

No. 728,966.

PATENTED MAY 26, 1903.

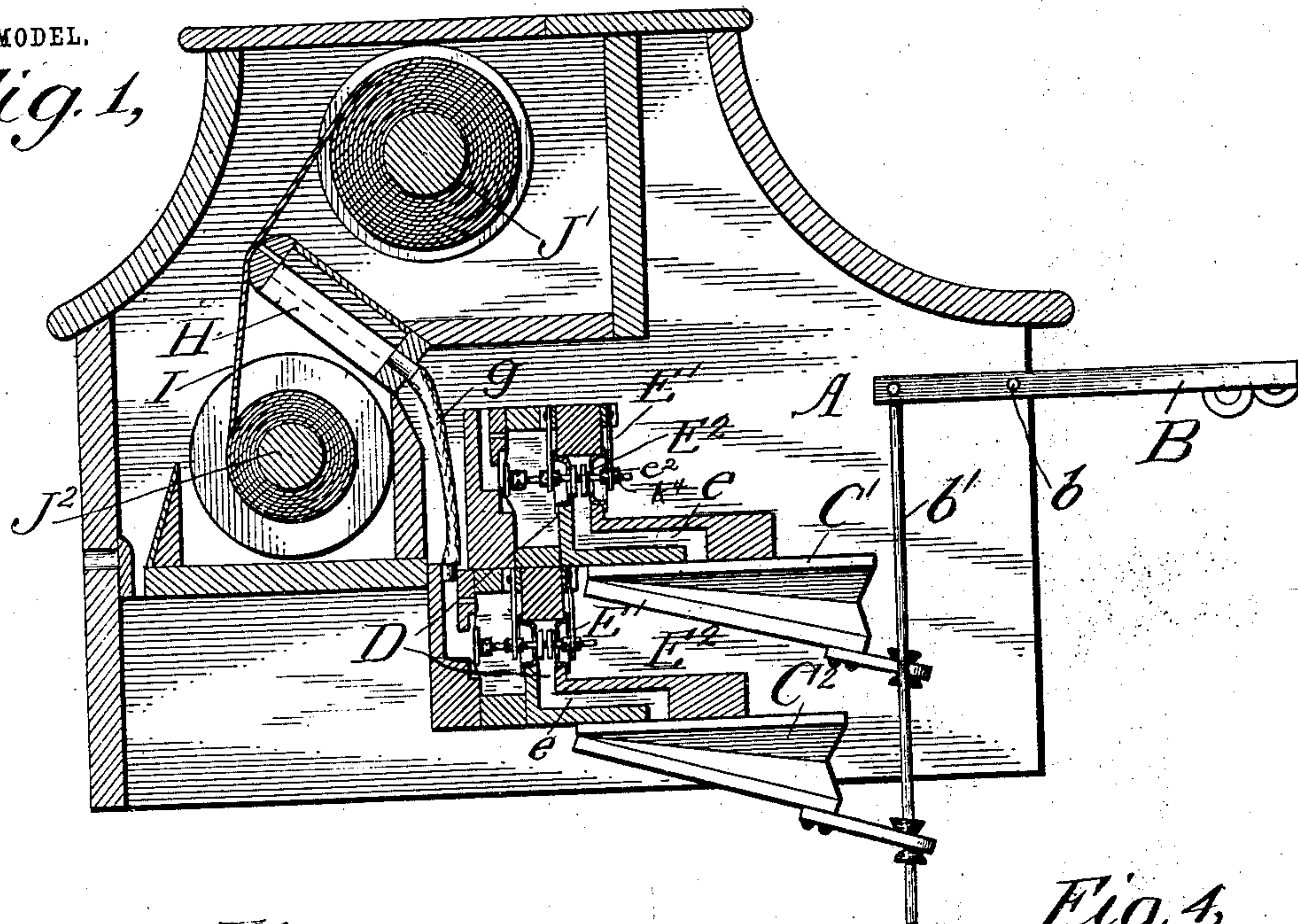
R. W. PAIN.

PRIMARY PNEUMATIC VALVE IN MECHANISM FOR PLAYING  
MUSICAL INSTRUMENTS.

