

H. A. VAN VALKENBURG.  
 SOUND PRODUCING DEVICE.  
 APPLICATION FILED FEB. 15, 1915.

1,243,645.

Patented Oct. 16, 1917.

2 SHEETS—SHEET 1.

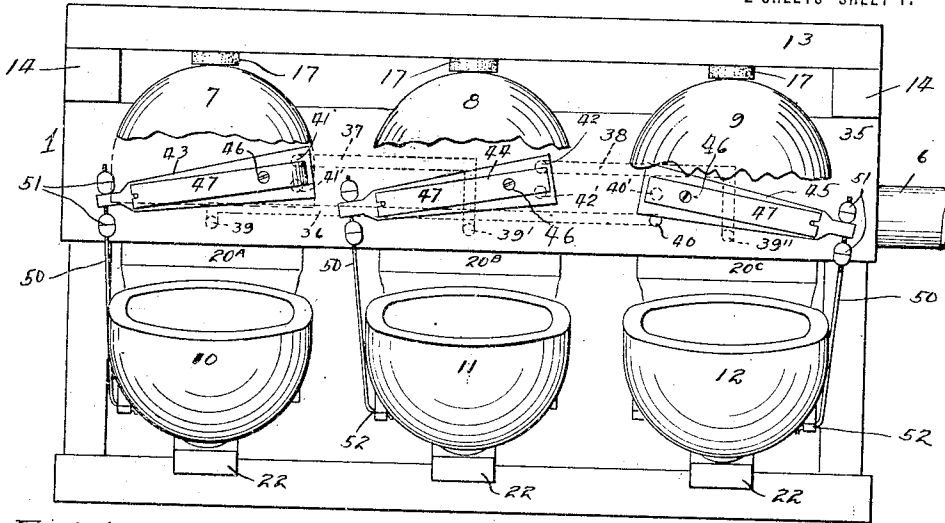


Fig. 1.

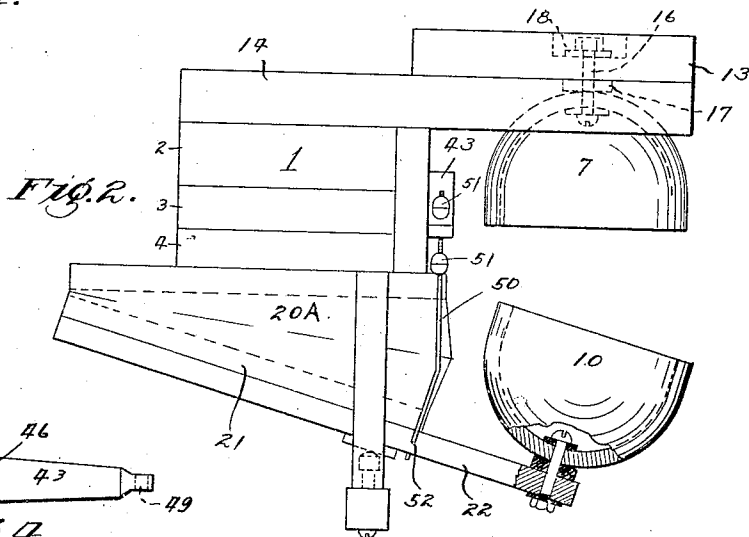


Fig. 2.

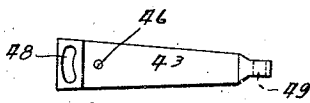


Fig. 4.

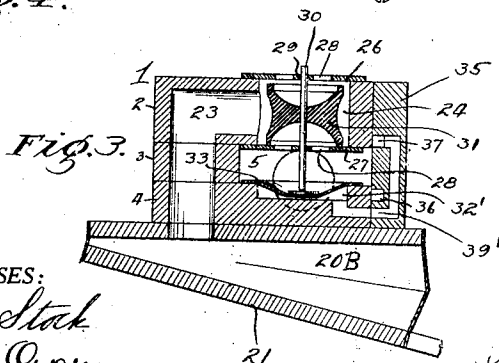


Fig. 3.

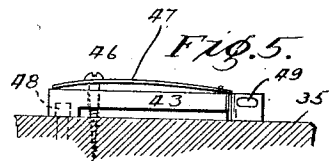


Fig. 5.

