

No. 684,339.

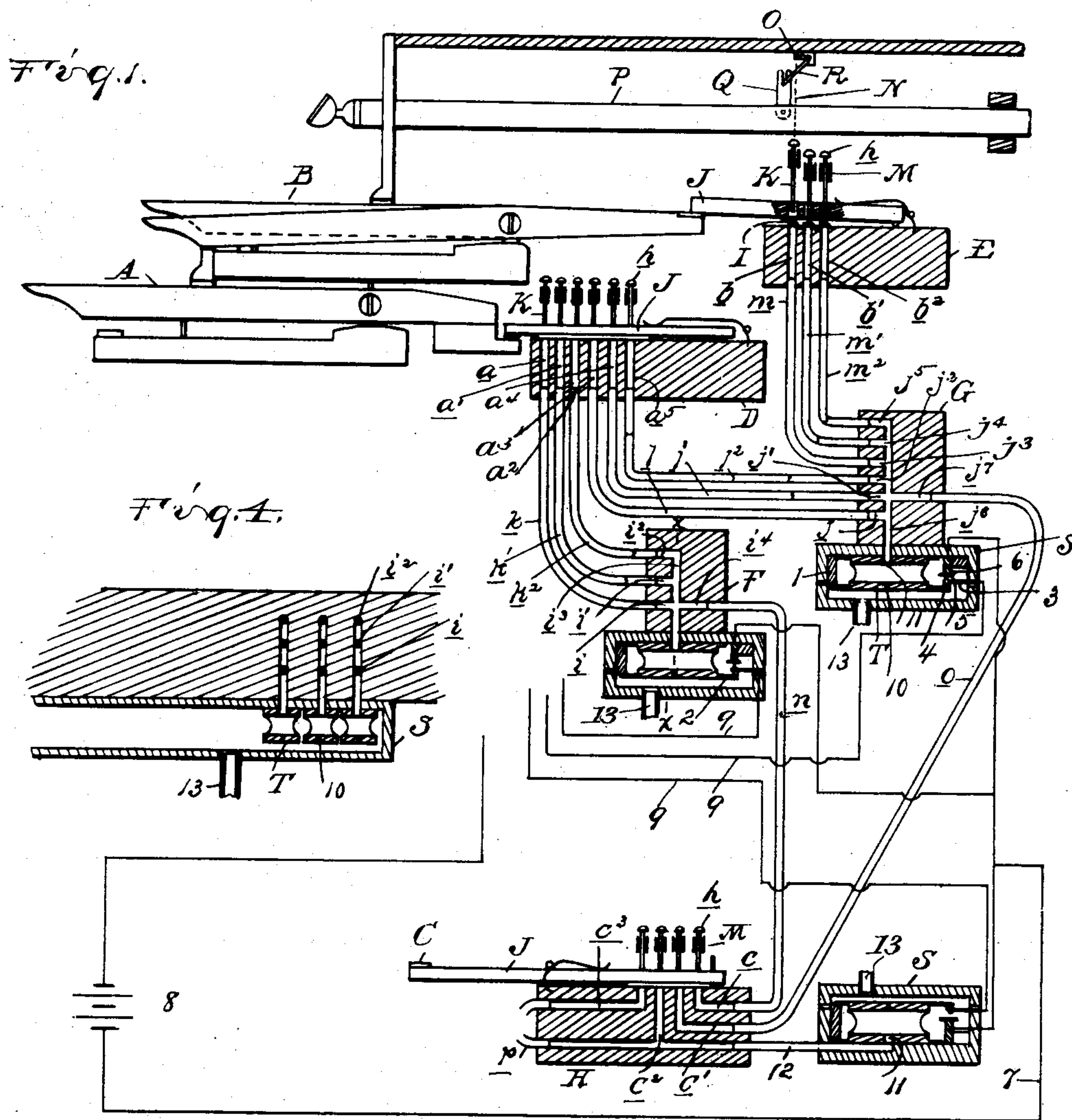
Patented Oct. 8, 1901.

J. T. AUSTIN.
ELECTROPNEUMATIC ACTION.

(Application filed July 22, 1898.)

(No Model.)

