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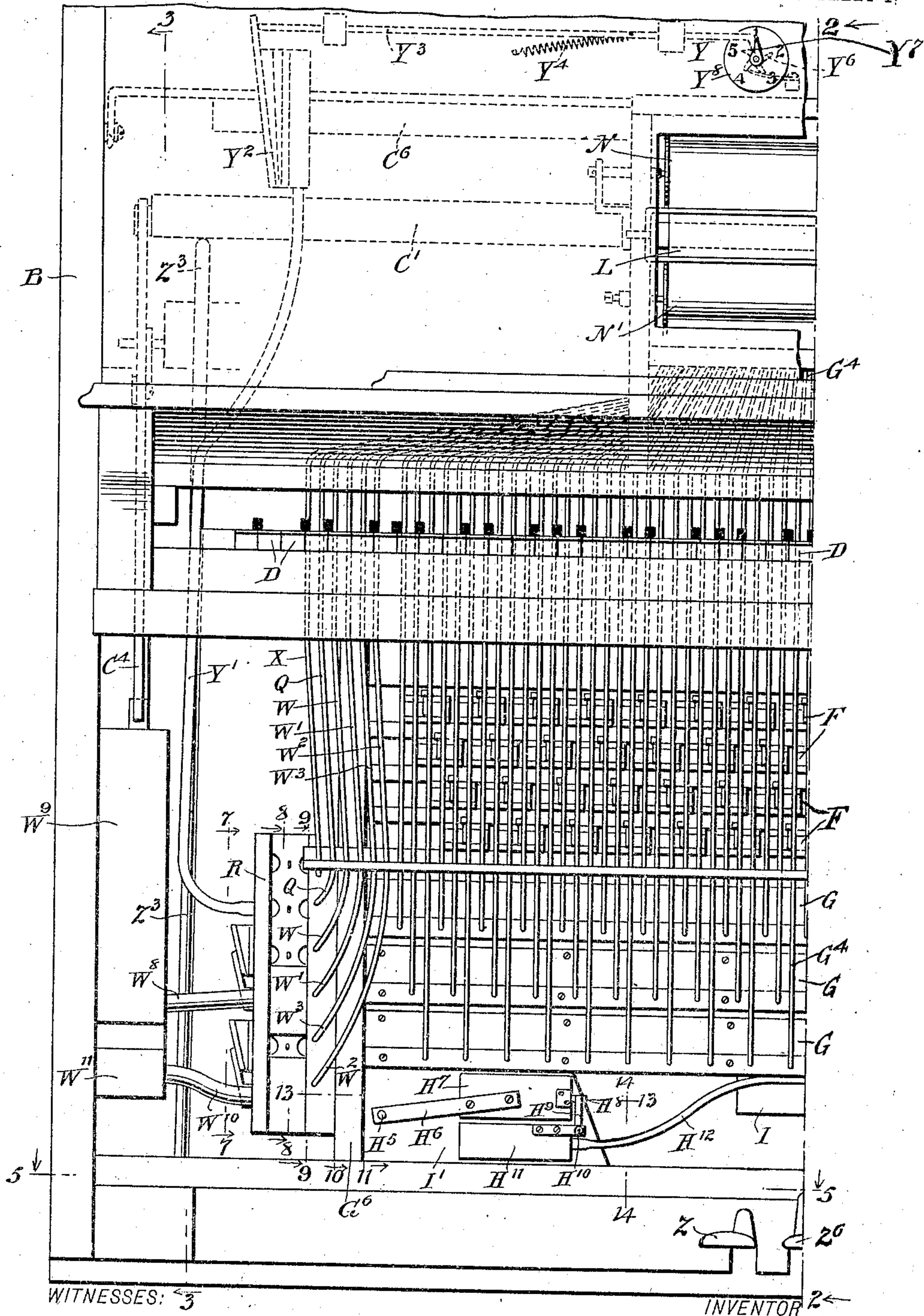
PATENTED MAR. 19, 1907.

H. MEYER.

SELF PLAYING PIANO.

APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 1.



WITNESSES: 3

INVENTOR 2

Edward Thorpe,
Rev. J. H. H. H.

Fig. 1.

Hermann Meyer
BY *Mumma*
ATTORNEYS

No. 847,798.

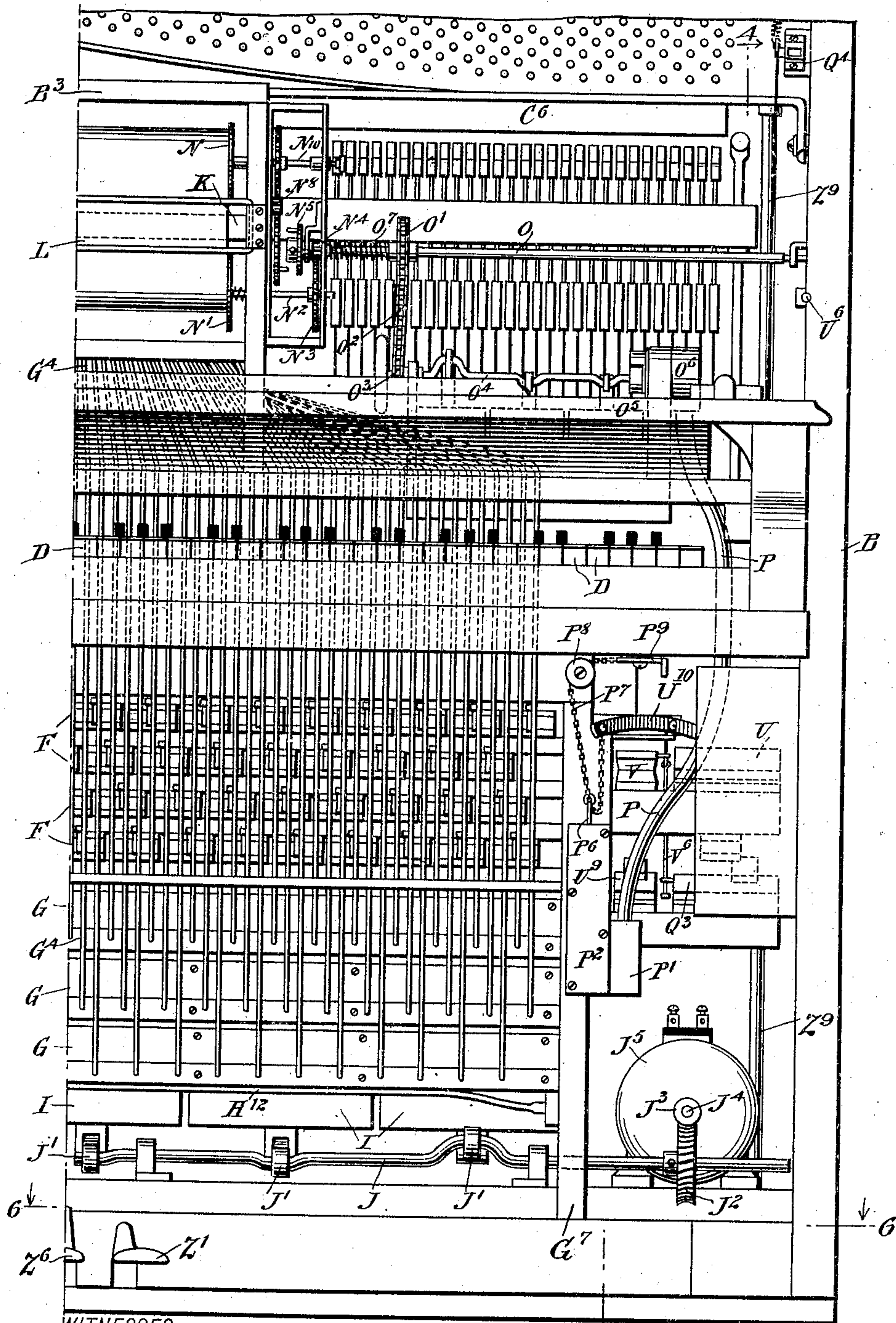
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16 SHEETS—SHEET 2.



WITNESSES:

Fig. 1^a

INVENTOR

Edward Thorpe.
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No. 847,798.

PATENTED MAR. 19, 1907.

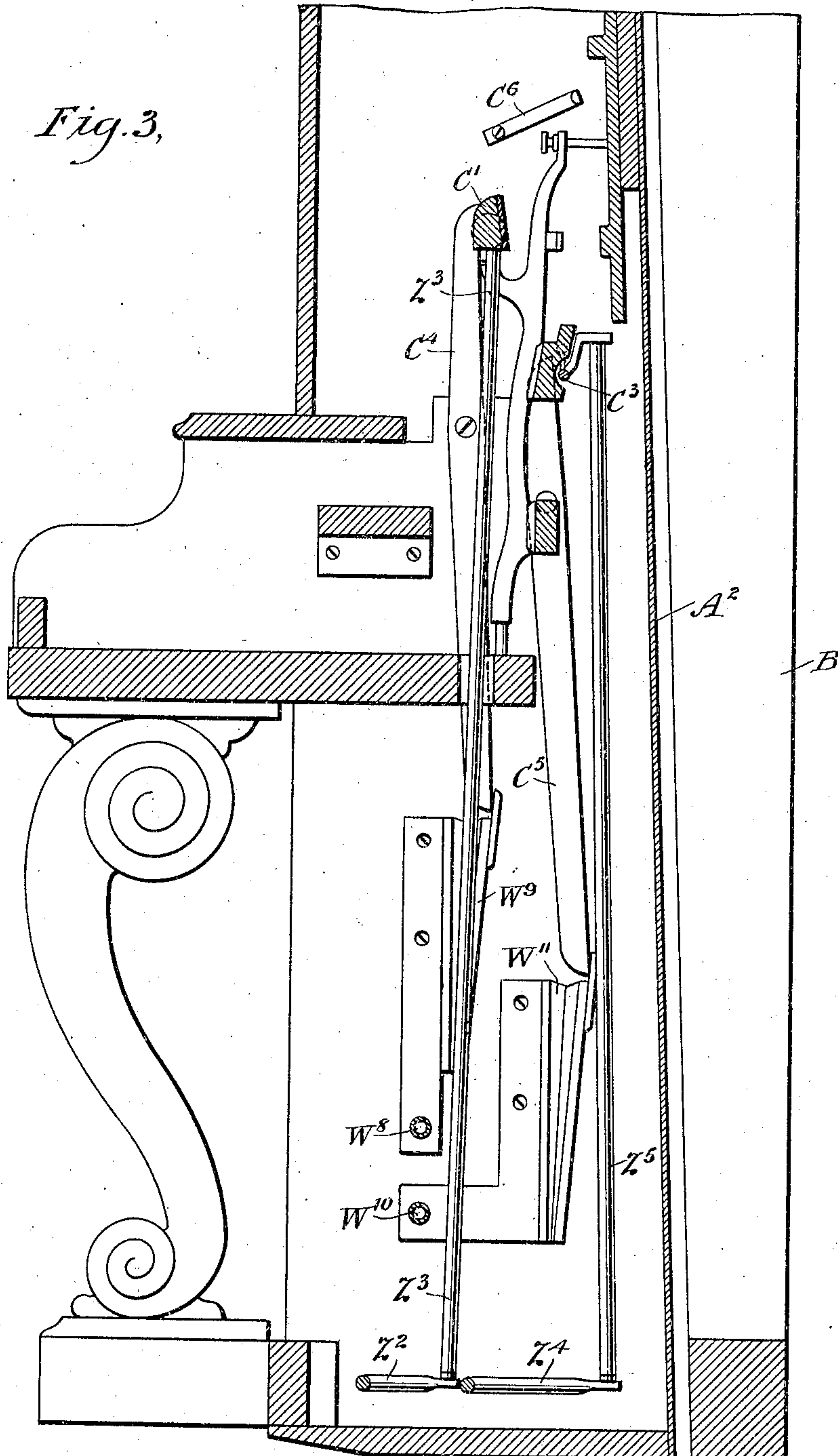
H. MEYER.

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16 SHEETS—SHEET 4.

Fig. 3,



WITNESSES:

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Prof. Hosh...

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No. 847,798.

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H. MEYER.
SELF PLAYING PIANO.

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16 SHEETS—SHEET 5.

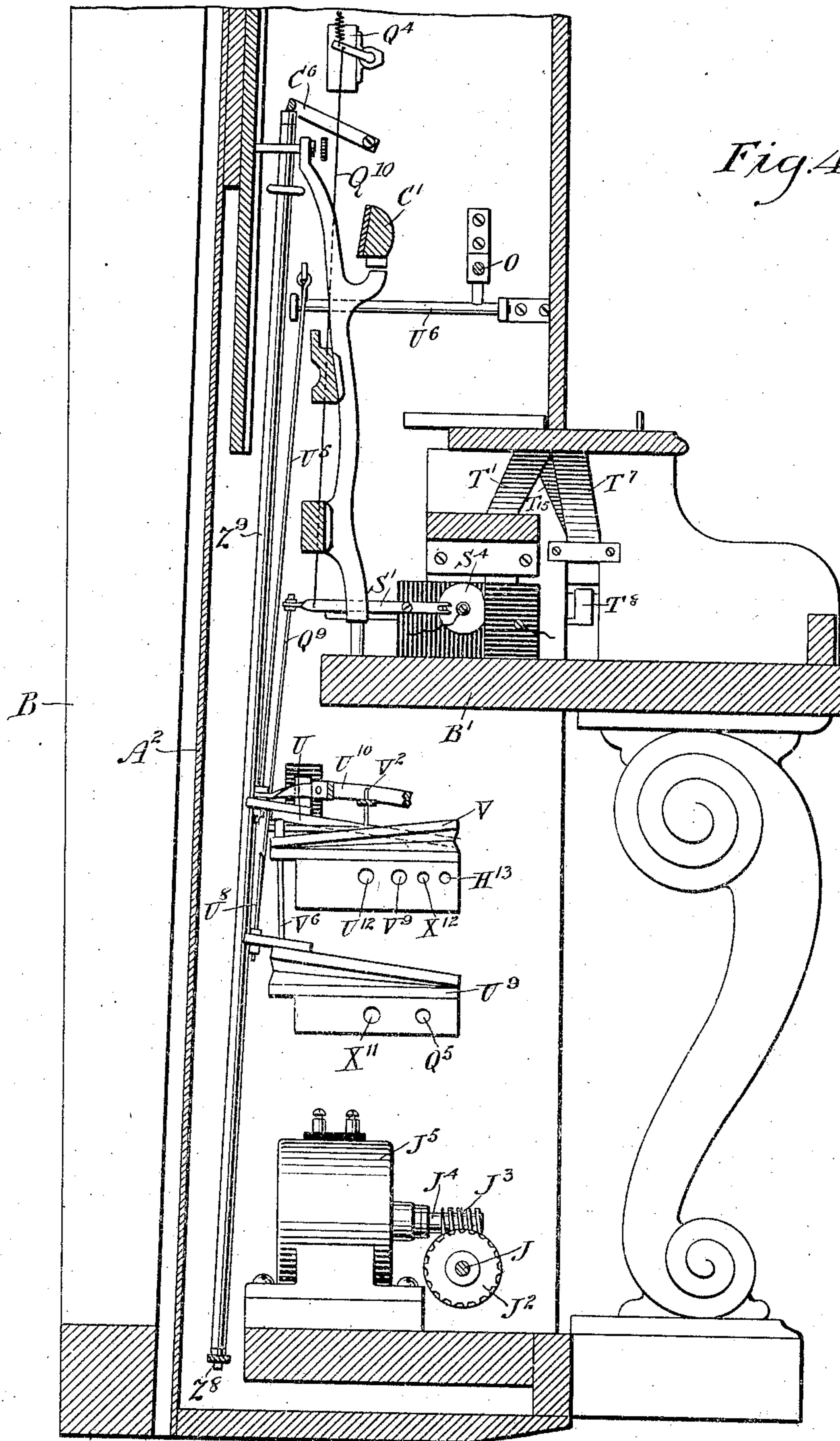


Fig. 4.

