A. D. SAUMELL.

SHEET MUSIC PERFORATING DEVICE.

APPLICATION FILED FEB. 15, 1912.

1,092,401.

Patented Apr. 7, 1914.

4 SHEETS—SHEET 1.

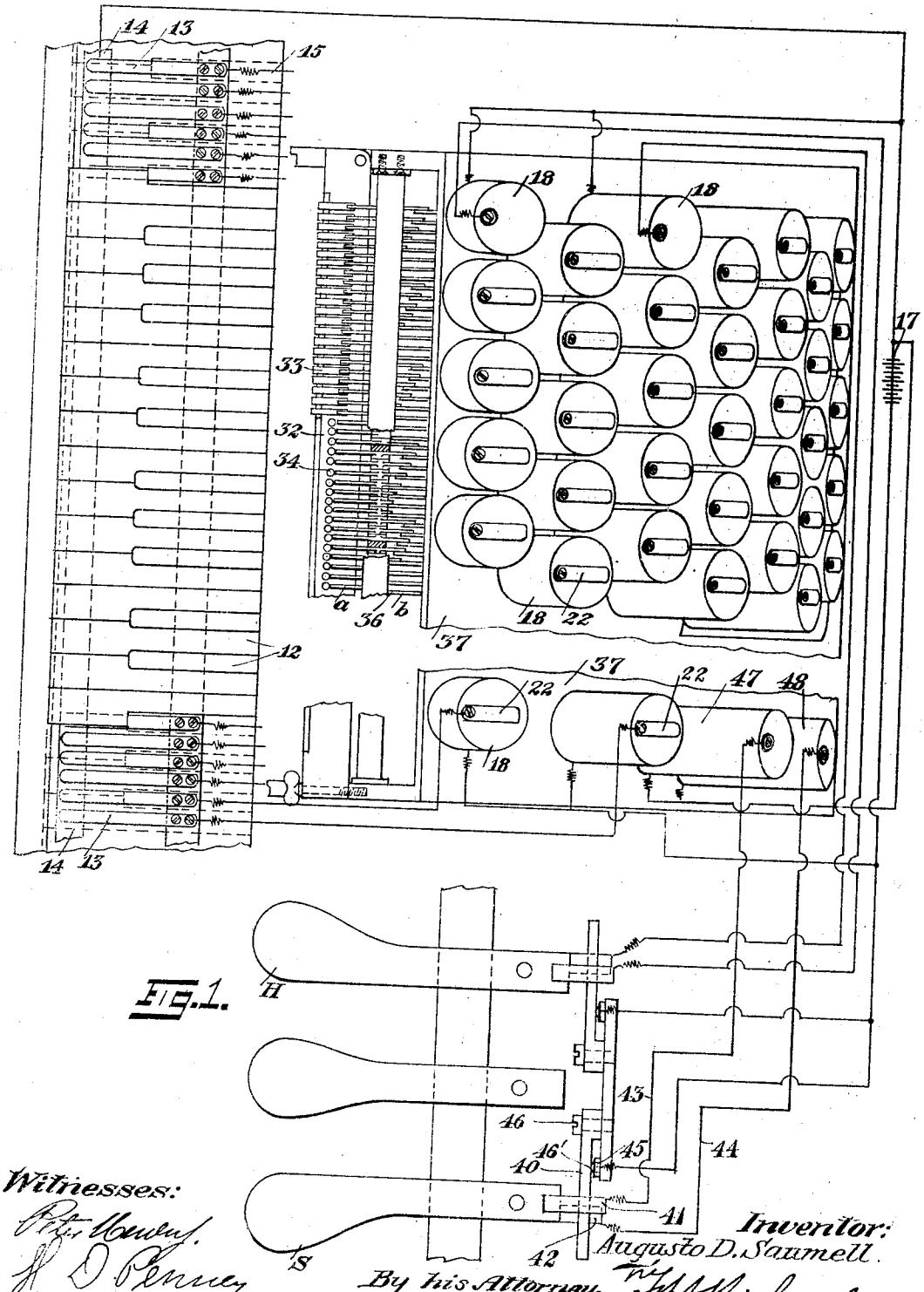


Fig. 1.

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H. D. Penney

Inventor:

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By his Attorney,

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4 SHEETS—SHEET 2.

