

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

A Musical Instrument for Producing Bass Tones

We, JOH MUSTAD AB, a Swedish company of Norra Hamngatan 4, Goteborg 1, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

Natural instruments for producing bass tones are bulky and difficult to transport. Further it is true for such instruments, e.g. double basses and tubas that tone production is a problem especially when fast passages are played and this kind of playing calls for great experience.

The purpose of the present invention is to provide a musical instrument in which said drawbacks, as far as possible, have been eliminated and which also gives new and valuable possibilities in musical respect.

An electrophonic musical instrument in accordance with the present invention for producing bass tones comprises a chassis, for example of guitar shape, to be carried during playing such box having a button or key manual the keys or buttons being associated with electrical contacts for putting into operation means for electronically producing bass tones, means for automatically building up and fading away the tones to simulate plucked double bass playing, and manually operable controls for modifying the timbre of the tones.

In the following, the invention will be elucidated with reference to the accompanying drawings, these drawings being intended to illustrate the invention and not restrict it.

In the drawings:—

Fig. 1 shows diagrammatically the exterior of a device according to the invention comprising a unit that can be carried, an amplifier and a loud-speaker, and

Fig. 2 shows as an example an embodiment of the construction of the electronic portion of the device.

The device shown in Fig. 1 comprises a

chassis part 1 to be carried which is shaped as the resonance box of a guitar or other musical instrument. The part 1 is provided with a manual constituted by a keyboard 2 which can comprise keys in the same way as a piano or buttons as in a way similar to conventional button accordions. The number of keys or buttons corresponds to the need for performing the bass accompaniment of actual music pieces whereas an increase of the tone field in relation to actual natural instruments can easily be achieved in the device according to the invention.

The unit 1 is provided with operation means, e.g. buttons or keys 3 and 4 for influencing the character of the reproduced sound, e.g. for timbre selection, the keying etc. The means 3 of the timbre selector should be easy to operate by the left hand. In a way known per se the unit 1 is further provided with a carrying strap 8.

The part 1 can contain the means required for producing and coupling of the intended bass tones and to the same there could be connected an amplifier 6 and a sound producing device 7. However, the amplifier and the loud-speaker could with advantage be included directly in the unit 1 which further could contain the required electric current sources for the instrument and thus the player will be completely independent of a mains source of electric power which gives an increased freedom for the choice of place for the playing. It is possible to take into account the current consumption which by means of a high resistant coupling can be kept at a low level.

The device according to Fig. 1 comprises an electronic portion included in the unit 1 and contact means operated by means of the keys 2 so as to initiate the intended bass tones. An embodiment of a circuit diagram for the electronic portion is shown in Fig. 2.

A transistor T1 (which of course can be

replaced by a corresponding electron tube) which together with the oscillating circuit C1, C2, C3, L1 connected between the base and the collector of the transistor comprises an oscillator for producing the intended bass tones. Between the emitter of the transistor and an earthed conductor 11 there is connected a variable resistance R4 and between the base of the transistor and the conduit there are connected resistances R18—R41 which can be connected by means of the keys of the manual. The resistances R18—41 are connected in series and a terminal between each resistance allows each resistance to be connected to the lead 11 by means of one of the keys, said keys in Fig. 2 being indicated by means of a letter denomination for the corresponding tones in the chromatic scale. It is obvious from Fig. 2 that a pressing down of an arbitrary key 2 will cause a coupling in series of the resistances from the resistance R18, inclusive, and the resistance for the corresponding pressed down button, inclusive, to remain connected between the base of the transistor and the earthed conduit 11. This will give such an adjustment of the oscillator comprising the transistor T1 and the elements C1—C3 that this oscillator will produce the bass tone corresponding to the pressed down key. It is also obvious that the instrument is capable of producing only one tone at a time.

The variable resistance R4 allows the instrument to be tuned.

Between the collector of the transistor T1 and the pole B of the voltage source there is connected a resistance R2. Between the terminal B and earth there are connected in series a resistance R1 and a variable resistance R3, the latter being intended for the setting of the lowest tone (F) of the bass tone scale.

The signal output from the oscillator is obtained from a central tapping of the inductor L1 so as not to load the frequency determining parts of the oscillator. Between the output 12 from the coil L1 and earth there is connected in parallel the resistance R5 and the condenser C4. The lead 12 is connected to the base of a second transistor T2 via a resistance R6 and a condenser C7 in series with one another. From a tapping between the resistance R6 and the condenser C7 there is connected a filter unit comprising the condenser C11 as well as the condenser C5 and the inductor L2 coupled parallel therewith. Further, the condenser C6 can be coupled in parallel with the condenser C5 and the inductor L2 by means of the contact K1 whereas the filter portion C5 and L2 can be short-circuited to earth by means of another contact K2.

