

Dec. 15, 1942.

J. A. KOEHL

2,305,575

MUSICAL INSTRUMENT

Filed Dec. 4, 1941

2 Sheets-Sheet 1

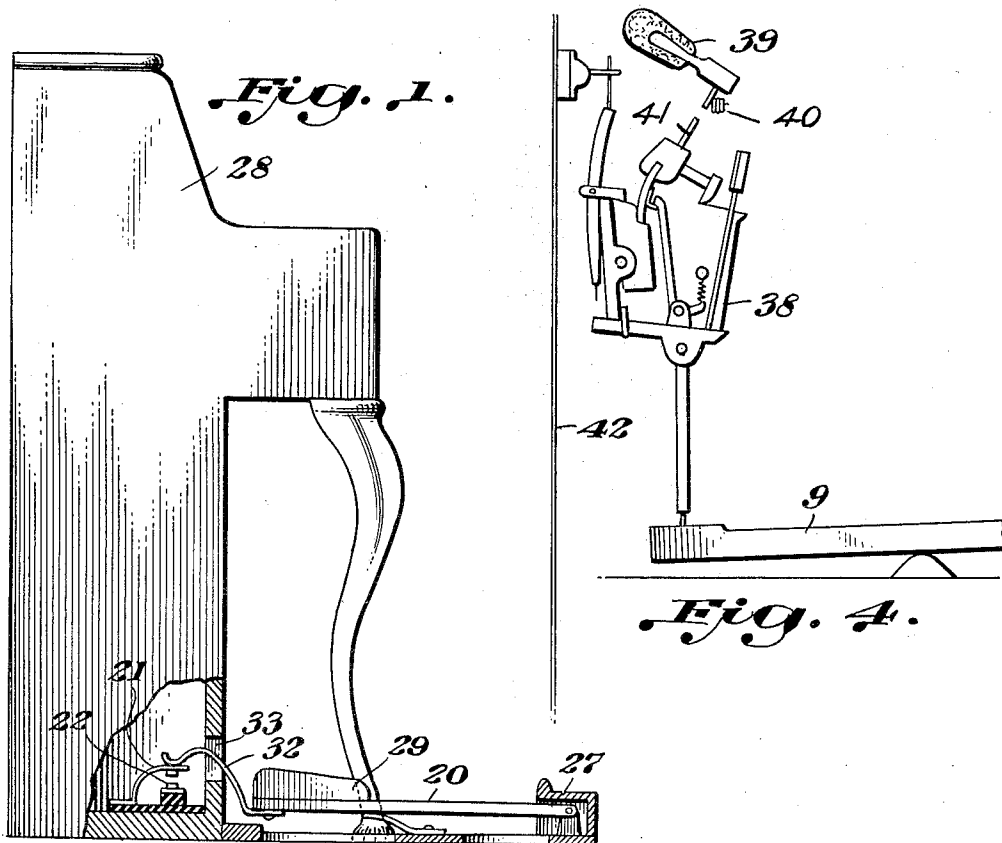


*Fig. 5.*

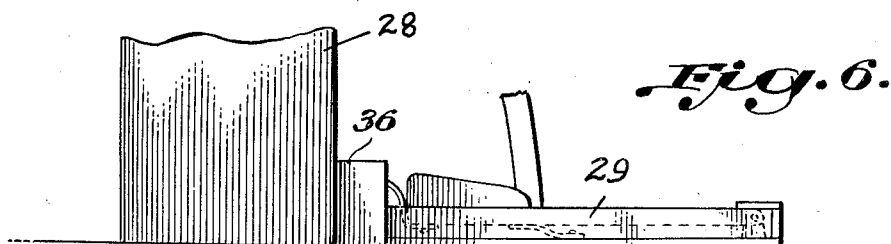
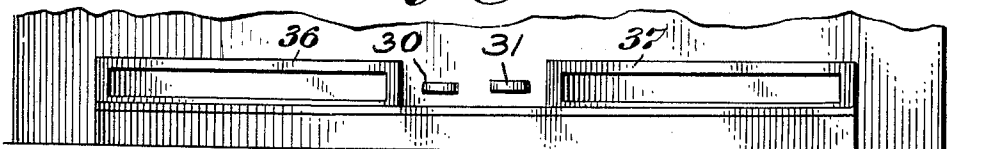


