H. P. BALL.

MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED JUNE 13, 1903.

984,257. Patented Feb. 14, 1911.

4 SHEETS—SHEET 1.

FIG. 1.

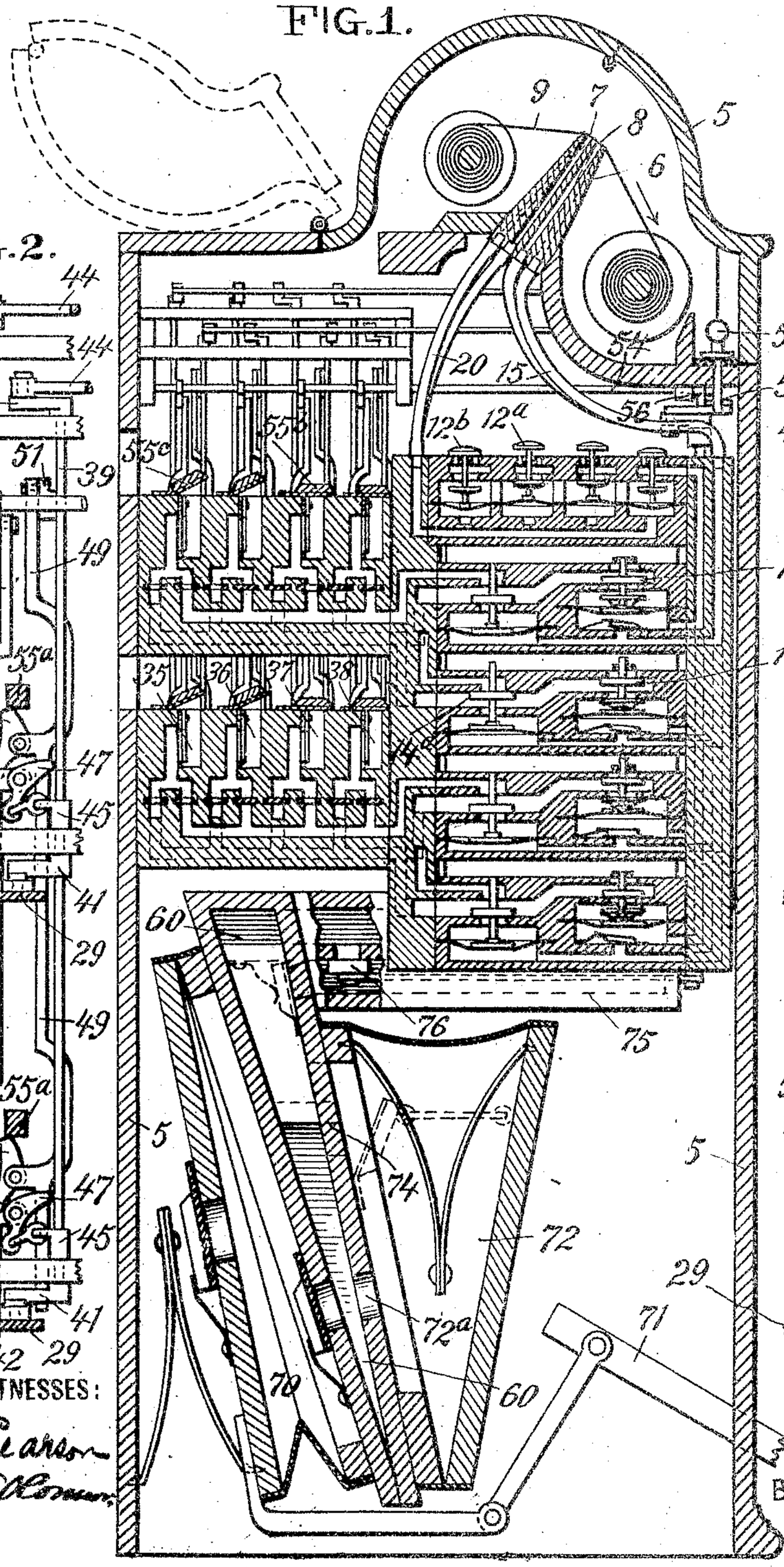
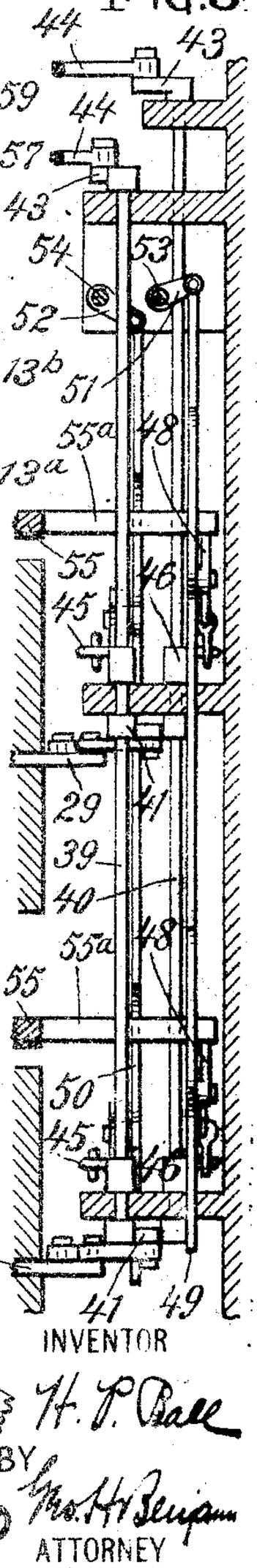


FIG. 2.

FIG. 3.



