April 10, 1928. 1,665,593

J. W. KLEIN

CHROMATIC SCALE AND SOLO NOTE SELECTING DEVICE FOR ORGANS AND PIANOS

Filed March 22. 1926 4 Sheets-Sheet 1

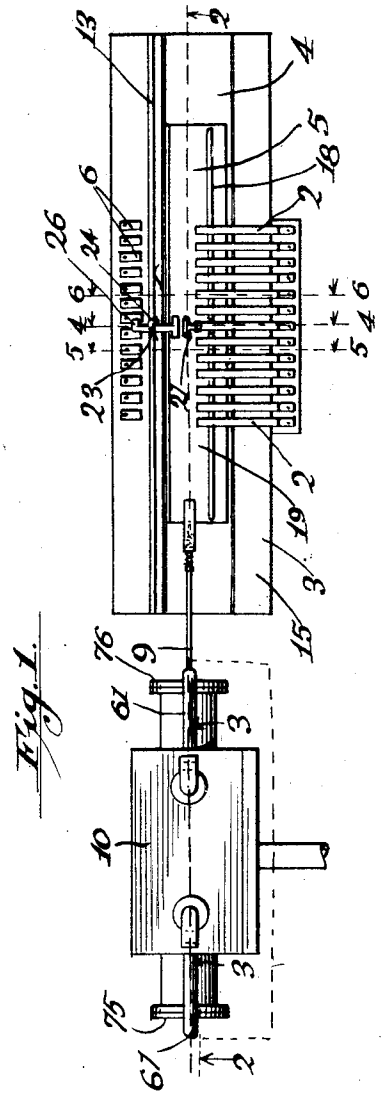


Fig. 1.

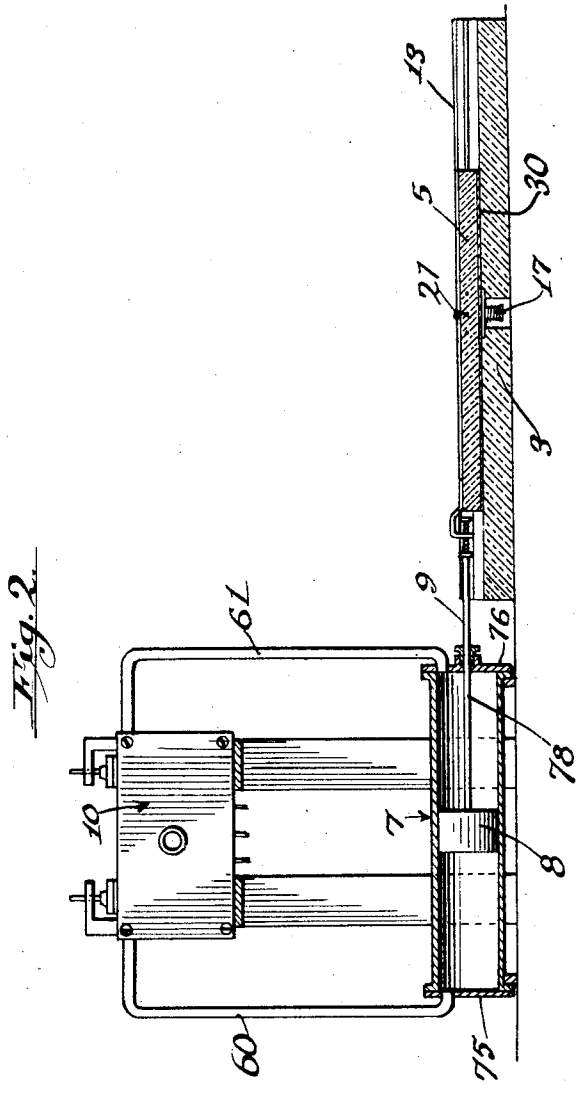


Fig. 2.

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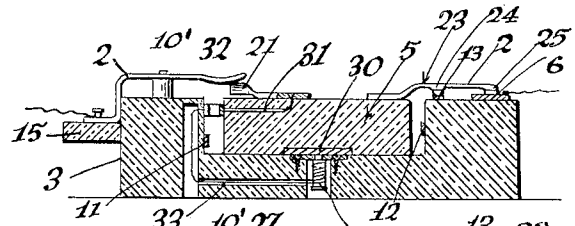


Fig. 4

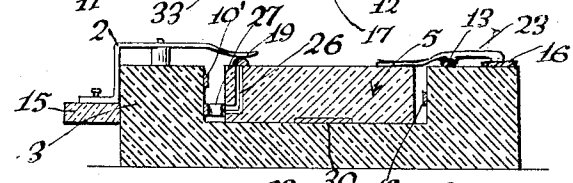


Fig. 5.

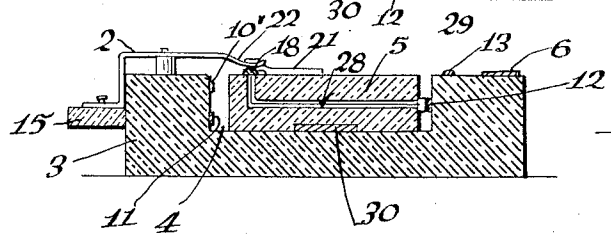


Fig. 6.

Fig. 3.

