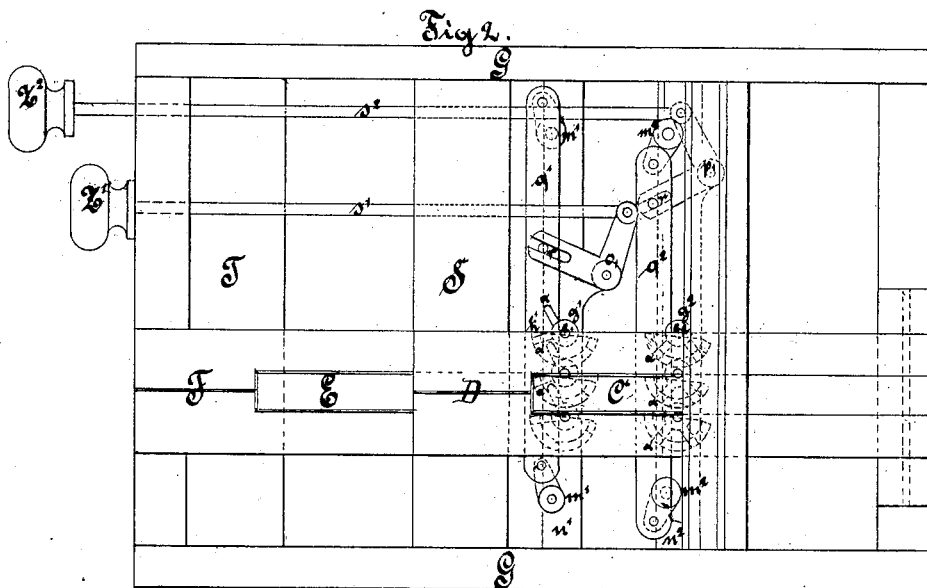
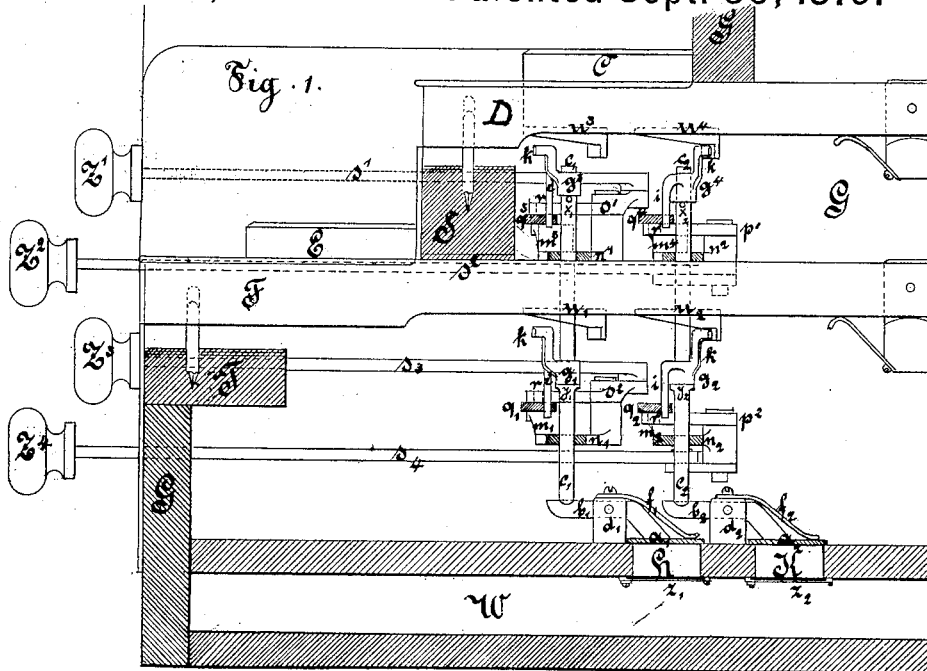


A. GRÜTERS.  
Organ Action.

No. 220,071.

Patented Sept. 30, 1879.



Witnesses:  
Adolph Müller  
Heinrich Klippert.

Inventor:  
August Grütters.  
Henry & Rader  
attorneys.

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Fig. III.