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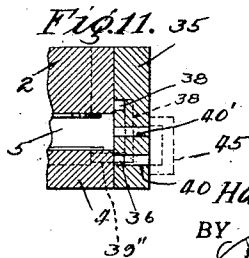
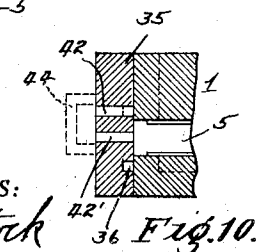
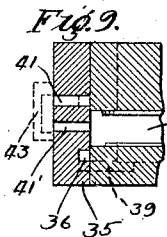
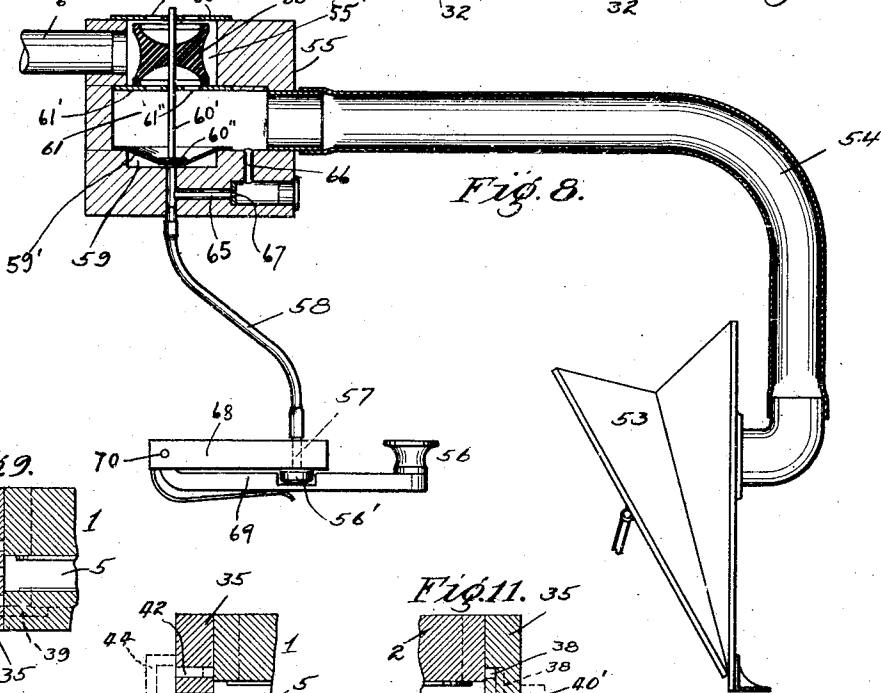
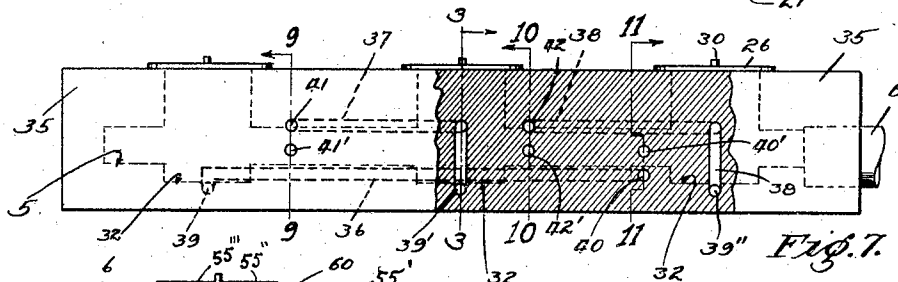
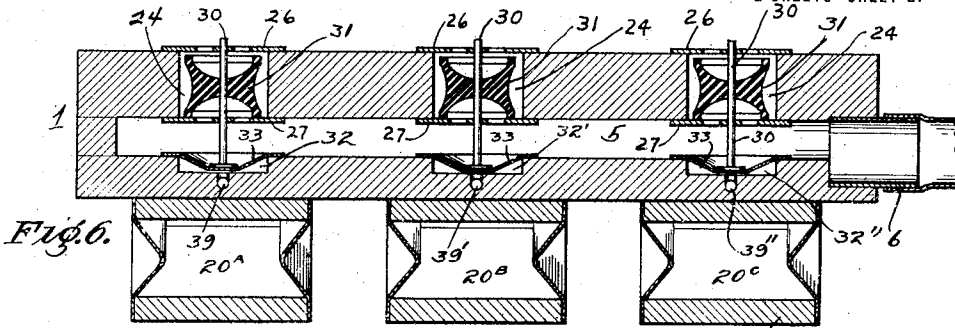
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

HAROLD A. VAN VALKENBURG, OF OAKLAND, CALIFORNIA.