*Fig. 6.*

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**Dec. 15, 1942.**

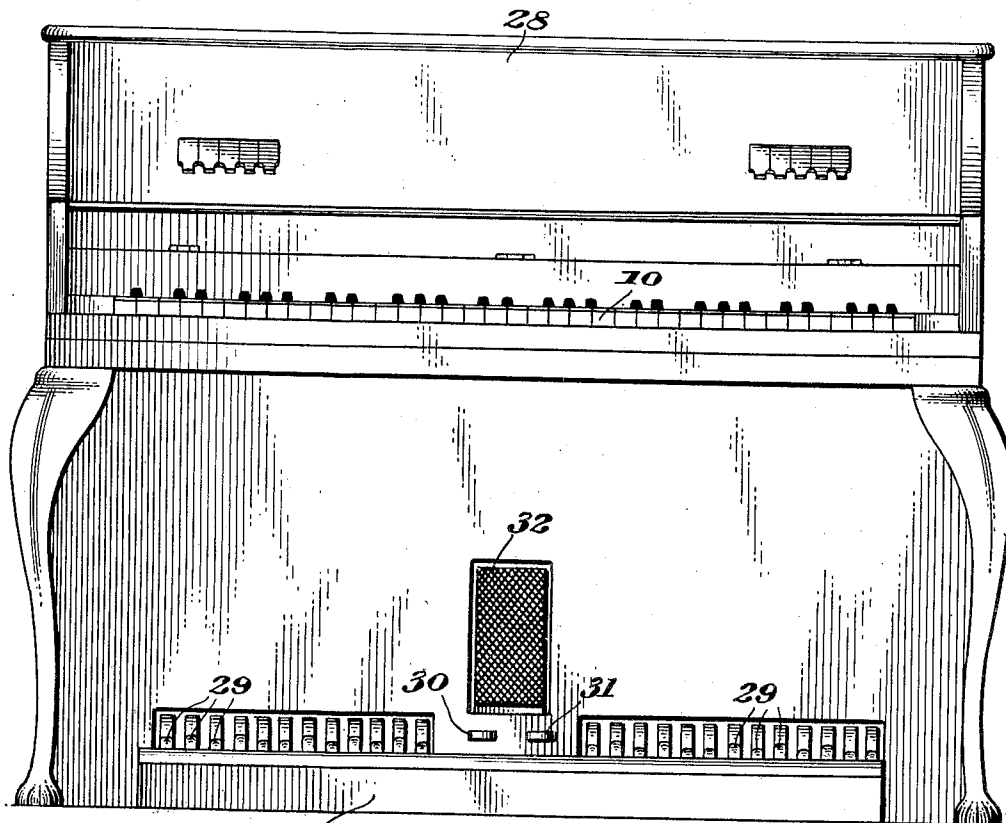
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MUSICAL INSTRUMENT