WITNESSES:

Edward Thorpe
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No. 847,798.

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H. MEYER.
SELF PLAYING PIANO.
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16 SHEETS—SHEET 6.

Fig. 5,

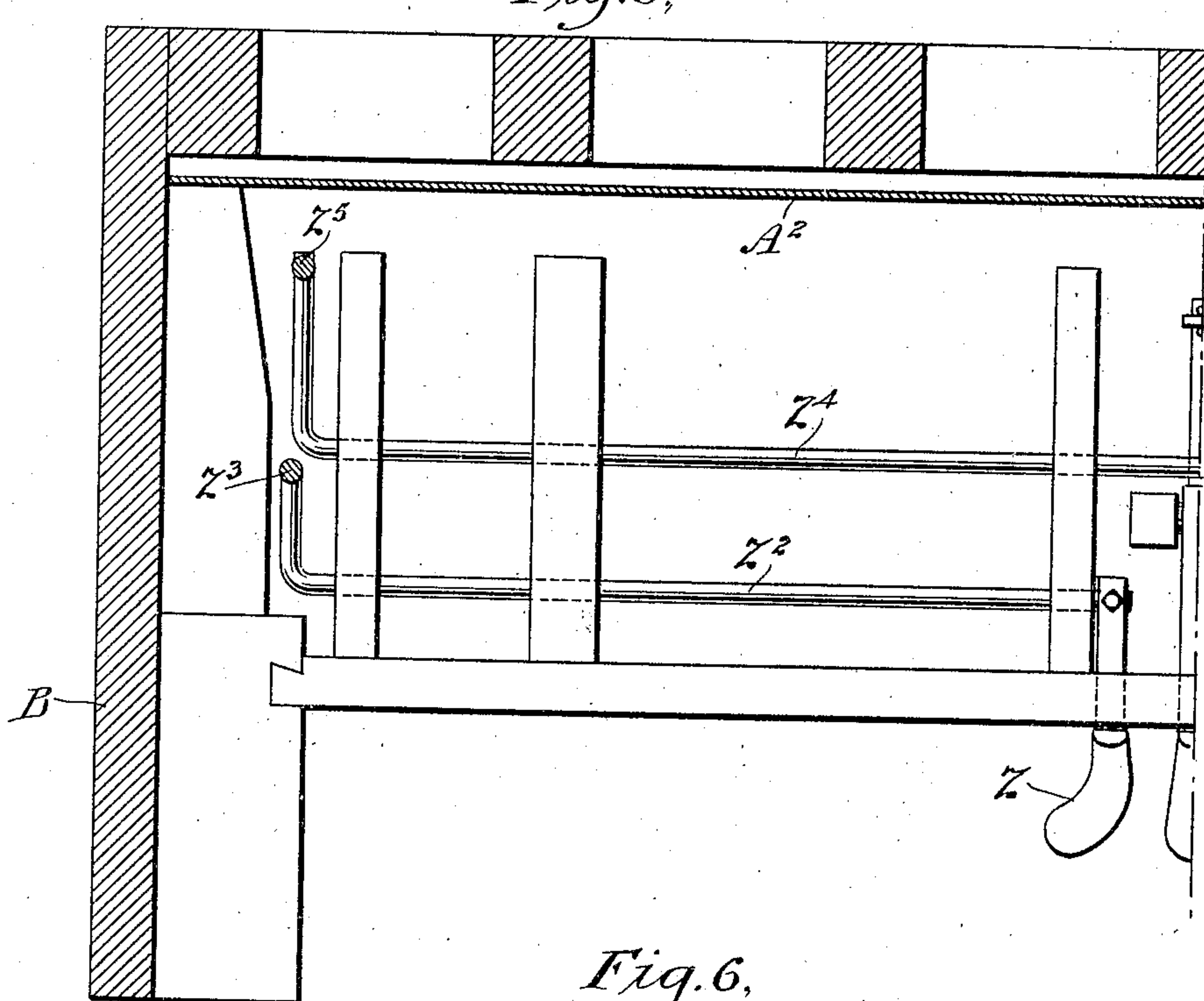
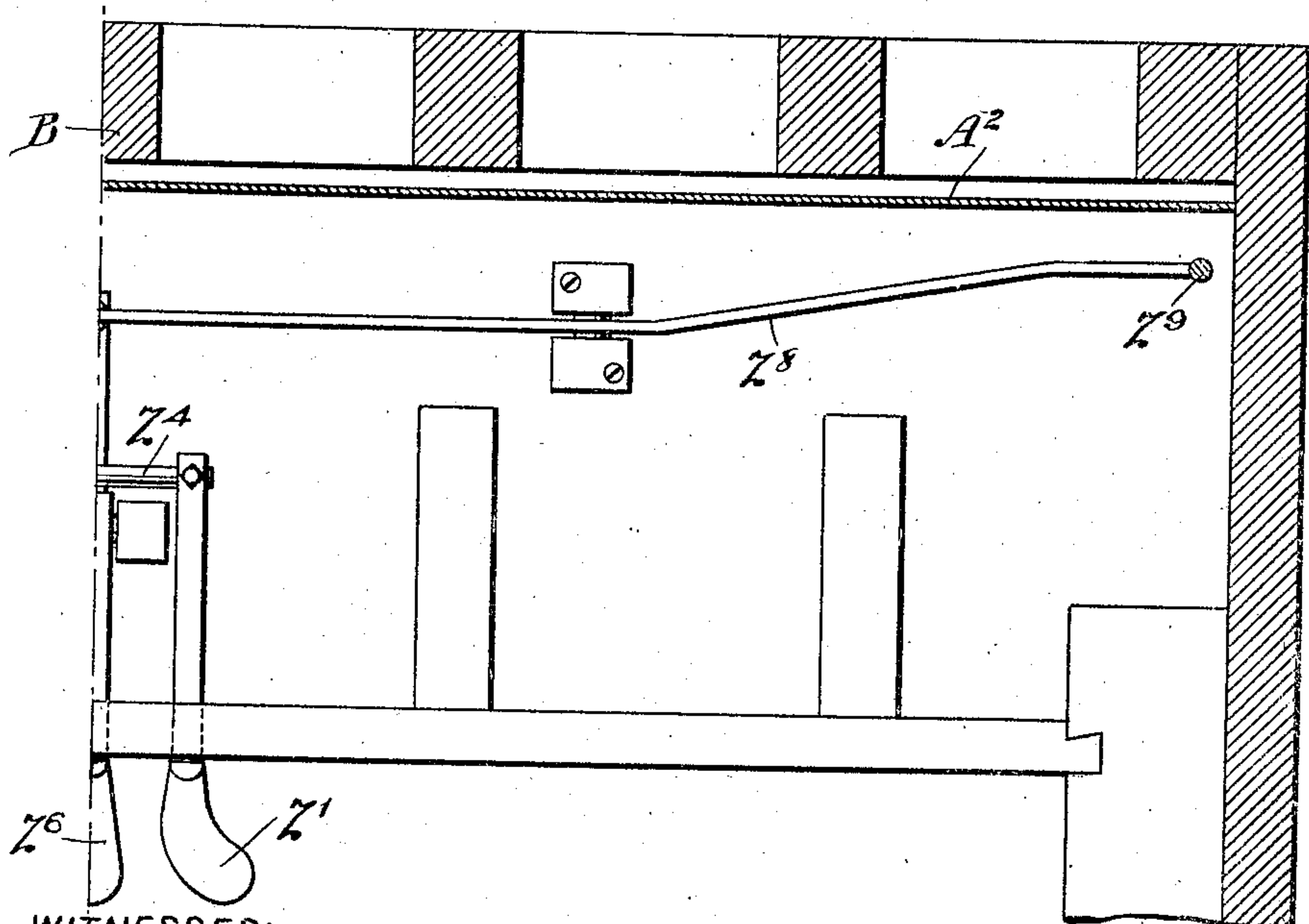


Fig. 6,



WITNESSES:

Edward Thorpe
Rev. J. H. H. H.

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M. M. M.
ATTORNEYS

No. 847,798.

PATENTED MAR. 19, 1907.

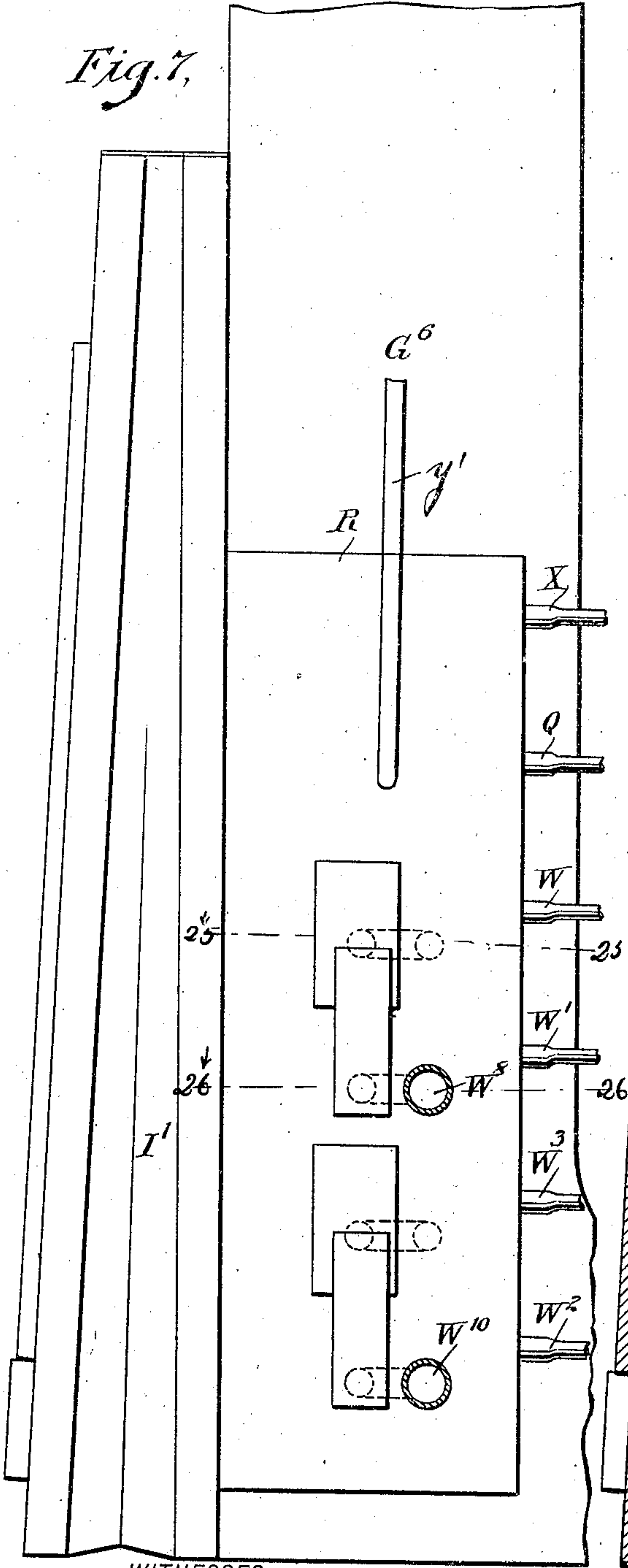
H. MEYER.

SELF PLAYING PIANO.

APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 7.

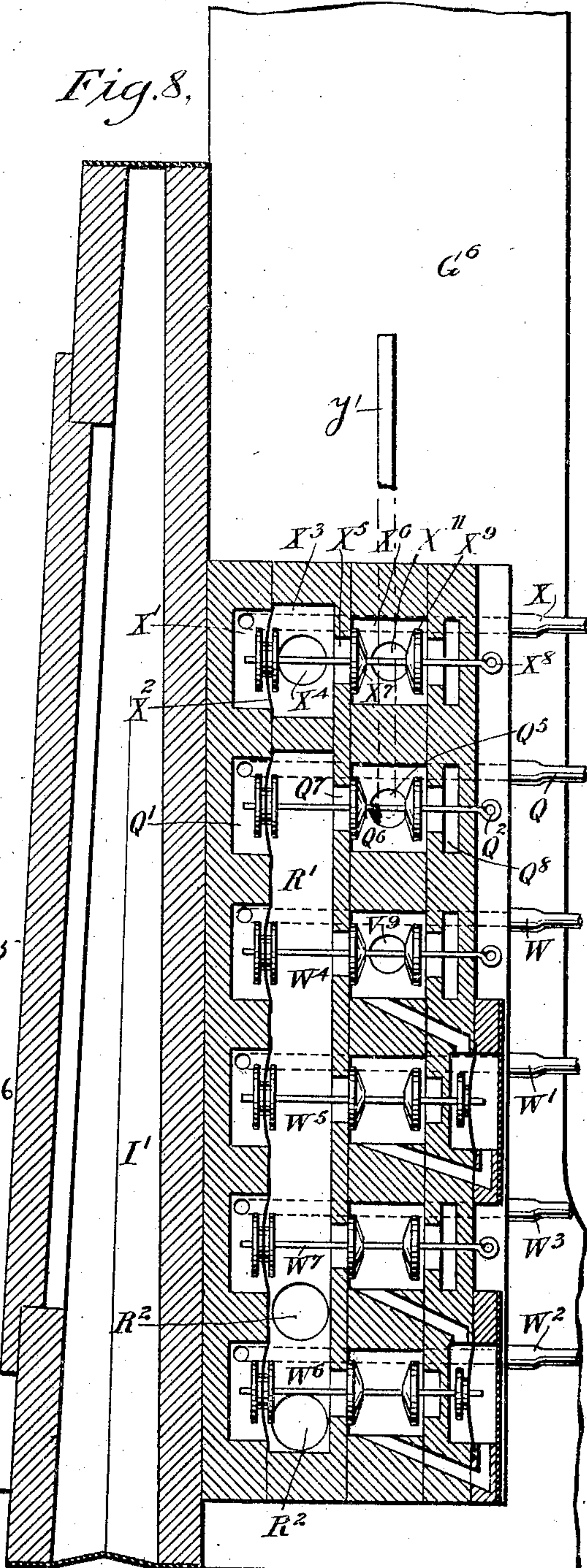
Fig. 7.