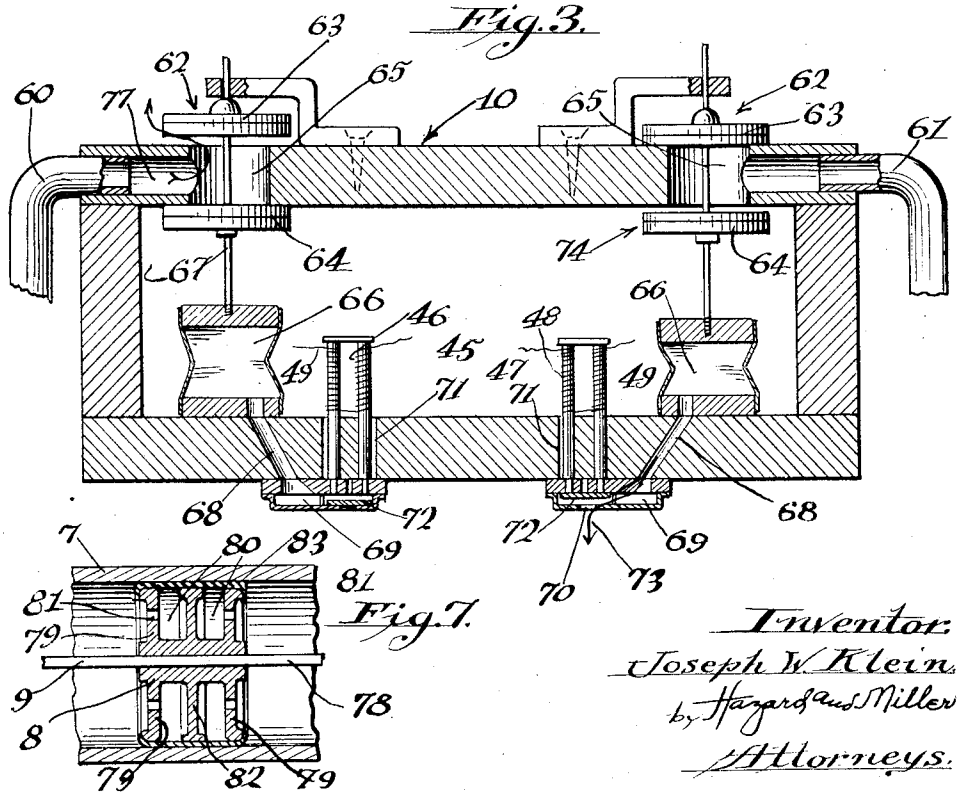


Fig. 7.

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Fig. 9.

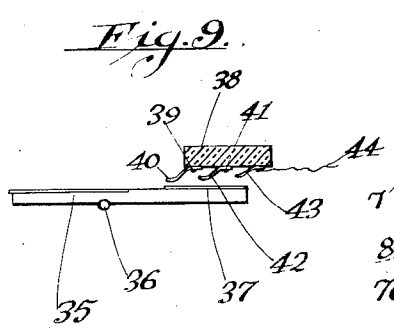
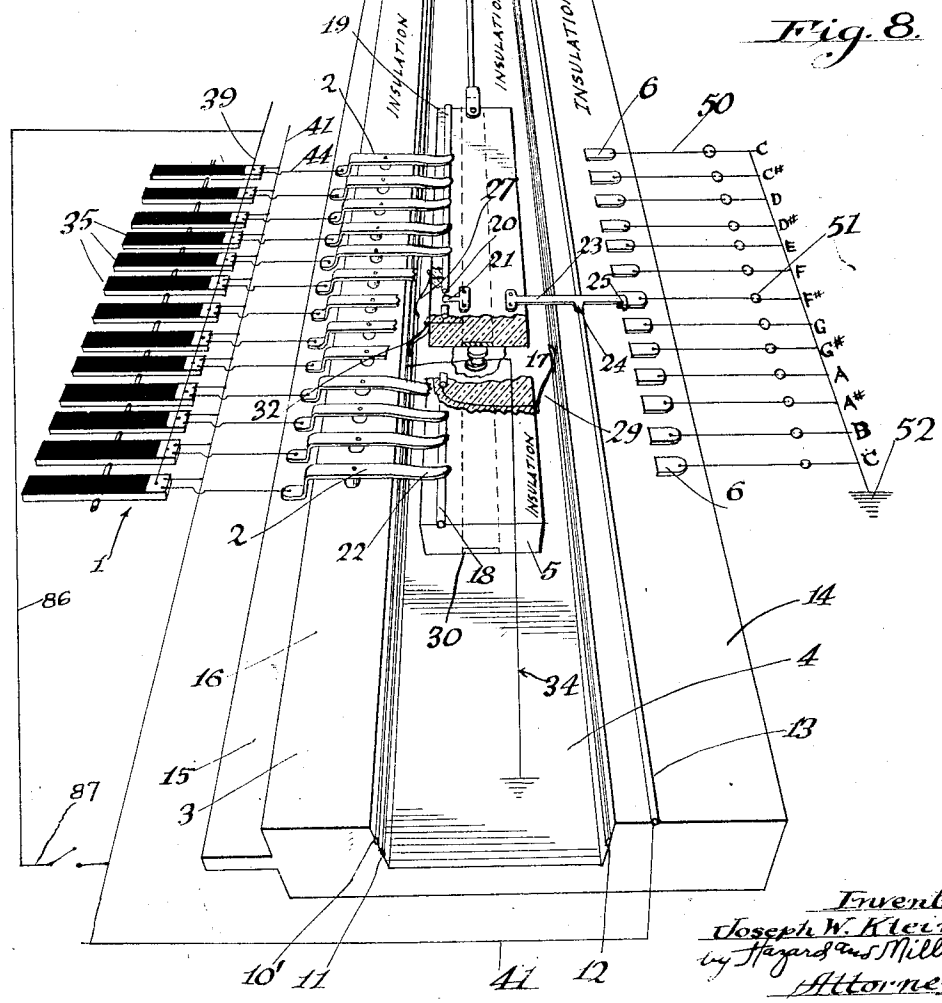


Fig. 8.



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CHROMATIC SCALE AND SOLO NOTE SELECTING DEVICE FOR ORGANS AND PIANOS

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Fig. 10.

