No. 747,358. PATENTED DEC. 22, 1903.

H. P. BALL.

PERFORATING DEVICE FOR MUSIC ROLLS.

APPLICATION FILED APR. 18, 1902.

NO MODEL.

FIG. 6.



FIG. 1.

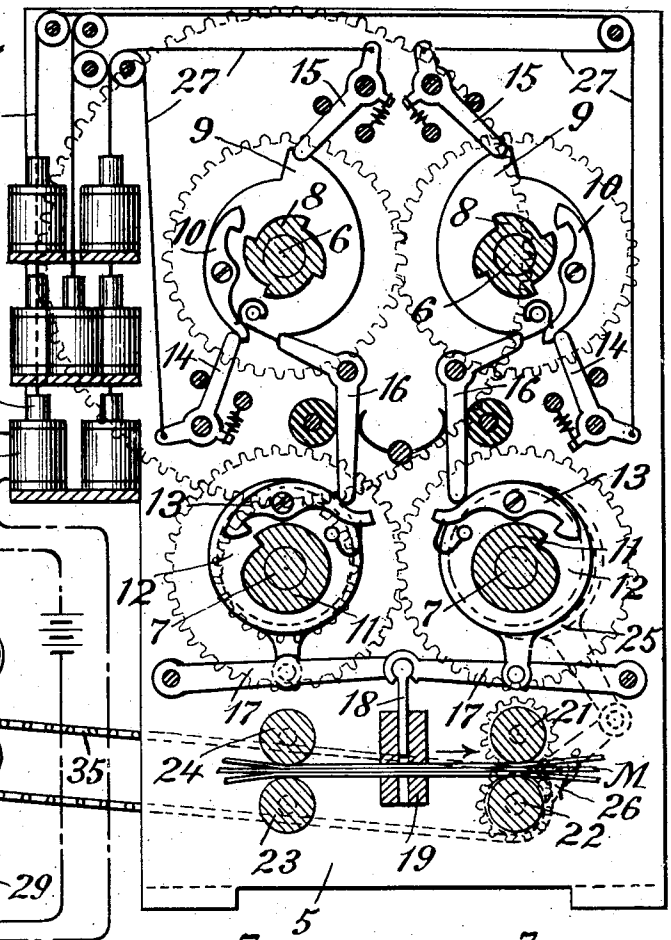


FIG. 5.

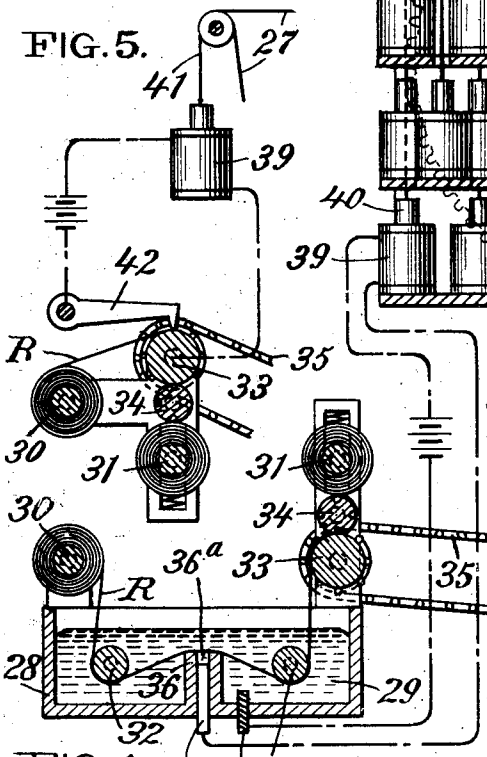


FIG. 4.

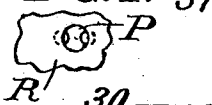
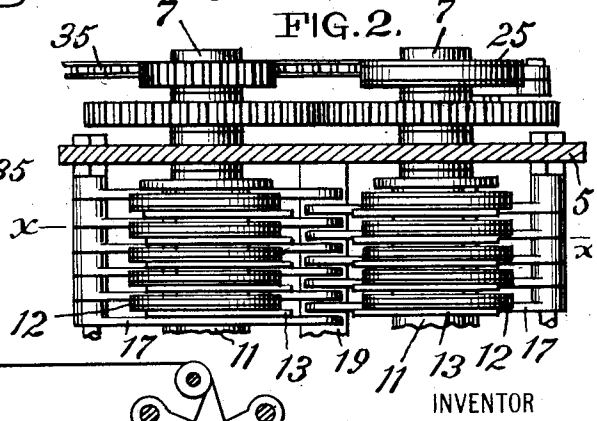
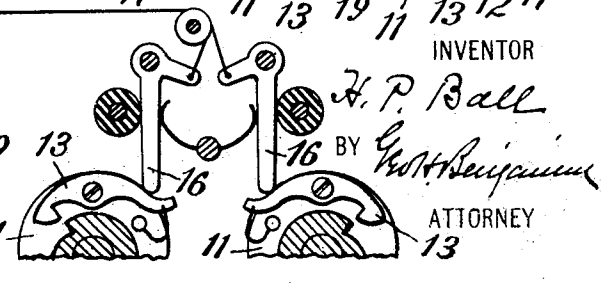


FIG. 3.