SOUND-PRODUCING DEVICE.

1,243,645.

Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed February 15, 1915. Serial No. 8,170.

*To all whom it may concern:*

Be it known that I, HAROLD A. VAN VALKENBURG, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Sound-Producing Devices, of which the following is a specification.

This invention relates to sound producing apparatus and more particularly to a device for producing the effects of horses trotting. The principal object of my invention is to produce an improved device of this character which may be operated in connection with orchestrians and instruments of like character.

Another object of my invention is to so arrange the device that the operation will remain continuous as long as the same is connected with the vacuum chamber.

Still another object of my invention is to so arrange an improved valve so that each movable element of the device governs the next succeeding element.

With these and other objects in view my invention consists in the novel construction and arrangement of parts as herein described and more specifically pointed out in the appended claims.

Reference being had to the accompanying drawing forming a part of this specification,

Figure 1 is a view in front elevation of my improved mechanism, a portion of the sounding producing elements being broken away to disclose the valve arrangement.

Fig. 2 is a view in side elevation.

Fig. 3 is a transverse view in section through the chest and bellows of the center of the device, the section being taken at the line 3 on Fig. 7 and viewed in the direction of the arrow.

Fig. 4 is a bottom plan view of a form of valve employed.

Fig. 5 is a view in side elevation of this valve.

Fig. 6 is a view in longitudinal sectional elevation of the mechanism shown in Figs. 1, 2 and 3, this section being taken in a plane coincident with the valve stems 30.

Fig. 7 is a view in side elevation of the structure shown in Fig. 3, the structure being viewed from the right-hand side of this figure, and with certain parts broken away between its ends.

Fig. 8 is a view, partly sectional, of mechanism for controlling the actuation of the construction shown in the preceding figures.

Fig. 9 is a section taken at the line 9 on Fig. 7 and viewed in the direction of the arrow.

Fig. 10 is a section taken at the line 10 on Fig. 7 and viewed in the direction of the arrow; and

Fig. 11, a section taken at the irregular line 11 on Fig. 7 and viewed in the direction of the arrow.

Referring to corresponding parts by the same numerals of reference, 1 denotes a chest constructed of several layers of material as 2, 3 and 4, containing a vacuum cavity 5 throughout the length thereof and which is connected by a pipe 6 to a suitable means such as that hereinafter described for maintaining a vacuum therein. In the preferred form of my invention I provide three units or elements for producing sound, consisting of the upper stationary members 7, 8 and 9 and the lower movable members 10, 11 and 12. These members are all substantially semi-spherical in shape and are hollow in order that when they are struck together the proper effect of horses trotting over hard roads is secured.

While the upper members 7, 8 and 9 are stationary they are nevertheless loosely mounted in order that the lower edges may conform to the upper edges of the movable companion members when the two are struck together. This mounting consists of the longitudinal strip 13 which is supported on suitable brackets 14 extending from the top of chest 1. Passing through member 13 are screws 16 to which the members 7, 8 and 9 are attached, flexible washer 17 of felt or rubber being interposed between these members and the underside of supporting member 13. In like manner a flexible washer 18 is interposed between the head of the screw 16 and the inner surface of the members 7, 8 and 9, thus holding these members between two flexible pads and allowing the plane of this lower edge to assume a slight variation to conform with the upper edge of the lower member.

