

No. 725,424.

PATENTED APR. 14, 1903.

F. W. DRAPER & J. COURVILLE.

SELF PLAYING ATTACHMENT FOR KEYBOARD MUSICAL INSTRUMENTS.

APPLICATION FILED FEB. 16, 1901.

NO MODEL.

Fig. 1.

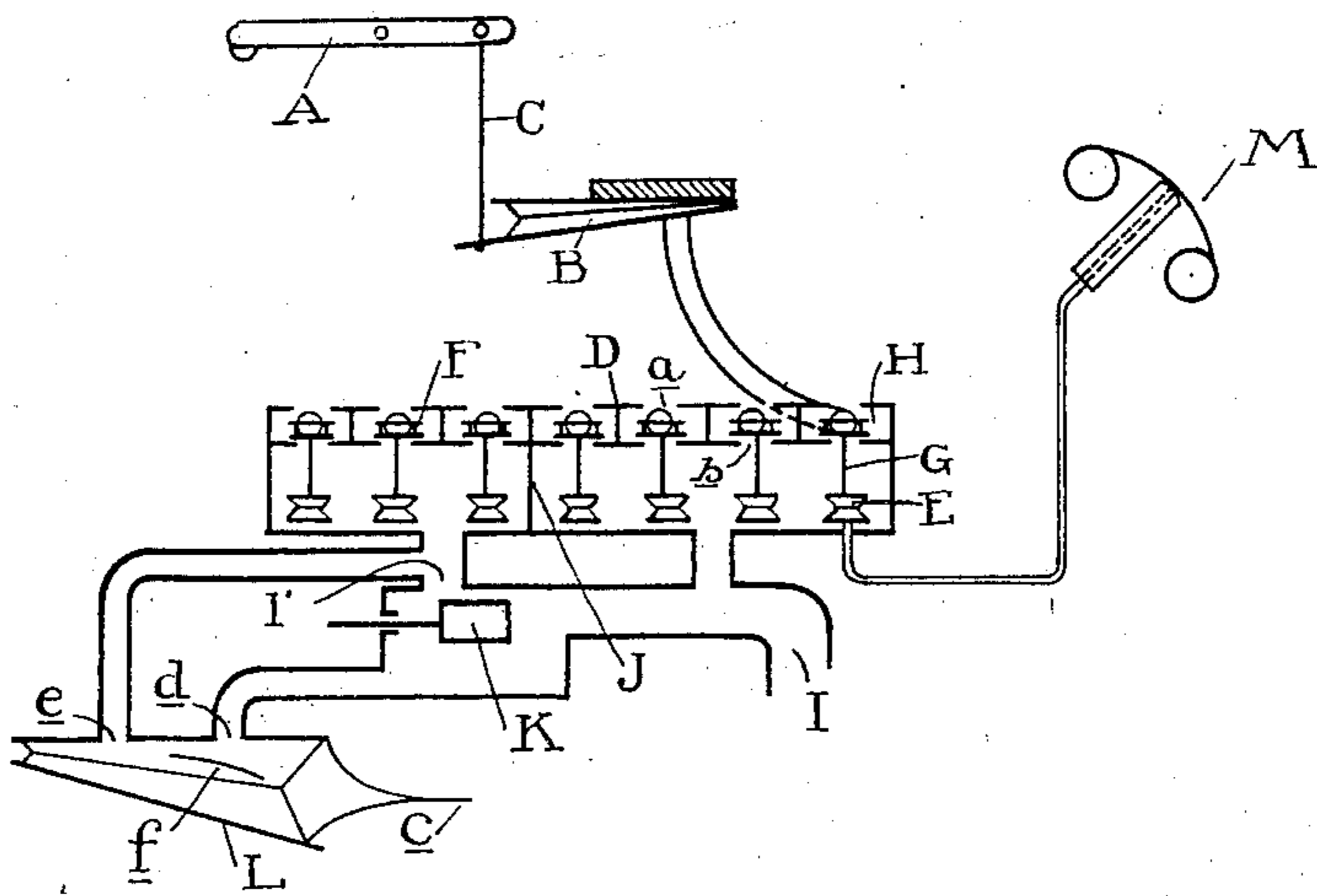


Fig. 3.

