

(No Model.)

W. M. JEWELL.
MUSICAL INSTRUMENT.

No. 460,688.

Patented Oct. 6, 1891.

Fig. 1.

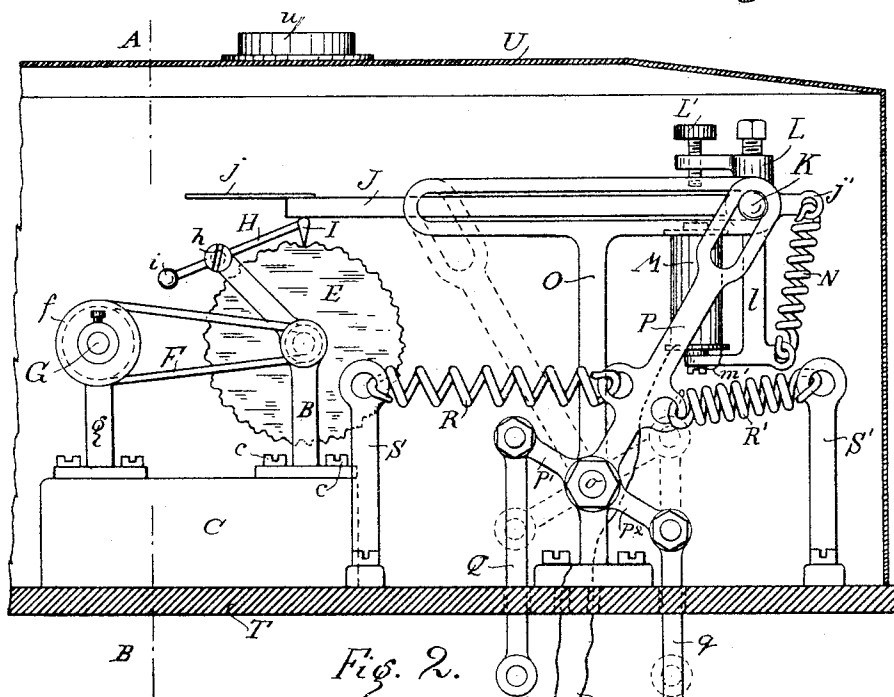
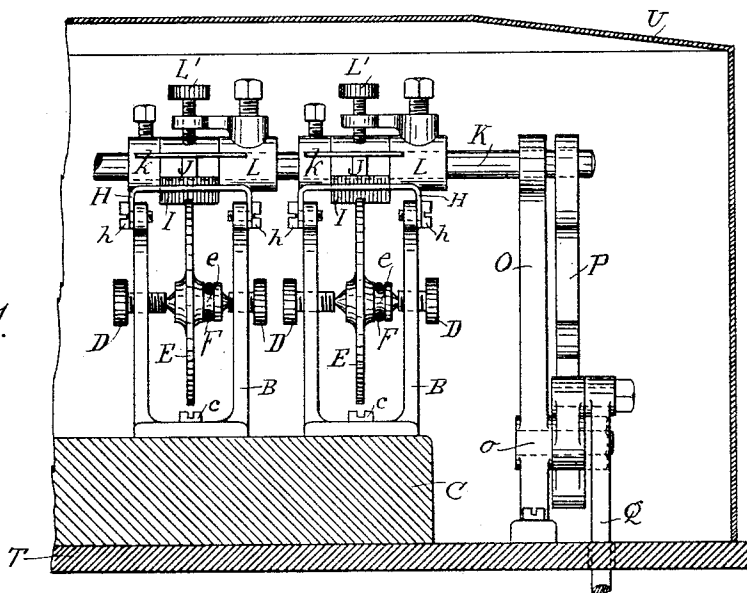


Fig. 2.

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MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 460,688, dated October 6, 1891.

Application filed April 27, 1891. Serial No. 390,721. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. JEWELL, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Musical Instruments, which are fully described in the following specification, reference being had to the accompanying drawings.

The objects of my present invention are to transpose any sound to any pitch or amplitude, still preserving the characteristics of the sound transposed, and to provide an apparatus for producing said sounds and any desired pitch or amplitude of these sounds continuously, separately, or simultaneously, which I will now proceed to describe.

Referring to the drawings, Figure 1 represents a vertical section at the line A B of Fig. 2. Fig. 2 shows a side elevation of an apparatus embodying the above-said improvements.

Corresponding letters refer to like parts.

