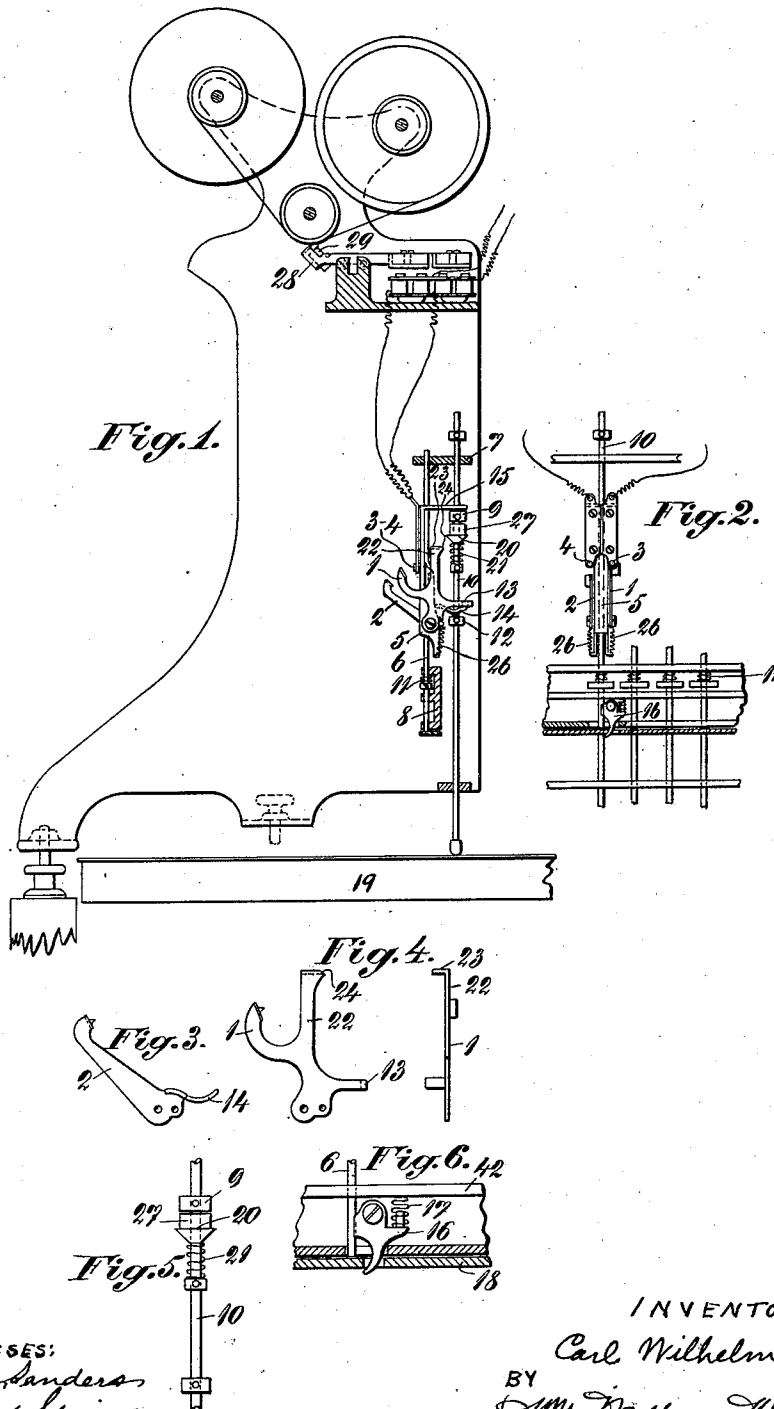


C. W. NYSTRÖM.
 APPARATUS FOR AUTOMATICALLY RECORDING MUSIC.
 APPLICATION FILED OCT. 2, 1911.

1,018,982.

Patented Feb. 27, 1912.