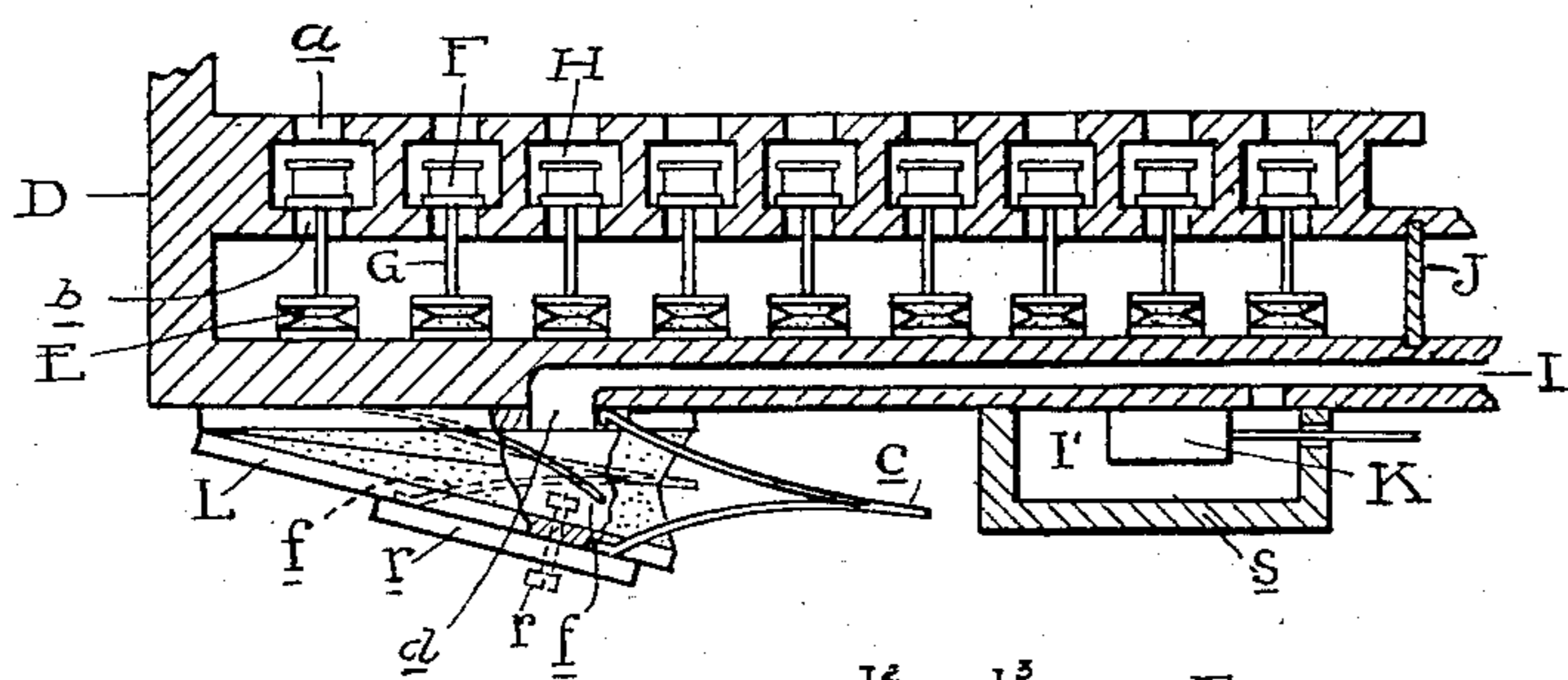
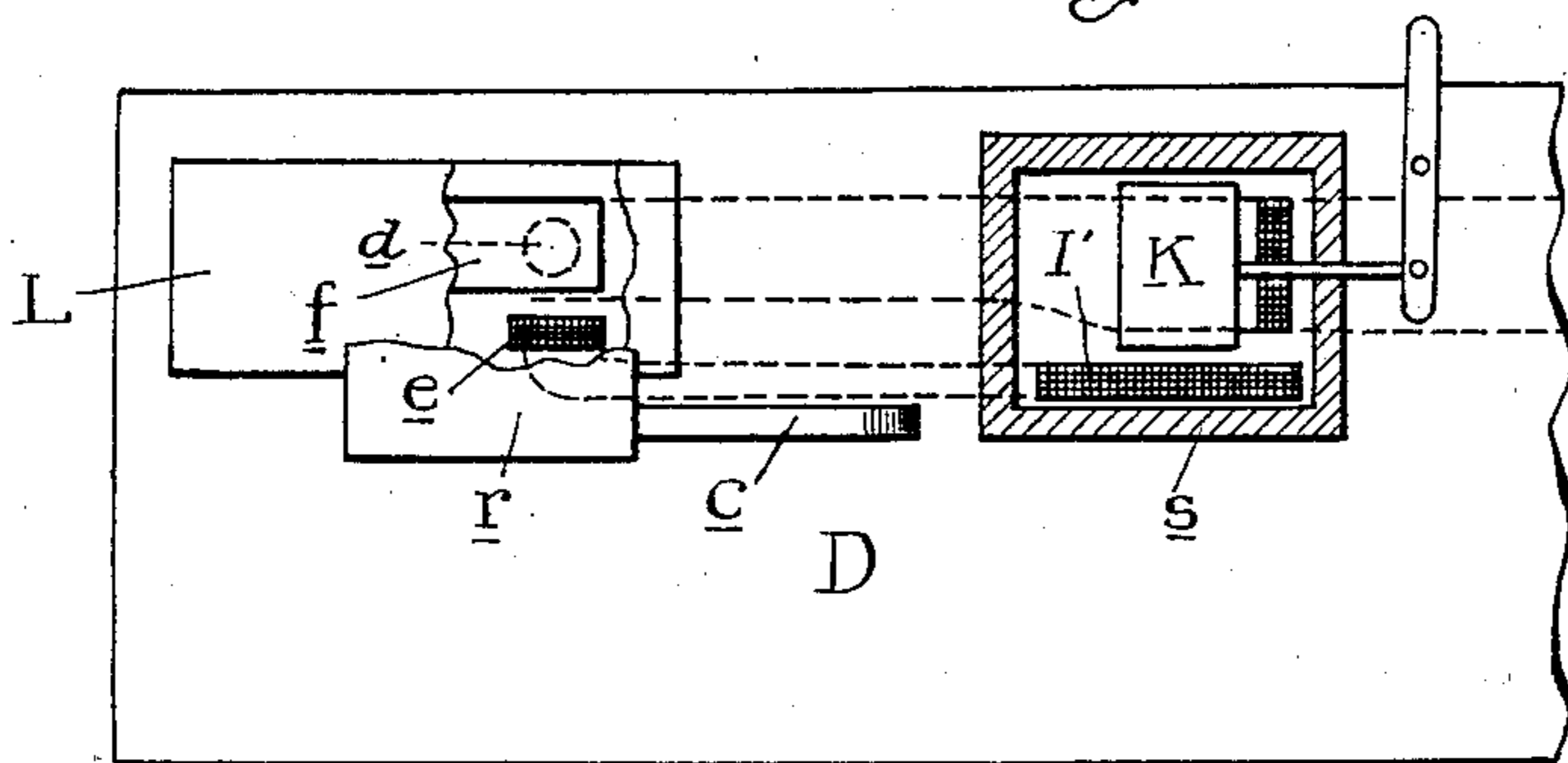