FIG. 2.





WITNESSES:

J. E. Pearson

Wm. H. Buckman

INVENTOR

H. P. Ball

BY Frost & Benjamin

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 747,358. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO SAMUEL INSULL, OF CHICAGO, ILLINOIS.

PERFORATING DEVICE FOR MUSIC-ROLLS.

SPECIFICATION forming part of Letters Patent No. 747,358, dated December 22, 1903.

Application filed April 18, 1902. Serial No. 103,481. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented a Perforating Device for Music-Rolls, of which the following is a specification.

My invention relates to a device adapted to reproduce upon a moving strip or number of moving strips of paper or other suitable material the perforations of a master music-roll.

In my previous application, Serial No. 102,226, filed April 10, 1902, I have described a machine for mechanically actuating the perforating device and accomplishing the above-stated result.

My present invention consists in means for electrically actuating the perforating device and accomplishing the desired result.

In my prior application, Serial No. 102,227, filed April 10, 1902, I have described the mechanism of the perforating device which is shown in my present application. I shall therefore describe the perforating mechanism in but general terms, referring to such prior applications for a full detailed description. I wish it understood, however, that I do not limit myself in any wise to the mechanism shown and described, as other mechanism may be employed.

The general object of my invention is to simplify and facilitate the production of music-rolls, thereby decreasing their cost and at the same time improve their accuracy.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a vertical section through the perforating device, taken on the line X X of Fig. 2. This view also shows in section a portion of the electrical device through which the master-roll passes and by reason of which the perforating device is actuated. Fig. 2 is a partial plan view of the perforating device shown in Fig. 1. Fig. 3 is a view corresponding to Fig. 1 and shows a modification of the perforating device, as well as the electrical portion of the device. Fig. 4 is a plan view illustrating a portion of a master music-roll passing over the contact-openings of Fig. 3. Fig. 5 is a vertical section and elevation showing a modified form of electrical device for actuating the perforating device. Fig. 6 is an enlarged section of the end of the contact lever and drum of Fig. 5.

The perforating device, described generally, consists of a frame 5, in which is mounted the pairs of shafts 6 7. On the shafts 6 are mounted the toothed wheels 8 and cams 9, which carry the latches 10. Mounted upon the shafts 7 are the toothed wheels 11 and the eccentrics 12, which carry the latches 13.

14 15 indicate bell-cranks in the path of movement of the latches 10 on the shafts 6, and 16 bell-cranks in the path of movement of the cams 9 on shaft 6 and latches 13 on eccentrics 12. Connected to the eccentrics 12 are the levers 17, which carry the punches 18, which punches reciprocate through the die-seat 19.

M indicates the music-roll to be perforated. This music-roll passes between the rollers 21 22 23 24. Motion is communicated to the music-roll forward in the direction of the arrow by means of an eccentric 25, which operates a pawl 26, which takes in a rack on wheel 22.

27 represents cords by means of which the levers 14 15 are actuated.

The description so far as given relates only to the perforating device and is a general description of the perforating device shown in my former applications, to which I have referred. I will now describe the mechanism for operating the perforating device.

28 indicates a tank preferably containing mercury 29. Mounted over the tank at the left is a roller 30, upon which the music-roll R to be copied is wound.

31 indicates a roller upon which the roller R is to be wound; 32, directing-rollers situated below the mercury in the tank; 33, sprocket-roller; 34, friction-roller, by means of which motion is given to the music-roll R. Motion is communicated to the sprocket-roller 33 through the chain 35, which passes over the sprocket-roller 22 of the perforating-machine, which latter roller receives its motion from the source of energy which drives the shafts 6 7, generally an electromotor, which may be arranged to be operated at any required speed, as has been explained in my previous applications. Projecting upward from the

bottom of the tank 28 is a bar 36, having recesses 36ª along its top, preferably made of the same material as the tank 28, and located at equidistances in such bar are a series of conducting-pins 37. The tops of these pins are situated below the top of the bar 36, and their lower ends may project below the bottom of the tank 28.

