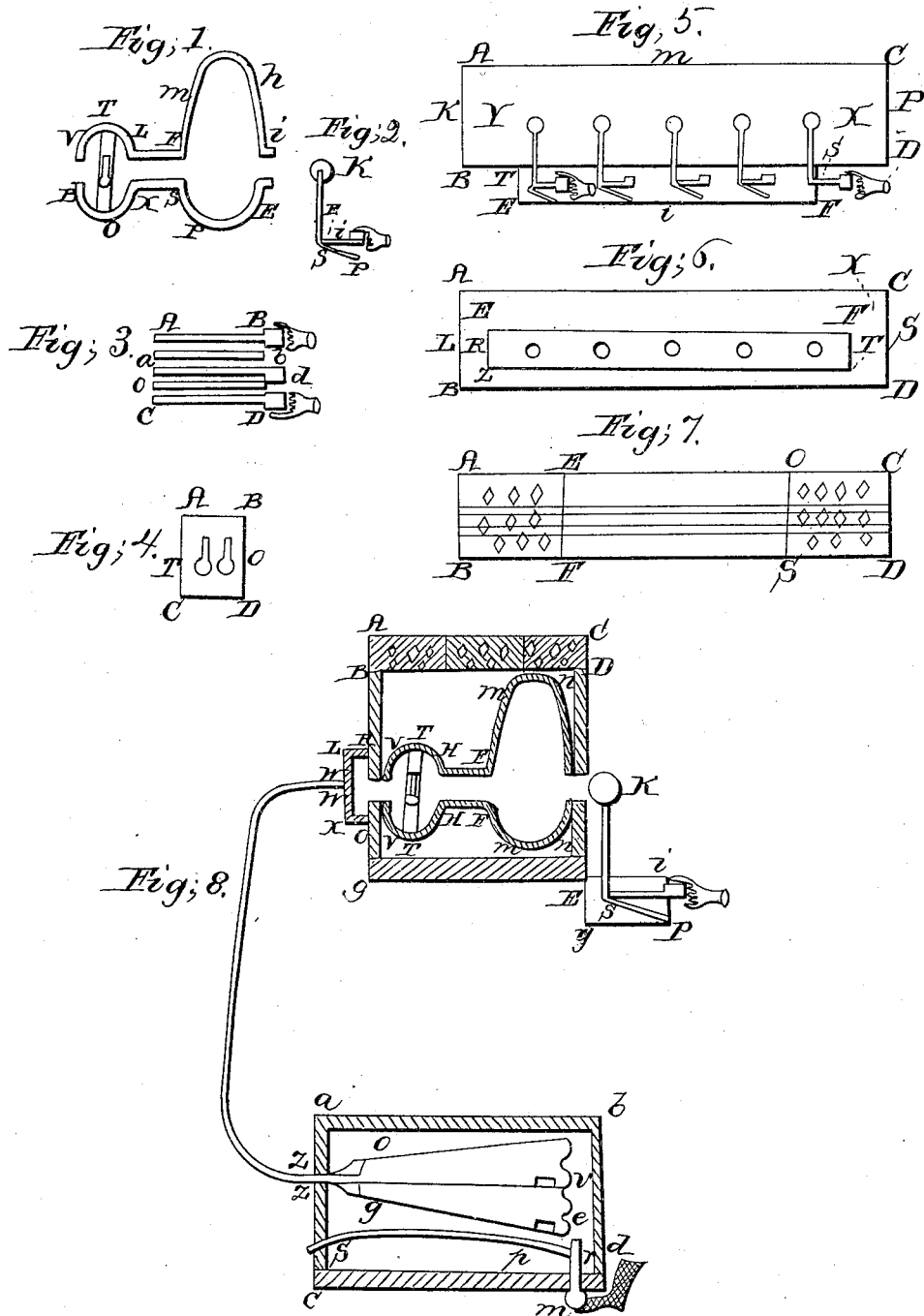


J. W. CAMPBELL.
ORGAN.

No. 1,859

Patented Nov. 26, 1840.