2 Sheets—Sheet i.



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2 Sheets—Sheet 2.

Fig. 3.

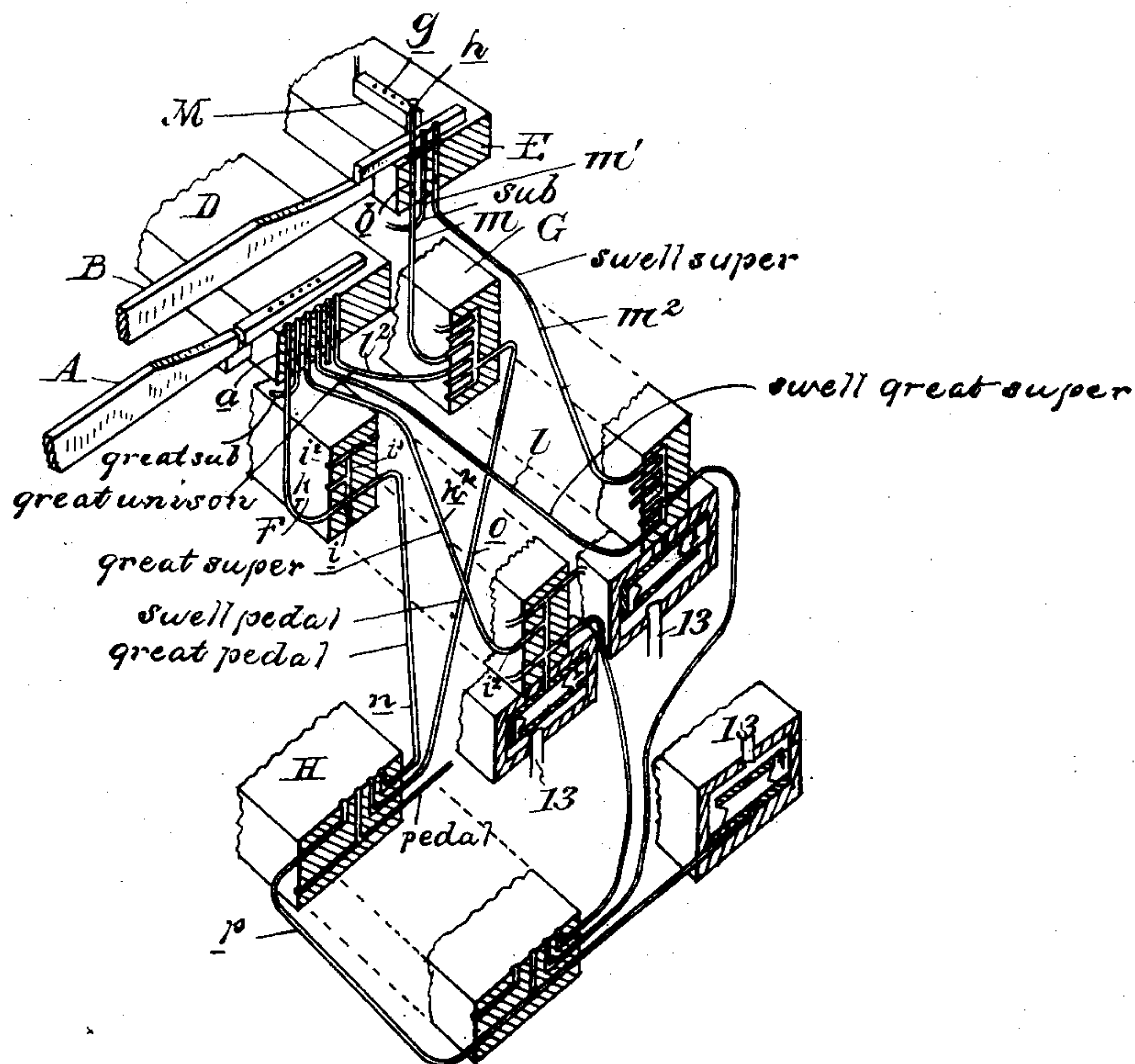
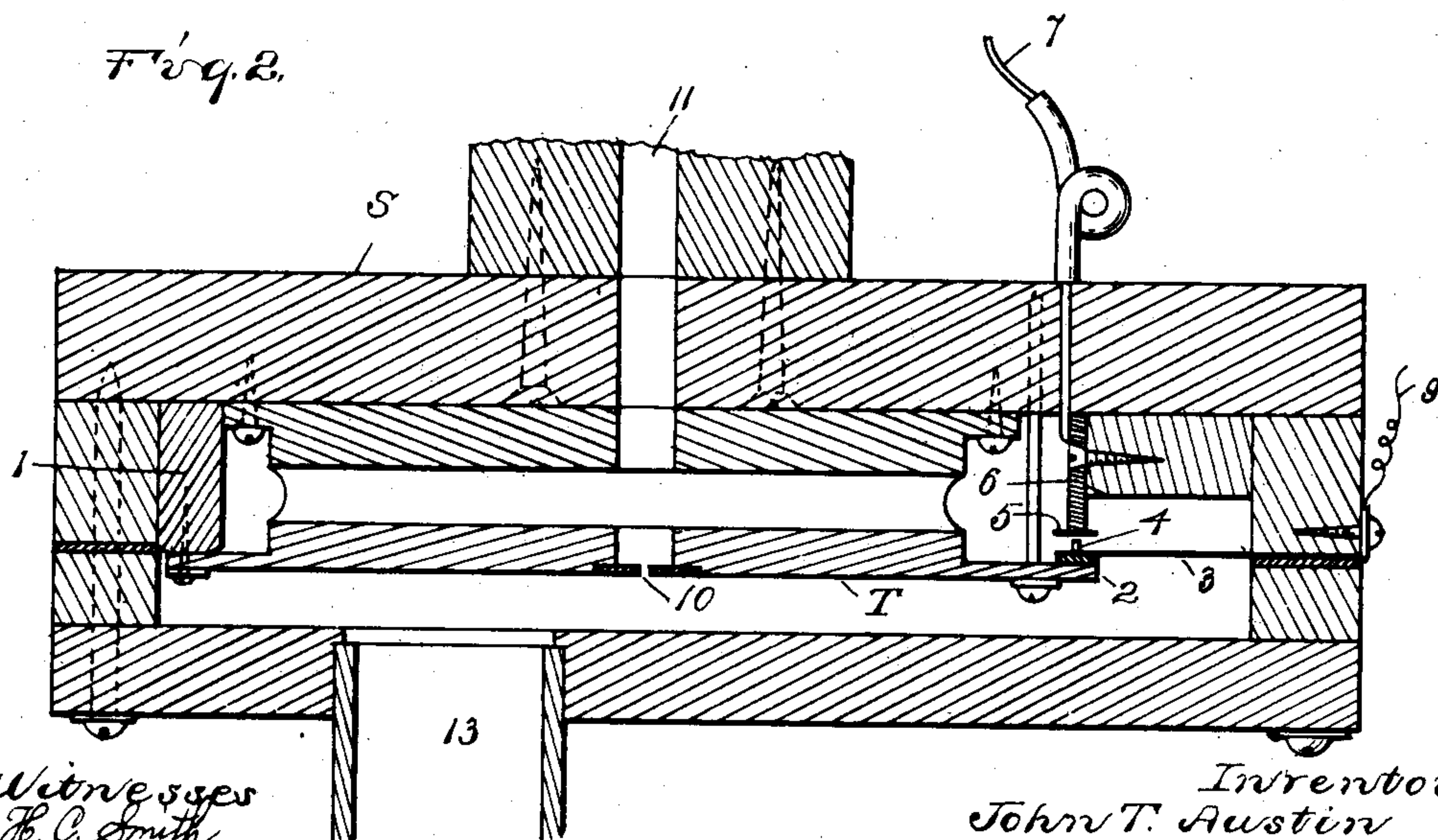


