

No. 773,406.

PATENTED OCT. 25, 1904.

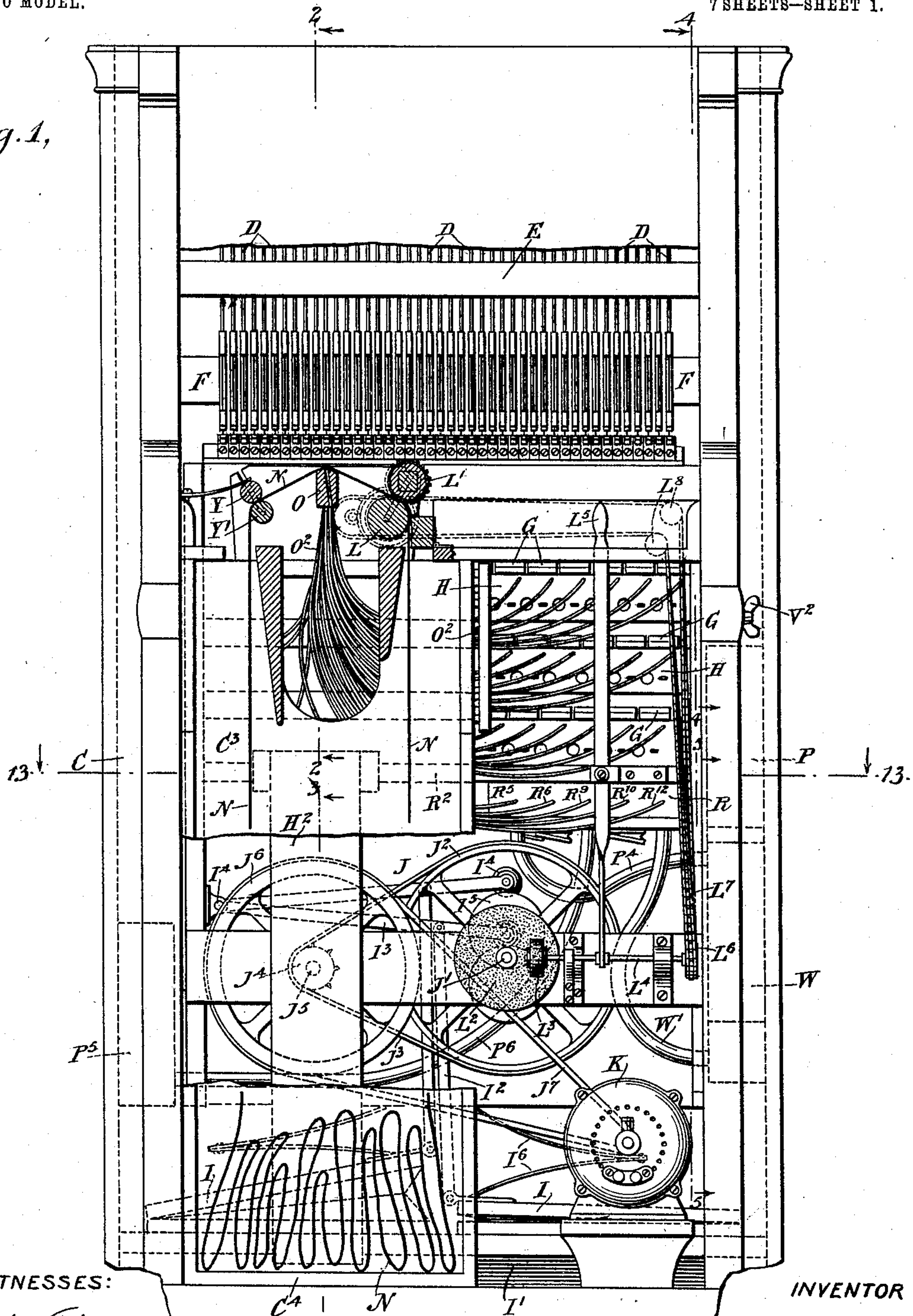
H. MEYER.  
SELF PLAYING PIANO.

APPLICATION FILED APR. 27, 1904.

NO MODEL.

7 SHEETS--SHEET 1.

*Fig. 1,*



**WITNESSES:**

Edw. Thorpe.  
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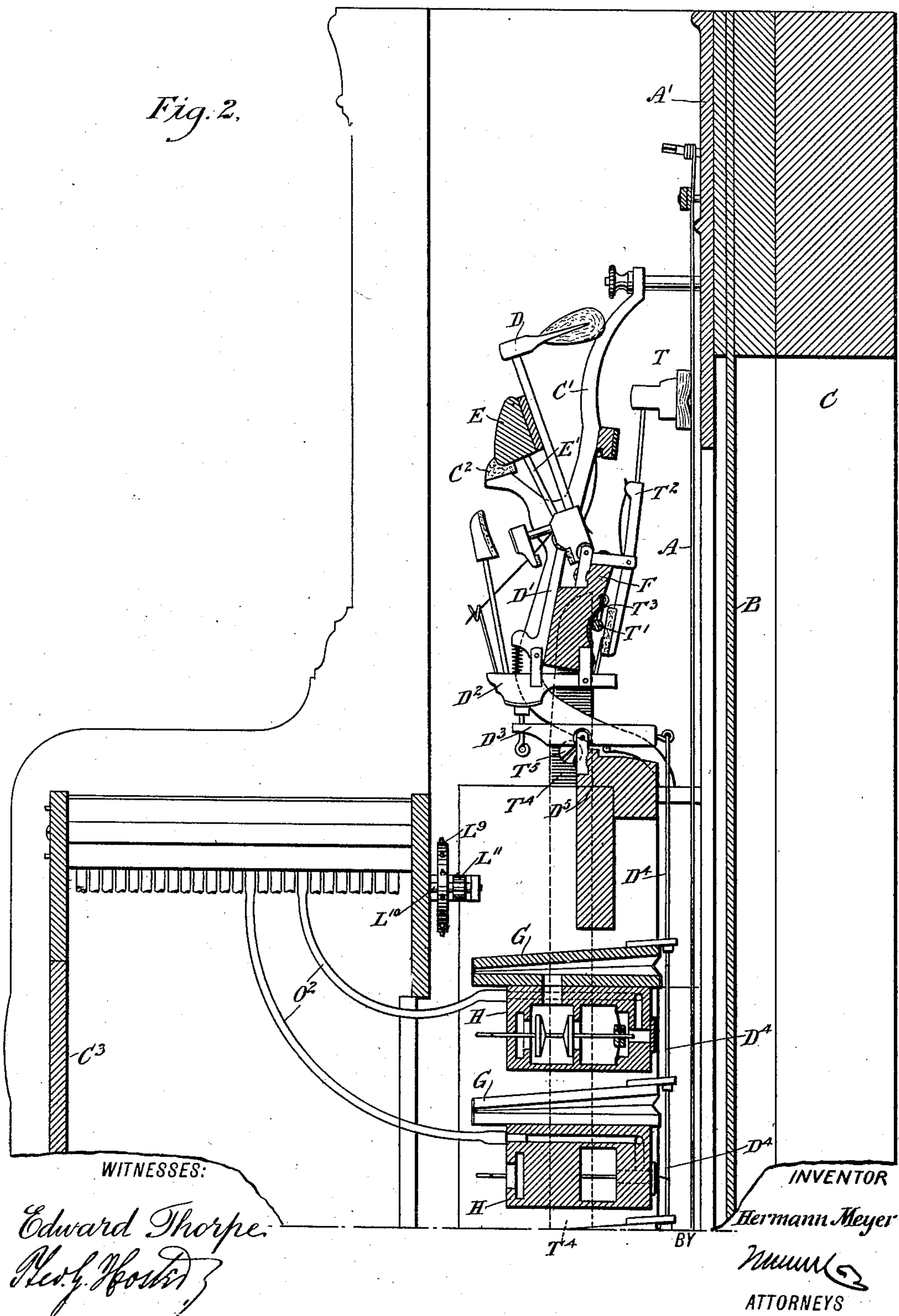
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7 SHEETS—SHEET 2.





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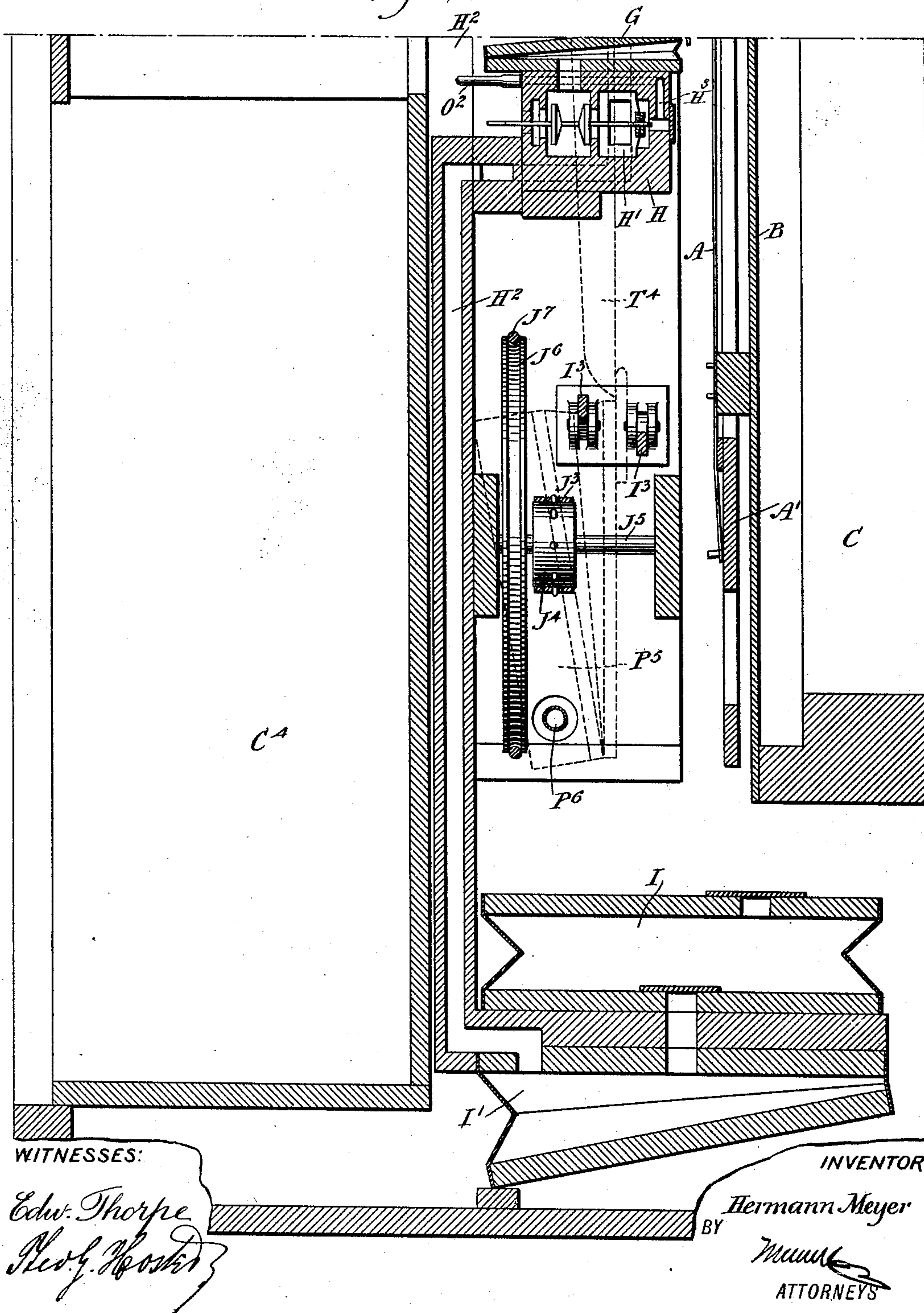
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7 SHEETS—SHEET 3.

