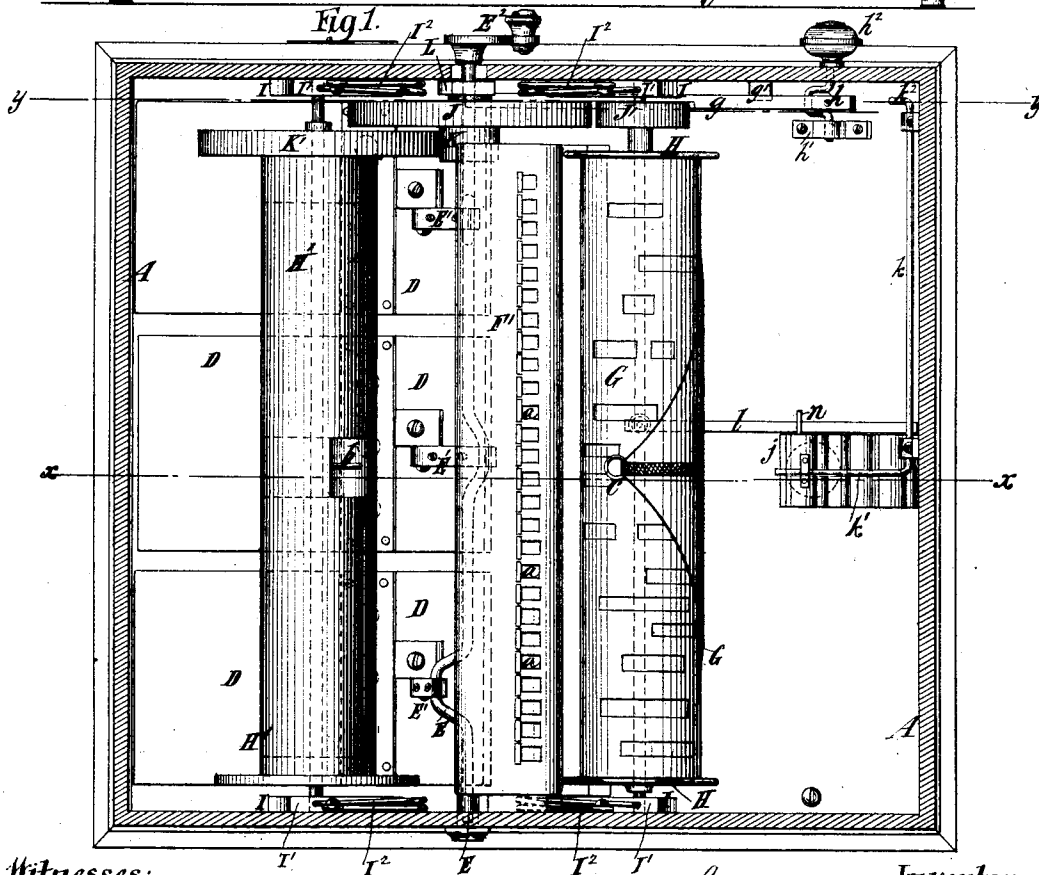


Fig 1.



Witnesses:

James R. Bowen.

Inventor:—

Andrew H. Hammond
By his Atty.
Edwin H. Brown

(No Model.)