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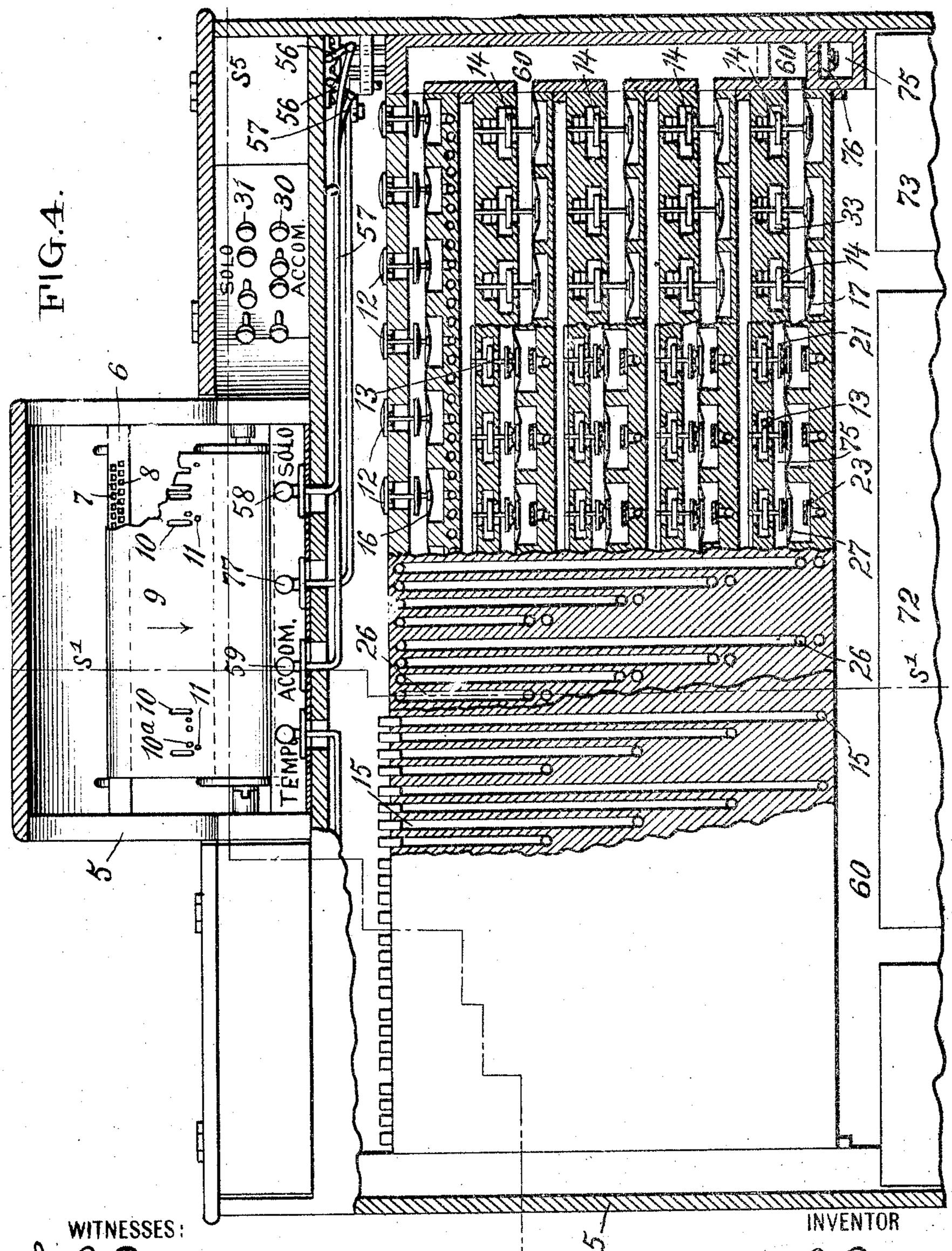
4 SHEETS—SHEET 2.

FIG. 4.



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4 SHEETS—SHEET 3.

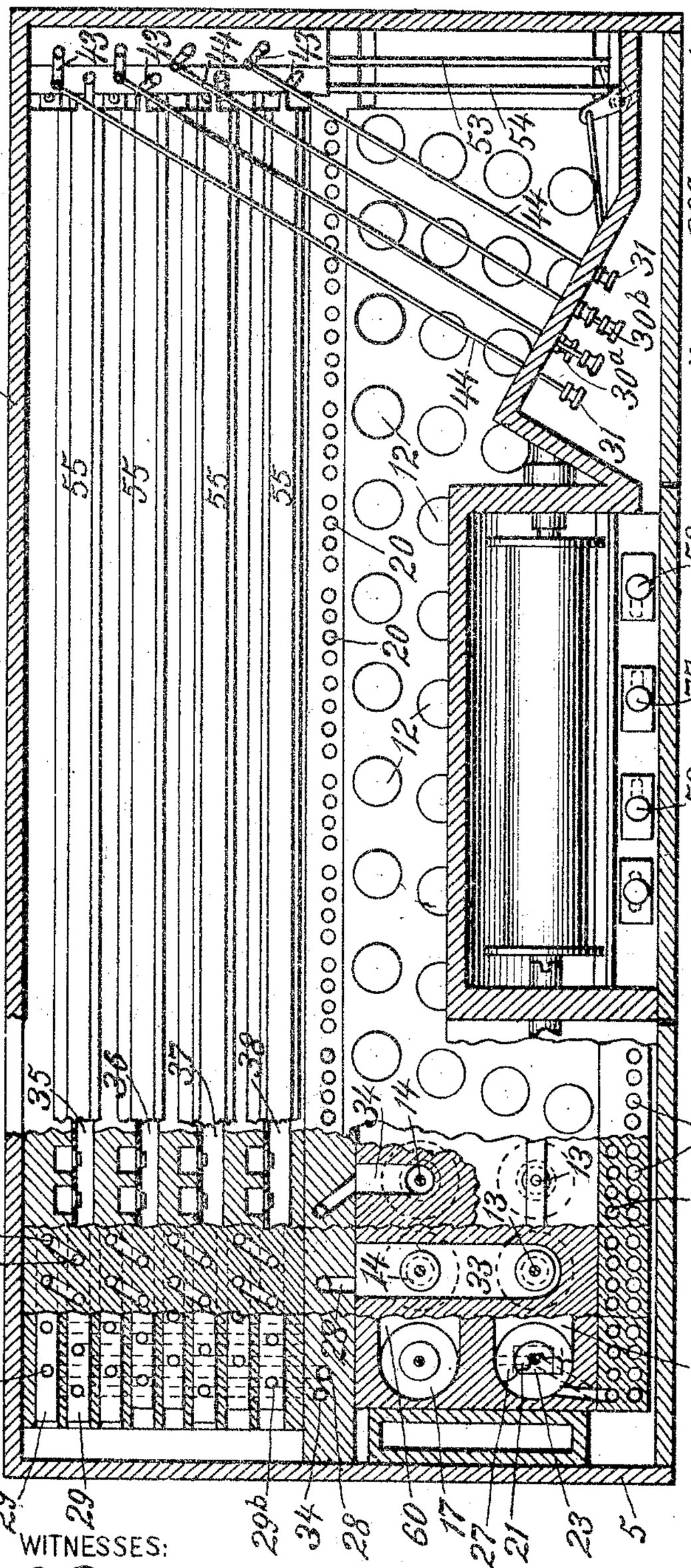

FIG. 5.

