Dec. 23, 1930. F. M. ROBB 1,785,915

SOUND REPRODUCING INSTRUMENT

Filed Sept. 29, 1927 2 Sheets-Sheet 1

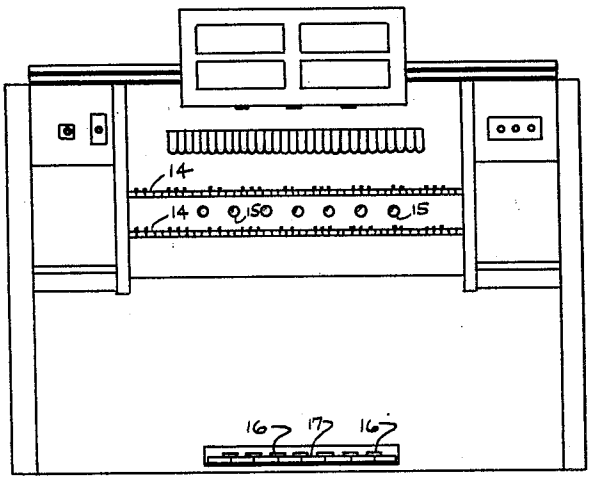


FIG 1.

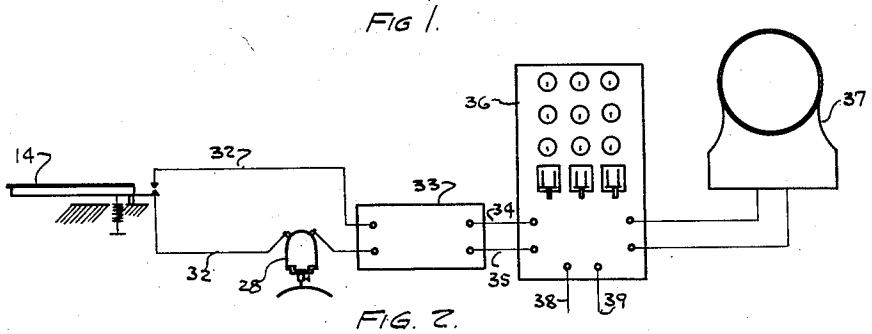


FIG. 2.

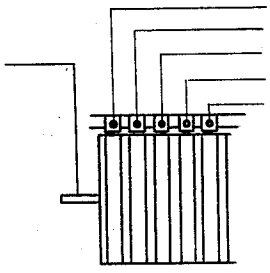


FIG. 9.

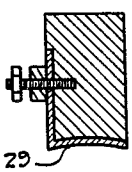


FIG 10

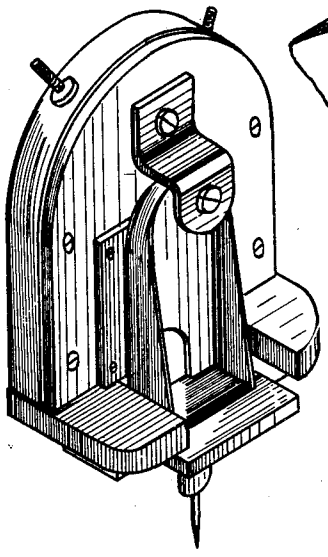


FIG. 8.

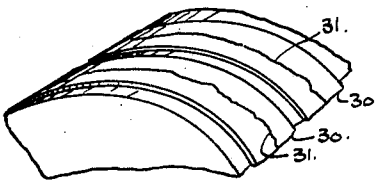


FIG. 5.

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SOUND REPRODUCING INSTRUMENT

Filed Sept. 29, 1927 2 Sheets-Sheet 2

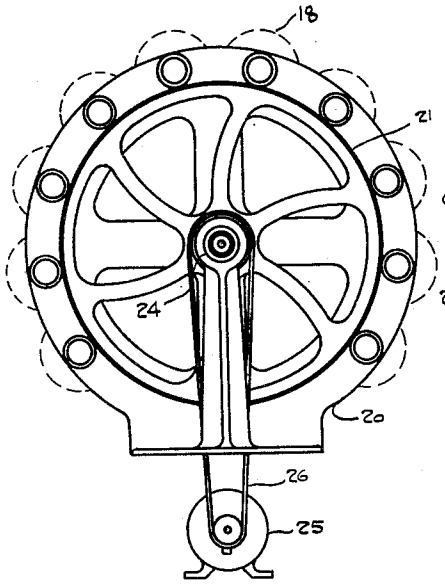


FIG. 6.