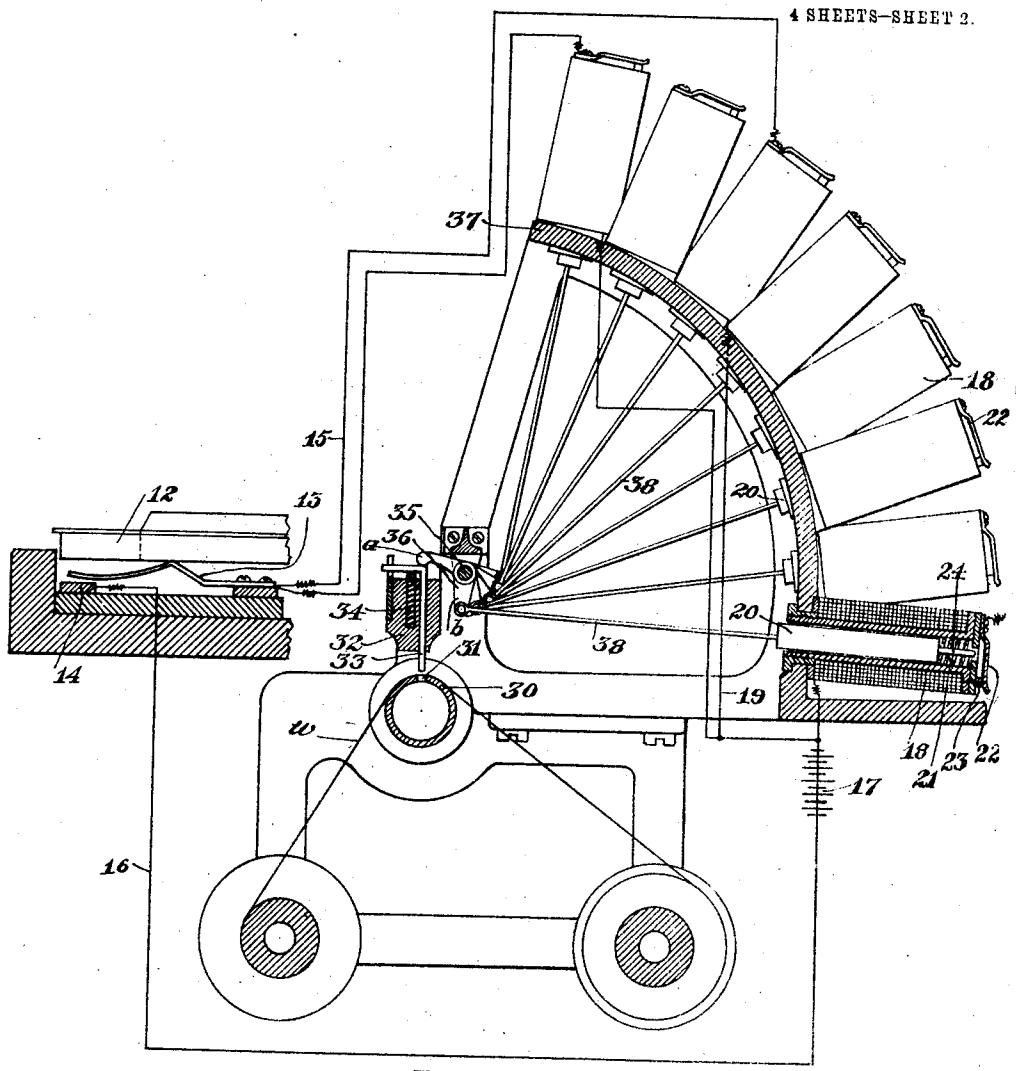


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

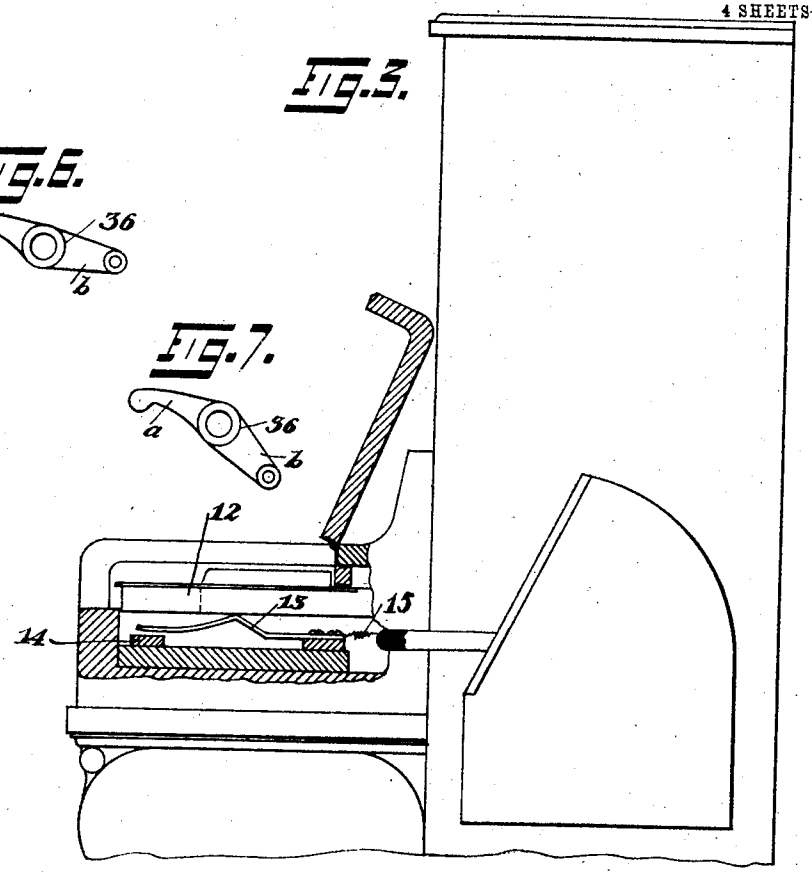


Fig. 6.

Fig. 7.

Fig. 5.

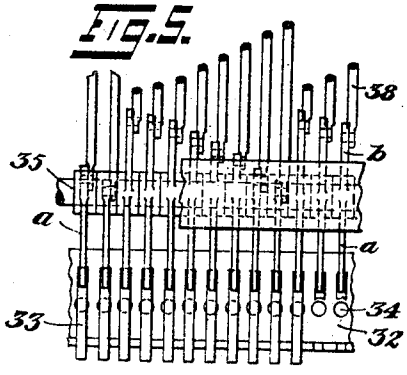