WITNESSES:

Edward Thorpe.
Geo. J. Hooper,

Fig. 8.



INVENTOR

Hermann Meyer

BY

Mumm

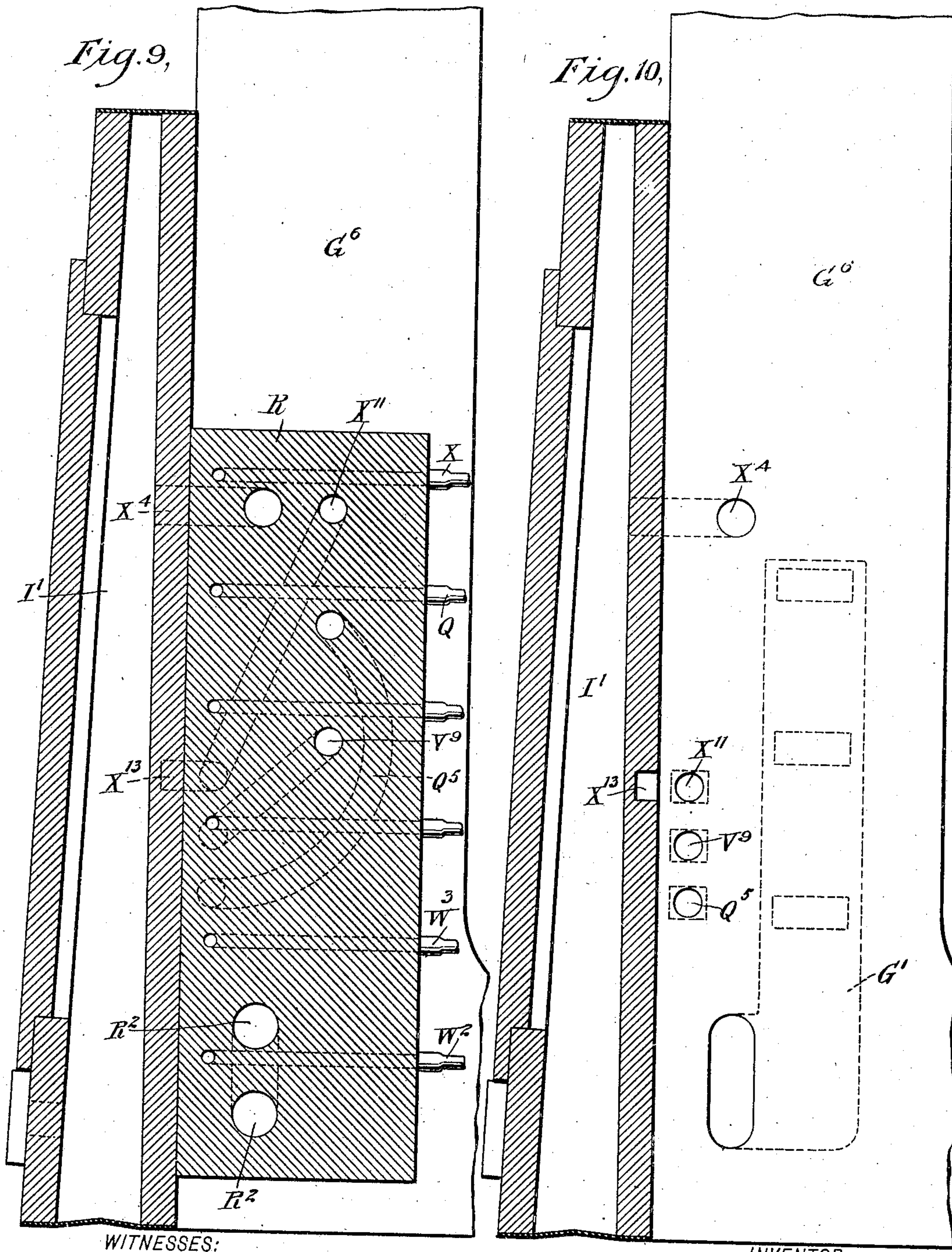
ATTORNEYS

No. 847,798.

PATENTED MAR. 19, 1907.

H. MEYER.
SELF PLAYING PIANO.
APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 8.



WITNESSES:

Edward Thorpe
Geo. J. Foster

INVENTOR

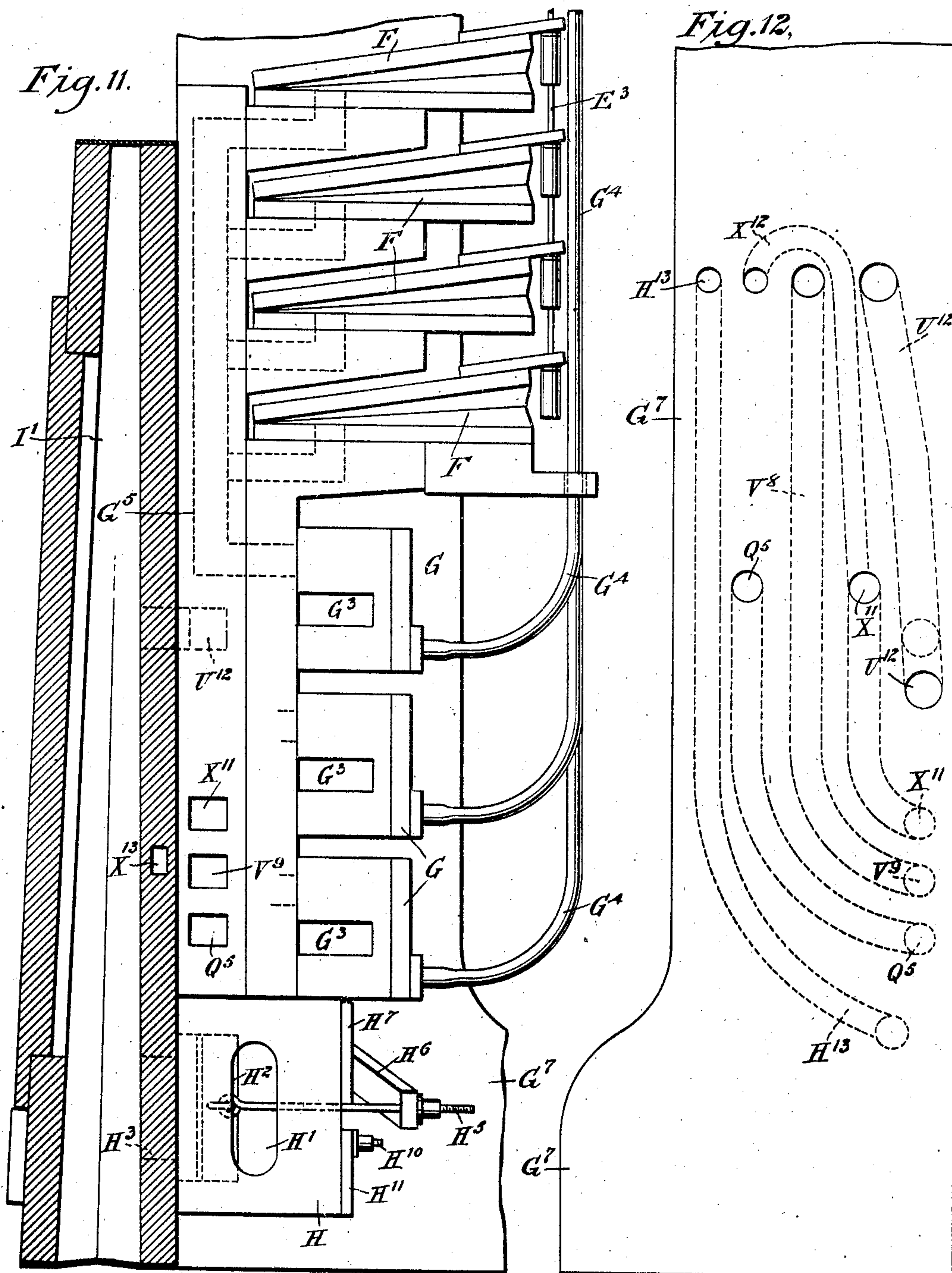
Hermann Meyer
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ATTORNEYS

No. 847,798.

PATENTED MAR. 19, 1907.

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SELF PLAYING PIANO.
APPLICATION FILED AUG. 3, 1906.

16 SHEETS—SHEET 9.



WITNESSES:

Edward Thorpe.
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No. 847,798.

PATENTED MAR. 19, 1907.

H. MEYER.
SELF PLAYING PIANO.
APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 10.

Fig. 13,

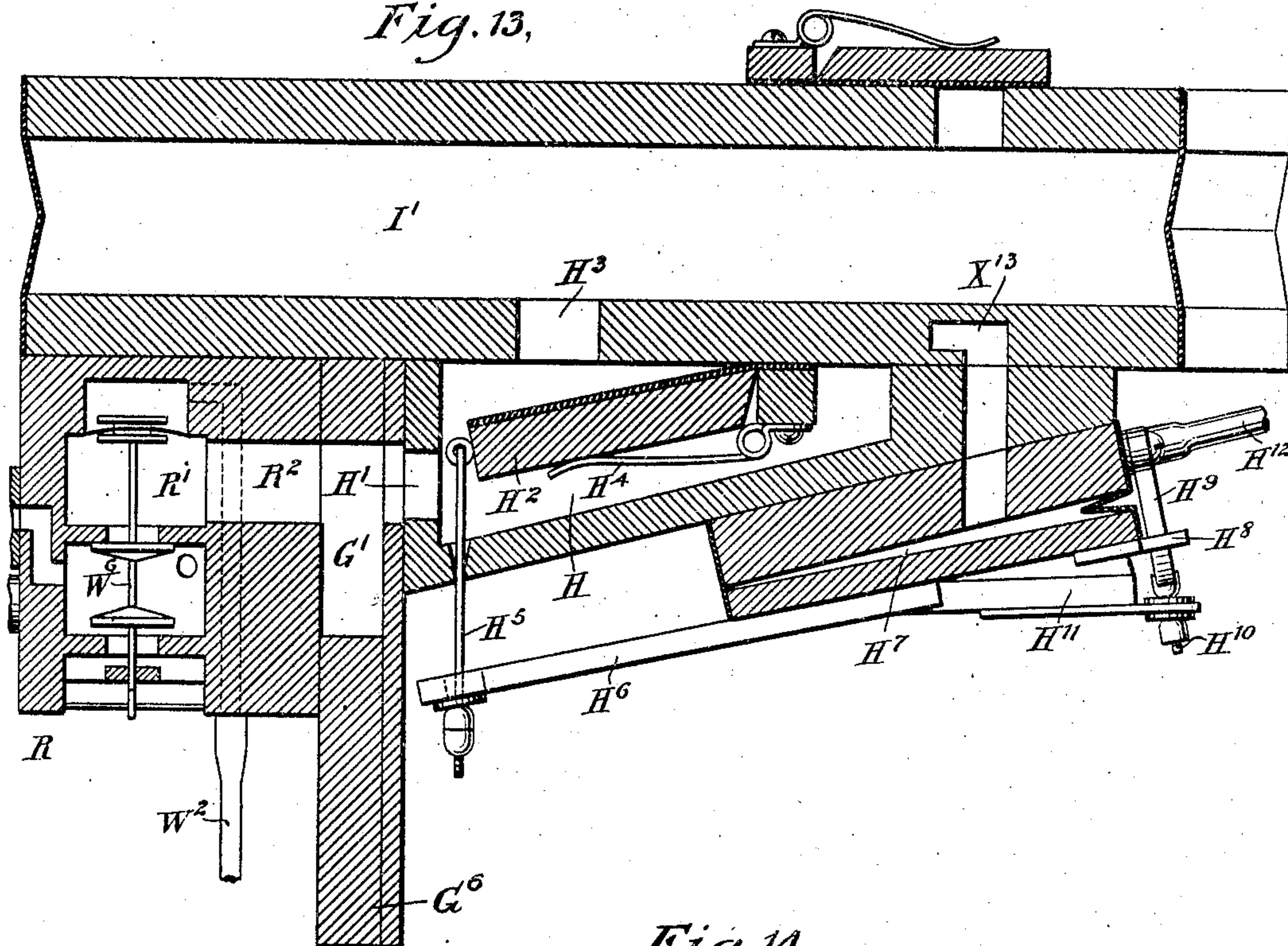
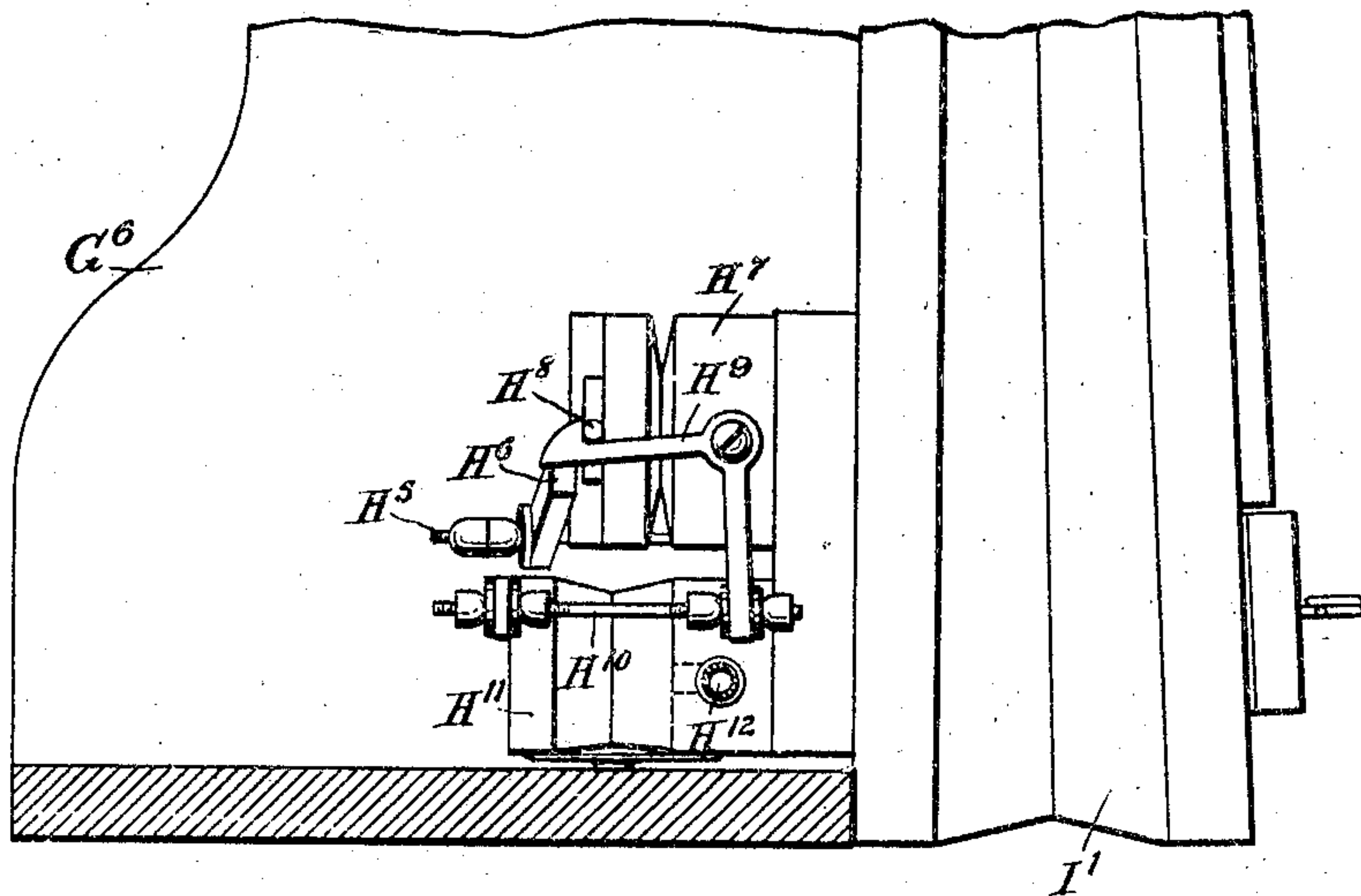