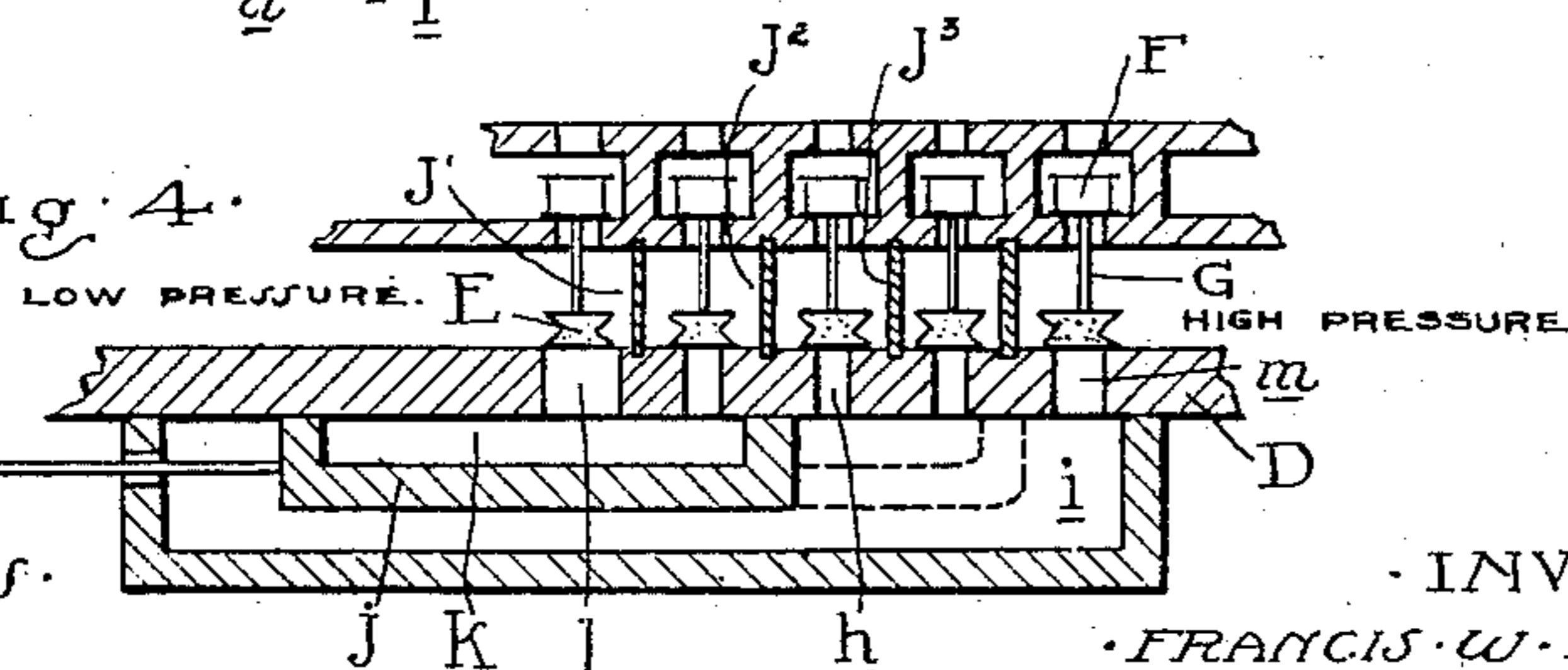