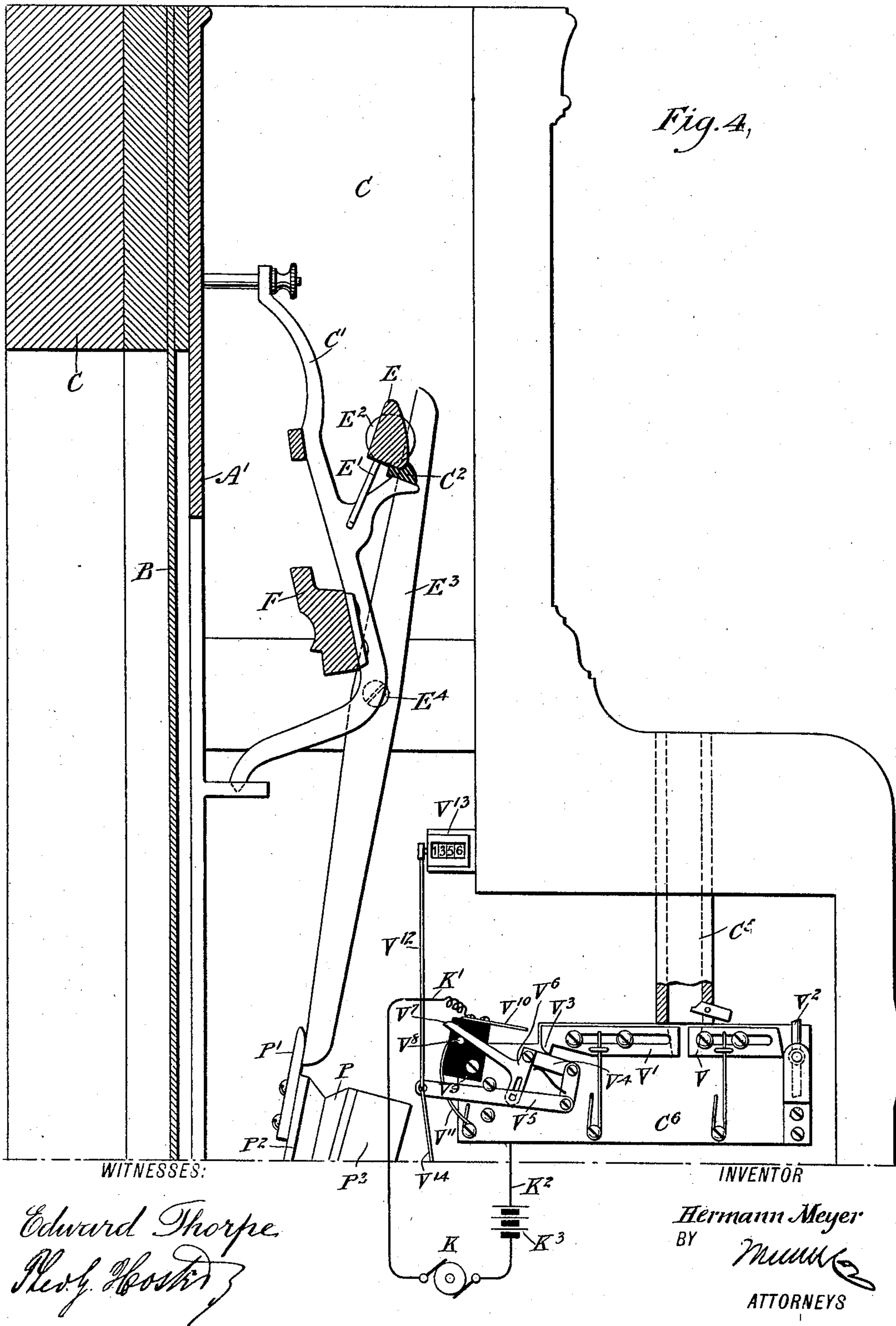
*Fig. 3,*



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7 SHEETS—SHEET 4.





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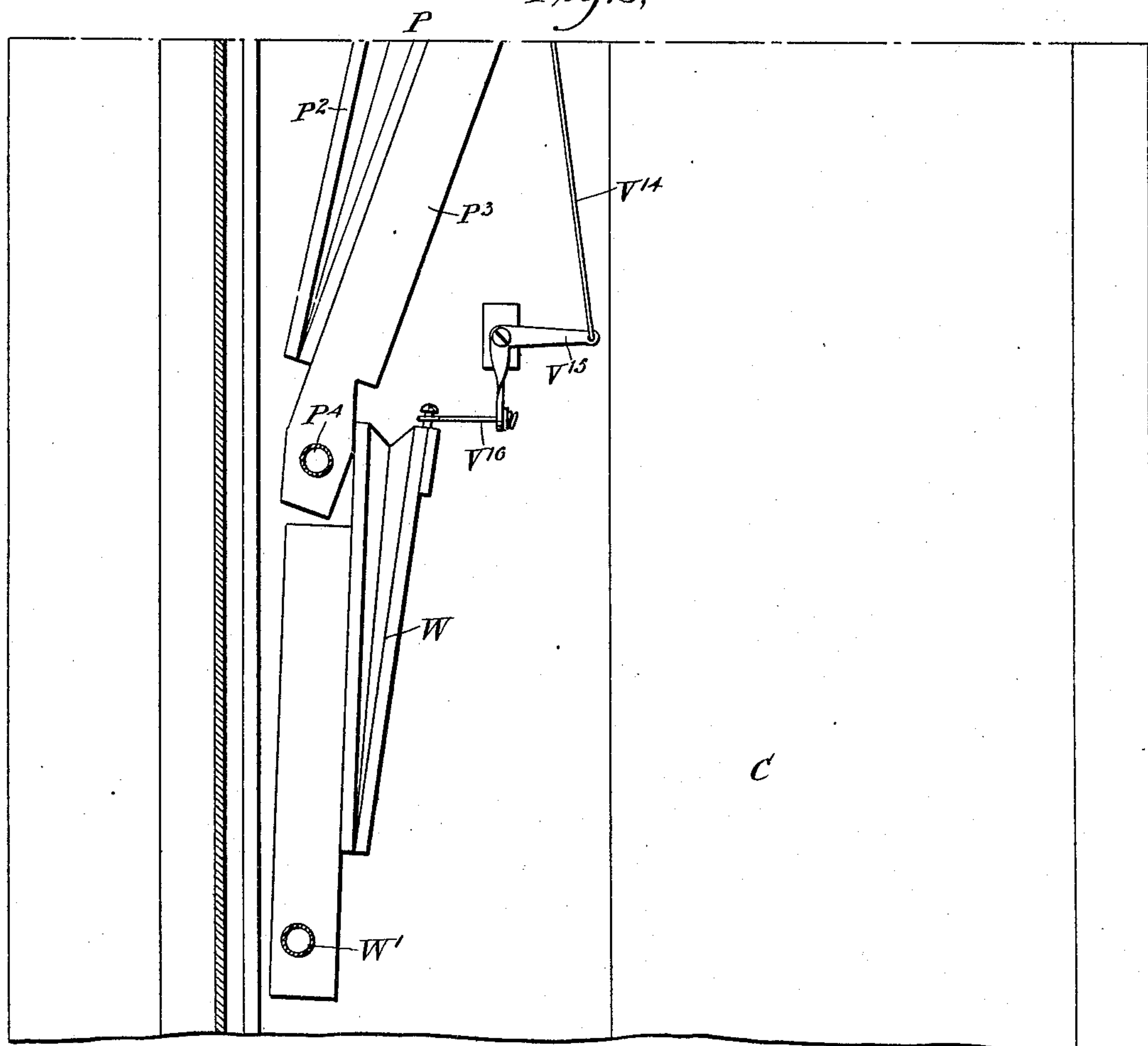
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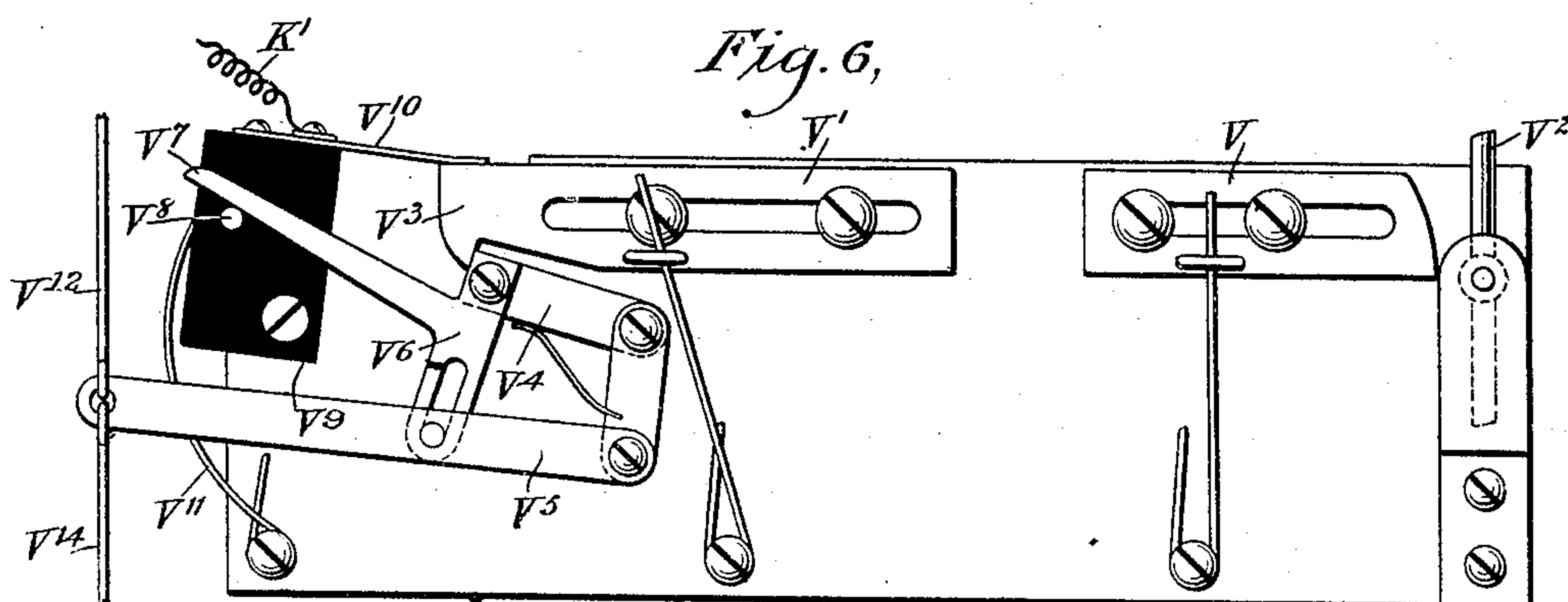
NO MODEL.

