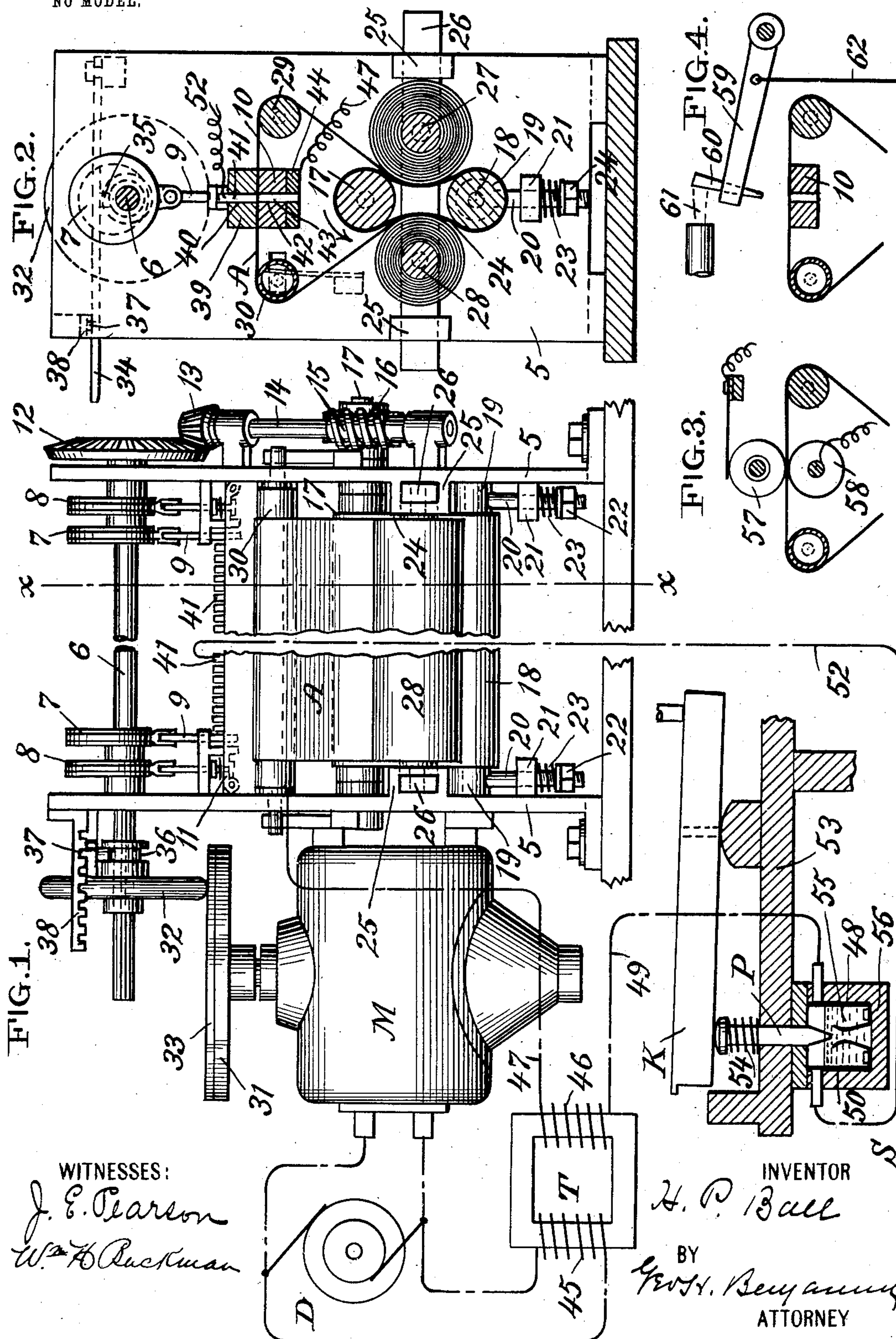


H. P. BALL.
PERFORATING DEVICE FOR MUSIC ROLLS.

APPLICATION FILED APR. 10, 1902.

NO MODEL.



