

May 25, 1926.

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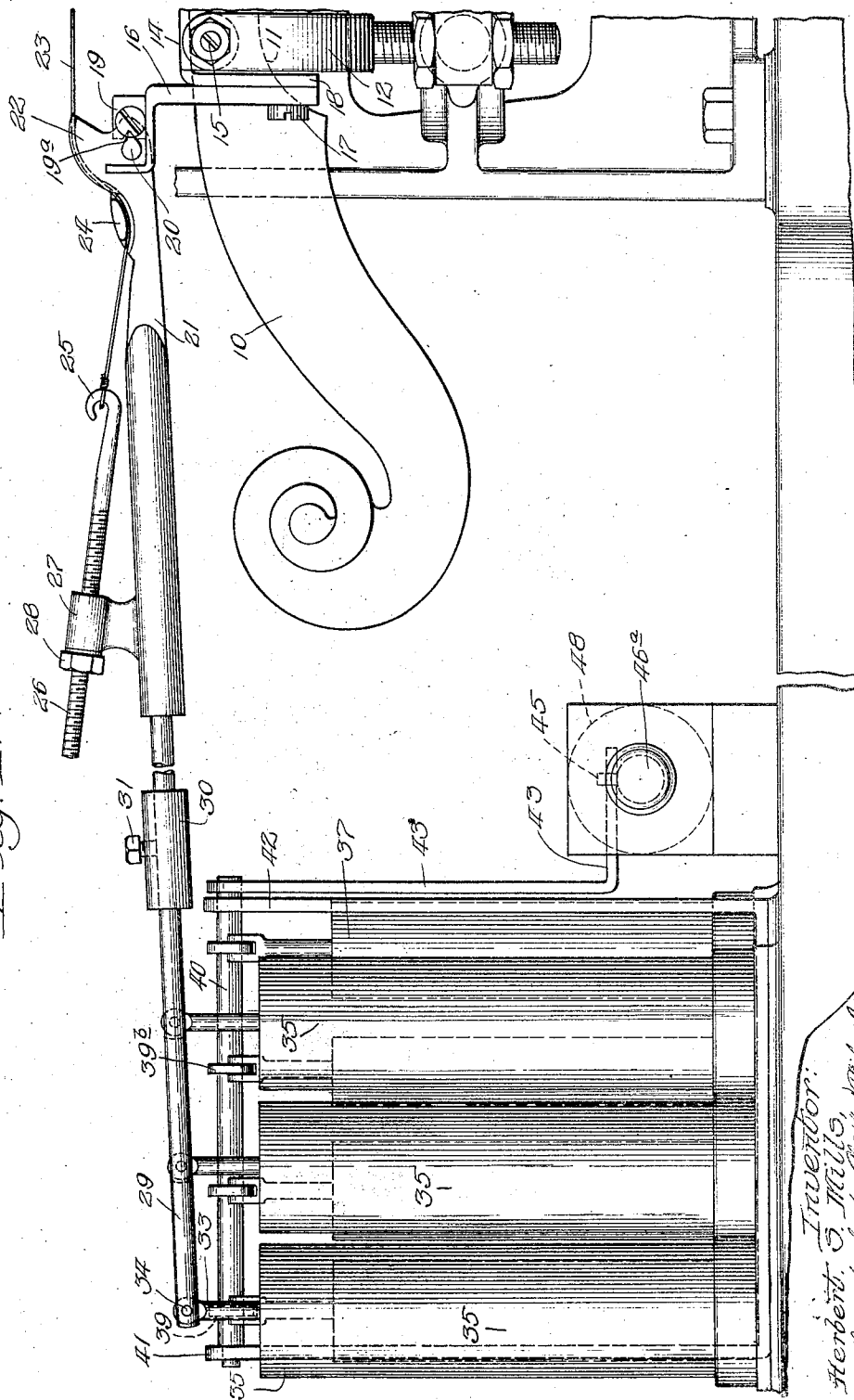
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TREMOLO DEVICE FOR SELF PLAYING STRINGED INSTRUMENTS

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Fig. 1.