Fig. 14,



WITNESSES:

Edward Thorpe.
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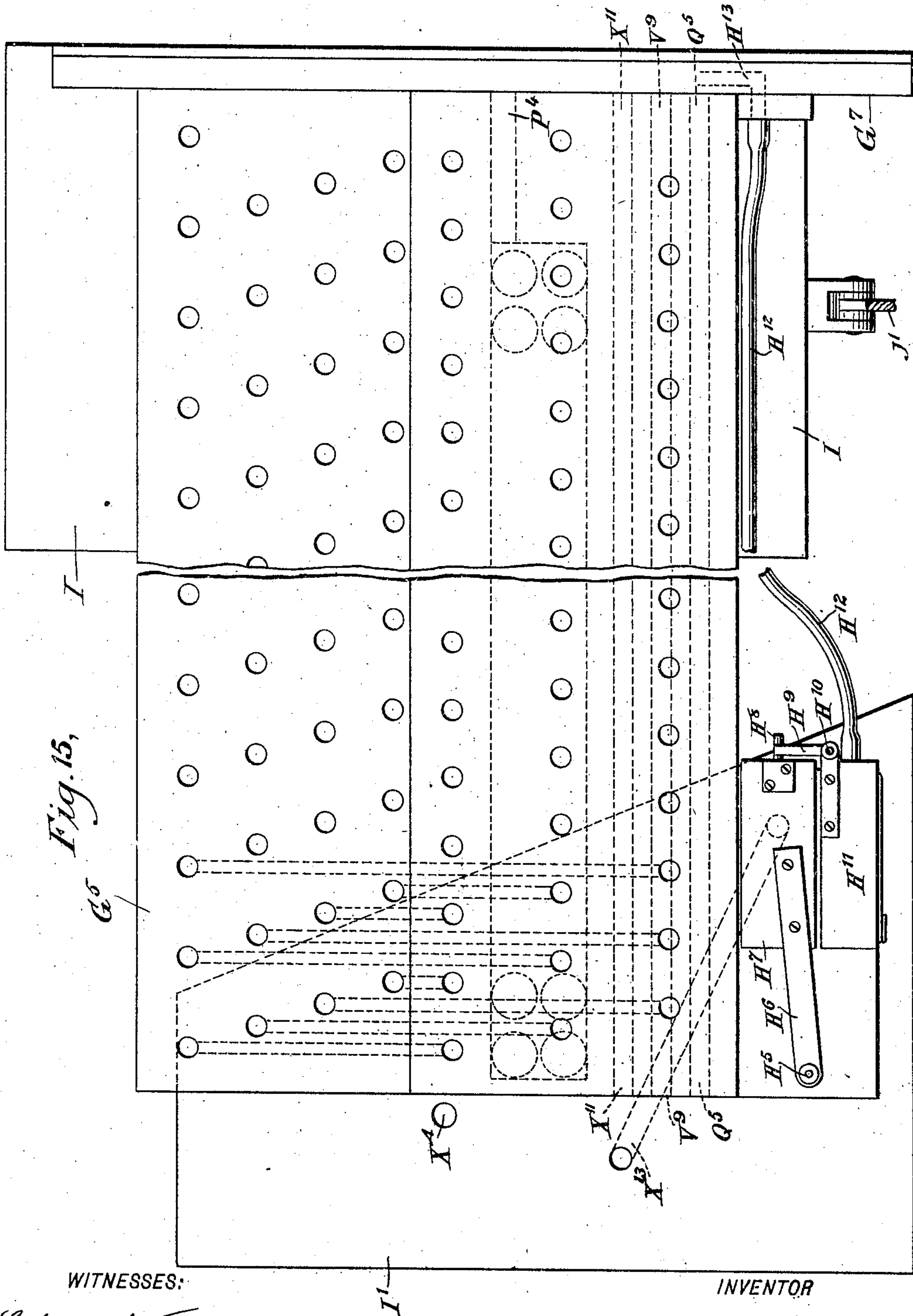
PATENTED MAR. 19, 1907.

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APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 11.



WITNESSES:

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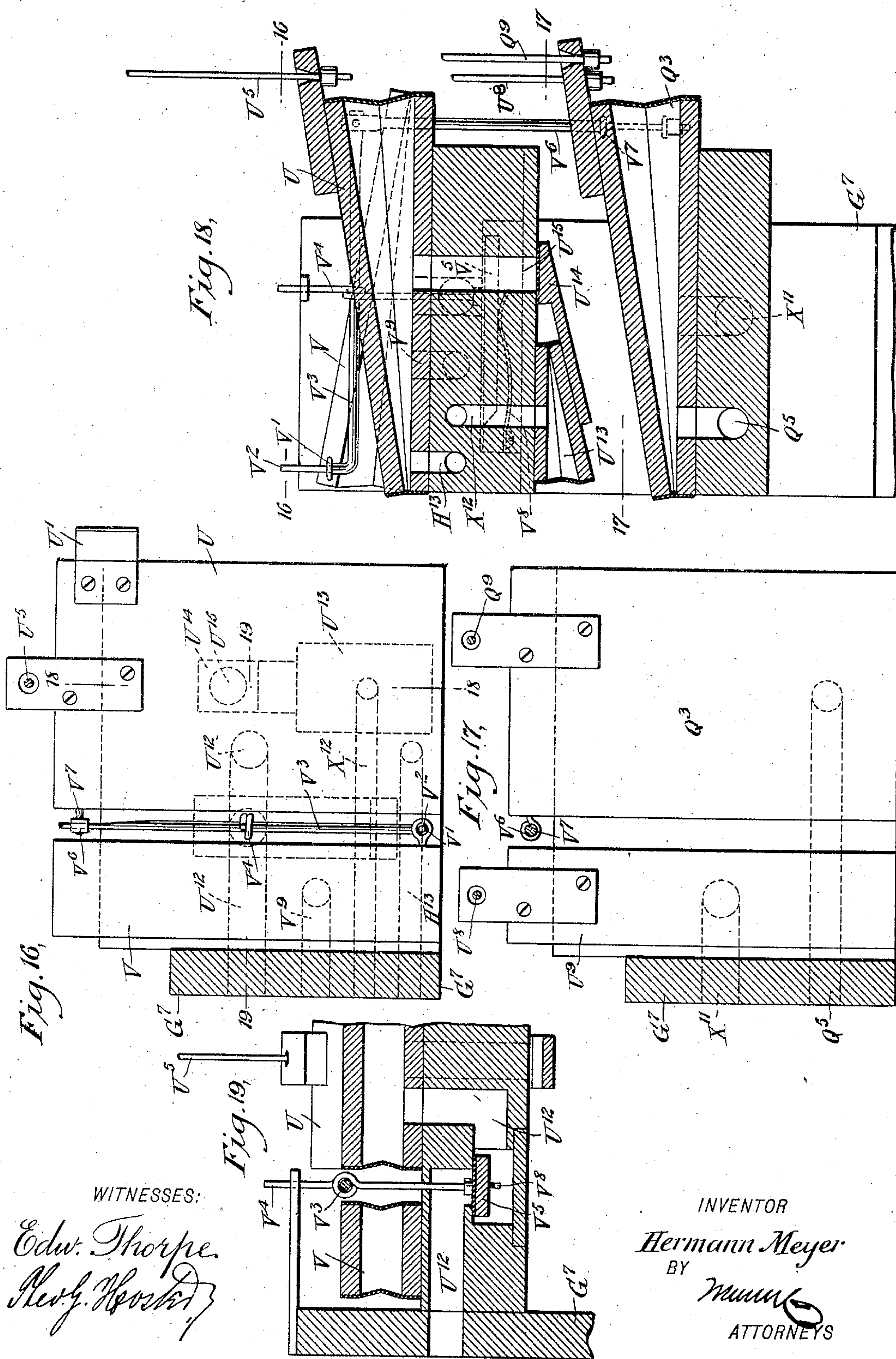
PATENTED MAR. 19, 1907.

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APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 12.



WITNESSES:

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Rev. J. Horner }

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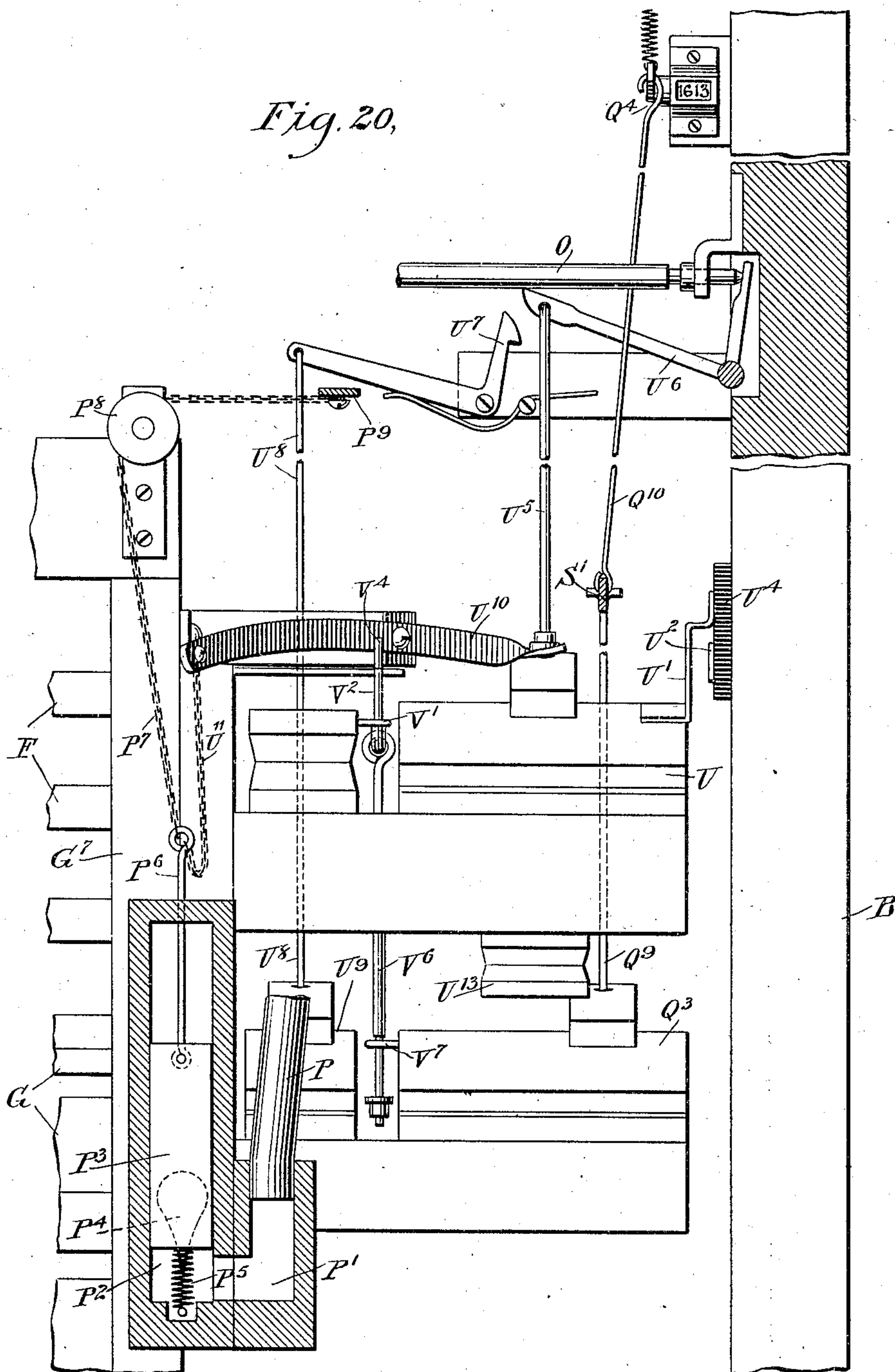
No. 847,798.

PATENTED MAR. 19, 1907.

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SELF PLAYING PIANO.
APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 13.

Fig. 20,



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APPLICATION FILED AUG. 3, 1906.

