My invention relates to musical instruments and more particularly to a tone producing mechanism designed to supplement the usual piano.

The primary object of my invention is to provide a mechanism, for producing vocal tones, which may be mounted in pianos of the usual types and may be used in connection therewith as an aid in voice culture and in the teaching of singing.

A further object is to provide an auxiliary tone producer, of the character described, which has a tone range corresponding approximately to that of the human voice and which may be adjusted for use separately with each of the several types of voice; namely, soprano, mezzo-soprano, contralto, tenor, baritone or bass.

Still a further object of my invention is to make possible the prolongation of any note that lies within the range thereof and to vary each note in accordance with the five vowel sounds represented by the letters a, e, i, o and u.

Other objects will appear hereinafter, as the details of the invention are described.

Referring to the accompanying drawing, which illustrates what is at present deemed to be a preferred embodiment of the invention.

Fig. 1 is a fragmentary plan view of a grand or square piano, equipped with my invention, showing the front part of the piano including the keyboard.

Fig. 2 is an enlarged fragmentary sectional view of the piano shown in Fig. 1, taken approximately on line 2—2 of Figs. 1 and 3.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2, showing, in fragmentary form, the disk carrier, which forms a part of my invention, and certain details associated therewith.

Fig. 4 is a plan view of one end of the disk carrier and associated parts, as seen when viewed from the front of the piano in the direction indicated by arrow 4 in Fig. 3.

Fig. 5 is an edge view further enlarged of one of the tone disks which are mounted on the disk carrier and which produce the vocal tones.

Considered more in detail the drawing will be seen to show my auxiliary tone producer as comprising an adjustable disk carrier 10, equipped with a multiplicity of tone disks 11, a series of needles or styluses 12, one of which is associated with each piano key whose tone is to be supplemented, and a series of sound-boxes 13 corresponding in number to the styluses, or, as here shown, each adapted to accommodate a pair of styluses.

Disk carrier 10 consists of two circular plates 14 and 15 fixed on a central tubular shaft 16 adjacent its ends which are journaled in bearings 17 formed on standards or brackets 18 and 19 which brackets are adapted to be mounted in the string chamber of a piano casing above the rear extensions of the piano keys, as shown in Fig. 2. Bearings 20 are fixed in plates 14 and 15 and six equally spaced shafts 21 preferably tubular ones, have their ends journaled therein. Each of said shafts 21 has a series of tone disks 22 strung thereon and clamped thereto by nuts 23 so that they turn therewith. One of said series, as at 22, is adapted to cover the range of a soprano voice, others, as at 24, 25, 26, 27 and 28, are adapted to cover the ranges of a mezzo-soprano, a contralto, a tenor, a baritone and a bass voice, respectively, each being somewhat more than two octaves.

Each of the disks 11 has a central opening corresponding in diameter to that of the shafts 21 and has an approximately V-shaped peripheral groove 29 in its edge as shown in Fig. 5, the bottom of which groove is slightly rounded, as at 30, so as to receive the point of a recorder stylus to reproduce the record and of a reproducer stylus to reproduce the tone. There are five disks for each key or note, as is clearly illustrated at 31 in Fig. 4, one for each of the five vowel sounds, a, e, i, o and u, and provision is made for shifting disk carrier 10 longitudinally so as to bring at pleasure, any of said five disks into alignment with the stylus of that key or note, this being necessary because the positions of the styluses are fixed so that they cannot be moved laterally.

Brackets 18 and 19 are spaced apart at a distance somewhat greater than the length of disk carrier 10 and the extensions of shaft 16 beyond plates 14 and 15 are made sufficiently long to permit the necessary longitudinal shifting of the disk carrier. A knurled nut or knob 32 is provided on one end of shaft 16 whereby this shifting readily may be done and whereby the shaft also may be turned in bearings 17.