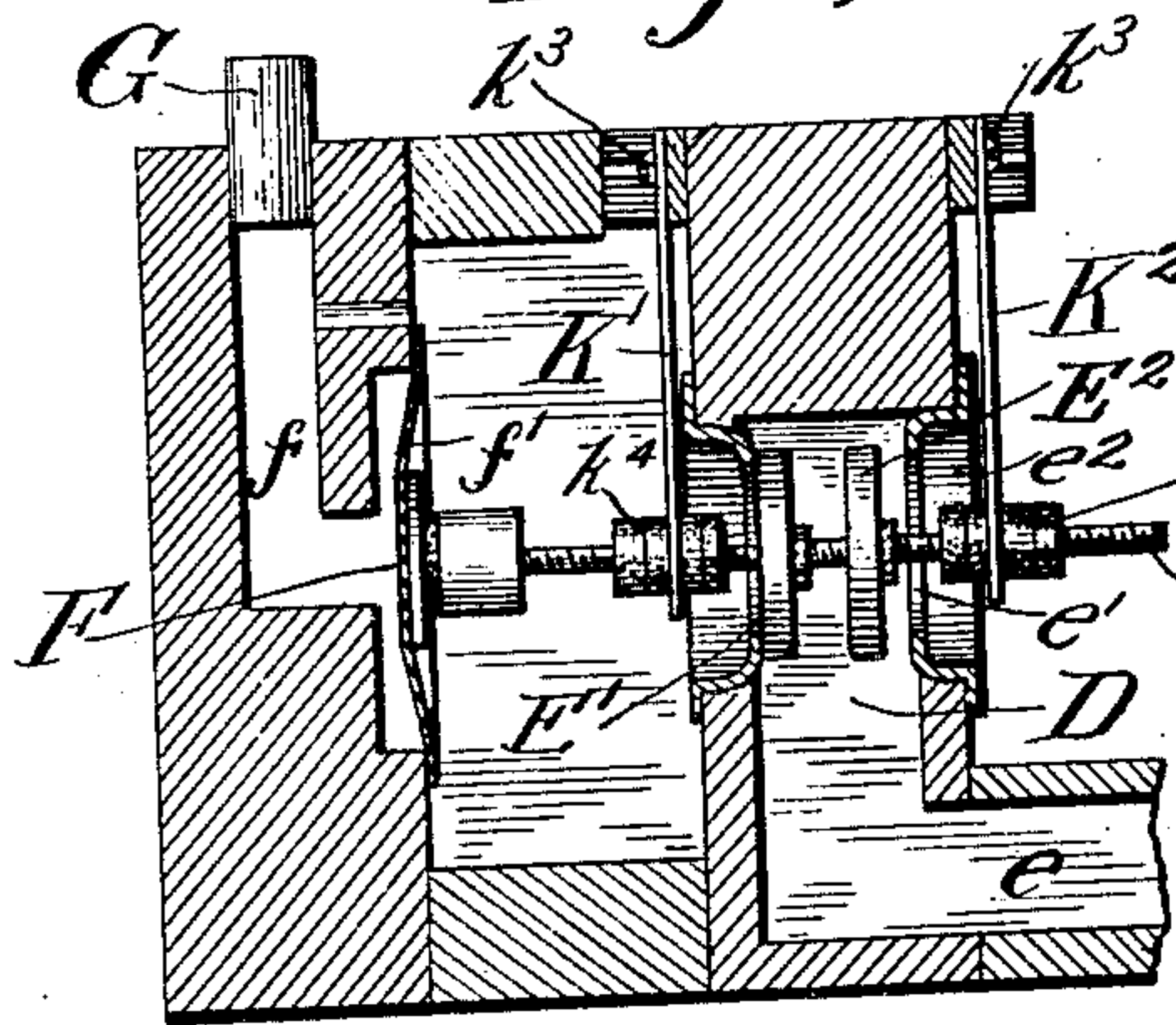
APPLICATION FILED APR. 21, 1902.

NO MODEL.