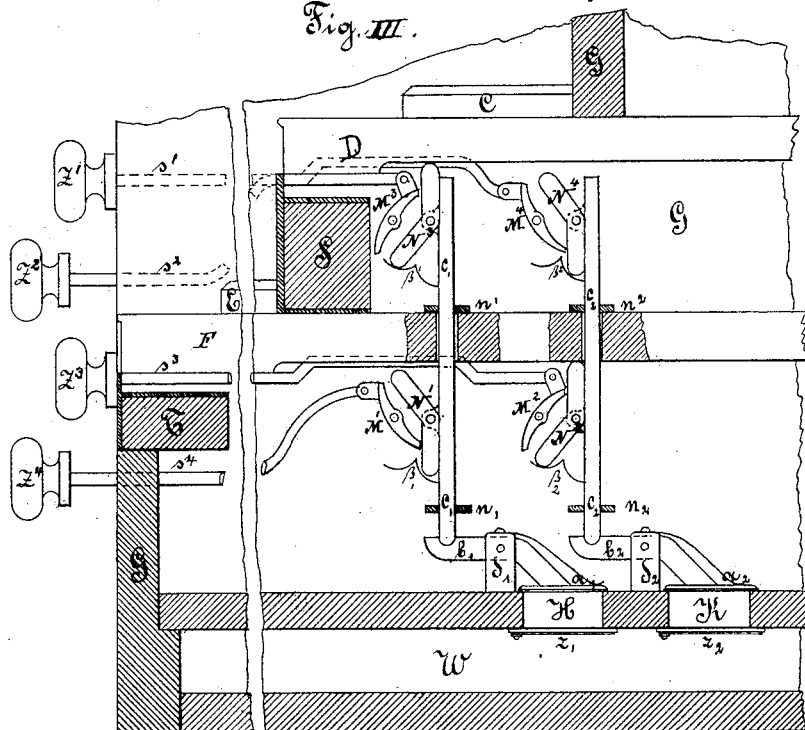
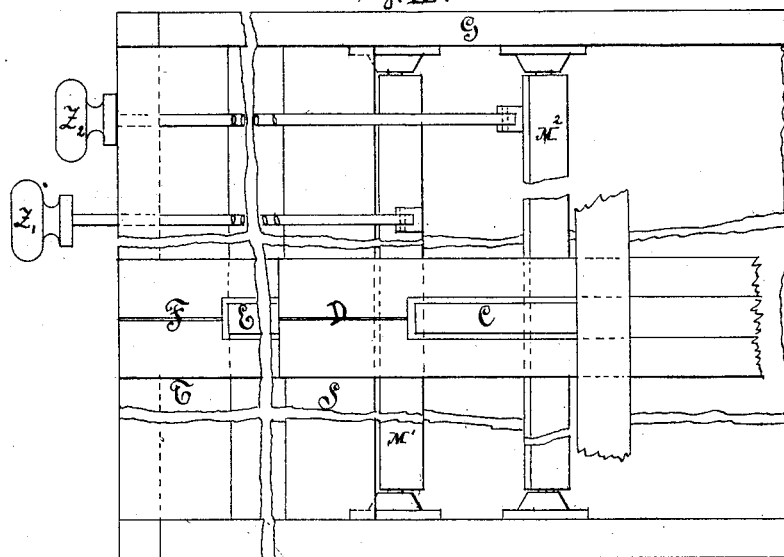


Fig. IV.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

AUGUST GRÜTERS, OF CREFELD, GERMANY.

## IMPROVEMENT IN ORGAN-ACTIONS.

Specification forming part of Letters Patent No. **220,071**, dated September 30, 1879; application filed March 8, 1879.

### *To all whom it may concern:*

Be it known that I, AUGUST GRÜTERS, of the city of Crefeld, in the Empire of Germany, have invented a new and useful Improvement in Organs and Similar Wind-Instruments having two or more rows of keys, of which the following is a specification.

In the accompanying drawings, Figure I represents a vertical section of an organ, and Fig. II is a plan or top view of the same.