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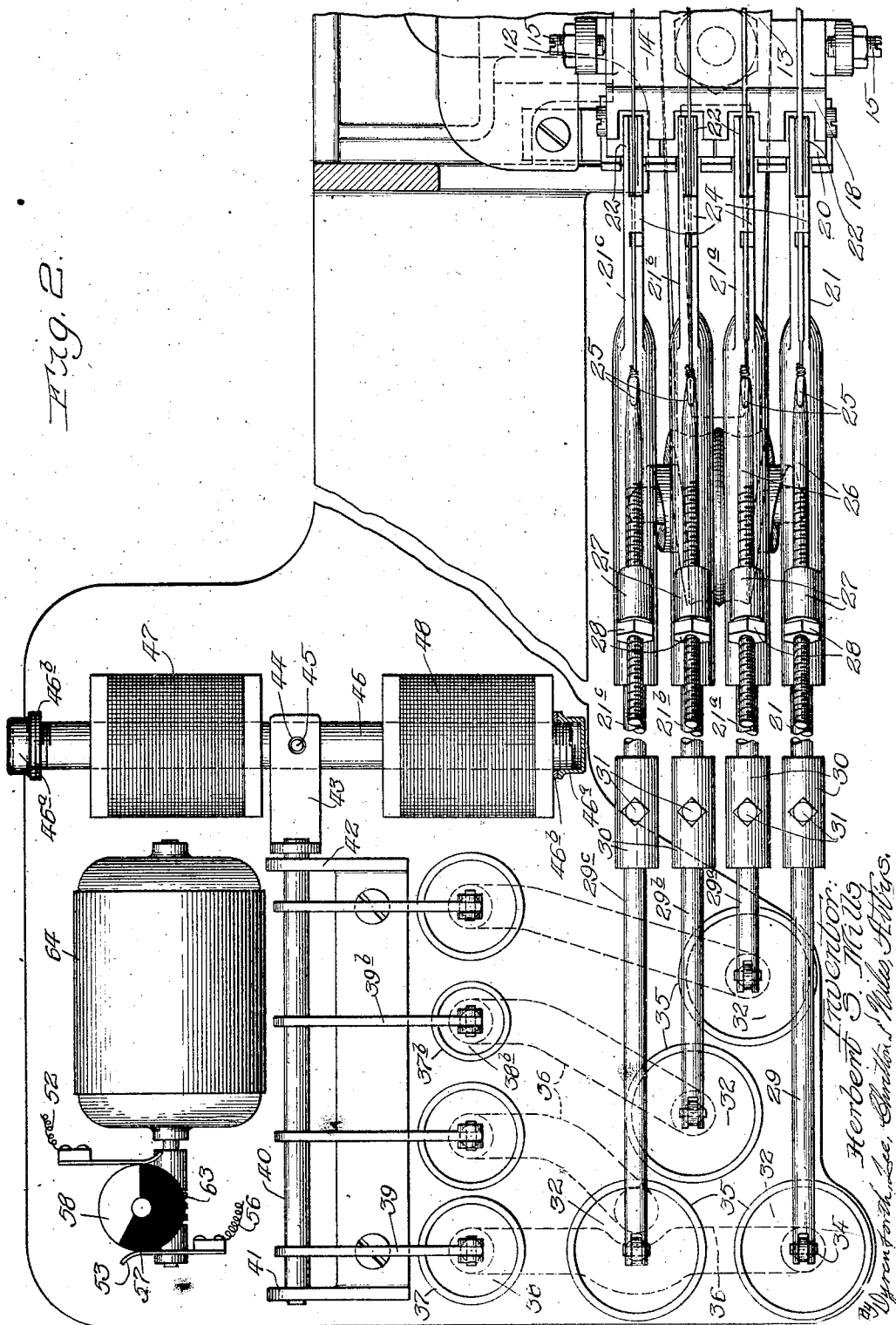
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TREMOLO DEVICE FOR SELF PLAYING STRINGED INSTRUMENTS