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PERFORATING DEVICE FOR MUSIC-ROLLS.

SPECIFICATION forming part of Letters Patent No. 736,571, dated August 18, 1903.

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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
5 invented a Perforating Device for Music-Rolls, of which the following is a specification.

My invention relates to a perforating device adapted to be used in connection with a piano or other similar musical instrument and which has for its purpose to reproduce
10 upon a moving strip or number of strips of paper or other material, as a series of perforations, the notes played upon the piano or other musical instrument, so that when a per-
15 forated strip is caused to pass through a suitable mechanical instrument the musical composition originally played will be exactly reproduced.

In all perforating-machines for music-rolls
20 of which I am aware the perforation of the music-roll has been accomplished by the direct action of a punch or punches.

My present invention consists in a construction where the perforation of the music-roll is
25 accomplished by means of electricity or heat and in a manner which will be described.

My invention also relates to various features of construction of the perforating device and the apparatus with which it is connected.

30 The object of my invention is to decrease the cost of producing perforated music-rolls and also to improve the character of the rolls produced.

The accompanying drawings will serve to
35 illustrate my invention.

Figure 1 is a front elevation of my improved perforating-machine and electromotor for driving the machine, a horizontal section through an operating-key, and also shows dia-
40 grammatically the circuit connections between the various parts and a source of electrical energy and transformer. Fig. 2 is a vertical section taken on the line X X of Fig. 1. Figs. 3 and 4 are vertical sections showing
45 modifications of the perforating mechanism.

In the drawings, 5 indicates the side frames of the perforating-machine. Mounted in this frame is a shaft 6, on the opposite ends of which are arranged the eccentrics 7 8. To
50 each eccentric 7 is connected a punch 9, which reciprocates through a die-plate 10, Fig. 2.

These punches are employed for forming the rack-holes usually provided in the outer edges of a master music-roll. To each eccentric 8 is connected a presser-foot 11, which serves
55 to hold the moving strip of paper while the punches 9 are reciprocating through it. The full details of this construction of punch and presser-foot are shown and described in my former application, Serial No. 97,353. Con-
60 nected to the right-hand end of the shaft 6 is a beveled gear 12, which meshes with the gear 13 on the shaft 14. On the lower end of the shaft 14 is a worm 15, which meshes with the worm-wheel 16 on shaft 17. Situated in the
65 same axial line as the shaft 17 is a shaft 18. This shaft is mounted in bearings 19, carried on the end of the vertical rods 20. These rods pass through brackets 21 on the inner side of the frames 5 of the machine and are provided
70 with a nut 22 on their lower end. Between the bracket 21 and the nut 22 is a helical spring 23, which exerts a constant downward tension upon the shaft 18. Situated over the shaft 17 and the shaft 18 is a belt 24.
75

Projecting from the side plates 5 of the machine are brackets 25, and in these brackets are carried the horizontal bars 26. Arranged parallel with their bearings in the bars 26 is the roll 27, upon which the material to be per-
80 forated is wound when it is introduced into the machine, and the roll 28, upon which the material when perforated is wound before removal from the machine. It will be observed that the belt 24 presses on the inner side of
85 the rolls 27 and 28 and that by reason of the horizontal bars, which are adjustable laterally, means are provided to compensate for the difference in size of the rolls 27 28 as the paper is wound from one to the other. The
90 springs 23 serve to maintain a constant tension upon the belt 24. The material to be perforated after passing from roll 27 passes over a roller 29, thence across the die-seat 10, and over the spring-pressed roller 20.
95

Motion is given to the parts by means of the motor M, on the shaft of which is mounted a horizontal disk 31. Over this disk, on shaft 6, is arranged the vertically-rotating wheel 32. The disk 31 is provided with a friction-surface
100 33. I prefer that the wheel 32 shall be adjustable horizontally along the shafts 6, as

by so doing the speed at which the perforating-machine is driven may be varied by moving the wheel from the center toward the periphery of the wheel 31. Means are shown
 5 for varying the position of the wheel 32, which consists of a pivoted handle 34, Fig. 2, provided with a pin 35, which takes in a slot 36 in the hub of the wheel 32. The outer end of the handle is provided with an upwardly-
 10 projecting pin 37, which is adapted to coact with a rack 38. By moving the handle to the right or left the wheel 32 may be moved across the face of the disk 31 of the motor M.