Six regularly spaced square notches 33 are cut in the edge of circular plate 14 and a like number of similarly spaced V-shaped notches 34 are cut in the edge of plate 15. A spacing plate 35 having a series of square notches 36, of sufficient width to permit the edge of plate 14 to run therein, cut in its lower edge, is fixed above plate 14 to an upper extension 18 of bracket 18, and a locking plate 37 adapted to be actuated downwardly by a spring 38, into notches 33 of plate 14, is loosely attached to spacing plate 35, as shown in Fig. 3. A spring actuated latch-bar 39, adapted...
to snap into notches 34 and thus indicate the proper angular positions of the several series of disks for action, is pivotally attached to bracket 19, as at 40.

It will be seen that the disk carrier will be locked in any one of its six active positions by the action of locking plate 37 as it enters one of the notches 33 in plate 14. It will be seen also that the disk carrier can be shifted longitudinally only when locking plate 37 is pulled upwardly so as to be withdrawn from any of the notches 33 and when the disk carrier has been turned sufficiently to bring the spacing plate 35 into alignment with one of the notches 33. It must be understood, of course, that the spacing of notches 36, in plate 35, corresponds to the spacing of the grooves in the groups of five disks which belong to each note or key, as explained above.

Shafts 21, upon which tone disks 11 are strung, are revolved in bearings 20 when in their active position by connecting each in turn to a stub shaft 41 which is journaled in a bearing 42 formed on a lateral arm 19′ of bracket 19. A pulley 43, adapted to be driven by a belt 44, coming from an electric motor or the like, (not shown) is fixed on stub shaft 41 which has an axial hole, square in cross section, extending therethrough. One end of each shaft 21 is provided with a square socket 45, of equal cross section to that of said axial hole through stub shaft 41, and connection of the former shaft with the latter is made by a square pin 46 extending through the latter into socket 45 of the former. A knob 47 is formed on one end of pin 46 whereby it may be withdrawn when any change in adjustment is to be made.

Styluses 12 are Sapphire-pointed and are pivoted between cone points 48 in the usual manner. They are provided with apertures 49, adjacent their pivoted ends, through which apertures the upper ends of the usual damper rods 50, associated with each piano key, extend. The projective ends of damper rods 50 are bent to form a laterally extending pin 51 adapted to contact with the upper edge of the stylus so as to hold its point out of engagement with the tone disk, except when the piano key is depressed, as is clearly illustrated in Fig. 2. Springs 52, adapted to actuate styluses 12 toward tone disks 11, when the piano keys are depressed and the damper rods are lifted in the usual way, so as to bring the stylus points into engagement with the grooves of the tone disks with a suitable amount of pressure, are attached to the front ends of sound boxes 15.

The sound boxes are attached to a cross-bar 53 which is adapted to support them in properly spaced relation to disk carrier 10, within the string chamber of the piano. Pairs of wires 54, leading from each sound box unit, are connected in parallel to a common loud-speaker or amplifier (not shown). The rectangular outline 55 shown in dotted lines in Fig. 1, indicates the approximate position of my auxiliary tone producer when mounted in a piano.

The operation of my auxiliary tone producer is believed to be so evident from the foregoing description as to require little if any further explanation. Obviously one set or series of the tone disks can be employed to produce vocal tones at a time and when the mechanism is adjusted for use the piano is played in the usual manner. The musical effect is that of a human voice singing note for note on one of the five vowels with the piano, within the range of operation of that particular voice. By holding down the piano key the voice notes may be prolonged indefinitely beyond those of the piano, thus affording an opportunity for close study of the several voices and the different vowel sounds.

It will thus be seen that my invention is useful not only for producing a unique kind of piano music, but also and more especially for vocal practice in musical studies by students as well as by instructors.

1. An auxiliary tone producer, for use in pianos, comprising a disk carrier adapted to be mounted in the string chamber of a piano so as to be adjustable therein about a horizontal axis parallel to the keyboard as well as longitudinally; revolvable shafts forming parts of said disk carrier and mounted therein in circumferentially spaced relation to each other; a multiplicity of tone discs strung on said shafts and fixed thereto, so as to turn therewith, said tone discs having vocal tones recorded thereon; a series of styluses adapted to engage said tone disks so as to reproduce the tones recorded thereon, when the piano keys are depressed; a series of sound boxes connected to said styluses so as to receive their vibrations, means to turn said disk carrier on its shaft to bring the tone disks mounted on an individual shaft thereof into position to be engaged by said styluses, and means for revolving said shafts when the tone disks thereon are in position to be engaged by said styluses.