7 SHEETS--SHEET 5.

*Fig. 5,*



*Fig. 6,*



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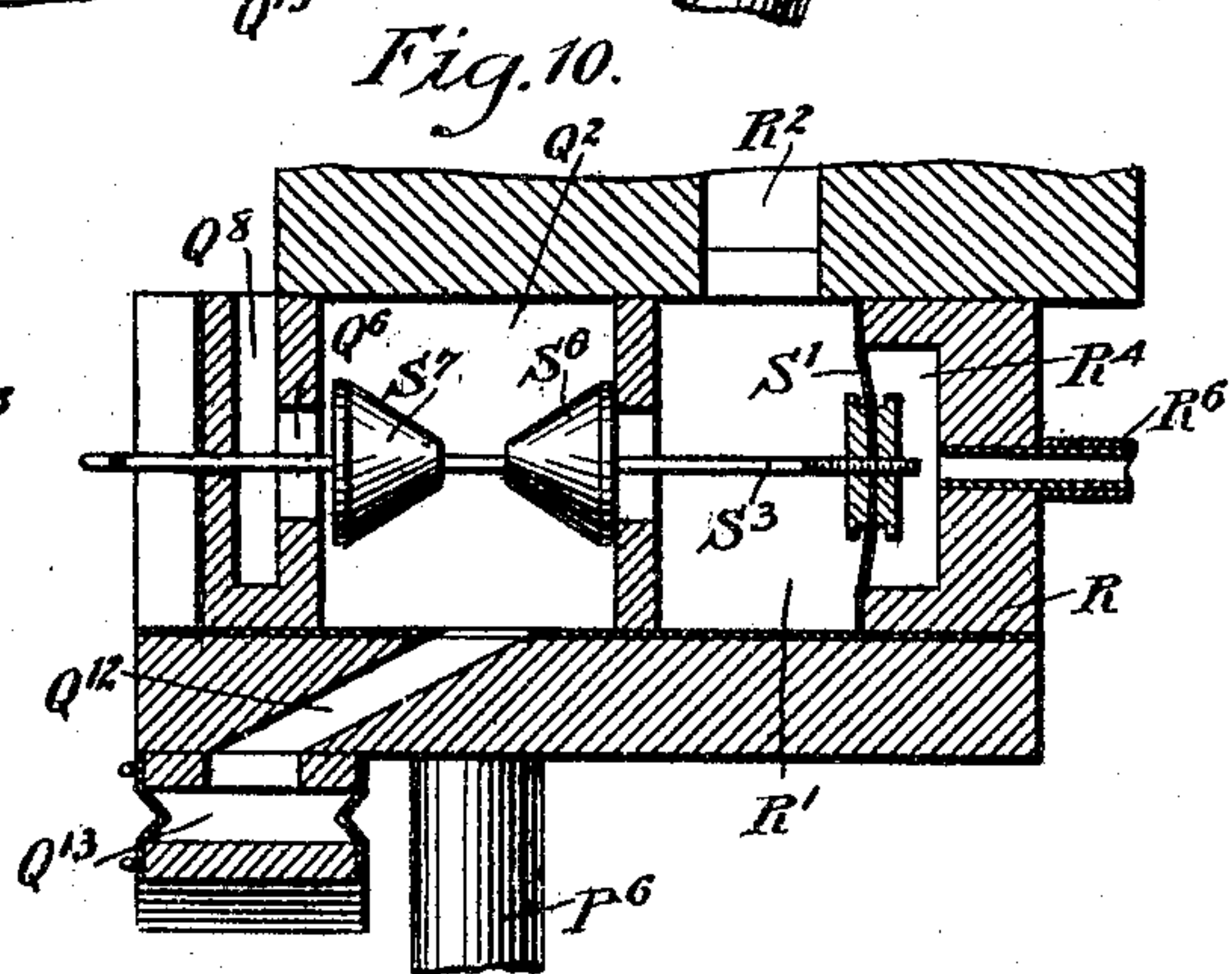
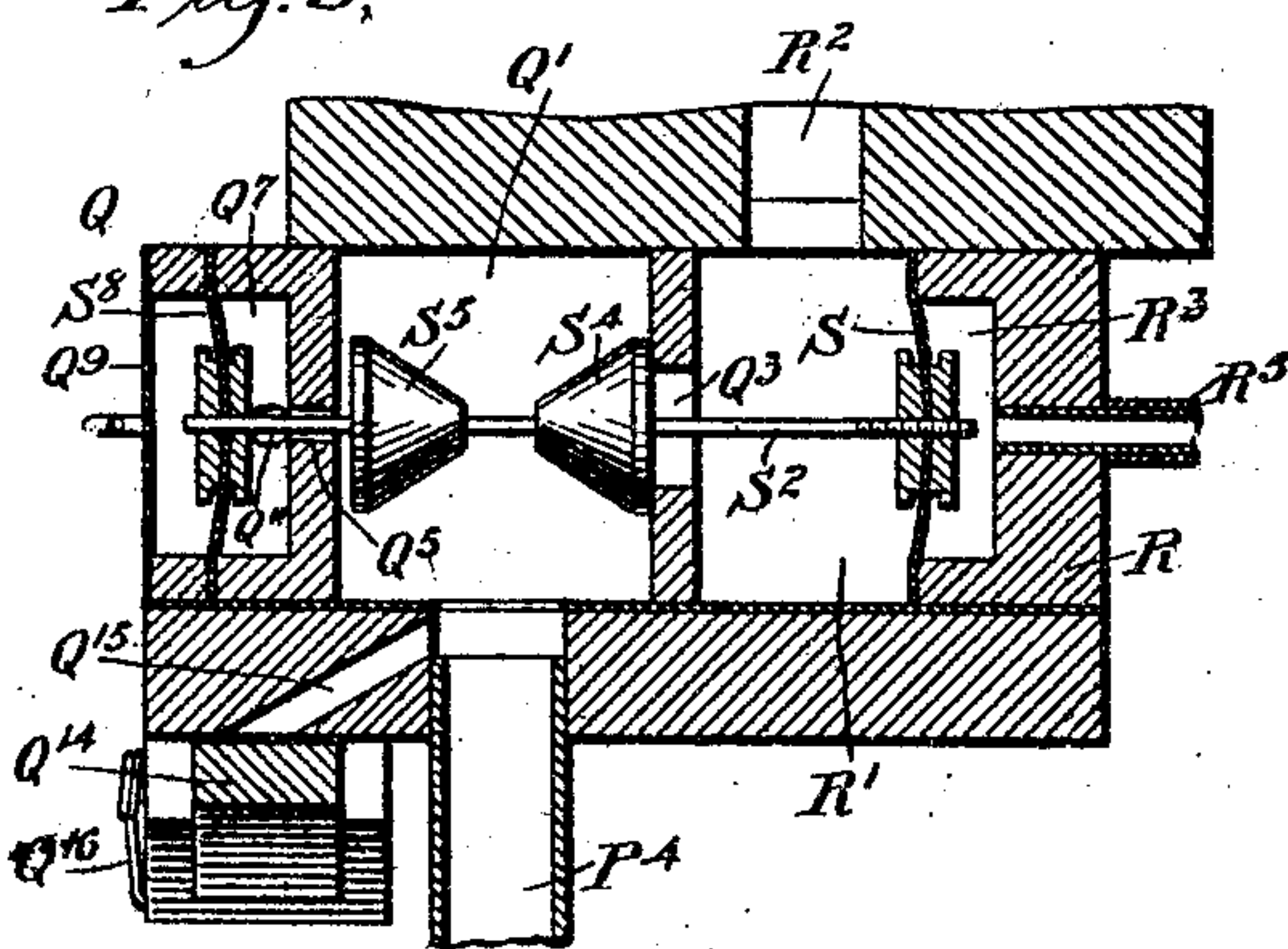
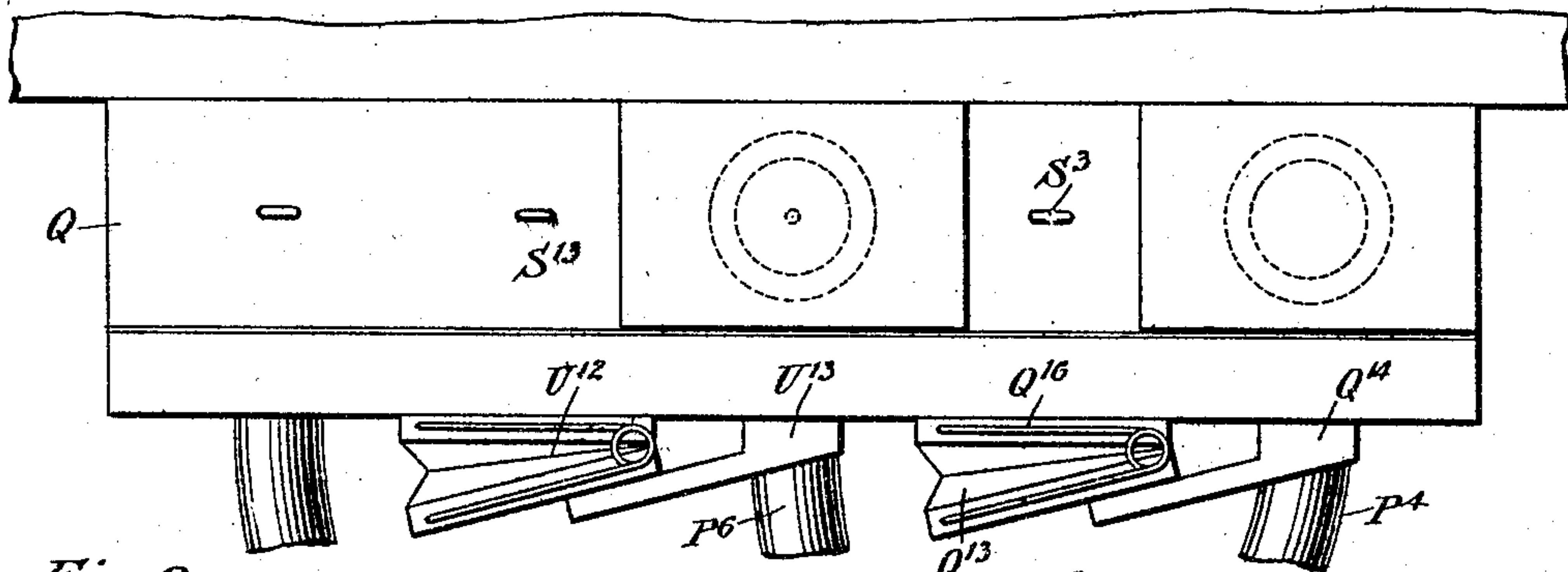
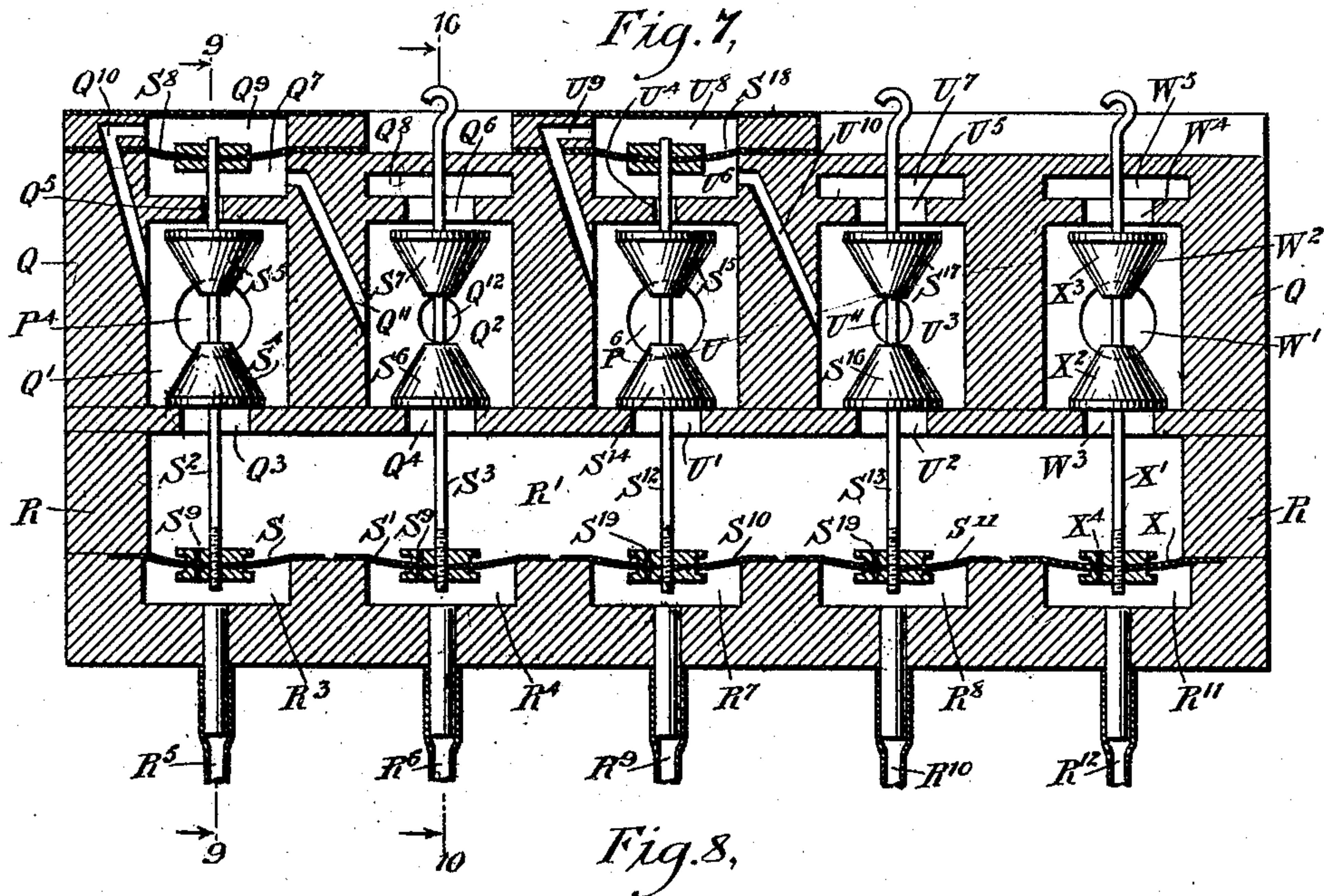
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APPLICATION FILED APR. 27, 1904.

