No. 849,453. PATENTED APR. 9, 1907.

H. P. BALL.

TONE PRODUCING AND RECORDING INSTRUMENT.

APPLICATION FILED DEC. 11, 1903.

FIG. 1

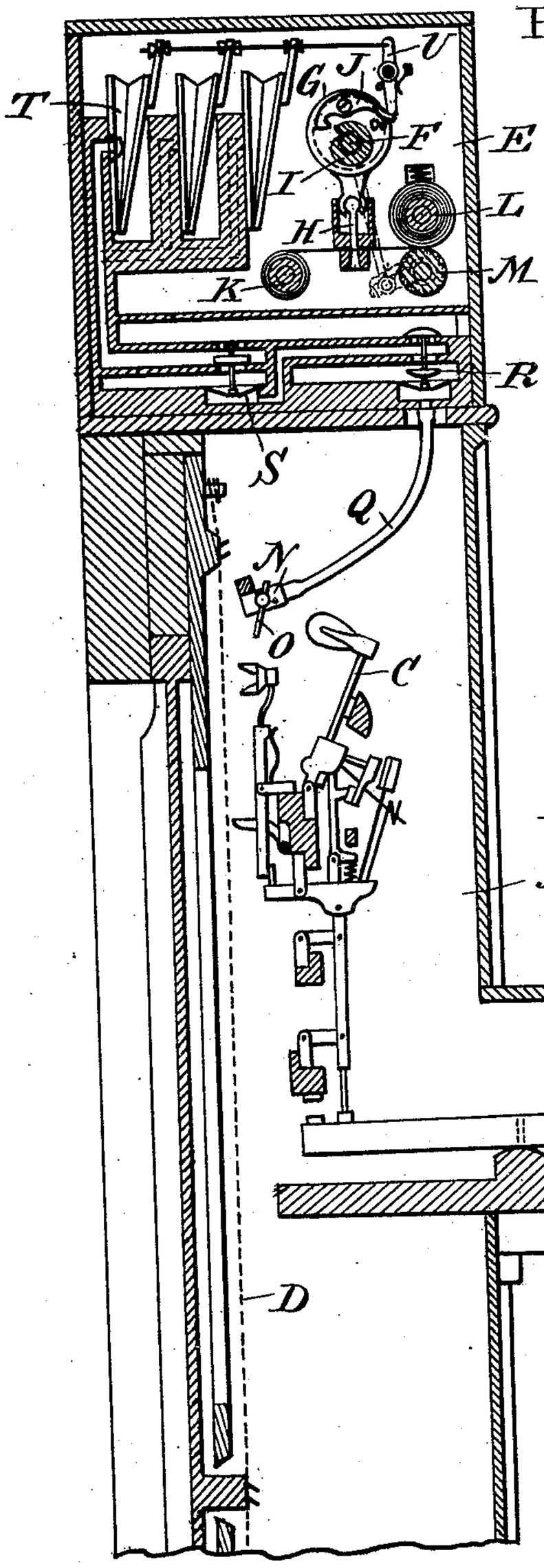


FIG. 2.

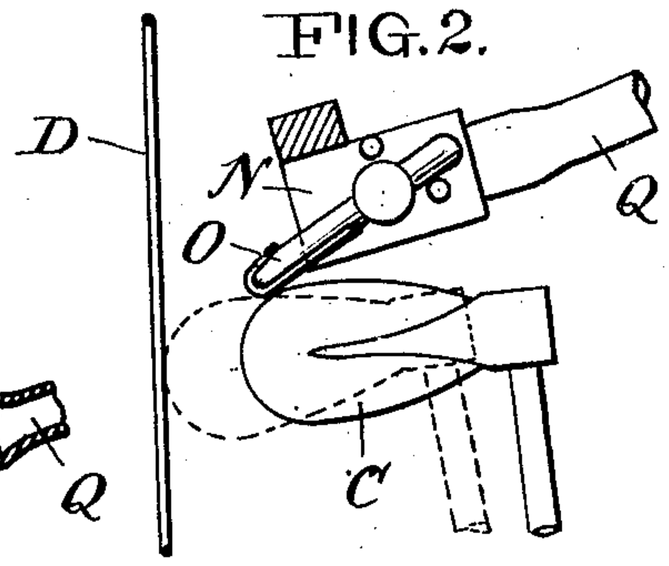


FIG. 3.

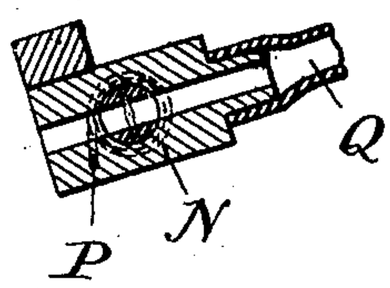


FIG. 4.