UNITED STATES PATENT OFFICE.

JOHN W. CAMPBELL, OF FOUNTAIN COUNTY, INDIANA.

MUSICAL INSTRUMENT ENTITLED THE "VOCAL ORGAN."

Specification of Letters Patent No. 1,859, dated November 26, 1840.

To all whom it may concern:

Be it known that I, JOHN W. CAMPBELL, of the county of Fountain, near Attica, and State of Indiana, have invented a new and
5 Improved Instrument of Music, Combining Cheapness and Usefulness with Beauty of Sound, which I call "Echo-Organ" because of its several echoes or vocal organ by reason of its near analogy to the human
10 vocal organs, being specially adapted to accompany vocal music and therewith improved on all other musical instruments; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification.

The nature of my invention consists in the following improvements on musical instruments. 1st, because of all other musical instruments, the echo-organ is much the nearest imitation of the human vocal organs, both in form and sound. 2ly in increasing the beauty of musical sounds on the principle of double-triple &c. echoes. 3ly in that
25 the echo-organ is constructed (I believe) cheaper than any other musical instrument which possesses the advantage of playing bass and tenor as conveniently as a forte piano, while using the foot to tread the bellows. Therefore considering all its advantages,—also that it is made quite portable—it will produce the best of instrumental music, except what is obtained at far more
35 cost.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

I proceed in the first place to describe the
40 method of building; and afterward the mode of operation, and explanations of the whole vocal or echo-organ.

I direct a silversmith, (in the known accordion form and not my invention), to take
45 plate brass near one eighth inch thickness and cut out 30 small plates, Figure 4th and Plate 1st; one inch wide—one and three fourth inch long; and make one or more mortises through each of these, as from
50 (T to O), of such width and length as to suit small tongues of different sizes, thus, the tongues must lack say a hair's breadth all around the mortise of fitting—and made as follows. Out of silver, steel or brass,
55 make plenty of thin, flexible tongues, near

one sixteenth inch wide, and varying in length from say one inch to near a fourth inch. One or more tongues (if tuned in unison) may go to one of the 30 plates, to be pinned over its said mortise as (T O). 60

The tongues should be tempered, polished &c.; and are tuned from low to high by shortening the length: likewise the more flexible the lower, and the less flexible the higher sound; but none of them should be
65 stiffer than those of an accordion. They may be all tuned, and yet all limber nearly alike, merely by causing them to differ in length. For there is danger of having them too stiff for the operation of the bellows. I
70 will hereafter carefully specify the degree of flexibility the tongues must have. The tuning is done easily by a piano: thus, before a tongue is pinned over its mortise (T O), merely hold it there fast, and cause
75 it to vibrate by applying the human mouth over it and blowing;—or spring its end with something; and though but a twang or weak sound, yet it shows what tone of the piano it is nearest; and if too low, file the
80 tongue gradually shorter till it hits the right tone.

I will here use a comparison as the test of flexibility for all the tongues. If the silversmith, while tuning as aforesaid, blow with
85 his mouth upon the naked tongue or tongues Fig. 4th Plate 1st, placed over either mortises (T O), and can make them vibrate or sound a tone, with a puff no stronger than what is needed for playing a flute,—all is
90 safe;—but if it should require as strong a puff as for playing a fife, there is danger that the bellows when of a portable size would fail in force of air to make them sound. Said 30 plates, containing one or
95 more tongues each; and tuned for bass and tenor; producing 30 different tones; may perhaps be some one fourth or a third of the expense of building the echo-organ.