NO MODEL.

7 SHEETS—SHEET 6.



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APPLICATION FILED APR. 27, 1904.

NO MODEL.

7 SHEETS—SHEET 7.

Fig. 11,

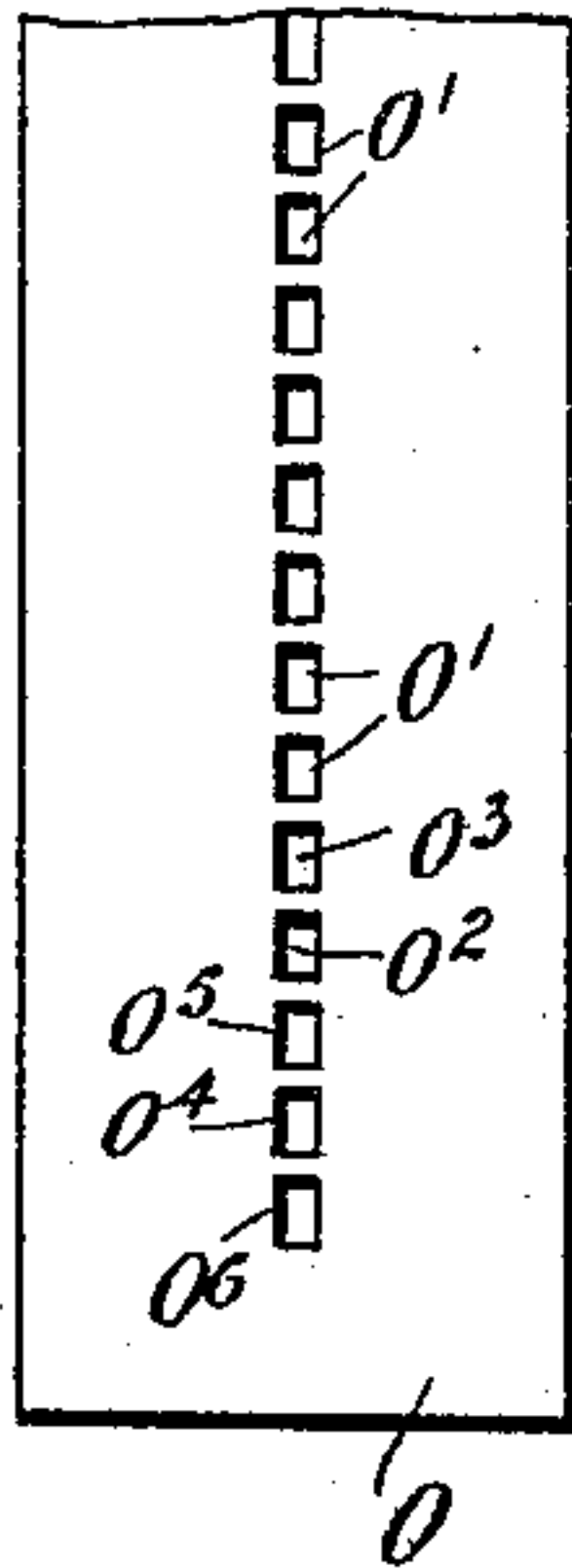


Fig. 12,

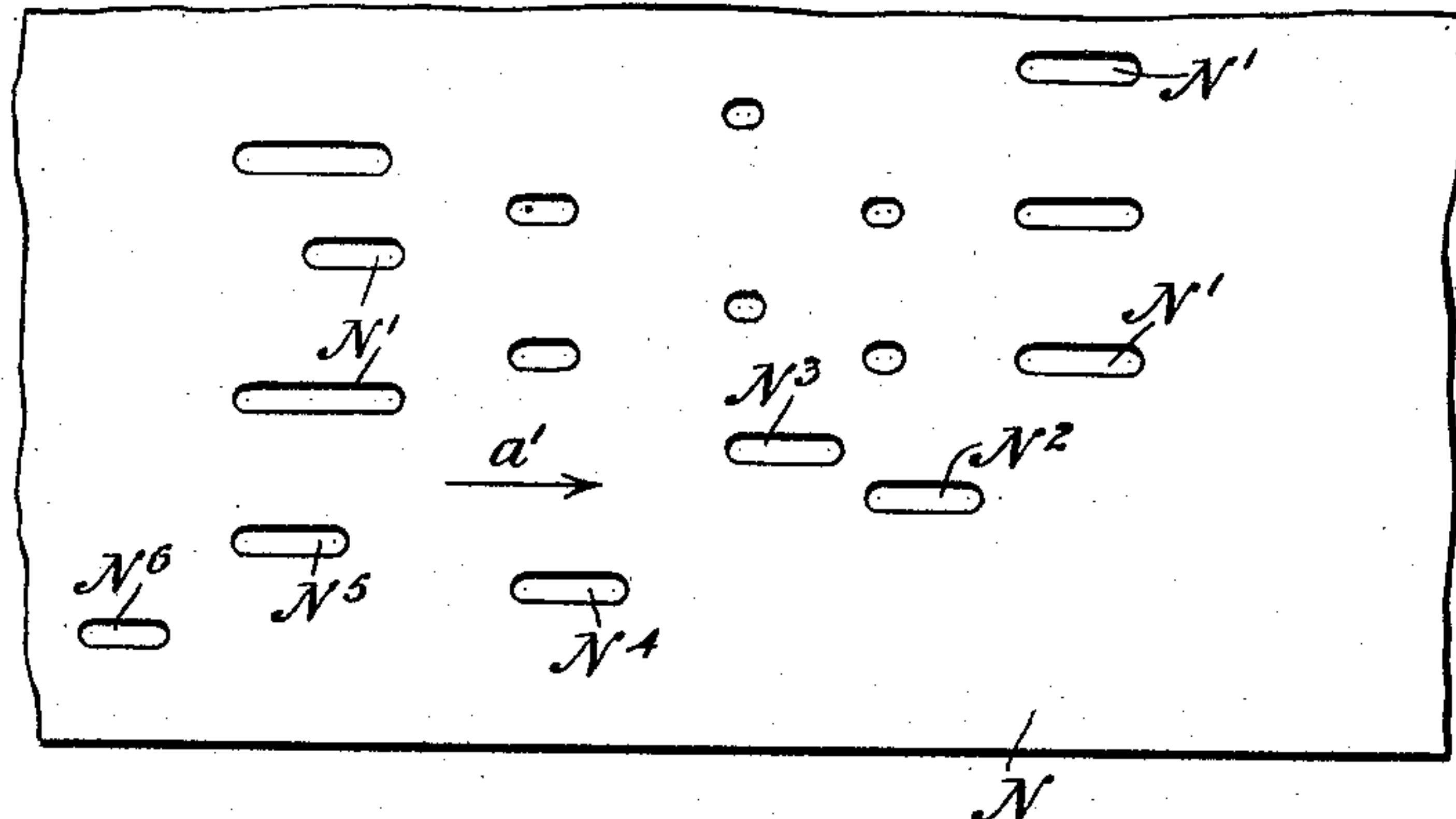


Fig. 13,

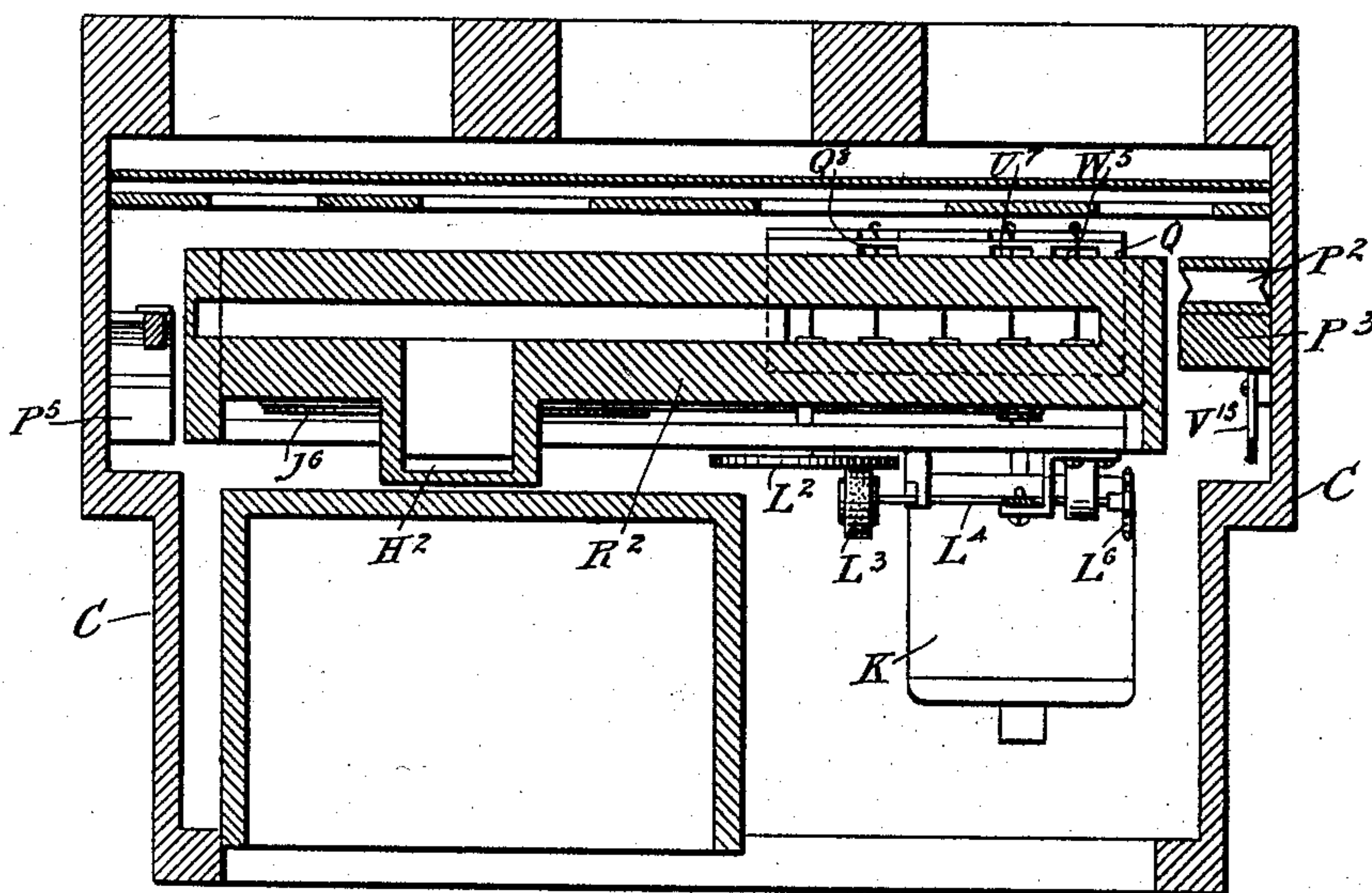
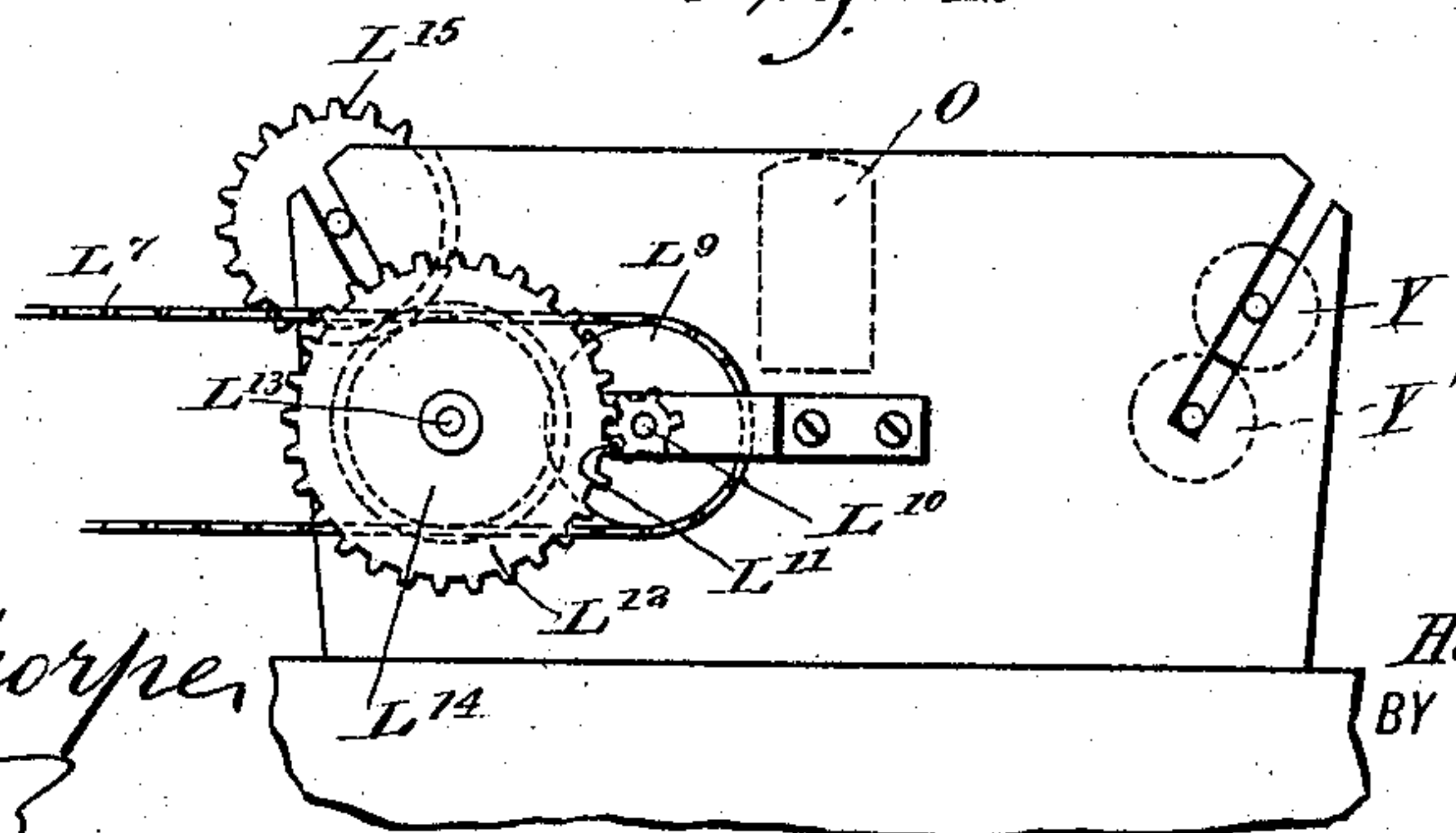


Fig. 14.



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# UNITED STATES PATENT OFFICE.

HERMANN MEYER, OF NEW YORK, N. Y.

## SELF-PLAYING PIANO.

SPECIFICATION forming part of Letters Patent No. 773,406, dated October 25, 1904.

Application filed April 27, 1904. Serial No. 205,126. (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 Self-Playing Piano, of which the following is a full, clear, and exact description.

The invention relates to self-playing musical instruments in which a note-sheet controls the sounding devices.

The object of the invention is to provide a new and improved self-playing piano arranged for the note-sheet to automatically control pneumatic devices for moving either the hammer-rail or the damper-rail into an active position, to hold the same therein the desired length of time, and to then release the rail for the latter to assume its normal position.

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, parts being in section. Fig. 2 is an enlarged transverse section of the upper portion of the improvement, the section being on the line 2 2 of Fig. 1. Fig. 3 is a like view of the lower part of the improvement, the section being on the line 3 3 of Fig. 1. Fig. 4 is a cross-section of the upper portion of the improvement on the line 4 4 of Fig. 1. Fig. 5 is a similar view of the lower portion of the improvement on the line 5 5 of Fig. 1. Fig. 6 is an enlarged face view of the coin-controlled mechanism. Fig. 7 is an enlarged sectional plan view of the pneumatic valve mechanism for controlling the hammer-rail, the damper-rail, and the stopping mechanism. Fig. 8 is a rear end elevation of the same. Fig. 9 is a cross-section of the same on the line 9 9 of Fig. 7. Fig. 10 is a similar view of the same on the line 10 10 of Fig. 7. Fig. 11 is a plan view of part of the tracker-board.