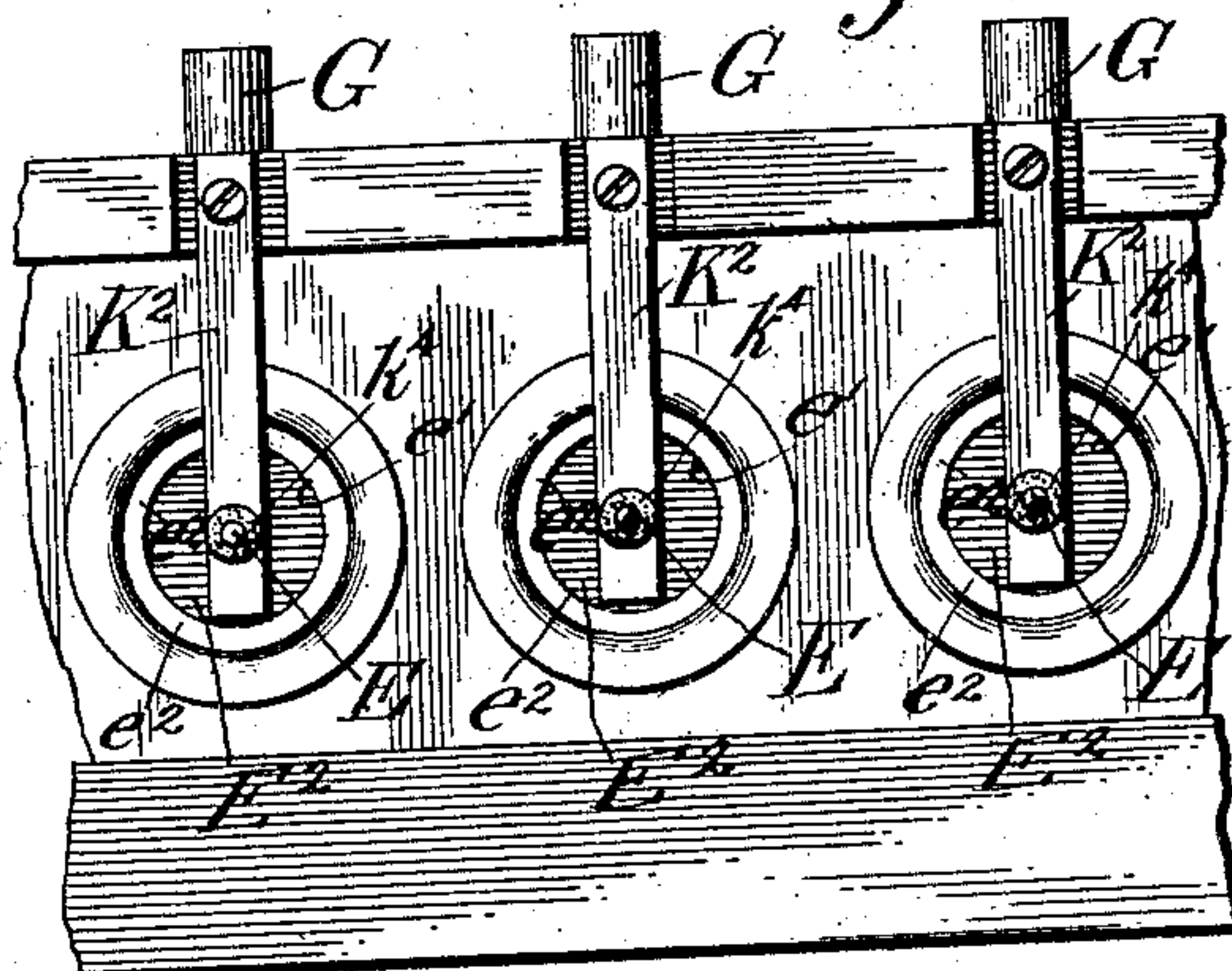
*Fig. 1,*



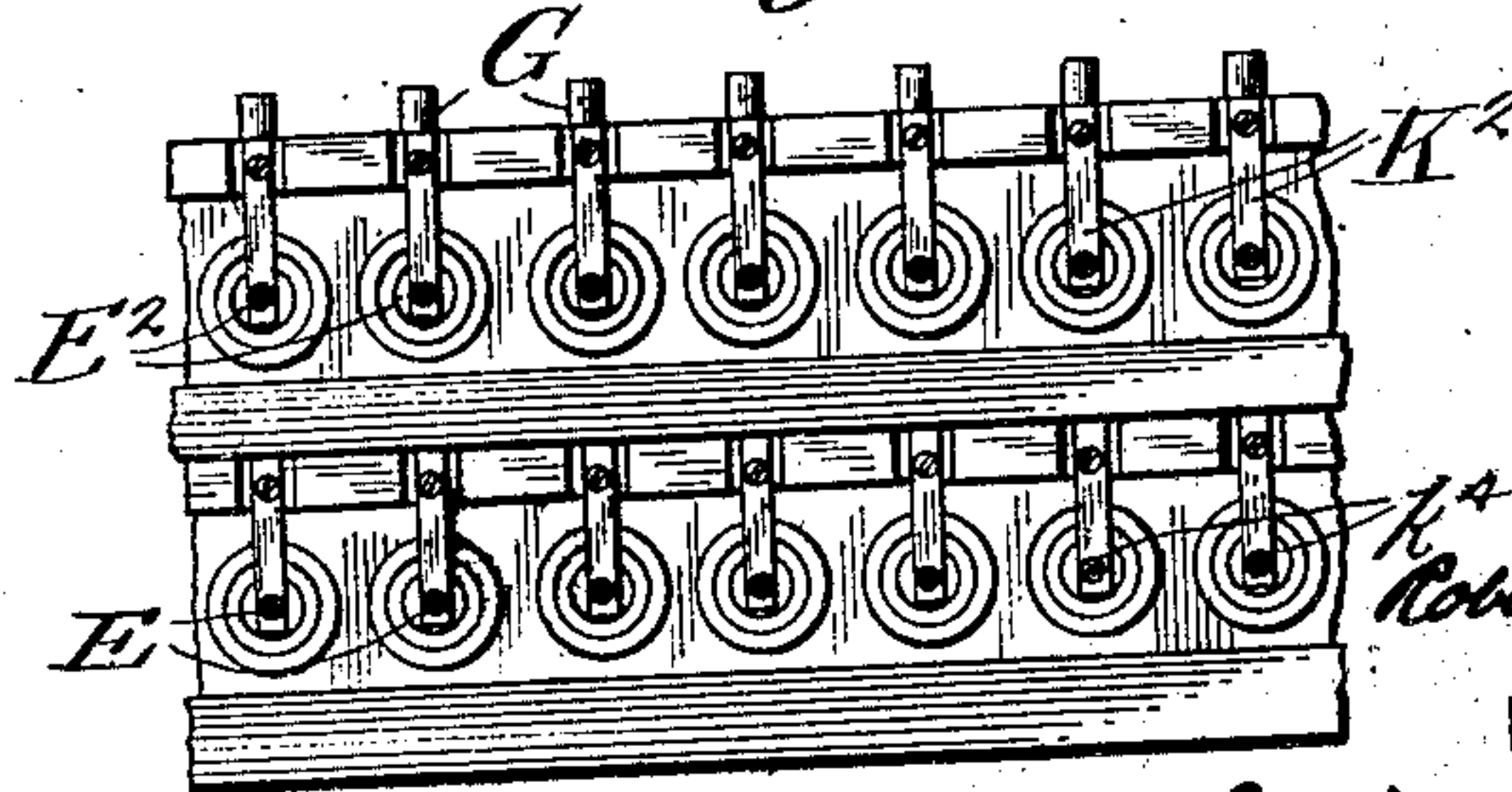
*Fig. 3,*



*Fig. 4,*



*Fig. 2,*



WITNESSES:

*E. E. Case.*

*A. H. E. Starr.*

INVENTOR

*Robert William Pain*

BY

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# UNITED STATES PATENT OFFICE.