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN T. AUSTIN, OF DETROIT, MICHIGAN.

ELECTROPNEUMATIC ACTION.

SPECIFICATION forming part of Letters Patent No. 684,339, dated October 8, 1901.

Application filed July 22, 1899. Serial No. 724,757. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. AUSTIN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electropneumatic Actions, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The invention relates to electropneumatic actions for pipe-organs or other musical instruments.

15 It is the object of my invention to obtain an electropneumatic action which combines all the advantages of the pneumatic action and the electric action or the electropneumatic actions as heretofore made and, on the other hand, eliminates some of the principal objections to both of the above.

20 The invention consists, essentially, in the construction of an action in which the speaking-pipes are controlled by electric circuits which in turn are provided with pneumatic circuit-closers directly controlled by the keys.

25 The invention further consists in the peculiar construction, combination, and arrangements of parts, as more fully hereinafter described.

30 In the drawings, Figure 1 is a vertical longitudinal section through a portion of an organ, showing my improved action. Fig. 2 is an enlarged view of a portion of Fig. 1. Fig. 3 is a sectional perspective view showing the coupler action, and Fig. 4 is a section on line $x-x$, Fig. 1.

35 For the pneumatic portion of my action I preferably employ the construction shown and described in a prior patent issued to me July 6, 1897, No. 585,946, the construction of which is as follows:

40 A A are the keys belonging to the lower bank or "great organ."

B B are the keys of the upper bank or "swell organ," and C are the pedals.

45 D, E, F, G, and H are bars, preferably of wood, extending across the organ in rear of the keyboard and pedals, in which are formed the valve-ports and coupling connections for the action. The upper face of the bar D has 50 formed therein a series of ports a a' a^2 , &c., for each of the keys A, and the bars E and H

are correspondingly provided with series of ports b , b' , and b^2 and c , c' , and c^2 , respectively, for the keys B and pedals C. Each of these ports is controlled by an outwardly-opening valve I, preferably formed of a flap 55 of leather or similar substance, and all of the valves of each series are closed by a single lever J, which I shall call the "damper."

The dampers J are preferably formed of 60 strips of wood felted on their under faces and hinged at their rear ends, their forward ends being in engagement with the keys or pedals. These dampers are provided with apertures opposite each of the ports in the seats adapted 65 to receive the pins K, which latter rest upon the valve-flaps and are adapted to hold them to their seats when the dampers are raised.

The pins K for each row of corresponding valves are adapted to be simultaneously raised 70 by a bar M, which has apertures g for each of the pins, the latter being provided with heads h , adapted when the bar is raised to rest upon its upper face and lift the pins. The mechanism for lifting the bars M com- 75 prises links N at each end connected to rock-arms O, which are adapted to be actuated by the stop-rod P through the medium of the slotted arm Q and rock-arm R.

The bars F and G are provided with con- 80 nected ports or passages, which form the various coupling connections. In the drawings I have shown the bar F provided in the plane of each key with three ports i i' i^2 , connected together by a central port i^3 and also to the rear 85 port i^4 . The bar G is correspondingly provided with six ports on the forward side j , j' , j^2 , j^3 , j^4 , and j^5 , connected together by the central port j^6 and to the rear port j^7 . The connection between these ports in the various bars is formed 90 by suitable conduit-pipes, preferably formed of lead and arranged as follows: The port a is connected by the pipe k to the corresponding port i , the port a' by the pipe k' to the port i' one octave lower in the scale, and the port a^2 95 by the pipe k^2 to the port i^2 one octave higher. In a like manner the ports a^3 , a^4 , and a^5 are connected by pipes l , l' , and l^2 with the ports j j' j^2 , the ports a^3 and j being connected in unison, the ports a^4 being connected with the 100 port j' one octave higher, and the port a^5 being connected with the port j^2 one octave

lower. The ports b , b' , and b^2 are also connected by the pipes m , m' , and m^2 with ports j^3 , j^4 , and j^5 in unison one octave higher and one octave lower. The ports i^4 and j^7 are connected by pipes n and o with the corresponding ports c and c' in the bar H, while the ports c^3 in said bar are connected by pipe p to ports c^2 one octave higher.