Fig. 12 is a face view of part of the note-sheet. Fig. 13 is a sectional plan view of the improvement on the line 13 13 of Fig. 1, and Fig. 14 is a rear face view of part of the driving mechanism for the note-sheet-drawing rollers.

The strings A of the self-playing instrument are stretched on a string-frame A', extending in the front of a sounding-board B and held with the latter in the usual manner on the piano-frame C. The piano-action for sounding the strings A may be of any approved construction. It preferably, however, consists of hammers D, normally resting in an inactive position on a hammer-rail E, mounted near its ends on links E', fulcrumed at their lower ends on brackets C', fixed on the piano-frame C. The hammer-rail E normally rests on felted stops C'', attached to the brackets C', as plainly indicated in Figs. 2 and 4.

The hammers D are fulcrumed at the usual flanges attached to a center or flanged rail F, and the said hammers are actuated by hammer-jacks D', held on jack-rockers D'', engaged by key-levers D<sup>3</sup>, connected by rods D<sup>4</sup> with the movable members of pneumatics G, preferably arranged in tiers to economize in space. The key-levers D<sup>3</sup> are fulcrumed on suitable flanges attached on a fixed rail D<sup>5</sup>, as plainly shown in Fig. 2.

The pneumatics G in each tier are secured by their fixed member to the top of a pneumatic valve-chest H, having a suction-chamber H' extending from one end of the chest to the other, and each suction-chamber H' for the several valve-chests H is closed at one end and opens at the other end into a duct H<sup>2</sup>, arranged on the side of the frame C and connected with the suction-chamber I' of a suction-bellows I, operated by an actuating mechanism J, driven from a motor K, preferably of the electrical type, held in the lower portion of the piano-frame C, as plainly indicated in Fig. 1. The actuating mechanism J also drives a pair of drawing-rollers L L', between which passes a note-sheet N, to cause the latter to travel over a transversely-disposed tracker-board O, fixed to an auxiliary frame C<sup>3</sup>, forming part of the main frame C, the



said auxiliary frame being provided with a receptacle  $C^1$  for containing the note-sheet  $N$ . (See Figs. 1 and 3.)

