

(No Model.)

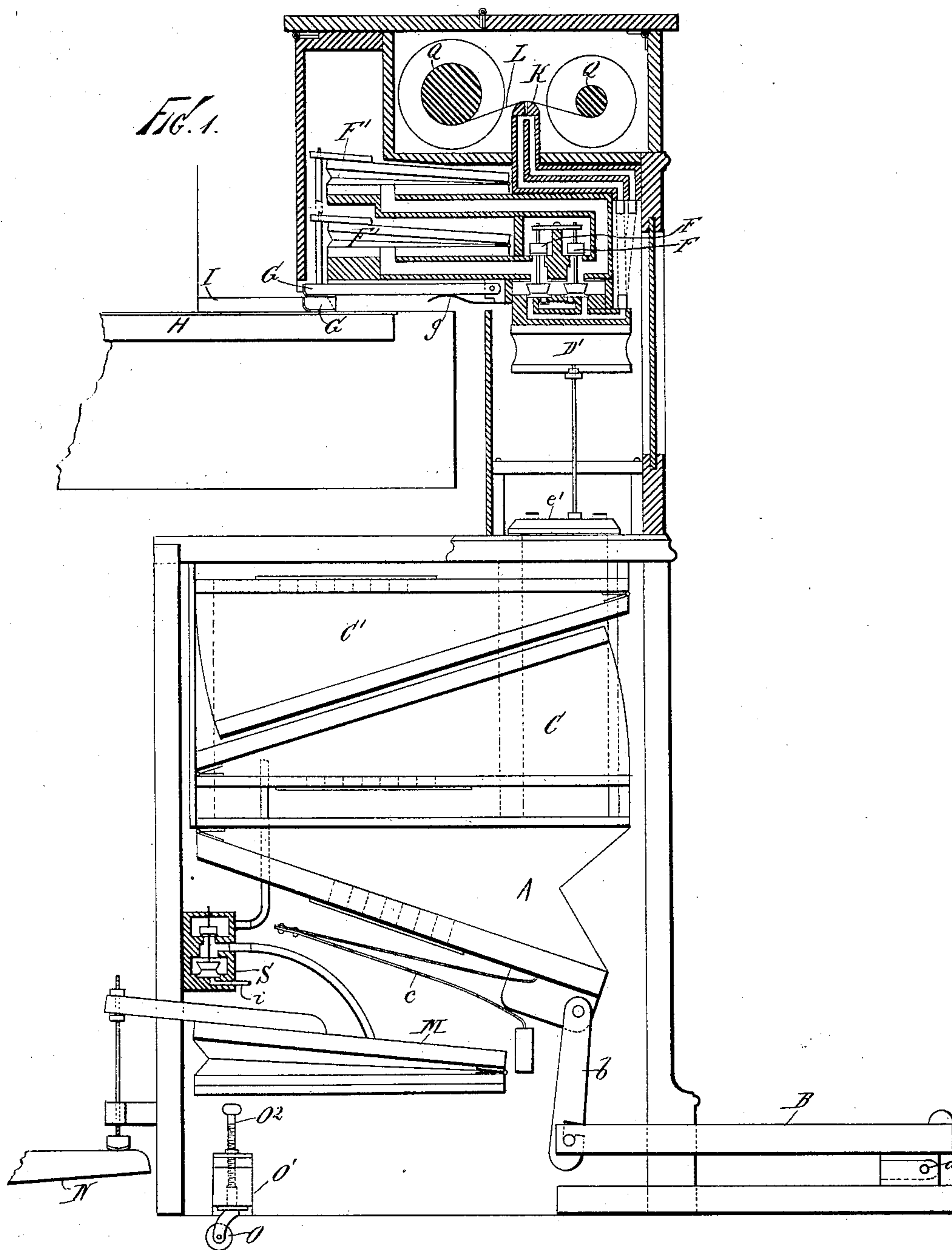
3 Sheets—Sheet 1.