Adjacent to the bars F, G, and H are arranged a series of pneumatic circuit-closers, preferably arranged in a common box or wind-chest S, and preferably of the following construction: Each of the circuit-closers comprises a small pneumatic motor or bellows T, arranged within the chest S and preferably hinged at one end, as at 1. At its opposite end is arranged a finger 2, which projects beneath a contact-spring 3, secured to the casing of the chest. This contact-spring 3 is preferably provided with a platinum point 4, which is adapted to contact in the operation of the motor with a contact-plate 5, also preferably of platinum, arranged thereabove. The contacts 5 are preferably connected to a common metallic bar 6, extending longitudinally of the chest. This bar is connected by a conductor 7 to the battery or electric generator 8, while the contacts 3 are individually connected by conductors 9 with electromagnetic devices (not shown) controlling the individual speaking-pipes.

The pneumatic motor T is provided with a small port 10, or what is commonly called a "bleed," through which air may pass from the chest to the interior of the motor.

11 is a port leading from the interior of the motor and connected either directly or by the conduit-pipe 12 with the corresponding port i^3 , j^6 , or c^2 , according to the particular bar F, G, or H with which said circuit-closers correspond.

13 is an air-supply pipe connected with the chest S.

The parts being constructed as shown and described, the operation of the device is as follows: Air under pressure is admitted through the pipes 13 into each of the wind-chests S and passes through the ports or bleeds 10 into the interior of the pneumatic motors, equalizing the pressure inside and outside the same. In the normal position of each of said motors the contacts 4 and 5 are separated from each other, so as to break the electric circuit 9. If now one of the stops is pulled so as to lift the pins K from their corresponding valves and if one of the keys is then operated, lifting its corresponding damper, the air in the corresponding pneumatic motor T will be allowed to exhaust through the ports 11, pipe 12, and other intermediate ports and pipes, escaping through the open valve. The capacity of these exhaust ports and pipes is so much greater than that of the port or bleed 10 that the pneumatic motor will be collapsed by the pressure in the chest, the finger 2 pressing the contact 4 against the contact 5 and

closing the electric circuit, which will cause its corresponding pipe to speak.

It will be readily understood that the coupling between the different pipes of the organ is effected pneumatically, as each of the keys in connection with the various stops controls a plurality of valves, which valves are connected by coupling-pipes and ports to the pneumatic circuit-closers. At the same time the connection between each of the circuit-closers and its corresponding pipe is electric. The advantage of this construction is that the electric connections can be more easily and economically placed where considerable distance intervenes between the point of operation and the devices operated, while on the other hand the pneumatic action is superior in many ways to the electric, and for that reason I employ it directly in connection with the operating-keys.

It is a well-known fact that where the electric action is employed difficulty is often experienced in properly controlling the electromagnetic devices which are initially actuated by the keys, the reason for this being that the electromagnetic devices are so small and delicate in their action and are so easily influenced by external conditions that often the pipes are sounded without any corresponding action of the keys. Again, where electric couplers are employed it involves the necessity of providing a great number of contact-points, making an expensive construction and one very liable to get out of order. My pneumatic circuit-closers and couplers therefore do away with these objections, and the construction is such that it can be very compactly arranged without employing any great length of tubing between the various ports. On the other hand, the connections between this pneumatic and coupler connection and the speaking-pipes, which are often placed at a considerable distance away, is formed by the electric circuits, and thus I avoid the expense of a great length of tubing, which would necessarily be employed if the action were entirely pneumatic.

What I claim as my invention is—

1. In a multimanual musical instrument, the combination of a wind-chest, a series of adjacent pneumatic circuit-closers therein corresponding to the keys of each manual, a plurality of exhaust-valves for each key conjointly controlled thereby and by the stop-action, pneumatic connections between said circuit-closers and valves, a series of electromagnets individually controlling the sound-producing devices, and electric circuits extending between and respectively including said electromagnets and their corresponding circuit-closers.

2. In an electropneumatic action for musical instruments, the combination of a wind-chest, a series of collapsible pneumatic motors therein each having a small port or "bleed" opening into the chest, a pair of electric con-

5 tacts for each motor separated in the normal position thereof, electric circuits individually controlling the sound-producing devices and respectively including said normally-separated contacts of the different motors, a series of valves, exhaust connections between said valves and motors interconnected to couple the same motor to a plurality of different valves, a series of keys, and a plurality of

stops, said keys and stops conjointly controlling said valves, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN T. AUSTIN.

Witnesses:

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R. P. ELLIOT.