Mounted on the underside of the chest 1 in alinement with the members 7, 8 and 9 are the bellows 20<sup>A</sup>, 20<sup>B</sup> and 20<sup>C</sup> having the movable sides 21 whereon are secured strips

22, on the outer ends of which are mounted the lower striking members 10, 11 and 12. These members are rigidly mounted so that when the bellows collapse they are brought  
 5 in contact with the lower side of the loosely mounted members 7, 8 and 9. The interior of the bellows communicate through channels 23 to valve chambers 24, these chambers extending from the vacuum cavity 5  
 10 to the outside of the chest. The openings of the valve cavities to the atmosphere and vacuum chamber are closed by means of disks 26 and 27 respectively, which are provided with passageways 28 and 29 through  
 15 the latter of which extend the valve stems 30. Mounted on these stems within the valve cavities 24 are valves 31, adapted to close the openings 28 in either disks 26 or 27. In alinement with cavities 24 are cells  
 20 32 32' and 32'' over which are mounted the flexible diaphragms 33 on which the lower ends of the valve stems rest. These cells govern bellows 20<sup>A</sup>, 20<sup>B</sup> and 20<sup>C</sup> respectively.

Forming part of chest 1 is a vertical side  
 25 plate 35 extending the full length thereof wherein are certain longitudinal passageways 36, 37 and 38. These passageways are connected by the angular disposed passageways 39 39' and 39'' respectively with the  
 30 cells 32 32' and 32'' respectively. The other ends of these passageways are connected by means of outwardly extending openings 40, 41 and 42 respectively, with the atmosphere, and adjacent each of these latter  
 35 openings are passageways 40', 41' and 42' extending from the surface of the plate 35 to the valve chamber 5. These three pairs of openings 40 and 40', 41 and 41' and 42 and 42' are normally in communication by  
 40 means of the valves 43, 44 and 45 respectively. Each of these valves is pivotally mounted as shown at 46 and provided with a spring 47 to hold the same in contact with the face of plate 35.

45 On the underside of each of these valve members is a segmental slot 48 of sufficient length to form a connection between two holes of each one of the above mentioned pairs, and the opposite end of each valve is  
 50 provided with a slotted opening 49 through which extends a rod 50. Nuts 51 on each side of the valves at one end cause the latter to move with these rods, the opposite ends of these rods being connected as shown at 52  
 55 with the movable strips 22 of the respective bellows.

The arrangement shown in Fig. 8 for controlling the operation of the mechanism just described, and which presents a suitable  
 60 form of operating means (though it is to be understood that I do not intend to limit my invention to the use of such operating mechanism) involves a valve device 55 containing a chamber 61 communicating with a  
 65 pipe 54 which opens into a vacuum produc-

ing bellows 53 operated in any suitable manner and which operates, when actuated, to create a vacuum in the pipe 54; a cell 59 below the chamber 61 and separated there-  
 70 from by a flexible diaphragm 59<sup>1</sup>; and a chamber 55<sup>1</sup> located above the chamber 61 and in communication with the pipe 6 here-  
 75 inbefore referred to. A plate 55<sup>11</sup> closes the top of the chamber 55<sup>1</sup>, except as to openings 55<sup>111</sup> therein which cause the chamber  
 55<sup>1</sup> to communicate with the atmosphere, when the valve 60, working in the chamber 55<sup>1</sup>, is in lowermost position, and a plate 61<sup>1</sup> closes the chamber 55<sup>1</sup> to the chamber 61  
 80 except through openings 61<sup>11</sup> in this plate. The valve 60, which has a valve-stem 60<sup>1</sup> sliding in the plates 61<sup>1</sup> and 55<sup>11</sup> and resting at a disk 60<sup>11</sup> on the diaphragm 59<sup>1</sup>, is adapted to alternately open and close the openings  
 85 55<sup>111</sup> and 60<sup>11</sup>. A pipe 58 opens into the cell 59, this pipe also having a connection through passages 65 and 66, with a bleeder constriction 67, and with the interior of the chamber 61. The pipe 58 opens  
 90 into a passage 57 in a block 68, the lower end of this passage being open and cooperating with a closure 56<sup>1</sup> mounted on a lever 69 pivoted at 70 to the block 68 and having a section 56 against which the operator presses to open the lower end of the  
 95 passage 57 to the atmosphere.