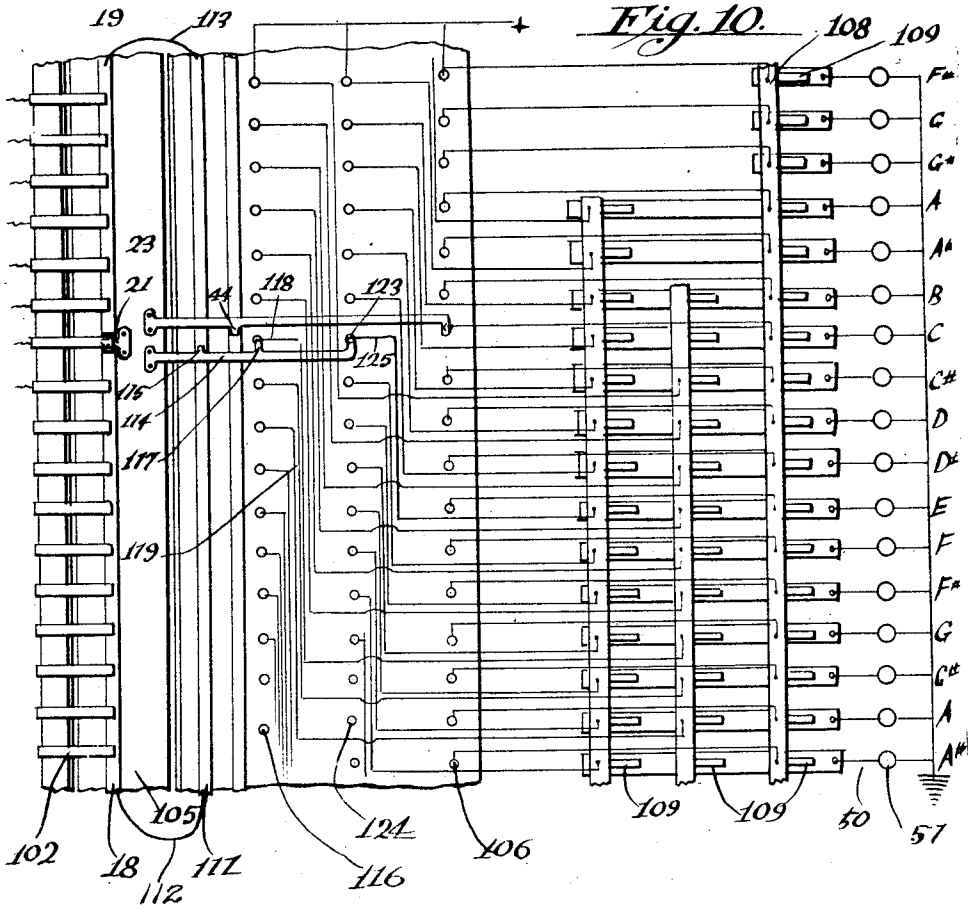
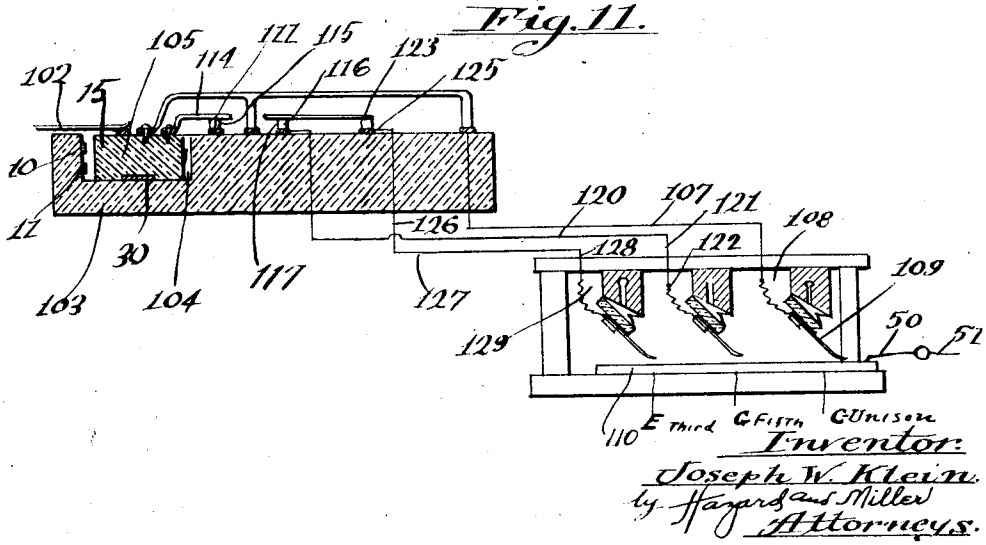


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOSEPH W. KLEIN, OF LOS ANGELES, CALIFORNIA.

CHROMATIC SCALE AND SOLO-NOTE-SELECTING DEVICE FOR ORGANS AND PIANOS.

Application filed March 22, 1926. Serial No. 96,554.

My invention is a chromatic scale and solo note selecting device for organs, pianos and the like, adapted to run chromatic scales either up and down the instrument and to hold a solo note if desired.

An object of my invention is an appliance by which chromatic scales may be run either from the bass towards the treble or from the treble towards the bass in organs or mechanically operated pianos or such instruments, and also to hold as a solo note the upper or lower note of the chromatic scale.

A further object of my invention is an arrangement for running chromatic scales by which it is only necessary to press a key representing the finishing note of the scale, say the note of low or high octaves, the instrument running the scale between its rest position wherever that may happen to be and the final note designated and stopping on the note held at which it is desired to stop the run of the scale. This note may also be held as a solo note.

A further object of my invention is to provide a keyboard with electrical contacts, a series of fixed electrical connectors associated therewith, a slide cooperating with the connectors and a single connector bar for leading the current to an electrical operating device for the organ or similar instrument.