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2 Sheets-Sheet 2



27 *Fig. 2.*

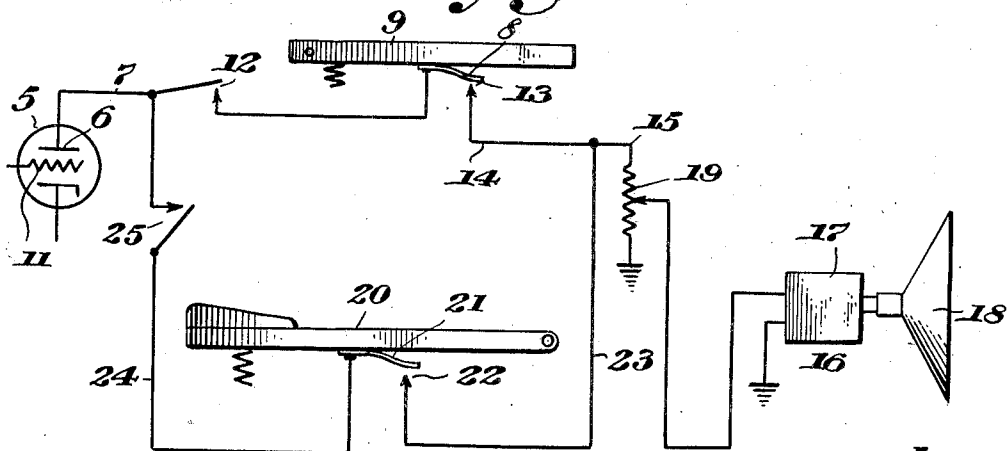


*Fig. 3.*

*Inventor,*

James A. Koehl

## UNITED STATES PATENT OFFICE

2,305,575

## MUSICAL INSTRUMENT

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8 Claims. (Cl. 84—1.01)

This invention relates to musical instruments and has particular reference to the type of instrument disclosed in my prior Patent No. 2,250,065, dated July 22, 1941, and has for its primary object the provision of a new, novel and effective system of controls for the various electro-mechanical sound producing mechanisms herein employed.

An important object of the invention is to arrange the expression pedals of a piano and the pedal clavier of my electric organ to enable instantaneous shifting of the feet of the player from the pedal keys of said pedal clavier to the expression pedals of the piano and vice versa according as changes in expression and musical effects are desired.

A still further object is to provide a piano with a pedal clavier which is actuatable substantially in the manner of the pedal clavier of any well known organ and whose relation to the keyboard of the piano is the same as that of the pedal clavier to said organ, i. e. substantially medially of the compass of the notes of said keyboard.

While I preferably employ an expression pedal for controlling the amplitude of electrically produced sounds, in some instances, said pedal will be omitted and some equivalent controlling means substituted therefor. This could be the case where my invention is sold as an attachment to a piano. With this in mind, it is a further object to provide a pedal clavier which will readily accommodate the customary expression pedals of and without the necessity of structural alterations to the piano.

The novel features of my invention are set forth with particularity in the hereto appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will be more fully understood from the following description of a preferred embodiment, when taken in connection with the accompanying drawings, in which:

Figure 1 is a view partly in end elevation and partly in section of my invention;

Figure 2 is a view in front elevation thereof;

Figure 3 is a schematic illustration of one of the electrical circuits employed;

Figure 4 is a view in elevation of the hammer action;

Figure 5 is a detail view in elevation of a slightly modified form of my invention, and

Figure 6 is a front elevation of the form shown at Figure 5.

In carrying the invention into practice it will

suffice to say that the electro-mechanical system herein employed may be the same as the system disclosed in my aforementioned prior patent.

In Figure 3, 5 represents an oscillator, the plate 6 of which is connected by a circuit lead 7 with a contactor 8 of playing key 9 of the keyboard 10 shown at Figure 2. The screen grid 11 of said oscillator may be supplied with a controlling signal from any well known frequency controlling source, not shown, such that the oscillator will deliver an output signal having the frequency of the musical note associated with said key 9. Circuit lead 7 has an electric switch 12 adapted when close circuited to cause current flow to said key contactor 8. A contactor 13, together with contactor 8 completes an electric switch for said key, and, as shown, contactor 13 connects by a circuit lead 14 with a common output conductor 15, the latter, in turn, connecting with an amplifying and sound producing system 16. The system 16 comprises an amplifier 17, electrical sound producer 18 and a potentiometer 19. In this manner, and as is well known in the art, amplified alternating current from said oscillator 5 will be converted into audible sound of any desired amplitude and the sound sustained as long as desired. The potentiometer 19 is adapted to be actuated by an expression pedal which will be more fully referred to presently.