Now I direct a cabinet-maker, (agreeably
100 to my invention); having sonorous wood, such as suits for a violin; to take a small block thereof, and with the turning lathe finish it somewhat the size and shape of a hen egg; however not quite so tapering as
105 the small end; but being a solid globe of one inch the shorter diameter, from V B to L X Fig. 1st Plate 1st; and one and three fourth inch the longer diameter from (T to O). Saw this through the center, parallel with 110

the longer diameter, viz, from (T to O); and excavate each half, till its walls are about one eighth inch thick. Bore a half inch hole both at B V, and L X. Coat the inside of each half of the globe with the best glue. After this is dry; apply fresh glue on the edges of each half of the globe: and then take any one of said 30 plates Fig. 4th, and inclose it, by fitting each half of the globe to it air tight at (T O) Fig. 1st. Said globe with its inclosed plate of one or more tongues, I call the vocal box. Next, make a tube one inch long from L X to F S Fig. 1st; having a half inch bore; and walls one fourth inch thick:—coat its inside with glue. This tube I call the fauces. Then apply fresh glue on its end L X; taking care to join its end on the vocal box at L X, and not B V; for the tongues must front the outside nearest the bellows pipe.

Next comes the mouth piece,—in miniature like a violin;—if a violin were as oval on the bottom as top side—divested of its apparatus next the strings—no sounding holes—and instead of a scallop, a bulge from F S to E *i* Fig. 1st, Plate 1st. This oval or violin shaped mouth piece, to be about four inches long from (*m h*) to P E; two inches wide from F S to E *i*; but not so much as two inches wide from (*m*) to (*h*);—a little less than one inch deep at the deepest place; being a gradual oval to fit the fauces; thus, by making a half inch hole at F S and E *i*: Affix the lips at E *i*; viz. a tube half inch bore like the fauces, but only one eighth inch long. Join the mouth piece to the fauces as at F S with glue. The walls of the mouth piece must not exceed one sixteenth inch thickness;—made of choice sonorous wood;—a thin coat of glue all over inside and out—and put together with glue. Said vocal box,—its fauces and mouth piece, being dried—then by blowing with the human mouth at V B Fig. 1st a beautiful sound is produced; *i. e.* one tone or note the same pitch that the silversmith left the tuned tongue or tongues (in unison), of its brass plate Fig. 4th. Said vocal box, with its fauces and mouth piece, may now have a private mark:—should it produce the lowest tone—call it No. 1st and lay it by as finished.

Having so clearly described one vocal box, with its fauces and mouth piece; composing or called—one set of echoes:—twenty nine sets of echoes are yet to be made precisely like the aforesaid. All 30 sets of echoes finished, and inclosing 30 brass plates; will produce 30 different tones; and may have private marks or Nos. from 1 to 30. I will say now, that the remaining of the echo or vocal-organ is very plain work. Likewise, agreeably to my invention: Next; out of sonorous wood; plane and polish off stuff to one eighth inch thickness, for a simple oblong box, 32 inches long,—5 inches deep—4½

inches wide—end pieces of course to fit it. Take one of the side pieces of 5 inches by 32; viz. Fig. 6th A B C D Plate 1st; and bore 30 half inch holes in a row lengthwise in it, from L R to X S, precisely one inch from center to center of each hole. By taking one of the sets of echoes; and placing the part of the vocal box V B Fig. 1st Plate 1st, on this side piece Fig. 6th A B C D; the place is ascertained where the row of half inch holes must be; so that all the sets of echoes will be enveloped without touching the oblong box, except at V B and *i* E Fig. 1st. Then adjust and glue such vocal box over the half inch hole nearest L R Fig. 6th, as gives the lowest tone; and so on, until the whole series of the sets of echoes have their vocal boxes at (V B) Fig. 1st glued over said half inch holes; ending with the highest tone nearest X S Fig. 6th. After this dries:—then, by taking the other side of the oblong box 5 inches by 32 Fig. 5th A. B C D; and placing it plumb over all the lips, reason shows where its 30 half inch holes must be bored, as from K *y* to X *p*, that the lips may open entirely out: which done glue the same to all the lips precisely over them. Now if the work is correct, the vocal boxes touch each other;—but the mouth pieces have a very small space between them. Next, take one of the pieces of 4½ inches by 32 viz. Fig. 7th; and make plenty of sounding holes through it; covering them over with varnished or glued silk, air tight; like the known form of a piano, at each end on top, as A E B F and O C S D Fig. 7th, and stretch several violin strings lengthwise from A B to C D, to help the ringing. Then, glue this piece on top of said oblong box: and of course glue on the bottom and end pieces.