2 SHEETS—SHEET 1.



WITNESSES:
John Sanders
Leon Spring

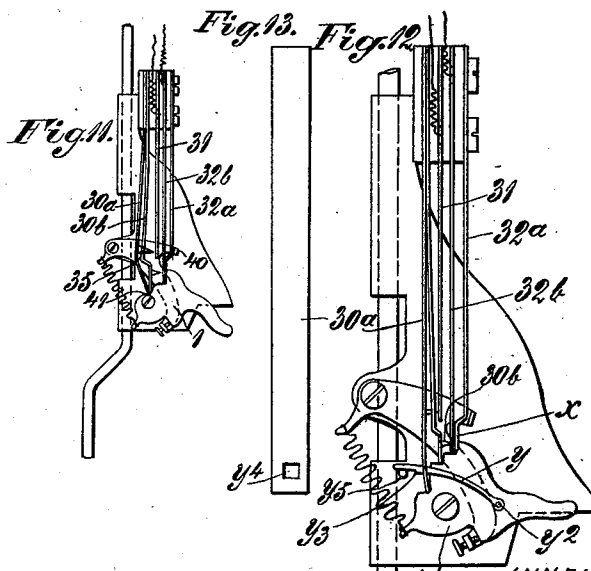
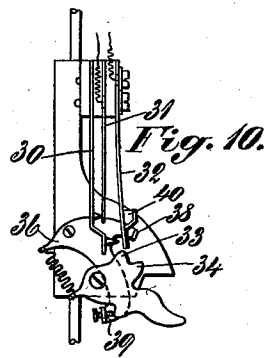
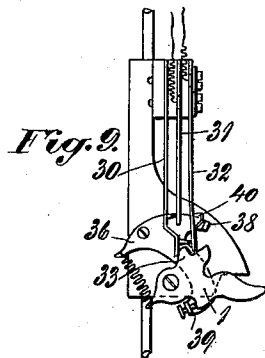
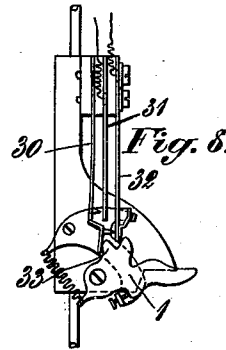
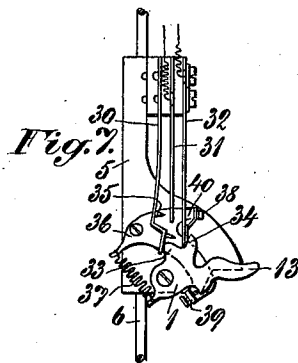
INVENTOR:
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 BY *Wm. M. Hall*
 ATT'Y.

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 Leon Spring

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UNITED STATES PATENT OFFICE.

CARL WILHELM NYSTRÖM, OF KARLSTAD, SWEDEN.

APPARATUS FOR AUTOMATICALLY RECORDING MUSIC.

1,018,982.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed October 2, 1911. Serial No. 652,279.

To all whom it may concern:

Be it known that I, CARL WILHELM NYSTRÖM, engineer, subject of Sweden, residing at Karlstad, Sweden, have invented new and useful Improvements in Apparatus for Automatically Recording Music, of which the following is a specification.

The present invention refers to certain improvements in apparatus for automatically recording music, said apparatus being of the previously known kind, in which two or more cutting tools, working against a continuously moving note strip or against a rotating note disk successively are put into action during the downward movement of a key by means of electromagnets. Experiments made by the inventor have proved, that in order to obtain an exact recording of the movement of the key, the pair of electric contacts, which first enters into action when depressing a key, should break when the second pair of contacts has closed its circuit. The invention refers to devices for said purpose.

In the accompanying drawings a constructional form of the invention is illustrated in Figures 1-6. Fig. 1 is an elevation partly in section and Fig. 2 a front view of the apparatus. Figs. 3-6 are details which will be referred to below. Figs. 7-13 illustrate modified constructional forms.

The pairs of recording contacts shown in Figs. 1 to 6 inclusive consist of angular pieces 1 and 2 coöperatively associated with the contact plates 3 and 4 respectively. All contacts are mounted upon a frame 5, which is fixed to a spindle 6. The spindle 6, which is actuated by the spring 11 and is adjustable in a vertical direction, is guided by lists 7 and 8 and for the purpose of establishing a constant distance between the contacts, even if the keys are not situated in one common plan, the angular plate 15 is provided on the frame 5, resting on a boss 9 on the spindle 6 by this construction is caused to follow the vertical movements of the spindle 10, and owing to the arrangement of the boss 12 on the spindle 10, toward which the angular pieces 1 and 2 are resting with their arms 13 and 14, the distance between the contacts is automatically made constant. When a piece of music is to be recorded the spindle 6 is fixed

in position which is performed by means of the angular arm 16, pivoted on the list 42, and the spring 17, pressing the angular arm 16 toward the spindle 6. The spindle 6 is released from the angular arm 16 by means of the list 18, movable in a longitudinal direction.