Connected in the circuit shown at Figure 3 is a pedal key 20, having an electric switch consisting of contactors 21 and 22 which are open circuited when the key is elevated. Contactor 22 connects by a circuit lead 23 with said common output conductor 15. Contactor 21 connects by a circuit lead 24 with the output lead 7 from oscillator 5, and, as shown, said lead 24 has an electric switch 25. When switch 25 is close circuited and switch 12 in lead 7 is open circuited, output current from said oscillator 5 is supplied contactor 21 of said pedal key 20. Upon depressing said pedal key the circuit thereby established causes current to be conducted from said oscillator and impressed upon said output conductor and translated into audible sound of any desired amplitude. With the circuit in the condition last stated, no current will be conducted to the contactor 8 of playing key 9 and the latter may be used for the playing of piano music. When switches 12 and 25 are both there-of close circuited, current from oscillator 5 is fed to the electric switches of keys 9 and 20 and impressed upon said output conductor 15 upon depressing said keys.

If now, we assume that each individual play-

ing key 9 will have an oscillator 5 and an electric switch for controlling conduction of output oscillations to the work circuit of my system, it follows that upon playing said keys, sustained tones having the characteristics of organ tones will be sounded and the tones sustained as long as desired.

At Figures 1 and 2 is shown a pedal clavier 27 which is substantially coextensive with the case of the piano 28. Said clavier has a group of keys 29 situated at the left of the expression pedals 30-31 of the piano and a similar group of keys 29 at the right of said expression pedals. These pedals are each thereof the same as pedal 20 referred to in the above description of the circuit shown at Figure 3 and each pedal will have a resilient switch actuator 32 adapted to enter a slot 33 in the case of the piano and lightly rest upon the contactor 21 of the electric switch which is individual to said key.

Said pedal clavier is detachable from the piano and by reason of the manner of grouping the pedal keys 29, the expression pedals 30-31 lie in the plane of said clavier and are laterally spaced apart from adjacent keys 29 as shown at Figure 2. In this manner, the feet of the player can be shifted as desired from the keys of the clavier to the expression pedals of the piano and vice versa and with required ease and convenience during concurrent playing of piano and organ music. When either type of music is played independently of the other, the expression pedals 30-31 or the keys 29, as the case may be, can be operated in the manner common to the organ and to the piano as will be readily understood.

In order that the potentiometer can be conveniently controlled from the pedal section of my organization, I provide an expression pedal 32 which is preferably set into the case of the piano where it occupies a position above the expression pedals 30-31 and in back of the clavier.

This method of assembling the pedal keys 29 and expression pedals 30-31 and 32, not only provides for compactness of the parts but enables any of said parts to be controlled from customary positions and insures instantaneous actuation of said parts according as different musical results are desired.

Each pedal key 29 will have its circuit controlling electric switches connected with an oscillator whose output frequency corresponds to the vibration frequency of the musical note associated with said key.

In those instances where the invention is employed as an attachment to a piano, the electric switches for the pedal clavier are preferably contained in a housing organization disposed in front of the case of the piano as shown at Figures 5 and 6. Said housing organization has a section 36 at the left of the expression pedals 30-31 and a similar section 37 at the right thereof. In this manner, the pedal clavier can be readily associated with the piano without requiring any changes in the construction of the case of the instrument and the expression pedals 30-31 will occupy their customary positions.

At Figure 4 is shown a conventional piano action 38. A single playing key 9 is illustrated. The hammer 39 for said key has its shank 41 resting against a manually shiftable stop 40. When the stop is advanced against the shank, the hammer will bear against the string 42 where it will be non-responsive to motion of the key 9, thereby enabling electrically produced music to

be rendered independently. As this feature has been fully described in my aforementioned prior patent, no further description is deemed necessary.

To the best of my knowledge no one has ever before combined a pedal clavier with the keyboard of a piano, and I therefore reserve the right to employ said clavier in association with any well known system having for its purpose the electrical production of organ tones. In some instances, said pedal clavier can comprise the whole of the invention herein disclosed and may be attached to a piano for coaction therewith to produce chorus, solo and many novel musical effects. While I have shown a pedal clavier having but twenty-five pedal keys, the number of keys can of course be either increased or decreased without departing from the spirit of my invention.