A more specific object of my invention is to provide a pneumatic control device for operating the slide so as to give the proper speed for running the scale, the pneumatic device being arranged to give a slight irregularity in such scale simulating a scale as played by a skilled organist.

A further object of my invention in running chromatic scales is in simultaneously running sub or super-harmonics of the main or what might be termed the unison scale. These sub or super-harmonics may be thirds, fourths, fifths, sixths, twelfths, or the scales may be run in octaves if desired. In fact, I may run any harmonic or scales in chords which would harmonize with the main or unison scales.

This is accomplished by having an extra series of plate contacts with brushes operating simultaneously with the brush for the main scale and having crossed or offset wiring to sound the harmonic notes. In each of the sets of wirings I utilize a standard type of pneumatically operated organ switch so that a scale may be run of single or unison notes and any one or more sub or super-harmonics therewith. If desired, by means of the cross or offset wiring and the use of the organ switch I may transpose the key in which a scale is run.

In constructing my invention I utilize a keyboard having an arrangement to make electrical contacts with a source of power supply. One branch of this supply is fed to a series of connectors one for each key; these connectors having contacts with a slide bar, the slide bar being operated by a pneumatically controlled device. Another branch of the circuit leads to a sliding single connector attached to the slide bar, this connector being adapted to form a series of electrical connections leading to electromagnets or the like controlling the different notes of an organ.

The device is constructed so that it is only necessary to press and hold a certain key and the scale will be run up and down to said key and then the running of the scale will stop. This note may be automatically held as a solo note, the organist working in suitable music therewith. It will be understood that while the scale is being run the organist may if desired also be causing other of the organ pipes to be speaking. The slide bar is operated by a pneumatically controlled device until a breaking contact engages one of the multiple connectors at the particular note held, that is, at the note to be the end of the scale and come to rest by means of an electro-magnet forming a brake for stopping the slide.

My invention will be more readily understood from the following description and drawings, in which:

Fig. 1 is a plan view of part of the electrical control mechanism with the slide bar, the pneumatic control box and the connections to the organ mechanism.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1, showing the pneumatic control box.

Fig. 4 is a vertical cross section on the line 4—4 of Fig. 1, illustrating the brake mechanism for the slide bar.

Fig. 5 is a vertical cross section on the

line 5—5 showing the sliding contacts to control the motion of the slide bar in one direction.

Fig. 6 is a vertical cross section on the line 6—6 of Fig. 1 showing the sliding contacts for controlling the motion of the slide bar opposite to that of Fig. 5.

Fig. 7 is a longitudinal sectional view of the pneumatic piston and part of the cylinder for operating the slide bar.

Fig. 8 is a diagrammatic view illustrating the electrical connections from the keyboard to the connectors, the slide bar, the organ control and the pneumatic mechanism for operating the slide bar.

Fig. 9 is a diagrammatic side view of one of the keys illustrating the switch contacts.

Fig. 10 is a diagrammatic plan of a stationary block having a series of contact plates thereon and a slide bar with connectors for engaging the different contact plates with the wiring to give certain harmonics with the main scale by crossed or offset wiring. This figure shows diagrammatically the wiring to the organ switch.

Fig. 11 is a cross sectional view of the block, the slide bar, the various electrical connections and the organ switch.

The general construction of my chromatic scale running device is substantially as follows, having reference particularly to Figs. 1, 2 and 8:

A keyboard 1 indicates an organ or like keyboard, including the half note keys therefor, having the commonly termed white and black keys. It will be understood that the keyboard will be the ordinary full length of the organ or piano keyboard or of any length desired and may include the foot pedals. A series of electric connectors 2 are situated on a stationary block 3; there being one connector for each key. The block is provided with a longitudinal groove 4 in which operates a slide bar 5.

The side of the block opposite the connectors 2 is provided with a series of flat stationary electric contacts 6. The slide is operated by a pneumatic cylinder 7 having a piston 8 therein and a piston rod 9, the piston being controlled by a pneumatic control box 10.

The construction of the block 2 provides a longitudinal electrical conductor 10′ secured to one side of the groove, a parallel conductor 11 on the same side, a conductor 12 on the opposite side of the groove and a conductor 13 on the top of the block on the upper face 14. The connectors 2 are secured to the tongue 15 which extends laterally from one side of the block and are formed of resilient material extending across the top face 16. An electro-magnet 17 is imbedded in the block in the groove 4 operating as hereunder set forth.

The slide bar 5 is constructed substantially as follows, having reference particularly to Figs. 1, 2, 4, 5, 6 and 8. The bar is preferably made of wood and fits in the groove to have free sliding movement therein. Conductors 18 and 19 are secured in the upper face of the slide bar. These conductors are slightly spaced apart at the center as indicated by the numeral 20 and therefore forming two independent electrical conductors.

A bridge bar 21 is secured on the upper face of the slide bar positioned in the space 20. The contact ends 22 of the connectors 2 are adapted to bear on the conductors 18 and 19 and in the sliding movement of the slide bar these ends of the connectors ride over the bridge bar 21. A single electrical connector 23 is secured to the slide bar, preferably at a central position and substantially opposite the bridge bar 21. This connector has a sliding brush 24 adapted to bear on the conductor 13 and also having a brush end 25 adapted to bear on the contacts 6.

An electric lead 26 is imbedded in the slide bar 5, being connected to the conductor 19 on top of the bar and extending to the brush 27 which is in sliding contact with the conductor 11 on the side of the slot as shown in Fig. 5. Another electric lead 28 is connected to the conductor 18 and extends through the slide bar 28 at the opposite side, having a brush 29 in sliding contact with the conductor 12. An iron armature 30 is imbedded in the base of the slide bar extending the full length thereof, adapted to be acted upon by the electro-magnet 17 as hereunder described. An electric lead 31 is connected to the bridge bar 21 and passes through the body of the slide bar having a brush 32 in sliding contact with the conductor 10. This conductor has an electric lead 33 passing to the electromagnet 17 and by the lead 34 to ground or the negative side of the circuit.

