

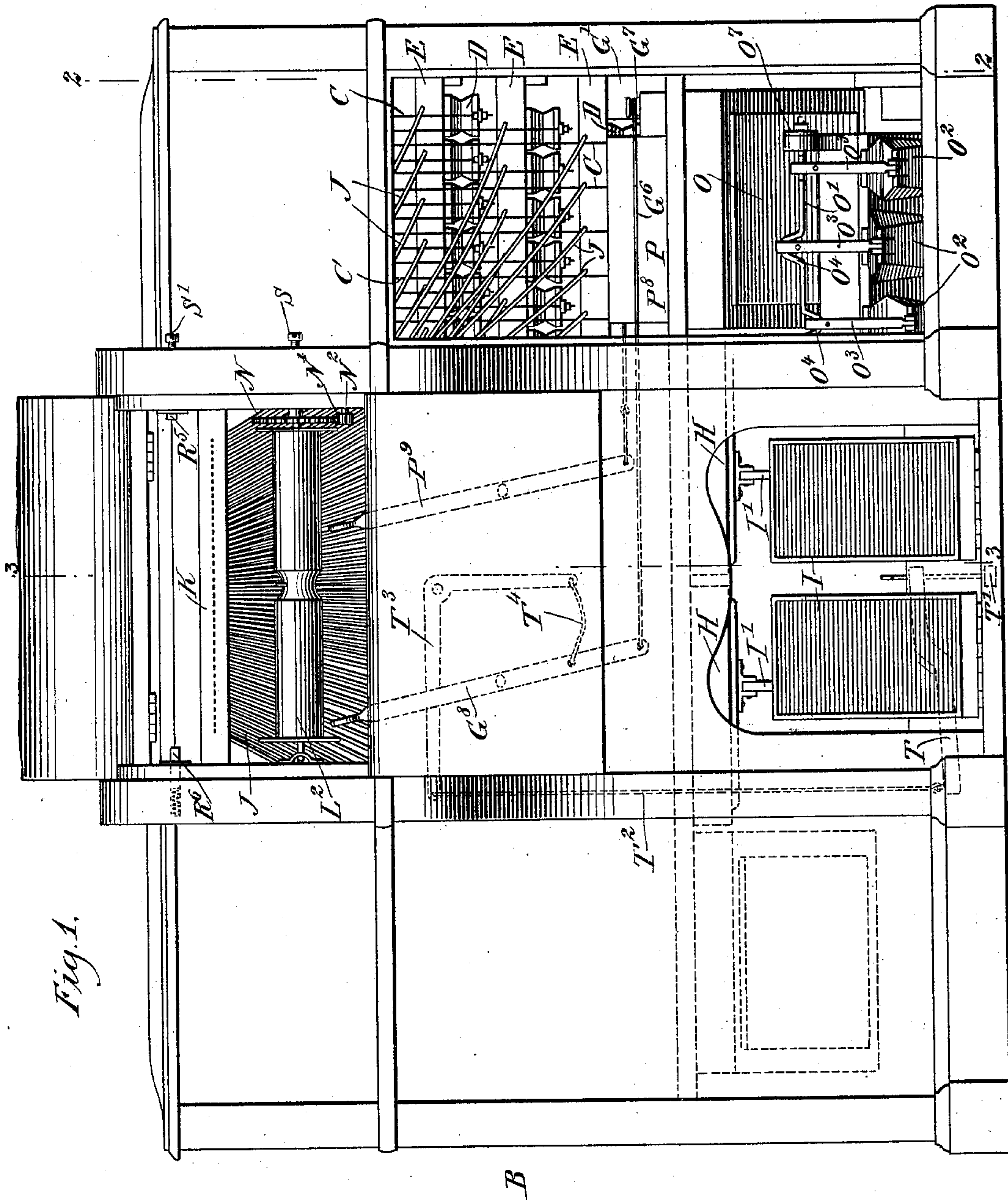
No. 756,674.

PATENTED APR. 5, 1904.

H. MEYER.
AUTOMATIC PIANO PLAYER.
APPLICATION FILED MAY 29, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

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Reed. Horner

INVENTOR

Hermann Meyer

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No. 756,674.

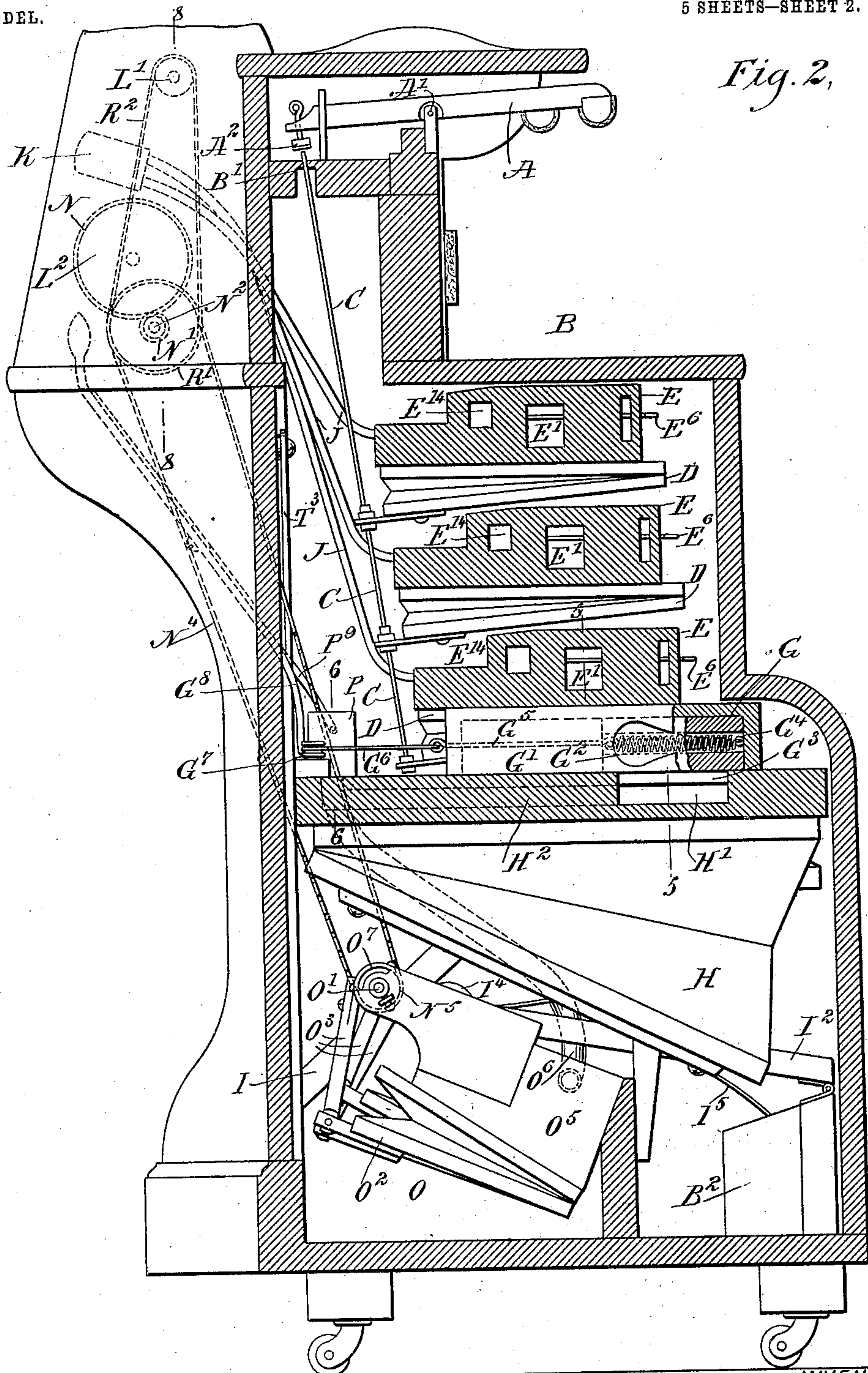
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5 SHEETS—SHEET 2.