C. A. KUSTER.

MECHANICAL MUSICAL INSTRUMENT.

No. 361,299.

Patented Apr. 19, 1887.



Witnesses:  
 Geo. Buckler,  
 L. H. Osgood

Charles A. Kuster,  
Inventor:  
By Worth Ogden  
Attorney.

(No Model.)

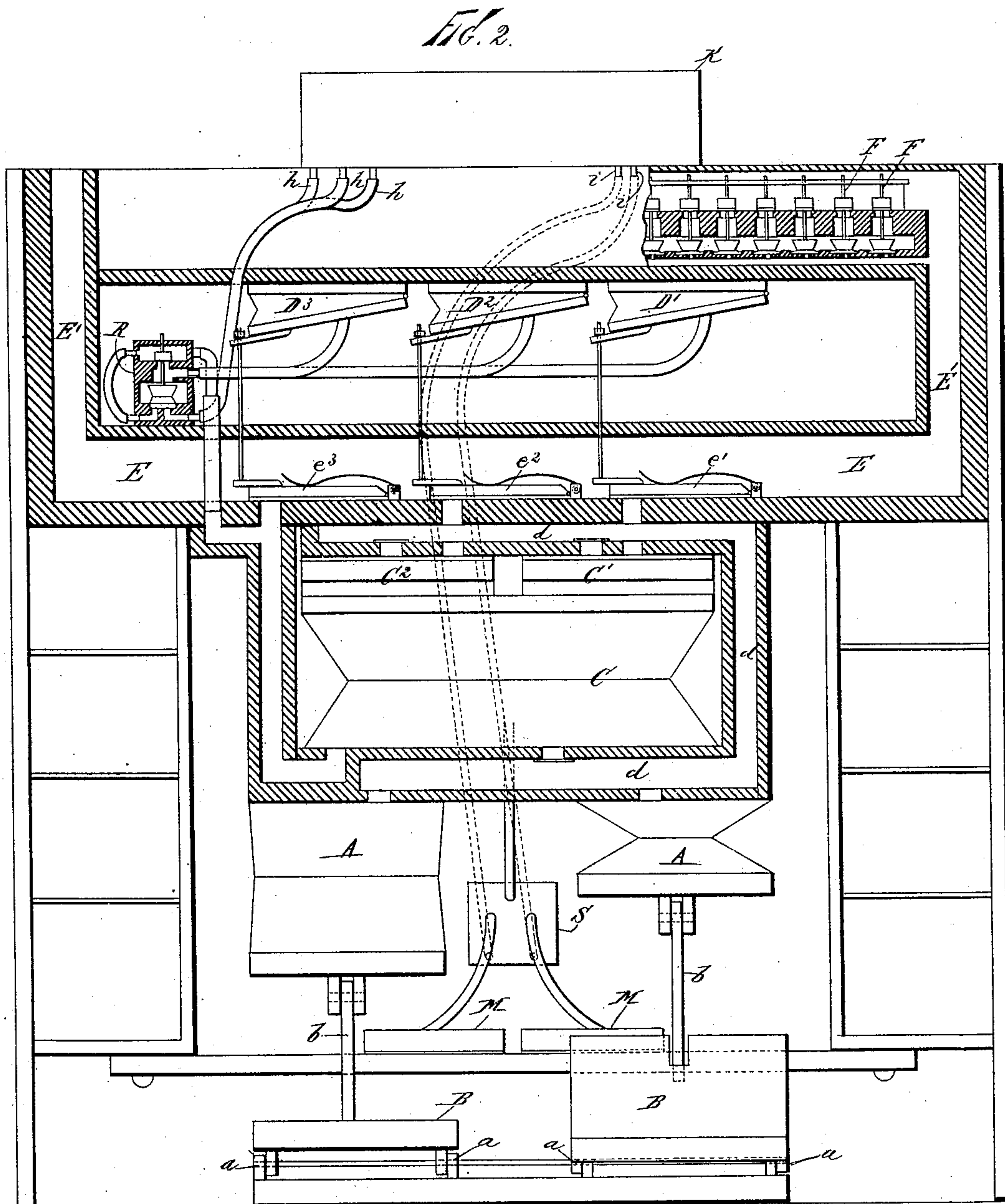
3 Sheets—Sheet 2.