The note-sheet  $N$  is provided with note-apertures  $N'$ , adapted to register with openings  $O'$  in the tracker-board  $O$ , which openings  $O'$  are connected by flexible tubes  $O^2$  with inlet-chambers  $H^3$ , formed in the valve-chests  $H$ , 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 when the instrument is in action and a note-sheet aperture  $N'$  registers with a tracker-board opening  $O'$  then the corresponding valve mechanism in a valve-chest  $H$  is actuated to connect the corresponding pneumatic  $G$  with the exhaust-chamber  $H'$  to cause the pneumatic  $G$  to collapse. When this takes place, the movable member of the collapsing pneumatic  $G$  pulls the rod  $D^1$  downward to impart a swinging motion to the key-lever  $D^3$  and cause the corresponding hammer  $D$  to swing in contact with its string to sound the same. As soon as the note-sheet aperture  $N'$  has passed out of register with its tracker-board opening  $O'$  then the air previously allowed to pass into the inlet-chamber  $H^3$  by way of the tube  $O^2$  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  $D$  to again inflate the same. When this takes place, the rod  $D^1$  of this pneumatic moves upward to allow the hammer  $D$  to swing back to its normal position of rest against the rail  $E$ .

When the music calls for pianissimo playing, then the hammer-rail  $E$  is automatically moved rearwardly to bring the hammers  $D$  into their usual half-stroke positions, the same as if the soft-pedal on an ordinary piano were pressed. For this purpose the following device is provided: On one end of the hammer-rail  $E$  (see Fig. 4) is journaled a flanged friction-roller  $E^2$ , engaged at its forward face by the upper end of a lever  $E^3$ , fulcrumed at  $E^1$  on the frame  $C$  to swing transversely, and the lower end of the said lever  $E^3$  is engaged by a projection  $P'$ , attached to the free end of the movable member  $P^2$  of a pneumatic  $P$ , secured with its stationary member  $P^3$  to the frame  $C$ . A flexible tube  $P^1$  connects the pneumatic  $P$  with an exhaust-chamber  $Q'$  in a valve-chest  $Q$ , secured to the rear face of a wind-chest  $R$ , attached to the frame  $C$ . (See Figs. 1, 7, 8, 9, and 10.) The wind-chest  $R$  has its main chamber  $R'$  connected by a duct  $R^2$  (see Fig. 1) with the duct  $H^2$ , leading to the suction-chamber  $I'$  to exhaust the air from the wind-chest chamber  $R'$  during the time the instrument is in action.

The wind-chest chamber  $R'$  is separated by

diaphragms  $S$  and  $S'$  (see Figs. 7, 9, and 10) from air-chambers  $R^3$  and  $R^1$ , connected by flexible tubes  $R^5$   $R^6$  with tracker-board openings  $O^2$   $O^3$ , (see Fig. 11,) adapted to be successively opened by openings  $N^2$   $N^3$  in the note-sheet  $N$  (see Fig. 12) to admit atmospheric air to the chambers  $R^3$   $R^1$ . On the diaphragms  $S$   $S'$  are adjustably secured the forward ends of valve-stems  $S^2$   $S^3$ , of which the valve-stem  $S^2$  extends through the exhaust-chamber  $Q'$ , and the valve-stem  $S^3$  extends through a similar chamber  $Q^2$ , formed in the valve-chest  $Q$ , adjacent to the chamber  $Q'$ , as plainly shown in Fig. 7. On the valve-stem  $S^2$  and within the chamber  $Q'$  are secured valves  $S^4$   $S^5$ , and similar valves  $S^6$   $S^7$  are fastened on the valve-stem  $S^3$ , the valves  $S^6$   $S^7$  extending within the chamber  $Q^2$ . The valves  $S^4$   $S^6$  control ports  $Q^3$   $Q^4$  for connecting the chambers  $Q'$   $Q^2$  with the chamber  $R'$ , and the valves  $S^5$   $S^7$  control ports  $Q^5$   $Q^6$  for connecting the chambers  $Q'$   $Q^2$  with chambers  $Q^7$   $Q^8$ , formed in the valve-chest  $Q$ . The chamber  $Q'$  contains a diaphragm  $S^8$ , on which the rear end of the valve-stem  $S^2$  is secured, the diaphragm separating the chamber  $Q'$  from a chamber  $Q^9$ , connected by a port  $Q^{10}$  with the chamber  $Q'$ . A port  $Q^{11}$  connects the chamber  $Q^2$  with the chamber  $Q^7$ , and the chamber  $Q^8$  leads to the atmosphere. The diaphragms  $S$   $S'$  are provided with pin-holes or leak-openings  $S^9$  to allow the air in the chambers  $R^3$   $R^1$  to leak into the chamber  $R'$ . The port  $Q^5$  is very small (see Fig. 7) and is mainly intended as a passage for the valve-stem  $S^2$  into the chamber  $Q'$ . The valve  $S^5$  closes the port  $Q^5$  whenever the valve  $S^4$  moves into an open position. Normally the valves  $S^4$   $S^6$  are in a closed position while the valves  $S^5$   $S^7$  are open, as indicated in Fig. 7. The chamber  $Q^2$  is connected by a port  $Q^{12}$  (see Fig. 10) with a pneumatic  $Q^{13}$ , secured to the under side of the valve-chest  $Q$ , and the movable member of this pneumatic  $Q^{13}$  is provided with a valve  $Q^{14}$ , (see Figs. 8 and 9,) controlling a port  $Q^{15}$ , leading into the chamber  $Q'$ . The pneumatic  $Q^{13}$  is normally held in an extended position by a spring  $Q^{16}$  for the valve  $Q^{14}$  to normally close the port  $Q^{15}$ .

The note-sheet opening  $N^2$  is arranged in the note-sheet  $N$  at the beginning of a pianissimo portion called for by the music, and the opening  $N^3$  is located at the end of the pianissimo portion. When the note-sheet opening  $N^2$  uncovers its tracker-board opening  $O^2$ , then air passes by the flexible tube  $R^5$  into the chamber  $R^3$  to press the diaphragm  $S$  rearward, thereby moving the valve-stem  $S^2$  and the valves  $S^4$   $S^5$  in a like direction for the valve  $S^4$  to open the port  $Q^3$  and the valve  $S^5$  to close the port  $Q^5$ . When this takes place, air is sucked out of the pneumatic  $P$  by way of the tube  $P^1$ , chamber  $Q'$ , port  $Q^3$ , and exhaust-chamber  $R'$ , so that the said pneumatic  $P$  collapses and imparts a swinging motion to the



lever  $E^3$ , which now swings the hammer-rail  $E$  rearwardly, to limit the swinging of the hammers, and thus cause the hammers to sound the strings pianissimo whenever the hammers are actuated by the corresponding note-sheet openings  $N'$ , uncovering the corresponding tracker-board openings  $O'$ , as previously explained.

When the suction in the chamber  $Q'$  takes place, then air is sucked out of the chamber  $Q'$  by way of the port  $Q^{10}$ , so that the diaphragm  $S^8$  is held in a rearmost position to cause the valve  $S^4$  to remain in an open position even after the note-sheet opening  $N^2$  has passed its tracker-board opening  $O^2$ —that is, the hammer-rail  $E$  is held by air-pressure in the half-stroke position until the end of the pianissimo portion called for in the music is reached. When this takes place, the note-sheet opening  $N^3$  moves in register with the tracker-board opening  $O^3$ , so that air now passes by way of the flexible tube  $R^6$  into the chamber  $R^4$  to press the diaphragm  $S'$  rearwardly, thereby moving the valve-stem  $S^3$  and its valves  $S^6$   $S^7$  in a like direction. The valve  $S^6$  now opens the port  $Q^4$ , while the valve  $S^7$  closes the port  $Q^6$ . The chamber  $Q^2$  is now connected with the exhaust-chamber  $R'$ , and as the said chamber  $Q^2$  is also connected by way of the port  $Q^{11}$  with the chamber  $Q^7$  it is evident that air is exhausted from this chamber  $Q^7$ , and consequently the pressure on the front side of the diaphragm  $S^8$  is reduced to cause the diaphragm  $S^8$  to swing forwardly, so as to move the valve  $S^4$  into a closed position over its port  $Q^3$  to disconnect the chamber  $Q'$  from the chamber  $R'$ , air having been admitted to the chamber  $Q'$ , for when the air is drawn out of the chamber  $Q^2$ , as before mentioned, air is exhausted by way of the port  $Q^{12}$  from the pneumatic  $Q^{13}$ , so that the said pneumatic  $Q^{13}$  collapses and its valve  $Q^{14}$  opens the port  $Q^{15}$  to allow atmospheric air to pass by way of the said port  $Q^{15}$  into the chamber  $Q'$ , from which the atmospheric air can now pass by way of the tube  $P^4$  into the pneumatic  $P$  to inflate the same, thus allowing the hammer-rail  $E$  and the lever  $E^3$  to swing back to their normal front positions. (Shown in Fig. 4.)

It is understood that after the aperture  $N^2$  has passed its tracker-board opening  $O^2$  and air is cut off from the chamber  $R^3$  then the air contained in this chamber  $R^3$  leaks by way of the pin-hole  $S^9$  into the suction-chamber  $R'$  to permit an immediate closing of the valve  $S^4$ , as previously explained, whenever the valve  $S^6$  opens the port  $Q^4$  and air is drawn from the chamber  $Q^7$  by way of the port  $Q^{11}$  and the chamber  $Q^2$ .

When the aperture  $N^3$  in the note-sheet  $N$  has passed its tracker-board opening  $O^3$  and air is cut off from the chamber  $R^4$ , then the air in this chamber can leak by way of the pin-hole  $S^9$  in the diaphragm  $S'$  into the ex-

haust-chamber  $R'$  to allow the valve  $S^6$  to close by preponderance of pressure on the valve  $S^7$  from the chamber  $Q^8$ , connected with the atmosphere.

When the valve  $S^6$  moves into a closed position, then atmospheric air can pass by way of the chamber  $Q^8$  and port  $Q^6$  into the chamber  $Q^2$  and by way of the port  $Q^{12}$  into the pneumatic  $Q^{13}$  to allow the latter to inflate or open quickly to move the valve  $Q^{14}$  into a closed position over its port  $Q^{15}$ . It is understood that when the valves  $S^4$  and  $S^6$  are in the closed position (shown in Fig. 7) then the pneumatic  $P$  is practically connected with the atmosphere by way of the tube  $P^4$ , chamber  $Q'$ , port  $Q^5$ , chamber  $Q^7$ , port  $Q^{11}$ , chamber  $Q^2$ , port  $Q^6$ , and chamber  $Q^8$ , opening to the atmosphere, so that there is no danger of the pneumatic  $P$  becoming accidentally deflated.