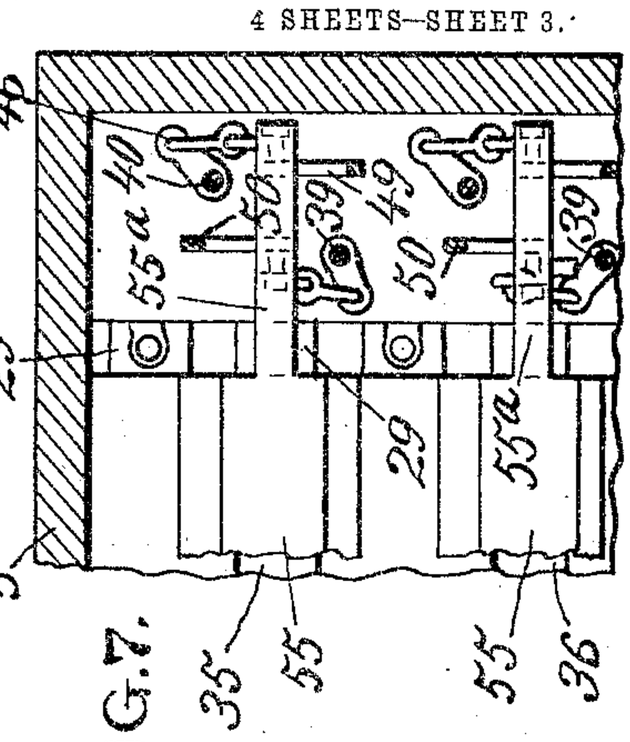

FIG. 7.

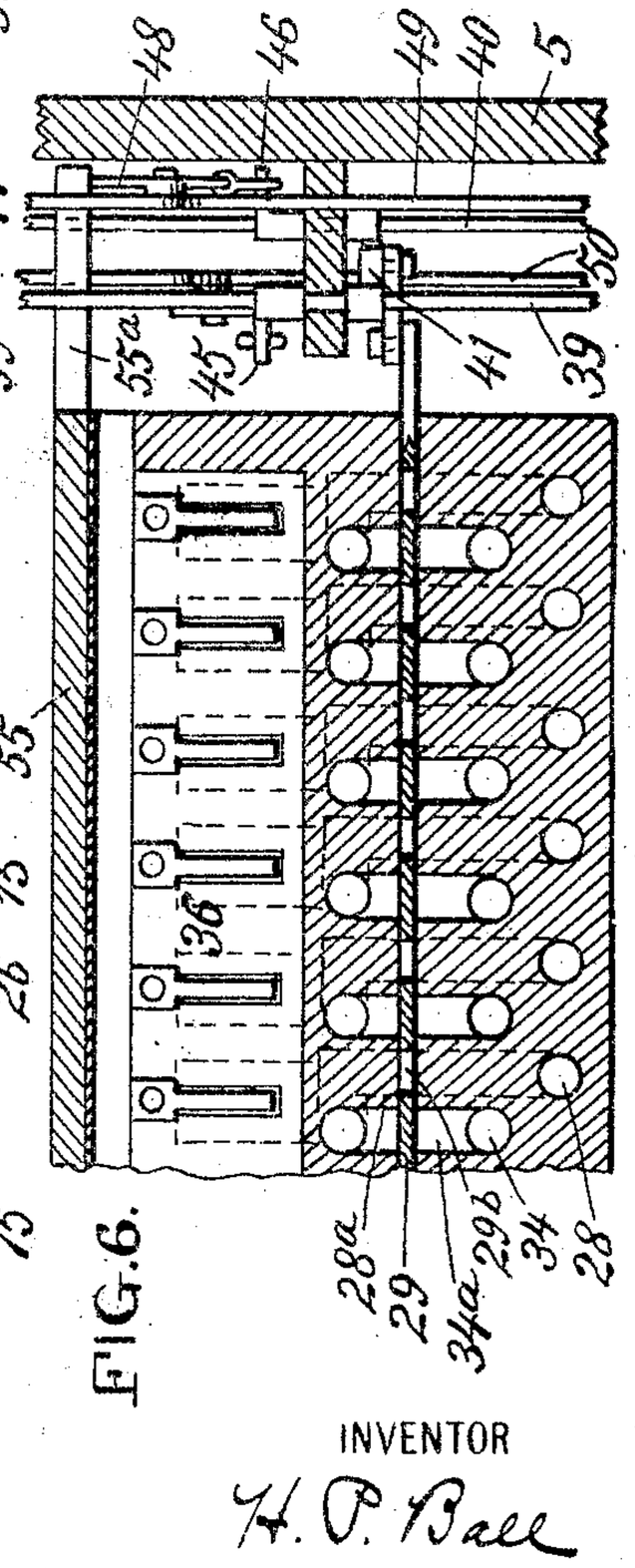

FIG. 6.

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APPLICATION FILED JUNE 13, 1903.

984,257. Patented Feb. 14, 1911.

4 SHEETS—SHEET 4.

FIG. 8.

