(No Model.)

R. T. SMITH.

KEY BOARD ATTACHMENT FOR MUSICAL INSTRUMENTS.

No. 346,237. Patented July 27, 1886.

Fig. 1.

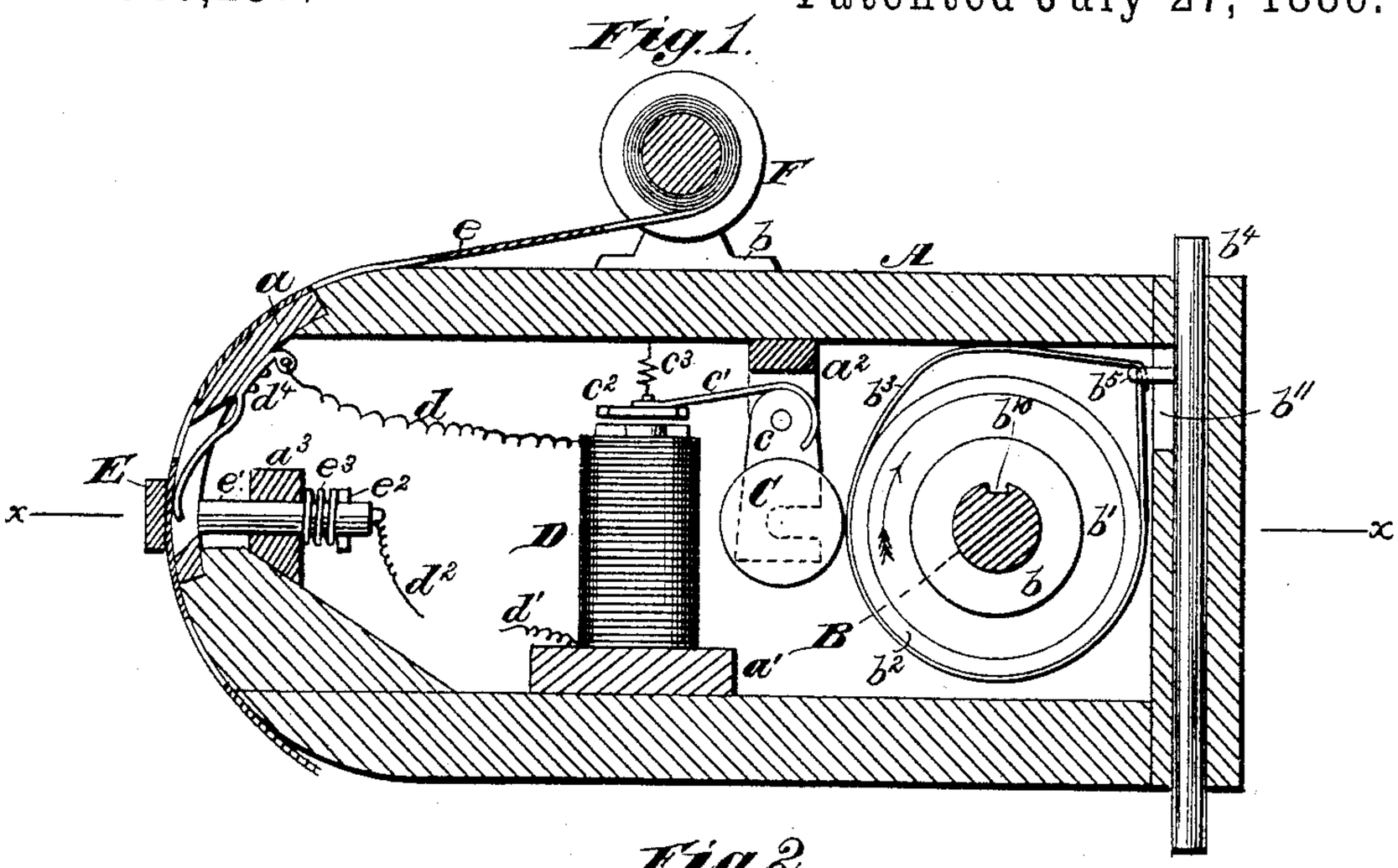

Fig. 2.