From the foregoing it will be readily understood that the hammer-rail  $E$  and the hammers  $D$  are held in the half-stroke position as long as the pneumatic  $P$  is deflated, and the said pneumatic is retained in this deflated condition by pneumatic means, and hence mechanical locking devices for holding the pneumatic closed are entirely dispensed with.

In order to throw the usual dampers  $T$  of the piano-action simultaneously out of engagement with the strings  $A$ , the damper-rail  $T'$  (see Fig. 2) for engaging the lower ends of the damper-levers  $T^2$  receives a rearward swinging motion, and for this purpose a pneumatic device is employed, similar to the one above described in reference to the hammer-rail  $E$ . The damper-rail  $T'$  is hung on arms  $T^3$ , fulcrumed on the center rail  $F$ , and one end of the said damper-rail  $T'$  is engaged at its front face by the upper end of a lever  $T^4$ , fulcrumed at  $T^5$  on the frame  $C$ . (See Fig. 2.) The lower end of the lever  $T^4$  is engaged by the free end of the movable member of a pneumatic  $P^5$ , (see dotted lines Fig. 3,) connected by a flexible tube  $P^6$  with a chamber  $U$ , formed in the valve-chest  $Q$  and connected by a port  $U'$  with the suction-chamber  $R'$  of the wind-chest  $R$ . A port  $U^2$  (see Fig. 7) connects the chamber  $R'$  with a chamber  $U^3$ , similar to the chamber  $Q^2$ , the chamber  $U$  corresponding to the chamber  $Q'$ , previously mentioned. The wind-chest chamber  $R'$  is separated by diaphragms  $S^{10}$  and  $S^{11}$  from air-chambers  $R^7$   $R^8$ , connected by flexible tubes  $R^9$   $R^{10}$  with tracker-board openings  $O^4$   $O^5$ , adapted to be successively opened by openings  $N^4$   $N^5$  in the note-sheet  $N$  (see Figs. 11 and 12) to admit atmospheric air to the chambers  $R^7$   $R^8$ . On the diaphragms  $S^{10}$   $S^{11}$  are secured valve-stems  $S^{12}$   $S^{13}$ , of which the valve-stem  $S^{12}$  carries valves  $S^{14}$   $S^{15}$ , and the stem  $S^{13}$  carries valves  $S^{16}$   $S^{17}$ . The valves  $S^{14}$   $S^{16}$  normally close the ports  $U' U^2$ , while the valves  $S^{15}$   $S^{17}$  are normally open relative to the ports  $U^4 U^5$ , connecting the chambers  $U$  and  $U^3$  with chambers  $U^6 U^7$ , of which the latter chamber  $U^7$  opens to



the atmosphere. The chamber  $U^6$  contains a diaphragm  $S^{18}$ , on which the rear end of the valve-stem  $S^{12}$  is secured, the diaphragm separating the chamber  $U^6$  from a chamber  $U^8$ ,  
 5 connected by a port  $U^9$  with the chamber  $U$ . The diaphragms  $S^{10}$   $S^{11}$  are provided with pin-openings  $S^{19}$  similar to the pin-holes  $S^9$  in the diaphragms  $S$   $S'$ . The chamber  $U^3$  is connected by a port  $U^{10}$  with the chamber  $U^6$ ,  
 10 and a port  $U^{11}$  connects the chamber  $U^3$  with a pneumatic  $U^{12}$ , similar to the pneumatic  $Q^{13}$  and likewise provided with a valve  $U^{13}$  for controlling a port connecting the outer air with the interior of the chamber  $U$ . The operation of this valve mechanism is similar to  
 15 the one above described relative to the pneumatic  $P$  and hammer-rail  $E$ , it being understood that when the instrument is in action and the note-sheet  $N$  travels in the direction of the arrow  $a'$  and its aperture  $N^4$  moves in  
 20 register with the tracker-board opening  $O^5$  then air passes into the chamber  $R^7$  to push the diaphragm  $S^{10}$  rearwardly in order to move the valve  $S^{14}$  off its seat and the valve  $S^{15}$  into  
 25 a closed position, to connect the chamber  $U$  with the chamber  $R^7$ , to draw air by way of the flexible tube  $P^6$  out of the pneumatic  $P^5$ , to impart a swinging motion to the lever  $T^4$ , to swing the damper-rail  $T'$  rearwardly, thus  
 30 imparting a simultaneous swinging motion to the damper-levers  $T^2$  to move the dampers  $T$  out of engagement with the strings  $A$ . When the hammers  $D$  are now actuated, they fully and loudly sound the strings  $A$ , as the dampers  $T$  are held out of engagement with the  
 35 said strings. The valve  $S^{14}$  is held off the port  $U'$  by the suction action on the diaphragm  $S^{18}$ , owing to the connection of the chamber  $U^8$  with the chamber  $U$  by way of the port  $U^9$ .  
 40 The dampers  $T$  remain out of engagement with the strings  $A$  until the following note-sheet aperture  $N^5$  moves in register with the tracker-board opening  $O^5$ , and when this takes place air passes by way of the tube  $R^{10}$  into  
 45 the chamber  $R^8$  to cause the diaphragm  $S^{11}$  to move rearwardly, and thereby cause the valve  $S^{16}$  to open the port  $U^2$  for connecting the chamber  $R^7$  with the chamber  $U^3$ . When this takes place, the valve  $S^{17}$  closes the port  $U^5$ ,  
 50 and suction is had in the chamber  $U^6$  by way of the port  $U^{10}$ , chamber  $U^3$ , and open port  $U^2$ , so that the valve  $S^{14}$  is moved back into a closed position—that is, to close the port  $U'$  to disconnect the chambers  $U$  and  $R^7$ . At the  
 55 same time that this takes place the suction in the chamber  $U^3$  causes a collapsing of the pneumatic  $U^{12}$ , so that the valve  $U^{13}$  establishes communication between the outer air and the chamber  $U$  for the outer air to pass by way  
 60 of the tube  $P^6$  into the pneumatic  $P^5$  to inflate the same, and thereby allow the lever  $T^4$ , damper-rail  $T'$ , damper-levers  $T^2$ , and dampers  $T$  to return to their former normal positions—that is, to allow the dampers  $T$  to move

back in contact with the strings  $A$  to damp 65 the same.

From the foregoing it is understood that the movable hammer-rail  $E$  and the movable damper-rail  $T'$  are each moved from a normal inactive position into and held in active posi- 70 tions by a corresponding special pneumatic actuating device controlled by a note-sheet aperture, and this pneumatic actuating device is released by a pneumatic releasing device controlled by another note-sheet aperture to 75 allow the hammer-rail  $E$  or the damper-rail  $T'$  to swing back into a normal inactive position at the proper time, as called for by the music.

In order to control the motor  $K$  for starting 80 the instrument, a coin-controlled mechanism is provided, which forms the subject-matter of the application for Letters Patent of the United States, Serial No. 201,639, filed by me April 5, 1904. The coin for the coin-con- 85 trolled mechanism (shown in Figs. 4 and 6) passes down a suitable coin-chute  $C^5$ , arranged in the frame  $C$  for the coin to drop between two spring-pressed slides  $V$  and  $V'$ , of which the slide  $V$  is adapted to be moved in the di- 90 rection of the other slide,  $V'$ , by a key  $V^2$  under the control of the operator. The slide  $V'$  is provided with a hook  $V^3$ , adapted to be engaged by a locking-link  $V^4$ , pressed on by a spring and fulcrumed on one arm of a bell- 95 crank lever  $V^5$ , connected at its other arm by a slotted link  $V^6$  with the link  $V^4$ , the slotted link  $V^6$  having an arm  $V^7$  adapted to engage a pin  $V^8$  on the insulating-body  $V^9$  of a contact-plate  $V^{10}$ , normally out of engagement 100 with the slide  $V'$ , as shown in Fig. 4, but adapted to move into contact with the said slide, as shown in Fig. 6. The body  $V^9$  of the contact-plate  $V^{10}$  is fulcrumed on a support or frame  $C^6$  for the coin-controlled mech- 105 anism and is pressed on by a spring  $V^{11}$  to hold the contact-plate  $V^{10}$  in firm engagement with the slide  $V'$ , as shown in Fig. 6. The contact-plate  $V^{10}$  is connected by a wire  $K'$  with the motor  $K$ , the other wire,  $K^2$ , of which 110 contains a source of electrical supply  $K^3$  and is connected with the support or frame  $C^6$ .

When the several parts are in the normal position (shown in Fig. 4) and the coin drops down the chute  $C^5$  between the slides  $V$  and 115  $V'$  and the operator turns the key  $V^2$ , then the slide  $V$ , coin, and slide  $V'$  are pushed from the right to the left against the tension of the springs of the slides, so that the hook  $V^3$  first imparts a downward-swinging motion to the 120 link  $V^4$  for the arm  $V^7$  to swing the contact-plate  $V^{10}$  upward, the said hook  $V^3$  finally on passing the end of the link  $V^4$  being engaged and locked in place by the said link to prevent return movement of the slide  $V'$ . When 125 the link  $V^4$  snaps under the hook  $V^3$ , the spring  $V^{11}$  swings the contact-plate  $V^{10}$  downward to engage the contact-plate with the slide



V' to complete the circuit, and consequently to start the motor K. When this takes place, the motor K drives the actuating mechanism J, which in turn works the bellows I and rotates the drawing-rollers L L' to cause the note-sheet N to travel in the direction of the arrow *a'*. After the key V<sup>2</sup> has been turned and the slide V' locked in place by the link V<sup>4</sup>, as described, then the spring for the slide V returns the latter to its right-hand position, so that the coin drops down into the coin-box held in the frame. The downward-swinging motion of the bell-crank lever V<sup>5</sup> operates the register V<sup>13</sup> by a link V<sup>12</sup>, the register indicating the number of coins dropped into the machine.

In order to stop the motor, it is necessary to break the circuit by unlocking the slide V' and allowing the same to return to its right-hand position by the action of its spring, and for this purpose the following device is provided: The bell-crank lever V<sup>5</sup> (see Figs. 4 and 6) is connected by a link V<sup>14</sup> with a bell-crank lever V<sup>15</sup>, (see Fig. 5,) connected by a rod V<sup>16</sup> with the movable member of a pneumatic W, connected by a flexible tube W' with an exhaust-chamber W<sup>2</sup>, formed in the valve-chest Q (see Fig. 7) and connected by a port W<sup>3</sup> with the chamber R'. The wind-chest chamber R is separated by a diaphragm X from an air-chamber R<sup>11</sup>, connected by a flexible tube R<sup>12</sup> with a tracker-board opening O<sup>6</sup>, adapted to be opened by a stop-aperture N<sup>6</sup>, formed in the note-sheet N a distance beyond the terminal of the note-apertures N'—that is, at the end of the piece of music. On the diaphragm X is secured a valve-stem X', provided with valves X<sup>2</sup> X<sup>3</sup>, of which the valve X<sup>2</sup> controls the port W<sup>3</sup> and the valve X<sup>3</sup> controls a port W<sup>4</sup>, leading to a chamber W<sup>5</sup>, connected with the atmosphere. Normally the valve X<sup>2</sup> is closed, while the valve X<sup>3</sup> is open. When the stop-aperture N<sup>6</sup> moves in register with the tracker-board opening O<sup>6</sup>, then air passes by way of the tube R<sup>12</sup> into the chamber R<sup>11</sup> to press the diaphragm X rearwardly, thus moving the valve X<sup>2</sup> off its seat and the valve X<sup>3</sup> onto its seat to disconnect the chamber W<sup>2</sup> from the atmosphere and to connect the said chamber W<sup>2</sup> by the port W<sup>3</sup> with the chamber R'. The air is now exhausted from the pneumatic W by way of the tube W', chamber W<sup>2</sup>, port W<sup>3</sup>, and main exhaust-chamber R' to cause the pneumatic W to collapse, and thereby impart a swinging motion by the link V<sup>16</sup> to the bell-crank lever V<sup>15</sup>, which by the link V<sup>14</sup> imparts a swinging motion to the bell-crank lever V<sup>5</sup>, and the latter by the link V<sup>6</sup> imparts a downward-swinging motion to the link V<sup>4</sup> to move the free end thereof out of engagement with the hook V<sup>3</sup>. The slide V' is thus unlocked and now immediately slides to its right-hand position by the action of its

spring, and in doing so the slide moves out of engagement with the contact-plate V<sup>10</sup> for the latter to break the motor-circuit to stop the motor.

