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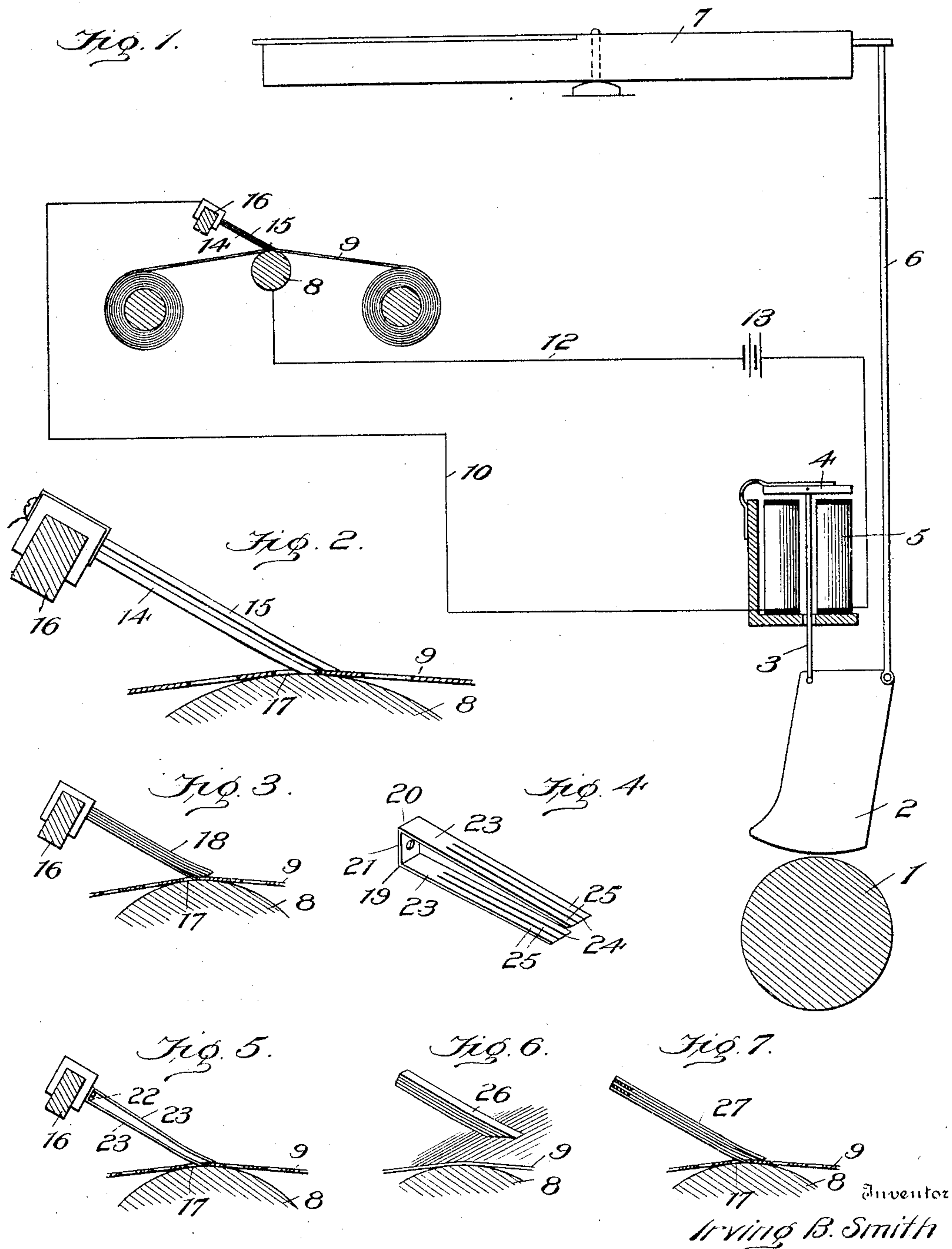
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CONTACT DEVICE FOR ELECTRIC SELF PLAYING MUSICAL INSTRUMENTS.

APPLICATION FILED JULY 14, 1904.

NO MODEL.



Witnesses

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CONTACT DEVICE FOR ELECTRIC SELF-PLAYING MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 777,153, dated December 13, 1904.

Application filed July 14, 1904. Serial No. 216,456. (No model.)

To all whom it may concern:

Be it known that I, IRVING B. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Contact Devices for Electric Self-Playing Musical Instruments, of which the following is a specification.

My present invention relates to electrically-operated musical instruments, and more particularly to an improved electric contact device or note-selecting finger that coöperates with the perforated music-sheet to control the circuits leading to the electrically-operated action.