Fig. 2.

Fig. 4.



WITNESSES.

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## SELF-PLAYING ATTACHMENT FOR KEYBOARD MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 725,424, dated April 14, 1903.

Application filed February 16, 1901. Serial No. 47,669. (No model.)

*To all whom it may concern:*

Be it known that we, FRANCIS W. DRAPER and JOSEPH COURVILLE, citizens of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Self-Playing Attachments for Keyboard Musical Instruments, of which the following is a specification, reference being had therein to the  
10 accompanying drawings.

The invention relates to self-playing attachments for musical instruments of that type comprising a pneumatic action controlled by a perforated music-sheet.

15 It is the object of our invention to give greater expression to the music by emphasizing the solo-note or (what is the same) subduing the accompaniment.

To this end the invention consists in the  
20 peculiar construction of a divided action whereby the actuating-pneumatics for a portion of the keys are subjected to a varying pneumatic pressure relative to that exerted upon the pneumatics for the remainder of the  
25 keys.

The invention further consists in the means employed for varying the pressure on one portion of said divided action, whereby the solo-note may be emphasized or the accompaniment suppressed to any degree desired, and,  
30 further, in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a diagrammatic  
35 perspective view illustrating the improvement. Fig. 2 is a longitudinal section through a portion of the divided action. Fig. 3 is a bottom plan of a portion of the wind-chest. Fig. 4 is a section illustrating a modification.