G G represent the casing of the instrument, containing the mechanism. C and D are the keys of the upper key-board, and E and F the keys of the lower key-board. W is the channel or passage for the wind to the valves and reeds. In the upper wall of this passage openings H K are made, at the lower part of which the reeds  $z^1$  and  $z^2$  are arranged, and the upper part of which said openings are closed by suitable valves  $a^1$  and  $a^2$ . These valves  $a^1$   $a^2$  are attached to levers  $b^1$   $b^2$ , turning on fixed centers  $d^1$   $d^2$ , and are acted upon by suitable springs  $f^1$   $f^2$  to keep the same closed. At the other ends of the levers  $b^1$   $b^2$  the spindles  $c^1$   $c^2$  are supported and attached. To these spindles  $c^1$   $c^2$  hubs  $g^1$   $g^3$  and  $g^2$   $g^4$ , capable of turning freely around said spindles, are attached, each hub being provided with two arms,  $i$  and  $k$ , the arms  $i$  being turned downward and the arms  $k$  projecting upward. The hubs  $g^1$   $g^2$  are, by means of suitable collars  $y^1$   $y^2$ , and the hubs  $g^3$   $g^4$ , by means of pins  $x^1$   $x^2$ , held in their proper positions on these spindles  $c^1$   $c^2$ .

The spindles  $c^1$   $c^2$  are supported in their perpendicular position, capable of the required up-and-down motion, through suitable cross-pieces  $n^1$   $n^1$  and  $n^2$   $n^2$ , attached to the casing G. To these cross-pieces  $n^1$   $n^2$  small cranks  $m^1$   $m^3$  and  $m^2$   $m^4$  are attached, supporting on their ends the bars  $q^1$   $q^3$  and  $q^2$   $q^4$ , respectively. These bars  $q^1$   $q^3$   $q^2$   $q^4$  are provided with suitable holes, into which the downward-projecting arms  $i$  of the hubs  $g^1$   $g^3$   $g^2$   $g^4$  are fitted, communicating, therefore, any motion given to said bars to the respective hubs connected to the bar by means of these arms  $i$ .

To the cross-pieces  $n^1$   $n^2$  bell-cranks  $o^1$   $o^2$  and  $p^1$   $p^2$ , respectively, are attached, one end of said bell-cranks being connected (by means

of pins  $r$ , attached to the bars  $q^1$   $q^3$   $q^2$   $q^4$ , working in suitable slots in the end of said crank, or in any other suitable manner) to the bars  $q^1$   $q^3$   $q^2$   $q^4$ , while the other arms of said bell-cranks are connected, through suitable rods  $s^1$   $s^2$   $s^3$   $s^4$ , with the knobs  $Z^1$   $Z^2$   $Z^3$   $Z^4$  at the outside of the casing G.

Concentric with the spindles  $c^1$   $c^2$  circular wedge-shaped cam-pieces  $u^1$   $u^3$   $u^2$   $u^4$  are attached to the under side of the keys C, D, E, and F.

S and T are the rest-boards to stop the motion of the keys.

The operation is as follows: When all the bars  $q^1$   $q^3$   $q^2$   $q^4$  are moved in positions similar to the bar  $q^1$  in Fig. II, the projecting arms  $k$  are moved in such a position that the concentric cam-pieces on the under side of the keys cannot operate the same, and consequently the valves  $a^1$  or  $a^2$  will not be operated by the motion of the keys, and no sound will be produced. If the knob  $Z^2$  is pulled out, the position of the bar  $q^4$  will be changed, and as the downward-projecting arms  $i$  are connected to said bar  $q^4$ , the upward-projecting arms  $k$  will thereby be moved under the raised part of concentric cam-pieces  $u^4$ , and the motion of the keys C and D in the upper key-board will operate the valves  $a^2$  to give the desired tone. When the knob  $Z^4$  is operated so as to change the position of the bar  $q^2$  to bring the upward arms  $k$  of the hub  $g^2$  under the raised part of the concentric cam-piece  $u^2$ , the motion of the keys in the lower key-board will likewise operate the valves  $a^2$ .

It will therefore be readily understood that in this manner the valve  $a^2$  can either be operated only by the keys of the upper key-board, or by the keys of the lower key-board, or by both the keys in the upper and lower key-boards, as may be desired.

In the same manner, by moving the knob  $Z^1$ , the position of the bar  $q^3$  will be changed, so that the upwardly-turned arm  $k$  of hub  $g^3$  is brought to be acted upon by the cam-piece  $u^3$ , whereby the keys in the upper key-board will operate the valves  $a^1$ , and when the position of the arms  $k$  on the hub  $g^1$  is changed the keys in the lower key-board will likewise operate these valves  $a^1$ , and consequently the

valves  $a^1$  can be operated either by the keys of the upper key-board, or by the keys of the lower key-board, or by both the keys of the upper and lower key-boards, as may be desired.