The keyboard switches are constructed substantially as follows, having reference particularly to Figs. 8 and 9:

The individual keys 35 are indicated as mounted on a pivot 36 and each having a conducting plate 37 at their inner end. A rail 38 extends lengthwise of the keyboard and is positioned above same. This rail supports on its under surface an electrical conductor 39, said conductor having a series of spring contacts 40 to each key. The conductor 39 is preferably connected to the positive side of the source of power, this being a direct current.

A bus bar 41 extends along the undersurface of the rail 38 and has a series of spring fingers 42 extending downwardly, positioned to engage the conducting plate 37 on each of the keys. A series of separate spring fingers 43 are also positioned on the undersurface of the bar 38 and are adapted to contact with the conducting plate 37 on

the keys. There are separate electrical leads 44 extending from each of the fingers 43 to the connectors 2.

The conductor 11 has an electric lead 45 extending to an electro-magnet 46 in the pneumatic control box 10 and the conductor 12 has an electric lead 47 extending to the electro-magnet 48 in the control box. These magnets have a common negative or return lead 49 either extending to ground or to the negative side of the source of power. The operation of the magnets in the control is as hereunder set forth.

The operation of the electric circuits is substantially as follows, having reference particularly to Figs. 4, 5, 6, 8 and 9:

When any key is pressed downwardly it forms an electric circuit from a source of power through the conductor 39, the finger 40, plate 37, the finger 42, the bus bar 41 to the conductor 13, from the conductor 13 to the sliding single connector 23 by means of the brush 24, from the brush 25 to any one of the plate contacts 6 through any one of the leads 50 to the electro-magnetic devices 51 and from thence to a ground or negative connection 52. The electro-magnetic devices 51 are indicated diagrammatically as operating an organ speaking mechanism of a standard type and may be arranged to actuate any of the different types of pipes in an organ or to operate the keys either electrically or electro-pneumatically of a mechanical organ, piano or like instrument.

The electro-magnetic devices 51 are standard equipment for controlling organ pipes and, as they form no part of my immediate invention, need not be described in detail.

Thus it will be seen that presuming the slide bar 5 is at rest and maintained at rest, that pressing any one of the keys transmits a current to the electro-magnetic devices 51 which operate or control the organ or other instrument.

The circuit from the keys through the electrical devices on the slide bar and to the electro-magnets 46 and 48 in the control box is as follows, having reference particularly to Figs. 4, 5, 8 and 9:

As above mentioned, on operating any individual key an electrical connection is made from the positive side of the source of power, through the conductor 39, the fingers 40, to any one of the plates 37; through the fingers 43, the leads 44 to any one of the connectors 2 and from these connectors to the conductors 18 or 19 or to the bridge bar 21.

Presuming a key on the left hand of the keyboard, that is the bass, is depressed, the current would be transmitted by the switches on the particular key to the conductor 19 and from this conductor through the lead 26 to the conductor 11 and through the lead 45 to the electro-magnet 46 by means of the mechanism hereunder set forth. This controls the action of the pneumatic control box 10 and the pneumatic cylinder 7 to draw the slide bar 5 to the left, that is, towards the bass.

It will be understood that the organist will hold the key that is pressed a sufficient length of time for the scale to be run in accordance with the speed of the control mechanism hereunder set forth, and therefore the bridge bar 21 will be brought under the particular connector 2 which is directly electrically connected to the specific key 35. An electric current will then pass from the bridge bar 21, through the lead 31, the brush 32 to the conductor 10, the lead 33; through the electro-magnet 17 and to the ground or negative side 34. The energization of the magnet 17 attracts the armature 30 extending lengthwise of the sliding bar and therefore forming a brake mechanism and bringing the slide bar to rest. It will be understood that this magnet is sufficiently powerful to attract the armature with sufficient force to overcome the pneumatic power in the cylinder 7 from the control box 10.

It is presumed the organ has been operated so that a chromatic scale has been sounded by drawing the slide bar towards the bass and thereby forming successive contacts from the conductor 13 through the single connector 23 to the contact plates 6 and hence to the organ control mechanism 51. If the organist wishes another chromatic run extending still further to the bass, he merely has to press a key further in the bass register from the last note sounded and the slide bar will continue its movement to the left until such note is reached and stop there, provided the organist holds his finger on the key until it is reached, otherwise it will be stopped at any note on which the bridge bar 21 comes to rest when he raises his finger, due to the de-energizing of magnets 46 and 48.

If the organist wishes a chromatic scale running up he presses one of the keys towards the treble end of the keyboard from the note last sounded and this by the similar connections above mentioned and through the connectors 2 forms an electrical connection with the conductor 18 on the slide bar. The connection from this conductor is through the lead 28, the brush 29 to the conductor 12, the lead 47 to the electro-magnet 48. This controls the operation of the pneumatic cylinder 7 as hereunder set forth to shove the slide bar towards the treble end of the keyboard or connectors 2 and contact plates 6. This gives a chromatic scale running up until the bridge bar 21 is brought underneath a connector 2 leading to the particular key the organist is depressing. The slide bar is then brought to rest in the manner above

described by the operation of the electro-magnet 17. If the organist wishes a chromatic scale running still higher he merely presses a note higher in the treble and then the last note sounded and the scale will rerun accordingly.