ROBERT WILLIARD PAIN, OF NEW YORK, N. Y., ASSIGNOR TO THE AEOLIAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

PRIMARY PNEUMATIC-VALVE IN MECHANISM FOR PLAYING MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 728,966, dated May 26, 1903.

Application filed April 21, 1902. Serial No. 103,830. (No model)

*To all whom it may concern:*

Be it known that I, ROBERT WILLIARD PAIN, of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Primary Pneumatic-Valves in Mechanism for Playing Musical Instruments, of which the following is a specification.

I will describe a mechanism embodying my improvement, and then point out the novel features in the claims, premising that the improvement may be embodied in that mechanism of an automatic instrument which renders it automatic or in mechanism constructed for operating the keys of any keyboard musical instrument.

In the accompanying drawings, Figure 1 is a transverse vertical section of a mechanism embodying my improvement. Fig. 2 is a longitudinal elevation showing certain parts of the mechanism. Fig. 3 is a view similar to Fig. 1, but it is on a larger scale and shows fewer parts. Fig. 4 is an elevation corresponding to Fig. 2, but showing fewer parts than Fig. 2 and made on the same scale as Fig. 3.

A designates the case of a mechanism for operating upon the keys of any keyboard instrument. It may be of any material and construction. It comprises a number of strikers B for extending over the keys of a keyboard musical instrument, and these strikers are shown as consisting of levers fulcrumed between their ends upon a pin or pins *b* and pivotally connected at their rear ends with rods *b'*, extending down to pneumatic-motors *C' C²*, which are shown as of bellows-like construction, having their movable boards connected to the lower ends of the rods *b'*. These pneumatic-motors communicate with a wind-chest D, (which preferably will be air-rarefied by foot-bellows;) but this communication is under control of valves *E' E²*, operating in conjunction with ducts *e*, leading to the interior of the pneumatic-motors *C' C²*. The pneumatic-motors *C' C²* are of the same character, and the entire number of these pneumatic-motors are arranged in two sets simply to enable them to be staggered for the purpose of economizing space widthwise of the case A.

The valves *E' E²* are affixed to a stem *E*, made in the form of a rod and the rods actuated by primary pneumatics *F*, which, as here shown, consist of small chambers *f*, covered by flexible diaphragms *f'* upon the side which is toward the wind-chest D. The rods *E* are here shown as being disconnected from the pneumatics *F*. Ducts *G* extend from the chamber *f'* of the pneumatics *F* and communicate by means of flexible tubes *g*, preferably made of soft rubber or a like material, with ducts in a tracker-board H. Of course it will be understood that for each striker B there is to be a single pneumatic-motor *C'*, a single duct *e*, a single pair of valves *E' E²*, and a single pneumatic *F*, communicating with a single duct of the tracker-board H.

A perforated music-sheet I serves as a valve for controlling the admission of atmospheric air to the ducts of the tracker-board H, and such music-sheet will be of ordinary construction and wound upon a music-roll *J'* and a take-up roll *J²* in the ordinary manner.

Whenever air is admitted to one of the ducts of the tracker-board H, the corresponding pneumatic *F* is expanded, and the valves *E' E²* are so shifted as to open communication between the wind-chest D and the duct *e* corresponding to that pneumatic *F*. At the same time the valve *E²* will be made to close a passage *e'*, which, as shown, is formed in a cap *e²* and establishes communication between the ducts *e* and the outside atmosphere whenever the valve *E²* is opened. As soon as the air is cut off from a duct of the tracker-board H the corresponding pneumatic *F* will be collapsed, as illustrated in Figs. 1 and 3, and the valves *E' E²* will be adjusted in the positions which they occupy in said figures, so as to cut off communication between the corresponding ducts *e* and the wind-chest D and open communication between that duct *e* and the outside atmosphere.

