

G. DE C. REGO.
MECHANICAL MUSICAL INSTRUMENT.
APPLICATION FILED OCT. 23, 1902.

989,874.

Patented Apr. 18, 1911.

4 SHEETS—SHEET 1.

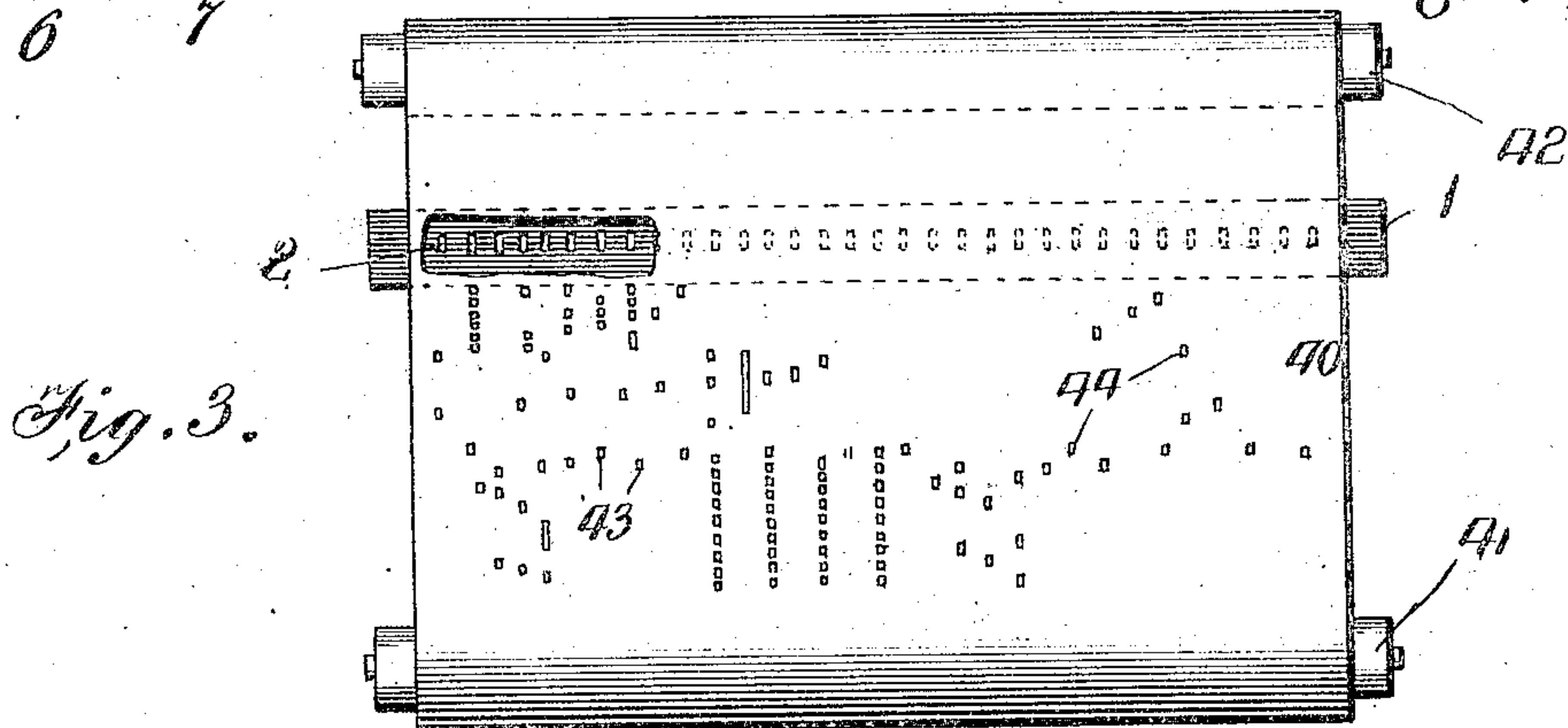
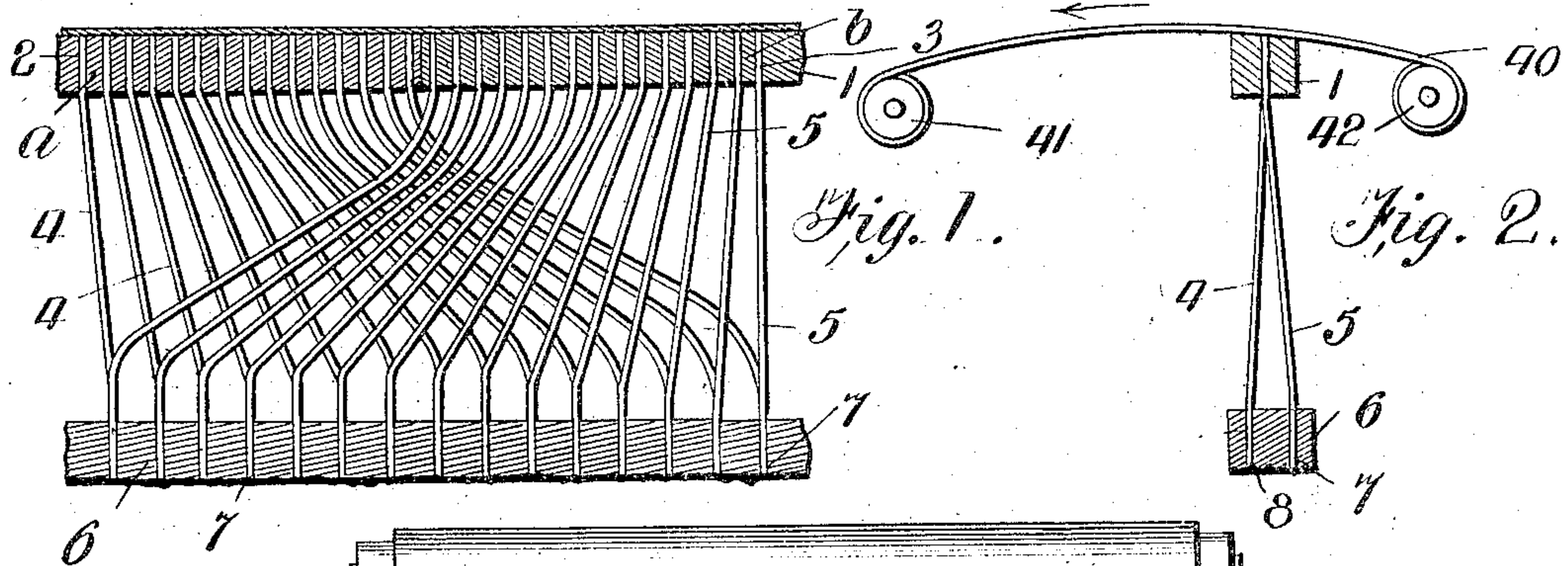
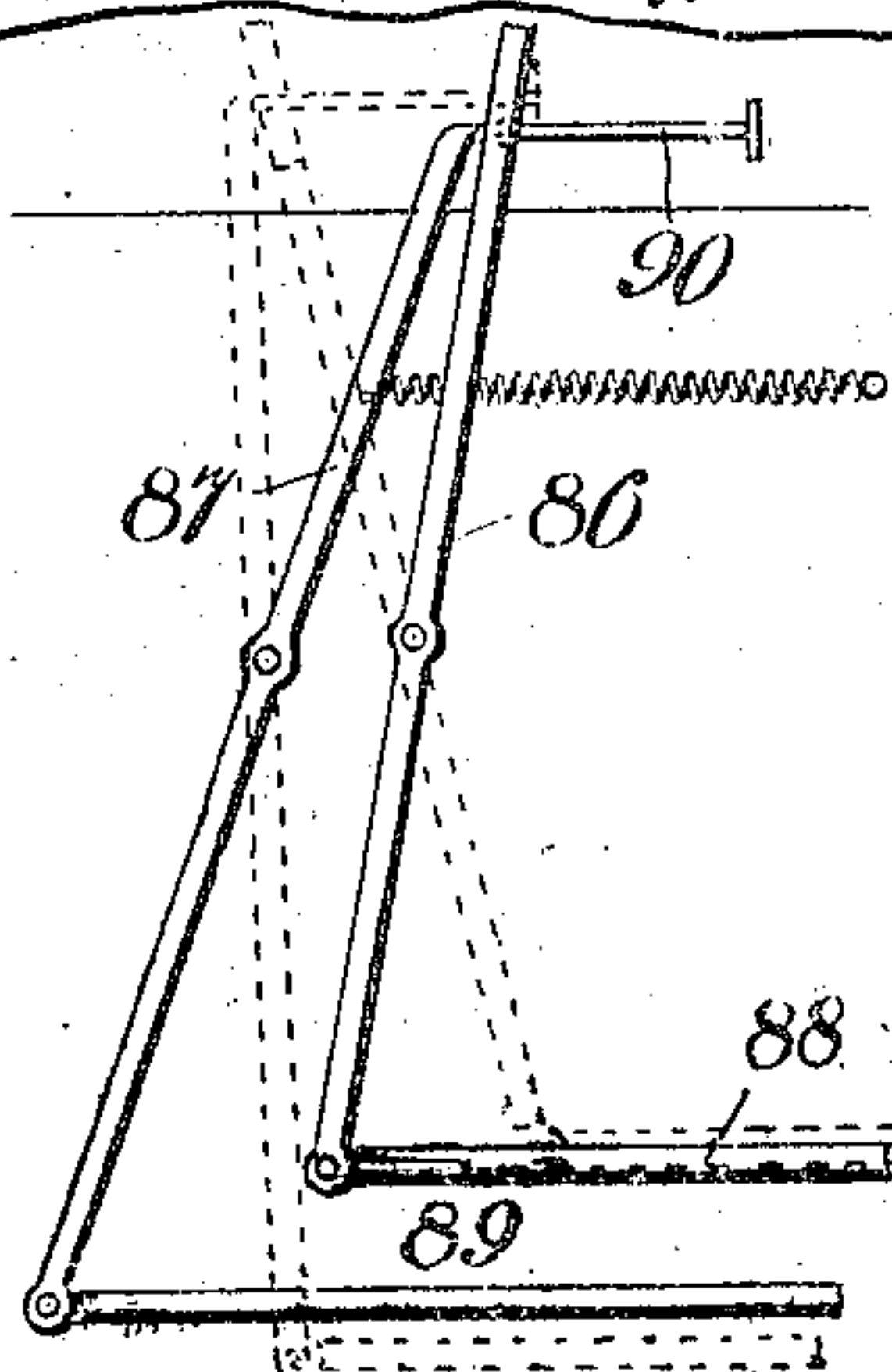