The operation of the apparatus is as follows:

When it is desired to operate the sound-producing apparatus described the operator  
 100 presses down on the portion 56 of the lever 69 which opens the pipe 58 to the atmosphere, assuming the bellows 53 to be operating, effects the lifting of the valve 60 to close  
 105 the pipe 6 to the openings 55<sup>111</sup>, and, consequently, to the atmosphere, and opens this pipe to the suction line 54 through the chambers 55<sup>1</sup> and 61, owing to the relieving of the vacuum in the cell 59, the bleeder-opening  
 110 67 not being sufficiently large to exhaust the atmospheric air from the cell 59 supplied to the latter through the pipe 58. Assuming that the valves of the sound-producing mechanism are positioned as shown in Fig. 1, then the air is exhausted from the cells  
 115 controlling bellows 20<sup>B</sup> and 20<sup>C</sup>, the exhaust from the cell of the former taking place through opening 41, segmental slot 48 of valve 43 through the opening 41', slot 37 to passageway 39' to the underside of that cell.  
 120 The under side of the cell of bellows 20<sup>C</sup> is exhausted through passageway 42' to segmental slot of valve 44, opening 42, slot 38, and passageway 39'' to this cell. Air is admitted to the underside of the cell controlling bellows 20<sup>A</sup> through the opening 40, passageway 36, which raises the valve 31 governing the bellows 20<sup>A</sup>, opening the passageway and permitting the vacuum within  
 125 cavity 5 to exhaust the air from bellows 20<sup>A</sup>. 130

This collapses the bellows causing the member 10 connected therewith to strike member 7 and through the rod 50 moves the valve 43 to open the passageway 41.

5 On admission of air to 41 atmospheric pressure passes through groove 37 and the passageway 39' to the cell governing bellows 20<sup>B</sup>, which in like manner raises the valve 31 of this bellows and collapses the same in  
10 a manner described, for 20<sup>A</sup>. This in like manner moves valve 44, opening hole 42 and collapsing bellows 20<sup>C</sup> producing another clap of the noise devices. The action thus far has produced three blows in rapid  
15 succession at equal intervals and all bellows are held collapsed.

Now, the collapsing of the last bellows 20<sup>C</sup> moves valve 45 so as to place opening 40 in communication with opening 40', thereby  
20 equalizing the pressure on both sides of the cell governing 20<sup>A</sup>. This allows the valve governing this bellows to drop, bringing atmospheric pressure to the bellows moving the valve 43 so as to place 41 and 41' in com-  
25 munication, thereby equalizing the pressure on both sides of the diaphragm governing the bellows 20<sup>B</sup> and allowing this bellows to expand which in turn equalizes the pressure in bellows 20<sup>C</sup>, which in expanding moves  
30 the valve 45 so as to admit atmospheric pressure through opening 40, which through the passageway 36 collapses the first bellows 20<sup>A</sup>, when the whole sequence of operations is repeated.

35 Thus, in the operation of the device, as long as the vacuum is maintained within the cavity 5 the bellows are collapsed at substantially equal intervals in rapid succession and are then inflated so that the sound  
40 effect is three claps in rapid succession followed by a short interval due to the time required to inflate the bellows, again followed by the three rapid claps. This effect is maintained as long as the device is connected  
45 with the source of vacuum and if the degree of vacuum is regulated the bellows may be made to collapse more or less rapidly with the corresponding degree of softness in sound produced. Thus, by properly gov-  
50 erning the vacuum admitted to chamber 5 the effects may produce such as the dying out of the horse trotting at retreating distance.

It will be understood from the foregoing  
55 description of the mechanism shown in Fig. 8, and which is of a construction commonly used, that the sound-producing apparatus is caused to discontinue operation upon the closing of the passage 57, as by the operator  
60 permitting the lever 69 to return to the position shown in Fig. 8, inasmuch as the closing of the pipe 58, as stated, operates to permit the suction in the pipe 54 to exhaust the air in the cell 59, thereby permitting the dia-  
65 phragm 59<sup>1</sup> to lower to the position shown in

Fig. 8, wherein the valve 60 closes the chamber 55<sup>1</sup> to the chamber 61 and opens the pipe 6 to the atmosphere through the openings 55<sup>111</sup>.