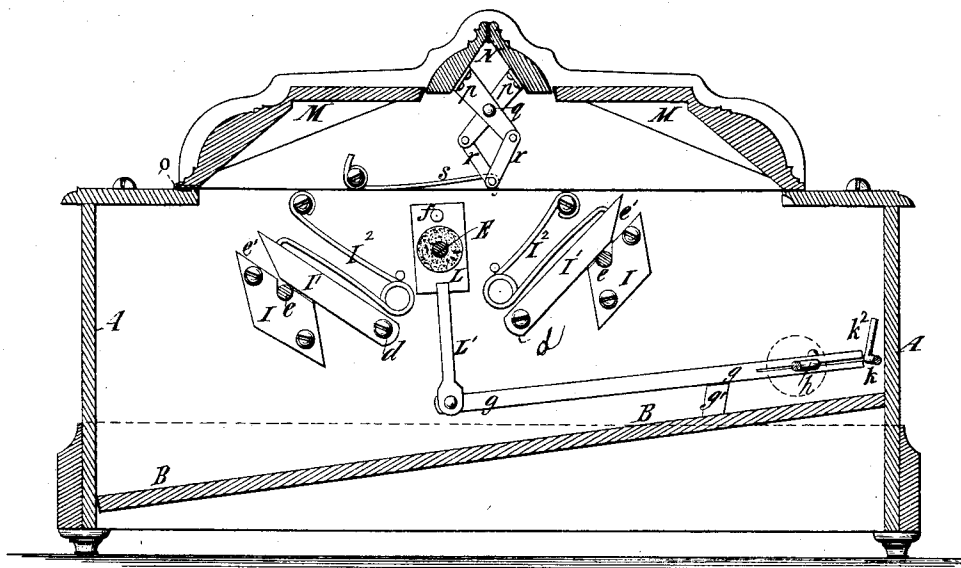
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Fig. 3.



Witnesses:-

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UNITED STATES PATENT OFFICE.

ANDREW H. HAMMOND, OF WORCESTER, MASSACHUSETTS.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 254,645, dated March 7, 1882.

Application filed September 8, 1881. (No model.)

To all whom it may concern:

Be it known that I, ANDREW H. HAMMOND, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification.

While my invention is applicable generally to musical instruments in which the operation of the sound-producing devices is controlled by a traveling music card, tablet, or sheet, certain features of the invention are particularly useful in instruments in which a perforated music-sheet is wound upon a music-roller preparatory to playing, and in the act of playing is drawn therefrom over a reed-board, the top of which constitutes a rest, and is wound upon a take-up roller.

My invention consists of the combination, in a mechanical musical instrument adapted to be operated by a traveling music-sheet, with a roller around which the sheet is wound or passes, and a driving-shaft for imparting motion thereto, of a rest for said music sheet overhanging said shaft and keeping the sheet out of contact with the shaft or its connections.

The invention also consists of the combination, in a mechanical musical instrument, with a music-roller and a take-up roller, of a driving-shaft arranged between them, a bearing-block for one end of said shaft fulcrumed or pivoted above or at one side of said shaft, and mechanism connected with said bearing-block below or at an opposite side of said shaft, for moving said block toward either roller to cause the shaft to engage therewith and simultaneously free the other roller from said shaft.

The invention also consists of the combination, in a mechanical musical instrument, of music and take-up rollers, a driving-shaft arranged between them, a bearing for said shaft capable of adjustment to cause said shaft to impart motion to one of said rollers and simultaneously release the other, an arm and means for actuating said arm to adjust said bearing, and at the same time put such a tension on the arm as to cause it to exert a spring force, whereby it holds said shaft with a yielding pressure in position to transmit the desired motion. This bearing-block has preferably a spring-arm or tail-piece, to which the mechanism for oper-

ating it is connected, so as to enable wheels upon the driving-shaft to be pressed against the said rollers or wheels thereon with an elastic or yielding pressure sufficient to enable it to transmit motion to them.

The invention also consists of the combination, in a mechanical musical instrument, with music and take-up rollers and a driving-shaft between them, of a crank connected with the bearing-block supporting one end of said shaft, whereby provision is afforded for moving the shaft in either direction to cause it to impart motion to either roller and for holding it in such position by simply bringing the crank on or slightly past its center. The crank is preferably connected by a rod with the spring-arm or tail-piece of the bearing-block before described.

The invention also consists in the combination, in a wind musical instrument to be operated by a traveling music-sheet, of a wind-chest or receiver, a relief-valve therefor, a rock-shaft provided with two arms, to one of which said valve is connected, and means for acting on the other arm to raise the valve, whereby an equilibrium of pressure within and without the receiver is established, and discordant sounds produced by the passage of air through the reeds during the rewinding of the music-sheet after playing are prevented.