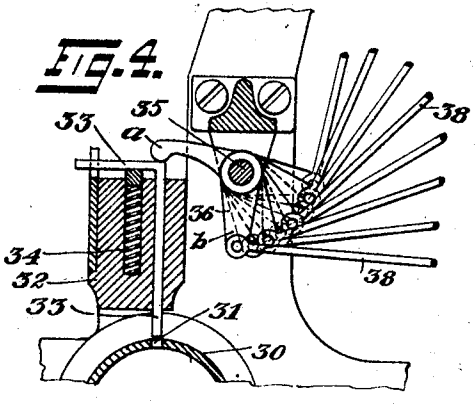


Fig. 4.



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4 SHEETS—SHEET 4.

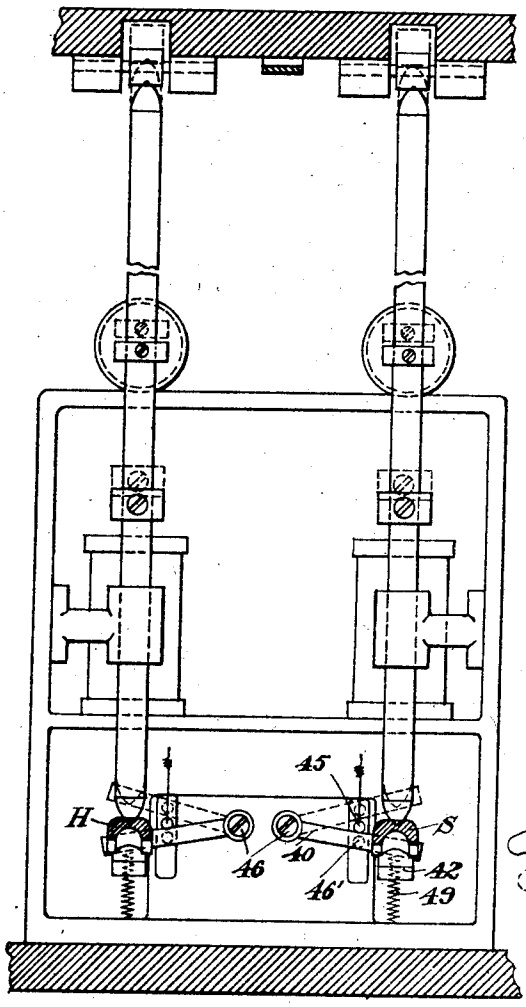


Fig. 9.