C. A. KUSTER.

MECHANICAL MUSICAL INSTRUMENT.

No. 361,299.

Patented Apr. 19, 1887.



Witnesses:  
John Buckle  
L. H. Osgood

Charles A. Kuster,  
Inventor.  
By Worth Osgood  
Attorney.

(No Model.)

3 Sheets—Sheet 3.

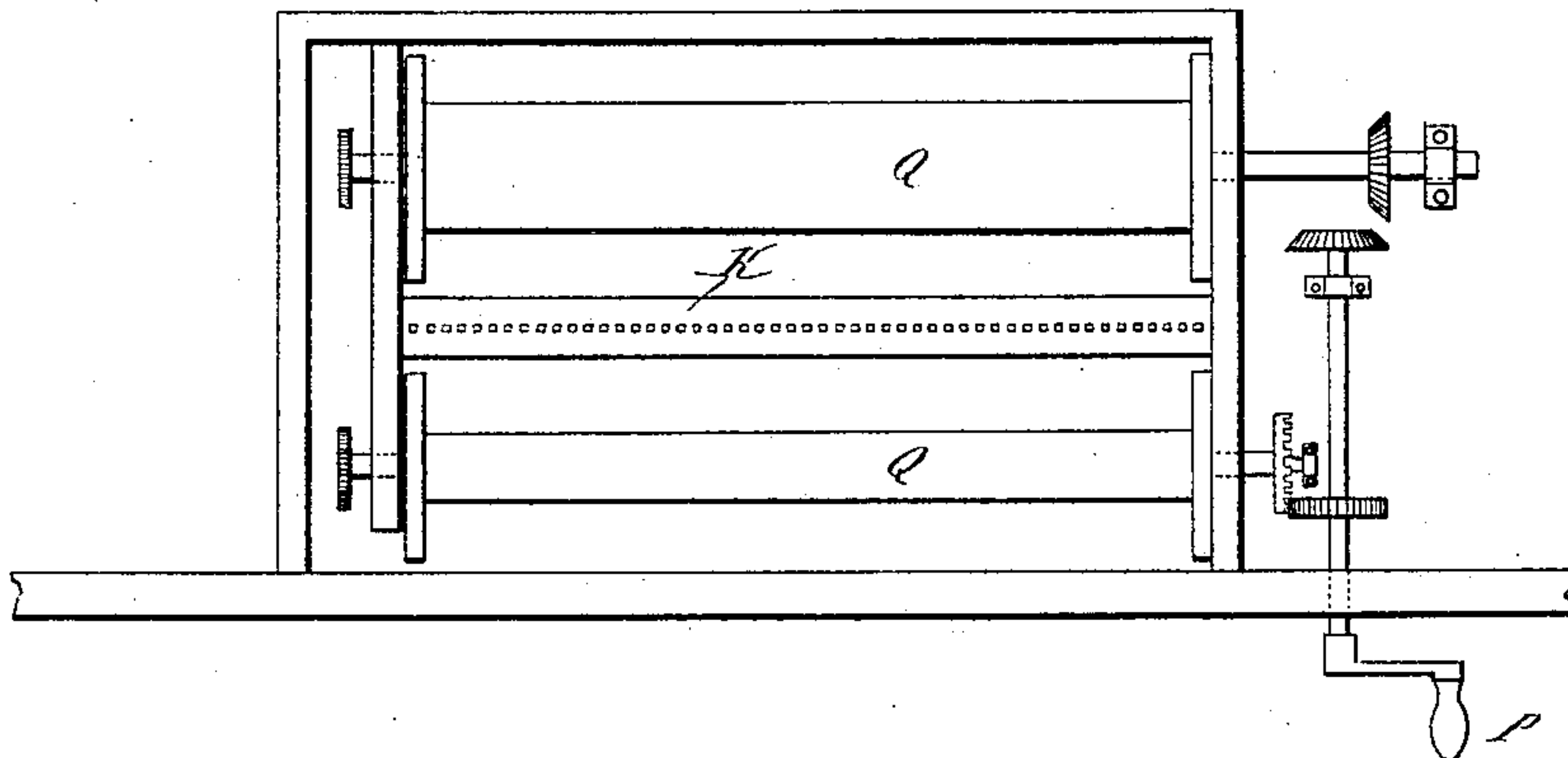
C. A. KUSTER.

