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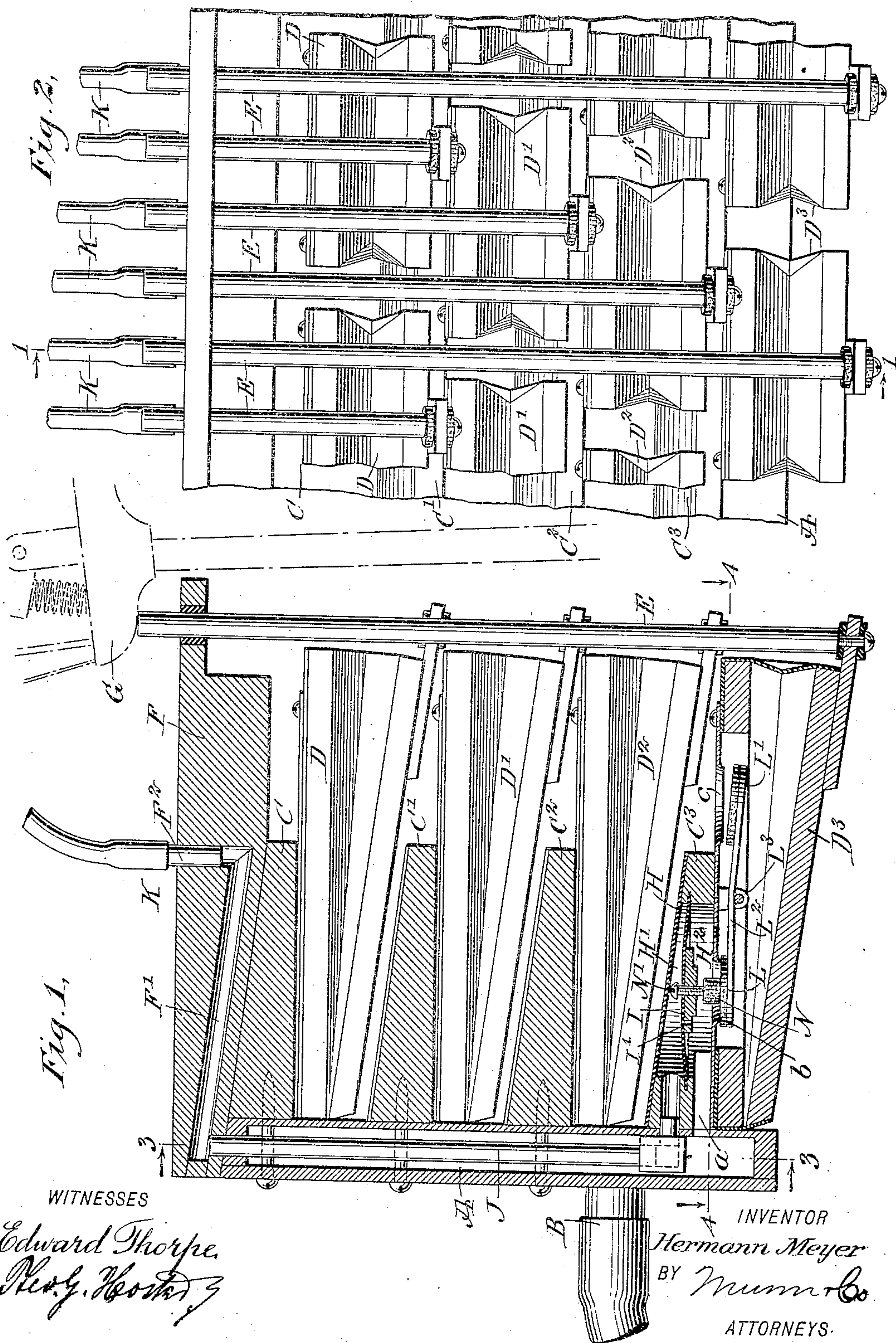
PATENTED FEB. 18, 1908.

H. MEYER.

PNEUMATIC ACTION.

APPLICATION FILED MAY 17, 1907.

