J. J. WALKER.

MUSIC RECORD FOR USE IN AUTOMATIC MUSICAL INSTRUMENTS.

APPLICATION FILED AUG. 24, 1906.

1,012,178. Patented Dec. 19, 1911.

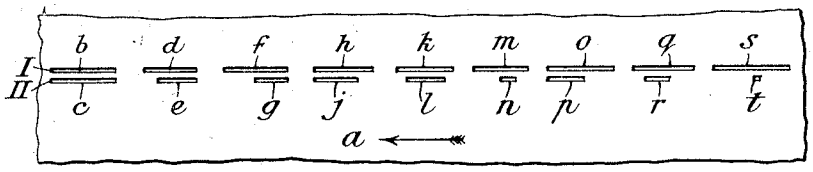


Fig. 1.

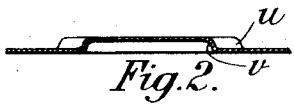


Fig. 2.

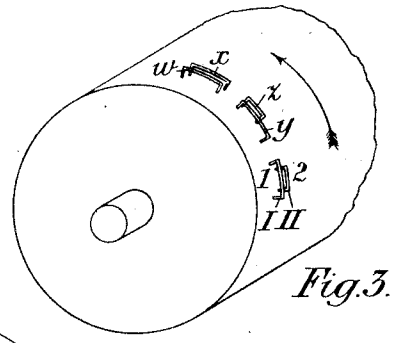


Fig. 3.

Fig. 4.

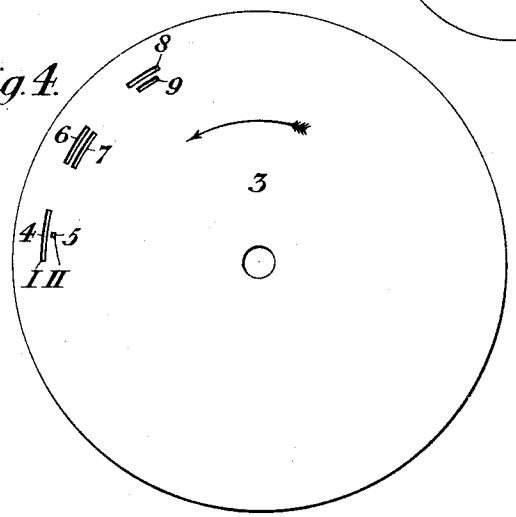
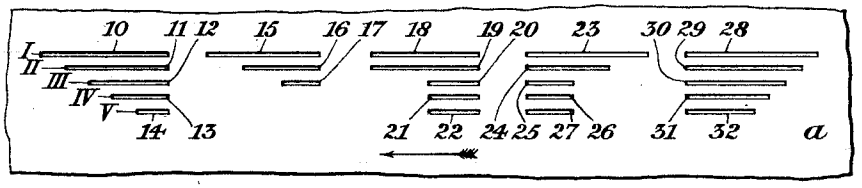


Fig. 5.



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MUSIC-RECORD FOR USE IN AUTOMATIC MUSICAL INSTRUMENTS.

1,012,178. Specification of Letters Patent. Patented Dec. 19, 1911.

Original application filed August 24, 1905, Serial No. 275,611. Divided and this application filed August 24, 1906. Serial No. 331,910.

To all whom it may concern:

Be it known that I, JAMES JOHN WALKER, a subject of the King of Great Britain, residing at No. 27 Francis street, Tottenham Court Road, London, England, have invented new and useful Improvements in Music-Records for Use in Automatic Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

According to the present invention a tune sheet is provided which is capable, in a properly constructed instrument, of reproducing music in almost identically the same manner as that in which it was originally played and with all the fine gradations and variations which may have been imparted to that original. For this purpose, preferably, two kinds of slots are formed in the record sheet to represent each note, one being representative of the particular key depressed, and the length of time which the said key is retained depressed, and the other representative of the speed at which such key is depressed and released and which might well be called, as it is hereinafter, an accelerator slot or perforation. In the specification of Letters Patent No. 872267 an apparatus is described suitable for the production of this improved music record, but while the principle of the present invention is best appreciated after a perusal of the said prior specification, it is to be understood that the record may be produced by hand or in any other manner.