In connection with that type of electrically-operated musical instruments embodying a rotary drum, a series of friction-shoes, striker-rods operated by the shoes, and electromagnets for throwing the shoes into contact with the drum is usually employed a contact device comprising a metallic roll or bar upon which bears a plurality of selector-fingers, one finger leading to each shoe-magnet. A perforated music-sheet is caused to travel between the metallic roll or bar and the selector-fingers and serves to normally hold these elements separated, so that all the circuits are broken. When, however, a perforation in the music-sheet appears under a selector-finger, its coöperating magnet is energized, which acts to throw its shoe into contact with the drum, and the striker-rod attached thereto is then moved upward to actuate the piano-key. As at present constructed, the contact-fingers each consist of one or more phosphor-bronze wires that are mounted on a suitable support and project at an angle of about thirty degrees toward the contact-roll, the free end of each finger being arranged to bear upon said roll or upon the music-sheet traveling over the same. Where more than one finger is used for each circuit, these have, so far as I am aware, always been arranged in the same horizontal plane, so as to make simultaneous contact with the contact-roll. Now it often occurs that the piece of music being played

contains a very short perforation or a group of such perforations, each representing a short note—say a thirty-second or a sixty-fourth note—said group of perforations being arranged very close together, so as to be played successively, and sometimes the musical score indicates that these notes are to be played in presto time. In prior constructions where a single selector-finger is employed for each magnet it has been found when a very short perforation appears in the music-sheet or a group of such perforations appear and the sheet is being moved at a fair rate of speed that the contact-finger is brought into engagement with the contact-roll for such an infinitesimally short space of time as to barely energize its magnet, the amount of such energization being only sufficient to cause the shoe to move downward into contact with the drum; but before the latter is able to accomplish its work—namely, actuate the piano-key through the movement of the striker-rod—the circuit is broken by the interposition of an imperforate part of the music-sheet between the finger and the contact-roll, the result being that the sound-actuating device (the hammer) simply trembles without striking the string and without giving off any sound whatever. Thus it will be seen that in many cases some of the notes of the composition are entirely lost, and this often destroys the musical theme.

It is therefore the purpose of the present invention to overcome the above-noted objections, which occur at the present time in electrical self-playing musical instruments, and I accomplish the end in view by employing a second set or bank of contact-fingers, which are disposed slightly in advance of the fingers ordinarily used, the arrangement of the fingers being such that before the first finger or set of fingers breaks contact with the contact-roller the second finger or set of fingers come into play and continue the electrical connection with the magnet or magnets for a sufficiently long period of time to enable the shoes and striker-rods to attain their full stroke, or,

in other words, to compel the hammers to strike the strings every time a short perforation or group of such perforations appear.

It is a well-known fact that pneumatically-operated musical instruments wherein power-pneumatics are employed to actuate the piano keys or hammers operate somewhat more rapidly than electrically-actuated devices, owing to the fact that the tracker-ducts are sufficiently long to enable a full supply of air to enter or escape from the power-pneumatics, and for this reason in cutting the perforated music-sheets for pneumatic instruments the perforations have generally been cut comparatively short. This is especially true with respect to perforations representing very short notes—say thirty-second and sixty-fourth notes—and it has been found, therefore, that music-sheets cut in this manner for pneumatic instruments are not well adapted for electrically-operated instruments as now constructed.

It is one of the prime objects, then, of this invention to provide a novel form of contact device for electrically-operated musical instruments that will accommodate perforated music-sheets that have been especially cut for other forms of automatic musical instruments.

A further object of the invention is to provide a novel form of flexible contact finger or brush possessing the necessary characteristics for use in connection with electrical self-playing musical instruments.

In order to enable others to understand, make, and use my said invention, I will now proceed to describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a part of one type of electrically-operated musical instrument, showing my invention applied thereto. Fig. 2 is an enlarged detail sectional view of my improved contact device, the same being shown in connection with a perforated music-sheet. Fig. 3 is a perspective view of a slightly-modified form of contact finger or brush, and Figs. 4, 5, 6, and 7 are similar views of other modified forms of contact-fingers.

I have shown my present invention as applied to a well-known type of electrically-operated self-playing musical instrument; but it will be obvious that the same may be applied to other forms of electrically-controlled musical instruments without departing from the spirit of the invention, the present showing being made only by way of example.

In the accompanying drawings the reference-numeral 1 designates a rotary drum, above which are suspended a plurality of friction-shoes 2, one for each piano-key, said shoes being hung or pivoted to rods 3, depending from armatures 4 of electromagnets 5. Extending upward from each shoe 2 is a striker-rod 6, the upper end of which is adapt-

ed to impinge the rear end of a piano-key 7, the arrangement and operation of the mechanism just described being such that whenever a magnet 5 is energized its shoe 2 will be thrown into frictional contact with the rapidly-revolving drum 1, resulting in thrusting the striker-rod 6 upward and operating the piano-key 7 to actuate the sounding devices or hammers. (Not shown.)

The magnets 5 are energized through the medium of selector-fingers cooperating with a contact roll or bar 8, and a perforated music-sheet 9 is caused to travel between the said selector-fingers and roll or bar 8. There is a separate circuit-wire 10 leading from each finger to its magnet 5, and from the magnets lead return-wires 12 to the contact bar or roll 8, a suitable source of energy, such as a battery 13, being located in the circuit.