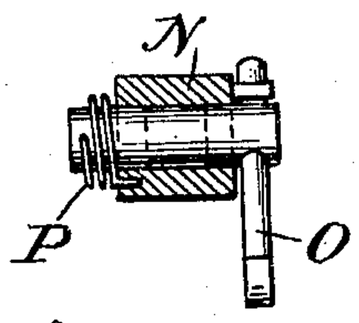


FIG. 5.

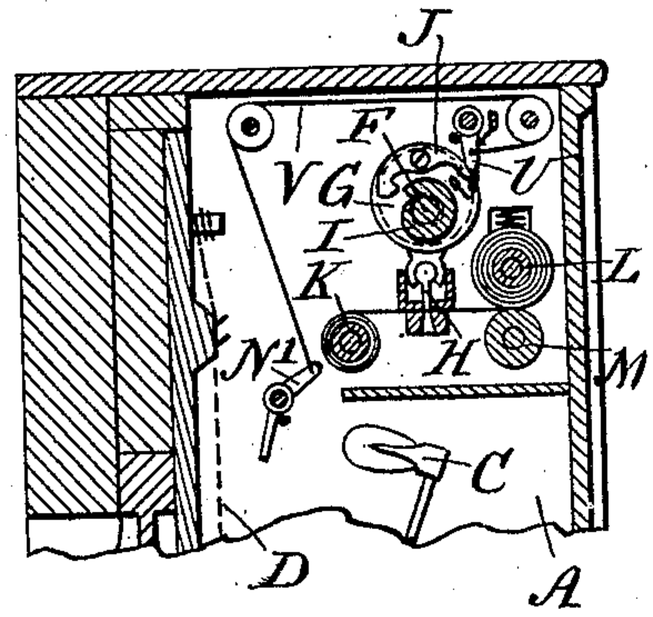
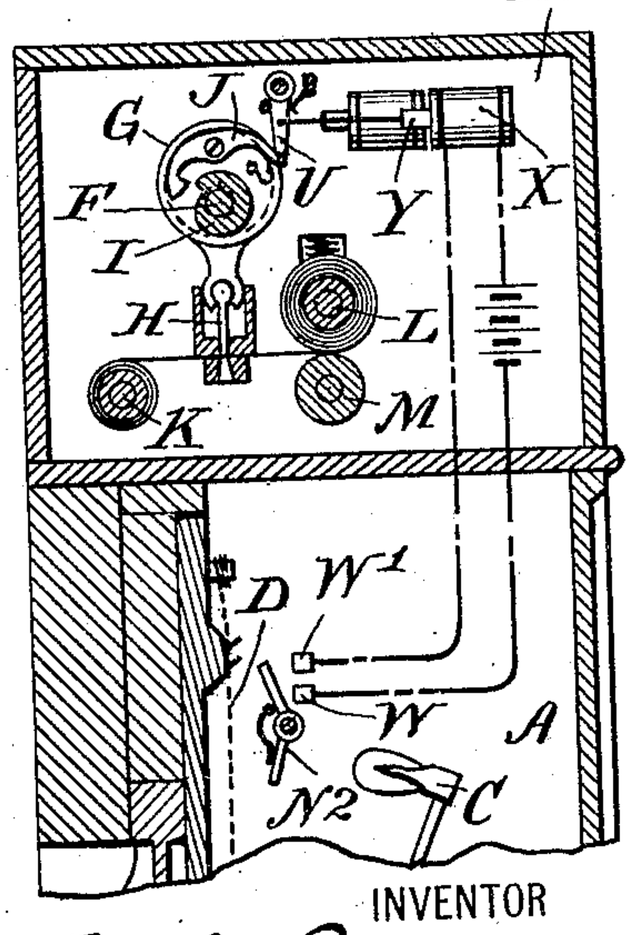


FIG. 6.



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TONE PRODUCING AND RECORDING INSTRUMENT.

No. 849,453. Specification of Letters Patent. Patented April 9, 1907.

Application filed December 11, 1903. Serial No. 184,815.

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Tone Producing and Recording Instruments, of which the following is a specification.

My invention consists in the combination, with the mechanism of a piano, of a device which will automatically produce upon a moving strip of paper or other material a complete record of the musical notes struck by the performer upon the piano, and, further, which will automatically introduce a definite time interval between the striking of a key or keys by the performer and the recording of such note or notes.

The object of my invention is to provide a recording device which will perform its function of recording without in any wise interfering with the touch of the performer or otherwise with the normal action of the piano mechanism.

