

(No Model.)

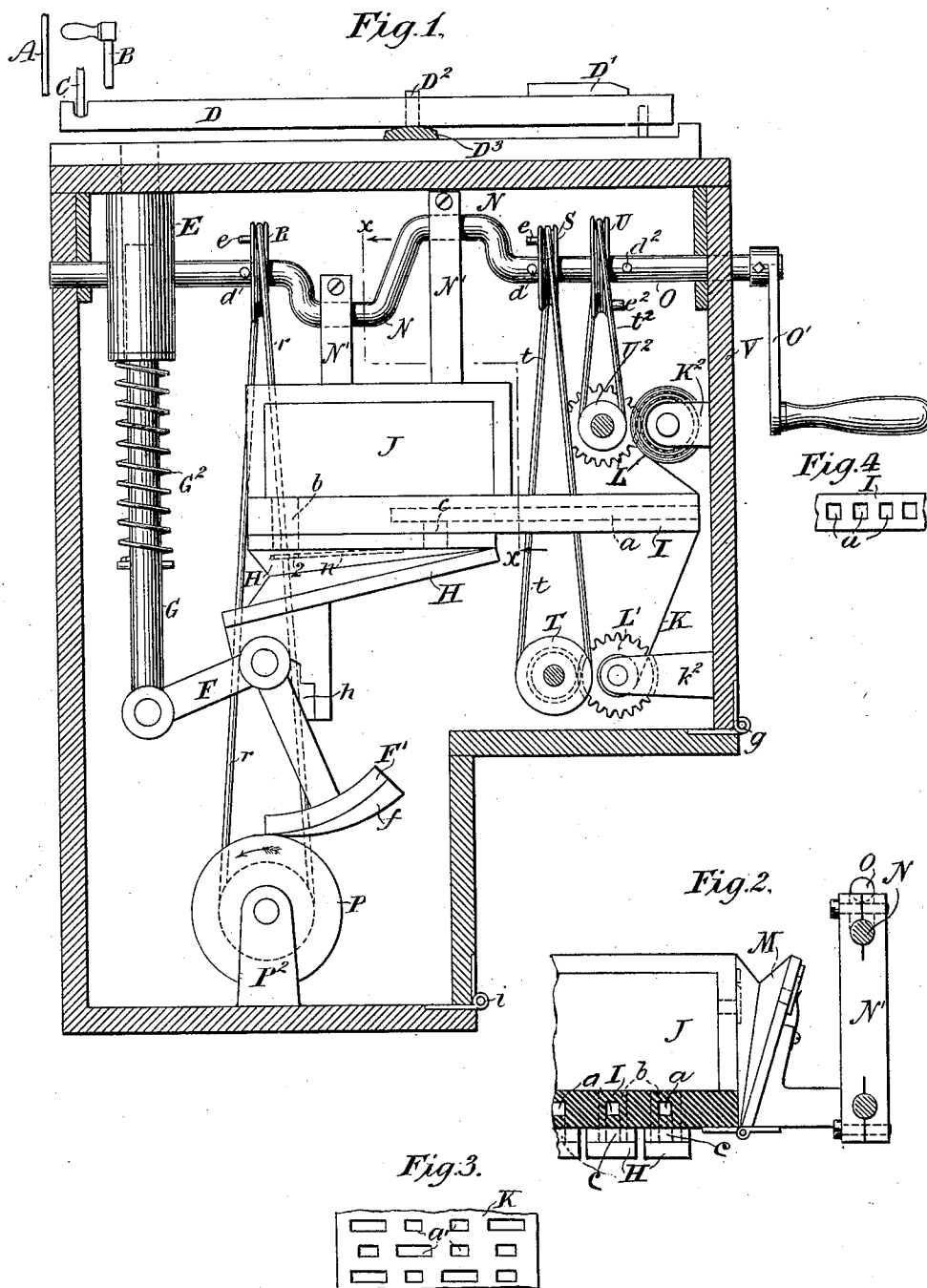
T. A. MACAULAY, Dec'd.

D. McCauley, Administrator.

AUTOMATIC MUSICAL INSTRUMENT.

No. 564,386.

Patented July 21, 1896.