The invention also consists in the combination, in a wind musical instrument, with an expandible wind-chest or receiver, of a valve and means deriving motion from the movable board of the wind-chest or receiver, and serving to impart to the valve a slower and more gradual motion than it would have if operated on directly by the movable board, whereby the wind chest or receiver is prevented from being exhausted of air or from having the pressure of air therein increased to such a degree as to overwork the sound-producing devices and impair their action. The means for operating the valve preferably consists of a lever extending beyond the valve, and provided with a pin projecting into the wind-chest or receiver through the fixed board, and adapted to be operated on by the movable board to slowly and gradually open said valve in exact proportion to the requirements of the music being played.

In the accompanying drawings, Figure 1 rep-

resents a plan view of an instrument embodying my invention, the top and the upper portion of the body of the case being removed. Fig. 2 represents a vertical section on the dotted line *x x*, Fig. 1; and Fig. 3 represents a similar section upon the dotted line *y y*, Fig. 1.

Similar letters of reference designate corresponding parts in all the figures.

A designates the body of the case of the instrument, and B designates a partition near the bottom thereof, and inclined from one side to the other of the case. Below the partition B is an expansible wind-chest or receiver, C, which comprises a movable board, C', and is exhausted of air by bellows D. The wind-chest or receiver C and bellows, though here constructed upon the exhaust principle, might be constructed to operate to produce air under pressure, the other parts of the instrument being modified accordingly. Three bellows, D, are here shown; and E designates a cranked driving-shaft, which operates the bellows through pitman or connecting rods E'. The cranks of the shaft E are set at different points, and therefore serve to operate the bellows successively and produce a nearly-uniform tension of air within the wind-chest or receiver. The shaft E is provided outside the case A with a hand-crank, E², whereby it may be turned.

F designates a reed-board erected upon the partition B, and projecting upward therefrom at an angle to the perpendicular and toward the shaft E. This reed-board is constructed with reed cells or ducts *a*, in which are reeds *a'*, and which are all in free communication with the wind-chest C. The reed cells or ducts extend through the upper surface of the reed-board F, and said upper surface is convex or rounded, so as to form a rest, F', for the perforated music-sheet G, whereby the operation of the reeds is controlled. The music-sheet G, before playing, is wound or rolled upon a music-roller, H, and in the act of playing is drawn therefrom over the rest F' and wound upon a take-up roller, H', to which its end may be attached by a hook, *b*, in the roller H', and an eye, *c*, upon the sheet. The course of the music-sheet is indicated by a dotted line in Fig. 2. The rest F' is made to extend considerably beyond that side of the reed-board which is nearest the driving-shaft E, and it thus is made to overhang the said shaft, so that it will prevent the music-sheet from coming in contact with the said shaft or its connections.

One end of the music-sheet G is permanently attached in any suitable manner to the music-roller H, and when it is desired to change the piece of music the roller itself is taken from its bearings and another substituted. In order to facilitate the removal and insertion of the roller I provide bearings therefor of peculiar construction. (Shown best in Fig. 3.)

Although the take-up roller H' is not necessarily so often removed from its bearings, I have shown its bearings as constructed like those of the music-roller H. Each bearing is

composed of a fixed block, I, secured to the case A, and a movable cap, I', pivoted at *d*, and held upon the block I by means of a spring, I². In the edge of the blocks I are formed notches or recesses *e*, which receive the journals, and in which the journals are retained by the pivoted caps I'. The opposite faces of the blocks and caps diverge, as at *e'*, beyond the notches *e*, thus enabling a roller to be placed with its journals resting between such diverging portions, and then inserted in the notches by simply pushing it down or into them, the caps I' being forced away from the blocks I by the pressure exerted upon them by the journals of the roller, and, after the entrance of the journals into the notches, returning to hold the journals in the said notches. The caps I' bear directly on the journals of the roller and exert a friction thereon, which will prevent the rollers from moving too rapidly, or from moving at all when they are not desired to move. When the roller is to be removed it may be readily done by pulling it outward with a little force, and hence it will be seen that the roller may be either inserted in the instrument or removed therefrom without the necessity of any manipulation of the bearings by the hands. The music-sheet G is drawn forward to effect the playing of the instrument by a positive rotation of the take-up roller H', the music-roller H being free to rotate as the sheet is unwound therefrom. After playing, the music-sheet is rewound or rerolled by imparting a positive rotation to the music-roller H, the take-up roller H' being free to rotate as the sheet is drawn from it.