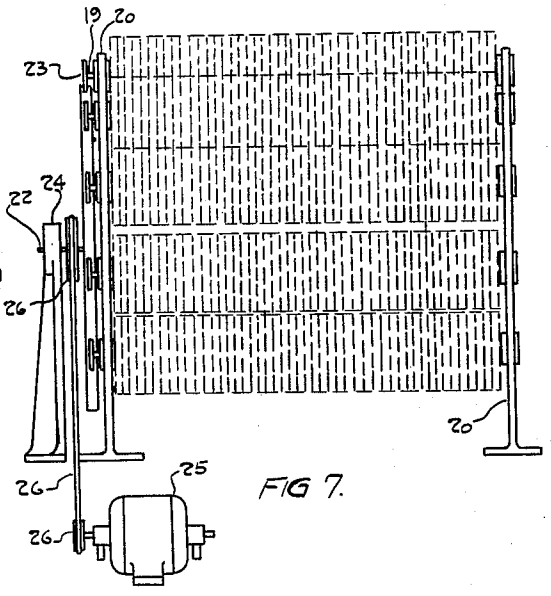


FIG 7.

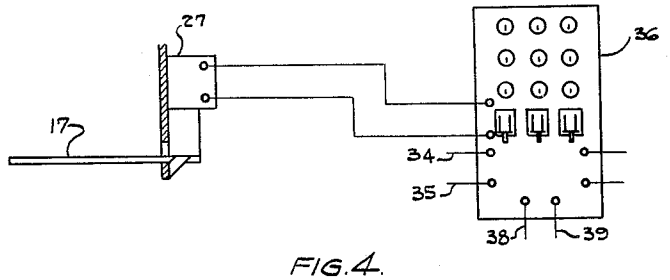


FIG. 4.

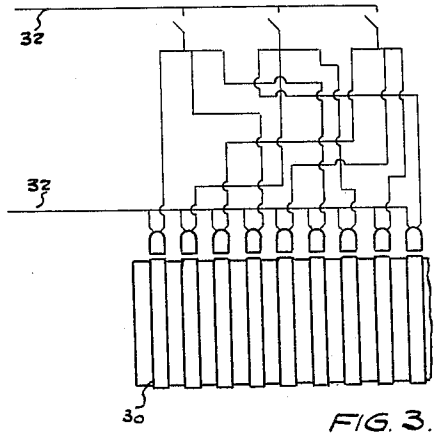


FIG. 3.

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Patented Dec. 23, 1930 1,785,915

UNITED STATES PATENT OFFICE

FRANK MORSE ROBB, OF BELLEVILLE, ONTARIO, CANADA

SOUND-REPRODUCING INSTRUMENT

Application filed September 29, 1927. Serial No. 222,806.

The invention relates to a sound reproducing instrument, as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially of the novel features of construction pointed out in the claim for novelty following a description containing an explanation in detail of an acceptable form of the invention.

The objects of the invention are to reproduce sounds faithfully individually and collectively through the agency of keys, pedals and stops, similar to those in organ construction, and various electrical devices; to eliminate the large expenditures incidental to the construction and purchase of pipe organs; to reduce the space occupied by pipe organs in regard to their multiplicity of pipes and use it for other purposes; to facilitate the interchange or replacement or regrouping of tones or sounds without being under the necessity of shifting great or small pipes; to do away with the possibility of the instrument becoming ruined by deleterious gases in the atmosphere or by lack of proper inspection; to insure the true sounds as produced by organ pipes or even by the human voices or by a musical instrument such as a violin, a harp, a violincello, guitar, piano and many others; to bring forth any original sounds, such as from horns, drums, bells, gongs, whistles and the cheering of crowds; to maintain with exactitude throughout numberless organs the tones and shades of a great master organ of which there are a limited number in the world; and generally to provide an instrument readily procurable at the fraction of the price of a master instrument and furnishing musical and other sounds quite equal to the original.