NO MODEL.

Fig. 2,



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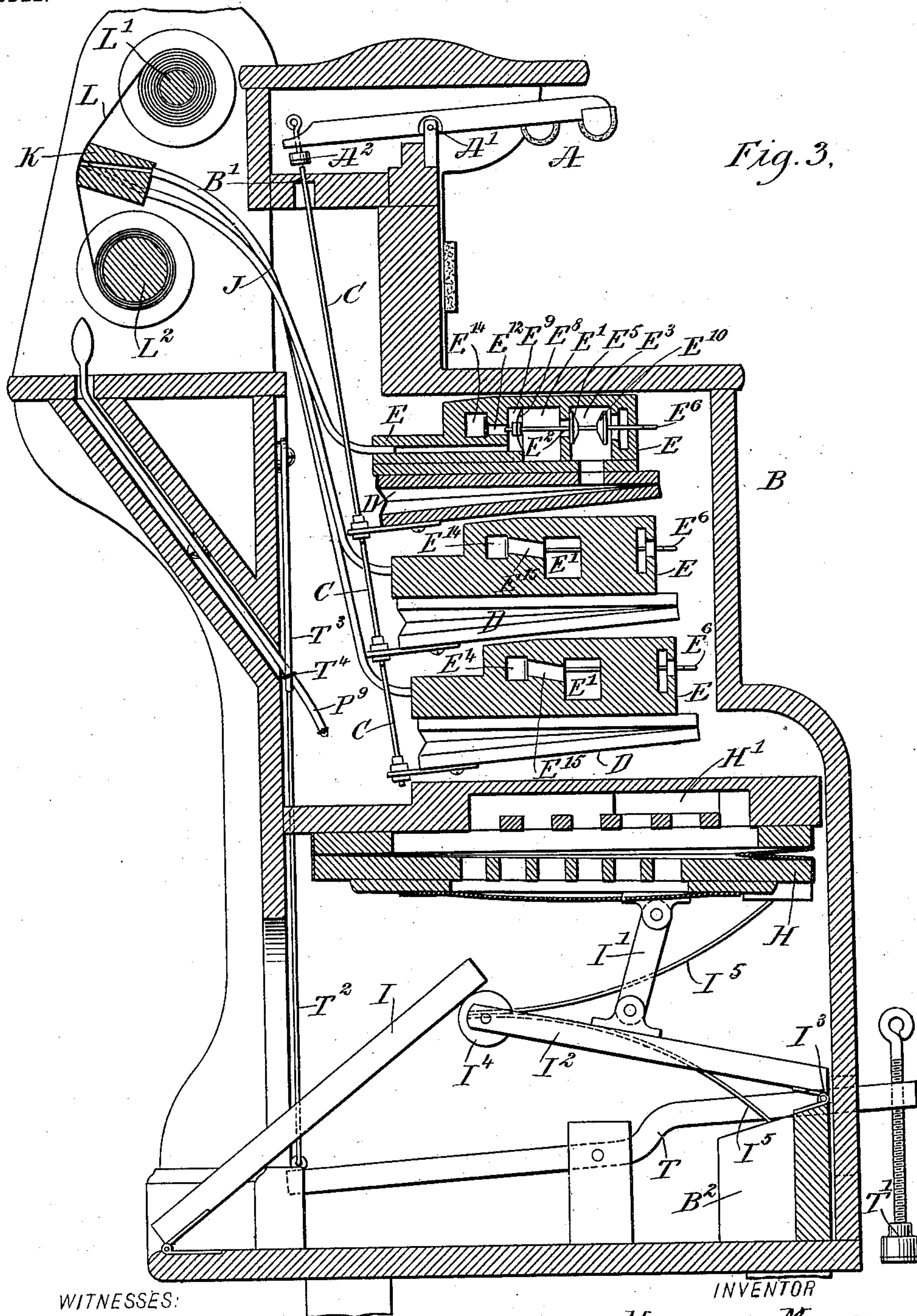
PATENTED APR. 5, 1904.

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AUTOMATIC PIANO PLAYER..

APPLICATION FILED MAY 29, 1903.

5 SHEETS—SHEET 3.

NO MODEL.