3 SHEETS--SHEET 1.





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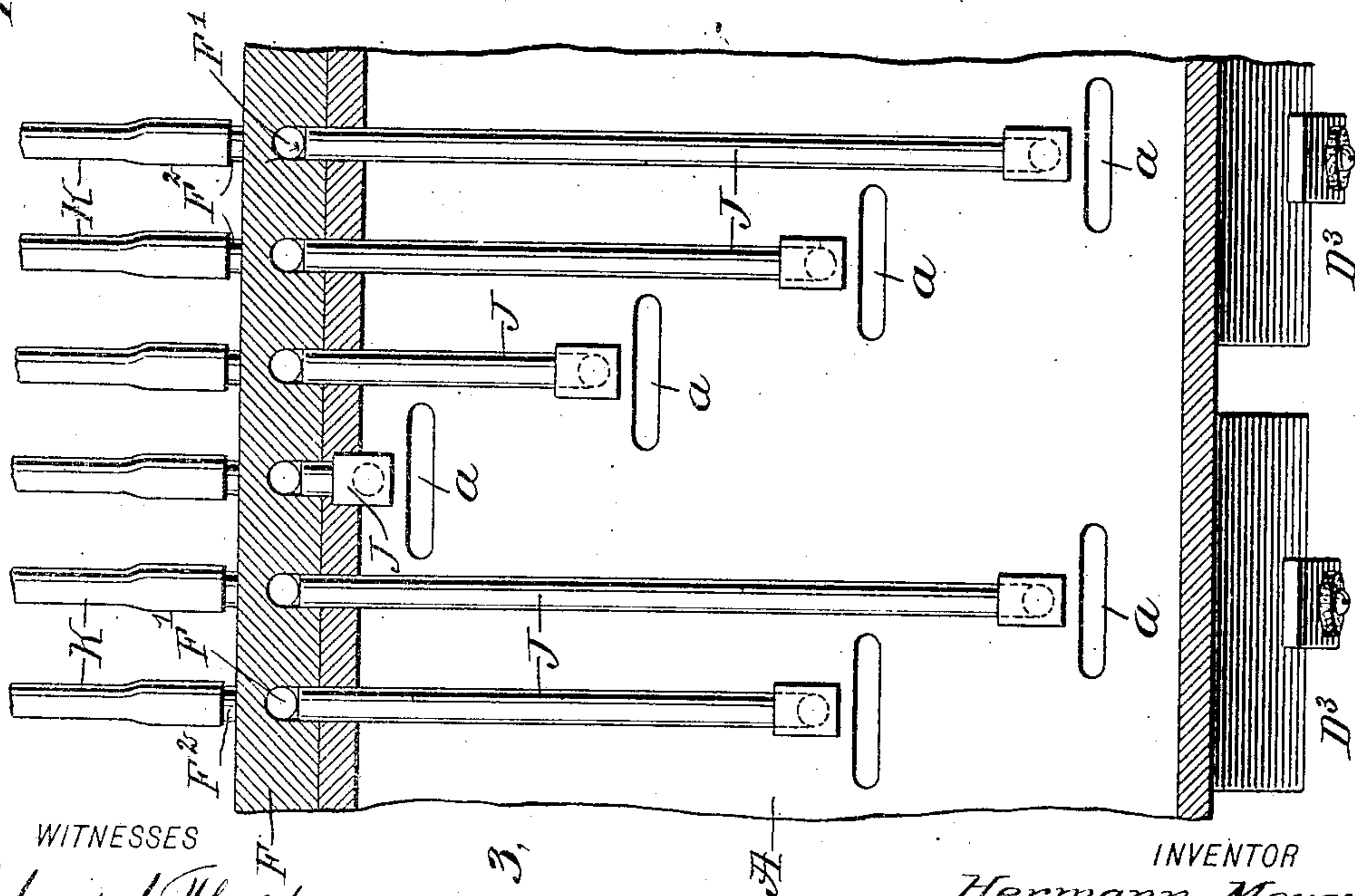
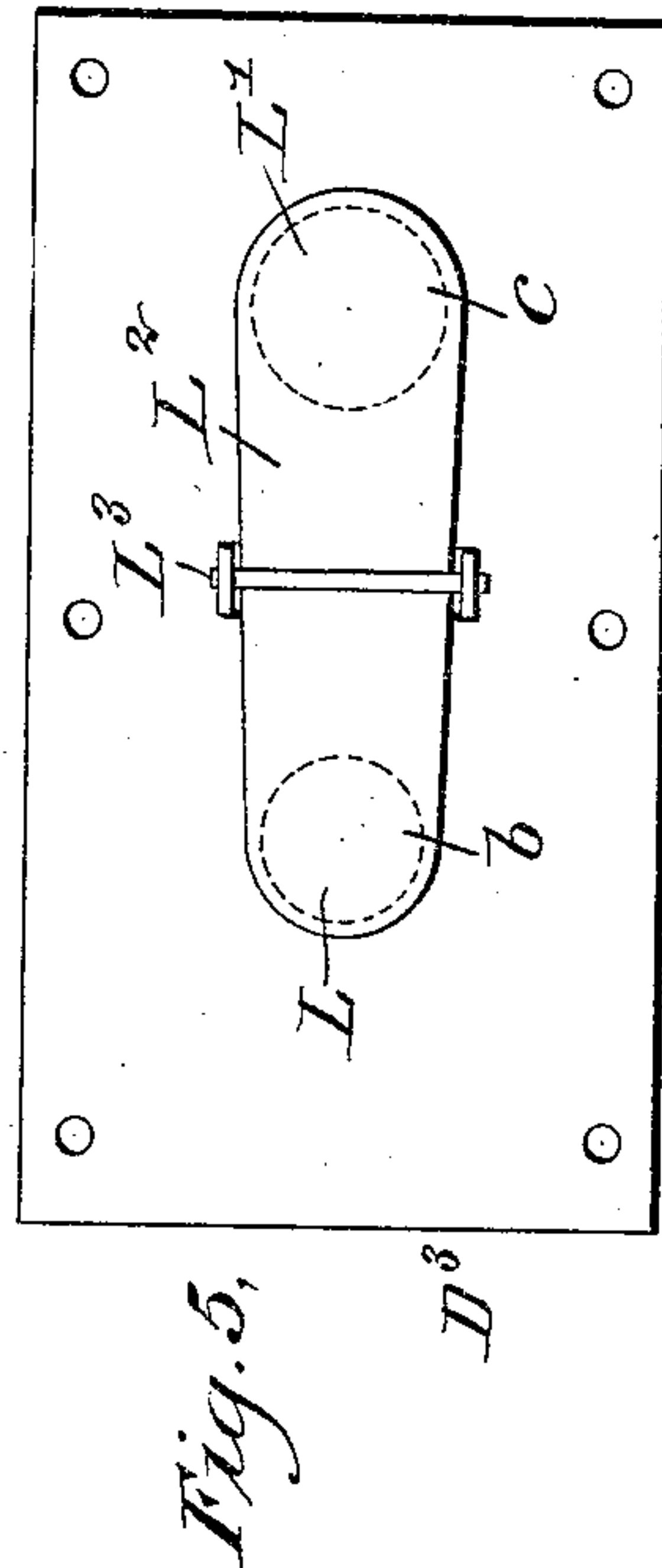
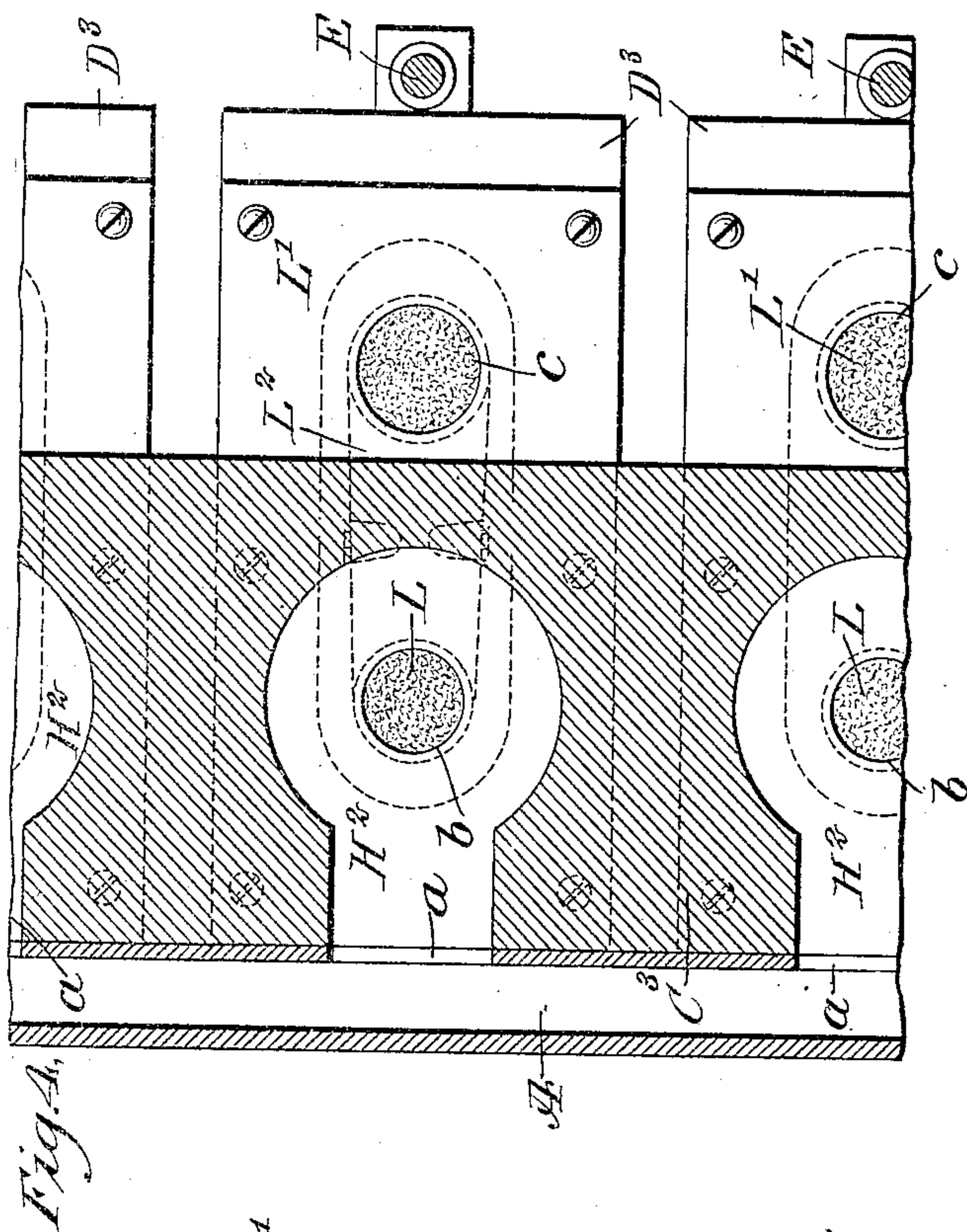
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3 SHEETS—SHEET 2.