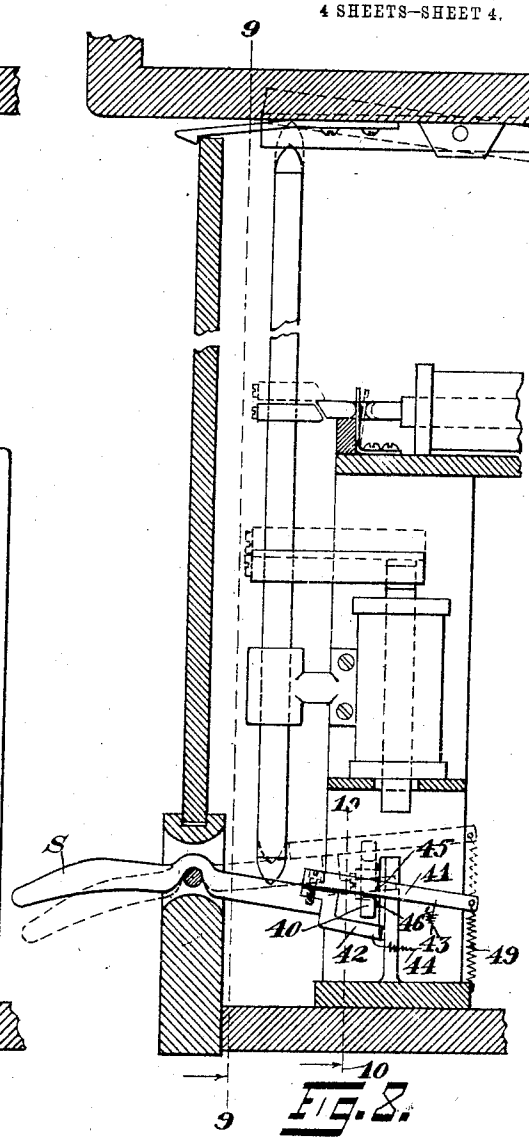


Fig. 8.

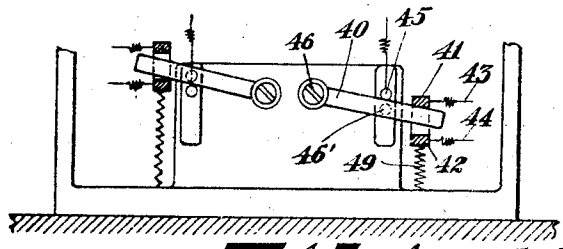


Fig. 10.

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UNITED STATES PATENT OFFICE.

AUGUSTO D. SAUMELL, OF NEW YORK, N. Y.

SHEET-MUSIC-PERFORATING DEVICE.

1,092,401. Specification of Letters Patent. Patented Apr. 7, 1914.

Application filed February 15, 1912. Serial No. 677,665.

To all whom it may concern:

Be it known that I, AUGUSTO D. SAUMELL, a citizen of the United States, residing in New York city, borough of Bronx, in the county of New York and State of New York, have invented certain new and useful Improvements in Sheet-Music-Perforating Devices, of which the following is a specification.

This invention relates particularly to means for producing perforated sheet music from the operation of a key-board, either from the usual keyboard of a piano during the playing of the same, or from a dummy keyboard; and also has reference to the means for producing the perforations corresponding to the operation of the pedals of a musical instrument.

One of the objects of the invention is to provide means for effecting a very rapid reciprocation of a punch member by the depression of a piano key or similar device for producing a practically continuous slot or opening in a music sheet or roll.

Another object of the invention is to provide means for causing perforations or marks on the music sheet or roll from the operation of the pedals of a musical instrument.