Fig. 5.



Fig. 4.



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4 SHEETS-SHEET 2.

Fig. 7.

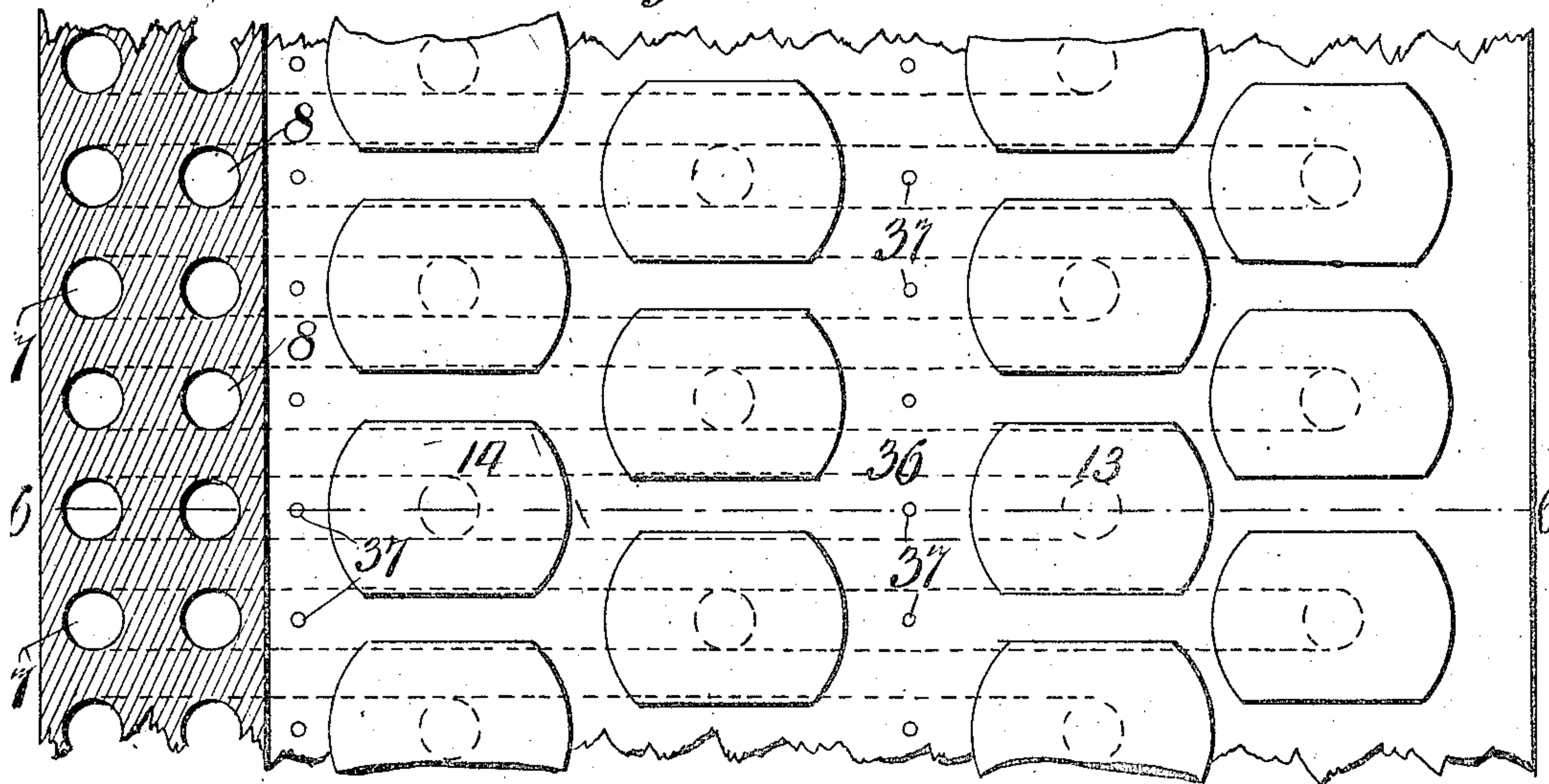
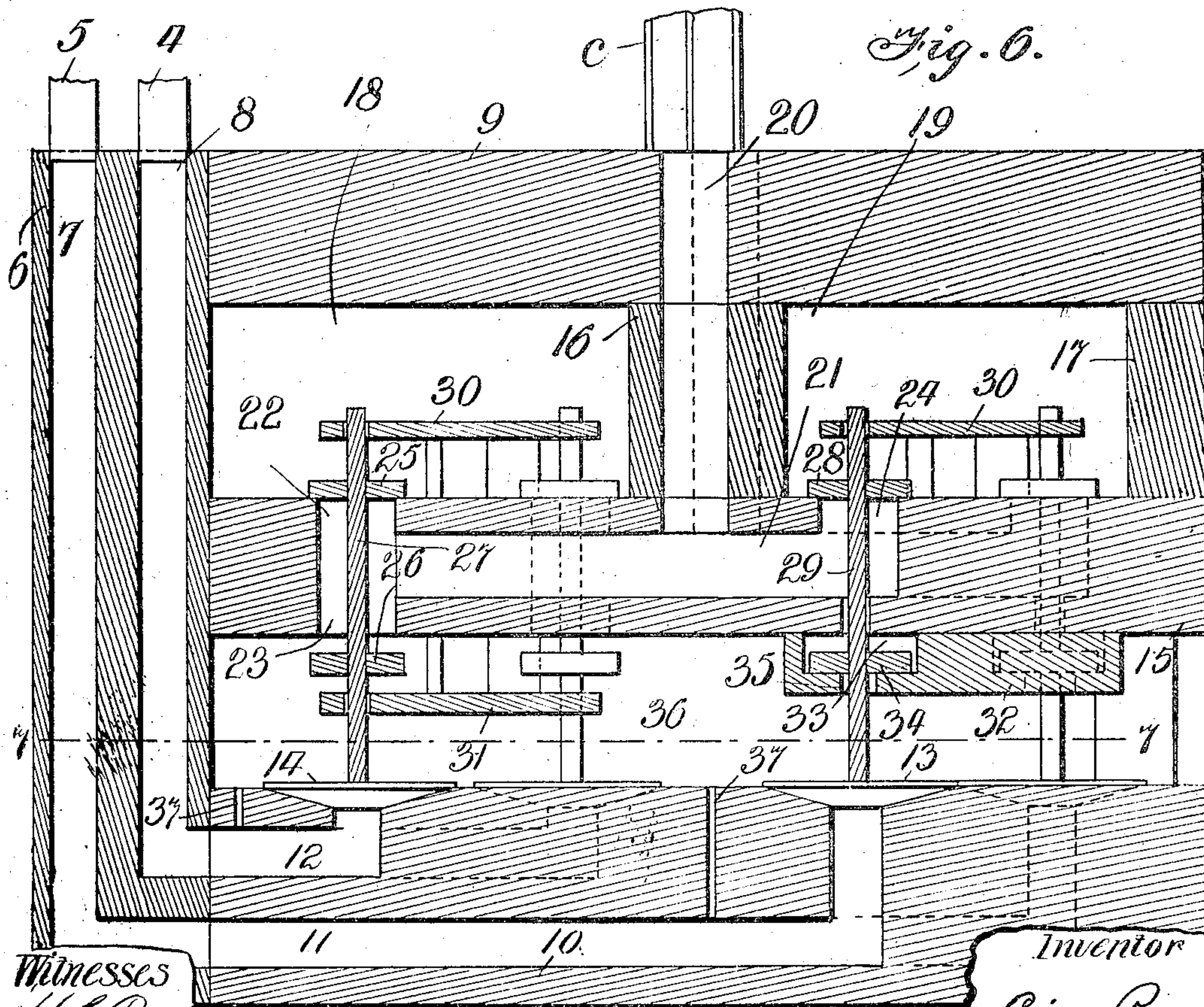