While I have illustrated and described a 70 particular construction in which my invention is embodied, I do not wish to be understood as intending to limit it thereto, as the same may be variously modified and altered without departing from the spirit of my in- 75 vention.

What I claim as new and wish to cover by Letters Patent is:—

1. A device for producing the effect of hoof beats, comprising a valve chest having a 80 vacuum chamber throughout its length, a plurality of bellows, the movable side of each of which carries a member adapted to strike a coacting member when said bellows is collapsed, valves adapted to place said 85 bellows in communication with said vacuum chamber, and other valves operated by the movable sides of said bellows and governing the operation of the next succeeding bellows. 90

2. A device of the character described comprising a valve chest having a vacuum chamber therein, a plurality of bellows mounted on said chest adapted to be succes- 95 sively operated, a substantially semi-spherical hollow member attached to the outer end of the movable side of each of said bellows, and adapted to coact with similar fixed members, valves pivotally mounted on said chests adapted to be operated by the 100 collapsing of said bellows, and other valves within said chest adapted to place the interior of said bellows in communication with either the atmosphere or said vacuum cavity, said first mentioned valve governing 105 passageways leading to said second-mentioned valve of the next succeeding bellows.

3. A device of the character described comprising a plurality of bellows, a sound producing member carried by the movable 110 side of each of said bellows adapted to strike a coacting member when said bellows is deflated, valves, operated by the movement of the movable sides of said bellows, said means controlled by said valves adapt- 115 ed to cause the deflation of the next succeeding bellows.

4. A device of the character described comprising, a valve chest having a vacuum 120 cavity therein, a plurality of bellows, valves adapted to place said bellows in communication with said vacuum cavity or the atmosphere, cells in the side of said vacuum cavity in alinement with said valves and adapted to cause the operation of said 125 valves, said chest having passageways leading from said cells to the atmosphere, and other passage ways from said vacuum cavity to the exterior of said chest, and valves operated by the movable sides of said bellows 130

and adapted to establish communication between said first and said second mentioned passageways.

5 5. In a device of the character described, the combination of a plurality of bellows, and means controlled by each of said bellows for causing the operation of the next succeeding bellows.

10 6. In a device of the character described, the combination of a plurality of bellows, valves operated by the movable sides of said bellows, and means controlled by said valves governing the operation of the next succeeding bellows.

15 7. In a device of the character described, the combination of a plurality of bellows adapted to be successively collapsed, and valves operated by the collapsing of said bellows, each of said valves controlling the operation of the next succeeding bellows.

20 8. In a device of the character described, the combination of a plurality of bellows, a valve operated by each of said bellows, and a second valve for each of said bellows controlling the exhaustion and inflation thereof, each of said first mentioned valves controlling the operation of the said second valve of the next succeeding bellows.

30 9. A device of the character described comprising a valve chest having a vacuum cavity, a plurality of bellows adapted to be successively operated and communicating with said vacuum cavity, valves controlling the communication between said bellows and said vacuum cavity, and other valves operated by the movement of said bellows, said last mentioned valves being adapted to throw into action the said first mentioned valve of the next operated bellows.

40 10. A device of the character described comprising in combination with a valve chest having a vacuum cavity, a plurality of bellows adapted to be successively operated, each comprising a fixed side and a movable side, flexibly mounted sound producing members, coacting members adapted to strike said first mentioned members attached to the movable sides of said bellows, pneumatically operated valves within said chest controlling the exhaustion and inflation of said bellows, and valves mounted upon the exterior of said chest operated by the movable sides of said bellows, each of said last mentioned valves controlling the operation of the pneumatically operated valve of the next successively operated bellows.

60 11. In a device of the character described, the combination of a valve chest having a vacuum cavity therein, a plurality of bellows, valves adapted to place said bellows in communication with said vacuum cavity or the atmosphere, cells in the side of said vacuum cavity in alinement with said valves

and adapted to cause the operation of said valves, said chest having passageways leading from said cells to the atmosphere, and other passageways from said vacuum cavity to the exterior of said chest, and valves operated by the movable sides of said bellows, said valves being adapted to establish communication between one of said second mentioned passageways and the said first mentioned passageway leading to the next successively operated bellows.