The present improvement relates to primary pneumatics and their concomitants. It will be seen that all these parts are so arranged that the valve-stem *E* is horizontal instead of vertical and is sustained by downwardly-extending supports *K' K²*. These supports, as shown in Figs. 1, 2, 3, and 4, may



consist of flat pieces of spring metal fixedly secured in some suitable manner at one of their ends to a fixed part of the mechanism—as, for example, by screws  $k^3$ . The valve-rod 5 E, which is here shown as screw-threaded, passes through the supports  $K^1 K^2$ , and the latter are secured in proper relation to it by means of nuts or friction-tight washers  $k^4$ . Only one washer  $k^4$  need be used in connection with the support  $K^2$ . By adjusting these 10 washers on the stem E the tension of the supports may be varied.

By the simple constructions which have been described the valves  $E^1 E^2$  of the primary 15 pneumatics F are made more uniform in their operation, because their gravities never oppose themselves to the movements of which these valves are capable. It will be observed from the drawings that two spring-supports 20  $K^1 K^2$  are provided for each valve-rod E. By supporting the valve-rod in this way the valve is always permitted to seat squarely, due to the fact that in any position of the valve-rod the same is parallel with any other position— 25 that is to say, the means of support hold the valve-rod in any position in a right line with respect to the valve-seat. The arrangement of the pneumatics F, as well as the valves  $E^1 E^2$ , in vertical planes also relieves these pneu- 30 matics of the weight of any of their concomitant parts during movement of these pneumatics in either direction. By adjusting the washers  $k^4$  on the valve-rod to slightly bow the supports the supports  $K^1 K^2$  will have the 35 functions of springs to act upon the valves  $E^1 E^2$ , so that the valves  $E^1$  will always be seated. For example, the washers  $k^4$  may be adjusted on the rod to such position that the support  $K^1$  will normally act to seat the valve  $E^1$ . There- 40 fore when the pneumatic F is actuated to unseat the valve  $E^1$  and to seat the valve  $E^2$  both supports will be under tension and both will act upon the rod E to cause the valve  $E^1$  to be reseated when the pneumatic F is collapsed. 45 It is obvious that only one of the supports  $K^1 K^2$  may have the function of a spring to cause a positive seating of the valve  $E^1$ .

It will thus be seen that according to my invention the primary pneumatics are ar- 50 ranged in vertical or approximately vertical planes, and there are substantially horizontal valve-rods connected to be actuated by said pneumatics and provided with vertical or approximately vertical valves, while each 55 of the valve-rods is supported in flexible supports adjustably connected to the rods.

What I claim as new, and desire to secure by Letters Patent, is—

1. In mechanism for playing musical instruments, the combination of primary pneu- 60 matics arranged in vertical or approximately vertical planes, valves operated thereby and also arranged in vertical or approximately vertical planes, and means comprising spring- 65 pieces for supporting these valves, one spring-piece being located inside and the other outside the wind-chest.

2. In mechanism for playing musical instruments, the combination of primary pneu- 70 matics, valves operated thereby and arranged in vertical or approximately vertical planes, a screw-threaded rod carrying said valves, spring-supports for said rod and adjustable nuts with which said spring-supports coact, 75 one of the spring-supports and a corresponding nut for each valve being located outside the wind-chest.

3. In mechanism for playing musical instruments, the combination of primary pneu- 80 matics arranged in vertical or approximately vertical planes, substantially horizontal valve-rods actuated by said pneumatics, vertical or approximately vertical valves carried by said rods, and flexible supports wholly support- 85 ing the said rods.

4. In mechanism for playing musical instruments, the combination of primary pneu- 90 matics, valve-rods actuated thereby, valves on the rods and a plurality of flexible supports for each valve-rod.

5. In mechanism for playing musical instruments, the combination of primary pneu- 95 matics, valve-rods actuated thereby, valves on the rods and a pair of flexible supports for each valve-rod.

6. In mechanism for playing musical instruments, the combination of primary pneu- 100 matics arranged in vertical or approximately vertical planes, substantially horizontal valve-rods actuated by said pneumatics, ver- 105 tical or approximately vertical valves carried by said rods, and means for supporting each rod to maintain a constant angular relation with respect to the valve-seat, whereby the valve is caused to seat squarely on its seat.

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

ROBERT WILLIARD PAIN.

Witnesses:

W. C. MANSFIELD,  
CHAS. SCHWARDT.