The base of the transistor T2 is connected to earth via the resistance R7 and its emitter is connected directly to earth. Between the

base of the transistor and the collector there is connected the resistance R8. The output signal from the transistor T2 is taken out via the condenser C9 in series with the resistance R14. Between the resistance R14 and earth there is connected a potentiometer R15 which serves as a volume control and which has its movable contact connected to the output terminal U of the coupling. The condenser C12 can be connected in parallel with the potentiometer resistance by means of the contact K3.

Thus, the contacts K1, K2 and K3 can be used for connecting the low pass filter described in the foregoing and they serve thereby as a timbre selector and for the modification of the tone character of the output tone signal.

Between the collector of the transistor T2 and the terminal B of current source there is connected a coupling in series of the resistances R9, R10, R11 and in series therewith, via the switch K4, the parallel coupling of a resistance R17 and a resistance R16, the latter in series with the condenser C10. The switch K4 comprises a key contact which is common to all the keys 2 of the instrument, i.e. a pressing down of any of the keys will cause the movable contact of the switch K4 to be connected with the resistance 11. When the key is released, said movable contact is connected with the terminal B so that the parallel coupling of the resistances R17 and R16 in series with the condenser C10 is short-circuited whereby the loading of the condenser C10 leaks away. At a renewed pressing down of the actual key or another key the movable contact of the switch K4 is again connected to the resistance R11 and a current impulse passes until the condenser C10 is loaded which causes a tone to be produced with a rather strong attack. The resistance R17 determines the steady signal after the keying; i.e. the signal which remains after said attack at the keying moment. The resistance R16 is intended to protect the switch against the detrimental influences of spark formation. The variable resistance R11 determines the tone build-up.

Between the resistances R9 and R10 there is connected one side of a condenser, the other side of said condenser being connected to earth. This condenser causes the desired tone muffling and damping. Between earth and the connection between the resistances R10 and R11 there is finally connected a coupling in series of the resistances R12 and R13 of which the resistance R12 is variable and intended to control the fading away of the tone.

The output U of the coupling according to Fig. 2 can be connected in a way known per se with an amplifier and a sound reproducer, the latter being of conventional type wherefore they do not have to be described in detail in connection with the present invention.

Examples of suitable values of the components comprised in the circuit diagram

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according to Fig. 2 are given in the table here below.

TABLE

5	T1 =OC 47 T2 =OC 47 L1 =2×1335,5/0, type Ferrox Cube L2 =1600/0,11 C1 =0,047 μF C2 =0,068 μF
10	C3 =300 pF C4 =1 μF C5 =0,047 μF C6 =0,47 μF C7 =0,1 μF
15	C8 =0,22 μF C9 =0,047 μF C10=2 μF C11=0,1 μF
20	R1 =1,5 M (Ohm) R2 =100 K (Ohm) R3 =500 K R4 =1 K R5 =5 K R6 =47 K
25	R7 =100 K R8 =5,1 M R9 =100 K R10=22 K R11=250 K
30	R12=2 M R13=68 K R14=15 K R15=250 K R16=47 Ohm
35	R17=2 M R18=50 K —33 K R19=5 K —2,6 K R20=5 K —3 K R21=5 K —3,4 K
40	R22=5 K —4 K R23=10 K —4,5 K R24=10 K —4,8 K R25=10 K —5,6 K R26=10 K —6,8 K
45	R27=10 K —7,1 K R28=10 K —8,5 K R29=20 K —10 K R30=20 K —12,5 K R31=20 K —15 K
50	R32=50 K —20 K R33=50 K —22 K R34=50 K —25 K R35=50 K —33 K R36=100 K—47 K
55	R37=100 K—65 K R38=200 K—100 K R39=200 K—160 K R40=500 K—270 K R41=1 M
60	K1, K2 and K3=timbre selector K4=keying contact, common for all the keys

Tone character counter bass=K2 and K3 closed
 „ baritone =all contacts open
 „ resonance =K1 closed

Loading capacity:—
 All the resistances ½W
 All the condensers min. 30 Volts.