In the drawings, Figure 1 is a plan view of an organ console.

Figure 2 is a diagrammatic view showing the connections from the operating key to the particular pick-up, the oscillator box, the amplifier and the loud speaker.

Figure 3 is a diagrammatic view showing electrical connections operated by switches originating at and representing the organ stops and adapted to bring certain sets of pick-ups into play and under the control of the performer.

Figure 4 is a diagrammatic view of a large foot pedal as a switch member in the electrical circuit including a rheostat controlling the volume of current and sound.

Figure 5 is a fragmentary perspective detail of one form of record member.

Figure 6 is an end elevation of a record member stand.

Figure 7 is a side elevational view of the record stand illustrated in Figure 6.

Figure 8 is a perspective detail showing a conventional form of pick-up.

Figure 9 is a fragmentary detail showing another form of pick-up applied to the records.

Figure 10 is a fragmentary sectional detail of the pick-up shown in Figure 9.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawings, the organ console needs no specific description and it is sufficient to say that the numeral 14 indicates the keys, the numeral 15 the stops, the numeral 16 the foot operated keys or pedals and the numeral 17 the larger pedal representing the swells, all of which are used in much the same manner as at present with the exception that the variety of sound may be increased to a greater extent than is possible under existing conditions in pipe organ construction.

The records are contained in cylindrical rolls 18, though they may be made in disc form, however, for the purposes of this description, the cylindrical types of record herein shown will give a clear understanding of the invention.

The rolls 18 are carried on the shafts 19 journalled in the circular frame 20 and driven by the friction wheel 21 on the shaft 22 coacting with the friction wheels 23 mounted respectively on the shafts 19.

The shaft 22 is journalled in the bearings 24 and is driven by the motor 25 through the belt and pulley driving mechanism 26.

It may be here explained that each record on the rolls is distinct to itself, that is to

say, on each roll, there are many records in respective grooves and every complete groove represents a distinct sound or collection of sounds contributing to the production of a composition, whatever that may be, such as a piece of music, or items in a programme of events or in fact anything that is made up of succeeding sounds.

This manner of making and using records is particularly adaptable to organ music, where a master instrument gives forth the tone for a record.

These tones are brought out by the artist in the same way, as in the full pipe organ, through the keys, stops and pedals, expression being obtained by means of the larger swell pedals 17, which increase and decrease the volume of electric current in the electrical circuits flowing into and out of a rheostat indicated by the numeral 27. The keys 15 form the switch arms in electrical operating circuits to produce sounds and also the pedals 16, while the stops 15 form the switch members for operating electrical circuits adapted to bring into play sets of pick-ups coacting with the records.

The pick-ups are indicated by the numeral 28, in one form that may be used, and known as the condenser type, and purchasable on the public market and formed of two plates one carrying the needle adapted to follow the groove of the record and movable in relation to the other plate and relying on the fact that any variation of the spacing of the two plates of a condenser in an electrical circuit will change the capacity of that condenser and hence will alter the characteristics of the circuit. One plate is of copper and the other of aluminum and any irregularities in the record groove will alter the spacing of the plates and bring about a change in capacity. The plates of these pick-ups are connected in oscillating vacuum tube circuits so that the variations of capacity as the records turn under the needle result in corresponding changes of the amplitude of the oscillations.

A novel form of pick-up is illustrated in Figures 8 and 9 and this may possibly be the type of pick-up generally adopted in carrying out this invention. The pick-up relies on the direct application of a plate 29 or even a point included in an oscillating vacuum tube circuit and coacting with a wave groove in a strip 30 on a cylinder, the wave groove 31 being waved circumferentially in the strip 30 consequently the bed of the groove insures constantly changing spacing between the strip and the plate 29 representing the undulations of the groove and thus the variations of capacity desired for the reproduction of the sound are obtained as both strip and plate are in the circuit and the modulated current passed through the radio apparatus to the audio frequency amplifier and loud speaker brings forth the tone or sound produced from the record.