40 The improvement is applicable to any of the various types of pneumatic self-playing attachments for musical instruments, and as the particular construction of pneumatic action is not essential only a portion thereof is shown  
45 and that diagrammatically.

As illustrated in Fig. 1, A represents the key-operating fingers; B, their actuating-pneumatics; C, the connecting-rods between said fingers and pneumatics; D, the wind-  
50 chest or vacuum-chamber containing the pri-

mary pneumatics E for operating the valves F, respectively controlling the main pneumatics B.

The primary pneumatics E are arranged in series within the chest D and are connected  
55 by rods G with their respective valves F, said valves being located in individual cells H, formed in the upper wall of the wind-chest. The action is preferably constructed to operate by suction, as is usual with this type of  
60 instruments; but it is obvious that it may be modified to operate by pressure, if desired. To furnish the required suction, the chest D is connected with a suction-bellows (not shown) by a conduit I, which, as shown in  
65 Fig. 1, is connected to the right-hand side of the chest containing the pneumatics corresponding to the upper notes of the musical instrument.

With the construction as thus far described  
70 when a partial vacuum is created in the chest by suction through the conduit I all of the primary pneumatics E will be normally collapsed; but whenever air is admitted to one or more of said pneumatics through the me-  
75 dium of the perforated music-sheet M it will be expanded, pushing upward upon the rod G and shifting its valve F to a position where the air-inlet port *a* to the cell H is closed and the port *b*, connecting with the vacuum-cham-  
80 ber, is opened. This will exhaust the air from said cell and through its connection with the key-actuating pneumatic B will collapse the latter and cause it to actuate the finger-lever A, which in turn strikes the key of the in-  
85 strument.

If the pressure throughout the chest D is uniform, it is obvious that all of the primary and secondary pneumatics will be actuated with the same degree of force, and conse-  
90 quently the several musical notes sounded simultaneously will be uniform in power. As it is the object of the invention to emphasize the solo-note, it is necessary to divide the chest D and to provide means for vary-  
95 ing the pressure in the two sections. As shown in Fig. 1, this is accomplished by placing the partition J in the chest, which divides the same into two sections, the right-hand section containing all of the pneumat-  
100

ics which are likely to be used for the solo-note and the left-hand section containing the pneumatics for the lower notes. The exact position of the partition J may be varied in different constructions, according to the character of music to be played; but for general use a division between G G $\times$  above middle C will be found satisfactory.

To cause the vacuum in the left-hand portion of the chest, Fig. 1, the latter is connected by a conduit I' with the suction means, and a valve K is arranged to cut off this conduit to any degree desired. When the valve K is partially closed, the conduit I' will be restricted, so that the vacuum in the left-hand portion of the chest will not be equal in degree to the right-hand portion. It is, however, necessary to provide means for regulating the pressure in the left-hand portion of the chest, so that the varying demands of the pneumatics may not cause an objectionable fluctuation in pressure. This may be accomplished by providing a regulator, such as L, comprising a collapsible chamber having a spring *c* for expanding it and provided with the ports *d* and *e*. The port *d* is connected to the main suction-conduit I and is governed by a spring-valve *f*, which as the chamber L collapses restricts the port and as said chamber expands opens said port to its full capacity. The port *e* is connected to the left-hand section, Fig. 1, of the wind-chest D or the conduit I', leading thereto. Whenever the valve K is partially closed, so as to restrict the passage of air through the conduit I' to the main conduit I, the air-pressure will be partially reduced in the chamber L, and as the tension of the spring *c* is relatively slight said chamber will be collapsed by external atmospheric pressure. In collapsing the spring *f* will be pressed down, so as to restrict the port *d*. This will diminish the quantity of air passing through said port until it balances the amount consumed by the pneumatics. Whenever a greater amount of air is used by the pneumatics, which would tend to diminish the vacuum in the chest D, the spring C will expand the chamber L, thereby restoring the vacuum and at the same time opening the port *d*, so as to permit of a greater exhaust from the chamber L. By shifting the valve K any degree of vacuum desired may be obtained from the maximum suction of the conduit I to a pressure balancing the spring *c*, which may be just sufficient to operate the pneumatics. Thus the force exerted by the pneumatics B of the left-hand section of the chest, and consequently the blows struck by the finger-levers upon the keys of the instrument, may be varied as desired. On the other hand, the pneumatics connected with the right-hand section of the wind-chest are always operated by pressure of the main suction I.

