

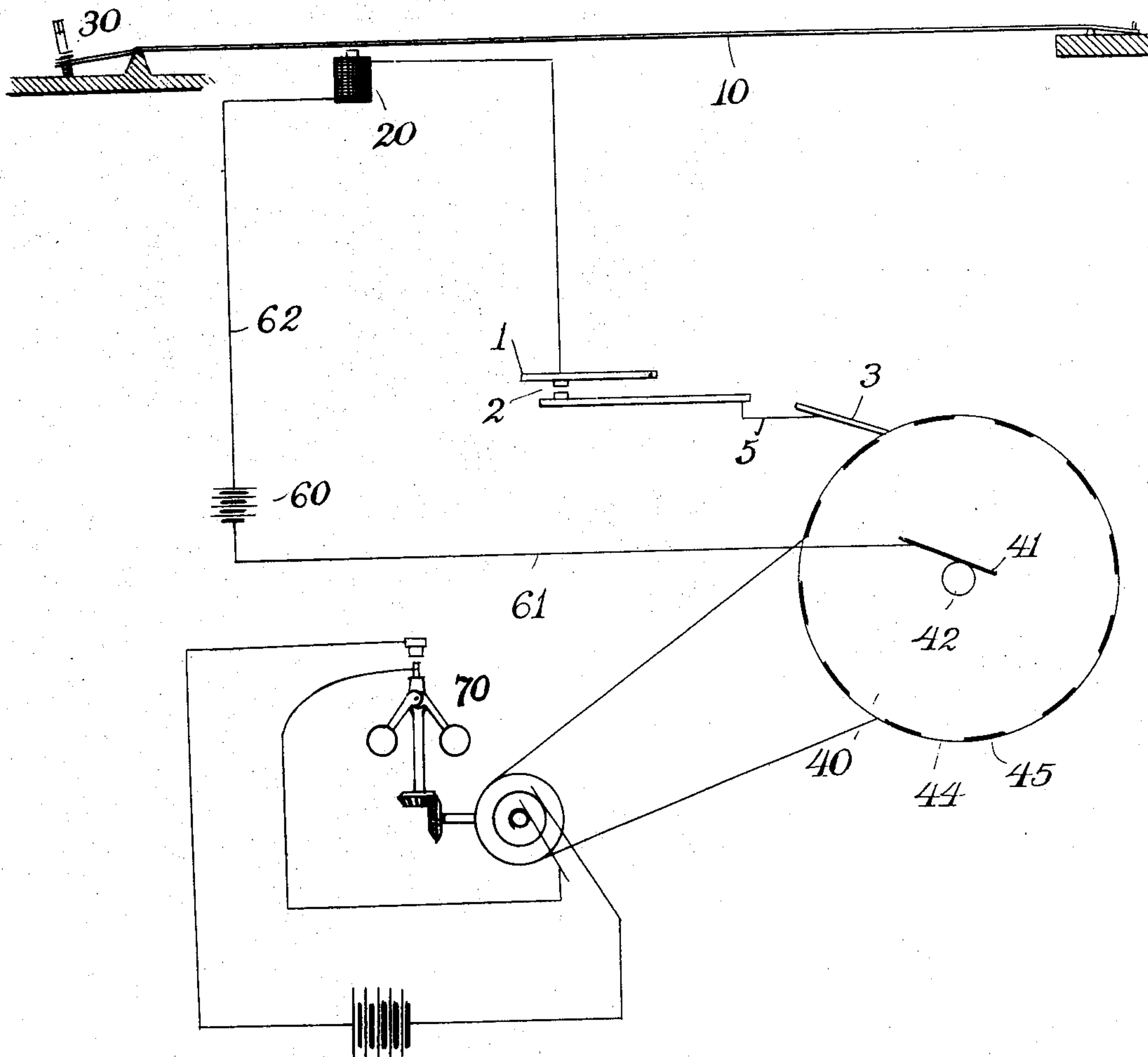
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M. L. SEVERY & G. B. SINCLAIR.

METHOD OF TUNING.

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# UNITED STATES PATENT OFFICE.

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## METHOD OF TUNING.

No. 890,803.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed August 7, 1905. Serial No. 273,204.

*To all whom it may concern:*

Be it known that we, MELVIN L. SEVERY and GEORGE B. SINCLAIR, both citizens of the United States, and residents of Arlington Heights, county of Middlesex, and Winthrop, in the county of Suffolk, respectively, in the Commonwealth of Massachusetts, have made certain new and useful Improvements in Methods of Tuning, of which the following is a full, clear, and exact description.

The object of this invention is the effecting of means whereby a stringed instrument can be tuned with absolute accuracy, even by a person devoid of what is termed a "musical ear", and wholly unskilled in the present art of piano tuning.