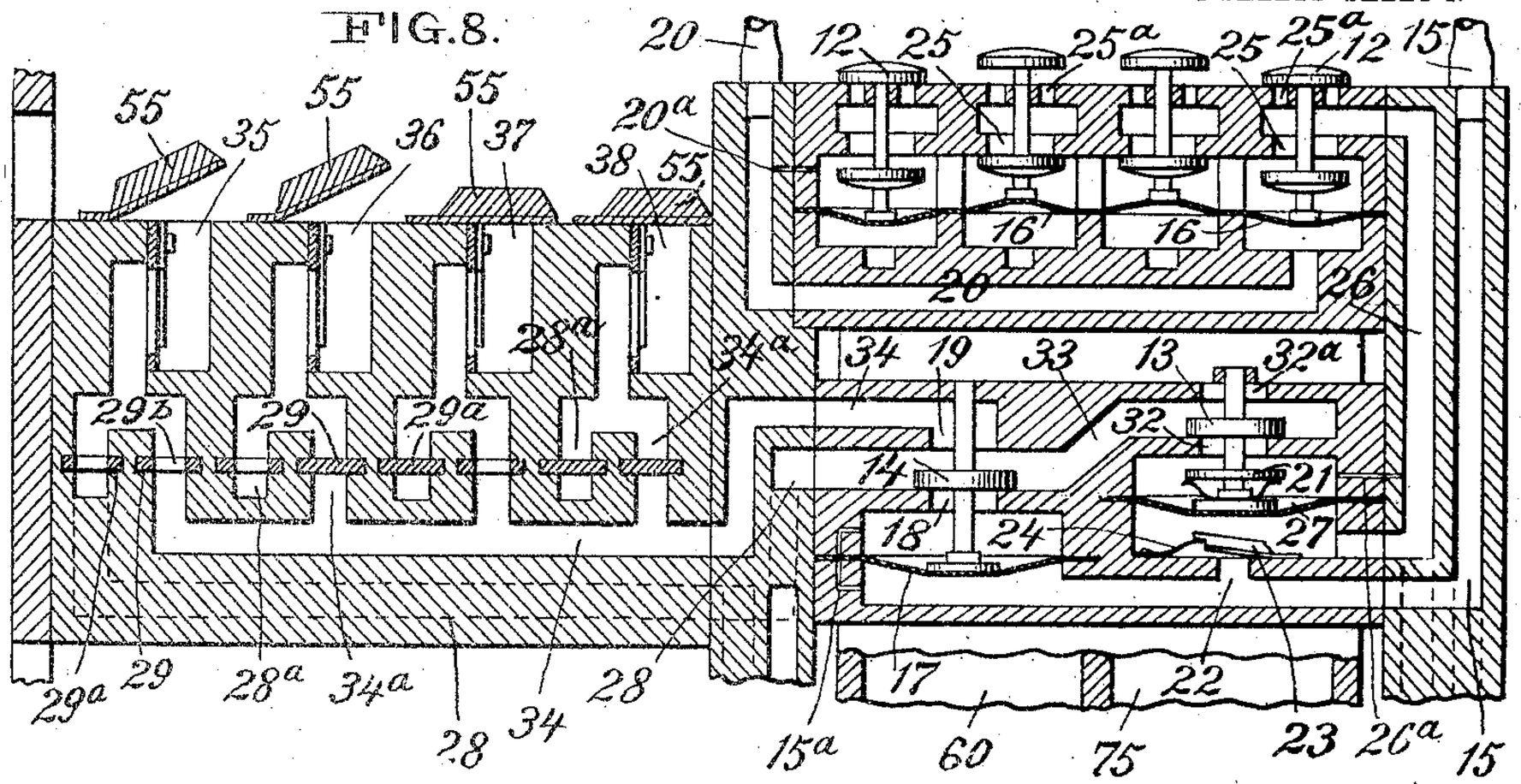


FIG. 9.

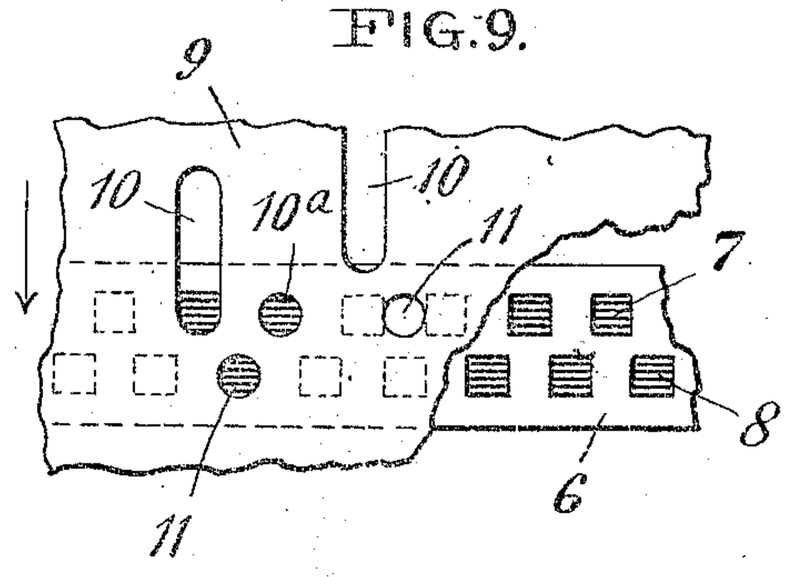
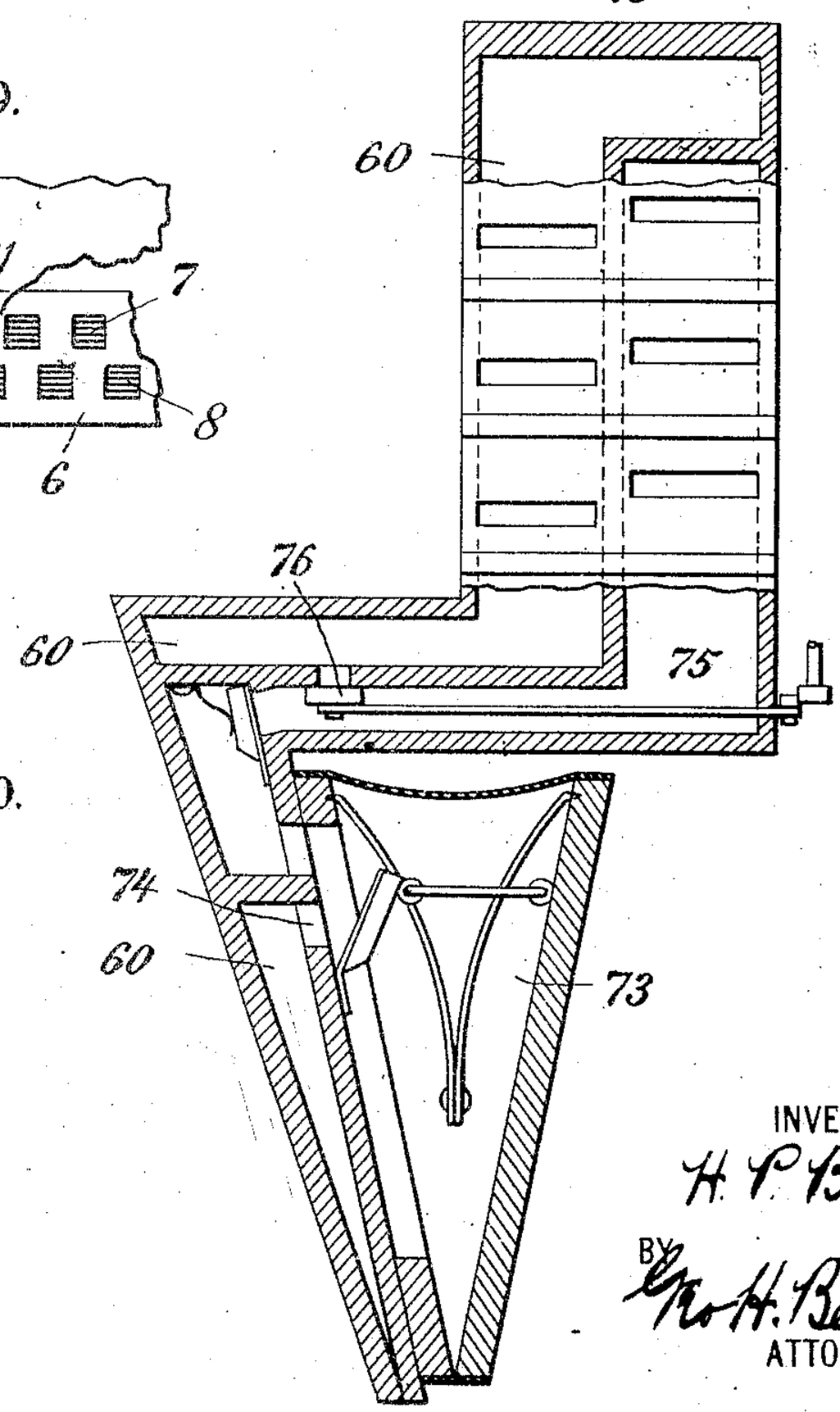


FIG. 10.



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MECHANICAL MUSICAL INSTRUMENT.

984,257. Specification of Letters Patent. **Patented Feb. 14, 1911.**

Application filed June 13, 1903. Serial No. 161,261.