What I claim as my invention is:

1. In an electro-mechanical musical instrument employing a keyboard, tuned strings, an action operated from said keyboard for vibrating said strings, a system of generators of tone signal currents including electro-acoustic means for translating said signal currents into audible sounds, means actuable by the playing keys of said keyboard for rendering selected tone signal currents effective upon said translating means, and expression pedals for controlling the volume of sound produced by said strings; a pedal board, the pedal keys of which and said expression pedals occupy substantially the same horizontal plane, means actuable by said pedal keys for rendering tone signal currents effective upon said translating means from selected generators of said system of generators, an expression pedal disposed above the aforementioned expression pedals and in back of said pedal keys, and means actuable by the last named expression pedal for controlling the amplitude of sound produced by said translating means.

2. In an electro-mechanical musical instrument employing a case having a keyboard, tuned strings, an action operated from said keyboard for vibrating said strings, a system of generators of tone signal currents including electro-acoustic means for translating said signal currents into audible sounds and means actuable from said keyboard for rendering tone signal currents effective upon said translating means, and expression pedals for controlling the volume of sound produced by said strings; a pedal board, the pedal keys of which and said expression pedals occupy substantially the same horizontal plane, means actuable by said pedal keys for rendering tone signal currents effective upon said translating means from selected generators of said system of generators, an expression pedal set into the case above the plane of the aforementioned expression pedals and in back of said pedal keys, and means actuable by the last named expression pedal for controlling the amplitude of sound produced by said translating means.

3. The combination with a piano including its case, expression pedals and a keyboard, of a pedal keyboard extending substantially from one end of the case to the other end thereof and provided with a group of pedal keys disposed at the left of said expression pedals and a group of pedal keys disposed at the right thereof, an electrical tone signal generating system, and means actuable by said pedal keys for rendering effective upon an electroacoustic translating means selected elec-

trically generated tone signals from said signal generating system.

4. The combination with a piano including its case, expression pedals and a keyboard, of a pedal keyboard extending substantially from one end of the case to the other end thereof and provided with a group of pedal keys disposed at the left of said expression pedals and a group of pedal keys disposed at the right thereof, an electrical tone signal generating system, an electroacoustic translating device for conversion of tone signal current generated by said system into audible sound, means actuable by said pedal keys for rendering signal current effective upon said translating device upon depression of any selected pedal key, and an expression pedal set into said case above said expression pedals and in back of said pedal keys.

5. The combination with an electrical system for the selective continuous generation of currents of audible frequency and a piano, the playing keys of the keyboard of which are in electrical coaction with said system to enable selective conduction of signal current to a work circuit; of a pedal keyboard, the keys of which are also in electrical coaction with the aforementioned electrical system to enable selective conduction of signal currents to said work circuit, the expression pedals of said piano extending into the plane of said pedal keyboard and spaced apart laterally from adjacent keys thereof.

6. The combination with an electrical system for the selective continuous generation of currents of audible frequency and a piano, the playing keys of the keyboard of which are in electrical coaction with said system to enable selective conduction of signal current to a work circuit; of a pedal keyboard extending approximately the full length of

the case of said piano, the keys of said pedal keyboard also having electrical coaction with the aforementioned electrical system to enable selective conduction of signal current to said work circuit, the expression pedals of said piano extending into the plane of said pedal keyboard and spaced apart laterally from adjacent keys thereof.

7. The combination with an electrical system for the selective continuous generation of currents of audible frequency and a piano, the playing keys of the keyboard of which are in electrical coaction with said electrical system to enable selective conduction of signal current to a work circuit; of a pedal keyboard, the keys of which are also in electrical coaction with the aforementioned electrical system to enable selective conduction of signal current to said work circuit, the expression pedals of said piano extending into the plane of said pedal keyboard and spaced apart laterally from adjacent keys thereof, and an expression pedal set into the case and above the plane of said expression pedals of the piano and in back of said pedal keyboard.

8. The combination with an electrical system for the selective continuous generation of currents of audible frequency and a piano, the playing keys of the keyboard of which are in electrical coaction with said system to enable selective conduction of signal current to a work circuit; a pedal keyboard detachably affixed to the case of said piano, the keys of said pedal keyboard also having electrical coaction with said electrical system to enable selective conduction of signal current to said work circuit, the expression pedals of said piano extending into the plane of said pedal keyboard and spaced apart laterally from adjacent keys thereof.

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