Next, comes the keys, which are easily made and adjusted, in the known form of accordion keys;—not my invention. First, make them precisely like piano keys,—size and shape,—Fig. 2d Plate 1st from E *i* to where the fingers play; or as shown more fully in Fig. 3d A C B D, and the semitones (*a b*) (*o d*). Then, they are finished like accordion keys; by affixing limber metal springs under them, as S P Fig. 2d; and thick brass wire one end at the pivot (E), and the other end having a key stop or leather knob at (K) Fig. 2d; just to fit over the lips or key holes, as from K *y* to X P Fig. 5th. Now comes another strip or board, of say 3 or 4 inches wide, as from E to T Fig. 5th;—convenient thickness,—and such length, as the space of 30 piano keys will show, if this board be measured across them, from E T to S F. Just make 30 mortises across this board; as the width of said keys will show; to bury said metal springs in; and to receive the pivots of the keys at E S Fig. 2nd; having holes and a wire

through them here, or from T to S Fig. 5th;—causing pivots. This board is to be glued on near the bottom of the oblong box, from T to S; as far from B as from D. Now, the center or 15th key knop will be perpendicular to its pivot; as (*m* to *i*): But the farther from this center, on each side of (*m* *i*), the more the said thick brass wire K E Fig. 2d must be bent from its perpendicular, to cover the lips or key holes: occasioned, because the vocal boxes are wider than what suits the key width for the fingers to play on.

Next;—by my invention—make 3 sides of a leather box; 32 inches long; 2 inches wide; and one inch deep—seen at E Z F T Fig. 6th; to fit over the vocal boxes outside,—covering their half inch holes from L R to X S Fig. 6th. The leather box is received into two narrow and mortised strips, from E to F and Z to T; fitting plow and groove fashion, air tight, that it may be slipped off, for cleaning the tongues occasionally.

Now all is ready for the bellows, and its adjoining tube. Make a bellows, the known form of a blacksmith's, not my invention; as (*g* *o*) (*v* *e*) Plate 2d, double valved at (*e* *v*); 32 inches long, 6 inches wide, and where deepest, one foot. Having a cross piece parallel with the bulge; see a blacksmith's; then just as simple a frame to fasten it in as fancy dictates; of course too simple to need description. However there must be a strong spring under the bellows, as (*s* *p*) Plate 2d; and a treadle adjusted transverse to this spring, as (*m* *r*), to work on a pivot loom fashion, and either a weight or spring on top of the bellows. This bellows, and its frame, to be decently boxed around trunk fashion, or as fancy may dictate.

There only now remains a semicircular tube till all is finished. I invent this or rather its adaptation to the echo-organ, thus:—Make of gum elastic, or in lieu thereof a leather tube, of one inch bore; and such length, as about fits from the top of a common dining table to the bellows pipe, near the floor under the table, as from *w* *w* to *z* *z* Plate 2d. Sew up a straight leather tube, length and diameter aforesaid, fill it with gun-shot, then bend it to the semicircle needed, now glue it all over, when dry, empty the shot and it is done; ready to slip one end on the bellows pipe at *z* *z*; and the other end on the leather box at *w* *w* Plate 2d. At each of the latter places, the tube is in a trice slipped on ready for playing; and as readily slipped off when done playing; that the oblong musical box may be safely laid away in a bureau, till needed again. This finishes the work of the echo or vocal-organ, ready for playing tunes.