As the present invention relates more particularly to the construction and arrangement of the contact-fingers, I will now proceed to describe this part of the device.

As before stated, each contact-finger, as heretofore constructed, consists of a single wire, as 14, or three of such wires arranged in horizontal alinement, so that all will simultaneously enter a perforation in the music-sheet when such perforation was encountered during the travel of the sheet; but as before explained such an arrangement proved to be fatally defective when very short perforations in the music were encountered. In order to overcome this serious defect, I arrange a second finger, as 15, in advance or in rear of each of the fingers 14, both said fingers being included in circuit with each electromagnet 5. The two wires 14 and 15 constituting each selector-finger are located in close proximity to each other, the distance between the two being slightly less than the length of the shortest perforation in a music-sheet—say a perforation representing a sixty-fourth note. All the selector-fingers are mounted on a bar or rail 16 and project at an angle of about thirty degrees toward the contact-roll 8, the ends of the fingers bearing upon the periphery of the roll or upon the note-sheet 9. By this arrangement it will be seen that during the forward travel of the music-sheet whenever a short perforation, such as 17, appears under the selector-fingers the finger 14 will be the first to enter said perforation and make contact with the contact-roll 8, (see Fig. 2,) thus energizing the magnet 5 to cause the shoe to bear upon the drum 1; but before this finger 14 is lifted out of contact with the roll 8 (which is caused by the continued travel of the sheet) the finger 15 will enter the perforation and continue the electrical connection with the magnet 5, thus enabling the shoe 2 and striker-rod 6 to do their full work—namely, impinge the rear end of the key 7 and cause the piano-hammer to strike its strings.

In Figs. 1 and 2 I have shown each finger

as consisting of two wires 14 and 15; but it will be obvious that I may employ more than two wires, and in practice I actually do prefer to use a group of four or more wires, two or more of which will correspond to the wires 14 and two or more corresponding to the wires 15, or I may bunch a lot of wires so that some will lead others, as seen at 18, Fig. 3. This latter arrangement insures a perfect contact at all times and is of advantage in cases where some of the wires become bent, which sometimes occurs, for it will be understood that the fingers are ordinarily made of very fine resilient wire in order that they will be quick in action and so that they will not tear the thin paper of which the music-sheet is composed.

Instead of constructing the fingers of wire, as above described, I may make each finger from a thin piece of sheet metal, as shown in Figs. 4 and 5, and in this case a thin strip of spring metal is bent along the lines 19 20 to provide a relatively broad base portion 21, through which an attaching-screw 22 may be passed, the two forwardly-projecting leaves 23 being provided with longitudinal slits 24, whereby independent fingers 25 are formed, the fingers on the upper leaf leading those of the lower leaf, or instead of constructing the fingers in this manner I may form them from several laminations of thin spring metal, as shown at 26, Fig. 6. In this case the spring of the laminations will permit the fingers to separate slightly at the point where they rest on the music-sheet in order to assist their independent action. If desired, the laminations may be slightly separated to give them a wider range of independent movement, as shown at 27, Fig. 7.

In each case described it will be seen that the leading feature of the invention resides in providing a contact-finger for electrical self-playing instruments comprising a plurality of closely-arranged selectors, in which one is located in advance of the other, so that they will make contact successively with a contact roll or bar during the passage of a music-sheet; but before one is lifted from the said roll or bar the other will be brought into engagement therewith, whereby to furnish a

continuous supply of electrical energy to the electric action for operating the sound-producing devices.

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

1. An electrically-operated musical instrument, having electrical means for controlling the operation of the sound-producing devices, and a contact device comprising in part a series of sets of selectors in circuit with the said electrical means, each set of selectors consisting of at least two fingers, one of which is located adjacent to and slightly in advance of the other.

2. An electrically-operated musical instrument, having electromagnets for controlling the operation of the sound-producing devices, and a contact device comprising in part a plurality of sets of selectors, each set of selectors consisting of at least two fingers, one of which is located adjacent to and slightly in advance of the others, and each set of selectors being included in a separate magnet-circuit.

3. An electrically-operated musical instrument controlled by a perforated music-sheet, having electrical means for controlling the sound-producing devices, and a contact device comprising a contact bar or roll and a series of sets of selectors in circuit with said electrical means, each set of selectors consisting of at least two fingers, one of which is located adjacent to and in advance of the other, the space separating the fingers of each set being less than the length of the shortest perforation in the music-sheet.

4. An electrically-operated playing device for musical instruments, having note-selecting means, comprising a contact bar or roll and a series of sets of selectors adapted to bear upon said bar or roll, each set of selectors consisting of at least two fingers, one of which is located adjacent to and slightly in advance of the other.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

IRVING B. SMITH.

Witnesses:

J. STODDELL STOKES,
GEO. Z. SUTTON.