As already described the angular pieces 1 and 2 rest with their arms 13 and 14 on the boss 12 on the spindle 10. Said spindle 10 rests with its lower end on the key 19. On the spindle is loosely mounted a boss 20, the one end of which is conical. Said boss 20 is pressed by a spring 21 toward the boss 9, whereby the pressure of the spring 21 is not essentially greater, than to keep the boss 20 lifted. On the angular piece 1 is provided another arm 22, the end 23 of which is bent at an angle and is provided with an inclined surface 24.

When now a piece of music is to be recorded, and the keys are depressed, the spindles 10 follow said movements of the keys in a known manner. The angular pieces 1 and 2 follow the downward movement of said spindles 10 owing to the boss 12 and the springs 26, which tend to carry the contacts together. From the drawing it will be obvious, that the angular piece 1 first closes contact with the plate 3, and this occurs when the key 19 is depressed about 1 millimeter. Said contact is still closed, until the angular piece 2 has entered into contact with the plate 4 and when this occurs the conical end of the boss 20, which has followed the downward motion of the spindle, has reached the arm 22 of the angular piece 1 at 24, whereby the contact between the angular piece 1 and the plate 3 is interrupted. This happens when the key has made about $\frac{3}{4}$ of its downward movement. In order to avoid that the angular piece 1 during the upward motion of the spindle 10 makes contact once more, the boss 20 is provided with a groove 27, into which the arm 22 falls, and said groove is arranged in such a manner, that another contact can not be performed during one and the same period. The boss 20 is of course hooked by the part 24, but said fact does not prevent the upward motion of the spindle 10, as the spring 21 is very feeble, as above mentioned, and only when the key is approaching its position of rest, the

spring is strained so much that it can move the arm 22, whereby the boss 20 takes the position shown on the drawing.

As the contacts are not closed during the whole downward motion of the key, the difference of time between the closing moments of the first and the second pair of contacts will be very small, and consequently the proportion between the first and the second impression on the note strip, will be very dissatisfying, even in case of a feeble touch. Said inconvenience however is obviated by placing the cutting tools 28, actuated by the circuit of the pair of contacts 1 and 3, 1 or 2 millimeters in front of the cutting tools 29, actuated by the circuit of the pair of contacts 2 and 4.

Figs. 7-10 show another constructional form, whereby the above mentioned purpose is gained, viz. that the pair of electric contacts, which first enters into action, is opened, when the second pair of contacts has closed its circuit. 6 indicates the spindle, carrying the frame 5, on which the contacts are mounted. 1 indicates the angular piece, resting with the arm 13 on the boss on the key spindle, shown in Figs. 1-6. 30, 31, 32 indicate three contact springs, fixed by their upper ends at the frame 5, and insulated from one another. The pair of contacts, which first closes its circuit, is constituted by the outer springs 30 and 32, of which the spring 30 is electrically connected with the frame 5, which in turn is electrically connected with one end of the corresponding electromagnet. The second pair of contacts is constituted by the springs 30 and 31, for which purpose the second electromagnet is electrically connected with the frame 5. The angular piece 1 is provided with two projections 33, 34, arranged in such a manner as to press against each of the springs 30 and 32, when the piece 1 occupies its upper position, whereby the lower ends of the contact springs 30 and 32 are separated from one another, and a contact 35 on the spring 30 is at the same time held out of engagement with the middle contact spring 31, which, as shown on the drawing, is shorter than the outer springs 30 and 32. An angular piece 36, connected by a spring 37 with the angular piece 1, is pivoted on the frame 5, and is provided with a projection 38, abutting against a projection 40 on the spring 32. A second projection 39 adjustably carried by the angular piece 36 abuts against a projection on the angular piece 1.