As above described, the valves  $a''$  can be operated exactly in the same manner; and it will therefore readily be seen that either one of the valves  $a'$   $a''$ , or both together and at the same time, may be operated by either the keys of the upper or by the keys of the lower key-boards, or by both of them at the same time.

I have only shown in the drawings two rows of valves,  $a^1$  and  $a^2$ ; but it will be understood that any desired number can be arranged and operated and combined in the same manner.

Should at any time two or more keys have been moved while it has been forgotten to operate the required stop or knob for the valves desired to be operated, this operation can be performed even while the keys are pressed downward; as the wedge-shape face of the concentric pieces  $u^1$ ,  $u^2$ ,  $u^3$ , or  $u^4$  will allow the turning of the arms  $k$  in the proper position, and will easily overcome the action of the springs  $f^1$  or  $f^2$  while the keys are pressed down.

Instead of arranging hubs upon the upright spindles  $c^1$   $c^2$ , capable of being turned around, so as to bring their upward-projecting arms in position to be acted upon by projecting pieces attached to the under side of the keys whenever the keys are pressed down, bell-cranks may be arranged on said spindles, operated in such a manner that the upper arms of said cranks shall be moved upward whenever the keys are to act upon the same, for the purpose of acting through the same and the spindles upon the valve, or that said upper arms are moved downward whenever it is desired to move the keys without operating said valve. This arrangement is shown in Figs. III and IV, Sheet II.

$c^1$   $c^2$  are the spindles operating the valves  $a^1$  and  $a^2$ .  $N^1$ ,  $N^2$ ,  $N^3$ , and  $N^4$  are bell-cranks centered on the spindle  $c^1$  and  $c^2$ .  $M^1$ ,  $M^2$ ,  $M^3$ , and  $M^4$  are curved plates centered to the casing G, and connected, through their respective rods,  $S^1$ ,  $S^2$ ,  $S^3$ , and  $S^4$ , to the knobs or stops

$Z^1$ ,  $Z^2$ ,  $Z^3$ , and  $Z^4$  at the outside of the casing. These plates  $M^1$   $M^2$   $M^3$   $M^4$ , when operated, act either against the upper arms of the bell-cranks  $N^1$   $N^2$   $N^3$   $N^4$ , so as to allow the keys to act upon the same, and thus operate through the same and the spindles  $c^1$  or  $c^2$  upon the valves  $a^1$  or  $a^2$ , respectively, or the lower edges of said plates  $M^1$   $M^2$   $M^3$   $M^4$  act against the lower arms of the bell-cranks  $N^1$   $N^2$   $N^3$   $N^4$ , thereby moving the upper arms partly downward away from the keys, so that said keys can be moved without producing any action on the valves  $a^1$  or  $a^2$ ; and in the same manner as above described these bell-cranks may be operated so that either the keys of the upper key-board or the keys of the lower key-board, or the keys of both upper and lower key-boards, will operate either one or both of the valves  $a^1$   $a^2$ , as may be necessary and desired.

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

1. In combination with the keys of an organ or similar wind-instrument and the spindles which operate the valves or reeds, arms or levers attached to said spindles, with suitable mechanism to turn said arms or levers, so as to be operated by the keys in either key-board, or by the keys in all the key-boards at the same time, in the manner and for the purpose substantially as described and set forth.

2. In an organ or wind-instrument, the hubs  $g^1$   $g^2$   $g^3$   $g^4$ , arranged to turn freely around the spindles  $c^1$   $c^2$ , to operate the valves  $a^1$   $a^2$ , respectively, each hub being provided with an arm,  $i$ , turned downward, and an arm,  $k$ , turned upward, the bars  $q^1$   $q^2$   $q^3$   $q^4$ , connected with the arms  $i$ , and, through rods  $s^1$   $s^2$   $s^3$   $s^4$ , &c., with the knobs  $Z^1$   $Z^2$   $Z^3$   $Z^4$ , respectively, in combination with concentric wedge-shaped cam-pieces  $u^1$   $u^2$   $u^3$   $u^4$ , attached to the under side of the keys C D E F, the whole being arranged to operate substantially in the manner and for the purpose herein described.

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Witnesses:

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