MECHANICAL MUSICAL INSTRUMENT.

No. 361,299.

Patented Apr. 19, 1887.

*Fig. 3.*



Witnesses:  
John Buckles,  
L. H. Osgood,

Charles A. Kuster,  
Inventor:  
By North Osgood,  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES A. KUSTER, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PIANOPHONE COMPANY.

## MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 361,299, dated April 19, 1887.

Application filed May 14, 1886. Serial No. 202,162. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. KUSTER, of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention has relation to that class of mechanical devices employed for striking the keys of an ordinary piano or organ or other keyed instrument, and for operating the pedals or other accessories of the instrument through the medium of air-currents which are governed or regulated in their flow by a perforated strip of paper or analogous material.

The objects of my invention are to simplify and improve the construction and arrangement of the parts comprising the pneumatic action and parts connected therewith, so as to insure the requisite duration, rapidity, and intensity of the stroke or touch, to perfectly regulate the tone or pitch, to make the improved device readily adjustable in connection with any ordinary piano or other such instrument, and to so construct the whole that it will be compact and durable in all its parts, certain and efficient in its various operations, and not liable to get out of order.

To accomplish this my improvements involve certain new and useful peculiarities of construction, relative arrangements or combinations of parts and principles of operation, all of which will be herein first fully described, and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section and partial elevation of a device constructed and arranged for operation in accordance with my invention, the same being shown as applied in position to operate upon the keys and pedals of an ordinary piano. Fig. 2 is a front elevation and partial sectional view, showing the pumps, reservoir, bellows, pneumatic action, and valves, omitting parts above. Fig. 3 is a top or plan view showing the tracker and means for operating the rollers, the top of the machine being removed.

In all these figures like letters of reference,

wherever they occur, indicate corresponding parts.

A A are two bellows, which are moved by the feet of the operator, and called "pumps." They serve to exhaust air from other parts of the machine, and are each supplied with a pedal, as B, hinged, as at *a*.

The pedals are connected with the pumps by arms, as *b*, from which they may be detached at any time, and, being detached, the pedals may be pushed into the casing of the machine at the bottom, where they are entirely out of the way. Each of the pumps A is kept normally closed by a suitable spring, as at *c*, the movements of the pedals serving to overcome the force of the springs *c* and to open the pumps, by which air is exhausted in a manner well understood.

Above the pumps are three reservoirs, C, C', and C<sup>2</sup>, in the form of bellows, and from these the air is exhausted by the pumps, which communicate with a chamber, *d*, extending below C and over C' and C<sup>2</sup>, as plainly shown, suitable valves being provided, as indicated.

Above the reservoirs are three valves, *e'* *e''* *e'''*, each held seated by a light spring, the valves *e'* and *e''* covering ports which communicate with reservoirs C' and C<sup>2</sup>, and the valve *e'''* covering a port which communicates with reservoir C (through the bottom) and also with the pneumatic actions.

D', D<sup>2</sup>, and D<sup>3</sup> are the "pneumatics," so-called, being in the form of bellows and serving to open valves *e'* *e''* *e'''* when by exhaustion of air therefrom either or all or any two of the pneumatics are sufficiently closed. The valves *e'* *e''* *e'''* are located in a chamber marked E; and as said valves are raised from off their seats they permit exhaustion of air from chamber E in quantity and rapidity according to which of the valves are opened, thus determining the degree of the stroke or touch which is to be communicated to the keys of the piano, the reservoirs, with which the ports under the valves communicate, being of varying sizes or capacities.