Various forms of perforating devices have been designed to be employed in connection with a piano mechanism. In all such devices cords, electric contacts, pneumatic apparatus, and similar devices have been directly connected to the keys of the instrument. Such devices by interfering with the normal action of the piano mechanism materially affect the touch of the performer, with the result that the record made is not such as represents the performance of the player upon an instrument not connected to such recording device. In the construction described in this application this condition is entirely overcome by providing that there shall be no direct connection between the keys of the piano and the recording mechanism.

In a former application, Patent No. 778,835, dated January 3, 1903, I have described a perforating mechanism controlled in its operation and directly connected to the keys of a piano or corresponding instrument and also containing means for introducing a time limit between the striking of a key and the recording of the note struck.

My present invention makes use of the perforating mechanism described in such former application, but differs therefrom in that the perforating mechanism while controlled by the keys of the piano is not directly connected to the keys of the piano.

Put in still other words, my invention consists in introducing between the keys of a piano or other tone-producing instrument and a series of perforating devices a series of devices not connected to the keys, but which will when a key or keys are struck cause perforating devices corresponding to such key or keys to be thrown into operation.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a vertical section through a piano mechanism and a perforating device. Fig. 2 is an enlarged side elevation showing the relation between a pneumatic-valve and a hammer of the piano-action. Fig. 3 is a longitudinal section through the valve. Fig. 4 is a transverse section through the valve. Fig. 5 is a vertical section showing a mechanical device for controlling the perforating mechanism by the movement of a hammer of the piano-action. Fig. 6 is a vertical section showing an electrical device for controlling the perforating mechanism by the movement of a hammer of the piano-action.

In the drawings, A represents the frame of a piano; B, keyboard; C, hammer of piano-action; D, stretched strings of piano. These parts present no points of novelty.

Mounted on the top of the piano is the perforating device, which is contained within a case E. This device, as shown, consists of a shaft F, adapted to be driven at constant speed. Mounted loosely upon this shaft are a series of eccentrics G, carrying punches H. Between the eccentrics and secured to the shaft are a series of toothed wheels I. Pivoted on each eccentric is a latch J, which when released is adapted to coact with a toothed wheel I.

K represents the feed-roll for the music-strip; L, take-up roll; M, driving-roll, which receives its motion through mechanism connected with the shaft F.

The particular features of construction of the perforating mechanism described are not essential. Any suitable perforating mechanism may be used.

The perforating mechanism shown in Figs.

1, 5, and 6 is the same. In Fig. 1 the perforating mechanism is shown as pneumatically controlled, and for this purpose there is arranged a series of valves N, (one valve for each punch,) to each of which is connected an arm O, situated in the path of movement of a hammer C. These valves are normally closed and are maintained in the closed position by means of springs P, Figs. 3 and 4. The valves N are connected to the ends of tubes Q, which lead to the primary pneumatics R, which in turn control secondary pneumatics S, which control power-pneumatics T, which control pivoted levers U, adapted to coact with latches J. In Fig. 5 bell-cranks N′ are substituted for the valves N, and interposed between the upper arm of each of such bell-cranks and a lever U is a cord V. In Fig. 6 bell-cranks N^2 are employed, the upper end of each of which is adapted to bridge a pair of contacts W W′ in circuit with a magnet X, the core of which, Y, is connected to a lever U.

The operation of the arrangement shown in Figs. 1, 5, and 6 is substantially the same. When an operator strikes a key, a hammer C of the piano-action flies up and then immediately returns to its original position unless the operator holds down the key, in which case the hammer is held up—that is, as shown in Fig. 2, the hammer strikes a string (position shown in dotted lines) and then rebounds, (position shown in full lines.) The hammer in its movement strikes a valve N or a bell-crank N′ N^2, as the case may be, and then a string of the instrument.

It will be observed that a hammer in moving upward must move through a definite distance and that consequently a time interval will intervene between the time that a key is struck and the time when the hammer actuates the valve N or bell-crank N′ N^2. When a valve N or bell-crank N′ N^2 is actuated, a lever U through the instrumentality of the interposed pneumatic or electric devices is actuated, which permits a latch J to coact with a toothed wheel I, thus connecting an eccentric G to the shaft F and throwing a punch into operation to perforate the music-strip passing under it. It will be observed that the perforating mechanism shown is entirely separate from the piano-action.

I wish it understood that I do not limit myself in any wise to the valve mechanism or bell-cranks for controlling the action of the levers U, as it will be understood that many devices may be placed within the path of movement of the hammers C of the piano-action and which will have an equivalent function.