Fig. 6.



Witnesses

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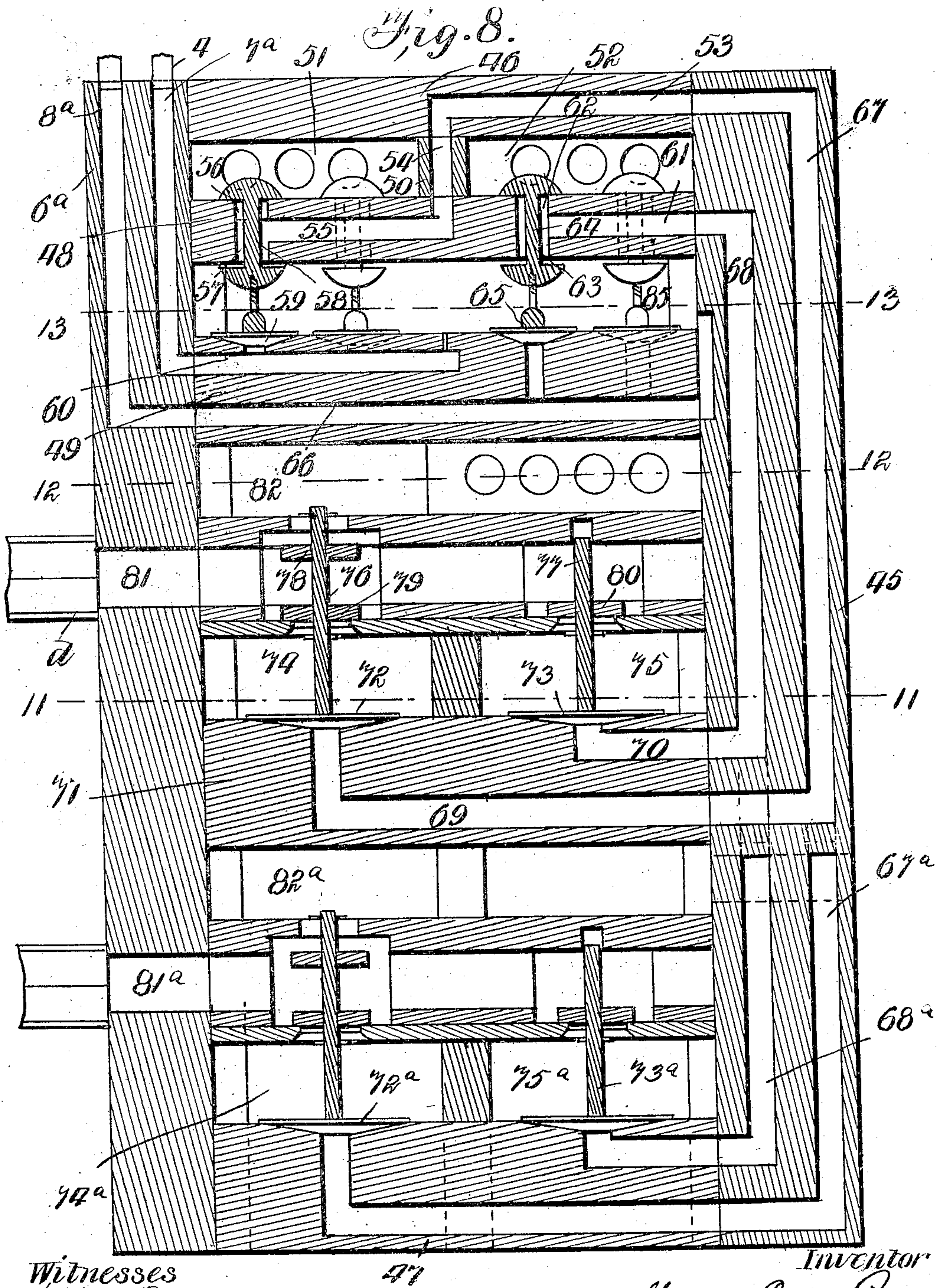
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4 SHEETS—SHEET 3