16 SHEETS—SHEET 14.

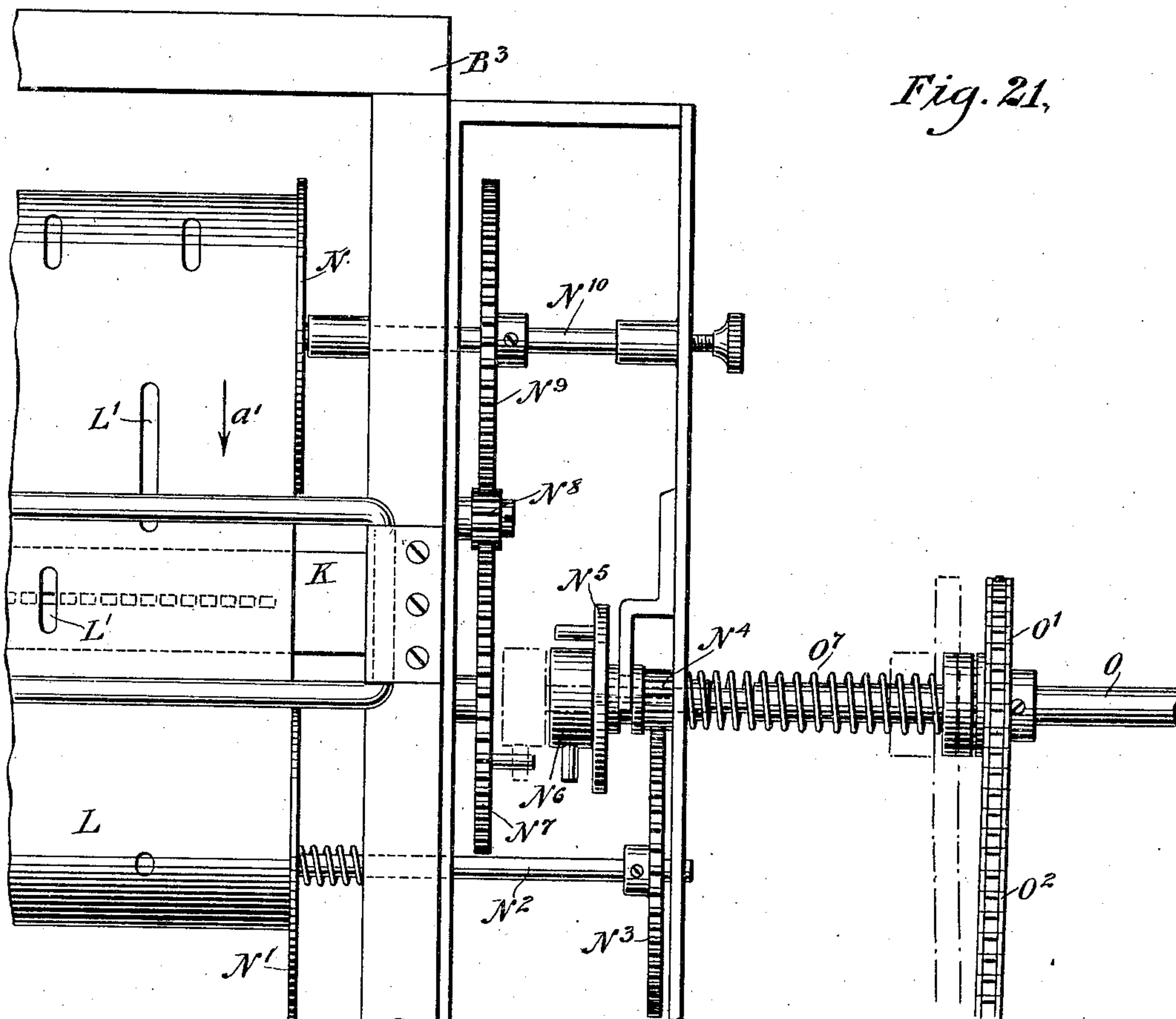
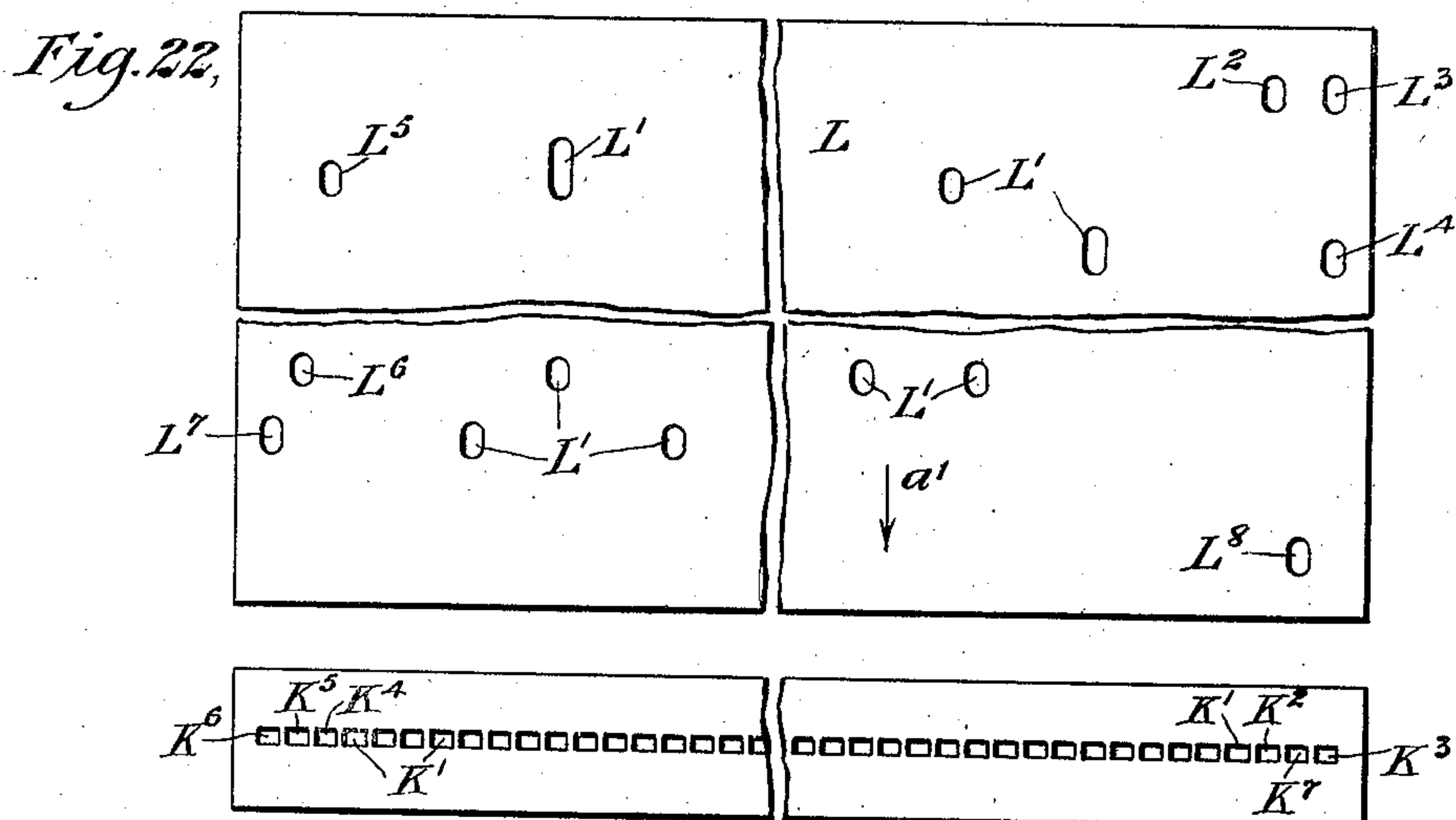


Fig. 21.



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SELF PLAYING PIANO.
APPLICATION FILED AUG. 3, 1905.

PATENTED MAR. 19, 1907.

16 SHEETS—SHEET 15.

Fig. 23,

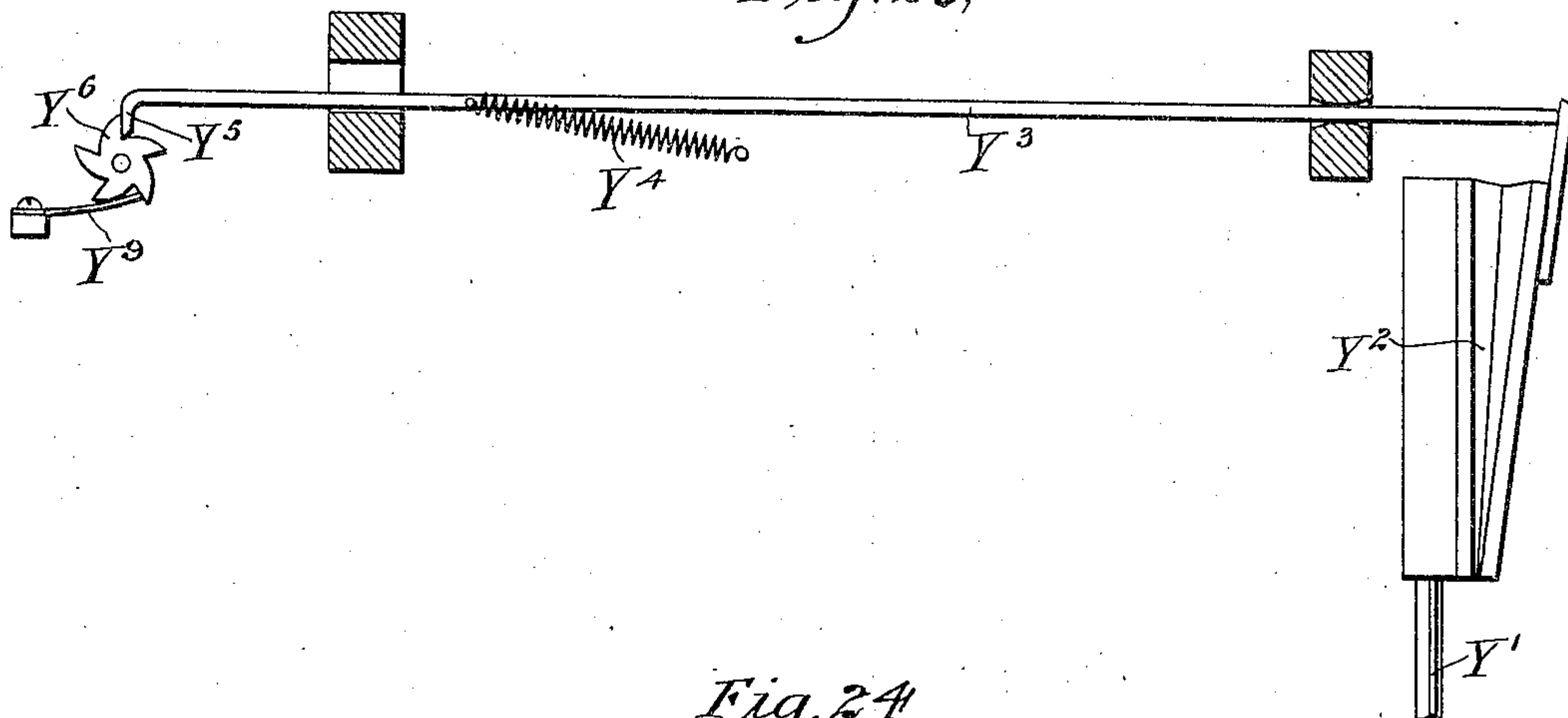
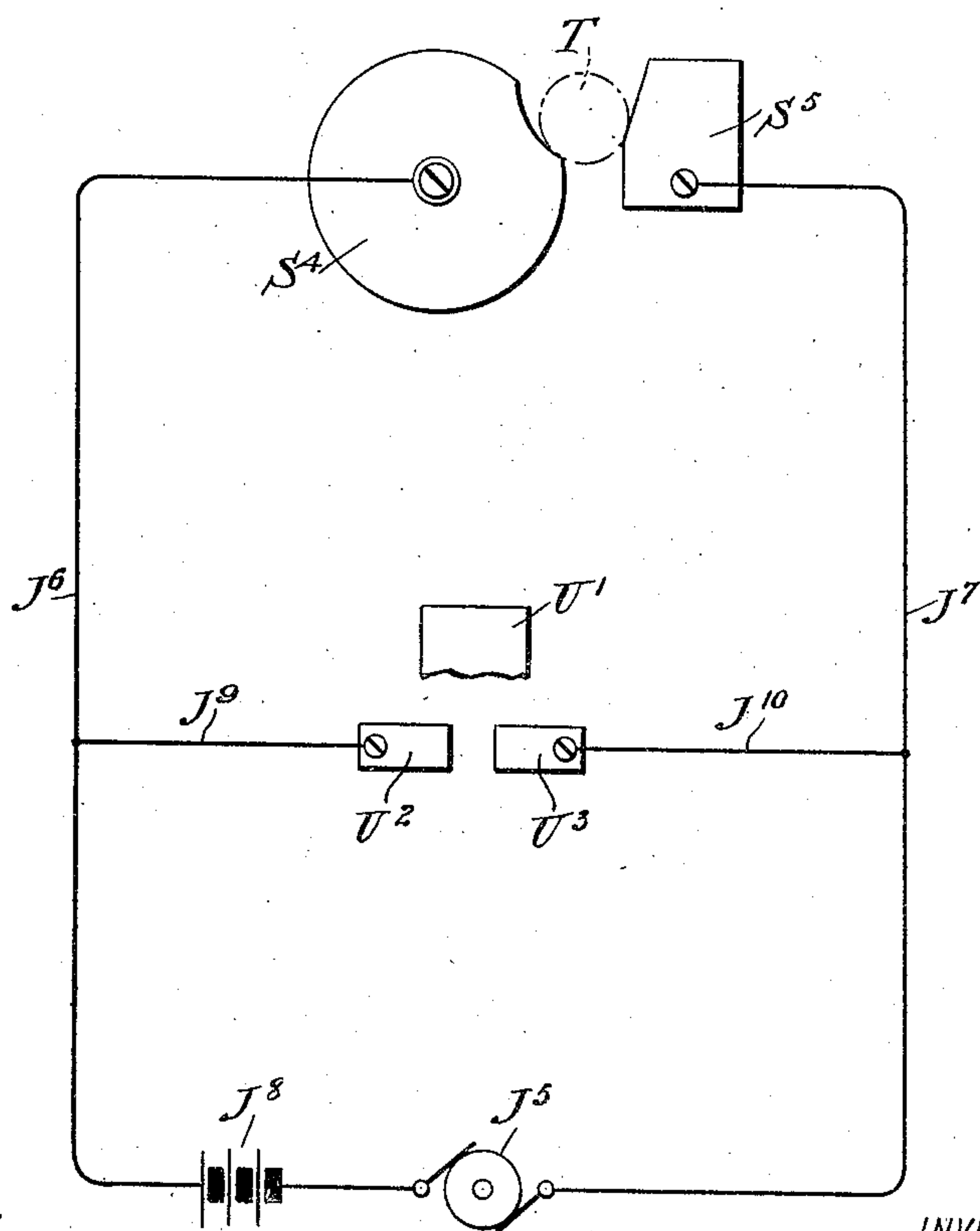


Fig. 24



WITNESSES:

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Wm. J. Housley

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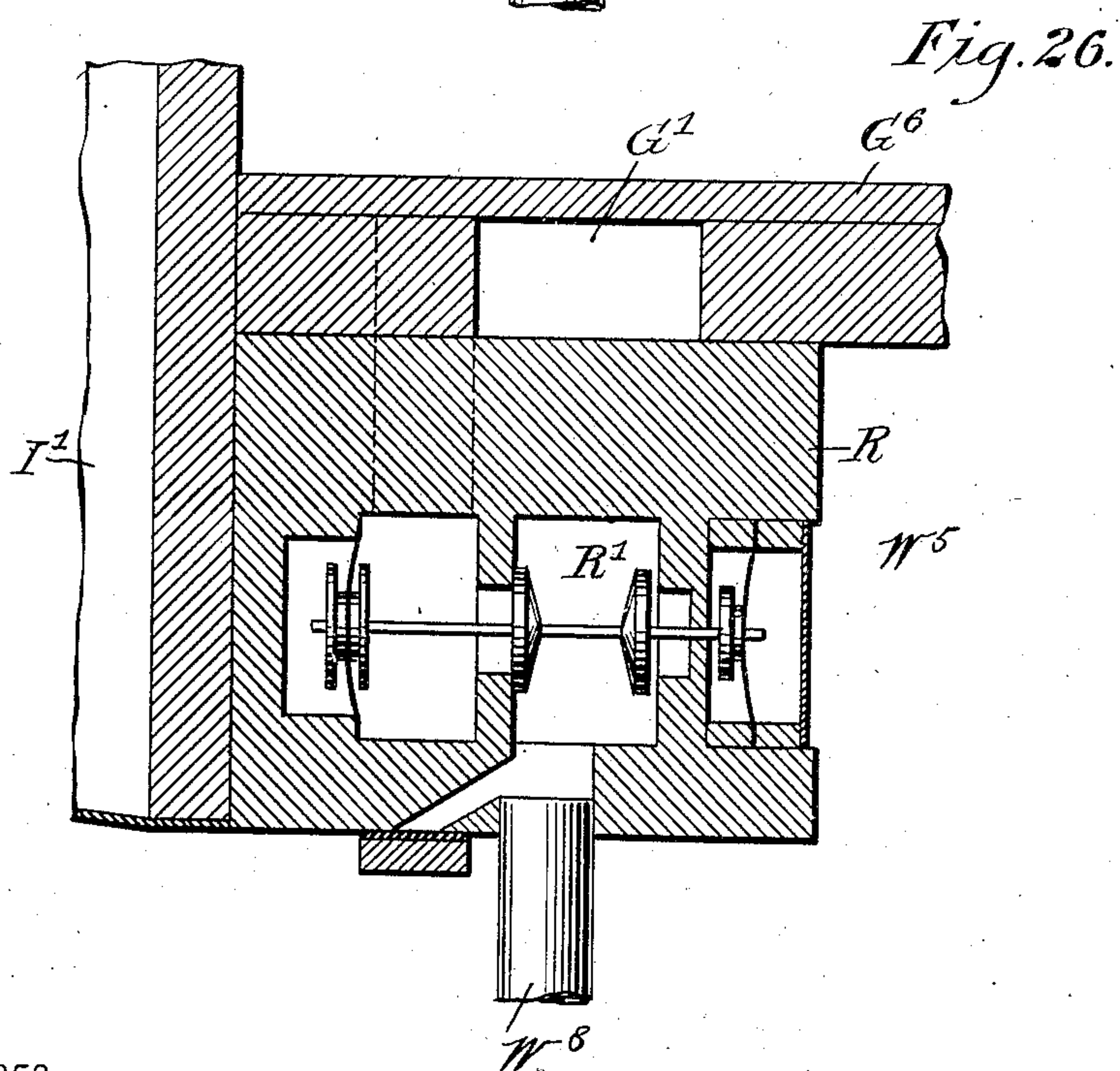
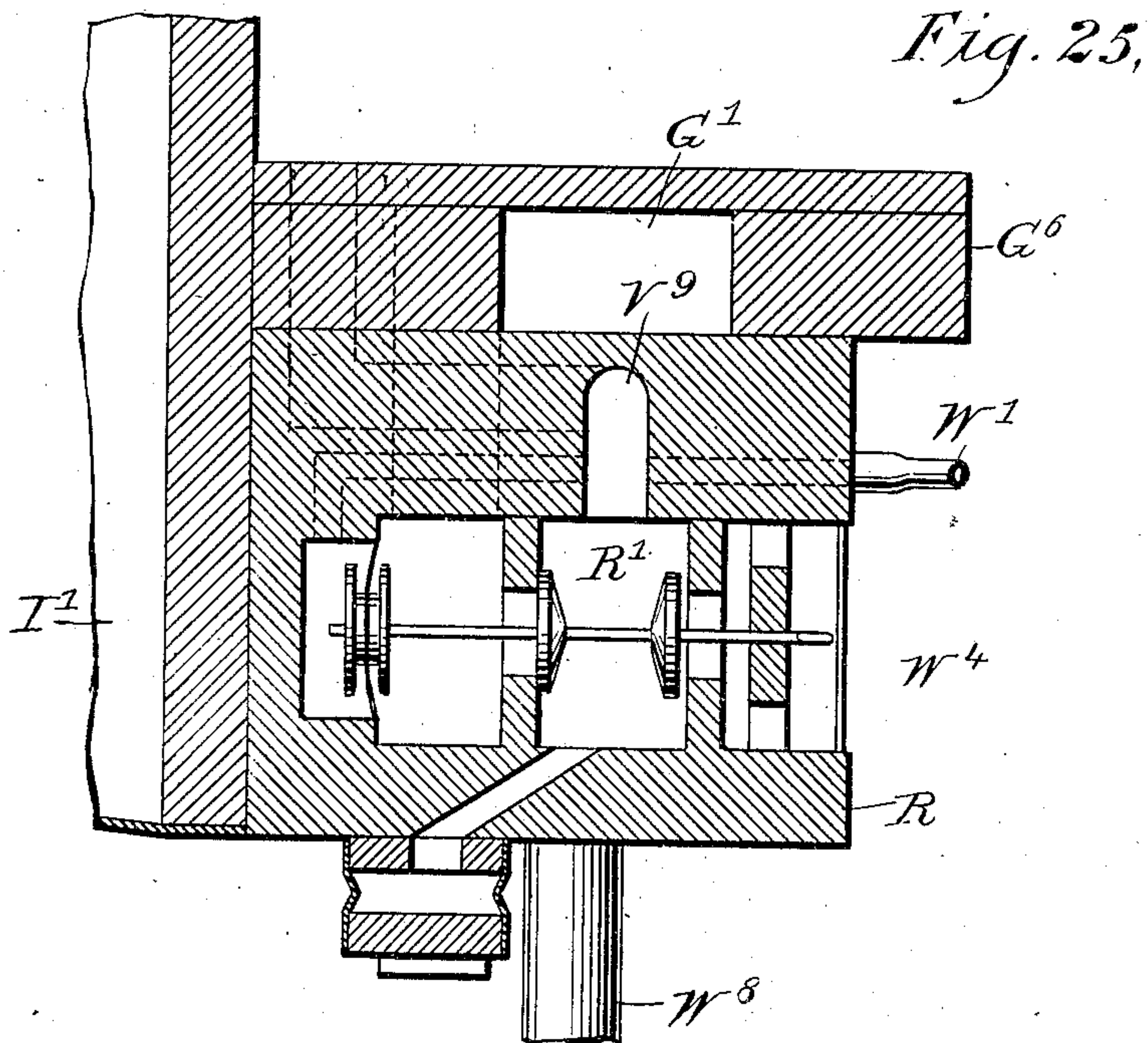
PATENTED MAR. 19, 1907.

H. MEYER.

SELF PLAYING PIANO.

APPLICATION FILED AUG. 3, 1905.

16 SHEETS—SHEET 16.



WITNESSES

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ATTORNEYS

UNITED STATES PATENT OFFICE.

HERMANN MEYER, OF NEW YORK, N. Y.

SELF-PLAYING PIANO.

No. 847,798.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed August 3, 1905. Serial No. 272,499.

To all whom it may concern:

Be it known that I, HERMANN MEYER, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented a new and Improved Self-Playing Piano, of which the following is a full, clear, and exact description.

The invention relates to self-playing musical instruments.

The object of the invention is to provide a new and improved self-playing piano arranged to insure accurate playing of the keys and with the proper touch and expression and to allow the use of a single note-sheet containing a number of pieces of music, only one of which is played at the introduction of a coin, the note-sheet being automatically rewound at the end of the last piece of music to start playing the first piece of music on the introduction of another coin.

The invention consists of novel features and parts and combinations of the same, which will be more fully described herein-after and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figures 1 and 1^a are elevations of the front of the instrument. Fig. 2 is a transverse section of the same on the line 2 2 of Fig. 1. Fig. 3 is a like view of the same on the line 3 3 of Fig. 1. Fig. 4 is a similar view of the same on the line 4 4 of Fig. 1^a. Fig. 5 is a sectional plan view of the improvement on the line 5 5 of Fig. 1. Fig. 6 is a similar view of the same on the line 6 6 of Fig. 1^a. Fig. 7 is an enlarged transverse section of the improvement on the line 7 7 of Fig. 1 and showing more particularly the pneumatic-valve mechanism for controlling the hammer-rail, the damper-rail, the stopping mechanism, and the indicating mechanism. Fig. 8 is an enlarged cross-section of the same on the line 8 8 of Fig. 1. Fig. 9 is an enlarged cross-section of the improvement on the line 9 9 of Fig. 1. Fig. 10 is a similar view of the same on the line 10 10 of Fig. 1. Fig. 11 is an enlarged transverse section of the improvement on the line 11 11 of Fig. 1. Fig. 12 is a face view of the right-hand side connecting-board. Fig. 13 is an enlarged sectional plan view of the improvement on the line 13 13 of Fig. 1 and showing more particularly

the main valve connection between the pneumatics and the suction-chamber of the suction-bellows. Fig. 14 is an enlarged cross-section of the same on the line 14 14 of Fig. 1. Fig. 15 is a face view of the main board for the action-pneumatics. Fig. 16 is a sectional plan view of several pneumatics, the section being on the line 16 16 of Fig. 18. Fig. 17 is a sectional plan view of the same on the line 17 17 of Fig. 18. Fig. 18 is a transverse section of the same on the line 18 18 of Fig. 16. Fig. 19 is a sectional front elevation of the same on the line 19 19 of Fig. 16. Fig. 20 is an enlarged sectional front elevation of the speed-regulating valve and part of the rewinding mechanism. Fig. 21 is an enlarged front elevation of the mechanism for winding up and rewinding the note-sheet. Fig. 22 is an enlarged front elevation of the tracker-board and note-sheet. Fig. 23 is an enlarged rear elevation of the indicator mechanism. Fig. 24 is a diagrammatic view of the motor and the two motor-circuits. Fig. 25 is an enlarged sectional plan view of the pneumatic-releasing valve for the hammer-rail, the section being on the line 25 25 of Fig. 7; and Fig. 26 is a like view of the pneumatic-actuating valve for the hammer-rail, the section being on the line 26 26 of Fig. 7.

The strings A of the self-playing instrument are stretched on a string-frame A', extending in front of a sounding-board A² and held with the latter in the usual manner on the piano-frame B. (See Fig. 2.) The piano-action for sounding the strings A may be of any approved construction. It preferably, however, consists of hammers C, normally resting on a hammer-rail C' and adapted to be actuated by keys D, which latter are either played by hand or by the mechanical means presently to be described in detail. The under sides of the keys D, at the rear ends thereof, are adapted to be engaged by pins E, mounted to slide vertically in suitable bearings formed on the keyboard-bottom B', and the lower ends of the said pins rest on the rear ends of levers E', fulcrumed on the under side of the said bottom B'. Each lever E' is pressed upward at its forward end by a spring E², and the said forward end is connected by a rod E³ with the movable member of an action-pneumatic F, the several action-pneumatics F being preferably arranged in tiers to economize in space. The pneumatics F are connected

with pneumatic valve-chests G, likewise arranged in tiers and located below the tiers of the pneumatics F, and the said valve-chests G are connected with a suction-chamber G' (see Figs. 10 and 13,) connected by a port H' with a valve-chamber H, provided with a valve H², controlling a port H³, opening into the suction-chamber I' of suction-bellows I, having their movable members connected by pitmen J' with a crank-shaft J, extending lengthwise and journaled in suitable bearings in the lower portion of the frame B. (See Figs. 1^a, 2, and 4.)

The crank-shaft J is provided with a worm-wheel J² in mesh with a worm J³, secured on the shaft J⁴ of a motor J⁵, preferably of the electric type. When the motor J⁵ is running, the suction-bellows I are actuated to exhaust air from the suction-chamber I', which in turn exhausts air from the valve-chamber H and the suction-chamber G' as long as the valve H² is open; but if the valve H² is closed and the motor J⁵ is running for re-winding purposes, as hereinafter more fully described, then the valve-chamber H and suction-chamber G', and consequently the pneumatic valve-chests G and pneumatics F are not affected.

The valve-chests G are provided with pneumatic valve mechanisms, preferably of the construction shown and described in Letters Patent of the United States No. 756,674, granted to me April 5, 1904, so that further detailed description of the said valve mechanism is not deemed necessary, it being deemed sufficient to state that each valve-chest G is provided with a conduit G² and an inlet-chamber G³, connected by a flexible tube G⁴ with a tracker-board opening K' in the tracker-board K, over which passes the note-sheet L, having note-apertures L' and unwinding from a roller N and winding up on a roller N' when the instrument is playing. The tracker-board K is fixed on an auxiliary frame B³, forming part of the main frame B, and the rollers N and N' are journaled in suitable bearings arranged on the said frame B³. When the instrument is in action and a note-aperture L' registers with a tracker-board opening K', then the corresponding valve mechanism in a valve-chest G is actuated to connect the corresponding pneumatic F with the exhaust-chamber G² to cause the pneumatic F to collapse. When this takes place, the movable member of the collapsing pneumatic F pulls the rod E³ downward to impart a swinging motion to the lever E' against the tension of the spring E² thereof, and this downward swinging motion of the front end of the lever E' causes the rear end thereof to move upward to lift the pin E, and thereby impart a swinging motion to the corresponding key D, which in turn causes its hammer C to sound the corresponding string A. As soon as the note-ap-

erture L' has passed out of register with its tracker-board opening K' then the air previously allowed to pass into the inlet-chamber G³ by way of the tube G⁴ is now permitted to escape or leak out to allow the valve mechanism to return to its previous position, so that atmospheric air passes into the pneumatic G to again inflate the same. When this takes place, the rod E³ of this pneumatic moves upward to allow the lever E', the pin E, and the key D and hammer C to assume their normal position, the hammer C moving back to a position of rest against the rail C'.

As shown in Figs. 1, 1^a, and 2, the pneumatics F and the valve-chests G are secured to the front of a longitudinally-extending board G⁵, (see Fig. 15,) carrying at its rear the suction-bellows I and suction-chamber I'. The ends of the tiers of pneumatics F and valve-chests G are attached to transversely-extending connecting-boards G⁶ and G⁷, (shown in detail in Figs. 10 and 12, respectively,) and the said connecting-boards are supported on the main frame B.