Having described the method of building, it remains to give explanations on the whole

instrument; and also the principle on which it operates. The principle of operation is evidently thus; place the oblong or musical box, already described, on a common dining table; and the bellows under it; slip on the semicircular tube as aforesaid. Then, by treading or working the bellows by the treadle (*m* *r*) Plate 2nd, air is constantly forced and pressing in the leather box L R X O; which covers 30 half inch holes, or the first ingress to all the tongues, as from L R to X S Fig. 6th and while the bellows works, all the sets of echoes, viz. vocal boxes, fauces, and mouth pieces, are constantly pressed full with air, even to the lips where the key knops or stops cover. But no tongue makes any sound, till as the fingers play, a key knop or stop is moved from the lips of one mouth piece, as at K Plate 2nd; which then only gives air vent to its own vocal box, and makes one tone; all the others remaining full pressed with air as aforesaid; but entirely mute until their key knops or stops are moved off in playing, as from K *y* to X *p* Fig. 5th; when they instantly sound. The beauty of sound as aforesaid is increased, on the principle of double, triple &c. echo. The tongues T T, sounding in the vocal box V V H H Plate 2nd; (which as nearly as possible resembles the human vocal box), causes one echo there; and this tone now created, while going through the fauces H H F F, (like the human fauces), is merely condensed, and gains strength; but in the mouth piece (*m* *n* *m* *n*) (much like the human mouth), receives its double echo, and special beauty of tone. Although, the tone is now in part liberated to reach the ear, from the lips at K Plate 2nd; yet as the mouth piece (*m* *n* *m* *n*), has such a thin and sonorous wall, which all through vibrates the said tone; causing all the air around it, and even in the oblong box (B *g* D E), to vibrate and give a third echo; which might now reach the ear direct as a third echo, through the sounding holes A B C D Plate 2nd; but these are covered with the thin wall of varnished silk, causing more vibration of said echo; and even the musical strings, on stretch from A B to C D Fig. 7th, just over the silk, vibrate considerably.

Now we have the bellows for the lungs, semicircular tube for the trachea, and the sets of echoes; viz. vocal boxes, fauces and mouth pieces, to fill or complete the analogy of the human voice; and besides as much echo for beauty, as the convenience of the echo-organ will admit. I have tested that if the lips should be a tube as long as the fauces, then, the music and echo is ruined, as badly as for a person to sing with a short tube to his lips; depending on some mysterious law of acoustics. The reason why I invented the mode of separation of

the oblong music box so far from the bel-
lows, was to save the expense of a piece
of furniture to include the whole instru-
ment; for this would much enhance the
5 price of the vocal-organ; and render it less
portable. No common cause breaks one
tongue more than another, or puts it out of
tune, (made permanent by the silversmith);
nevertheless, I herewith provide for what
10 might be thought a future emergency; thus,
instead of gluing the lips, and vocal boxes,
to each row of 30 half inch holes, as afore-
said; just wedge them here, with some elas-
tic substance around them; say gum-elas-
tic; and then the top piece of the oblong
15 box may be made to slip off; and if a tongue
should break, slip out its vocal box or set
of echoes, and repair, then replace it again.
But as heretofore described, the leather box
20 slips off, as out of a plow and grooved
place; then the tongues are partly exposed,
and may be cleaned, by introducing a small

pointed or hooked wire about them, to re-
move dust or fuzz.

What I claim as my invention, and desire 25
to secure by Letters Patent, is—

1. The construction of the vocal appa-
ratus herein described consisting of the vocal
box with its vibrating tongues as set forth
and the mouth piece and fauces attached to 30
the same.

2. I also claim the placing of the forego-
ing vocal apparatus or such number of them
as may be necessary to produce the required
notes in a box constructed in the manner 35
herein described. The said vocal pieces be-
ing arranged beside each other and governed
by stops operated by keys for producing the
tone in the manner herein set forth.

JOHN W. CAMPBELL.

Witnesses:

J. J. ELDRIDGE,
H. STULZ.