70 12. In a device of the character described, the combination of a valve chest having a vacuum cavity therein, a plurality of bellows, valves adapted to place said bellows in communication with said vacuum cavity or the atmosphere, cells in said vacuum cavity, diaphragms in said cells adapted to operate said valves, said valve chest having passageways leading from each of said cells to the atmosphere, and other passageways from said vacuum cavity to the atmosphere, and valves operated by the movable sides of said bellows adapted to normally establish communication between one of said second mentioned passageways and the said first mentioned passageway from the cell of the next successively operated bellows, the first operated of said bellows having its cell normally open to the atmosphere.

95 13. A device of the character described comprising a valve chest having a vacuum chamber therein, a plurality of bellows mounted on said chest adapted to be successively operated, a substantially semi-spherical hollow member attached to the outer end of the movable side of each bellows, flexibly mounted stationary members adapted to coact with said first mentioned members, valves pivotally mounted on said chest adapted to be operated by the collapsing of said bellows, and other valves within said chest adapted to place the interior of said bellows in communication with either the atmosphere or said vacuum cavity, said first-mentioned valve governing passageways leading to said second-mentioned valve of the next succeeding bellows.

110 14. In a device of the character described, the combination of a valve chest having a vacuum cavity therein, a plurality of bellows, valves adapted to place said bellows in communication with said vacuum cavity or the atmosphere, cells in said vacuum cavity, diaphragms in said cells adapted to operate said valves, said chest having passageways from each of said cells, and valves controlled by the movable sides of said bellows for placing said passageways in communication either with said vacuum cavity or the atmosphere, said valves controlling the passageways to the next successively operated bellows, the passageway to the cell of the first operated bellows being normally open to the atmosphere.

15. In a device of the character described, the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats and comprising a bellows for each device, the operation of which causes said devices to produce the said sounds, and means for actuating said bellows in relatively quick succession and repeatedly with a relatively long interval of time between the actuation of the last one of said bellows to be operated, and the first one to be operated.

16. In a device of the character described, the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats and comprising a bellows for each device, the operation of which causes said devices to produce the said sounds, and automatically operating means for actuating said bellows in relatively quick succession and repeatedly with a relatively long interval of time between the actuation of the last one of said bellows to be operated and the first one to be operated.

17. In a device of the character described, the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats and comprising a bellows for each device the operation of which causes said devices to produce the said sounds, and pneumatically operated means for actuating said bellows in relatively quick succession and repeatedly with a relatively long interval of time between the actuation of the last one of said bellows to be operated and the first one to be operated.

18. In a device of the character described, the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats and comprising a bellows for each device the operation of which causes said devices to produce the said sounds, and automatically operating pneumatically operated means for actuating said bellows in relatively quick succession and repeatedly with a relatively long interval of time between the actuation of the last one of said bellows to be operated and the first one to be operated.

19. In a device of the character described,

the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats, and a plurality of actuating mechanisms for actuating said devices, each of said mechanisms controlling the actuation of the next succeeding mechanism, for operating said devices in succession.

20. In a device of the character described, the combination of a plurality of devices adapted, when actuated, to produce sounds simulating hoof-beats, and a plurality of pneumatically-operated mechanisms for actuating said devices, each of said mechanisms controlling the actuation of the next succeeding mechanism, for operating said devices in succession.

21. In a device of the character described, the combination of a plurality of devices, adapted, when actuated, to produce sounds simulating hoof-beats, a plurality of bellows for operating said devices, and means controlled by each bellows for causing the next succeeding bellows to operate.

22. In a device of the character described, the combination of a plurality of devices operating, when actuated, to produce sounds simulating hoof-beats, a plurality of bellows for operating said devices, valves operated by the movable sides of said bellows, and means controlled by each valve for causing the next succeeding bellows to operate.

23. In a device of the character described, the combination of a valve-chest having a vacuum cavity, a plurality of bellows adapted to be successively operated and communicating with said cavity, pneumatically-operated valves controlling communication between said bellows and vacuum cavity, and other valves operated by the movement of said bellows and adapted to throw said first-mentioned valve of the next operated bellows, into action.

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

HAROLD A. VAN VALKENBURG.

Witnesses:

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R. M. OYARZO.