Witnesses
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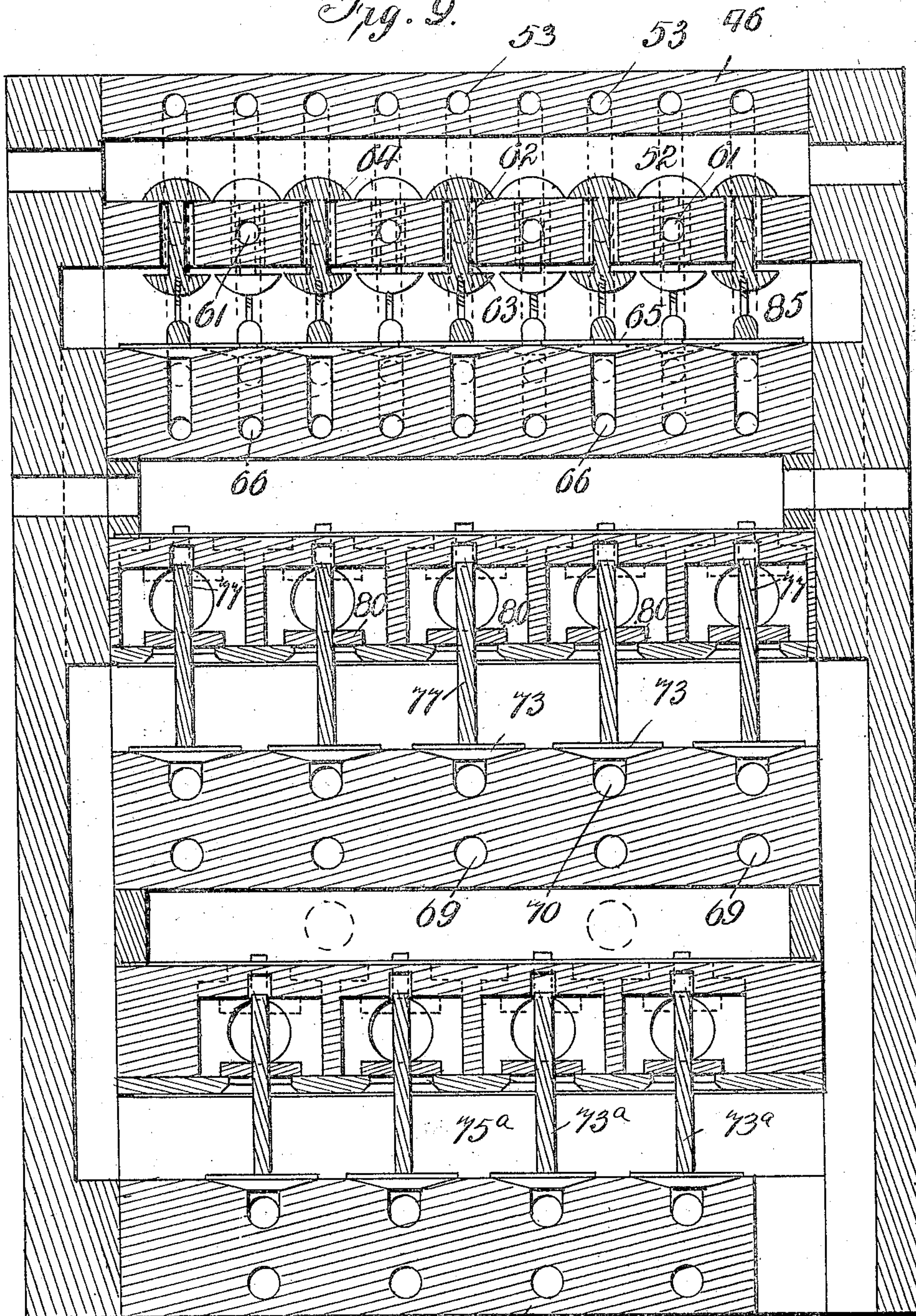
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4 SHEETS—SHEET 4.

Fig. 9.



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47

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UNITED STATES PATENT OFFICE.

GEORGE DE CAIROS REGO, OF SYDNEY, NEW SOUTH WALES, AUSTRALIA.

MECHANICAL MUSICAL INSTRUMENT.

989,874.

Specification of Letters Patent.

Patented Apr. 18, 1911.

Application filed October 23, 1902. Serial No. 129,268.

To all whom it may concern:

Be it known that I, GEORGE DE CAIROS REGO, subject of the King of Great Britain, residing at Sydney, in the Colony of New South Wales, Australia, have invented a certain new and useful Improvement in Mechanical Musical Instruments, (Case 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates in general to musical instruments, and in particular to mechanical musical instruments which are operated by the traveling of a perforated sheet of music over a tracker board or similar device having a series of ports with which the perforations in the music sheet successively register as the sheet advances. Instruments of this kind are, mechanical piano players, (frequently called self-players,) æolians, reed organs, and the like. Certain of these instruments, such as the mechanical piano players of self-players, are employed to operate the keyboard of another instrument such as a piano; in others of these instruments the traveling sheet of music is arranged in the instrument itself and produces the operation of the same.