2. An auxiliary tone producer, for use in pianos, comprising a disk carrier adapted to be mounted in the string chamber of a piano so as to be adjustable therein about a horizontal axis parallel to the keyboard as well as longitudinally; revolvable shafts forming parts of said disk carrier; a multiplicity of tone disks strung on said shafts and fixed thereto, so as to turn therewith, said tone disks having grooved edges in which vocal tones are recorded; a series of styluses adapted to engage said tone disks so as to reproduce the tones recorded thereon, when the piano keys are depressed; a series of sound boxes connected to said styluses so as to receive their vibrations; means for locking said disk carrier in any one of its several adjusted positions and means for revolving any one of said shafts when the tone disks thereon are in position to be engaged by said styluses.

3. The combination with a piano of an auxiliary tone producer mounted within the piano casing, said auxiliary tone producer comprising six parallel shafts turnable about axes parallel to the piano keyboard; a multiplicity of tone disks strung on each of said shafts, in groups of five for each note and fixed thereto so as to turn therewith, said tone disks having vocal tones recorded thereon; a multiplicity of styluses mounted in position to engage one in each group of five tone disks, on one of said shafts at a time, when the piano key with which each is associated is depressed, a multiplicity of sound boxes connected to said styluses so as to receive their vibrations; means for locking the disk carrier in any one of its several adjusted positions and means for revolving any one of said shafts when the tone disks thereon are in position to be engaged by said styluses.

4. The combination with a piano of an auxiliary tone producer mounted within the piano casing, said auxiliary tone producer comprising a plurality of parallel shafts turnable about axes
parallel to the piano keyboard; a multiplicity of tone discs strung on and fixed to each of said shafts in groups, there being a group for each note, said tone discs having vocal tones recorded thereon; a multiplicity of styluses mounted in position to engage one in each group of said tone discs, on one of said shafts at a time, when the piano key with which each is associated is depressed, a multiplicity of sound boxes connected to said styluses so as to receive their vibrations; means for bringing the tone discs on each of said shafts into engagement with said styluses, in turn, and means for revolving said shafts when they are in that position.

5. In an apparatus of the kind described, a disk carrier comprising a plurality of circumferentially arranged substantially parallel shafts, end disks for said carrier provided with bearings in which said shafts are turnably mounted, a central shaft to which said disks are secured and whereby they are rotatably supported, bearing supports for said central shaft providing therefor a limited sliding movement as well as a turning movement, a pair of cooperating locking elements, one of said locking elements being adapted to engage a peripheral portion of a disc to lock it against both a sidewise and a turning movement and the other of said locking elements being associated with a disc to lock it against a rotational movement while permitting a sidewise movement thereof, a plurality of tone disks arranged in groups on the individual shafts of said parallel shafts, styluses associated with said tone disks to reproduce tones recorded on them when said disk carrier has been rotated and longitudinally adjusted to bring the desired tone disks into their operative positions with relation to said styluses in which they are maintained by said locking devices, a motor to rotate said tone disks, and means operatively connecting said motor and tone disks with the keys of a piano with which the apparatus is associated.

6. In an apparatus of the kind described, a disk carrier which is adjustable in two directions, a plurality of substantially parallel shafts mounted upon said disk carrier and extending in one of said directions, a plurality of tone disks mounted in groups upon each of said shafts, said disks being fixed to said shafts and said shafts being turnably mounted upon said disk carrier, a pair of cooperating locking elements associated with said disk carrier, one of said locking elements being adapted to lock said carrier against movement in both directions and the other of said locking elements permitting movement of said carrier in one direction while locking it against movement in the other direction, styluses associated with said tone disks to reproduce tones recorded on them when said disk carrier has been adjusted in both directions to bring the desired tone disks into their operative positions with relation to said styluses, in which positions they are maintained by said locking devices, a motor to rotate said tone disks, and means operatively connecting said motor and tone disks with the keys of a piano with which the apparatus is associated.

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