A further object is to provide the latter device with means for causing a single perforation or other indication when the pedal is depressed, and a similar perforation or mark when the same pedal is released.

In the accompanying drawings representing embodiments of my invention, Figure 1 is a fragmentary plan view of portions of a musical instrument with my invention applied. Fig. 2 is a detailed view, enlarged, in section. Fig. 3 is a view similar to Fig. 2 showing the relative size of the keyboard and the perforating mechanism. Fig. 4 is a detail enlarged of the levers operating the punches. Fig. 5 is a plan view of the parts shown in Fig. 4. Figs. 6 and 7 show the levers for operating the punches. Fig. 8 is a vertical section of a portion of the pedal engaging means. Fig. 9 is a section on the line 9—9 indicated in Fig. 8; and Fig. 10 is a section on the line 10—10, indicated in Fig. 8.

The device is shown as applied to an ordinary upright piano with a conventional form of keyboard; but this can be a dummy keyboard. The keys 12 may be simply the ordinary key levers or any such device, and beneath each key is arranged a circuit breaker of any suitable character, shown as comprising a spring plate 13 that is engaged by the key in its normal position, and when the key is depressed the plate is bent down to engage a terminal 14, another terminal being connected with the plate 13, and these terminals by wires 15 and 16 form a circuit including a battery 17 or other source of electric power that will operate any suitable electric actuating device, when the key is depressed to close the circuit closer.

A series of sheet perforators or punches are provided, and also an electro-magnetic means, such as a solenoid 18, and core for operating each of the punches. Each of the solenoids will have its circuit connected with the circuits of the several keys to be closed thereby. As shown a common return 16 is provided connecting one terminal of the key circuit closer with the battery 17, while the individual wires 15 connect each of the plates 13 of the circuit closer with the respective electro-magnets, a wire 19 passing from each electro-magnet to the other terminal of the battery 17. Each solenoid 18 is shown provided with a core 20 that normally extends only partly into the solenoid, and will be drawn in when the latter is energized, to compress a coil spring 21 therein, the reaction of the latter returning the core to normal position when the current is broken for the solenoid.

Upon suitable means connecting each of the punches with the core of the magnet, the punch will be advanced by depression of a key to close the circuit and energize that magnet. Means are also provided for interrupting the circuit of each magnet whereby upon the key being held depressed and the circuit retained closed thereby, the circuit will be rapidly broken to cause the rapid reciprocation of the core of the magnet, and consequently the punch will be given a rapid reciprocation, that will serve to punch a series of holes in the paper as the latter is advanced; but the holes will be so close together as to form a practically continuous slot, the length of which is determined by the advance movement of the paper during the depression of the key. As shown, a circuit breaker is provided in the circuit of each solenoid, comprising a spring lever 22 connected to one wire of the circuit, that normally engages a contact 23 connected to

the other wire of the solenoid circuit. A pin 24 is carried by the core 20 and when the core is drawn into the solenoid, this pin will strike the lever 22 and cause it to leave the terminal 23 and break the circuit of the solenoid. The latter will at once deënergize the solenoid, permitting the coil spring to return the core to normal position. This latter movement will release the lever 22 and again close the circuit. By this means the circuit for the solenoid will be very rapidly interrupted and produce a quick reciprocation of the core.

The means for perforating the sheet or roll is shown as comprising a stationary curved plate or tube 30 provided with a series of holes 31 therein preferably arranged in line. A bar 32 is arranged above the line of holes 31 and has bores therein in which reciprocate punches 33, each alining with and arranged to enter one of the holes 31 when advanced, but normally held a short distance away from the plate 30 by springs 34 that will return them when advanced. A shaft or rod 35 is arranged at one side of the bar 32 and parallel therewith, and on which shaft swing a series of levers 36, shown separately in Figs. 6 and 7. These levers have one arm *a* extending over to engage each of the punches 33 to advance the punches when the levers are swung.