The distinguishing feature of this invention is that the two or more slots above mentioned are variably positioned relatively to each other and not in constantly the same relationship to one another, or in one of the two definite positions relatively to one another.

In the accompanying drawings:—Figure 1 is a plan of part of a perforated or slotted sheet, or band, for controlling, say, a pneumatically operated reproducing instrument. It may be that in this and the succeeding figures the various relative positions of the slots or music control elements have been exaggerated but this has been done in order to enable a clear understanding of the invention, as, in practice, the maximum and minimum variation in said relative positioning will be such as will suit the speed of travel of the record in the reproducer and the quickness of action of the motors, as will be readily understood. Fig. 2 is a sectional elevation of portion of an embossed record. Fig. 3 shows in perspective, one application of the invention to a barrel record. Fig. 4 is a plan of a disk record suitable for controlling an electrically operated instrument, and Fig. 5 is a plan of part of a sheet or band, having perforations or slots for controlling say a pneumatically operated organ swell.

The improved record is intended to be used in reproducing instruments in which the power operating the keys or levers can be augmented at any moment, as for instance in that class of instrument forming the subject of application for Letters Patent S. N. 275611 filed August 24th 1905, from which the present application is a divisional one, and in which two or more pneumatics or other motors are arranged in operative connection with each key, or lever, of the reproducer action.

The band or sheet *a* in Fig. 1 is shown provided with a series of perforations intended to represent a note which is to be played in various ways, by a pneumatic instrument of the type indicated above. The slots in the row marked I are the ordinary tune slots and may control one of the pneumatics connected with the key of the particular note represented by the slot. The slots in the row marked II are what may be termed "accelerator" slots, and these may control the other one of the pneumatics or motors connected with the key, as described in the above-named application for Patent S. N. 275611. The companion slots *b* and *c* are seen, in Fig. 1, to be cut abreast of one another, both at their front and rear ends, they therefore represent a loud note quickly damped for, as the band travels in the direction of the arrow, both motors or pneumatics will be put into action simultaneously, and the key in the reproducer being thus caused to rapidly descend, the corresponding note will be loudly struck. The slots *b*, *c*, terminating together, the actions of the two motors or pneumatics will terminate simultaneously and the lever is permitted to rise quickly, thereby producing an abrupt termination of the note. The slots *d*, *e* terminate together, but the slot *d* is

cut somewhat in advance of the slot *e*, therefore the corresponding motor or pneumatic is brought into action upon the key, somewhat in advance of the pneumatic, or motor, controlled by the slot *e*. The maximum power not being applied at once, the resultant descent of the key of the reproducer will be at only a medium speed and the note produced will be say a note of average loudness, the abrupt termination of the note is again obtained, however, by the simultaneous termination of the slots. The slot *f* at its forward end is far in advance of the slot *g*, the maximum power, in this instance, may therefore not be effectively applied for sounding the note, for, the pneumatic, or motor, controlled by the slot *f*, may have depressed the lever so far as to sound the note, or nearly so, before the power is augmented by the slot *g*, the key is therefore depressed comparatively slowly and the resultant note is soft but the abrupt termination is obtained in this instance also by the rear ends of the slots *f* and *g* being cut abreast of one another. The slot *h* commences abreast of the slot *j*, but terminates somewhat in arrear thereof, therefore the note will be struck loudly but the power applied by the slot *j*. being removed from the key in advance of that controlled by the slot *h*, the note ending will not be abrupt but of the ordinary character. The slot *l* commences somewhat in arrear of the slot *k* but terminates somewhat in advance thereof and, as will now be well understood, such a combination represents a note of the ordinary character. The slot *n* commences some distance in arrear of the slot *m* but terminates slightly in advance thereof, this combination represents a note of ordinary character softly struck. The slots *o* and *p* commence abreast of one another but the slot *p* terminates far in advance of the slot *o;* the note represented by this combination will therefore be loudly struck, but as the power controlled by the slot *p* is removed from the key at an early moment, say at or about the moment at which the note is sounded and the power controlled by the slot *o* continues to act, the note, although loudly struck will not be abruptly ended. The slot *r* commences slightly in arrear, but terminates some distance in advance of the slot *q;* this combination represents a note, say, of medium intensity and not abruptly ending. The slot *t* is seen to be very short, this is owing to the fact that it is required to augment the power controlled by the slot *s* very late in the action of the key to produce a soft note, the augmentation being quickly removed in order to produce the slow damping effect as before described.