The foregoing description has related entirely to the mechanical features of my device
 15 and has described the means by which the material to be perforated is moved through the machine and the rack-holes to be formed in the sides of the music-roll. I will now describe the means employed for perforating
 20 the material to form the musical notes.

39 represents a bar of insulating material arranged transversely of the machine. This
 25 bar is provided with a series of vertical perforations 40, in which are located independent conducting-pins 41. Situated below the bar 39 and arranged transversely of the machine is another bar 40, provided with the perforations 42, in which are the pins 43. These
 30 pins are all connected electrically by means of a plate of connecting material 44. The pins 41 43 occupy fixed positions, although preferably they may be made adjustable to compensate for wear in use.

35 D indicates a dynamo-machine. This dynamo serves to run the motor M and also is connected to the transformer T to form the primary coil 45 of the transformer. The secondary coil 46 of the transformer is connected
 40 at one end to the plate 44 through the conductor 47 and is connected through its opposite end to a contact-plate 48 of the switch S through conductor 49. The opposite contact-plate 50 of the switch S is connected to a pin
 45 41 through conductor 52.

K represents the key of a musical instrument upon which the composition to be perforated upon the music-roll is played. Located under the key is a pin P, between which
 50 and the keys of the musical instrument 53 is a spring 54.

The contacts 48 50 of the switch S are immersed in a body of oil 55, contained in a suitable trough 56. This trough may be arranged to extend across the whole distance
 55 occupied by the keys of a musical instrument or the trough may be divided into a number of sections representing the number of keys of the musical instrument. It will be understood from the description as given that there
 60 will be a switch for each key and that such switch will be in electrical circuit with a pin 41 and a pin 43.

Instead of using the pins 41 43, as shown
 65 in Fig. 2, I may use a pair of disks 57 58, the upper one of which is spring-pressed, as shown in Fig. 3, or instead of using the pins

or disks I may use the arrangement shown in Fig. 4, which consists of a pivoted lever 59, carrying the pin 60, adapted to move over the
 70 die 10. Located in front of the pin 60 but in its uppermost position is a heating-flame 61. Connected to the lever 59 is a cord 62, the lower end of which can be connected through any suitable intermediate means directly to
 75 the key. When the construction shown in Fig. 4, however, is employed, the transformer T and switch S are not employed.

A represents the material to be perforated, which may be of paper such as is commonly
 80 employed, or paper saturated with any chemical substance—as, for instance, alum or tungstade of sodium—which will prevent ignition of the paper, or paper saturated with any chemical substance—such as a solution of
 85 iodid potash, bromid potash, starch, and water—which will be altered by the passage of an electric current, or instead of using paper I may use any other material—for instance, I find that what is known as “taffeta-silk”
 90 serves as an excellent material for this purpose. I, however, do not wish to limit myself, as I have in contemplation using any material which may be perforated or acted upon either mechanically, electrically, or
 95 through the action of a heated body—such, for instance, as is shown in the construction illustrated in Fig. 4.

The operation of my device is as follows:
 100 When the motor M is started, motion is given to the material A to be acted upon, and at the same time the punches 9, which make the rack-holes, and presser-feet 11, which hold the material to be acted upon while the punches 9 are passing through it, are set in
 105 motion. When the key K is depressed, contact is made between a pin P and the contacts 48 50 of the switch S. This closes a circuit between the pins 41 43 or the disks 57 58. The current from the secondary of the trans-
 110 former T, which may be as high a voltage-current as necessary, passes across the contacts and acts either to directly perforate the material passing between the pins or disks, to char the material, or chemically act upon
 115 the material. The character of the effect produced—i. e., the note or size of the perforations, i. e., whether a small hole or a long hole, a small char or a long char, a chemically-
 120 changed spot or slot is produced—will depend entirely upon the length of time that the key K is held down. The same will be true when the key is used in connection with the device shown in Fig. 4. It will thus be seen that if
 125 the material to be perforated is driven at a fixed speed the character of the changes produced in the material to be perforated or altered will correspond with the character of the impressions made by the performer upon the
 130 key K of the musical instrument upon which the composition is played.