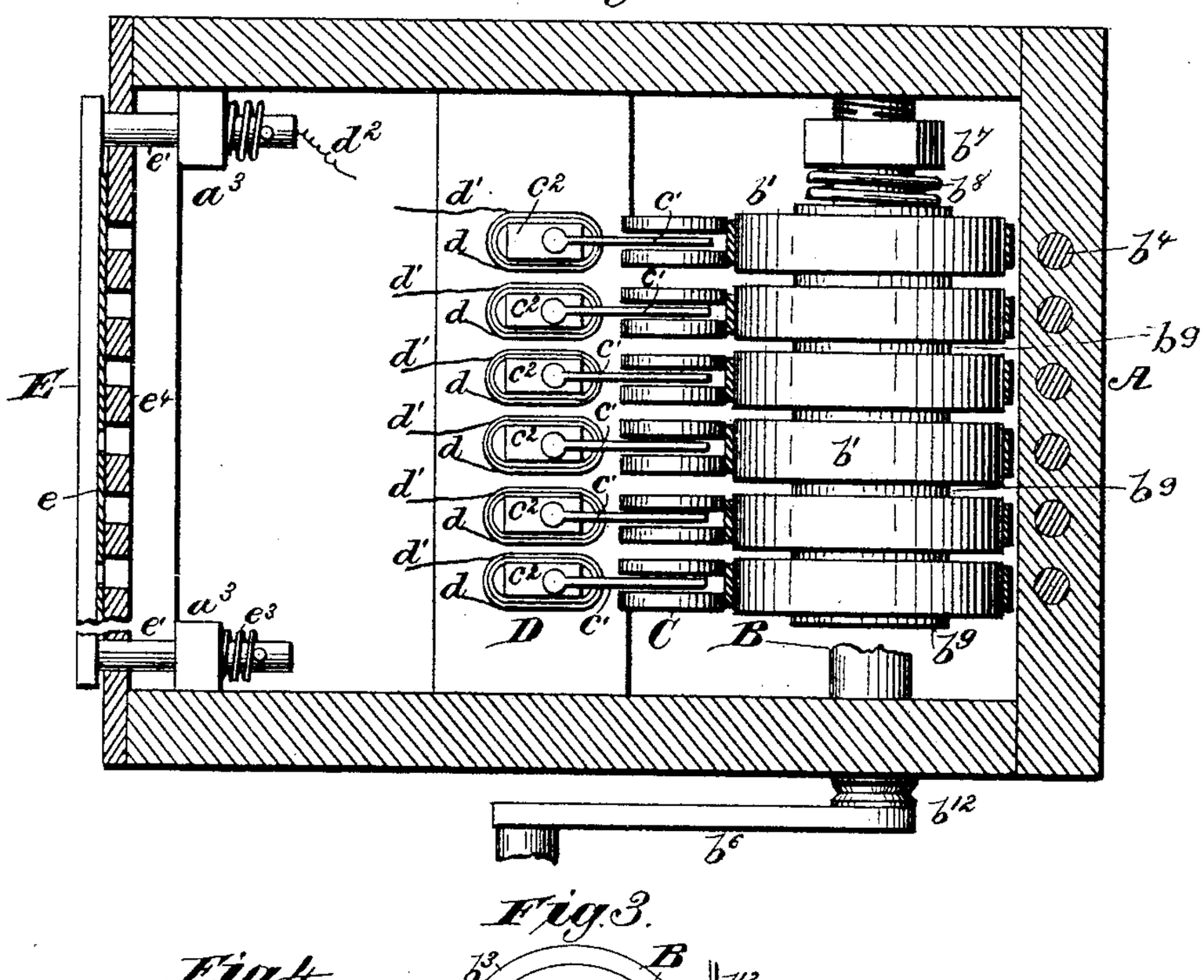

Fig. 3.

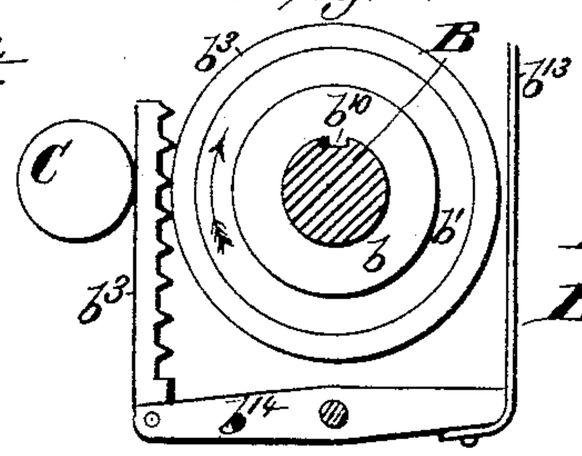

Fig. 4.