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification.

This invention relates to mechanical musical instruments adapted to be employed in connection with a perforated music strip having two sets of perforations; one set adapted to produce the accompaniment notes and the other set the solo or melody notes. The instrument is also provided with means for producing a sustained note or notes; for swelling a note or notes from a small to a high amount or vice versa; for shifting any or all of the sound responsive means from one set of perforations to the other; for rendering irresponsive to any set of perforations any or all of the sound producing means, and generally for varying the character of the sounds produced.

The object of my invention is to simplify the construction of such instruments, and to permit the production of musical effects which have heretofore not been possible in instruments of the class described.

The accompanying drawings will serve to illustrate my invention in an instrument employing reeds, as a sound producing means. I wish it understood, however, that I may substitute pipes for such reeds and that the air used for actuating the reeds or pipes may exert its pressure by exhaustion or compression.

The accompanying drawings will serve to illustrate such an instrument as may be employed to carry my invention into effect but I do not wish to limit myself to the particular mechanism shown, as it will be obvious that other mechanisms may be employed acting in substantially the same manner, to produce the same result.

In the device which I have shown in the drawings, the pneumatic mechanism employed, is adapted to be operated by pressure of the atmosphere, made effective through exhaust apparatus. I may however arrange the mechanism to operate with air under compression or with both exhaust and compressed air.

In the drawings: Figure 1 is a vertical section of a mechanical musical instrument, taken on the line s', s', of Fig. 4. Fig. 2 is a detail view of the connections between the stops and the valves controlling the air pressure to the sound producing devices. Fig. 3 is a similar view thereof, from the side. Fig. 4 is a front elevation, partly in section, of the instrument shown in Fig. 1. Fig. 5 is a horizontal section, taken on the line s^5, s^5, of Fig. 4, portions being broken away to more clearly show the arrangement of air passages from the pneumatics to the reeds. Fig. 6 is a detail sectional view showing a portion of one of the reed cells. Fig. 7 is a plan view of the mechanism shown in Fig. 6, and Fig. 8 is an enlarged view of the upper portion of Fig. 1. Fig. 9 is a plan view showing a portion of a perforated music strip and the top of the tracker-board provided with two sets of openings or ducts. Fig. 10 is a detail sectional view, showing the low pressure bellows, the equalizing wind-chest, etc.

In previous applications, Serial Numbers 91,748 and 144,259, I have described pneumatic mechanism and its operation for the production of two sounds, *i. e.*, a sound having a normal value, and a sound accentuated or otherwise increased above the normal value, and as this mechanism is duplicated in my present application, I shall therefore describe it only in general terms, referring to such prior application for a full detailed description.

Referring now to the drawings, 5 indicates the inclosing case of the instrument, which may be given any suitable shape and construction.

A tracker-board 6, located in the usual position, in the upper part of the instrument, is provided with two rows of equi-spaced tracker-ducts 7 and 8. One series 7, which I shall hereinafter term the accompaniment tracker-ducts, coöperate with the accompaniment perforations 10 or 10^a in the music strip, Fig. 9 to produce any note or combination of notes within the range of the instrument, and the other series 8, to

be termed, the solo tracker-ducts, cooperates in a similar manner with the solo perforations of the music strip to produce the sounds upon a separate set or sets of sound producing devices.

Arranged to move over the tracker-board 6, is a perforated music strip 9, a portion of which is shown on an enlarged scale, in Fig. 9. This strip as shown is provided with three perforations 10, 10ª and 11. The accompaniment perforations 10, 10ª are adapted to register with the accompaniment tracker-ducts 7, and the solo perforation 11, with the solo tracker-duct 8. It will be observed, that the relative positions of the perforations 10 and 11, correspond to that of the tracker-ducts 7 and 8.

Located below the tracker-board 6, are the pneumatics, arranged in sets of three, one set capable of coöperating for each sound to be produced and these I term, 12, the primary pneumatic, 13, the secondary accompaniment pneumatic, and 14, the secondary solo pneumatic. The primary pneumatics 12, are controlled by the sound tracker-ducts 7, through air passages 20, leading therefrom to the chambers below the diaphragms 16, the space above the diaphragms communicating with the main wind-chest 60. The air passage 26, from the primary pneumatic to the secondary pneumatic 13 communicates with the high pressure wind chest and the atmosphere, through valved-ports 25, 25ª. Bleed holes 20ª are provided for exhausting air trapped in the passage 20. The secondary accompaniment pneumatics 13, are controlled by the primary pneumatics through the air passage 26 leading to the chamber below the diaphragm 27. The space above the diaphragms communicates with the wind chest 75. The air passages 33, leading from the secondary pneumatics 13, communicate with the wind chest 75 and the atmosphere through valved ports 32, 32ª. The secondary solo pneumatics 14, are controlled by the solo tracker-ducts 8, through the air passages 15, which lead therefrom to the chamber beneath the diaphragm 17, the space above the diaphragm communicating with the main wind chest 60. The air passage 33 from the secondary pneumatics 13 and 14 communicate directly with the passage 28 to the reeds and with the main wind chest 60 and the passages 28 and 34 to the reeds, through valved ports 18 and 19.

The operation of the pneumatics in producing a sound ordinarily played in the accompaniment for example, is as follows: When a note perforation, such as 10, registers with the sound tracker-duct 7, air at atmospheric pressure enters through passage 20 beneath the diaphragm of the primary pneumatic and raises the same as shown at 12ª, Fig. 1, opening the passage 26 to the atmosphere through the port 25ª and closing the port 25 between this passage and the high pressure wind chest. The passage 26 leading beneath the diaphragm of the secondary pneumatic 13 being now open to the atmosphere, air enters and raises the secondary pneumatic 13 as indicated at 13ª Fi · 1, closing the port 32ª between the passage 33, and the atmosphere and also the port 32 through which this passage communicates with the wind chest 75. The valve disk 21, however, being spring supported, yields to the greater pressure in the passage 33, and the communicating passages leading therefrom to the reed cells, and the air therein exhausts through port 32 into the wind chest, 75. The primary and secondary pneumatics are maintained thus adjusted, to sustain the note sounded, while the tracker-duct 7 remains open to the atmosphere. As this duct is closed by the passing of the note perforation, the air trapped in the passage 26, is exhausted into the wind chest through the bleed holes 26ª, and the pneumatics drop by gravity and resume their normal positions, indicated at 12ᵇ, 13ᵇ, Fig. 1. It will be observed that during this operation, the secondary solo pneumatic 14 remains inactive.