The description and operation of the pneumatic control box 10 is substantially as follows, having reference particularly to Figs. 1, 2, 3 and 8:

The air is maintained under pressure in the box by any suitable source and has a plurality of outlet pipes 60 and 61, these leading to opposite ends of the pneumatic cylinder 7. These outlets are controlled by left valves 62 having upper and lower valves 63 and 64 engaging the ports 65 on top of the box. A pair of bellows 66 are mounted in the base of the box in the air chamber and have stems 67 connected to the valves 63 and 64. Passages 68 lead through the structure of the box and to an air chamber 69 having an outlet port 70. A passage 71 also leads around the electro-magnets 46 and 48 to the interior of the box.

Armatures 72 are positioned in the air chamber 69 and when lifted by the electro-magnets block the passage of air between the air box and the bellows and open the outlet port 70 so that the air may be discharged from the bellows to the atmosphere, the bellows being collapsed by the air under pressure in the pneumatic control box.

The manner of operation of the control box is substantially as follows:

Referring to Fig. 3, the magnet 48 is indicated as being energized, lifting the armature 72 and allowing escape of air from the bellows as indicated by the arrows 73. This action lowers the valve 64 and allows the air in the box to follow the path indicated by the arrows 74 into the outlet pipe 61; thus allowing air under pressure to enter the end 75 of the pneumatic cylinder and force the piston with the slide bar 5 towards the treble end of the instrument. At the same time the valve 63 is lifted from the port 65 on the opposite side of the box and allows the air from the end 76 of the pneumatic cylinder to exhaust through the pipes 60 into the atmosphere as indicated by the arrows 77.

It will thus be seen that accurate control is given to the motion of the piston 8 and therefore that accurate control is obtained by the movement of the slide bar 5. This action may be arranged to operate the slide bar the full length of all the connectors and contact plates 6 or any limited number of same.

The construction of the pneumatic cylinder 7 and piston 8 is substantially as follows, having reference particularly to Figs. 7 and 8:

The cylinder 7 is closed at opposite ends 75 and 76 and has a piston rod 78 operating through the said ends, the rod being connected to the slide 5. The piston 8 is formed preferably of wood with a series of partitions 79 forming air chambers 80 therein. The outer partitions have apertures 81, the central partition 82 having no opening. A rubbing surface 83 stretched on the outside of the piston is preferably formed of buckskin or some equivalent material so that when the air under pressure enters the air chambers 80 in the piston this buckskin is expanded against the walls of the cylinder and forms a tight but sliding fit.

I prefer to form the cylinder with slight contractions or expansions on its inside surface as indicated by the numerals 84 and 85 so that during the travel of the piston there will be slight accelerations of speed or slight retarding due to the slight difference of internal diameter. This gives an action in running scales simulating the hesitancy of manual manipulation of a musical instrument and does away with the mechanical perfection of machinery.

My solo note selecting device is arranged substantially as follows, having reference particularly to Fig. 8:

It is intended that if desired that in running a scale the last note speaking may be sustained or any particular note sustained. To accomplish this I connect an electric lead 86 to the positive source of power, preferably by connecting same to the conductor 39 and insert a switch 87 in this, forming a short circuit with the bus bar 41. This switch will be of any suitable type as used in organ mechanism. It will therefore be seen that when a scale has been run as above described, and the switch 87 closed, that on the particular connector 2 engaging the bridge bar 21, the scale will be stopped as above mentioned and this note continue to speak.

If the organist wishes to reset the scale running mechanism to run scales either from the bass towards the treble or vice versa and it is not in the position he desires, he merely has to cut out the electro-magnetic devices 51 from operating the speaking parts of the organ and have the scale run silently to the position desired. Therefore he may readily use this device for sustaining any note by running the scale to the desired position without the organ speaking and then closing the switch 87.

The cut out for the electro-magnetic devices 51 is a standard equipment in organ construction and, as it does not form an immediate part of my invention, need not be described in detail.

It will be apparent that the speed of motion of the slide bar 5 may be readily changed by increasing or decreasing the pressure of air in the control box 10. I do not

disclose the mechanism for doing this as such arrangements for changing the pressure in pneumatic controlled instruments is well known and it is only necessary to govern same as desired in order to increase the pressure or decrease the pressure of air in the pneumatic control box.

In the construction of my instrument it will be apparent that while it is desirable to have the keyboard of standard size similar to the other manuals of an organ and to form a keyboard for my instrument I would preferably utilize the ordinary keyboards already installed on an organ. If the keys of these keyboards are already overloaded with electrical connecting devices, the scale running device could be operated by relays. It is also to be understood that the scale running device and the solo note sustaining feature may be operated on what are known as first and second touches and also by a pedal keyboard. It is not necessary to have the scale extending the full length of the keyboard as the scale would hardly ever be run in the low and high registers. However, if these are desired it could be arranged by coupling octaves in the usual manner.

The arrangement for obtaining sub or superharmonic scales run in connection with what might be termed the main scale, is illustrated particularly in Figs. 10 and 11 which show an arrangement for obtaining a third and a fifth above the main scale. These are merely taken as illustrative and a sufficient number of contacts may be utilized to give any desired number of harmonic scales.

In the above figures the keyboard is omitted, the sets of connectors electrically associated with the keyboard being designated by the numeral 102 and mounted on a stationary block 103. This block has a groove 104 in which the slide bar 105 operates. The series of contact plates 106 are utilized to give the main scale directly in accordance with the particular keys operated in the keyboard.

In this arrangement I utilize the conductor wires 10, 11, 12, 18 and 19 in a similar manner to that described in connection with Fig. 8 and have a similar type of bridge block 21 in the space 20 between the said wires. The conductor 13 has the same function as described in connection with Fig. 8 as has also the single connector 23 with the brushes 24 and 25. However the electric leads 107 lead to an organ switch 108, this being of a standard type and pneumatically operated, causing the contact fingers 109 to bear upon connectors 110. These connectors lead directly to wires 50 actuating the electromagnetic control device 51 of the organ mechanism.