Upon the driving or crank shaft E are large and small wheels J K, and upon the shaft of the music-roller H is a wheel, J', which ranges with the large wheel J, and upon the shaft of the take-up roller H' is a wheel, K', which ranges with the small wheel K. The end of the shaft E, upon which are the wheels J K, passes through a slot or elongated hole in the case A, thus permitting the said end of the shaft to be shifted laterally a slight distance in either direction. If the shaft E be shifted toward the take-up roller H', as seen in Fig. 1, the wheel K is brought into contact with the larger wheel K' upon the take-up roller, and a slow motion for playing is imparted thereto; but if moved in the opposite direction the wheel K is removed from the wheel K', and the large wheel J is brought into contact with the wheel J' upon the music-roller, thus rotating the latter at a rapid speed for rewinding. The arrangement of these wheels is clearly shown in Fig. 1, and in order to increase their effectiveness certain of the wheels might be covered with rubber.

The shaft E is journaled adjacent to the wheels in a bearing-block, L, which is fulcrumed at *f*, as seen in Fig. 3, above the shaft, and is provided with a downwardly-projecting arm or tail-piece, L', by which it may be swung or moved in either direction.

To the arm or tail-piece L' is connected one end of a pitman or connecting rod, g , the other end of which is connected to a crank, h , which may be turned to impart longitudinal movement to the rod g , and thus effect the swinging of the bearing-block L . The journals of the crank h are fitted in suitable bearings in the side of the case A and in a block, h' , and one of its journals projects through the case, and is provided with a knob, crank, or hand-piece, h^2 , whereby it may be turned. By turning the crank h a half-revolution the shaft E may be moved into such position that when rotated it will impart motion to either the music-roller or the take-up roller, and when said crank is in either position the rod g and crank will be on or slightly past the dead-center, and therefore will hold the shaft E rigidly in either position to which it may be adjusted.

Upon the side of the case or top of the partition B , below the rod g , is a block, g' , forming a stop upon which the rod g will bear when the crank h is turned in either direction, and prevent its being turned any considerable distance past the dead-center. The tail-piece or arm L' may be made of wood or other suitable material, and is preferably thin, so as to be slightly elastic. The crank h is so combined with the arm or tail-piece that when operated it serves to pull or push the lower end of the arm or tail-piece farther than is necessary to bring the wheel J into contact with the wheel J' , or the wheel K into contact with the wheel K' . Hence in either case the arm or tail-piece is deflected and made to constitute a spring. The wheels J and K are therefore held with a yielding pressure against their fellows, and a good frictional contact is maintained between them.

The swinging bearing-block L , with its elastic arm or tail-piece L' , might be employed in connection with other mechanism than that here shown for adjusting the bearing-block, and the crank h might be combined with other mechanism for operating upon the shaft E .

In the partition B , or top of the wind-chest or receiver C , is an opening, i , which is closed by an outwardly-opening valve, j , hinged at one edge, so that it may be raised to place the receiver or wind-chest in free communication with the atmosphere, as seen clearly in Fig. 2. The opening of the relief-valve j during the re-winding of the music-sheet prevents the reeds from being sounded. The valve j is raised by turning a rock-shaft, k , which has an arm, k' , connected with the valve, and a second arm, k^2 , which is arranged immediately in line with the rod g , as seen in Fig. 1. When the rod g is moved into the position shown in Fig. 2, to effect the rotation of the music-roller H for re-winding the music-sheet, the end of the rod g acts upon the arm k^2 and turns the rock-shaft k , thus effecting the opening of the valve j , and the valve is thus held open during the whole operation of re-winding the music-sheet.