Instead of motors or pneumatics, different sources of pressure may be connected to a single motor as is well known in the art.

In Fig. 2 a portion of a band or sheet is shown provided with two embossed or raised portions *u*, *v*, which stand in the same relation to one another as the slots *k* and *l* and are therefore suitable for the reproduction of a note of medium strength and of the ordinary character. The embossed band may be used to actuate a mechanical controlling mechanism for automatic instruments but it is necessary of course that such instrument be provided with extra levers or devices to be operated by the various series of "accelerator" embossments which are similarly disposed, with regard to the tune embossments, as the slots in the row II, Fig. 1, are to those in the row I.

Fig. 3 shows the invention applied to a barrel record, the tune staples, or it may be the pegs, of which are arranged in a similarly variable manner with regard to one another as the slots in Fig. 1. For instance the staples *w* and *x* are arranged side by side, their front and rear ends being opposite one another as is the case with the slots *b* and *c* Fig. 1. The front ends of the staples *y*, *z* are opposite one another, but the staple *y* extends far in arrear of the staple *z*, this arrangement corresponds to that of the slots *o*, *p*, Fig. 1. Similarly the staples 1 and 2 correspond in their relative positions to the slots *k* and *l*, Fig. 1, and represent a note of ordinary character and of medium intensity.

The disk record shown in Fig. 4 may consist of a disk 3 of conducting material coated with a surface of varnish or other insulating material, the record being scratched through the insulating coating to expose the conductor in a well-known manner. The disk 3 turns in the direction of the arrow and the marks 4 in row I, and 5 in row II, are relatively disposed with regard to one another to produce a soft note in the same manner as are the slots *s*, *t*, Fig. 1. Also the relative positions of the markings 6, 7 are intended to represent a loud note and correspond to those of the slots *b*, *c*, Fig. 1, and the markings 8 and 9 to represent a note of average intensity and character corresponding to that produced by the slots *k*, *l*.

The record band seen in Fig. 5 has five rows of slots and is chiefly applicable for the operation of the heavier levers or controlling devices such as a swell lever. For instance supposing each slot in either of the rows I to V is capable of controlling a source of power sufficient for operating the swell lever, to open the swell box either partially or completely, slightly in the case of the row I and more and more in the case of the other rows, the row V providing for the complete opening of the said swell box, then the slots 10 to 14 represent a more or

less ordinary manipulation of the swell pedal, commencing slowly and gradually accelerating in speed as the power for operating the lever is augmented by the successive registrations of the forward ends of the slots 11, 12, 13 and 14 with the tracker, or other power-controlling device. The slots 15, 16 and 17 may represent a partial opening of the swell at a rather slow rate of speed, the forward end of the slot 16 commencing some distance in arrear of the front end of the slot 15 and the slot 17 in arrear of the slot 16, so that, the augmentation of power being slow, a slow operation of the lever results and only part of the available power being employed, as only three slots are used out of five, the swell box may not be completely opened. The slots 18 and 19 are cut with their forward ends abreast of one another and they will thus effect the application of say two fifths of the available power to the swell lever, which will commence to operate rather quicker than with the preceding example. Some time afterward, say when the swell has been half opened, the slots 20, 21, 22, having their front ends cut abreast of one another, bring into operative effect the total amount of power, the result being a quick completion of the movement of the swell lever.