In order to obtain a super-harmonic with the main scale run as above described, I mount a continuous conductor 111 on the block 103 and connect this electrically by a lead 112 and 113 with the conducting bars 18 and 19. A bridging connector 114 is rigidly attached to the slide bar and has a brush 115 in continuous contact with the conductor 111.

The arrangement for giving a super-harmonic one fifth above the main scale is substantially as follows:

A series of contact plates 116 are mounted on the block 103, being in cross alinement with the contact plates 106. The connector bar 114 has a brush 117 bearing on these plates. The electric leads from the contact plates 116 designated by the numerals 118, 119, 120 and 121 are connected to organ switches 122 of a similar character to the organ switches 108. It will be seen by tracing out the electric connections that the bridging bar 21 where the slide has come to rest in accordance with the key being struck or held, is on the C note as indicated by the notes on the right hand side of Fig. 10 and that the brush 117 conducts an electric current to operate the note of G above, which is the fifth above the C, giving a scale in harmony therewith. If it is desired to run both at the same time both of the organ switches 108 and 122 are operated simultaneously and when the bridge bar 21 comes to the position between the conductors 18 and 19, the conductor 111 is de-energized and therefore the harmonics stop sounding although the fundamental or main note may keep sounding.

In order to play thirds above, the connector 114 is provided with a brush 123 contacting with the contact plates 124. The wiring from these plates is by electric leads designated by the numerals 125, 126, 127 and 128 to the pneumatic organ switch 129, such switch controlling the circuit to the electro-magnetic devices 51 for sounding the different pipes or the like.

It will be noted therefor that the brush 123 sounds the note E when the C of the main scale is sounded, thereby giving a super-harmonic third, which would be cut out on the last note of the scale.

It will be understood that the cross and offset wiring may be arranged so that the harmonic scales may be arranged to be sub-harmonics instead of the super-harmonics as illustrated in Figs. 10 and 11; and moreover, if desired, the arrangement could be made to have both sub and super-harmonic scales, but this is not necessary as the desired effects can be given by having a sufficient number of harmonic notes to be sounded with the main scale being run. Hence it will be clear that the harmonic scales may be run simultaneously with the main scale or the main scale may be cut out by the organ switch and any one or more of the transposed scales run.

In this manner I may readily transpose the scale of playing from that of the written music the organist is following to any other scale by having proper offset or crossed wiring to other notes.

My invention not only comprises the mechanism for running chromatic scales and harmonics thereof and holding selected solo notes, but also comprises the method of running such scales and holding such solo notes.

It will be apparent that the various features both in general construction and in specific details of my invention may be considerably changed without departing from the spirit of my invention as set forth in the description, drawings and claims.

Having described my invention, what I claim is:

1. A scale running instrument comprising in combination a keyboard, means for sounding a musical instrument electrically controlled from said keyboard, and means for electrically shifting the control from one key to another.

2. A scale running instrument comprising in combination a keyboard, a slidable device, an electrical connection between each of the keys to the slidable device, electrical devices to operate a musical instrument, and means operated by the slide to cause the consecutive speaking of different notes in accordance with the movement of the slide.

3. A scale running instrument comprising in combination a keyboard, a slidable device electrically connected to the keyboard, an electric mechanism for controlling the sounding of notes of a musical instrument, an electric device operated by the said slide to control the sounding of such notes, and a pneumatic operated device having electrical control means operated by the keys of the keyboard to move the slide.

4. A scale running instrument comprising in combination a keyboard, a slide bar, a plurality of connectors electrically connected to the keys, said connectors being electrically connected to the slide, a pneumatic device to operate the slide, electric control means operatively connected to the slide to control the pneumatic device and electric control mechanism operated by the movement of the slide to sound a series of notes consecutively by the movement of the slide.

5. A scale running instrument as claimed in claim 3, having in addition an electromagnetic device to stop the slide after movement a designated distance.

6. A scale running instrument as claimed in claim 4, having in addition an electromagnet, a contact element on the slide bar positioned to engage each of the connectors, and an electric connection from the contact to the magnet to operate the magnet when a certain key in electric circuit with a connector engages the said contact.

7. A scale running instrument comprising in combination a keyboard, a series of stationary connectors, each electrically connected to a key on the operation of such key, a slide bar having electrical conductors in sliding engagement with the connectors, a pneumatic device to operate the slide, a pair of stationary conductors having brushes forming an electric connection with the conductors on the bar, electro-magnets connected to the stationary conductors to control the pneumatic device, a single connector attached to the slide having a plurality of fixed contacts to engage therewith, said contacts having electric connection with the electro-magnetic device to sound different notes of a musical instrument.

8. A scale running instrument as claimed in claim 7, in which the conductors on the bar are slightly spaced apart at their adjacent ends, a bridge bar in said space, and an electro-magnet mounted in a stationary position adapted to act on an armature on the slide bar, said bridge bar forming a connection with any particular key operated and thereby forming a brake.

9. A scale running instrument comprising in combination a keyboard, a stationary block having a sliding bar operating thereon, a series of connectors one for each key, electrically connected to each key on the operation of same, a pair of conductors positioned longitudinally of the slide bar, slightly spaced apart at their adjacent ends, in contact with the said connectors, a pair of conductors in the block, a pneumatic control box having a pair of electro-magnets, pneumatic means controlled by said magnets to slide the bar, an additional conductor extending lengthwise of the block, a single connector attached to the bar having a brush bearing on the additional conductor, a series of stationary contact plates to form an electrical connection with the single connector and electrical devices in circuit with said plates to control the sound of the various notes of a musical instrument.