When the angular piece 1 is in its upper position the springs 30, 31, 32 and the pieces 1 and 36 occupy the positions shown in Fig. 7, in which all the contacts are interrupted. When now depressing the key, the arm 13 of the angular piece 1 follows the movement downward, whereby the angular piece

1 is moved to the position, shown in Fig. 8, in which the spring 30, owing to the movement of the projection 33, has closed contact with the spring 32. The second pair of contacts 30, 31 is still open. During the further movement downward of the angular piece 1, the projection 33 is moving more away from the spring 30, so that said spring 30 can close contact with the spring 31, as shown in Fig. 9. The springs 30 and 32 are still in contact with one another. When the key is still more depressed the angular piece 1 has moved the angular piece 36 by means of the cooperation with the projection 39, so that the projection 38 has moved down the projection 40 of the spring 32, whereby said spring by its elasticity is moved away from the spring 30, breaking the contact between said springs, as shown in Fig. 10. Only the pair of contacts 30, 31 is now closed. When the key and the angular piece 1 is moving upward, the projections 33, 34 will move the springs 30, 31 to the left, so that the parts assume the positions shown in Fig. 7.

Fig. 11 shows another constructional form, departing from the construction described with reference to Figs. 7-10 essentially only thereby, that two springs substitute the spring 32, the outer of which 32^a being provided with the projection 40 whereas the inner spring 32^b is provided with a contact. In a similar way two springs substitute the spring 30, of which the outer spring 30^a is prolonged downward, entering a hook 41 in the angular piece 1, and tending to press said piece against the boss of the spindle. The inner spring 30^b is provided with a contact cooperating with the contact of the spring 32^b. The outer spring 30^a is provided with a contact pin 35, penetrating a hole in the spring 30^b for cooperating with the spring 31.

Figs. 12 and 13 illustrate an arrangement for securing the interruption of the pair of contacts 30^a, 31 in the moment when the key begins to move upward and the angular piece 1 begins to return to its original position. On the angular piece 1 a yielding arm y is fixed at y^2 . The free end of said arm penetrates a hole y^4 in the spring 30^a, and is provided with a hook y^3 . The arm y tends to abut against the lower edge of the hole y^4 . When the angular piece 1 moves downward said arm y rests on said lower edge of the hole y^4 , and in the lowest position of the piece 1 the hook y^3 is below the lower edge of the hole y^4 , so that the arm y moves the spring 30^a in a sidewise direction, when the angular piece 1 begins to move upward, separating the contact pin 35 from the spring 31 and breaking the contact between the springs 30^a and 31. When the arm 1 has moved sufficiently upward the end of the yielding arm y engages the pin y^5 , whereby

the arm will be raised to move the hook y^3 out of engagement with the spring 30^a , whereby it will pass through the hole y^4 , allowing the spring 30^a to assume its normal position.

What I claim is:

1. In an apparatus for automatically recording music a multitude of cutting tools for each key, actuated by electromagnets, pairs of electric contacts, successively entering into action during the downward motion of the key, and means for breaking the contacts of a preceding pair of contacts, when a subsequent pair of contacts is closed.

2. In an apparatus for automatically recording music a spindle, resting on the key, a frame, carrying pairs of electric contacts, an arm, pivoted on said frame and actuated by the spindle, and means for breaking the contacts of a preceding pair of contacts, when a subsequent pair of contacts is closed.

3. In an apparatus for automatically recording music, a spindle, resting on the key, a frame carrying pairs of electric contacts means for automatically adjusting the frame in a vertical direction according to the posi-

tion of the spindle, and means for securing the frame in said adjusted position.

4. In an apparatus for automatically recording music a spindle, resting on the key, a frame carrying insulated contact springs, an arm, pivoted on said frame and actuated by the spindle, means on said arm for closing said contact springs two and two in succession.

5. In an apparatus for automatically recording music a spindle, resting on the key, a frame, carrying insulated contact springs, an arm, pivoted on said frame and actuated by the spindle, means on said arm for closing contact between the springs two and two and for breaking a preceding pair of contacts when a subsequent pair of contacts is closed.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL WILHELM NYSTRÖM.

Witnesses:

WALDEMAR BOMAN,
THORVALD NYSTRÖM.