The electrodes or pick-ups, as they have been called, are of equal number to the number of grooved cylinders or rolls and electrically are in parallel arrangement, each electrode being introduced into a groove for producing purposes, and it must be understood herein that these electrodes or pick-ups are not constantly in the grooves as they only coact with the cylinder wave grooves at such times as it is wanted to reproduce the original tone, represented by the chosen waves of the grooves.

Therefore it will be seen by reference to the drawings that there must be an equal number of circuit wires 32, and these wires or perhaps it might be nearer to say, this wiring in the corresponding number of stretches extends through a common oscillator and each circuit wire continues in the common wires 34 and 35 to the audio frequency amplifier 36, and on to the loud speaker 37, said amplifier being connected to a power line by the leads 38 and 39, which energizes in one of the circuit wires or in groups of the circuit wires, including the cylinders which are common to all of the circuit wires, the distinction being made in the particular electrode or electrodes inserted through the operation of the electrical switch or switches by means of the selected keys, stops or foot levers.

From each groove or wave strip of a record, is intended to be produced by the electrical devices herein described a single tone of a pipe organ or a combination of tones or a collection of sounds, such as a chorus of voices or a single voice of a human or otherwise. This single record will be placed by depressing a finger key or a foot key, these keys being pivoted or otherwise connected and adapted to bring together coacting contacts to close the key circuit including the particular record and the playing electrical devices.

It varies from sound reproducing machines in the fact, that it is an instrument played by the individual performer, who selects his several notes and sounds to produce a whole, in other words the artist plays the organ as an instrument of that class and the sounds instead of emanating from the vast array of pipes directly do so indirectly.

A magnetic type of pick-up may be used, though for the purpose of this invention the forms described are considered satisfactory.

The rheostat 40 is included in the general circuit and may be of conventional design and is operatively connected to the swell pedals, whereby the volume of current is increased or diminished from time to time.

To explain this further in order that the practical person may understand the construction, it is perhaps better to add that in

this invention, the electrical circuit 32 extends through the radio apparatus, the audio frequency amplifier and the loud speaker, but in order that the many keys or notes of an organ may be accommodated, the particular portion of the circuit 32, including the pick-up, is repeated as many times as there are keys or notes or sounds in the organ, and this part of the instrument corresponds to the numerous pipes of an organ, in other words it is an electrical substitution for the pipes and a purely electrical substitution for the magnetic feature always in such sound reproducing instruments is entirely missing.

It will thus be seen that a great many sound records may be used, these sound records being manufactured from the original record receiving the sound or from the exact reproductions thereof or as the art progresses from original cuts made in a record and such records during the use of the instrument may be continuously rotated, so that when the circuit or circuits including one or more of the pick-ups, is or are closed, then the sound waves are transmitted from one or more records through the radio apparatus, the audio frequency amplifier and the loud speaker, in other words, presuming that three of the pick-ups are in cooperation with three of the sound records, then the combined sound is transmitted through the radio apparatus, the audio frequency amplifier to the common loud speaker, which means that the loud speaker, the audio frequency amplifier and the radio apparatus are all common to the multiplicity of pick-ups, so that one record may be reproduced in one sound and ten records may be reproduced in one sound, though in the latter case, it is a blend of sounds.

The particular operation of the switches by the keys is not an essential, for it is a common electrical device, which is readily made by an electrician or bought on the public market, and the same may be said of the radio apparatus, including the oscillator, radio frequency amplifier and the detector, and again the same remarks apply to the audio frequency amplifier and the loud speaker, these are all electrical devices which may be purchased from any electrical dealer in the particular classes of goods to which they refer.

What I claim is:

In a sound reproducing instrument, a plurality of rotatable records suitably driven and formed of conducting material with undulatory grooves representing a plurality of musical scale tones, a plurality of electrodes in set positions in relation to said grooves and adapted to vary a current in agreement with the varying distances of the undulations from the electrodes during the rotation of the records, switches operated by key stop or pedal and electrical circuits individual to said switches and records commonly oscillated and developing the sounds emanating from said variations through electrical translating devices.

Signed at Montreal, Canada, this 2nd day of August, 1927.

FRANK MORSE ROBB.