The relief-valve j might be arranged on the

reed-board instead of on the partition B or top of the wind-chest, and operated in a similar manner by a rock-shaft and the rod g . It might in either case be connected with any mechanism employed for actuating the music-roller for re-winding the music-sheet, so as to be automatically opened and held open during re-winding.

It is obvious that the relief-valve may be raised by manipulating its arm k' to uncover the opening i and prevent the instrument from playing any particular piece of music.

The bellows and wind-chest or receiver of musical instruments have heretofore been proportioned to effect the proper operation of the largest number of reeds which are designed to operate simultaneously. Consequently, when a fewer number of reeds are in operation the bellows exhaust air too rapidly from the wind-chest or receiver, and thus subject the reeds to a much stronger current of air than they are designed to bear, throwing them out of tune and impairing their tone. In mechanical or automatic musical instruments wherein the bellows are operated and the music-sheet fed from the same driving-shaft, this shaft has to be kept in operation at a certain speed to feed the music-sheet, and oftentimes results in an operation of the bellows which is far more vigorous than is necessary to cause the speaking of the reeds which the music-sheet at the time permits to operate. Therefore it is especially necessary in this class of instruments that some provision be afforded for equalizing the action of the bellows on the reeds which are in operation, whatever their number may be. To accomplish this result I provide a valve which may be gradually opened more or less whenever the operation of the bellows is more than sufficient to cause the speaking of the reeds permitted at any particular time by the music-sheet to operate. As here shown, the valve j subserves this additional purpose, and is caused to open at the desired times by being operated from the movable board C' of the wind-chest.

I am aware that relief-valves operated by the movable board of a wind-chest have been employed, and hence I do not claim such a valve, broadly. What I desire is a valve that shall operate gradually and slowly, and in exact proportion to the requirements of the music being played. I do not therefore actuate the valve directly by the said movable board of the wind-chest, but by an intermediate device, which will transmit to the valve a slower movement than the valve would derive if operated directly by the said movable board.

The intermediate device here shown consists of a lever, l , which is hinged in place at one end, and at the other end is provided with a pin, m , projecting through a hole in the top of the wind-chest or receiver. A piece of leather or other suitable material, m' , affixed to the under side of the lever l , prevents leakage of air around the pin m , except when the lever is raised, and then leakage is not objec-

tionable. The lever is arranged below a pin, *n*, or projection extending from the valve *j*, and when the movable board *C'* of the wind-chest or receiver is raised by the collapsing of the wind chest sufficiently to bear against the pin *m* the lever *l* will be raised, and, acting upon the pin *n*, will raise the valve *j* and admit air. Thus it will be seen that the valve *j* is made to constitute a means of equalizing the pressure in the wind-chest or receiver.

It will be observed that the lever *l* extends toward the slow-moving portion of the movable board *C'* of the wind-chest, and that it extends a considerable distance past the valve. This is of importance, because then a very slow and gradual motion is imparted to the valve *j* when it is operated and the tension of air in the wind-chest is gradually relieved, and the proper operation of the reeds is secured at all times. If desirable, a separate equalizing-valve might be employed, and the pin *m* might act upon the valve through other mechanism than the lever *l*, having an equivalent effect on the valve.

If the wind-chest or receiver and bellows were pressure instead of exhaust, the movable board *C'* might act upon an equalizing-valve in a different manner from that here shown. For instance, it might serve to draw a valve inward. By the employment of my gradually and slowly opening valve the tension of air is always graduated to suit the number of reeds in operation, and the tension is relieved so gradually as not to effect undesirable results. When a relief-valve is raised by the direct action of the movable board of the wind-chest the relief afforded is very sudden, and, besides being objectionable in regard to the action produced on the reeds, so suddenly reduces the resistance offered to the motion of the driving-shaft as to allow its motion to become suddenly accelerated and interfere seriously with the uniform feeding of the music-sheet. My slowly and gradually operating valve is advantageous in obviating this result.