Concerning the timbre selectors K1, K2, and K3 it should be mentioned that a simultaneous closing of the contacts K2 and K3 causes the output tones to get the character of counter bass tones while the tones will have baritone character when none of the contacts K1, K2, and K3 is closed. A closing of only the contact K1 causes a resonance effect of the output tone signal whereby the tone has the "Vox humana" quality. Further filter elements could of course be connected if considered as suitable so as to obtain other tone qualities.

The invention has been described in the foregoing for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims. Thus, many modifications could be carried out within the scope of the invention.

One of the most important advantages obtained by means of the instrument according to the present invention beside its low weight and its great possibilities of variation concerning the tone character is that the instrument can be played by any musician who is used to play an instrument of another type but having a manual of the same kind as the instrument according to the present invention. Due to the invention, many musical ensembles, especially those playing dance music and entertainment music, could get along without any trained bass instrument player.

WHAT WE CLAIM IS:—

1. An electrophonic musical instrument for producing bass tones comprising a chassis, for example of guitar shape, to be carried during playing such box having a button or key manual the keys or buttons being associated with electrical contacts for putting into operation means for electronically producing bass tones, means for automatically building up and fading away the tones to simulate plucked double bass playing, and manually operable controls for modifying the timbre of the tones.

2. A musical instrument as claimed in claim 1, comprising an electric and electronic circuit enclosed in said chassis, said circuit comprising an oscillator for producing bass tones, contacts controlled by the buttons or keys of the manual for connecting electric elements so as to tune said oscillator to the frequencies corresponding to the key and means for tuning and adjusting said oscillator.

3. A musical instrument as claimed in claim 2, wherein means are provided for con-

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necting an adjustable low pass filter after the oscillator in the circuit.

- 5 4. A musical instrument as claimed in any of the preceding claims, wherein the chassis includes an electric current source and all the required electric and electronic circuit elements.

5. A musical instrument as hereinbefore des-

cribed with reference to, and as shown in, the accompanying drawings.

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Fig.1

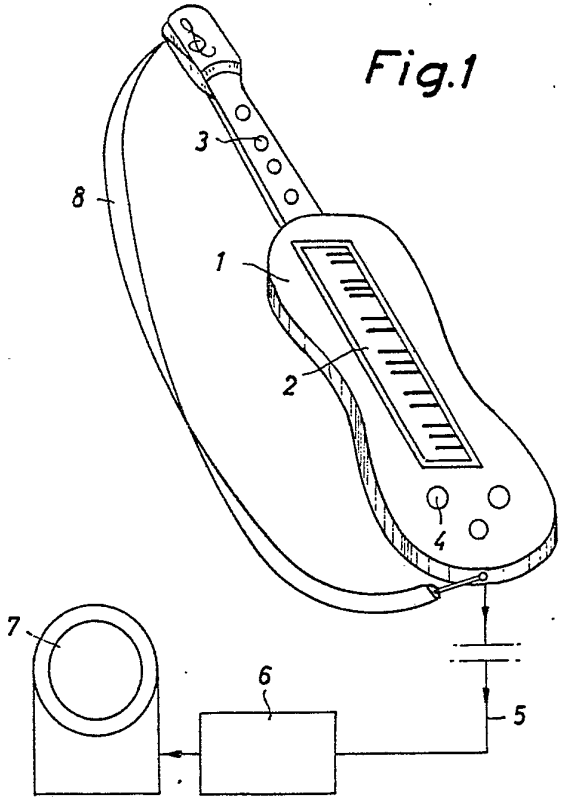
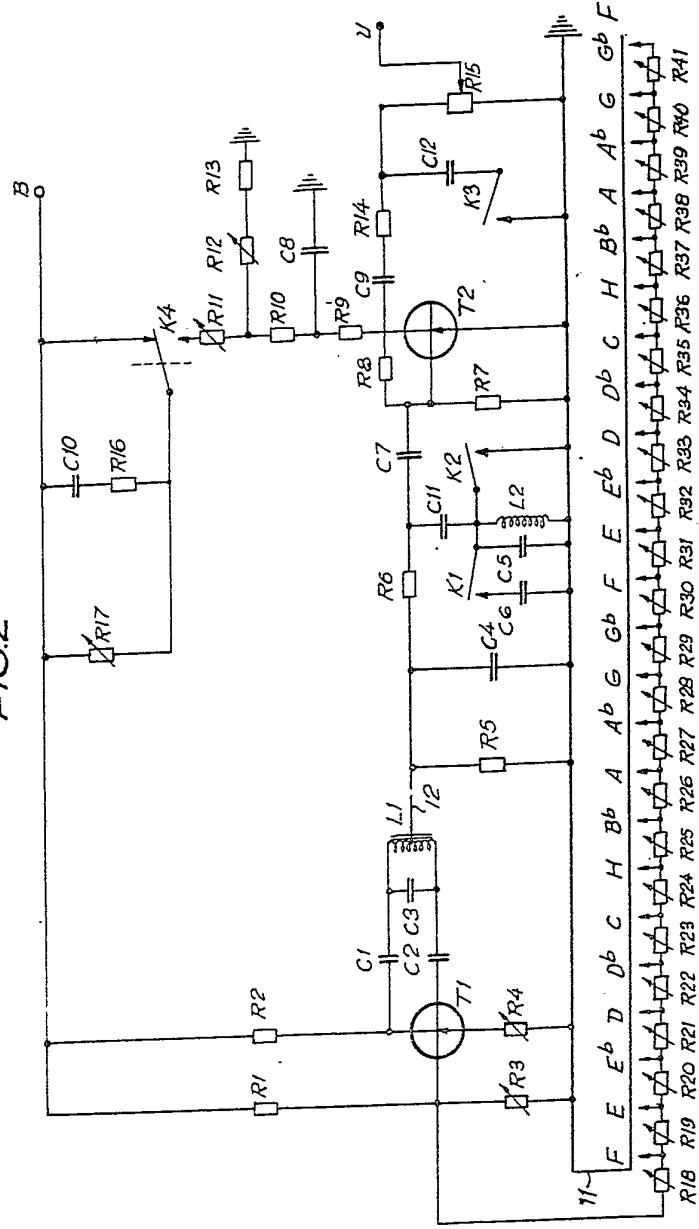