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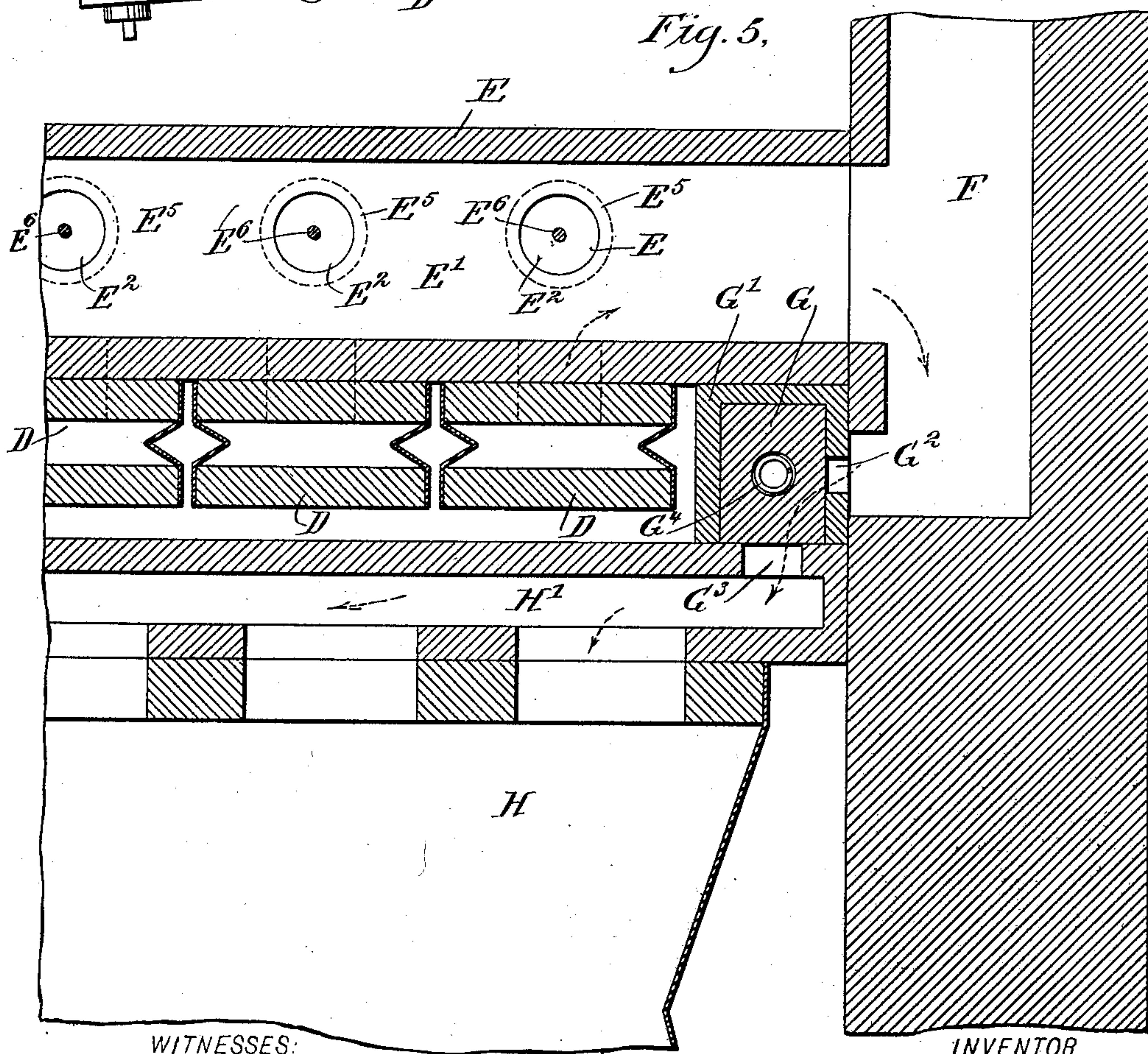
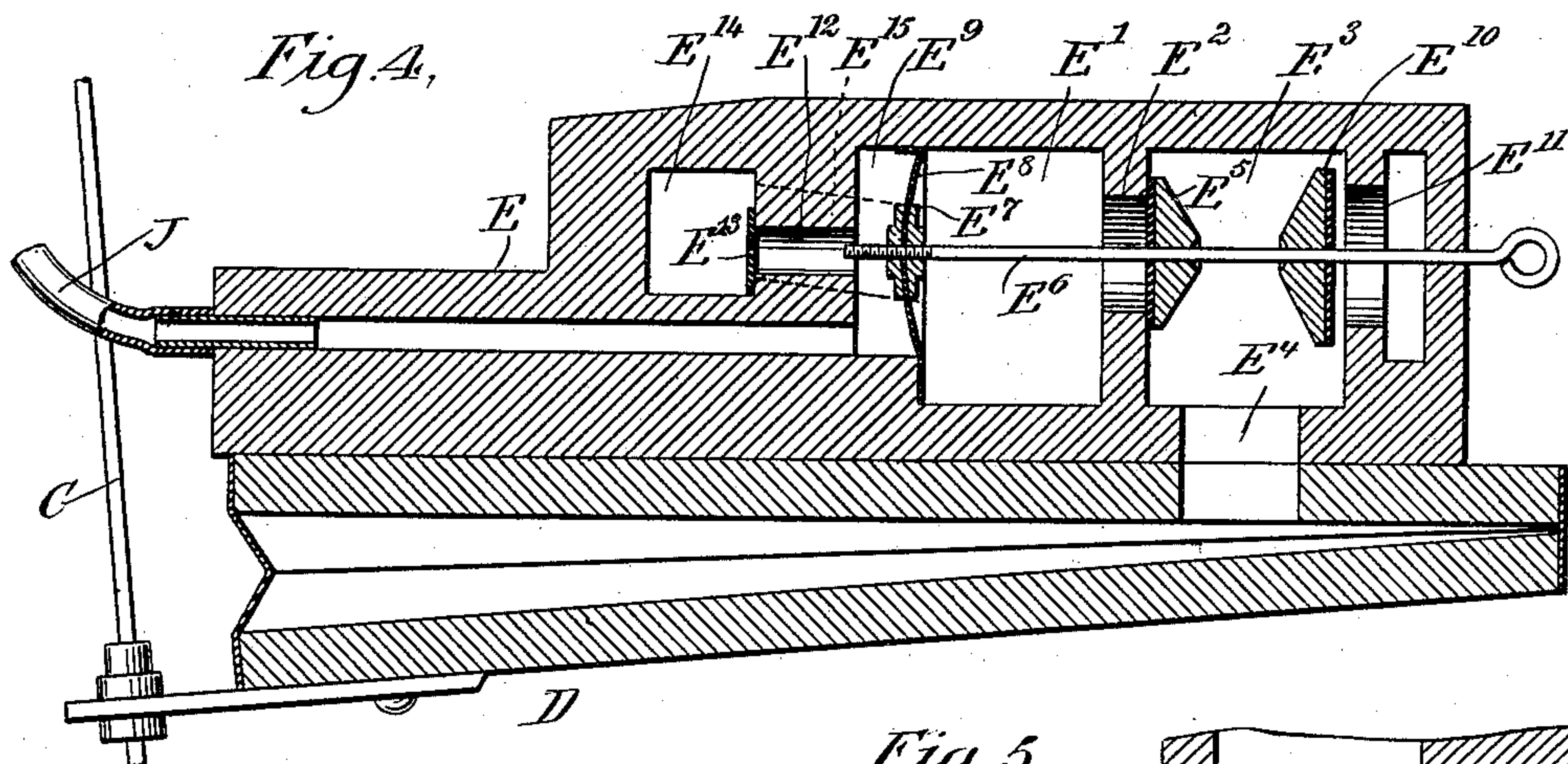
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H. MEYER.
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APPLICATION FILED MAY 29, 1903.