In order to cause the note-sheet L to travel downward over the tracker-board K in the direction of the arrow a' for playing purposes, the following device is provided, special reference being had to Figs. 1^a and 21. On the shaft N² of the winding-up roller N' is secured a gear-wheel N³ in mesh with a pinion N⁴, provided with a clutch member N⁵, adapted to be engaged by a clutch member N⁶, secured at one end of a shaft O, mounted to turn and to slide in the direction of its length in suitable bearings arranged on the main frame B. The shaft O is provided with a sprocket-wheel O', over which passes a sprocket-chain O², also passing over a sprocket-wheel O³, secured on the crank-shaft O⁴ of a pneumatic motor O⁵, used for imparting a rotary motion to the shaft O⁴, which by the sprocket-wheels O³ O' and sprocket-chain O² imparts a rotary motion to the shaft O. When the several parts are in the position as shown in Figs. 1^a and 21 and the shaft O is rotated, then the clutch member N⁶ engages the clutch member N⁵ to rotate the pinion N⁴, mounted loosely on the shaft O, and the rotation of the pinion N⁴ is transmitted to the gear-wheel N³ and shaft N² to turn the winding-up roller N' with a view to wind up the note-sheet L—that is, to cause the same to travel downward in the direction of the arrow a'. In order to rewind the note-sheet L at the end of the last piece of music on the note-sheet, the shaft O is shifted from the right to the left, so that the clutch member N⁶ moves out of engagement with the clutch member N⁵ and moves into engagement with a clutch gear-wheel N⁷ in mesh with a pinion N⁸, meshing with a gear-wheel N⁹, secured on the shaft N¹⁰ of the unwinding-roller N. When the clutch member N⁶ is in mesh with the clutch gear-wheel N⁷ and the shaft O is

rotated, then the clutch gear-wheel N^7 is rotated by the clutch member N^6 and rotates the pinion N^8 , which in turn rotates the gear-wheel N^9 , shaft N^{10} , and unwinding-roller N for the latter to wind up the note-sheet L —that is, to cause the same to travel upward in the inverse direction of the arrow a' . It is understood that during this operation the roller N' is free to rotate, as the clutch member N^6 is out of engagement with the clutch member N^5 , and consequently the pinion N^4 can rotate freely on the shaft O .

The pneumatic motor Q^5 may be of any approved construction and provided with a suitable suction-valve O^6 , connected by a flexible tube P with a chamber P' , (see Figs. 1^a and 20,) and this chamber P' is in communication with a valve-chest P^2 , containing a slide-valve P^3 , controlling a graduated opening P^4 , directly connected with the suction-chamber I' of the suction-bellows I , so that when the valve P^3 is open air is exhausted by way of the graduated opening P^4 , chest P^2 , chamber P' , and tube P from the exhaust-valve O^6 to cause the pneumatic motor O^5 to start running, with a view to rotate the shaft O for either driving the winding-up roller N' or the unwinding-roller N for rewinding the note-sheet L , as hereinafter more fully explained. A pull-spring P^5 is connected with the slide-valve P^3 to move the latter into a more or less closed position relative to the graduated opening P^4 , and the said slide-valve P^3 is connected at its valve-stem P^6 with one end of a chain P^7 , passing over a guide-pulley P^8 and connected with a speed-regulating lever P^9 , fulcrumed on the main frame B and under the control of an operator to enable the latter to shift the slide-valve P^3 into a more or less open position, according to the speed desired for moving the note-sheet L over the tracker-board and according to the time in which the piece of music is written.

In order to control the motor J^5 for starting the instrument, a coin-controlled mechanism is provided arranged in such a manner that the introduced coin closes the motor-circuit, thus starting the motor J^5 for actuating the suction-bellows I . As the valve P^3 is always open (more or less) and the graduated opening P^4 is directly connected with the suction-chamber I' of the suction-bellows I , it is evident that air is exhausted from the exhaust-valve O^6 to start the pneumatic motor O^5 and to keep the same running as long as the circuit is closed by the introduced coin. When the pneumatic motor O^5 is running after a coin is introduced, the note-sheet L is caused to wind up on the driven roller N' and to unwind from the roller N . The note-sheet L is preferably provided with a number of pieces of music, only one of which is played on the introduction of a coin, and in order to stop the motor J^5 automatic-

ally, and hence the pneumatic motor O^5 , at the end of each piece of music, the note-sheet L is provided between adjacent pieces of music with a stop-aperture L^2 , adapted to register with a tracker-board opening K^2 , connected by a tube Q with the air-chamber Q' of a pneumatic-valve Q^2 , (see Fig. 8,) controlling a stopping-pneumatic Q^3 , which in turn controls the coin retaining and releasing device and also the counter Q^4 for counting the coins introduced into the machine. The valve Q^2 is similar to the one described in the Letters Patent of the United States No. 773,406 for a self-playing piano, granted to me October 25, 1904, so that further detailed description of the same is not deemed necessary, it being sufficient to state that the stopping-pneumatic Q^3 is connected by a channel Q^5 with an exhaust-chamber Q^6 in communication by a port Q^7 with a main chamber R' of a wind-chest R , attached to the connecting-board G^6 . (See Figs. 1 and 8.) The main chamber R connects by ports R^2 (see Figs. 8 and 13) with the suction-chamber G' in communication with the suction-chamber I' , as previously stated, so as to exhaust air from the main chamber R' when the machine is in operation and the valve H^2 is open. The valve Q^2 normally closes the exhaust-chamber Q^6 to the main chamber R' , as plainly shown in Fig. 8, while the chamber Q^6 is connected by a port Q^8 with the atmosphere. When a stop-aperture L^2 in the note-sheet L registers with a tracker-board opening K^2 , then air passes by way of the tube Q into the air-chamber Q' to actuate the valve Q^2 to close the chamber Q^6 to the atmosphere and to connect the said chamber Q^6 by the port Q^7 with the main chamber R' , so that air is exhausted from the pneumatic Q^3 by way of the channel Q^5 to collapse the said pneumatic.

The movable member of the stopping-pneumatic Q^3 is connected by a rod Q^9 with a coin-controlled mechanism S .

After the last piece of music of the note-sheet L is played then the note-sheet is automatically rewound, and for this purpose it is necessary to release the coin T in the coin-controlled mechanism by the action of the stopping-pneumatic Q^3 to break the motor-circuit of the same and to again immediately close the motor-circuit to keep the motor running during the rewinding operation, at the same time closing the valve H^2 for preventing the instrument from playing. For the purpose mentioned use is made of a pneumatic U , controlled by the simultaneous action of the stopping-pneumatic Q^3 and a pneumatic V , singly actuated whenever the mechanism is actuated which is employed for releasing the rail C' from its rearward or half-stroke position, the same as if the soft pedal on an ordinary piano were released. The pneumatic U (see Figs. 16, 18, 19, and 20) is provided on top with a contact-closing

plate U', adapted to make contact with contact-plates U² and U³ whenever the pneumatic U is collapsed, the said contact-plates U² and U³ being secured on an insulated plate U⁴, attached to the main frame B, and the said contact-plates U² and U³ are connected by branch wires J⁹ and J¹⁰ with the circuit-wires J⁶ and J⁷, thus forming a second or pneumatically-controlled motor-circuit. (See Fig. 24.)

The movable member of the pneumatic U (see Fig. 20) is connected by a rod U⁵ with one arm of a bell-crank lever U⁶, fulcrumed on the main frame B and engaging with its other arm the right-hand end of the shaft O, pressed in the direction from the left to the right by the spring O⁷, as plainly shown in Figs. 1^a and 21. When the pneumatic U collapses, then the rod U⁵ imparts a swinging motion to the bell-crank lever U⁶, so that the latter shifts the shaft O from the right to the left to move the clutch member N⁶ out of engagement with the clutch member N⁵ and to move the clutch member N⁶ into engagement with the clutch gear-wheel N⁷.

As the motor J² is kept running, owing to the closing of the second circuit, as above described, the shaft O is rotated, and consequently the roller N is driven to rewind the note-sheet L.

When the bell-crank lever U⁶ is actuated, as above described, then a spring-pressed catch U⁷ (see Fig. 20) engages and locks the lever U⁶ to hold the shaft O in the reversing position until the note-sheet L is completely rewound, and when this has taken place then the catch U⁷ is tripped to release the bell-crank lever U⁶ to allow the spring O⁷ to return the shaft O to its right-hand end position—that is, to move the clutch member N⁶ out of engagement with the clutch gear-wheel N⁷ and to move the clutch member N⁶ back into engagement with the clutch member N⁵. The spring-catch U⁷ is connected for the purpose by a rod U⁸ with a pneumatic U⁹, located alongside the pneumatic Q³ and operating in conjunction with the pneumatic U. The movable member of the pneumatic U is also connected with one end of a lever U¹⁰, (see Fig. 20,) connected by a chain U¹¹ with the stem P⁶ of the slide-valve P³, so that when the pneumatic U collapses the lever U¹⁰ is caused to swing, and the chain U¹¹ then pulls the slide-valve P³ into a wide-open position to insure a fast working of the pneumatic motor O⁵, with a view to quickly rewind the note-sheet L.

The note-sheet L, besides having the stopping-apertures L², is provided at the end of the note-sheet with an aperture L³, arranged in transverse alinement with the last stopping-aperture L². The aperture L³ is in alinement with a row of apertures L⁴, controlling the mechanism for releasing the rail

C' from the half-stroke position, it being understood that another row of apertures L⁵ controls the means for moving the rail C' into the half-stroke position. In a like manner the note-sheet L is provided with two rows of apertures L⁶ and L⁷, which control the mechanism for throwing the damper C² off or on, and as the two sets of apertures L⁴ L⁵ and L⁶ L⁷ and the mechanisms they control are the same as the ones shown and described in the Letters Patent of the United States No. 773,406, above mentioned, it is not deemed necessary to further describe the same in detail, it being sufficient to state that the apertures L³ and L⁴ in the note-sheet L are adapted to register with a tracker board opening K³, the row of apertures L⁵ is adapted to register with the tracker-board opening K⁴, the row of apertures L⁶ is adapted to register with the tracker-board opening K⁵, and the row of apertures L⁷ is adapted to register with the tracker-board opening K⁶. The tracker-board openings K³, K⁴, K⁵, and K⁶ are connected by flexible tubes W, W', W², and W³ with the corresponding air-chambers of pneumatic-valve mechanisms W⁴, W⁵, W⁶, and W⁷, (see Figs. 8, 25, and 26,) all connected with the suction-chamber R', previously referred to.

It is understood that the valve mechanism W⁵ controls the rail C' with a view to move the same into a half-stroke position and the valve mechanism W⁴ serves to release the rail and allow it to return to a normal position of rest. For this purpose the valve mechanism W⁵ is connected by a pipe W⁸, (see Figs. 1, 3, 5, and 7) with the pneumatic W⁹, which when collapsing actuates a lever C⁴, engaging one end of the rail C'. When the valve mechanism W⁴ is actuated, the pneumatic W⁹ is allowed to inflate to permit the rail C' to return to a position of rest. In a like manner the valve mechanism W⁶ is connected by a tube W¹⁰ with the pneumatic W¹¹, controlling the lever C⁵ for the damper-rail C³, actuating the dampers C², so that when the pneumatic W¹¹ collapses the dampers C² are thrown off the strings and when the valve mechanism W⁷ is actuated the pneumatic W¹¹ is allowed to inflate to return the dampers C² to their normal position—that is, against the strings to damp the same.

The pneumatic valve mechanism W⁴ has its exhaust-chamber connected by a channel V⁹ with the pneumatic V, so that when the valve mechanism W⁴ is actuated on any one of the note-sheet apertures L⁴, registering with the tracker-board openings K³ then the rail C' is returned to a normal position of rest and at the same time the pneumatic V is caused to deflate or collapse; but as the pneumatic Q³ does not collapse at this time it is evident that the pneumatic U is not affected,

as it requires both the pneumatics V and Q³ to collapse simultaneously in order to collapse the pneumatic U. When the note-sheet apertures L² and L³, however, register simultaneously with the tracker-board openings K² and K³, then both pneumatics V and Q³ are simultaneously deflated.

The connection between the pneumatics U, V, and Q³ is as follows, special reference being had to Figs. 16, 17, 18, and 19. The movable member of the pneumatic V is provided with an eye V⁷, engaging the angular end V² of a lever V³, fulcrumed on a rod V⁴, resting on the top of a hinged valve V⁵, controlling the exhaust-channel U¹², leading from the pneumatic U directly into the suction-chamber I' of the suction-bellows I, (see Figs. 11 and 12,) and the said lever V³ is provided with a link V⁶, having a limited sliding connection with an eye V⁷, secured on the movable member of the pneumatic Q³. A spring V⁸ (see Figs. 18 and 19) presses the valve V⁵ to normally hold the same in a closed position. When the pneumatic Q³ collapses while the pneumatic V is inflated, it is evident that the eye V⁷ slides freely on the link V⁶, and when the pneumatic V collapses while the pneumatic Q³ is inflated then the eye V⁷ simply rocks the lever V³, as the end of the link V⁶ now slides freely in the eye V⁷. When, however, both pneumatics V and Q³ are simultaneously collapsed on the apertures L² and L³ registering simultaneously with the tracker-board openings K² and K³, (see Fig. 22,) then a downward pull is exerted on both ends of the lever V³ to move the latter bodily downward, and with it the rod V⁴, to swing the valve V⁵ into an open position, and thereby allow the air to be sucked out of the pneumatic U for the latter to collapse.

In order to close the valve H² at the time the pneumatic U collapses and the rewinding of the note-sheet L begins, the following device is provided, special reference being had to Figs. 1, 1^a, 13, 14, and 18. The valve H² is a hinged valve and is pressed on by a spring H⁴, and the said valve is connected by a rod H⁵ with an arm H⁶, attached to the movable member of a normally collapsed pneumatic H⁷, provided at its movable member with a pin H⁸, normally engaged by a catch H⁹ in the form of a bell-crank lever fulcrumed on the fixed part of the pneumatic H⁷. By this arrangement the pneumatic H⁷ is normally locked in a collapsed position. The bell-crank lever H⁹ (see Fig. 14) is connected by a rod H¹⁰ with the movable member of a pneumatic H¹¹, connected by a flexible tube H¹² with a channel H¹³, (see Fig. 18,) opening into the pneumatic U, so that when the latter is connected by the channel U¹² with the suction-chamber I' then suction is had through the channel H¹³ and tube H¹² in the pneumatic H¹¹ to collapse the same.

In collapsing the pneumatic H¹¹ the rod H¹⁰ swings the catch H⁹ out of engagement with the pin H⁸, so as to release the normally collapsed pneumatic H⁷ to allow the spring H⁴ of the valve H² to close the port H³, thus disconnecting the valve-chest H from the suction-chamber I', and hence the air is not exhausted from the valve-chamber H and the suction-chamber G' for the pneumatics F. Thus the latter remain dormant during the rewinding of the note-sheet.