It will be seen by reference to Fig. 5, that in each of the three foregoing examples the rear ends of all the slots in each group representing an operation of the swell lever, have been cut abreast of one another, thus, in operation, the maximum power is suddenly cut off, thereby permitting the swell lever to rise quickly and to suddenly close the swell box. The slots 23, 24, 25, 26 and 27 having their front ends all in the same straight line transversely of the band, the swell lever in this case will be suddenly and perhaps completely opened. The slots 25, 26, 27 terminate in the same transverse straight line, while the slot 24 terminates some distance in arrear of these slots and the slot 23 some distance in arrear of the slot 24, thus, after the slots 25, 26, 27 have been moved away from the tracker board, the swell will be allowed to close gradually. In the last example shown in Fig. 5, the slots 28 to 32 have their forward ends cut in the same transverse straight line and in operation the swell lever will be quickly operated to suddenly and fully open the swell, in order, it may be, to give a dramatic effect to a passage of music; after the termination of the slot 32 the swell lever is gradually allowed to close, as will be seen and understood from the relative positions of the rear ends of the slots 31, 30, 29 and 28.

It is apparent that this invention is not restricted to the employment of any particular number of companion slots, but each note, or expression, or swell controlling perforation may be accompanied by any desired number of accelerator slots, or perforations, the relative positions of the front and rear ends of which may vary in very many ways, a few of which have been described, in order to give practically an exact record of the manipulation of the various keys, levers, or controlling devices, into the action of which speed enters as a factor more or less important.

This invention enables the records of tune and expression to be simultaneously effected by one operation of a recording key or lever, instead of the tune record requiring to be gone through a second time for the insertion of the expression slots or markings as has hitherto generally been necessary.

I claim,

1. A music record having principal music control elements of varying lengths in parallel rows each of such elements being representative of a respective key to be depressed when the record is in operation and the length of time during which said key is depressed; and additional music control elements also of varying lengths and located in rows parallel with the first named rows said additional elements being situated at different distances behind respective principal elements in such a manner that every additional element is not only accessory to a respective principal element but the distance of any additional element behind its respective principal element is representative of one of many speeds of depression of the corresponding key lever.

2. A music record having principal music control elements of varying lengths in parallel rows each of such elements being representative of a respective key to be depressed when the record is in operation and the length of time during which said key is depressed; and additional music control elements also of varying lengths and located in rows parallel with the first rows said additional elements having their forward ends at different distances behind the forward ends of the respective principal elements in such a manner that every additional element is not only accessory to a respective principal element but each of said different distances is representative of one of many speeds of depression of the corresponding key lever.

3. A music record having principal music control elements of varying lengths in parallel rows each of such elements being representative of a respective key to be depressed when the record is in operation and the length of time during which said key is depressed: and additional music control elements also of varying lengths and located in rows parallel with the first rows said additional elements having their forward ends at different distances behind the forward

ends of respective principal elements in such a manner that every additional element is not only accessory to a respective principal element but each of said different distances is representative of one of many speeds of depression of the corresponding key lever all of said additional elements moreover having their rear ends in advance of the rear ends of respective principal elements.

4. A music record having principal music control elements of varying lengths in parallel rows each of such elements being representative of a respective key to be depressed when the record is in operation and the length of time during which said key is depressed; and groups of additional music control elements also of varying lengths located in rows parallel with the first named rows every group of additional elements being accessory to a respective principal element the forward ends of members of any group being at different distances behind the forward end of a respective principal element, said distances increasing from the first to the last member of each group, the rate of such increase and the distance of the first additional element behind its respective principal element being representative of the speed of depression of the corresponding key lever.

5. A music record having principal music control elements of varying lengths in parallel rows each of such elements being representative of a respective key to be depressed when the record is in operation and the length of time during which said key is depressed; and groups of additional music control elements also of varying lengths located in rows parallel with the first named rows every group of additional elements being accessory to a respective principal element the forward ends of members of any group being at different distances behind the forward end of a respective principal element, said distances increasing from the first to the last member of each group, the rate of such increase and the distance of the first additional element behind its respective principal element being representative of the speed of depression of the corresponding key lever the rear ends of members of any group being in advance of the rear end of the respective principal element.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES JOHN WALKER.

Witnesses:
HENRY HART,
A. NUTTING.