Before describing the operation of the pneumatics in the production of a solo note, I would again call attention to the use in this instrument of a music strip, identical in all respects to that employed in connection with the piano-playing mechanism of my prior applications above referred to. The solo perforations 11, (shown in Fig. 9) which may be given any suitable form, such as circular, for example, are of uniform size throughout the sheet and while such a perforation when accompanying a sustained note perforation, would operate in connection with either piano or organ playing mechanism, at the instant the note is sounded, yet to produce the desired result, it will be evident, that to sustain an organ note, the initial adjustment of valves must be maintained during the full length of the note, and as the opening and closing of the solo tracker-duct 8, occurs at the instant the note is sounded, means must be provided for continuing the relation of the valve mechanisms, until the accompaniment perforation has passed the tracker-duct 7. For this purpose, I provide a communicating opening between the passages 26 and 15, the same being in the form of a port 22, opening from the chamber beneath the secondary pneumatic 13, into the passage between the solo tracker-duct 8 and the chamber beneath the diaphragm of the secondary pneumatic 14. This port is controlled by a flexibly hinged valve 23, held normally open by a spring 24. The primary and secondary pneumatics in responding to a note perforation 10 unac-

companied by a solo perforation, 11, will operate in the manner as above described and the secondary pneumatic 14 will be inactive, as at such times, the atmospheric pressure in the passage 26 will overcome the spring and close the valve 23.

I will now describe the operation of the pneumatics in producing a solo note.

Assuming a note perforation 10 and a solo perforation 11, (Fig. 9) to register simultaneously with their respective tracker-ducts, both passages 26, 15, will be open to the atmosphere. Air will then enter beneath the diaphragms of both secondary pneumatics. As the pressure is equal in the passages 15, 26, above and below the valve 23 it will remain open. Under the pressure admitted, both secondary pneumatics will be raised to the position indicated at 13ª, 14ª, Fig. 1. This results in causing the secondary pneumatic 13 to close both ports 32, 32ª, as above described and the secondary pneumatic 14 to open the ports 18, between the passages 33 and the main wind chest 60 and close the passage 34 leading to the reed cells. In other words, it establishes communication between the reed cells and the main wind chest 60 through passage 28, and thereby produces a tone on those reeds opened to passage 28 and not on those reeds opened to passage 34. If now, the solo tracker-duct be closed by the passing of the perforation 11, while the tracker-duct 7 continues open to sustain the note, the pressure of the air trapped in the passage 15, will be sufficient, notwithstanding the exhaust through the bleed holes, 15ª, to maintain the valve 23 open, and the pneumatics will remain as adjusted, until the tracker-duct 7 is closed by the passing of the note perforation 10. Assuming this to have occurred, the air trapped in the passages 26, 15, will be exhausted into the main wind chest 60 through the bleed holes 15ª and into wind chest 75 through bleed holes 26ª and the several pneumatics will assume their initial positions.

In describing the operation of the primary and secondary pneumatic in responding to a note perforation unaccompanied by a solo perforation, the valve disk 21 was referred to as yielding, to permit the air in passage 33, to exhaust into the low pressure wind chest. Obviously there would be no yielding action of this disk when both secondary pneumatics are lifted, as the passage 33 at such time communicates with the main wind chest and consequently the greater pressure below the spring-supported disk holds the latter closed.

I have shown as sound producing devices, several sets of reeds arranged to respond singly or in combinations to the action of either of the secondary pneumatics by which they are controlled, but it will be understood, that pipes may be substituted therefor, without involving material change in the construction or arrangement of the instrument.

Referring now to Figs. 1 and 5, it will be seen, that the reeds are arranged in two sets of four rows each, and located immediately in the rear of the pneumatics. Such arrangement however is made merely for convenience in connecting the reed cells with the air passages leading from the pneumatics and may be altered and the number of sets of reeds increased or reduced as may be desired. In the present instance, the secondary pneumatics 13 and 14, are operatively connected with the cells of four sets of reeds, 35, 36, 37, 38, through passages 34, 28. I shall hereinafter term 34, the accompaniment exhaust passage and 28, the solo exhaust passage. These passages opening out of the passage 33, extend rearward beneath the cells and are each provided with branches 34ª, 28ª, leading upward therefrom to the reeds, there being a separate branch from each passage to each reed. Controlling each of the branches of the accompaniment exhaust passage, there is a valve 29, in the form of a flat strip provided with a series of openings, 29ᵇ, (Fig. 6), and a similar valve 29ª is provided in each branch of the solo exhaust passage. It being understood that there are two valves for each set of reeds and that one of these valves controls the accompaniment exhaust passage 34 and the other the solo exhaust passage 28, it will therefore be seen that by a proper adjustment of the same, one or more sets of reeds may be thrown in or out of communication with the pneumatics, or a particular set of reeds in or out of communication with either or both of the passages 34, 28. From the foregoing it will also be seen, that the main exhaust alone is active, when the instrument responds to note perforation 11, to produce a solo note and that when responding to an ordinary note perforation 10 only the pressure in wind chest 75 is active. It follows therefore, that by adjusting one or more of the valves 29ª controlling the solo exhaust passage 28, between the reeds and the pneumatics, the corresponding set or sets of reeds may be rendered responsive to such solo note perforations, which I would here observe, usually represent the melody and by a similar adjustment of one or more of the valves 29, the ordinary note perforations or the accompaniment may be played on either the reeds responsive to the melody notes or on any other set or sets the operator may prefer. For convenience in operating the valves 29 and 29ª, I provide suitable mechanism, by means of which they may be controlled by a series of stops 30, 31, located in

the front of the instrument as shown in Figs. 4 and 5.

Referring to Figs. 2 and 3, I have illustrated in detail the valves and connections for controlling one set of reeds. As shown, 39 and 40 are vertical rods mounted in the frame and connected by means of crank-arms and links 41, 42, with the slide valves 29, 29ª. Each rod at its upper end is provided with an additional crank-arm 43, and a horizontally disposed rod 44, connecting this crank arm with one of the stops 30 or 31. When a stop is pushed in, as indicated at 30ª in Fig. 5, the valve occupies the position shown in Fig. 6 and communication is closed between the branch passages 34ª, for example, and the adjoining set of reeds. When the stop is drawn out as indicated at 30ᵇ, the valve is adjusted through the connections described and the openings therein are caused to register with the branch passages 34ª thereby opening communication between the exhaust passage proper and this set of reeds.

I will now describe how a note produced, either as a normal sound or a solo note, may be further modified or swelled and its intensity varied, at the will of the operator. For this purpose, I have shown in detail, two sets of connections, one set, which may be said to control the melody or solo notes, being shown in an adjusted position and the other set, controlling the accompaniment, in the normal position. By means of separate slides 58, 59, within convenient reach of the operator, either or both sets of connections may be adjusted to produce the effect desired.