It is understood that when the stop-aperture N<sup>6</sup> has passed the tracker-board opening O<sup>6</sup> then the air leaks out of the chamber R<sup>11</sup> by the pin-hole X<sup>4</sup> in the diaphragm X to allow the valve X<sup>2</sup> to return to its seat by atmospheric pressure against the valve X<sup>3</sup>, the opening of the latter allowing air to pass by way of the port W<sup>4</sup>, chamber W<sup>2</sup>, and tube W' into the pneumatic W to again inflate the same for the corresponding parts of the coin-controlled mechanism to return to their normal positions. (Shown in Fig. 4.)

The actuating mechanism J is provided with a transverse shaft J', journaled in suitable bearings carried by the frame C, and on the said shaft is secured a pulley J<sup>2</sup>, connected by a belt J<sup>3</sup> with a pulley J<sup>4</sup>, held on a counter-shaft J<sup>5</sup>, connected by a pulley J<sup>6</sup> and belt J<sup>7</sup> with a pulley on the shaft of the motor K, so that when the latter is actuated, as above described, a rotary motion is given to the counter-shaft J<sup>5</sup>, which in turn drives the shaft J'. The actuating mechanism J operates the bellows I, which are preferably two in number, each being connected at its movable member by a link I<sup>2</sup> with a lever I<sup>3</sup>, fulcrumed at I<sup>4</sup> on the main frame C. On the free end of each lever I<sup>3</sup> is arranged a friction-roller I<sup>4</sup> in peripheral contact with a cam I<sup>5</sup>, secured on the shaft J', so that when the latter is rotated the cam I<sup>5</sup> imparts an upward-swinging motion to the corresponding lever I<sup>3</sup> for the link I<sup>2</sup> to swing the movable member of the bellows I into an open position. The movable member of each bellows I is pressed on by a spring I<sup>6</sup> to cause the movable member to move into a closed position on the return stroke of the lever I<sup>3</sup>—that is, at the time the cam I<sup>5</sup> swings downward from the friction-roller I<sup>4</sup> and after the latter has reached its uppermost position.

The drawing-rollers L and L' are driven from the actuating mechanism J, and for this purpose the following device is provided: On the shaft J' is secured a friction-disk L<sup>2</sup>, engaged at its face by the peripheral face of a friction-pulley L<sup>3</sup>, fastened on a shaft L<sup>4</sup>, mounted to slide in suitable bearings held on the frame C, the said shaft L<sup>4</sup> being engaged by a shifting-lever L<sup>5</sup>, under the control of the operator for shifting the shaft L<sup>4</sup>, so as to move the friction-pulley L<sup>3</sup> nearer to or farther from the axis of the friction-disk L<sup>2</sup>, so that a slower or faster motion is given to the shaft L<sup>4</sup> without variation in the speed of the friction-disk L<sup>2</sup>. On the shaft L<sup>4</sup> is secured a sprocket-wheel L<sup>6</sup>, engaged by a sprocket-chain L<sup>7</sup>, passing over suitable guide-rollers L<sup>8</sup> to pass around a sprocket-wheel L<sup>9</sup> (see Fig. 2) and secured on a counter-shaft



L<sup>10</sup>, carrying a pinion L<sup>11</sup> in mesh with a gear-wheel L<sup>12</sup>, secured on a shaft L<sup>13</sup> for the drawing-roller L. On the drawing-roller L is secured a gear-wheel L<sup>14</sup> in mesh with a gear-wheel L<sup>15</sup> on the drawing-roller L', so that the drawing-rollers L and L' rotate in unison to draw the note-sheet N forward over the tracker-board O at the desired rate of speed—that is, according to the time in which the music is to be played.

From the foregoing it will be seen that the motor K drives the actuating mechanism J, which in turn works the bellows I at the same rate of speed; but the drawing-rollers L and L' for the note-sheet N are driven at a varying rate of speed from the said actuating mechanism J, according to the position given by the operator to the lever L<sup>5</sup>. Thus by the arrangement described the operator can shift the lever L<sup>5</sup> to cause the note-sheet N to travel faster or slower, according to the time called for by the music to be played, it being, however, expressly understood that the shifting of the lever L<sup>5</sup> does not affect the working of the bellows, notwithstanding the bellows and the note-sheet-driving mechanism are actuated from the same source.

As shown in Fig. 1, the drawing-rollers L and L' are located on one side of the tracker-board O and guide-rollers Y and Y' are located on the opposite side of the tracker-board, between which passes the note-sheet N to the tracker-board to give the desired tension to the note-sheet while in contact with the tracker-board. The roller Y is preferably spring-pressed, as indicated in Fig. 1, to prevent slack in the note-sheet while the same passes over the tracker-board.

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

1. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position and holding it therein, and a pneumatic releasing device for releasing the said pneumatic actuating device pneumatically to allow the said rail to return to a normal position.

2. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position and holding it therein, a pneumatic releasing device for releasing the said pneumatic actuating device pneumatically to allow the said rail to return to a normal position, and a note-sheet having sets of note-sheet openings of which one controls the said pneumatic actuating device and the other the said pneumatic releasing device.

3. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position and holding it therein, a pneumatic releasing device for releasing the said pneumatic actuating device pneumatically to allow the said rail to return to a normal position, a tracker-board having spaced tracker-board openings, of which one

is connected with the said pneumatic actuating device and the other with the said pneumatic releasing device, and a note-sheet having sets of note-sheet openings in alinement with the said tracker-board openings.

4. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position, holding it there and releasing it, the said device comprising a lever for engaging the said rail, a pneumatic for the said lever, a pneumatic controlling valve, mechanism for controlling the said pneumatic, a pneumatic releasing-valve mechanism for releasing the said pneumatic controlling mechanism, a tracker-board having separate connections with the said pneumatic valve mechanisms, and a note-sheet traveling over the tracker-board and having sets of note-sheet openings in alinement with the said tracker-board openings.

5. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position and holding it therein, and a pneumatic releasing device for releasing the said pneumatic actuating device pneumatically to allow the said rail to return to a normal position, the said pneumatic releasing device, when dormant, connecting the atmosphere with the said pneumatic actuating device when the latter is dormant, the said pneumatic releasing device having a pneumatic valve for admitting air to the said pneumatic actuating device at the time both the said pneumatic actuating device and the said pneumatic releasing device are in action.

6. A self-playing piano provided with a rail, a pneumatic actuating device for the said rail, to move the latter into an active position, hold it there and finally release it, the said device having a pneumatic connected with the rail, a pneumatic valve device provided with a wind-chest and two valves, one for connecting the wind-chest with the pneumatic, to deflate the same and thereby move the rail into an active position and hold it therein and the other valve for connecting the pneumatic with the atmosphere, to inflate the pneumatic and release the rail, and a pneumatic releasing device for releasing the said pneumatic actuating device, the said pneumatic releasing device being provided with a pneumatic valve for admitting air to the said pneumatic actuating device at the time both devices are in active positions.

7. A self-playing piano provided with a rail, a pneumatic actuating device for throwing the said rail into an active position and holding it therein, a pneumatic releasing device for releasing the said pneumatic actuating device pneumatically to allow the said rail to return to a normal position, the said pneumatic releasing device, when dormant, connecting the atmosphere with the said pneumatic actuating device when the latter is dormant, the said pneumatic releasing device having a pneumatic valve for admitting air to the said pneu-



matic actuating device at the time both the said pneumatic actuating device and the said pneumatic releasing device are in action, a tracker-board having spaced tracker-board openings, of which one is connected with the said pneumatic actuating device and the other with the said pneumatic releasing device, and a note-sheet having sets of note-sheet openings spaced lengthwise and transversely of the note-sheet and in alinement with the said tracker-board openings.

8. In a self-playing piano, the combination with the movable hammer-rail, of a pneumatic actuating device for throwing the said hammer-rail into an active position and holding it pneumatically therein, and a pneumatic releasing device for releasing the said actuating device to allow the hammer-rail to return to its normal inactive position.

9. In a self-playing piano, the combination with the movable damper-rail, of a pneumatic actuating device for throwing the said damper-rail into an active position and holding it pneumatically therein, and a pneumatic releasing device for releasing the said actuating device, to allow the damper-rail to return to a normal inactive position.

10. In a self-playing piano, the combination with the movable 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 connected with the said pneumatic actuating device and independently with the said pneumatic releasing device, and a note-sheet having apertures controlling the tracker-board openings for the said devices.

11. In a self-playing piano, the combination with the movable damper-rail, of a pneumatic actuating device for throwing the said damper-rail into an active position and holding it pneumatically therein, a pneumatic releasing

device for releasing the said actuating device, to allow the damper-rail to return to a normal inactive position, a tracker-board connected with the said pneumatic actuating device and independently with the said pneumatic releasing device, and a note-sheet having apertures controlling the tracker-board openings for the said devices.

12. A pneumatic mechanism for controlling a pneumatic, comprising a pneumatic controlling valve mechanism for deflating the pneumatic and holding it deflated for a given time, a pneumatic releasing valve mechanism for releasing the said pneumatic controlling valve mechanism, to inflate the pneumatic, a tracker-board having separate tracker-board openings connected with the said valve mechanisms, and a note-sheet having separate openings for separately registering with the said tracker-board openings.

13. In a self-playing piano, the combination with a movable part, such as a hammer-rail, a damper-rail and the like, of a lever for imparting movement to the said part, a pneumatic for imparting a swinging motion to the said lever, a pneumatic controlling valve mechanism for deflating the said pneumatic and holding it deflated for a given time, a pneumatic releasing valve mechanism for releasing the said pneumatic controlling valve mechanism, for the latter to allow the pneumatic to reinflate, a tracker-board having separate tracker-board openings connected with the said valve mechanisms, and a note-sheet having separate openings for separately and successively registering with the said tracker-board openings.

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 BOLTON MARSHALL.