38 indicates a bar or plate of conducting material, which extends through the bottom of the case and is in contact with the material within the case. The pins 37 and plate 38 are in circuit with a source of electrical energy.

I do not limit myself to the construction of the tank and the electrodes as described, as very many modifications may be made therein.

39 indicates a series of electromagnets, one magnet for each note to be recorded. Each magnet is provided with an armature 40, and connected to this armature is a cord 41, connected to the two bell-cranks 14 15. The two bell-cranks shown as connected in the drawings are those to the right of the figure.

In Fig. 3 the construction of the tank is slightly different. Instead of having one row of pins there are two rows, arranged parallel. In this figure also the perforating device is different from that shown in Fig. 1 in that the shafts 6, toothed wheels 8, cams 9, and latches 10 are done away with and only the eccentrics 11 be employed, the construction being that shown in my prior application, Serial No. 102,227.

In Fig. 5 a further modification is shown. In this device instead of making use of a mercury-bath I make the roll 33 of conducting material and employ a pivoted conducting-hook 42. The roll 33 and hook 42 are in circuit with the magnet 39, which is connected to the cords 41.

The operation of my device will be readily understood. Referring first to Figs. 1 and 3, the music-roll as it is moved across the tank 28 and through the mercury 29 has the perforations in its surface brought over the pins 37 or 37 38ª, Fig. 3, with the result that the mercury 29 flows through the perforations in the music-roll and is brought in contact with certain of the pins under the music-roll, thereby closing a circuit or circuits through the magnets 39, which make traction through the cords 41 upon the bell-cranks 14 and 15 and release the cams 9, which in turn actuate the eccentrics 12 and through them the punches 18, thereby causing the punches to perforate the moving strip or strips of paper or other material M to produce the duplicate music-rolls. It will be observed that the music-roll R in passing through the mercury-bath 29 is held taut through the instrumentality of the rolls 32 33 44, thus causing the paper to adhere closely to the top of the bar 36, in which the contact-pins 37 or 37 38ª are inserted, thereby preventing any mercury from flowing between the music-roll and the bar 36, and, further, that the circuits through the magnets 39 can only be closed when the perforations in the music-roll coincide with the position of the pins; further, that owing to the fact that contact between the mercury and the pins is established below the body of the mercury no arc or arcs will be formed which will act destructively upon the music-roll or tend to effect the mercury so as to decrease its conducting properties.

In the construction shown in Fig. 3 that portion of the perforating device—*i. e.*, the cams 9, which introduce a time limit between the closing of the circuits at the tank and the operation of the punches, is omitted. Means for introducing a time limit, however, is obtained by separating the pins 37 38ª. In this figure, it will be observed, the body of mercury is not connected to the source of energy, as in Fig. 1, but both terminals are connected to the pins 37 38ª. In Fig. 4 I have indicated the top of the pins 37 38ª, and lapping these pins I have indicated at P a perforation in the music-roll.

From the above it will be seen that the circuit through the magnet 39 can only be closed when the perforation P laps the pins 37 38ª. Assuming the pins 37 38ª to be of a certain size, it will be evident that an interval of time will be required for the perforation to pass across one pin and to lap both pins and then leave the opposite pin. Of course this time will depend upon the size of the perforation P, which if it is an extended perforation, such as is commonly employed to indicate a sustained note, will be longer than if a single round perforation, and, further, that the size of the perforations will be reproduced by the perforating device.

In Fig. 5 the point of the hook 45 passes through the perforation P of the paper and is in contact with the roller 33. The length of time that the hook will remain in contact with the opening will depend upon the size of the perforation P. Any suitable hook may be employed which will, irrespective of the size of the perforation in the music-roll, be sufficiently long to insure the action of the perforating device, which is a feature of considerable importance, especially where the construction of perforating device illustrated in Fig. 3 is employed—*i. e*, where there is no time-limit mechanism interposed between the actuating device for the punches and the punches which do the perforating, as has been explained in my former application, Serial No. 102,227.

In this specification for the purpose of distinguishing the music-roll to be copied from the music-rolls produced I have in the claims referred to the first music-roll as a "moving master-roll."

Having thus described my invention, I claim—

1. In combination with a perforating device for music-rolls, a perforated music-roll, a

bath containing a conducting fluid, and electrical means in connection with said bath, adapted when energized through the instrumentality of a perforated music-roll, to throw said perforating device into action.

2. In combination with a perforating device for music-rolls, a perforated music-roll, a bath containing a conducting fluid, an electrical device for throwing said perforating device into action, and an electric circuit between said bath and said electrical device, adapted to be controlled by the action of the perforated music-roll.