Witnesses
Edward Thorpe.
Fred. G. Lasher

Inventor
Thos A. Macaulay

UNITED STATES PATENT OFFICE.

THOMAS A. MACAULAY, OF NEW YORK, N. Y.; DANIEL McCAULEY ADMINISTRATOR OF SAID THOMAS A. MACAULAY, DECEASED.

AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 564,386, dated July 21, 1896.

Application filed May 2, 1892. Renewed February 3, 1893. Serial No. 461,526. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. MACAULAY, of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Musical Instruments, of which the following, with the accompanying drawings, is a specification.

My invention relates to that class of musical instruments in which a sheet of perforated paper representing a musical composition controls the devices which operate the sounding devices; and it consists of the devices hereinafter described and claimed. It is especially adapted to pianos, but is also applicable to other instruments.

In the drawings, Figure 1 is a view showing the leading features of the invention. Fig. 2 is a view through X X of Fig. 1, showing the vacuum-chamber, the bellows, and operating devices. Fig. 3 shows the perforated music-sheet. Fig. 4 is a view of the air-duct bridge at the front end.

In the drawings, A represents a string of a pianoforte, B the hammer for operating the string, and C the rod which actuates the hammer. They are moved upward by the keys D, which are fulcrumed between their ends upon a rail D³ and held in position by pins D². The keys are operated by the push-rod G, which moves upward.

E is a guide for the push-rod.

F is a bell-crank lever, having the wedge-shaped piece *f*, and operatively connected to a pneumatic motor H.

G² is a spring on the push-rod G.

I is an air-duct bridge connected with the motor by ducts *c* and forming one side of the vacuum-chamber J.

J is a vacuum-chamber secured over the air-duct bridge I, and connected with the pneumatic motor by air-ducts *b*.

K is a perforated music-sheet wound on roller L. K² are brackets having bearings for rollers L L and fixed to the hinged door V.

M is an exhaust or vacuum bellows operated by cranks N on shaft O.

n is the usual vent-valve in the motor H.

P is a cylinder having rotary motion imparted by pulley R on shaft O through band *r*.

S is a pulley on shaft O, which operates the pulley T through band *t*.

U is a pulley on shaft O for operating the pulley U² through band *u*.

c is a duct in the pneumatic motor H, connecting the pneumatic motor with the bridge-duct *a*.

N N are the cranks on shaft O, operating the bellows through the pitmen N¹.

P is a cylinder suitably journaled in bearings in bracket P².

The operation is as follows: By turning the crank O' the shaft O is rotated, the cranks N N operate the exhaust-bellows M through the pitmen N¹, and the pulley R is turned, which rotates the cylinder P in the direction of the arrow. The pulley S rotates the pulley T through the band *t*. This pulley T is geared to the take-up roller L', which winds the music-sheet from the roller L over the duct-bridge I. As perforations *a'* in the music-sheet pass over the ducts *a* in the bridge, the vacuum which exists in the pneumatic motor by reason of its connection with the vacuum-chamber through the ducts *b* is broken and permits the shoe lever F' to fall on the cylinder P by force of gravity and the spring G². The cylinder will carry the shoe F' forward by frictional contact and cause the push-rod G to move upward and come in contact with the key D between its center of movement D² and the extreme end near the hammer-operating rod C, causing it to operate the hammer B and sound the string A, producing the requisite sound. When the perforations have passed over the ducts *a*, the unperforated portion acts as a valve over the duct *a*, when no more air can enter the duct, and the air in the pneumatic motor being exhausted into the chamber J, the motor collapses again and raises the lever F off the cylinder, when it returns to its position by force of the spring G², resting against the stop *h*, which is fixed to the motor H, ready again to be operated as before. The music-rollers are inserted in position by bringing the door V in a horizontal position and closing it again, as shown in the drawings, the music-sheet coming against the duct-bridge. After the piece of music is played, the sheet

is rewound back from roller L' to roller L by pushing the shaft O forward. This disengages the pulleys R and S from the pins e d and engages the pulley U with pins e^2 d^2 by turning the crank O' . The sheet is then rewound back again.

Having described my invention, I claim—

1. In an automatic musical instrument a perforated sheet, a pneumatic motor, a lever pivoted to said pneumatic motor, a rotary cylinder, and suitable devices for operating the sounding device substantially as specified.