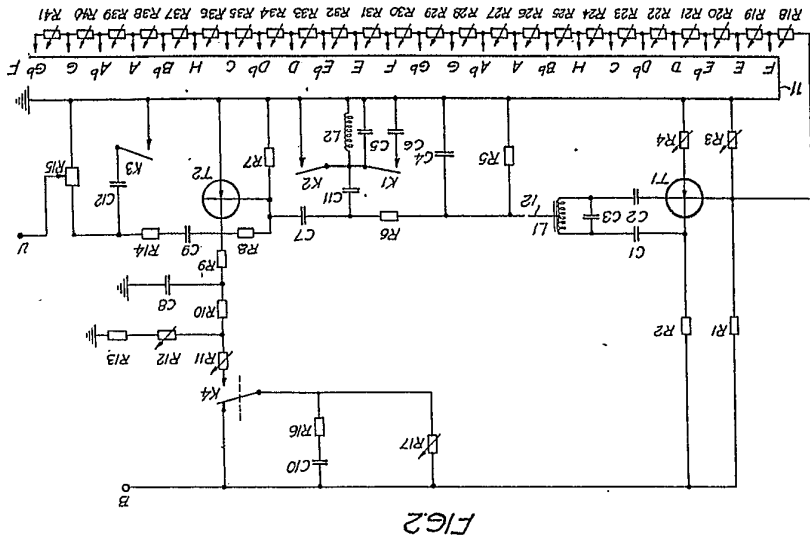
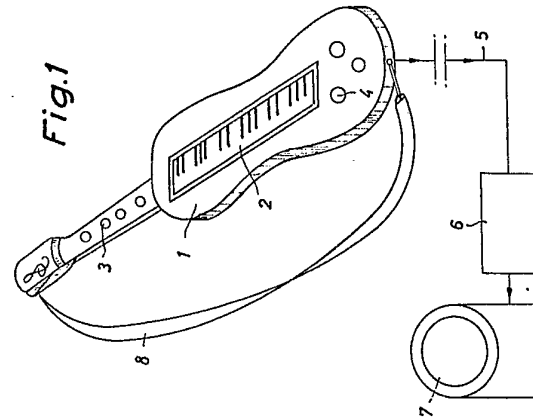


FIG.2



F E Eb D Db C H Bb A Ab G Gb F
 R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41

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 2 SHEETS This drawing is a reproduction of
 the Original on a reduced scale.
 Sheets 1 & 2



R18 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41
 F E E^b D D^b C H B^b A A^b G G^b F
 F E E^b D D^b C H B^b A A^b G G^b F

FIG. 2