I further wish to have it understood that my invention may be employed with devices other than a piano—in fact, with any device where a moving part serves to actuate a valve or bell-crank or corresponding devices for controlling the action of a punch or punches and without in any wise affecting the mechanical action or force required to operate the device—for instance, a piano-key—necessary to produce the original impulse.

It will be seen from the above description that the device is certain in its operation—*i. e.*, will record every note struck—as a valve or bell-crank must necessarily be operated before a hammer is brought in contact with a string of a piano.

Having thus described my invention, I claim—

1. A tone producing and recording instrument, comprising a tone-producing mechanism, a recording mechanism, and a controlling device for the recording mechanism adapted to be actuated by the final driven part of the tone-producing mechanism.

2. A tone producing and recording instrument, comprising a tone-producing mechanism, a recording mechanism, and a controlling device for the recording mechanism structurally separate from the tone-producing mechanism, but adapted to be actuated by the final driven part thereof.

3. A tone producing and recording instrument, comprising a tone-producing mechanism, a recording mechanism, and a controlling device for the recording mechanism situated in the path of movement of the final driven part of the tone-producing mechanism, and adapted to be actuated thereby.

4. A tone producing and recording instrument, comprising a tone-producing mechanism, a recording mechanism provided with means for introducing a time interval between possible successive actions of such recording mechanism, and a controlling device for the recording mechanism structurally separated from but adapted to be actuated by the final driven part of the tone-producing mechanism.

5. A tone producing and recording instrument, comprising a tone-producing mechanism, having a keyboard and moving parts actuated thereby, a recording mechanism, and controlling mechanism for the recording mechanism, situated between the tone producing and the recording mechanisms, not connected to the tone-producing mechanism, but in the path of movement of the final driven part thereof.

6. A tone producing and recording instrument, comprising a tone-producing mechanism having a series of moving hammers, a recording mechanism, and mechanism not connected to the tone-producing mechanism, but in the path of movement of the moving hammers for controlling the action of the recording mechanism.

7. A tone producing and recording instrument comprising a tone-producing mechanism, a recording mechanism provided with means whereby a time interval will elapse between the striking of a note by the per-

former and the action of the recording mechanism, and a controlling device for the recording mechanism structurally separated from but adapted to be actuated by the final driven part of the tone-producing mechanism.

8. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and means actuated by the movement of the hammers of the piano-action for controlling the movement of the perforating mechanism.

9. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and means actuated by the movement of the hammers of the piano-action for controlling after a definite time the movement of the perforating mechanism.

10. A tone producing and recording instrument comprising a series of keys, a series of hammers, a series of controlling devices situated in the path of movement of the hammers, and a series of punches responsive to the action of said controlling devices.

11. A tone producing and recording instrument comprising a series of keys, a series of hammers, a series of pneumatic controlling devices situated in the path of movement of the hammers, and a series of punches responsive to the action of said controlling devices.

12. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and a series of controlling-valves actuated by the hammers of the piano-action.

13. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and a series of controlling-valves actuated by parts of the piano-action which are separate from but actuated by the keys of such action.

14. A tone producing and recording instrument comprising a piano-action, a series of perforating mechanisms, a series of controlling mechanisms interposed between the piano-action and the perforating mechanisms, and actuated by the hammers of the piano-action, whereby the movements of the perforating mechanisms are controlled.

15. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and means actuated by the movement of but not connected to the hammers of the piano-action for controlling the movement of the perforating mechanism.

16. A tone producing and recording instrument comprising a piano-action, a perforating mechanism, and pneumatic mechanism for controlling said perforating mechanism, not connected to but actuated by, the hammers of the piano-action.

17. A tone producing and recording instrument comprising a piano-action having as parts thereof a keyboard, and a series of hammers, a recording mechanism, and controllers therefor, actuated by the movement of the hammers of the piano-action.

18. A tone producing and recording instrument comprising a keyboard, a piano-action, a recording mechanism, a controller therefor which is mechanically separated from the hammer portion of the piano-action, but adapted to be moved by the hammer when the latter is actuated by a performer in striking a note on the keyboard.

19. A tone producing and recording instrument, comprising a piano-action, a perforating mechanism, a controlling means for the perforating mechanism actuated by but separated from the piano-action and located to introduce a time interval between the actuation of the piano-action and the actuation of the perforating mechanism.

20. A tone producing and recording instrument comprising a piano-action, a recording device, and controlling means for the recording device actuated by the hammers of the piano-action.

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

HENRY PRICE BALL.

Witnesses:
J. E. PEARSON,
J. FRANK O'CONNOR.