I wish it understood that I do not limit myself to the precise instrumentality shown for perforating, altering, or effecting the music-

roll to be produced. I consider myself to be the first in the art to suggest any means other than that due to the action of a punch for producing perforations in the roll, and I desire to claim any and all means which may be considered equivalents of the means shown and described in this application.

Having thus described my invention, I claim—

1. A perforating device for music-rolls, comprising in its construction, a series of pairs of electrodes, arranged in line and separated, means for moving the strip of material to be acted upon between the said electrodes, and a series of keys, one in circuit with each pair of electrodes for causing a current of electricity to pass between one or more of said electrodes.

2. A perforating device for music-rolls, comprising in its construction, a series of oppositely-disposed and separated pairs of electrodes, means for moving a strip of material to be acted upon between said electrodes, and a series of circuit-closing devices one connected to each pair of electrodes for causing a current of electricity to pass between one or more of said electrodes.

3. A perforating device for music-rolls, comprising in its construction, a series of pairs of oppositely-disposed and separated electrodes, punching mechanism, means for moving a strip of material to be acted upon between said electrodes, and beneath said punches, means for causing a current of electricity to pass between one or more of said electrodes, and means for actuating said punches.

4. A perforating device for music-rolls, comprising in its construction, a source of electricity, a series of pairs of separated electrodes, one electrode of each pair in circuit with one terminal of the source of electricity, and one electrode of each pair in circuit with an independent circuit-closing device, and a series of circuit-closing devices corresponding in number with the number of pairs of electrodes.

5. A perforating device for music-rolls, comprising in its construction a series of pairs of electrodes arranged in line and separated, a series of keys, a series of electric switches, said keys collectively connected to one electrode of each pair and said switches individually connected to one electrode of one pair, and means for moving a strip of material to be acted upon between the electrodes.

6. A perforating device for music-rolls, comprising in its construction a series of oppositely-disposed and separated electrodes, means for moving a strip of material to be acted upon between said electrodes, and means for closing one or more circuits through

said electrodes at any moment during the passage of the strip of material.

7. A perforating device for music-rolls, comprising in its construction, a series of electrodes arranged in pairs and in line, one of the electrodes of each pair electrically connected and one of the electrodes of each pair electrically insulated, means for moving a strip of material to be acted upon between said electrodes, and means for closing the circuits between the electrodes of each pair.

8. In a perforating device for music-rolls, the combination of a series of keys, a circuit-closing device for each key, a series of pairs of electrodes arranged in line and separated, and means for moving a strip of material to be acted upon between the electrodes and in such manner that only the portion of the strip to be acted upon will be within the influence of the electrodes.

9. A perforating device for music-rolls, comprising in its construction, a series of oppositely-disposed and separated pairs of electrodes, supporting-plates for said electrodes, means for moving a strip of material to be acted upon between said electrodes and supporting-plates, and means for closing electric circuits between said electrodes.

10. In a perforating device for music-rolls, the combination of a pair of rolls from and on which the music-roll is wound, means for driving said rolls at the same peripheral speed, means for punching rack-holes in said music-roll, and means for driving said first and second named means at a variable speed.

11. In a perforating device for music-rolls, the combination with means for mechanically punching the rack-holes in the music-roll, of means for electrically perforating the music-roll to form the holes which are used to produce the musical notes.

12. In a perforating device for music-rolls, the combination of the perforating mechanism, means for driving the perforating mechanism, and means for altering the speed of the perforating mechanism without altering the speed of the driving mechanism.

13. In a perforating device for music-rolls, the combination of a pair of rolls from and on which the music-roll is wound, and means for driving said rolls at the same peripheral speed, consisting of a driven endless belt arranged to bear upon the opposing surfaces of both rolls.

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

HENRY PRICE BALL.

Witnesses:

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