The object of my invention is to arrange for the accentuation of any note or series, group or collection of notes, so that such note or series or group of notes will be played more loudly than the other notes in the composition. The most common application of this principle would be to accent a melody or melodic phrase so that it will stand out over the accompaniment.

In carrying out my invention as herein after more particularly set forth, I provide a duplex or double tracker board; that is, a tracker board having two like sets of ports or openings, each similar to the usual set of ports or openings in a tracker board; and I connect each set of ports or openings with the usual pneumatic apparatus or pneumatics so that the latter will be selectively actuated by the admission of air into the ports. I also provide a duplex perforated sheet of music; that is, a sheet of music adapted to extend and travel over both sets of tracker board ports; and I provide this sheet of music with two different sets or

series of perforations, one for the unaccented or the accompaniment notes, and the other for the accented or melodic notes. By such arrangement the unaccented or accompaniment perforations travel over one set of tracker board ports or openings and actuate the pneumatics in the usual way to produce the accompaniment notes, while the other set of perforations travels over the other set of tracker board ports or openings and causes the actuation of the pneumatics so as to bring about the accentuation of the notes of said second set of perforations.

As a preferred arrangement, the unaccented or accompaniment set of perforations includes all of the notes both unaccented and accented, and the accented set of perforations includes only the accented notes, and these latter perforations are placed correspondingly on the music sheet so that the corresponding notes in the two sets of perforations reach the corresponding ports simultaneously. In this way a pneumatic or pneumatic apparatus for actuating an accented note or series of notes, receives a double impulse, one from the unaccented or accompaniment set of tracker board ports, and the other from the accented or melody set of ports. This double actuation produces a distinctly harder blow, thereby causing the louder actuation of the accented or melodic note or series or group of notes.

As a matter of further and specific improvement, I desirably arrange for the control of the accented or melody notes so as to vary the loudness or prominence of the same, as well as to control the loudness of the accompaniment notes.

As another matter of further and specific improvement, I make the accented or melody perforations in the music sheet of uniform and short length, even where the corresponding accompaniment perforations are long and of ununiform length, the arrangement being such that the accented or melody perforations reach the corresponding tracker board ports at the same time that the corresponding accompaniment or unaccented perforations reach the corresponding ports. As a result the wind is economized, because it is not used in the accented or melody pneumatics after the accenting effect has been secured after the striking of the blow. I also

provide other matters of further specific improvement which will be pointed out hereinafter.

In the accompanying drawings I have shown my invention as applied to mechanical piano players or self-players, although it will be understood that I do not intend to be understood as so limiting it, as its use can be extended to other musical instruments without departing from the spirit of the invention. In as much as there are two well known and different types of mechanical piano players operating on different principles so far as the pneumatic actions are concerned, I have shown both of such types with my invention applied to each. In one type the pneumatics which operate the fingers for striking the piano keys, open to produce the striking blow, and in the other type these pneumatics close.

In the accompanying drawings, Figures 1 and 2 are respectively longitudinal and transverse sections of a portion of a mechanical piano player embodying my present invention; Fig. 3 is a plan view of the music sheet and the tracker board over which the music travels; Fig. 4 is a view of the lever arrangement for controlling the expression of both the accented and unaccented notes; Fig. 5 is a view of a printed music sheet showing the score for a player embodying the present invention; Fig. 6 is a transverse section of a portion of a player constructed with opening pneumatics, embodying my invention; Fig. 7 is a section taken on line 7-7 in Fig. 6; and Figs. 8 and 9 are transverse sections of a portion of a player provided with closing pneumatics embodying my invention.

Referring first to Figs. 1 and 2, I have shown therein a tracker board 1 which can be arranged in the usual manner in piano players. This tracker 1 is a duplex tracker, being composed of two parts *a* and *b*, each of which is similar to the tracker boards now common in mechanical piano players; that is, each part or section is provided with ports or apertures corresponding to the number of piano keys to be operated by the player. The ports in the section *a* are indicated at 2, 2, and the ports in the section *b* at 3, 3. From the tracker board 1 tubes or passages 4, 4, and 5, 5, lead downwardly, the pipes 4, 4, being extended from the section *a*, and 5, 5 from the section *b*. The tubes or pipes 4, 4, can be made either of flexible elastic material such as rubber, or of metal such as lead, as desired in the construction of the instrument. They extend downwardly from the tracker board 1 to a front board 6, which latter is provided with two sets or series of apertures or ducts 7, 7 and 8, 8, whereof the series 8, 8, is conveniently in the rear of the series 7, 7. The pipes 4, 4 and 5, 5 are connected with these

two different sets or series of apertures, the pipes 4, 4, for example, with the rear series 8, 8, and the pipes 5, 5, with the front series 7, 7, all as well shown in Figs. 1 and 2.