B represents a frame or support of any convenient form, which is fastened rigidly to a base-block C by means of the set-screws c. This frame is provided with two screw-threaded and directly-opposite holes, into which are secured two cup-shaped screws D, adapted to receive the conical-pointed axles of the wheels or disks E, thus allowing an independent and ready removal of either of the disks E, which are free to revolve in these bearings.

The disks E are preferably made thin and of metal, though any other material may be used. They are grooved or indented by any suitable means or process (preferably around their circumference and entire width) corresponding to the vibrations of the sound to be produced. The axles of the disks E are grooved on one end, so as to form a pulley e, in which runs a belt F. This belt also passes over a pulley f, fastened to a shaft G, which is supported by fixed uprights g, placed suitable distances apart the entire length of the shaft G.

Upon the top termini of the frames B are loosely supported, by means of screws h, the double levers H, the levers H being provided with holes for the screws h. On the upper and closed ends are soldered tapering blades I. The thin edge of the blades I point down-

ward and rest upon the uneven circumference of the disks E, while the open ends of the levers H are provided with weights i, which tend to lift the blades out of contact with the disks and up against the armature J. The elongated armature J swings vertically upon the shaft K, and is held in position horizontally by the collars k and L, which are secured by set-screws to the shaft K. The armature J has fastened to its extreme outer end a thin broad plate j. The collar L, irregular in form, has a projection on top extending over the armature J. In this projection is a screw-threaded hole, into which is set a thumb-screw L', forming a back support or rest for the armature J. Directly underneath the armature and centrally with the thumb-screw L' is placed an electro-magnet M upon a support l, formed by an extension of the collar L. This said extension is also provided on a line with the bottom of the magnet M with a circular hole, into which is fastened one end of a spiral spring N, the other end of said spring being fastened through a like hole in a back projection j' of the armature J.

The shaft K is supported at necessary intervals by the posts O, the upper or horizontal part of said posts being slotted to allow a horizontal movement of the shaft K, which carries the armature J, electro-magnet M, and collars k and L, thus enabling the armature J to slide over the blades I, thereby varying the travel or vibration of the plates j.

The posts O have a stud o screwed into the vertical part of said posts. Fig. 1 shows a sectional view of the stud o. This stud forms a bearing for the lever P, said lever being secured thereon by the nut o'. The lever P has two arms P' and P², (not shown in Fig. 1,) projecting at right angles to the main stem of said lever. These arms are provided with two connecting-rods Q and q, which pass downward through openings in the base or mounting board T. The lever P has also two holes, one on each side and directly over each arm P' and P², into which are secured one end of the spiral springs R and R'. The opposite ends of the springs R and R' are in like manner fastened to the respective standards S and S'.

The electro-magnets M are controlled by

wires m , which may be connected to any suitable circuit breaking and closing device, the other termini of the magnet-wires m' being connected to the general frame-work, which is in turn connected by wires m^2 to the opposite contact of the above-mentioned circuit-controlling device.

The whole apparatus is entirely inclosed within a cover U , whose bottom edges rest upon the base-board T . This cover is closed on top, with exception of a small opening u , upon which may be placed a trumpet (not shown) for increasing the strength of sound. Any number of disks E may thus be placed together and operated from the two shafts G and K . As the preparation of these disks does not form a part of my invention, an arrangement for this purpose has not been shown. They may, however, be engraved or cut as follows: The sound to be produced is played before or against a flexible diaphragm, to which is connected a long and light lever having its fulcrum near one end, this end being attached by a delicate spring to the diaphragm. To the opposite end of the lever is secured a pencil or marking device, which is brought to rest upon the side of a disk or circular plate. The sound, vibrating the diaphragm, will cause the lever to travel to and fro, and the pencil, being attached to its end, will trace upon the plate, which is made to revolve, a diagram of the sound-pressures or what is more frequently termed a "wave-line," the number of waves or undulations traced in one revolution of the registering-plate depending upon its speed and the distance of the pencil from its center. The plate is now cut so that the line traced upon its side will form its boundary or circumference. It now only remains to mount this disk upon an axle and connect it so that it will be driven at the same speed as it was revolved during tracing. To transpose this now fundamental note to a higher or lower pitch of the same, the circumference of the disk is now placed against the tracing-lever and revolved, when the original note will be reproduced. If the speed of the disk be increased, the note will become higher, due to the increased rapidity of the vibrations, but the quality of the sound remains the same. Now if in like manner this higher tone be traced, and so on, any number of tones or fractions of tones either above or below the said fundamental note may be produced.