Referring again to Figs. 2 and 3, crank-arms 45, 46, are shown fast on the vertical rods 39 and 40, above referred to. These crank-arms are linked to cam arms 47, 48, pivoted to bars 49, 50, the connection being such, that as either of the rods 39 or 40 is rotated, by the action of the operator in drawing out a stop, the cam arm connected therewith, will be turned on its pivot until the high point thereof is adjusted into operative relation with an extension 55ª, of a valve or shutter 55 coöperating with the cell of the particular set of reeds selected. Obviously, now, by lifting a bar, the cam carried thereby will raise the shutter, and open the reed cell to a greater or less extent, causing the notes to be sounded with increased or decreased intensity. It will be understood, that with the shutter in its normal position, *i. e.*, closing the reed cell, as shown at 55ᵇ, Fig. 1, the tones produced from this set of reeds will be softened and also, that as the shutter is raised and lowered to increase and decrease the extent of opening to the cell, the intensity of the tones will be correspondingly varied. The adjustment of the shutter is effected by raising and lowering either of the bars 49 or 50, they being for this purpose separately connected at their upper ends to crank-arms 51, 52, fast on shafts 53, 54, which latter are horizontally disposed and extend toward the front of the instrument, as shown in Fig. 1, where they are each connected, by means of crank-arms 56, 56, and bars 57, 57, to controlling slides 58, 59. Thus it will be seen, that by shifting the controlling slide in one direction, the cam may be lifted to raise the shutter and by a reverse movement of the slide, the shutter will be closed.

The operation is as follows: Those sets of reeds, which are to respond to the solo or melody and those for the accompaniment notes are selected by the operator by drawing out the stops. Assuming now that the rod 40, Fig. 2, to be rotated by one of the stops selected, the valve 29ª, will be adjusted to open communication between the set of reeds it controls and the exhaust passage to the pneumatics and the cam 48, will be moved into operative relation with the shutter 55. If now the instrument is operated, all notes to which this set of reeds respond, will be reduced in intensity and softened, as the reed cell is closed by the shutter 55. To swell one or more of the melody notes, the operator moves the proper controlling lever 58, gradually or suddenly according to the effect desired, and thereby rotates the shaft 53, which in turn, lifts the bar 49 and causes the cam carried thereby to raise the shutter and open the reed cell, as indicated at 55ᶜ, Fig. 1, the extent of opening depending upon the movement of the controlling lever, determining the intensity of the sound produced.

I obtain the exhaust pressures and regulate and control the same in a similar manner as described in my previous application above referred to and it will therefore not be necessary for me to enter into a detailed description of the construction and operation of the apparatus employed for this purpose as the present invention is not limited to the use of the same. It suffices to say, that the particular apparatus illustrated consists essentially of one or more feeder bellows 70, mounted on the back of the wind-chest 60 and suitably valved and operated by means of foot-treadles 71, to maintain an exhaust pressure in the wind-chest. High and low pressure equalizing bellows 72, 73, are mounted to coöperate with the high pressure wind-chest, the high pressure bellows 72, being in permanent communication therewith through an opening 72ª, while the low pressure bellows is connected through a valved opening 74, as indicated by dotted lines in Fig. 1 and in Fig. 10.

Located between and connecting the high

and low pressure wind chests, there is an equalizing wind chest 75, which serves to limit the volume of high pressure exhausted air which is thrown at any time into the low pressure wind chest and aids in maintaining a constant difference between the high and low pressure chests. The openings or ports of this chest are controlled by a valve 76, operated through suitable connections by means of a lever or slide 77, located within convenient reach of the operator, as shown in Fig. 4.

Having thus described my invention, I claim:—

1. A mechanical musical instrument comprising a series of tone producing devices, means for selecting certain tones and sounding them, and means separate from said selecting means controlling the duration of the tones sounded.

2. A mechanical musical instrument comprising a series of tone producing devices, means for selecting certain tones and sounding them, and separate automatic means controlling the duration of the tones produced.

3. A mechanical musical instrument comprising a series of tone producing devices, means for sounding the tones, means for swelling the tones, and separate automatic means controlling the duration of the tones produced.

4. A mechanical musical instrument comprising a series of tone producing devices, two controlling connections for each device, means for throwing the series of tone producing devices from one connection to the other, means for selecting certain tone producing devices and causing them to speak, and automatic means controlling the duration of the tone produced.

5. A mechanical musical instrument comprising a series of tone producing devices, two controlling connections for each device, means for throwing the series of devices from one connection to the other, means for selecting certain tone producing devices and causing them to speak, and means coöperating with the selecting means controlling the duration of the tones.

6. A mechanical musical instrument comprising a number of series of tone producing devices, a source of energy, pneumatic connections between the tone producing devices and the source of energy, a tracker board having two series of openings therein, diaphragm pneumatics and primary valves between one series of tracker openings and the source of energy, and diaphragm pneumatics between the other series of tracker openings and the source of energy, automatic valves controlling the said connections, and means coöperating with said automatic valves to cause the tone producing devices to respond to either series of tracker openings.

7. A mechanical musical instrument comprising a number of series of tone producing devices, two sources of energy, a tracker board having two series of openings, two connections for each tone producing device, valve mechanisms situated between the openings in the tracker board and the tone producing devices, together with coacting means for throwing different series of tone producing devices into connection with either source of energy.

8. A mechanical musical instrument comprising a tracker board having two series of ducts, devices responsive to one series of ducts for controlling the tones to be produced, devices responsive to the other series of ducts for modifying the tones produced, and pneumatically operated means coöperating with the first named devices for controlling the length of the modified tones separate from the last named responsive devices.

9. A mechanical musical instrument comprising a tracker board having two series of ducts, pneumatic mechanism responsive to one series, additional pneumatic mechanism responsive to the second series, and coöperating means for continuing one of the pneumatic mechanisms in action for a definite period of time and out of control of its tracker ducts after it has responded to the same.

10. A mechanical musical instrument comprising a series of tone producing devices, a source of energy, a tracker board having two series of openings in staggered relation, controlling valves between said openings and said tone producing devices, means for determining which of the tone producing d vices shall be responsive to the respective openings in the tracker board, and automatic means separate from said last mentioned means and coöperating with one series of tracker openings and their corresponding valves for controlling the period of the response when the other series is in operation.

11. A mechanical musical instrument comprising a series of tone producing devices, a source of energy, a tracker board having two series of openings arranged in staggered relation, valve mechanism introduced between said openings and said tone producing devices, means for determining which of the tone producing devices shall be responsive to the two series of openings, means separate from said last mentioned means cooperating with one series of valved passages for controlling the period of the response when the other series is in operation, and means for controlling the volume of the tones produced.

12. A mechanical musical instrument comprising a series of tone producing devices, a source of energy, a tracker board having two series of openings therein, a series of valved passages for each series of openings, means for determining which of said tone producing devices shall be responsive to said openings, and automatic means separate from said last mentioned means coöperating with one series of valved passages when the other series is in operation for controlling the response of each tone producing device.

13. A mechanical musical instrument comprising a series of tone producing devices, a source of pneumatic energy, means for directing the energy exerted, means for controlling the effect of said energy upon said tone producing devices, means comprising two series of valved passages adapted to be controlled by a traveling perforated sheet for selecting said tone producing devices and causing them to speak, and separate automatic means controlling the duration of the tones produced through the medium of one series when the other series is in operation.