I will refer now more particularly to Figs. 6 and 7, which, it will be remembered, show a portion of a player whose pneumatics produce the striking blow by opening. In these figures, the front board 6 is shown arranged at one side of a structure whose top is the mounting board 9, which it is understood is the usual board upon which the pneumatics for actuating the striking fingers of the player, are arranged. One of these pneumatics *c* is shown in Fig. 6, in order to indicate their location and general arrangement. As they form no part of my present invention, they have not been shown in detail or fully. It is understood that they are the usual set or series of pneumatics for operating the striking fingers, one pneumatic for each finger. The bottom of the structure consists of the lifter board 10 provided with ducts 11, 11, and 12, 12, whereof the ducts 11, 11, connect with the apertures or ducts 7, 7, in the front board 6, and the ducts 12, 12, connect with the rear apertures 8, 8, in said front board. The lifter board 10 is provided with two sets of lifters 13, 13, and 14, 14, which are made of flexible material such as leather, in the usual manner. The lifters 13, 13, are arranged at the ends of the ports 11, 11, and the lifters 14, 14, at the ends of the ports 12, 12. The structure is provided with a valve board 15 which is arranged between the mounting board 9 and the lifter board 10. Between the mounting board 9 and valve board 15 is a partition 16 and an end wall 17; the former divides the space between the boards 9 and 15 into two chambers 18 and 19 which form wind trunks and are understood to be connected with the outside air. The space between the boards 10 and 15 is an exhaust or vacuum chest 36 and is understood to be connected with the vacuum or exhaust apparatus commonly employed in piano players. The mounting board 9 is provided with a series of apertures 20, which are understood to communicate with the finger-actuating pneumatics *c*, of the player. These apertures 20, 20, extend down through the partition 16 and are connected with cross ducts or passages 21, 21, which extend across the board 15. Each duct or passage 21 is provided with two ports 22 and 23 at one end, and a port 24 at the other end. The ports 22 and 23 are controlled by valves 25 and 26 on a valve spindle 27 supported by the lifter 14. The port 24 is controlled by a valve 28 on a valve spindle 29 carried by the lifter 13. The valve spindles 27 and 29 are provided with the usual supports and guides 30, 30 and 31, 31. A supplemental valve board 32, is arranged below and sup-

ported by the valve board 15. This supplemental board 32 is provided with a valve cell 33 containing a valve 34 on the spindle 29. This cell 33 is provided with a port 35 opening into the exhaust chest 36. The lifter board 10 is provided with the usual bleeder ports 37, 37.

Referring again to Figs. 1 and 2, a traveling sheet of music 40 is mounted upon two rolls or spools 41, 42, and extended over the tracker board in the usual way. The movement of this music 40 is effected by rotating one of the spools, as for example the spool 41, in the usual manner. The music sheet 40 is provided with two sets or series of perforations 43, 43 and 44, 44. The perforations 43, 43, register, as the music sheet is drawn along, with the ports 2, 2 in the section *a* of the tracker board, and the perforations 44, 44, register with the ports 3, 3, in the section *b* thereof. The perforations 43, 43, are for the notes which are not to be accented, which for convenience I shall call accompaniment notes, although it will be seen that this is more limiting than is required by the invention. The perforations 44, 44, are for the notes which are to be accented, which for convenience I shall term the melody notes. The accompaniment side of the music sheet has perforations corresponding to the perforations on the melody or accented side. By preference the melody perforations, however, are all short in length, whereas the corresponding perforations in the accompaniment side are of various lengths so as to give the full time value of the note.

From the foregoing the operation of the device can be seen to be as follows. As the music sheet advances the perforations 43, 43, admit air into the ports 2, 2, and thereby cause the operation of the lifters 14, 14. The operation of these latter cause the ports 22, 22 to be opened, and 23, 23 to be closed, thereby establishing communication between the accompaniment or unaccented wind trunk 18 and the pneumatics, through the ports 20, 20, thereby causing the actuation of the pneumatics. Communication with the exhaust or vacuum chest 36 at such time is prevented by the valve 34 controlling the port 35, and thereby interference with the action of the pneumatics when the lifters 14, 14, alone are operated, is prevented. At the same time that the perforations 43, 43, are causing the actuation of the pneumatics, to play the accompaniment notes, the melody perforations 44 admit air into certain of the ports 3, 3, in the section *b* of the tracker board. This causes the actuation of the lifters 13, 13, thereby actuating the valve spindles 29, 29, and connecting the ports 24, 24, also with the wind trunk 19, thereby admitting air from such wind trunk also into the port 20 and at the same time clos-

ing communication between the duct 21 and the exhaust chest 36. In as much as the melody perforations 44, 44, have their counterparts in the perforations 43, 43, the pneumatics actuating the fingers which are to play the melody, receive double or augmented or emphasized actuations, thereby causing the playing of the melody more loudly or prominently than the accompaniment. Since the perforations 44, 44, are desirably short, the melody actuations of the pneumatics are momentary only at the striking of the note, after which the melody actuation ceases; the sustaining of the accented notes during their proper time values, is accomplished by the accompaniment actuations. This effects an economy of wind and reduces the labor of operating the machine.

The scoring of music for a duplex tracker board and music sheet operating in accordance with my invention as just described, is shown in Fig. 5. In this arrangement the staves 3 and 4 bear the complete composition and are for the accompaniment section of the tracker board and music sheet; the staves 1 and 2 bear the melody notes or theme, and are for the melody or unaccented side of the tracker board and music sheet.

I will refer now to Figs. 8 and 9, in which, it will be remembered, is shown certain mechanism of a mechanical piano player operated by pneumatics which close to produce the striking blow. In this construction a front board 6^a having ducts or passages 7^a, 7^a and 8^a, 8^a, whereof the passages 7^a are connected with the tubes or pipes 4, 4, and the passages 8^a with the tubes or pipes 5, 5. The board 6^a is extended downwardly to form one side of a structure, and on the opposite side is a rear board 45. The top of the structure is formed by a top board 46, and the bottom by a bottom board 47. Below the top board 46 are a primary valve board 48 and primary lifter board 49. Between the boards 46 and 48 is a partition 50 dividing the space between said boards into wind trunks 51 and 52. The space between the boards 48 and 49 is a vacuum chamber or chest 85 and is understood to be connected with the vacuum-producing apparatus of the player. The board 46 is provided with ducts or passages 53, 53, the partition 50 with ducts or passages 54, and the board 48 with ducts or passages 55, 55, whereof the corresponding ducts or passages 53, 54 and 55 communicate with one another to form continuous ducts or passages, as shown in Fig. 8. The passages 55, 55, each have ports 56 and 57, and these are controlled by puppet valves 58, 58, actuated by lifters 59, 59, arranged on passages 60, 60, communicating with the rear front board apertures or openings 7^a, 7^a. The board 48 is also provided with passages 61, 61, each having ports 62