It will be observed that the variation of pressure in the left-hand section of the chest

is always relative to that in the right-hand section or the conduit I connected thereto and that if it is desired to provide the instrument with additional expression devices for varying the pressure in the conduit I this may be done without interfering in any way with the operation of the mechanism above described.

In Fig. 4 is illustrated a modification in which the division between the two sections of the chest is variable in position. As shown, each of a number of pneumatics E, between the limits of variation, is placed in a separate cell formed by the division-strips J' J<sup>2</sup> J<sup>3</sup>, &c. These cells are connected by ports *h* with a chamber *i*, in which is arranged a valve *j*. This valve is adapted to be shifted in position to cut off the ports *h* from communication with the chamber *i* and to establish communication with a chamber *k* within the valve, the latter being connected with a port *l*, communicating with the left-hand section of the wind-chest. The chamber *i* communicates through a port *m* with the right-hand section of the chest. With this arrangement by shifting the position of the valve *j* the point of division between the two sections of the chest will be varied within the limits described.

In order to vary the pressure furnished by the regulator L, we preferably provide an adjustable tension-spring therefor, so that the operator may set said spring to exert a greater or lesser force in expanding the chamber, and thereby change the pneumatic pressure therein. As shown in Figs. 2 and 3, the spring *c* is of a V form, one leg bearing against the bottom of the wind-chest (to which the regulator L is attached) and the other leg bearing against a plate *p*, secured to the movable side of the chamber. As the regulator L is in the form of a bellows, hinged at one end, it is obvious that by shifting the position of the spring toward or from the hinge a variable pressure will be exerted thereby. Thus in the position of the spring indicated in dotted lines, Fig. 3, it will exert a lesser pressure thereon in the position shown in full lines. The action of the regulator may also be varied by adjusting a screw *r*, which bears against the spring-valve *f*.

In the construction shown in Figs. 2 and 3 the conduits I I' and ports *d e*, &c., are formed in the bottom wall of the wind-chest, while the regulator L and valve K are arranged below said chest. The latter is inclosed in a casing *s*, forming a chamber connected by ports with the passages in the wall of the chest.

What we claim as our invention is—

1. In a self-playing attachment for musical instruments, the combination with a series of key-actuating pneumatic motors and connections therewith to a common source of pneumatic pressure, of means for variably restricting the pneumatic connection to a portion of said motors to diminish the actuating-pressure for the latter, and means for regu-

lating the pressure at each adjustment of restriction.

2. In a self-playing attachment for musical instruments, the combination with a series of  
5 key-actuating pneumatic motors and connections therewith to a common source of pneumatic pressure, of a regulator for automatically restricting the pneumatic connection  
10 to a portion of said motors to produce a different working pressure therefor from that on the remainder of said motors.

3. In a self-playing attachment for musical instruments, the combination with a series of  
15 key-actuating pneumatic motors and connections therewith to a common source of pneumatic pressure, of a regulator for automatically restricting the pneumatic connection to a portion of said motors to produce a different working pressure therefor from that  
20 for the remainder of said motors, said regulator comprising a collapsible chamber inter-

posed in the pneumatic connection to said variable-pressure motors, a valve adapted to restrict said connection upon the collapsing of said chamber, a spring for expanding said  
25 chamber, and means for varying the tension of said spring to vary the pressure at which said chamber collapses.

4. In a self-playing attachment for musical instruments, the combination with a series of  
30 key-actuating pneumatic motors, of means for producing differential working pneumatic pressure for two sections of said series of motors, and means for varying the point of division between said sections.  
35

In testimony whereof we affix our signatures in presence of two witnesses.

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Witnesses:

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