WITNESSES  
*Edward Thorpe*  
*Per. G. Hester*

*Fig. 3.*

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*Hermann Meyer*  
 BY *Mum & Co*  
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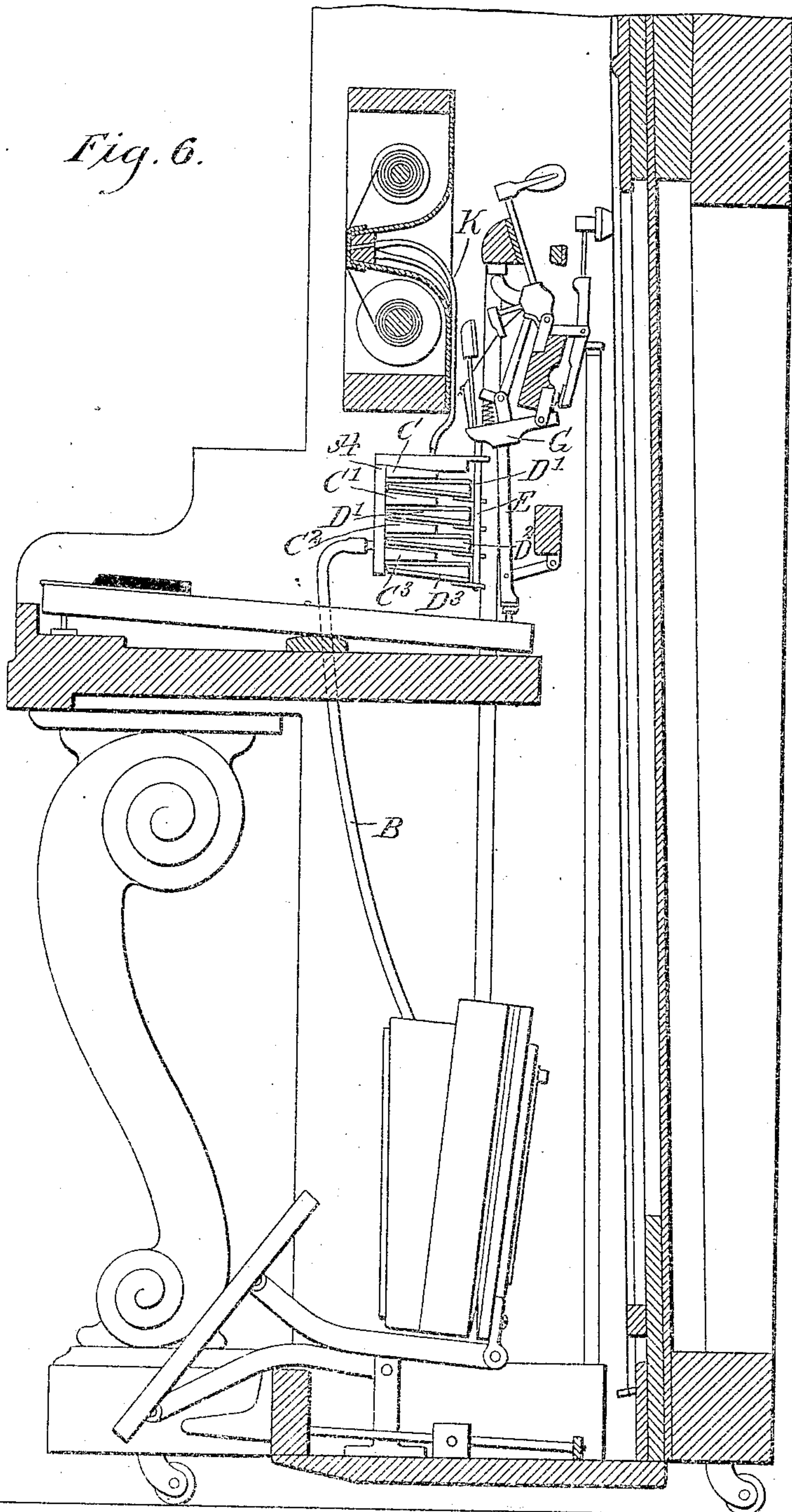
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3 SHEETS—SHEET 3.

*Fig. 6.*



WITNESSES

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INVENTOR

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# UNITED STATES PATENT OFFICE.

HERMANN MEYER, OF NEW YORK, N. Y.

## PNEUMATIC ACTION.

No. 879,786.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed May 17, 1907. Serial No. 374,117.

*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 Pneumatic Action, of which the following is a full, clear, and exact description.

The invention relates to self-players, self-playing pianos and like musical instruments, and its object is to provide a new and improved pneumatic action, which is simple, durable and compact in construction, to permit its convenient installation above the key board for direct connection with the piano or other action.

The invention consists of novel features and parts and combinations of the same, which 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 cross section of the improvement on the line 1—1 of Fig. 2; Fig. 2 is a rear end elevation of the same; Fig. 3 is a sectional front elevation of the same on the line 3—3 of Fig. 1; Fig. 4 is a sectional plan view of the same on the line 4—4 of Fig. 1; Fig. 5 is an inverted plan view of one of the valves inside of a pneumatic; and Fig. 6 is a cross section of a piano provided with the improvement.

The main suction chamber A is connected by a tube B with a suction device of any approved construction, and on the rear side of the said suction chamber A are secured a number of rails C, C', C<sup>2</sup>, C<sup>3</sup>, located one above the other and supporting pneumatics D, D', D<sup>2</sup>, D<sup>3</sup>, each having its movable member connected with a lifter rod E mounted to slide in a suitable bearing arranged in the top board F of the pneumatic action, and which top board is secured to the top of the suction chamber A. The upper end of each lifter rod E engages the under side of the front end of a corresponding jack rocker G of the piano action, so that when a pneumatic D, D', D<sup>2</sup> or D<sup>3</sup> collapses, then a swinging motion is given to the corresponding jack rocker G to actuate the corresponding hammer, with a view to sound the desired string. By the arrangement described the piano

can be readily played by hand without interference with the pneumatic action.