Witnesses.
Robert Gratt.
H. Clay Smith

Inventor.
Roswell T. Smith.
By Chas. B. Wilder
Atty.

UNITED STATES PATENT OFFICE.

ROSWELL T. SMITH, OF NASHUA, NEW HAMPSHIRE.

KEY-BOARD ATTACHMENT FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 346,237, dated July 27, 1886.

Application filed January 15, 1885. Serial No. 152,945. (No model.)

To all whom it may concern:

Be it known that I, ROSWELL T. SMITH, of Nashua, in the county of Hillsborough, State of New Hampshire, have invented a new and useful Improvement in Attachments for Playing Key-Board Musical Instruments, of which the following is a specification.

The invention relates to that class of automatic musical instruments called "key-board players."

Various devices for fingering the key-board of an organ or piano have been made, all of which are slower and less reliable in their action, and are not as sensitive and complete in their rendering the music on the music-sheet as my present invention.

The object of my invention is to furnish a device which will be more sensitive, perfect, and quicker in its communication from the music-sheet to the keys of the musical instrument.

My invention consists of a pulley or a series of pulleys mounted upon a revolving shaft, a series of straps to actuate a series of fingers, which strike the keys of the musical instrument, a series of idle-rollers which govern the action of the straps, a series of electro-magnets with their armatures governing the action of the idle-rollers, a series of selectors connected to one pole of a battery by conductors whose currents pass through the electro-magnets, an insulated bar connected by a conductor to the other pole of the battery, the insulated bar and the selectors being so placed that in their normal state they shall come in contact and form a continuous electric current, and a perforated music-sheet which by its imperforate parts shall break the current between the selectors and the bar, and which shall renew the connection and the current when it presents perforations.

In the drawings forming a part of this specification, Figure I is a vertical cross-section. Fig. II is a horizontal opening on the line x x, showing the working device, part in plan and part in section. Fig. III represents a substitute for the strap. Fig. IV is a plan of the idle-roll.

A represents the frame or box which incloses or supports the working parts, and is adapted to extend over that portion of the key-board of an organ or piano on which it may act.

B is a shaft subject to constant revolution by means of the crank b^6, when the instrument is in use. Upon the right-hand end of the shaft is placed the fixed collar b^9. To the left and next to this collar is the free pulley b', and next beyond this pulley is a washer, b, which so engages a groove, b^{10}, in shaft B as to prevent its revolving on the shaft, but so loose as to slide easily upon it. There are as many similar pulleys mounted upon the shaft as there are keys to be acted upon, and between the pulleys in the series are placed collars similar to b. Beyond the completed series of pulleys are placed collars like b^9, which press against the left-hand side of the outer pulley, and beyond this is a spring, b^8, which is brought to the desired tension upon the series of pulleys and washers by a screw and nut on the end of the shaft. This nut presses the series of alternate washers and pulleys against the collar b^9 with greater or less pressure at will, and each pulley is held between its two collars, and is compelled by friction to revolve with the shaft until sufficient resistance is applied to it to overcome the friction of the collars, when the pulleys remain still, while the collars continue to revolve. The pulleys may be covered with rubber, b^2, which gives a better hold for the strap or its substitute.

Placed in the rear portion of the frame A are the series of fingers b^4. These fingers, corresponding to the number of pulleys, are placed directly in line with them, and act directly upon the keys of the musical instrument.

Inserted in the fingers b^4 are the pins b^5. These pins project from the fingers through the slot b^{11} in the frame, and serve as a connection between the fingers b^4 and the strap b^3. This strap passes around the pulley b' so loosely as not to be acted upon by it.

In front of the series of pulleys is placed a bracket, a^2. Depending from this bracket and directly in front of each pulley in the series hangs the swinging bracket c. On the lower end of these swinging brackets and forming a part of them are mounted the idle rolls C.

Projecting forward from the tops of the swinging bracket c are the spring-arms c', and mounted upon these arms are the armatures c^2.

c^3 represents light springs, which lift the armature from the magnet when the current is broken and removes the swinging bracket from the strap.