14. A mechanical musical instrument comprising a series of tone producing devices, a source of energy, means for throwing said tone producing devices into and out of connection with the source of energy, means for modifying the tone produced by said devices, means comprising two series of valved passages adapted to be controlled by a traveling master sheet for selecting the tone producing devices and causing them to speak, and separate automatic means cooperating with one series of valved passages when the other series is in operation for controlling the duration of the tone produced.

15. A mechanical musical instrument comprising a series of separate and independent tone producing devices, a source of energy, requisite connections between each tone producing device and the source of energy, a separate controlling device in each connection, a valve controlling both connections, and a valve controlling one of said connections.

16. A mechanical musical instrument comprising a number of series of tone producing devices, a source of energy, independent means for controlling the volume of tone from each series of tone producing devices, means for controlling the value of the force exerted from the source of energy, together with means for selecting the tone producing devices and causing them to speak.

17. A mechanical musical instrument comprising a tracker-board having two series of ducts therein, a series of tone-producing devices, two sources of energy, two series of diaphragm pneumatics, valves and connections, each coacting with a duct in its series and terminating at each tone-producing device, and requisite valves operating independently to throw the tone-producing devices in and out of connection with either source separately from the other source of energy or together to connect said tone-producing devices with one source of energy.

18. A mechanical musical instrument comprising a tracker board having two series of tracker ducts, mechanism responsive to one series for sounding musical notes, mechanism responsive to the second series for modifying the sounds produced, and pneumatic means for continuing the sound modifying mechanism in action for a period determined by the first named mechanism.

19. A mechanical musical instrument comprising a tracker board having two series of tracker ducts, a series of pneumatics connected to one series of tracker ducts, sound producing mechanism responsive to such pneumatics and adapted to produce musical sounds, a second series of pneumatics connected to the second series of tracker ducts, connections under the control of such pneumatics for modifying the sound produced, and pneumatically actuated means coöperating with the second series of tracker ducts for continuing the last named pneumatics in action for a period determined by the length of the note sounded.

20. A mechanical musical instrument comprising two series of tracker ducts, a series of pneumatics connected to one set of tracker ducts, sound producing mechanism responsive to such pneumatics and adapted to produce musical sounds of definite value, an additional series of pneumatics connected to the second series of tracker ducts, connections under the control of such pneumatics for modifying the action of the sound producing mechanism, and separate automatic means coöperating with the first series of tracker ducts and their connections for continuing the last named pneumatics in action for a period determined by the length of the note sounded.

21. The combination of a tracker-board having two series of ducts therein, a series of pneumatically operated valves, means for selecting certain of said valves and causing them to act, and coöperating controlling means for varying the periods of action of said valves.

22. A mechanical musical instrument comprising a moving music strip provided with two series of perforations, one series accompaniment perforations and the other series solo perforations, a tracker board having two series of tracker ducts therein corresponding in number and adapted to register with said two series of perforations of

the music strip, mechanism operated by air entering through one series of tracker ducts adapted to actuate a responsive device to produce musical tones of normal value, and pneumatic means operating separately from said mechanism for prolonging the tones produced, said means being actuated by the air entering through the other series of tracker ducts.

23. A mechanical musical instrument comprising a moving music strip provided with two series of note perforations, one series varying individually in length accompaniment perforations, and the other series of uniform length solo perforations, a tracker board having two series of tracker ducts therein corresponding in number and adapted respectively to register with said accompaniment perforations and said solo perforations of the music strip, mechanism operated by air entering through one series of tracker ducts adapted to actuate a responsive device to produce organ tones of normal value, mechanism actuated by air entering through the other series of tracker ducts adapted to modify the tones produced, and means for continuing the tones as modified for a period determined by the length of the note perforations after the solo perforations have passed the tracker ducts.

24. A mechanical musical instrument comprising two series of pneumatics, a set of passages leading to each series of pneumatics, and normally open valved ports connecting the passages in pairs.

25. A mechanical musical instrument comprising a tracker-board having two series of ducts therein two series of pneumatics, a set of passages leading to each series of pneumatics, and valved ports connecting the passages in pairs.

26. A mechanical musical instrument comprising a tracker bar having two series of ducts arranged in parallel relation, a series of tone producing devices, pneumatics between said tone producing devices and said ducts, passages connecting said tone producing devices and said pneumatics, selecting valves for said passages, energy producing pressure apparatus, passages connecting said energy producing apparatus and said pneumatics, separate passages leading to said pneumatics and under the control of said ducts, and means for controlling the volume of sound from said tone producing device.

27. A mechanical musical instrument comprising a tracker bar having two series of ducts, a series of tone producing devices, a series of primary pneumatics and a series of secondary pneumatics, a series of high tension pneumatics, a set of passages rendering said primary and secondary pneumatics subject to one series of tracker ducts, a separate set of passages for rendering said high pressure pneumatics under the control of the other series of tracker ducts, a high tension apparatus connected to said high tension pneumatics by passages, low tension apparatus connected to said secondary pneumatics by passages, passages between said high and low tension pneumatics and said tone-producing devices, means for controlling said last named passages, and means for controlling the volume of sound produced.

28. A mechanical musical instrument comprising a tracker-board with main and auxiliary ducts in pairs, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and a maintaining valve controlling a port between each pair of main and auxiliary passages.

29. A mechanical musical instrument comprising a tracker-board provided with a main and an auxiliary duct in pairs, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and an automatic maintaining valve controlling a port between each pair of main and auxiliary passages.

30. A mechanical musical instrument comprising a tracker-board provided with a main and an auxiliary duct, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and an automatic maintaining valve, said valve being normally open and controlling a port between the main and auxiliary passages.

31. A mechanical musical instrument comprising a tracker-board provided with a main and an auxiliary duct, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and an automatic maintaining valve, said valve being spring-held, normally open and controlling a port between the main and auxiliary passages.

32. A mechanical musical instrument comprising a tracker-board provided with a main and an auxiliary duct, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and an automatic maintaining valve controlling a port between the auxiliary and main passages from the tracker-board, said valve being arranged to be closed by the

difference of pressure in the main and auxiliary passages.

33. A mechanical musical instrument comprising a tracker-board provided with a main and an auxiliary duct, requisite pneumatic valves, a main passage leading from the main tracker ducts to the pneumatic valves, an auxiliary passage leading to the valves under the control of the auxiliary ducts, and an automatic maintaining valve controlling a port between the auxiliary and main passages from the tracker-board, said valve being moved in one direction by a spring, and in the opposite direction by a difference in pressure in the main and auxiliary passages.

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

HENRY PRICE BALL.

Witnesses:

C. H. VOM BAUR,

I. WERTHEIMER.