In each of the rails C, C', C<sup>2</sup>, C<sup>3</sup> are arranged or formed diaphragm chambers H, one for each pneumatic D, D', D<sup>2</sup> or D<sup>3</sup>, and in each diaphragm chamber H is arranged a diaphragm I dividing the diaphragm chamber H into the air chamber H' and the suction chamber H<sup>2</sup>, of which the latter is connected by a port a with the interior of the main suction chamber A. The air chamber H' of each diaphragm chamber H is connected with a pipe J extending through the main suction chamber A and connecting at its upper end with a channel F' formed in the top board F and containing a short pipe or nipple F<sup>2</sup> connected by the usual flexible tube K with an opening in the tracker board.

The fixed member of each of the pneumatics D, D', D<sup>2</sup>, D<sup>3</sup> is provided with an exhaust port b and an air inlet port c opening to the atmosphere, and the said ports b and c are controlled by valves L and L' arranged on the ends of a valve lever L<sup>2</sup> fulcrumed at or near its middle at L<sup>3</sup> on the fixed member of the corresponding pneumatic D, D', D<sup>2</sup>, D<sup>3</sup>, as plainly illustrated in the drawings, it being understood that the valve mechanism mentioned is arranged inside of the corresponding pneumatic. The port b of each pneumatic D, D', D<sup>2</sup>, or D<sup>3</sup> opens into the suction chamber H<sup>2</sup> of the corresponding diaphragm chamber H, and the valve L for opening and closing this port b is engaged by a button N held on a screw N' screwing in the diaphragm I at or near the middle thereof, so that the diaphragm I controls the opening and closing of the valve mechanism; that is, normally the valve L is closed at the port b, while the valve L' is open at the port c. Now when a tracker board opening is uncovered and air passes through the tracker board opening, the tube K, the nipple F<sup>2</sup>, the channel F' and the pipe J, into the air chamber H' of the corresponding diaphragm chamber H, then the diaphragm I moves downward and consequently the button N actuates the valve mechanism, so that the valve L opens and uncovers the port b, while the other valve L' swings into a closed position on the port c, thus cutting off atmospheric air from the interior of the pneumatic D, D', D<sup>2</sup> or D<sup>3</sup>. When this takes place, the interior of the pneumatic is connected by the open port b with the suction chamber H<sup>2</sup>, and by way of



the port *a* with the main suction chamber A, so that the pneumatic is collapsed and consequently the lifter rod E of this pneumatic actuates the corresponding jack rocker G, for actuating the hammer and sounding the proper string. As soon as the tracker board opening is again covered by the note sheet, then the diaphragm I returns, and with it the valve mechanism, to normal position, as shown in Fig. 1; that is, the valve L moves into a closed position to disconnect the interior of the pneumatic from the suction chambers H<sup>2</sup> and A, while the valve L' moves into an open position; that is, uncovers the port *c* to allow atmospheric air to pass into the previously collapsed pneumatic, to return the same to open position.

The pneumatics, the controlling valve mechanisms and the diaphragm chambers in the several tiers are staggered, as plainly shown in Fig. 2, to readily accommodate the entire pneumatic action required for a piano in an exceedingly small space, thus permitting the installation of the pneumatic action directly above the rear of the key board, and allowing connecting the pneumatics directly with the jack rockers of the piano action, as described and shown, and without interference with the piano action when it is desired to play the piano by hand.

As the tracker board and the driving mechanism for the note sheet is usually located in the upper portion of the piano casing, it is evident that only very short tubes K are required, thus reducing the expense and decreasing the danger of leakage by long, defective tubes. By locating the tubes J within the main suction chamber A, a large amount of space otherwise required for accommodating the tubes J is saved. The valve mechanism within each pneumatic D, D', D<sup>2</sup> or D<sup>3</sup>, is so arranged that the valve L is slightly overbalanced by the valve L', to insure a very quick action of the pneumatic, for the latter to open and collapse almost instantly.

The leak connection between the chambers H', H<sup>2</sup> is by the use of a hole I' formed directly in the diaphragm I, and hence when the diaphragm is actuated it prevents dust and other impurities from settling and clogging up the leak hole I', as the vibration of the diaphragm shakes off the dust and prevents the same from settling in the hole I' of the diaphragm.