In front of each pulley in the series of pulleys and swinging brackets, and beneath each armature in the series of armatures, is placed a series of electro-magnets intended to engage with the armatures. From the base of each of these electro-magnets proceeds a wire, d', connecting the electro-magnet with one pole of the battery, and from the top of each electro-magnet proceeds a wire, d, connecting it with its corresponding selector.

In front of and forming a part of the frame A is the part a. This is composed of vulcanite, rubber, or other non-conducting material, and has mounted upon its inner side a series of selectors, d^4, corresponding to the number of electro-magnets. These selectors project through openings d in the part a, so as to strike when in their normal position the bar E. The openings in the part a are at regular intervals, to correspond to the perforations in the music-sheet. The selectors are made of spring-steel, and will allow any thin substance—as a sheet of paper—to pass between them and the bar E. The bar E is supported by the rods e' e', and is, with its supporting-rods, insulated.

To one of the rods e' is secured a wire, d^2, which connects it with the unoccupied pole of the battery.

e represents an ordinary sheet of perforated music-paper, and is moved by a suitable connection with the revolving shaft B in any of the various and familiar ways common to automatic musical instruments, in which a music-sheet is used, one form of which would be to connect a pulley upon the take-up roll F of the music-sheet by a cord-belt, which shall pass around the pulley b^{12} on the driving-shaft B.

Fig. III represents an arrangement which may be used as a substitute for the strap and pulley. The toothed bar b^2, being forced against the rubber surface of the pulley by the idle-roll, will, through the balance-arm b^{14} and cord b^{15}, draw the fingers down in precisely the same way as the strap. The advantages which this instrument presents are a quicker and surer connection between the perforations in the music-sheet which represents the tune, and the fingers which strike the keys of the musical instrument.

Having shown the various parts of my invention, I will now describe its action. Place the music-sheet in position between the part a and the bar E. Seize the crank b^6 and revolve the shaft B. This will set in motion the music-sheet e, and when in its forward movement a perforation in the music-sheet presents itself before an opening in the part a. The selector which acts through this opening springs so as to strike the bar E, and thereby forms a circuit from one pole of the battery to the other through the electro-magnet, when the armature is drawn down by the magnet and the swinging bracket is forced against the strap, causing it to cling to the pulley and draw the corresponding finger down upon the key of the musical instrument until an amount of force is exerted sufficient to operate the key, after which the strap slips upon the pulley, or the pulley slips between its washers. The instant the music-sheet has passed beyond the length of the note-opening the circuit is broken by the intervention of the imperforate portion of the sheet between the selector and the bar E, the magnet releases its hold upon the armature, the swinging bracket is released from its contact with the strap, and the strap loses its grip upon the pulley and allows the fingers to be thrown up by the return of the key to its place.

As each key of the musical instrument has its corresponding finger, pulley, strap, swinging bracket, armature, and selector independent of all other sets in the series, it will be apparent that as the music in its progress presents the various note-openings required to express a given tune, this instrument will by its action produce the same upon the key-board of a musical instrument.

What I claim is—

1. In a key-board player, the combination of a vibrating selector having electric conductivity, an electro-magnet having one pole connected to said selector, a swinging bracket having an arm carrying the armature of said magnet, a roll journaled in the bracket, a conducting-bar electrically connected with the other pole of the magnet, a music-sheet having perforations and fed between the bar and the selectors, a battery in the same circuit with the magnet, and mechanism brought into action by the swinging bracket for operating the key-strikers, substantially as specified.

2. In a key-board player, a series of key-actuating devices consisting of a constantly-revolving shaft, a series of pulleys free to turn thereon, but held by friction to revolve therewith until a resistance is met sufficient to slip the pulley, a series of key-strikers directly acted upon by said pulleys, a series of vibrating brackets or supports, a series of devices intermediate between said brackets and pulleys, and also between the latter and the strikers, a series of electro-magnets connected with one pole of a battery, a series of armatures connected with the brackets and attracted by the magnets, a series of insulated selectors connected with one pole of said magnets, an insulated conducting-bar lying in the circuit, and a perforated music-sheet, whereby the contact normally existing between the selectors and the bar is made and broken, substantially as specified.

ROSWELL T. SMITH.

Witnesses:

L. B. FLAGG,

C. L. LOVELAND.