For convenience is assembling the solenoids in close proximity to engage the several operating levers for the punches, they are arranged in rows with the axes of the solenoids of each row radiating from practically a common point, or in other words arranged in the arc of a circle, and in several adjacent rows, as indicated in Figs. 1 and 2; but being in somewhat staggered relation. The solenoids are all mounted on a curved plate 37, and the cores 20 of the solenoids are connected with the arms *b* of the levers 36 respectively, by rods 38. It will be observed that the adjacent levers have their arms *a* and *b* at different angles, to accommodate the different angular positions of the adjacent solenoids. It will now be understood that when any key is depressed the circuit closer lever 13 will close the circuit including wire 16 and one of the wires 15, and one of the solenoids. The core of that solenoid will be drawn in and the lever 36 swung to advance the corresponding punch, that will pass through the web W drawn over the plate 30 by any suitable means, not shown. But the advance of the core will cause the spring plate 22 to open the circuit whereby the core is returned and also the punch. The circuit interrupter will at once close the circuit again, causing the current to pulsate in the solenoid and produce a rapid reciprocation of the core and hence of the punch. The successive advances of the punches as the paper is advanced at a uniform speed, will produce perforations in the paper that will be so close together as to produce a practically continuous slot in the paper, that will extend as long as the key is held down and the paper advances. Immediately upon the key being released this circuit will be opened and the punch retracted.

In Figs. 8 and 9 a pair of pedals S and H are shown that are the ordinary hard and soft pedals for the piano or other instrument. The same mechanism to be now described, is applied to each of these pedals, and the description of one of them only will be given. For the pedal S is a lever 40 that extends between terminal portions 41 and 42 of the pedal, which portions are insulated from each other and connected with wires 43 and 44, respectively. As shown in Fig. 8, the pedal is in its normal raised open position at the outer end, with the lower end depressed, as indicated at the right in Fig. 10. In this position the terminal portion 41 of the pedal will engage with the lever 40, that is pivoted at 46 by suitable insulating means. When the pedal S is depressed by the foot, raising the inner end to the position indicated at the left in Fig. 10, the terminal 41 will disengage the lever and the terminal 42 will strike the lever 40 and shift the lever to the position indicated in Fig. 10, during which moment the terminal 41 is cut out from the lever 40. A terminal member is provided that will connect with the lever 40 at the intermediate portion of this movement, but which will not engage at the upper or lower position of the lever 40. As shown the terminal 45 is provided in the form of a button that will engage a terminal portion 46′ on the lever, the terminals 45 and 46′ being engaged at the intermediate portion only of the lever movement, but free therefrom at the two extreme positions, as indicated in Fig. 10 on each side, respectively.

For each of the pedals a pair of solenoids are provided, solenoids 47 and 48 being connected with the terminals 43 and 44, respectively, while the terminal 45 forms a common return from the battery to said solenoids, hence when the pedal S is in its normal position, as shown in Fig. 8, neither of these circuits will be closed; but upon the pedal being closed, the inner end will be elevated and the terminal portion 42 will strike the lever 40 and elevate the lever. During this latter movement the button on the lever will engage the terminal 45 to complete the circuit for the solenoid 47, and the latter will draw in its core and operate a punch whose construction and operation is identical with those described. But the continued movement of the pedal and of the lever 40 will disconnect the terminal 45 from the lever and the latter will be cut out at the end

of the downward movement of the pedal, so that the punch is advanced for an instant only and then retracted. When the pedal is released it will be returned to its normal position, as by a spring 49. The inner elevated end of the pedal will now be lowered, and the terminal portion 43 will engage the lever 40 and swing it down to its former position, but at the intermediate part of the downward movement contact will be made with the member 45, whereby the circuit is closed and another punch advanced for the short period of time when the contact is made at 45 during this return movement of the pedal. This will cause a different perforation to be made in the roll from that made when the pedal was depressed. From this it will be seen that a certain predetermined punch of the set will cause a hole or mark to be made on the paper only at the instant that the pedal is depressed; but that a different punch will make a mark in the paper at a different place, and only at the instant the pedal is released. It will be understood that between such two marks on the roll the pedal has remained depressed and the tone of the instrument made loud or soft during such period. For the other pedal, H, or for any number of pedals, a similar device and pair of punches are provided operating identically in the same manner, whereby a hole or mark is made at the instant the pedal is depressed and another indication when such pedal is released.