In order to throw the rewinding-gear out of action after the note-sheet is rewound on the roller N and to reopen the valve H² and to bring all the parts back to a normal position, the following arrangement is made: On the beginning end of the note-sheet L is arranged an aperture L⁸, adapted to register with the tracker-board opening K⁷ (see Fig. 22) at the time the note-sheet is rewound. The tracker-board opening K⁷ is connected by a flexible tube X with an air-chamber X', (see Fig. 8,) forming a part of a pneumatic valve mechanism similar to the valve mechanism Q²—that is, the diaphragm X² separates the air-chamber X' from the suction-chamber X³, connected by a channel X⁴ directly with the interior of the suction-chamber I' of the suction-bellows I. A port X⁵ leads from the suction-chamber X³ into a chamber X⁶, and this port X⁵ is normally closed by a valve X⁷, held on a valve-stem X⁸, attached to the diaphragm X² and carrying a valve X⁹, controlling a port X¹⁰, leading to the atmosphere. From the chamber X⁶ leads a channel X¹¹ into the pneumatic U⁹, (see Fig. 17,) and the channel X¹¹ is provided with a branch channel X¹², (see Figs. 12 and 18,) opening into a pneumatic U¹³, carrying a valve U¹⁴, normally closing an air-inlet port U¹⁵, opening into the pneumatic U. From the channel X¹¹ leads another branch port X¹³ (see Figs. 13 and 15) to the pneumatic H⁷. When the aperture L⁸ registers with the opening K⁷, then air is admitted to the chamber X' to cause the diaphragm X² to move, and thereby open the valve X⁷ and close the valve X⁹. When this takes place, air is drawn out of the chamber X⁶ by way of the port X⁵, chamber X³, and channel X⁴, connected with the suction-chamber I', and hence air is drawn by way of the channel X¹¹ from the pneumatics U⁹, U¹³, and H⁷ to collapse the same and approximately at the same time. The collapsing of the pneumatic U⁹ causes the catch U⁷ to release the bell-crank lever U⁶, (see Fig. 20,) and the collapsing of the pneumatic U¹³ (see Fig. 18) causes the valve U¹⁴ to open, so that atmospheric air can pass by way of the port U¹⁵ into the pneumatic U to inflate the same, and thereby allow the spring O⁷ to quickly slide the shaft O from the left to the right to move the clutch member N⁶ out of engagement with the clutch member N⁷. The inflation of the pneumatic U causes the

contact-plate U' to move out of engagement with the contact-plates U² and U³ to break the second motor-circuit with a view to stop the motor. Drawing the air out of the pneumatic H⁷ by way of the channel H¹³ causes the said pneumatic to collapse, and in doing so it swings the valve H² back into an open position against the tension of the spring H⁴. (See Fig. 13.) When the pneumatic H⁷ collapses, the catch H⁹ again engages the pin H⁸ to lock the pneumatic H⁷ in the collapsed position.

In order to indicate which of the pieces of music is playing at the time, an indicator Y is provided, (see Figs. 1, 2, and 23,) controlled from the stopping-valve mechanism Q². (See Fig. 8.) For this purpose the exhaust-chamber Q⁶ is connected by a tube Y' with a pneumatic Y², the movable member of which controls a sliding rod Y³, pressed on by a spring Y⁴ and having a pawl Y⁵ engaging a ratchet-wheel Y⁶ on the shaft of a pointer Y⁷, indicating on a dial Y⁸, arranged on the front of the machine, as plainly shown in Fig. 1. Thus when the stopping-valve mechanism Q² is actuated at the time the end of a piece of music is reached, as before explained, then the air is drawn out of the pneumatic Y² to collapse the same, and thereby actuate the sliding rod Y³ and its pawl Y⁵ to turn the ratchet-wheel Y⁶ and the pointer Y⁷ for the latter to indicate the next piece of music on the dial Y, the pieces of music on a note-sheet being preferably indicated by numerals on the dial Y⁸, as shown in Fig. 1. When the pneumatic Y² inflates, then the sliding rod Y³ returns by the action of the spring Y⁴. The sliding rod Y³ has a free upward movement to allow the pawl Y⁵ to glide backward over the ratchet-teeth of the ratchet-wheel Y⁶, held against return movement by a spring-dog Y⁹.

The soft and loud pedals Z and Z' of the piano are used to throw the hammer-rail C' and the damper-rail C³ on or off by the operator in the usual manner, and whenever desired and for this purpose the soft pedal Z is secured on a crank-shaft Z², (see Figs. 3 and 5,) on which rests the lifter-rod Z³, engaging the hammer-rail C' to swing the same rearward on pressing the pedal Z and to allow the hammer-rail C' to return to a position of rest on releasing the pedal Z. In a like manner the loud pedal Z' (see Figs. 3, 5, and 6) is secured on a crank-shaft Z⁴, on which rests the lifter-rod Z⁵, engaging the damper-rail C³. When the loud pedal Z' is pressed, the dampers C² are thrown off the strings A, and when the said pedal Z' is released the dampers C² move back in contact with the strings A. The middle pedal Z⁶ when pressed imparts a swinging motion to the lever Z⁸, engaging a lifter-rod Z⁹, controlling the muffler C⁶ in the usual manner. (See Figs. 1^a and 6.)

The operation is as follows: Presuming

that the note-sheet L is wound up on the roller N and extends over the tracker-board K and has its beginning end attached to the roller N' and a coin T is passed into coin-controlled apparatus. Now as the motor-circuit is closed by the coin T the motor begins running, and thus actuates the suction-bellows I to draw air out of the suction-chamber I' and out of the pneumatic motor-valve O⁶ to start the pneumatic motor O⁵, which in turn rotates the shaft O and the roller N' for the latter to draw the note-sheet L over the tracker-board K and to wind it up on the roller N'. As the note-apertures L' register with the tracker-board openings K' the corresponding pneumatics F; keys D, and hammers C are actuated for the hammers to sound the strings A, thus playing the first piece of music on the note-sheet L. When the first piece of music is played, the note-sheet aperture L² registers with the tracker-board opening K², so that air passes into the chamber Q' of the valve mechanism Q², which connects the stopping-pneumatic Q³ with the suction-chamber R', connected by way of the suction-chamber G' and valve-chest H with the suction-chamber I' of the suction-bellows I, so that the pneumatic Q³ collapses, and thus turns the member S⁴ of the coin-controlled mechanism to cause the coin T to pass out from between the members S⁴ and S⁵, thus breaking the motor-circuit, and thereby bringing the motor J⁵ to a stop. It is understood that during the playing of the first piece of music some of the apertures L⁴ L⁵ and L⁶ L⁷ may register with their corresponding tracker-board openings K³ K⁴ and K⁵ K⁶ for actuating the corresponding valve mechanisms W⁴, W⁵, W⁶, and W⁷ with a view to play corresponding parts of the music more or less pianissimo or forte, as the case may be, and called for by the music. Whenever the valve mechanism Q² is actuated as above described, then the pointer Y⁷ of the indicator Y moves automatically to the next indicating-numeral on the dial Y⁸ to indicate the following piece of music. When the next coin is introduced, the above-described operation is repeated, and in a like manner the several pieces of music on the note-sheet L are played in succession whenever a coin T is introduced. When the end portion of the note-sheet passes over the tracker-board K at the end of the last piece of music on the note-sheet, then the transversely-aligned note-sheet apertures L² and L³ register with the tracker-board openings K² K³, whereby the valve mechanisms Q² and W⁴ are simultaneously actuated to cause the pneumatics V and Q³ to collapse simultaneously to open the valve V⁵ for collapsing the pneumatic U. The collapsing of the pneumatic Q³ causes a release of the coin T between the members S⁴ S⁵, and hence the first motor-circuit is broken; but as the valve V⁵ is opened to allow

the pneumatic U to collapse it is evident that the second motor-circuit is immediately closed to keep the motor going without the coin T being between the members S⁴ and S⁵. The collapsing of the pneumatic U causes a shifting of the shaft O from the right to the left to drive the roller N, so that the note-sheet L is rewound on the roller N and is unwound from the roller N'. When the pneumatic U collapses, the valve P³ is moved into a full-open position, so as to allow a fast running of the pneumatic motor O to insure a rapid rewinding of the note-sheet. When the pneumatic U collapses as above described, then air is also drawn out of the pneumatic H¹¹ by way of the channel H¹³ and tube H¹², so that the collapsed pneumatic H⁷ is unlocked to allow the valve H² to close by the action of its spring H⁴ to cut off the connection between the suction-chamber I' and the chest H, so that no air whatever is drawn out of the suction-chambers G' and R' during the rewinding of the note-sheet, and hence the pneumatics F are not actuated on the note-apertures L' registering with the tracker-board openings K' during the rewinding of the note-sheet. When the note-sheet L is almost rewound, then the aperture L⁸ at the beginning end of the note-sheet registers with the tracker-board opening K⁷, so that air is admitted to the chamber X' (see Fig. 8) to actuate the diaphragm X² with a view to shift the valves X⁷ and X⁹, as previously explained. When this takes place, air is drawn out of the pneumatic U⁹ by way of the channel X¹¹, so that the pneumatic U⁹ collapses and in doing so actuates the catch U⁷ to release the bell-crank lever U⁶. At the same time the air is drawn out of the pneumatic U¹³ for the latter to open the valve U¹⁴ to allow the pneumatic U to inflate, so that the shaft O returns to its right-hand side position by the action of the spring O⁷. When the pneumatic U is inflated, its contact-plate U' moves out of contact with the contact-plates U², so that the second circuit is broken and the motor J⁵ ceases running, thus also causing the pneumatic motor O⁵ to come to a standstill at the time the note-sheet L is completely rewound. When the air is exhausted from the chamber X⁶, then air is also drawn out of the pneumatic H⁷ by way of the channels X¹³ X¹¹, so that the pneumatic H⁷ collapses and in doing so swings the valve H² back into an open position. At the same time the pneumatic H⁷ is locked in a collapsed position by the action of the bell-crank lever H⁹ engaging the pin H⁸. Thus the several parts of the instrument are returned to their original position, and on the introduction of a coin the above-described operation is repeated.

From the foregoing it will be seen that the piano can be played by hand the same as any ordinary piano and without requiring any

changes whatever. If the proper coins are introduced, the several pieces of music on the note-sheet are played in succession, and when the last piece of music is finished the note-sheet is automatically rewound. The rollers N and N' are arranged in the usual manner to permit convenient exchange of note-sheets. By controlling the various devices, except the starting device for the motor, by pneumatic means the instrument is not liable to get easily out of order, and by having the several devices arranged and connected as described and shown ready access is had to any one of the devices to permit proper adjustment thereof and allow convenient repairing.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A self-playing piano having a pianissimo device, a stopping device, and a rewinding device and means whereby it is controlled by the combined action of the said pianissimo device and the said stopping device.

2. A self-playing piano having a pianissimo device, a stopping device, a rewinding device and means whereby it is controlled by the combined action of the said pianissimo device and the said stopping device, a tracker-board connected with the said pianissimo device and the said stopping device, and a note-sheet having apertures for controlling the tracker-board openings to the said pianissimo device and the said stopping device.

3. A self-playing piano having a tracker-board, a note-sheet passing over the said tracker-board, an actuating device for a movable part of the piano-action, a stopping device for the piano, a rewinding device for the said note-sheet, and pneumatics, of which one releases the said controlling device and is connected with the said tracker-board, another pneumatic governs the said stopping device and is connected with the tracker-board, and the third pneumatic actuating the said rewinding device and controlled by the other two pneumatics.

4. A self-playing piano provided with a hammer-rail, of a pneumatic actuating device for throwing the said hammer-rail into an active position and holding it pneumatically therein, a pneumatic releasing device for releasing the said actuating device to allow the hammer-rail to return to its normal inactive position, a tracker-board and connections therefrom to the said pneumatic actuating device and independent connections therefrom to the said pneumatic releasing device, a note-sheet having apertures controlling the tracker-board openings for the said devices, a rewinding mechanism for the said note-sheet, a stopping device for the piano and pneumatic means for actuating the rewinding mechanism, the said pneu-

matic means being controlled by the said pneumatic releasing device and the said stopping device.

5. A self-playing piano provided with a hammer-rail, of a pneumatic actuating device for throwing the said hammer-rail into an active position and holding it pneumatically therein, a pneumatic releasing device for releasing the said actuating device to allow the hammer-rail to return to its normal inactive position, a tracker-board and connections therefrom to the said pneumatic actuating device and independent connections therefrom to the said pneumatic releasing device, a note-sheet having apertures controlling the tracker-board openings for the said devices, a motor, a pneumatic stopping device for the said motor and connections between the said pneumatic stopping device and the tracker-board, a rewinding mechanism for the said note-sheet, and pneumatic means for actuating the rewinding mechanism, the said pneumatic means being controlled by the said pneumatic releasing device and the said stopping device.

6. A self-playing piano provided with suction-bellows having a suction-chamber, a valve-chamber having a valve normally open, a connection between the said chambers and controlled by the said valve, action-pneumatics, valve-chests for the said action-pneumatics and in communication with the said valve-chamber, pneumatic means for controlling the said valve, and a pneumatically-controlled locking device for holding the said valve normally open.

7. A self-playing piano provided with suction-bellows having a suction-chamber, a valve-chamber having a valve normally open, a connection between the said chambers and controlled by the said valve, action-pneumatics, valve-chests for the said action-pneumatics and in communication with the said valve-chamber, pneumatic means for opening the said valve and releasing it for the valve to close, and a pneumatically-controlled locking device for locking and unlocking the said pneumatic means.

8. A self-playing piano provided with suction-bellows having a suction-chamber, a valve-chamber having a valve normally open, a connection between the said chambers and controlled by the said valve, action-pneumatics, valve-chests for the said action-pneumatics and in communication with the said valve-chamber, pneumatic means for opening the said valve and releasing it for the valve to close, a pneumatically-controlled locking device for locking and unlocking the said pneumatic means, a tracker-board, and a note-sheet having apertures

controlling the tracker-board openings to the said pneumatic means and the said pneumatically-controlled locking device.

9. A self-playing piano provided with suction-bellows having a suction-chamber, a valve-chamber having a valve normally open, a connection between the said chambers and controlled by the said valve, action-pneumatics, valve-chests for the said action-pneumatics and in communication with the said valve-chamber, pneumatic means for controlling the said valve, a tracker-board, and a note-sheet having apertures controlling the tracker-board openings to the said pneumatic means for opening the said valve for locking it in an open position and for releasing the said valve.

10. A self-playing piano provided with action-pneumatics, a valve-chest for the same, a suction-chamber, a spring-pressed valve normally open for establishing communication between the said suction-chamber and the said valve-chest, a pneumatic device normally collapsed and connected with the said spring-pressed valve, and a pneumatically-controlled locking device for the said pneumatic to lock the latter in a collapsed position.

11. A self-playing piano provided with action-pneumatics, a valve-chest for the same, a suction-chamber, a spring-pressed valve normally open for establishing communication between the said suction-chamber and the said valve-chest, a pneumatic device normally collapsed and connected with the said spring-pressed valve, a locking device for locking the said pneumatic device in a collapsed position, and a pneumatic releasing device for controlling the said locking device.

12. A self-playing piano provided with action-pneumatics, a valve-chest for the same, a suction-chamber, a spring-pressed valve normally open for establishing communication between the said suction-chamber and the said valve-chest, a pneumatic device normally collapsed and connected with the said spring-pressed valve, a locking device for locking the said pneumatic device in a collapsed position, a pneumatic releasing device for controlling the said locking device, a tracker-board, and a note-sheet having apertures controlling the tracker-board openings for the said devices.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMANN MEYER.

Witnesses:

THEO. G. HOSTER,
EVERARD B. MARSHALL.