NO MODEL.

5 SHEETS—SHEET 4.



WITNESSES:

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INVENTOR

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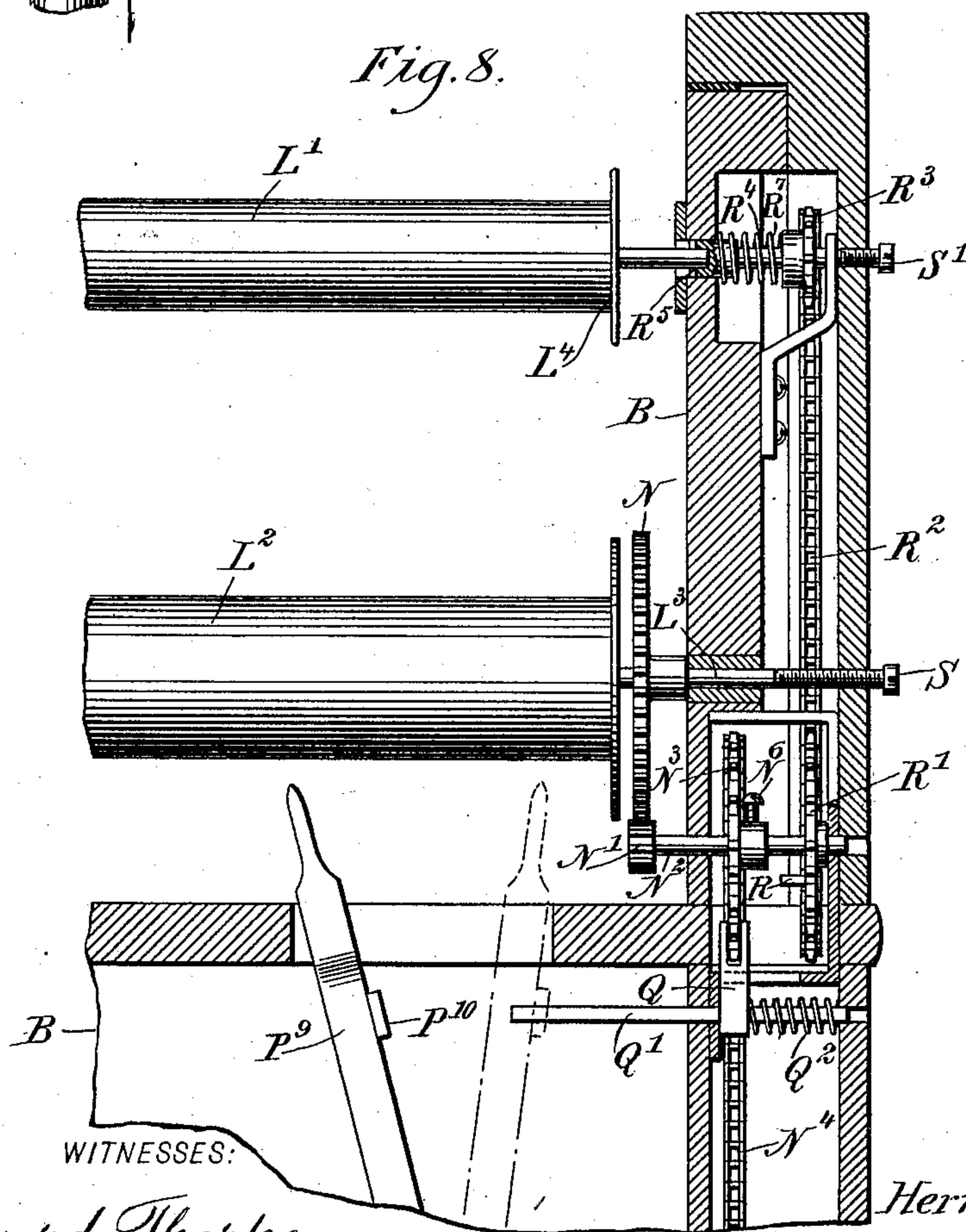
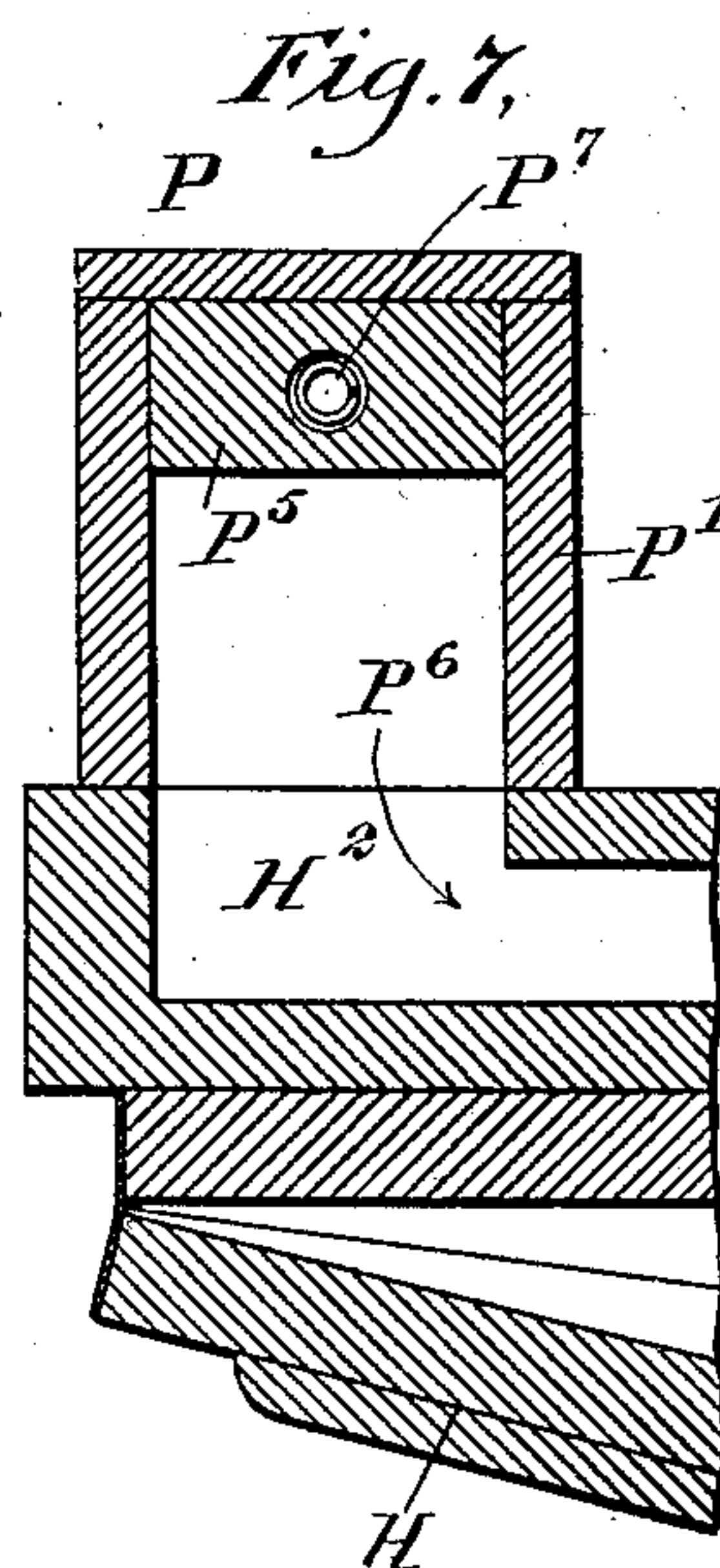
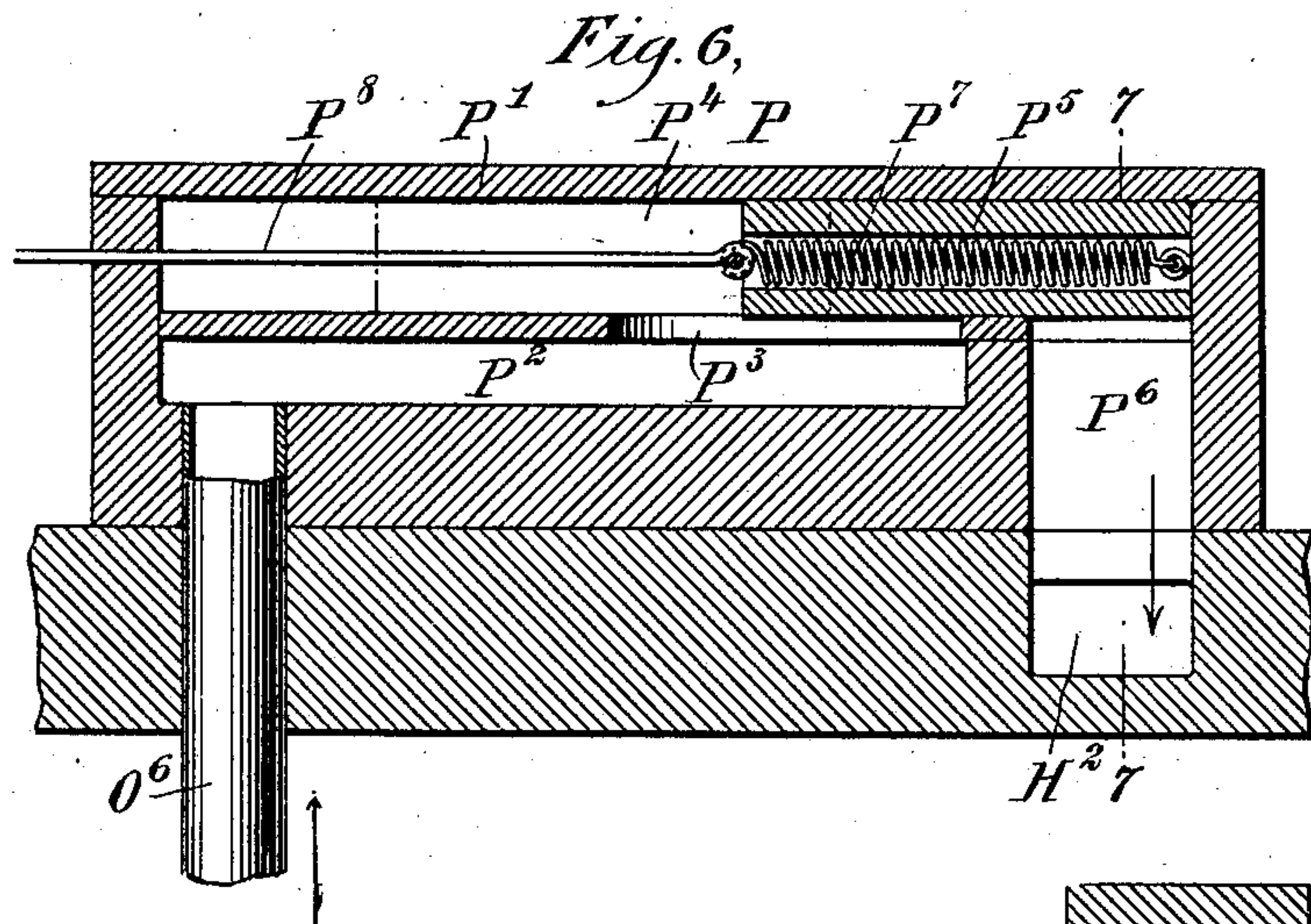
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H. MEYER.
AUTOMATIC PIANO PLAYER.
APPLICATION FILED MAY 29, 1903.

NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HERMANN MEYER, OF NEW YORK, N. Y.

AUTOMATIC PIANO-PLAYER.

SPECIFICATION forming part of Letters Patent No. 756,674, dated April 5, 1904.

Application filed May 29, 1903. Serial No. 159,294. (No model.)

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 Manhattan, in the county and State of New York, have invented a new and Improved Automatic Piano-Player, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved automatic player for a piano, organ, or like key-actuated musical instrument arranged to permit convenient varying of the speed of the note-sheet traveling over the tracker-board, to actuate the key-strikers with more or less force, to keep the note-sheet in proper alinement with the tracker-board, and to quickly reroll the note-sheet.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter 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.

Figure 1 is a front elevation of the improvement, some of the front casing-panels being removed to show the pneumatics and the motor-bellows and adjacent parts. Fig. 2 is an enlarged transverse section of the improvement on the line 2 2 of Fig. 1. Fig. 3 is a similar view of the same on the line 3 3 of Fig. 1. Fig. 4 is an enlarged transverse section of one of the pneumatics. Fig. 5 is a longitudinal sectional elevation of the lower tier of pneumatics, the main suction-chamber, and the suction-bellows. Fig. 6 is an enlarged sectional side elevation of the valve mechanism for regulating the speed of the pneumatic-motor. Fig. 7 is a transverse section of the same on the line 7 7 of Fig. 6, and Fig. 8 is an enlarged sectional front elevation of the rerolling device for the note-sheet.