2. In an automatic musical instrument, the combination of the hinged door V , having the roller-brackets K^2 K^3 and the music-rollers L L' with the operating-gears U and T substantially as specified.

3. In an automatic musical instrument, the combination with the hinged door V , having the roller-brackets K^2 K^3 and the rollers L L' , of the horizontal duct-bridge I substantially as set forth.

4. In an automatic musical instrument, in combination the perforated sheet, the duct-bridge, the vacuum-chamber, the pneumatic motor, the bell-crank lever pivoted to said pneumatic motor, the stop h , push-rod and spring substantially as described.

5. In an automatic musical instrument in combination, a perforated sheet and means to move it, a duct-bridge located horizontally, a vacuum-chamber above said duct-bridge, a pneumatic motor, located under said duct-bridge, air-ducts connecting said duct-bridge, vacuum-chamber and pneumatic motor, a rotary cylinder, a bell-crank lever, directly fulcrumed to said pneumatic motor and adapted to be operated by said cylinder, a push-rod operatively connected to said bell-crank, a key, a hammer, and a sounding device, substantially as set forth.

6. In an automatic musical instrument, the horizontal duct-bridge, the series of pneumatic key-motors arranged horizontally on one side of said duct-bridge and the vacuum-chamber arranged horizontally on the opposite side of said duct-bridge, the air-ducts in said duct-bridge communicating with said pneumatic motors, and the air-passages between said motors and said vacuum-chamber extending through said duct-bridge, substantially as set forth.

7. In an automatic musical instrument, in combination, an operating-shaft at one end of the piano beneath the keyboard, a vacuum-chamber extending from said shaft lengthwise of the piano and under the keyboard, a duct-bridge beneath said vacuum-chamber, a pneumatic motor under said duct-bridge, a lever directly fulcrumed to said pneumatic motor and depending therefrom, a rotary cylinder below said duct-bridge, said lever adapted to be operated by said cylinder; a push-rod connected to said lever a

guide as E , a key, a hammer, and a sounding device, substantially as set forth.

8. In an automatic musical instrument, a pneumatic key-motor controlled by a perforated sheet and a vacuum-chamber, a bell-crank lever carried by and pivoted to said motor, a sounding device and operating means therefor connected with one arm of said lever, and an independent actuating device arranged to positively actuate said lever to operate said sounding device when said lever is carried by movement of said motor into operative relation with said actuating device, substantially as set forth.

9. In an automatic musical instrument, the combination of the shaft O having a suitable bellows-operating device, the pulley R , the bellows M , the vacuum-chamber J , the duct-bridge I , the pneumatic motor H , the bell-crank lever F , the push-rod G , the key, the hammer and a sounding device, substantially as set forth.

10. In an automatic musical instrument in combination, the shaft O , having the pulley R ; the rotary cylinder P , the perforated sheet and means for moving it, the vacuum-chamber and the pneumatic-motor bellows for maintaining the vacuum in said chamber, a bell-crank lever directly fulcrumed to said bellows and adapted to be operated by said cylinder, a push-rod, operatively connected to said bell-crank lever, a key, a hammer and a sounding device, substantially as set forth.

11. In an automatic musical instrument in combination, a perforated sheet and means to move it, a duct-bridge located horizontally, a vacuum-chamber above said duct-bridge, a pneumatic motor located under said duct-bridge, air-ducts connecting said duct-bridge, vacuum-chamber and pneumatic motor, a rotary cylinder, a bell-crank lever, directly fulcrumed to said pneumatic motor and adapted to be operated by said cylinder, a push-rod operatively connected to said bell-crank, a key a hammer and a sounding device, substantially as set forth.

12. In an automatic musical instrument, in combination, a perforated sheet and means to move it, a duct-bridge located horizontally, a vacuum-chamber over said duct-bridge, a pneumatic motor located under said duct-bridge, a bell-crank lever directly fulcrumed with said pneumatic motor and moved thereby, bringing one end of said bell-crank lever into contact with an actuating device and a push-rod operated by said lever, and operating the key between its center of movement D^2 , and the end near the hammer-rod C , substantially as set forth.

THOS. A. MACAULAY.

Witnesses:

M. E. GORDINIER,
BERTHA FOX.