We have discovered that when a piano string is brought into the field of an electromagnet having a definitely timed number of electric pulsations conveyed thereto, and such string is gradually tuned up to vibrate in accord with said pulsations, the instant the same are in exact accord the string will respond with a markedly pronounced maximum loudness, while if tuned but slightly sharp or flat, the resonance will at once fall off and become much weaker. Furthermore, as the string departs in the slightest degree from the number of vibrations per unit of time given by the electromagnet, not only does its volume decrease, but the quality of the tone changes as well. Hence, by providing a standard set of electromagnets and pulsating devices for the piano strings, and then gradually tightening each wire until its magnet fails to further increase its loudness of vibration, the operator can know that the string is in exact tune. Or if he tightens the wire a trifle too much, as evidenced by its diminution in loudness, he loosens up thereon until again the maximum volume is reached. When the operator becomes more experienced, he can also detect the exact point by noting the change in quality of sound produced.

In carrying our invention into effect for ordinary pianos or other stringed instrument, all that is needed in the way of apparatus is a single electromagnet, and a device for imparting thereto any desired number of standard pulsations. Such magnet being supported in close proximity to any one of the strings, and the electric pulsations appropriate to the string communicated to the magnet, all that the tuner needs to do is to

tighten up or loosen such wire until its maximum loudness and proper quality are reached. Then the magnet can be shifted to the next string; the pulsations changed in accordance therewith, and the tuning done as before. Our process is, however, especially designed for electric pianos wherein the strings are vibrated by electromagnets permanently in place. Previous to our invention of this process, the method of tuning the strings was that of the old-time piano tuner,—to turn the tuning-hammer and strike the note until the latter reached the standard set by the tuning-fork; striving to reach the point where the beats, which showed a near approximation, should wholly cease. As different tuner's ears varied in their capacity to detect the exact vanishing point of these beats, it is impossible to tune all pianos precisely alike, even with the same standard. This, however, is a comparatively insignificant matter in comparison with the inability of even the same tuner to get identical temperaments on two or more pianos, or to duplicate the temperament in the same instrument when it is re-tuned; for the reason that the question of temperament is one of individual judgment, of compromise with exact chords.

Prior to our invention, the only known method of tuning electrically actuated pianos was to first change the tension upon each string until it suited the tuner's ear, and then to time the pulsation producing mechanism until it accorded with the vibrations of the strings. In other words, the pulsation producing device of each string is planned to deliver the proper number of impulses per unit of time to equal the theoretical number of its strings vibrations. Then the strings are tuned in the usual manner, and the pulsation producing motor speeded up or down until the periodicities thereof approximate the strings' vibrations. This is never satisfactory, however, inasmuch as no man can accurately temper the scale of the piano twice alike, and much less can two professional tuners make two different instruments with their scales exactly the same, so that the strings are never brought to the precise pitch for which their pulsation producing mechanism is planned. This renders the piano irregular and uneven in tone, and unreliable and uncertain in timbre. By means of our process, however, we are enabled to produce



an instrument wherein not only are the strings tuned into exact accord with the standard established for every note in the entire scale, but wherein the strings vibrate with a maximum volume with a minimum expenditure of current, and which can be kept in perfect tune by any person who will follow the simple directions laid down.

Referring to the drawings forming part of this specification, and which show in diagram a means for carrying our process into effect, the reference numeral 10 designates a piano string having a tuning pin 30, and an electromagnet 20 in close proximity thereto. The rotating disk 40 having its periphery divided into alternate sections of conducting and non-conducting material 44, 45, acts in connection with the brush 3, wire 5, source of electricity 60, lead-wires 61, 62 and brush 41, to impart to said magnet the desired electric pulsations. 1 and 2 represent a key and contact by which the pulsations are turned off and on to the magnet. By turning the pin 30, the string is tightened or loosened in the usual manner. In tuning said string, the electric pulsations produced by the current-breaker 40 and exactly timed by a governing device 70, are continuously maintained in the electromagnet 20 while the string is being tightened. As the string approaches an octave below the set standard, it will increase in loudness, and then diminish as the tuning is continued past, but the quality of the note produced will make it evident that the string has not reached the true pitch for which it is designed. So the tightening is continued until a second marked increase in loudness

and a richness of quality in the note produced, prove that the string has reached the set pitch. Should the tuning-pin turn slightly too much, the diminution in loudness and quality show instantly that the true point has been passed. This process of tuning is especially adapted for the electric pianos constructed in accordance with our application Serial No. 273,199.

What we claim as our invention and for which we desire Letters Patent is as follows, to wit;—

1. The herein described method of tuning a vibrating magnetically sensitive body, which consists in producing in close proximity to the same, magnetic pulsations corresponding to the number per unit of time designed for such body, and then tuning the latter until it responds to the said magnetic pulsations with its maximum loudness.

2. The herein described method of tuning a vibrating magnetically sensitive body, which consists in producing in close proximity to such body magnetic pulsations corresponding to the number per unit of time of vibrations designed for such body, and then tuning the latter until its loudness and quality of sound show it has reached its true pitch.

In testimony that we claim the foregoing invention, we have hereunto set our hands this 21st day of July, 1905.

MELVIN L. SEVERY.  
GEORGE B. SINCLAIR.

Witnesses:

FRED G. TILTON,  
A. B. UPHAM.