The key-strikers A are fulcrumed at A' on the casing B of the piano-player, and each key-striker is provided with an adjustable button A², engaged by the upper end of a rod

C, (see Figs. 2 and 3,) guided the its upper portion in a casing-bearing B' and connected at its lower end with the movable member of a pneumatic D, and the several pneumatics D of the instrument are preferably arranged in tiers, and the pneumatics in each tier are secured by their fixed members to the under side of a valve-chest E, having a suction-chamber E' extending from one end of the chest to the other, and each suction-chamber E' is closed at one end and opens at the other end into a duct F, arranged on the side of the casing B and adapted to be connected by a valve G with the main suction-chamber H' of a suction-bellows H, actuated by the operator manipulating pedals I. In case a motor is used instead of the pedals then the suction-bellows H are actuated from the motor.

The suction-chamber E' for each valve-chest E (see Figs. 3 and 4) connects by valve-seats E² with chambers E³, each opening by a port E⁴ into the corresponding pneumatic D, attached to the valve-chest, as previously stated, and the said seat E² is normally closed by a valve E⁵, secured on a valve-stem E⁶, connected by nuts E⁷ with the middle portion of a diaphragm E⁸, separating the chamber E' from an inlet-chamber E⁹, connected by a flexible tube J with a corresponding opening in a tracker-board K, arranged in the front upper portion of the casing B, as plainly shown in Figs. 1 and 3.

Over the tracker-board K passes a note-sheet L, unwinding from a roll L' and winding up on a roll L² during the execution of the music. Now when an opening in the note-sheet L registers with a tracker-board opening, then atmospheric air passes through the said registering openings into the corresponding tube J and chamber E⁹ to press the diaphragm E⁸ rearwardly into the chamber E', and as the diaphragm E⁸ is connected with the stem E⁶ it is evident that the latter is shifted, and in doing so it moves the valve E⁵ off its seat E² to connect the chambers E' and E³ with each other to exhaust the air from the pneumatic D and cause the same to collapse. The pneumatic in doing so moves the rod C upward, and the latter thus imparts a swinging motion to

the corresponding key-striker A to press the corresponding key of the piano or organ, and thereby sound the same.

On the stem E^6 is secured a second valve E^{10} , somewhat larger than the valve E^5 and controlling a port E^{11} , leading to the atmosphere. The valve E^{10} is in an open position at the time the valve E^5 is seated, and hence atmospheric air can pass by way of the port E^{11} , chamber E^3 , and port E^4 to the pneumatic D to inflate the same, and thereby move the rod C downward to allow the key-striker A and the piano or organ key to swing back to their normal inactive position.

Each inlet-chamber E^9 (see Fig. 4) is connected by a port E^{12} with a pin-hole or leak-opening E^{13} , opening into a chamber E^{14} , having a channel E^{15} returning to the suction-chamber E' (see Fig. 3 and dotted lines, Fig. 4) to allow the air previously passed into the chamber E^9 by the tube J to escape from the chamber E^9 as soon as the tracker-board hole is again covered up. Now when this takes place the pressure is equalized on both sides of the diaphragm E^8 , and the valves E^5 and E^{10} now return to their previous normal position (shown in Fig. 4) owing to the atmospheric pressure against the valve E^{10} to move the latter off its seat E^{11} and the valve E^5 to its seat E^2 . Now when this takes place atmospheric air immediately passes by way of the port E^{11} , chamber E^3 , and port E^4 into the corresponding pneumatic D to inflate the same and to move the pneumatic into position for immediate action as soon as the tracker-board opening is again uncovered by a registering opening in the note-sheet, as previously explained.

The valve-stem E^6 extends through the port E^{11} to the outside of the chest E to be under the control of the operator to allow the latter to turn the stem E^6 , so that the latter screws in the nuts E^7 and moves the diaphragm E^8 into proper position relative to the valves E^5 and E^{10} to insure proper action of the valve mechanism, as above described. This adjustment renders the valve mechanism exceedingly sensitive, so that comparatively little air-pressure is needed in the chamber E^9 to actuate the diaphragm E^8 . The adjustment is also especially serviceable in case the leather or other material from which the diaphragm E^8 is made is more or less stiff and does not flex correspondingly under a given pressure.

By having the valve-stem E^6 adjustably secured in the diaphragm-nuts E^7 and the valves E^5 and E^{10} both fastened on the valve-stem it is evident that the slightest movement of the diaphragm E^8 causes a corresponding movement—that is, alternate seating and unseating—of the said valves E^5 and E^{10} . Furthermore, by arranging the valve-stem E^6 horizontally very little power is required to produce the desired shifting of the parts.

It is understood that two nuts E^7 are preferably employed and secured to the diaphragm

on opposite sides, and by having the handle end of the stem E^6 extend to the outside of the chest it can be readily reached by the operator to adjust the diaphragm relative to the valves at the time the attachment or self-player is in position on the piano or organ, and hence the corresponding pneumatic and its key-striker are regulated to a nicety to cause the key-striker to properly act on its piano or organ key. It is understood that the back of the casing is temporarily removed to give the operator convenient access to the stems E^6 for adjusting the diaphragms relative to the valves to bring the key-strikers into the proper position relative to the piano or organ keys, as above described. As shown in the drawings, the pivotal ends of the transverse pneumatics D are at the rear end of the casing in that portion which extends under the keyboard-frame of the piano or organ, and hence the instrument-casing can be made very narrow to take up as little room as possible. Furthermore, by having the pneumatics D arranged as described their movable members are connected by the forwardly-inclined rods or links C with the key-strikers A to actuate the latter without lost motion and with as little force as possible, so that the operator can readily actuate the attachment or self-player without undue physical exertion on the pedals. Furthermore, the arrangement of the pneumatics D and the wind-chests E permits of bringing the tracker-board K and the rolls L' and L^2 in a low position to permit convenient access to the rolls for inserting or removing the note-sheets, and the length of the tubes J is reduced to a minimum, so that the slightest amount of air passing by way of the tracker-board openings into the tubes and the wind-chests E readily actuates the extremely sensitive diaphragm E^8 and the minutely-adjusted valves E^5 E^{10} .