Having now prepared one or more disks E , I will proceed to describe the operation of my apparatus. The shaft G being driven by any motive power, an electric motor coupled direct being most preferred, the disks E will be in turn revolved. If now a current of electricity be sent through the coil of the magnet M , the armature J will be attracted and the blade I forced down upon the circumference of the disk E , which will thereby cause the said blade to rise and fall with the

undulations of the disk, the magnet M maintaining a steady downward pull, while the high parts of the disk will force the blade to rise in opposition to the said magnet, and as the armature J is being firmly pressed upon the said blade it will be caused to vibrate, and being provided with a diaphragm or plate j , which serves to set the surrounding air into corresponding rarefactions and condensations, will produce the characteristic sound and pitch of the disk. The sound is discharged through the opening u , and thence through a trumpet mounted upon said opening. The cover U is, however, not essential to its working. If now it is desired to increase the loudness of the emitting tone, the rod Q is lowered, which will swing the lever P out of its normal vertical position and assume an angle shown by dotted lines in Fig. 2, causing at the same time the shaft K to be slid horizontally toward the disk, thereby bringing the blade I closer to the fulcrum of the armature J , and hence increasing the length of travel of the plate j or amplitude of vibration, and therefore the intensity of the tone. If, on the contrary, the sound is to be diminished or softened, the lever P is brought to the position shown in Fig. 2 by pulling down the rod q and releasing the rod Q , the effect being to bring the plate j directly over the blade I , in which position only the extent of motion of said blade will be imparted to the plate j , thus decreasing the amplitude of vibration, and consequently the sound. When the force is released from the rods Q and q , the lever P will return to a vertical position automatically. The note will be continuously sounded until the electric circuit controlling the magnet M is broken. When the said current is interrupted, the spring N will raise the armature from the blade against the adjusting-screw L' . The blade I will now be lifted out of contact with the disk and up against the armature by the weights i , when the sound will cease, though the disk will continue to revolve.

When several or more of the disks E are to be operated together, the magnets M of the disks E may be connected by their wires to as many circuit-controlling keys placed side by side, the same as in the usual piano key-board, and the tones emitted by the plates j will be as easily controlled as the notes upon our present pianos.

It is obvious that various modifications in the construction and mode of operation herein shown and described may be made without departing from the principle of my invention. I therefore do not wish to be understood as limiting myself strictly to any precise details hereinbefore described or shown by the drawings.

I wish also to mention that this apparatus may be made to sound the alphabetical letters and figures or any other characters in the same manner as notes or tones, thus enabling

any character, or two or more of them, to be sounded simultaneously, and thus form a sym-
bological chord or word.

Having now described my invention, what I
5 claim as new, and desire to secure by Letters
Patent, is—

1. An apparatus for producing or transmit-
ting musical or other sounds continuously,
separately, or simultaneously, having one or
10 more revolving disks or cylinders upon which
are indented or engraved the vibrations of
the sounds to be produced, a suitable mech-
anism for converting said recorded vibrations
to vibratory motion and transmitting said mo-
15 tion to a body capable of making audible the
said vibrations, said converting mechanism
being depressed upon or released from said
disks by electro-magnets or other suitable de-
vice suitably connected to and operated by
20 a key-board, substantially as and for the pur-
poses specified.

2. In an apparatus for producing or trans-
mitting musical or other sounds, the combi-
nation, with a revolving disk having inden-

tured or grooved thereon the vibrations of any 25
sound, of a lever actuated by said disk and
suitably connected to a diaphragm or other
body capable of making audible the vibra-
tions of said lever, whose fulcrum may ad-
vance or recede from the motive power, sub- 30
stantially as set forth.

3. In an apparatus for producing or trans-
mitting musical or other sounds, the combi-
nation, with one or more revolving disks E,
having indented or engraved on their cir- 35
cumference the vibrations of any sound, of a
driving-shaft G, blades I, bearing upon and
automatically released from said disks, arma-
ture-levers J, sliding upon said blades, elec-
tro-magnets M, springs N, supports O, levers 40
P, and a suitable key-board for controlling the
circuits of said electro-magnets, substantially
as and for the purposes specified.

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Witnesses:

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IRA H. JEWELL.