From chamber E on each side trunks or branches, as E', extend up to the chamber within which the actions F F are located. These actions are in number one for each key



of the musical instrument to be played upon, and they operate as valves to permit exhaustion from the corresponding bellows, as F' F', which move the hammers, as G G, through suitable connections. The hammers G are arranged so as to strike the white and black keys in their proper order, and are held out of contact with the keys by light springs, as at g, the force of which is to be overcome.

H represents one of the white keys and I one of the black keys of any piano.

K is the tracker, which is perforated according to the number of notes and expressions, and from each note-perforation a small tube leads to and communicates with its corresponding action, F.

L is the perforated paper moved over the tracker. When any perforation in the paper uncovers an opening in the tracker, air is allowed to enter the action under the influence of the pumps, opening the valve, which permits the air to be drawn from the corresponding bellows connected with the striker, and thus to strike the required key.

At h h h are tubes which correspond in number with the pneumatics. By opening one of these air is admitted to the corresponding action, R, which opens the valve therein and permits the air to be exhausted from the corresponding pneumatic, D', D<sup>2</sup>, or D<sup>3</sup>, under the influence of the pumps, which are kept constantly moving. Thus the stroke is under control of the operator, and may be regulated at pleasure. The regulation is accomplished by suitably perforating the paper. Tubes i i permit the flow of air to actions S, similar to R, and these (when the tubes are open) permit air to be exhausted from bellows, as M, also called "pneumatics," which, when closed, press down the pedals, as N, of the instrument, and thus serve to regulate the tone.

The machine is mounted upon casters, and is made adjustable thereon, so that it may be brought to any required height to correspond with any instrument.

O is a caster mounted in a cross-piece, O', of the machine, and O<sup>2</sup> is a threaded rod accessible from the interior and connecting with the caster. By turning the rod O<sup>2</sup> the machine may be raised or lowered, as required.

P is the crank by which the perforated paper is moved over the tracker. This stands in place of any device for moving the paper, the same being connected with the rollers Q Q in any suitable manner.

The machine may be inclosed, and any arrangement of shelves for music, &c., provided.

The improved device thus constructed and arranged is simple and effective in operation, and well calculated to answer the purposes or objects of the invention, as previously stated.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an instrument of the character herein set forth, the combination, with the pumps, of the foot-pedals hinged at their outer ends, made detachable from the pumps and arranged to slide within the casing, substantially as and for the purposes set forth.

2. In an instrument of the character herein set forth, the three reservoirs of graded capacity, the same being combined with the pumps and the pneumatics which operate the valves upon the reservoirs, substantially as shown and described.

3. In an instrument of the character herein set forth, the pumps, the reservoirs, pneumatics for operating the valves leading to the reservoirs, the pneumatic actions, the pneumatics connected with the key-hammers, the bellows serving to operate the pedal-strikers and the tubes leading to said bellows, and the traveling perforated paper, combined and arranged substantially as shown and described.

4. The combination of the pumps, the reservoirs, the pneumatics for operating the valves leading to the reservoirs, the pneumatic actions governed by the traveling perforated paper, the pneumatics connected with the hammers, and the hammers, all constructed and arranged for operation, substantially as shown and described.

5. The herein-described mechanical musical instrument, having the pumps, the sliding detachable foot-pedals for operating the same, the three reservoirs, the pneumatics for operating the valves upon the reservoirs, the pneumatic actions for operating the strikers, the traveling perforated paper governing the flow of air, and the key and pedal strikers, the said parts being combined and arranged within a casing mounted upon adjustable casters, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

CHARLES A. KUSTER.

Witnesses:

JOHN BUCKLER,  
WORTH OSGOOD.