In order to more or less powerfully actuate the pneumatics D, and consequently the key-strikers A and the keys of the piano or organ, the valve G is shifted to exhaust more or less air from the suction-chambers E' by the action of the bellows H. For the purpose mentioned the valve G is mounted to slide transversely in a valve-casing G' , provided in one side with a slot G^2 , gradually increasing from the rear toward the front (see Fig. 2) and opening into the duct F. In the bottom of the casing G' is arranged an opening G^3 , (see Fig. 5,) opening into the suction-chamber H' . The valve G is normally held in a rearmost closed position by a spring G^4 to disconnect the slots G^2 G^3 . On the front end of the valve is secured a rod or stem G^5 , connected with one end of a cord or rope G^6 , passing over a guide-pulley G^7 (see Figs. 1 and 2) and connecting at its other end with a regulating-lever G^8 , fulcrumed on the casing B and having its upper or handle end within convenient reach of the operator seated in front of the instru-

ment. Now by the operator moving the upper or handle end of the regulating-lever G^8 from the left to the right a pull is exerted on the cord or rope G^6 and the rod G^5 to slide the valve G forward against the tension of its spring G^4 . The valve in its forward movement uncovers the openings $G^2 G^3$, so that air communication is established between the duct F and the main suction-chamber H' for exhausting more or less air from the chambers E' , according to the distance the valve G is moved forward by the operator moving the handle end of the lever G^8 a greater or less distance from the left to the right. By the operator releasing the pressure on the handle end of the lever G^8 the spring G^4 forces the valve G to slide rearward and the handle end of the lever G^8 to swing back from the right to the left. Thus by the operator simply moving the regulating-lever G^8 the pneumatics D are more or less powerfully actuated, and consequently a corresponding movement is given to the keys of the musical instrument to execute the music piano or forte as called for by the music-piece.

In order to move the note-sheet over the tracker-board K at any desired speed for executing the music according to the prescribed tempo of the music-piece, the following device is provided: On the shaft L^3 of the roller L^2 is secured a gear-wheel N (see Figs. 1, 2, and 8) in mesh with a pinion N' , fastened on a shaft N^2 , carrying a sprocket-wheel N^3 , over which passes a sprocket-chain N^4 , also passing over a sprocket-wheel N^5 , secured on the main shaft O' of a pneumatic-driving device O , preferably of the construction shown and described in the application for Letters Patent of the United States filed by me March 24, 1903, Serial No. 149,295, so that further detailed description of this driving device is not deemed necessary. This pneumatic-driving device O is in general construction provided with a plurality of pneumatics O^2 , connected at their movable members by pitmen O^3 with crank-arms O^4 , secured on the main driving-shaft O' , so that when the pneumatics O^2 are successively exhausted their pitmen O^3 impart a continuous rotary motion to the main shaft O' , and the rotary motion of the latter is then transmitted by the gearing described to the roller L^2 to wind up the note-sheet unwinding at the time from the roller L' .

The wind-chest O^5 of the driving device O is connected by an exhaust-pipe O^6 with a valve mechanism P , connected by a branch channel H^2 with the main suction-chamber H' , previously described, and the said valve mechanism P (see Figs. 6 and 7) is provided with a valve-casing P' , having a chamber P^2 , into which opens the exhaust-pipe O^6 . The chamber P^2 is connected by a port P^3 with a chamber P^4 , containing a slide-valve P^5 , controlling the port P^3 , and a port P^6 , leading to the branch channel H^2 . Normally the port P^6 is closed by

the action of a spring P^7 on the slide-valve P^5 , holding the latter in the position shown in Fig. 6, and the front end of the said slide-valve P^5 is connected by a valve-stem P^8 with a controlling-lever P^9 , fulcrumed on the casing B and having its upper or handle end within convenient reach of the performer to enable the latter to impart a swinging motion to the lever P^9 , to move the slide-valve P^5 from the right to the left, to connect the ports P^3 and P^6 with each other, and to allow air to exhaust from the wind-chest O^5 to actuate the pneumatics O^2 successively, the exhaust of the pneumatics being controlled by a valve O^7 , rotating with the shaft O' , as more fully described in the application mentioned.

Now by the operator swinging the handle end of the lever P^9 from the left to the right the slide-valve P^5 is more or less opened to allow more or less suction in the driving device O to rotate the shaft O' faster or slower, and consequently to rotate the gear-wheel N correspondingly, so that the note-sheet L is drawn over the tracker-board K with more or less speed, according to the tempo required by the music to be executed.

It is understood that when the operator releases the pressure on the upper end of the lever P^9 then the spring P^7 draws the slide-valve P^5 from the left to the right into a closed position, and hence reduces the suction correspondingly to rotate the main shaft O' slower, and with it the roller L^2 .

From the foregoing it will be seen that by the simple movement of the regulating-lever P^9 any desired speed can be given to the note-sheet passing over the tracker-board K .

In order to allow rerolling of the note-sheet on the roller L' whenever it is desired to do so by the performer, the following device is provided: The sprocket-wheel N^3 (see Fig. 8) is engaged by a shifter Q , held on a shifting rod Q' , mounted to slide in suitable bearings in the casing B , and a spring Q^2 presses the shifter Q to normally hold the sprocket-wheel N^3 , shaft N^2 , and pinion N' in the position shown in Fig. 8—that is, the pinion N' in mesh with the gear-wheel N . The rod Q' extends into the path of a block P^{10} on the regulating-lever P^9 , so that when the latter is moved into an extreme right-hand position then the rod Q' is shifted by the said lever to move the sprocket-wheel N^3 and its shaft N^2 from the left to the right to disengage the pinion N' from the gear-wheel N and to move a pin N^6 on the said shaft N^2 in engagement with a pin R on a sprocket-wheel R' , mounted to rotate loosely on the shaft N^2 . This sprocket-wheel R' is connected by a sprocket-chain R^2 with a sprocket-wheel R^3 , secured on a shaft R^4 , journaled in the casing B and provided with a socket and pin R^5 for engaging the spindle L^4 of the roller L' . Now when the shaft N^2 is shifted as described then the rotary motion of the shaft N^2 is transmitted to the sprocket-wheel R' by the pins

N⁶ and R, and hence the sprocket-chain R² imparts a rotary motion to the sprocket-wheel R³, so that the shaft R⁴ by its socket and pin R⁵ rotates the roller L' to wind up the note-sheet now unwinding from the roller L² out of mesh with the driving mechanism.

By the arrangement described the performer is enabled to stop the traveling of the note-sheet at any time and to rewind the note-sheet, or only a part thereof, on the roller L'. Thus the performer is enabled to repeat music-pieces or portions of the pieces. When the note-sheet has been rewound on the roller L' and it is desired to remove this note-sheet from the instrument, then the roller L' is disengaged from the socket R⁵ and a socket R⁶ to allow of inserting a new roll containing another note-sheet.

A screw S screws in the casing B and abuts against the end of the shaft L³, and this is under the control of the operator to allow the latter to screw the screw S inward or outward, so as to shift the roller L² in the direction of its length to bring the note-sheet in proper relation to the openings in the tracker-board K. A like adjustment can be made of the roller L' by adjusting a screw S', engaging the outer end of the shaft R⁴. A spring R⁷ presses the shaft R⁴, as indicated in Fig. 8, so as to hold the shaft always in contact with the end of the screw S'. It is also understood that the socket R⁶ is of usual construction and spring-pressed to allow convenient insertion or removal of the roller L'.