10. A scale running instrument as claimed in claim 9, having in addition a bridge bar positioned on the slide bar between the ends of the conductors thereon, a stationary conductor for a brake circuit mounted on the block having electric connection with the bridge bar, an armature extending lengthwise of the slide bar, and an electro-magnet secured in the block in circuit with the brake conductor in the block to operate the magnet to stop the slide when a connector rides on the bridge bar, the said connector being in circuit with the particular key being operated.

11. In a scale running instrument, a stationary block having a longitudinal groove,

a slide bar extending longitudinally of said groove having a pair of electrical conductors in alinement spaced slightly apart at their ends, a bridge bar secured to the slide bar in the said space, a pair of conductors on opposite sides of the groove, electrical connections through brushes from each of the conductors on the bar to the stationary conductors, a brake circuit conductor in the groove, an electric connection by a brush from the bridge bar to said brake circuit conductor, an electro-magnet in circuit with the brake circuit conductor, the magnet being mounted in the base of the groove, and an armature in the base of the bar to be operated on by the magnet.

12. In a scale running instrument as claimed in claim 11, having in addition a series of connectors attached to the block, said connectors being in electrical contact with the conductors on the bar and adapted to form an electric connection with keys of the keyboard.

13. In a scale running instrument as claimed in claim 11, having in addition a conductor for a note circuit mounted on the block, a series of contact plates also mounted in the block adjacent the last mentioned conductor, a single connector mounted on the slide bar forming an electric bridge between the last mentioned conductor and the said plates, the said plates being adapted to form an electric connection with note sounding devices.

14. A solo note selecting device comprising in combination a keyboard, a slide bar having electrical conductors thereon, a series of electric connectors from each of the keyboards of the said conductors, electric pneumatic means controlled through the said conductors to slide the bar, an electric device operated by the slide bar to sound notes of a musical instrument, and a switch to pass an electric circuit to the note sounding device.

15. A scale running instrument as claimed in claim 4, having in addition an electric switch operatively connected to continuously sound the final note in the run of the scale.

16. In a scale running instrument having a plurality of keys, electrical devices operated by said keys to sound notes of a musical instrument, electrically controlled means to sound the said notes in succession, electric means operated by a specific key to stop the run at a certain note and in addition a switch to continuously sound the said note.

17. In a scale running instrument, a pneumatic control box having a pair of electro-magnets, a cylinder having a piston, a pneumatic connection from the control box to opposite ends of the cylinder, and valves controlled by the electro-magnets to allow passage of air from the control box to either end of the cylinder and to exhaust the air from the opposite end.

18. In a scale running instrument as claimed in claim 17, having in addition a pair of bellows, means to control said bellows from said magnets, and valves controlled by the bellows to pass the air from the box to the cylinder and from the cylinder to the external air.

19. In a scale running instrument, a pneumatic control box having a plurality of electro-magnets therein, a pair of bellows having a passage to the external air and to the interior of the box, armatures operated by the magnets to control the flow of air between the box and the bellows or the bellows and the external air, and valves operated by each of the bellows to control the flow of air from the box to a device to be operated or from said device to the external air.

20. In a scale running instrument, a pneumatic cylinder having a hollow piston, a flexible covering on said piston from end to end in contact with the cylinder walls, said material being adapted under compression of air inside the hollow piston to form a tight fit with the cylinder.

21. In a scale running instrument, a cylinder having slight irregularities in its bore, a hollow piston slidable therein, the piston having a surface covering of flexible material from end to end adapted to expand under compression of air in the piston to form a tight but sliding fit with the walls of the cylinder.

22. A scale running instrument having a keyboard with a series of keys, and means operated by any key to start the running of a scale in either direction towards the bass or treble.

23. A scale running instrument having a keyboard, and means operated by any individual key to start a musical instrument playing a scale, said key controlling the last note of the said scale in running a scale towards the bass or towards the treble.

24. A scale running instrument having a keyboard, a series of individual keys, means controlled by any one key to start a musical instrument playing a scale, means to stop the scale at the note corresponding to the said key, and additional means to sound the note of said key after the key is freed.

25. A scale running instrument having a keyboard, means controlled by any one key to cause a musical instrument to run a chromatic scale, and means to simultaneously run harmonic scales therewith.

26. A scale running instrument having a keyboard, means controlled by any one key to cause a musical instrument to run a chromatic scale and to end said scale on the note corresponding to the key operated, and

means to simultaneously run a chromatic scale in sub or super-harmonics of the first mentioned scale.

27. A scale running instrument having a keyboard, means controlled by any one key to cause a musical instrument to run a chromatic scale, and means to simultaneously run a plurality of chromatic scales in sub or super-harmonics of the first mentioned scale.

28. A scale running instrument comprising in combination a block having a series of contact plates, one series being for one set of notes and another set for another set of notes, a slide bar having an electric connector, conductors extending lengthwise of the block, brushes engaging the conductors and the plates, a keyboard having an electric connection through the slide bar to the said connector, an electric connection from the first mentioned series of plates to notes of a musical instrument corresponding to the keys, and cross wiring from the second set of contact plates to different notes of a musical instrument, whereby on operating a certain key of the keyboard two scales may be run on the instrument simultaneously.

29. A scale running instrument comprising in combination a plurality of sets of contact plates, electrical conductors extending parallel to said plates, a slide bar having connectors with brushes, the brushes being in contact with certain of the conductors and certain of the sets of the contact plates, a keyboard, an electrical connection from the keyboard through the slide bar to the connectors, a plurality of sets of switches, an electrical connection from one set of plates through one switch set to notes of a musical instrument corresponding to the keys, and offset electric wiring from the other sets of plates through the other switches to different notes of the musical instrument, whereby playing certain keys causes the sounding of different notes in the musical instrument.

In testimony whereof I have signed my name to this specification.

JOS. W. KLEIN.