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

1. A pneumatic action provided with a suction chamber for connection with a suction device, a diaphragm chamber on the said suction chamber and having a diaphragm, the suction side of the diaphragm chamber being connected with the said suction chamber, a pipe for connection with

the tracker board and extending through the suction chamber to connect with the pressure side of the diaphragm chamber, a pneumatic having one member fixed to the said diaphragm chamber at the suction side thereof, the said fixed member being provided with an air inlet port and an air exhaust port leading to the exhaust side of the diaphragm chamber, and a swinging valve lever having valves at the ends for controlling the said ports, the valves being controlled by the said diaphragm.

2. A pneumatic action provided with a suction chamber for connection with a suction device, a diaphragm chamber on the said suction chamber and having a diaphragm, the suction side of the diaphragm chamber being connected with the said suction chamber, a pipe for connection with the tracker board and extending through the suction chamber to connect with the pressure side of the diaphragm chamber, a pneumatic having one member fixed to the said diaphragm chamber at the suction side thereof, the said fixed member being provided with an air inlet port and an air exhaust port leading to the exhaust side of the diaphragm chamber, and a swinging valve lever having valves at the ends for controlling the said ports, the valves being controlled by the said diaphragm by way of the said exhaust port.

3. A pneumatic action provided with a suction chamber for connection with a suction device, a diaphragm chamber on the said suction chamber and having a diaphragm, the suction side of the diaphragm chamber being connected with the said suction chamber, a pipe for connection with the tracker board and extending through the suction chamber to connect with the pressure side of the diaphragm chamber, a pneumatic having an air inlet port and an air exhaust port leading to the exhaust side of the diaphragm chamber, a swinging valve lever having valves at the ends for controlling the said ports, and a button on the said diaphragm and engaging the exhaust port valve.

4. A pneumatic action provided with a suction chamber for connection with a suction device, a diaphragm chamber on the said suction chamber and having a diaphragm, the suction side of the diaphragm chamber being connected with the said suction chamber, a pipe for connection with the tracker board and extending through the suction chamber to connect with the pressure side of the diaphragm chamber, a pneumatic having one member fixed to the said diaphragm chamber at the suction side thereof, the said fixed member being provided with an air inlet port and an air exhaust port leading to the exhaust side of the diaphragm chamber, a swinging valve lever



having valves at the ends for controlling the said ports, and a button on the said diaphragm and engaging the exhaust port valve.

5 5. A pneumatic action comprising a suction chamber connected with a suction device, rails arranged in tiers and each being provided with a plurality of diaphragm chambers, opening at the suction side into the said suction chamber, tracker board  
10 pipes one for each diaphragm chamber, the said pipes extending through the said suction chamber, and the said pipes connecting at one end with the tracker board and at the other end with the pressure side of the corresponding diaphragm chamber, and pneu-  
15 matics on the said rails and connected with the open air and the said diaphragm chambers at the suction side thereof.

20 6. A pneumatic action comprising a suction chamber connected with a suction device, rails arranged in tiers and each being provided with a plurality of diaphragm chambers opening at the suction side into the said suction chamber, tracker board pipes,  
25 one for each diaphragm chamber, the said pipes extending through the said suction chamber, and the said pipes connecting at one end with the tracker board and at the other end with the pressure side of the corresponding diaphragm chamber, and pneu-  
30 matics arranged in tiers, the pneumatics in one tier having each one member fixed to the said rail, the fixed member having an air inlet port and an exhaust port leading to the

suction side of the diaphragm chamber, and valves within the said pneumatic and controlling the said ports, the valves being controlled by the diaphragm in the said diaphragm chamber. 35

7. A pneumatic action comprising a suction chamber connected with a suction device, rails arranged in tiers and each being provided with a plurality of diaphragm chambers opening at the suction side into the said suction chamber, tracker board pipes,  
45 one for each diaphragm chamber, the said pipes extending through the said suction chamber, and the said pipes connecting at one end with the tracker board and at the other end with the pressure side of the corresponding diaphragm chamber, and pneu-  
50 matics arranged in tiers, the pneumatics in one tier having each one member fixed to the said rail, the fixed member having an air inlet port and an exhaust port leading to the  
55 suction side of the diaphragm chamber, valves within the said pneumatic and controlling the said ports, and a button on the diaphragm in the said diaphragm chamber and engaging one of the said valves by way  
60 of the said exhaust port.

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.