In order to actuate the forte pedal of the piano automatically at the time the valve-chests E are exhausted to the fullest extent by the operator shifting the lever G⁸ correspondingly, the following device is provided: An adjustable button T' (see Figs. 1 and 3) is held on the rear end of a lever T, fulcrumed in the casing B, and pivotally connected at its forward end by a link T² with a bell-crank T³, having a flexible connection T⁴, such as a chain or the like, with the regulating-lever G⁸. Now the flexible connection T⁴ remains slack until the regulating-lever G⁸ is moved into an extreme right-hand position—that is, at the time the valve G is opened to its fullest extent, and at this time the connection T⁴ imparts a swinging motion to the bell-crank lever T³, so that the link T² imparts a swinging motion to the lever T, which by its button T' presses the forte pedal of the piano, and hence the piano is caused to sound extremely loud at the time the keys are actuated forcibly by the key-strikers A.

The mechanism for actuating the main bellows H from the pedals I consists, essentially, of a link I', pivotally connecting the main bellows with a lever I², hinged at its rear end at I³ to the casing B, as plainly illustrated in Figs. 2 and 3. The free end of the lever I² carries a friction-roller I⁴, engaged by the corresponding pedal I, and a double or V-

shaped spring I⁵ rests with the free end of one arm on a fixed casing-support B², and the free end of the other arm presses against the movable member of the main bellows to hold the latter normally in a closed position and the lever I² and pedal I in an uppermost position. Now when the pedal I is pressed by the foot of the operator then a downward-swinging motion is given to the lever I², which by the link I' imparts a swinging motion to the movable member of the main bellows H, so as to open the latter, and when the pressure is released by the operator on the pedal I then the spring I⁵ immediately closes the bellows H and returns the lever I² and pedal I to their former positions. By having the pedal I riding at its free end on the friction-roller I⁴ the pedal action is rendered comparatively noiseless and the friction is reduced to a minimum, so that it requires comparatively little physical exertion on the part of the performer to actuate the bellows H.

The operation is as follows: The note-sheet on the roller L' is stretched over the tracker-board K and attached to a hook on the roller L² in the usual manner, and then the operator actuates the pedals I and with the right hand manipulates the regulating-lever P⁹, and with the left hand imparts movement to the regulating-lever G⁸. Now when the lever P⁹ is moved from the left to the right the slide-valve P⁵ is opened, so as to connect the exhaust-tube O⁶ with the branch channel H², and consequently the driving device O is actuated to turn the main shaft O' and cause a rotation of the roller L² to wind up the note-sheet. Now as the note-sheet passes over the tracker-board the note-sheet openings register with the corresponding tracker-board openings, and consequently air is admitted by the flexible tubes J to the corresponding chambers E⁹ to actuate the diaphragm E⁸ therein, as previously explained, for deflating the corresponding pneumatics D to actuate the key-strikers and the keys of the piano or organ to sound the same.

From the foregoing it will be understood that the performer can conveniently vary the speed with which the note-sheet travels over the tracker-board, and the force with which the strikers engage the keys of the piano is likewise under the control of the operator manipulating the regulating-lever G⁸ correspondingly.

Whenever it is desired to reroll the note-sheet or a portion thereof, it can be done by the operator moving the lever G⁸ into an extreme right-hand position, so that the motor runs at a higher speed to quickly reroll the sheet on the roller L'. The pins N⁶ and R form a clutch device for throwing the rerolling or reversing gear into and out of action, as described; but I do not limit myself to the particular device shown and described. It is understood that when the note-sheet unwinds

from the roller L' the sprocket-wheel R' runs loose on the shaft N². It is further understood that when forte is required by the music then the lever G⁸ is moved to an extreme right-hand position to exhaust the pneumatics D to the fullest extent and at the same time actuate the forte pedal of the piano for the purpose mentioned. The bell-crank lever T³ and pedal-lever T are dormant during the ordinary working of the regulating-lever G⁸, which only becomes taut and acts on the bell-crank lever whenever the lever G⁸ is moved to the extreme position mentioned.

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

1. A self-playing attachment for musical instruments, provided with a valve-chest having a suction-chamber, a diaphragm-chamber, a diaphragm between the said suction-chamber and the diaphragm-chamber, a pneumatic-chamber having connection with a pneumatic and by a valve-seat with the atmosphere and by a port with the said suction-chamber, valves for the said seats, a valve-stem extending to the outside of the valve-chest, and on which the said valves are permanently fixed and nuts screwing on the valve-stem and fixed to opposite faces of the diaphragm, as set forth.

2. A self-playing attachment for musical instruments, provided with a plurality of valves, adapted to be alternately seated on their valve-seats, a valve-stem on which the said valves are permanently secured, a diaphragm, and a connection between the diaphragm and the valve-stem, to allow adjusting of the latter in the direction of its length, to adjust the diaphragm relative to the said valves, as set forth.

3. A self-playing attachment for musical instruments, provided with a plurality of valves, adapted to be alternately seated on their valve-seats, a valve-stem on which the said valves are permanently secured, a diaphragm, and a connection between the diaphragm and the valve-stem, to allow adjusting of the latter in the direction of its length, to adjust the diaphragm relative to the said valves, the said connection consisting of nuts secured to oppo-

site sides of the diaphragm, and in which nuts screws a threaded portion of the valve-stem, as set forth.

4. A self-playing attachment provided with a casing, valve-chests secured in the rear of the casing one above the other, each valve-chest having a plurality of valve mechanisms, and each valve mechanism consisting of a horizontal valve-stem mounted to slide at one end in the valve-chest, a diaphragm on which the other end of the valve-stem is adjustably secured, and two valves permanently secured on the said stem and spaced apart, as set forth.

5. A self-playing attachment for musical instruments provided with strikers for engaging the keys of the instrument, means for actuating the strikers, and a valve mechanism for controlling the said striker-actuating means, the valve mechanism being provided with diaphragms, valves and valve-stems permanently carrying the valves and adjustably connected with the diaphragms for adjusting the said diaphragms relative to the said valves and from the outside of the instrument, to regulate the said striker-actuating means at the time the attachment is in position on the instrument, as set forth.

6. A self-playing attachment for musical instruments, provided with key-strikers, pneumatics connected with the said key-strikers, for actuating the same, a valve-chest for the said pneumatics, having a diaphragm, valves, and a valve-stem permanently carrying the valves and adjustably connected with the diaphragm, the valve-stem extending to the outside of the valve-chest, to allow adjustment of the valves relative to the diaphragm at the time the attachment is in position on the musical instrument, as set forth.

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

HERMANN MEYER.

Witnesses:

LOUIS RENO,
H. F. RENO.