I claim—

1. In a sheet music perforator, the combination of a perforating device comprising a member having a series of openings therein, a set of punches arranged to be advanced to enter said openings respectively to perforate the sheet, means for advancing the sheet over the said openings in the member at a certain pre-determined speed, a bank of keys, a circuit closer adjacent each key that is normally opened to be closed by the depression of the key, electro-magnets one for each of said circuits, a core for each magnet, connections between each core and one of said punches, whereby the depression of a key will cause the advance of its corresponding punch to perforate the sheet, a circuit breaker for each of said circuits, and a spring for retracting each punch, said circuit breaker and said sheet moving device being relatively arranged whereby a rapid reciprocation of each punch is effected as long as its key remains depressed to produce a close succession of perforations upon the sheet to form a substantially continuous opening in the sheet whose length depends on the depression of the key.

2. In a music sheet perforator, a perforating device comprising a member having a series of holes, a punch coöperating with each of said holes, means for moving the paper between the punch and said member at a pre-determined speed, a bank of keys, a circuit closer connected with each key, electro-magnetic means in each of said circuits arranged to operate said punches respectively in one direction, retracting means for operating the punches in the opposite direction, and an interrupting device in each of said circuits arranged to cause a rapid reciprocation of any punch when its corresponding key is depressed, whereby a rapid succession of perforations are produced in the paper to produce a substantially continuous opening whose length depends on the time the key is depressed.

3. In a music sheet perforator, the combination of a bank of keys, a cut-out connected with each key that will close a normally open circuit when the key is depressed, a perforating device comprising a member having a series of openings therein and a member carrying a series of punches movable therein and into said openings when advanced, a segment shaped support, a plurality of electromagnets carried by the support with their axes arranged substantially in radiating lines, a core carried by each of the magnets, each of the magnets being in circuit with one of the said circuit closers whereby the core will be actuated by depression of a corresponding key, a cut-out for each of the magnet circuits operated by the core thereof to produce an interrupted current, a shaft, a series of levers arranged on the shaft, the levers having one end arranged adjacent the ends of said punches respectively, the other ends of the levers being connected with said magnet cores respectively whereby to operate the punches as the cores are reciprocated in the magnets.

4. In a music sheet perforator, the combination with the pedal of a musical instrument, of a pair of punches for the pedal, electro-magnetic means for operating each of said punches, a circuit breaker in the circuit of each of said magnetic operating means, means for causing the pedal when moved from normal position to shift the circuit closer to closed position and then open the same without closing such circuit on the return movement to normal position of such pedal, and means for causing the return movement to normal position of such pedal to operate the other said circuit closer for that pedal to first close and then open the same whereby one of said punches is operated when the pedal is opened and the other punch is operated when the same pedal is returned to closed position.

5. In a music sheet perforator, the combination with a pedal of a musical instrument, of a pair of punches, independent electromagnetic means for operating each of the punches, and circuit closing means connected with said pedal and adapted at the interme-

diate part of the opening movement thereof, to close the circuit of one of said electro-magnetic means, and at the intermediate part of the closing movement thereof, to close the circuit of the other electro-magnetic means.

6. In a music sheet perforator, the combination with a pedal of a musical instrument, of a pair of punches, an electromagnetic circuit for each of the punches, a terminal common to each of said circuits, a terminal actuated by the pedal member to engage said terminal at the intermediate part only of the closing movement of the pedal and also at the intermediate part only of the return movement of the pedal, a circuit closer connected with the pedal that will close one of said magnet circuits during the closing movement of the pedal and which will close the circuit of the other electromagnetic member during the return movement of the pedal.

7. In a music sheet perforator, the combination with the pedal of a musical instrument, of a pair of punches, an electromagnetic operating means for each of the punches, a lever, a terminal portion on the pedal arranged to engage said lever when the pedal is closed to shift the lever in one direction, another terminal on the pedal arranged to engage said lever when the pedal is returned from the closed position to swing the lever in the opposite direction, said terminals on the pedal being spaced whereby they alternately engage said lever, a terminal member arranged to engage said lever at the middle portion only of its said movements by the pedal, the circuit of one of said punch operating means being connected to one of said terminals on the pedal to engage said lever when the pedal is raised whereby at the intermediate portion only of the closing movement of the pedal the circuit is closed through said contact device for the lever, the circuit for the other said punch being connected with the other said terminal on the pedal to engage the said lever during the return movement of the pedal whereby the other circuit is closed through said lever terminal at the intermediate portion only of the return movement of the pedal.

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