and 63 controlled by a puppet valve 64, actuated by lifters 65, 65 on ducts or passages 66, 66, communicating with the front ducts or passages 8^a, 8^a in the front board 6^a. The passages 53 and 61 communicate respectively with passages 67 and 68 in the rear board 45, and these in turn communicate with passages 69 and 70 in a lifter board 71. On this lifter board are arranged lifters 72, 72 and 73, 73, located in exhaust chests 74 and 75 respectively. The lifters 72, 72 and 73, 73 control valve spindles 76, 76 and 77, 77, having valves 78 and 79, and 80 respectively. Above the exhaust chests 74, 75 are ducts or passages 81, 81, which are understood to communicate with part of the usual set of pneumatics *d*, *d* which operate the striking fingers. Above the passage 81 is an air trunk 82 which is understood to communicate with the outside air. Below the lifter board 71 is another wind chest 82^a, other pneumatic ducts or passages 81^a, 81^a, exhaust chests 74^a and 75^a, and lifters and valves 72^a, 72^a, 73^a, 73^a, etc., corresponding to the wind trunk 82, the passages 81, 81, etc. The passages 81^a, 81^a communicate with the other portion of the set of pneumatics *d*, *d*. The lower pneumatic passages 81^a, 81^a and controlling valve mechanisms communicate, by means of ducts or passages 7^a and 8^a arranged between the ports or passages 7^a and 8^a controlling the pneumatic passages 81, 81.

The arrangement herein shown operates on the same general principles as that set forth in connection with Figs. 6 and 7. The accompaniment perforations 43, 43, in the music sheet cause the operation of the lifters 59, 59, thereby admitting air into the passages 55, 55, and actuating the lifters 72, 72, as a result of which communication with the passages 81, 81, is cut off from the wind trunk 82 and opened to the accompaniment exhaust chest 74, thereby causing the pneumatics to be exhausted and collapsed or closed. In a similar way the melody perforations 44, 44, cause the operation of the lifters 65, 65, thereby closing the passages 68, 68, to the vacuum chest 85 and opening them to the wind trunk 52, whereby air will be admitted to the passages 68, 68, thereby operating the lifters 73, 73, and opening the melody exhaust chest 75 to the passages 81, 81, thus hastening and strengthening the collapse of certain pneumatics, and causing the melody notes to be struck harder and more forcibly than the accompaniment notes. It will be seen that the only communication between the wind trunk 82 and the pneumatic passages 81, 81, is by way of ports controlled by the accompaniment valves 78, 78, whereby the operation of the accompaniment notes is not interfered with by the melody valve mechanism.

In Fig. 4 I have shown an arrangement for controlling the wind in the wind chests

18 and 19, in the arrangement of Figs. 6 and 7, and in the exhaust chests 74, 75 in the arrangement of Figs. 8 and 9. In this arrangement there are two levers 86 and 87 whereof the lever 86 is to control the accompaniment notes, and the lever 87 to control the melody notes. These two levers are shown as being connected with links 88, and 89 respectively, which it is understood are connected with valves suitably located in the wind trunks or vacuum chests as required. These valves are not shown in the drawings, as the part of the player in which they are located is not shown; but it will be understood that they can be any suitable form of controlling valve, such for example as simple slide valves adapted to move back and forth across the various passages, to open them to a greater or less extent as desired. The levers 86 and 87 are led to the top and front of the player in any desired manner, and the lever 87 has a bent end 90 extending through a slit near the top of the lever 86. The control is effected by shifting either or both of these levers as required. The arrangement is such that this can be done readily by placing the top of the lever 86 between two of the fingers of the left hand and operating the lever 87 by the thumb of the same hand, thereby placing the entire expression in the control of one hand, and permitting a variation relatively between the accompaniment and melody parts as desired.

It will be seen by the foregoing, that I provide a simple, practical and effective manner of allowing the accent of any note or series or group of notes. It will be understood that I do not intend to limit myself to the arrangement herein set forth, as the same can be modified, varied or changed, without departing from the spirit of my invention.

What I claim as my invention is:—

1. The combination with a duplicate tracker board, and duplicate sets of passages leading therefrom, of pneumatic key-striking mechanisms, two pneumatic ducts or chambers, a third duct or chamber, passages leading to the pneumatic key-striking mechanisms, and two valve systems, one of which opens and closes said passages to one of said pneumatic ducts or chambers and said third duct, to control said systems, and the other of which valve systems opens and closes the other pneumatic duct or chamber to said passages so as to coöperate with the first-mentioned valve mechanisms to cause the second pneumatic duct or chamber to intensify certain actuations of the key-striking mechanisms, substantially as described.

2. In a mechanical musical instrument, the combination with the pneumatically operated key-striking mechanism, of two wind systems, a duplicate tracker system governing said striking mechanisms through the

agency of said two wind systems, valves for
controlling said two wind systems, and le-
vers controlling said valves, said levers be-
ing associated and one of the same being
5 bent and the other having an aperture
through which the bent end of the first lever
is extended.

In witness whereof, I hereunto subscribe
my name this 17th day of October A. D.,
1902.

GEORGE DE CAIROS REGO.

Witnesses:

NELSON BOOTH,
A. MILLER BELFIELD.