The top of the case *A* is closed by a cover, *M*, hinged at *o*, and in said cover are two swells, *N*, which have arms *p* projecting from their under sides, and crossed and pivoted to the side of the case *A* at *q*. To the lower ends of the arms *p* are connected links *r*, by which the diverging lower ends of the pair of arms *p* are brought together and the swells *N* closed. The swells are kept closed by a spring, *s*, which acts upon the pivot connecting the two links *r*.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a mechanical musical instrument adapted to be operated by a traveling music-sheet, the combination, with a roller around which the sheet is wound or passes, and a driving-shaft for imparting motion thereto, of a rest for the traveling music-sheet overhanging said shaft, substantially as specified.

2. In a mechanical musical instrument, the

combination, with a music-roller and a take-up roller, of a driving-shaft arranged between them, a bearing-block for one end of said shaft fulcrumed or pivoted above or at one side of said shaft, and mechanism connected with said block below or at an opposite side of said shaft for moving said block to cause the shaft to impart motion to either of said rollers and simultaneously release it from the other roller, substantially as specified.

3. In a mechanical musical instrument, the combination of music and take-up rollers, a driving-shaft arranged between them, a bearing-block for said shaft capable of adjustment to cause said shaft to impart motion to one of said rollers and simultaneously release the other, an elastic arm, and means for actuating said arm to adjust said bearing-block, and at the same time put such a tension on the arm as to cause it to exert a spring force, whereby it holds said shaft with a yielding pressure in position to transmit the desired motion, substantially as specified.

4. The combination of the music and take-up rollers *H H'*, the driving-shaft *E*, the pivoted bearing-block *L*, having the elastic arm or tail-piece *L'*, and mechanism connected with said arm or tail-piece for moving said block, substantially as specified.

5. In a mechanical musical instrument, the combination, with music and take-up rollers, and a driving shaft arranged between them, of a crank connected with the bearing supporting one end of said shaft, and serving to adjust said shaft transversely and hold it in the position to which it is adjusted, substantially as and for the purpose specified.

6. The combination of the music and take-up rollers *H H'*, the driving-shaft *E*, the pivoted bearing-block *L*, the crank *h*, and rod *g*, all substantially as specified.

7. In a mechanical musical instrument, the combination of a wind-chest or receiver, a relief-valve, a rock-shaft provided with two arms, to one of which said valve is connected, and means for acting upon the other arm to raise said valve, substantially as and for the purpose specified.

8. The combination of the driving-shaft *E*, the bearing-block *L*, the rod *g* and crank *h*, the relief-valve *j*, and the rock-shaft *k*, having the arm *k²*, which is acted upon by the rod *g* to open said valve, substantially as specified.

9. In a wind musical instrument, the combination, with an expansible wind-chest or receiver, of a valve and means deriving motion from the movable board of the wind-chest or receiver, and serving to impart to the valve a slower and more gradual motion than it would derive if operated directly from the movable board of the wind-chest or receiver, substantially as and for the purpose specified.

10. In a wind musical instrument, the combination, with an expansible wind-chest or receiver, of a valve and means comprising a lever deriving motion from the movable board of the

wind-chest or receiver, and imparting to the valve a slower and more gradual motion than the said board would impart to the valve if it acted directly on the valve, substantially as
5 and for the purpose specified.

11. In a wind musical instrument, the combination, with an expansible wind-chest or receiver, of a valve, a lever extending beyond the valve, and a pin projecting into the wind-
10 chest or receiver through the fixed board thereof, and adapted to be operated by the movable board to slowly and gradually open the valve, substantially as and for the purpose specified.

12. The combination of the wind-chest or receiver C, the valve *j*, having a projection, *n*, 15 the lever *l*, arranged below said projection *n*, and carrying the pin *m*, which is acted upon by the movable board C', substantially as specified.

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Witnesses:

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