3. In combination with a perforating device for music-rolls, a moving master-roll, a bath containing a conducting fluid in which the roll moves, and electrical means contained in said bath and energized by the movement of said master-roll for throwing said perforating device into action.

4. In combination with a perforating device for music-rolls, a moving master-roll, a bath containing a conducting fluid in which the roll moves, an electrical contact device so located as regards the roll that when the perforations of the roll pass the contact device selected electrical circuits will be closed, magnets in said circuits, and means energized by the magnets for throwing the perforating device into operation.

5. In combination with a perforating device for music-rolls, a moving master-roll, a bath containing a conducting fluid in which the roll moves, a series of electrical terminals arranged in pairs in said bath and so located as regards each other that when the perforations in said music-roll lap the contacts selected electrical circuits will be closed, magnets in said circuits, and means energized by said magnets for throwing said perforating device into operation.

6. In combination with a perforating device for music-rolls, a moving master-roll, a series of contact-pins connected to one terminal of a source of energy, and a body of mercury through which the master-roll moves connected to the opposite terminal of the source of electricity.

7. In combination with a perforating device for music-rolls, a tank containing a body of mercury, a recessed bar arranged transversely of said tank, a series of contact-pins supported by said bar and having their tops on a level with the bottom of the recess of the bar, a moving master-roll, and means for moving the master-roll across the top of the bar and holding it in contact with the bar.

8. In combination with a perforating device for music-rolls, a generator of electricity, a series of electroresponsive devices, a series of contacts, a body of conducting fluid, the interposed circuit connections, and a perforated music-roll, whereby when the roll is moved circuits will be controlled between the contacts and the body of fluid in accordance with the physical characteristic of the music-roll.

9. In a perforating device, a master-roll having holes therein representing musical notes, a series of electric-circuit-selecting devices, a series of punches, paper to be perforated thereby, and means whereby the perforating of the paper is delayed between successive note-holes, until the paper has advanced a definite amount through the perforating-machine.

10. In a perforating device, a master-roll having holes therein representing musical notes, a series of electric-circuit-selecting devices, a series of punches, paper to be perforated thereby, means whereby the perforating of the paper is delayed between successive note-holes until the paper has advanced a definite amount through the perforating-machine, and means for changing the speed of the paper to be perforated relative to that of the master-roll.

11. In a perforating device, a master-roll having holes therein representing musical notes, a series of electric-circuit-selecting devices, a conducting fluid-bath forming part of an electric circuit, a series of punches, paper to be perforated thereby, means whereby the perforating of the paper is delayed a definite amount between successive note-holes, and means for changing the speed of the paper to be perforated relative to the speed of the master-roll.

12. In a perforating device, a master-roll having holes therein representing musical notes, a conducting fluid-bath in which electric contacts are made, perforating mechanism responsive thereto, and means whereby the perforating mechanism is delayed between successive note-holes, until after the paper to be perforated has advanced a definite amount through the perforating mechanism.

13. In a perforating device, a master-roll having holes therein representing musical notes, a conducting fluid-bath in which electric contacts are made, perforating mechanism responsive thereto, and means whereby the perforating mechanism is delayed in its operation between successive note-holes, until the paper to be perforated has advanced a definite amount through the perforating mechanism, and means for changing the speed of the paper to be perforated relative to that of the master-roll.

14. In a perforating device, a master-roll having holes therein representing musical notes, a series of electric-circuit-selecting devices, a series of punches, paper to be perforated thereby, means whereby the perforating of the paper is delayed between successive note-holes until after the paper has advanced a definite amount through the perforating-machine, and means for changing the speed of the paper to be perforated relative to that of the master-roll.

15. In a perforating-machine, a series of punches and a series of electroresponsive devices, a conducting-bath containing electric

contacts for making and breaking electric circuits and a perforating-sheet through the perforations of which the electric contacts are made.

16. In a perforating-machine, a series of punches and a series of contacts for selecting one or more electric circuits out of a number, a conducting-bath for said contacts, and a sheet having holes therein conforming to the electric contacts to be selected thereby.

17. In combination with a perforating device for music-rolls, a series of punches and a series of electroresponsive devices, a conducting-bath forming one terminal of an electric circuit and a series of contacts forming the other terminal, and a means whereby one of the contacts is thrown into circuit with the fluid of the conducting-bath.

18. In combination with a perforating device for music-rolls, a series of punches and a series of electroresponsive devices, a perforated sheet passing over a row of contacts and a fluid conductor throwing such contacts into circuit as have corresponding holes in the sheet.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY PRICE BALL.

Witnesses:
J. E. PEARSON,
WM. H. BUCKMAN.