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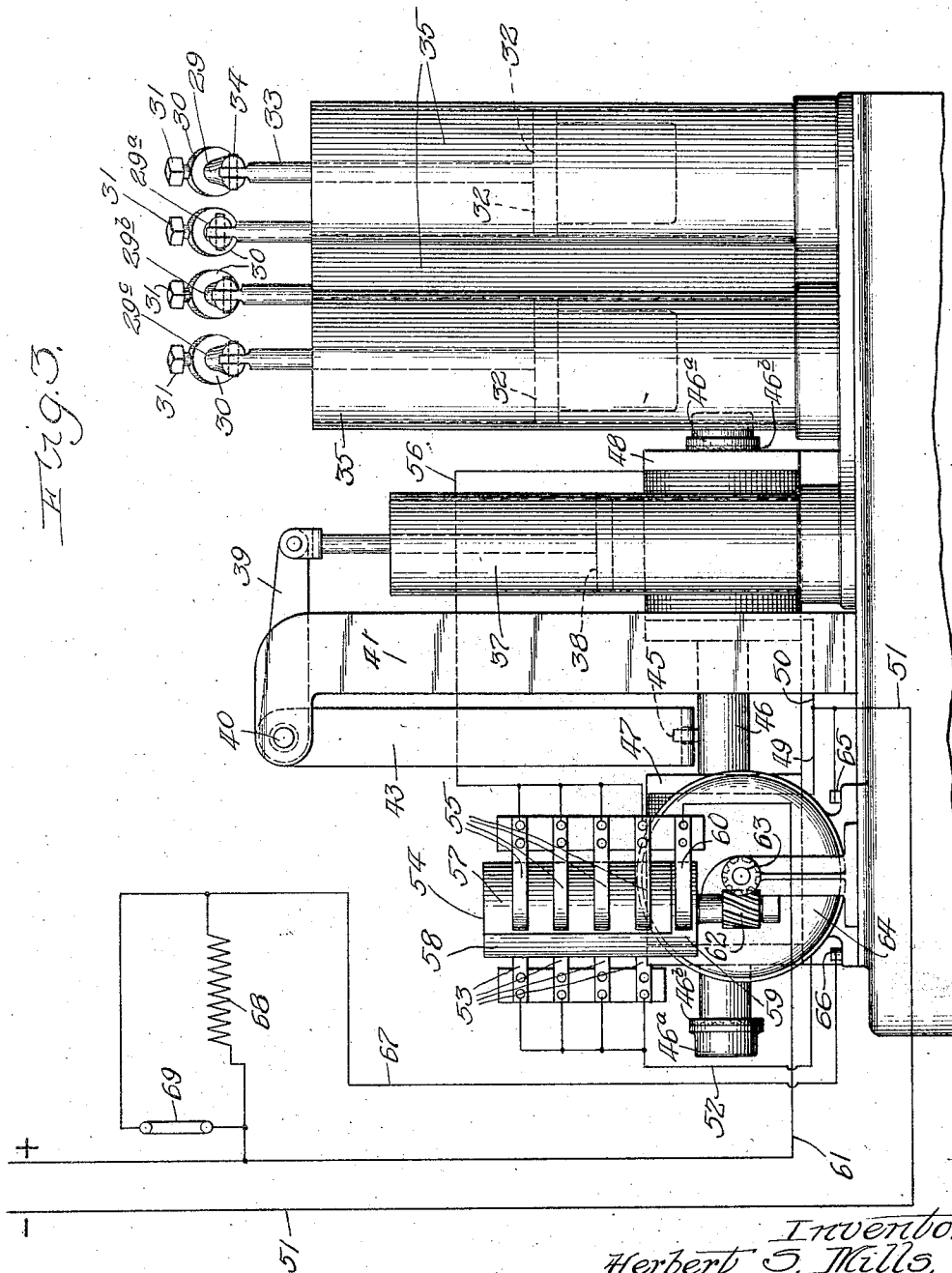
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TREMLO DEVICE FOR SELF PLAYING STRINGED INSTRUMENTS

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TREMOLO DEVICE FOR SELF-PLAYING STRINGED INSTRUMENTS.

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This invention relates to improvements in tremolo devices for use in connection with stringed instruments of the viol class and more particularly of the character described in the patent to Henry K. Sandell No. 855,021, dated May 28, 1907. It will be understood from the following specification, illustrated by the accompanying drawings in which:

Figure 1 is a side elevation of a head of a violin to which a tremolo device embodying the invention is attached;

Fig. 2 is a plan view of the device shown in Fig. 1; and

Fig. 3 is an end elevation of the same.

The device is illustrated as being applied to an instrument of the viol type, such as a violin, the head 10 of which is shown in Fig. 1. The neck 11 of the instrument is supported by means of a suitable bracket 12. A flat neck plate 13 is secured to the upper flattened top of the neck 11 and at its forward end is provided with laterally extending projections 14 the ends of which are bent downwardly on each side of the neck and are adjustably held therebetween by screws 15 which are threaded through the ends of the Y-shaped bracket 12.

A U-shaped member 16 (Fig. 1) passes over the neck and is secured by means of screws 17 to tongues 18 which are integral with the flat neck plate 13. The member 16 carries a block 19 which is notched at 19^a to receive knife edges 20, two of which are carried by each of the four tuning levers 21.

Each of these levers has an arcuate portion 22, the center of which is substantially coincident with the point of the knife edge 20, the convex surface being grooved to receive a string 23. This string passes under the lug 24 and is secured to a hook 25, the shank of the hook being threaded at 26 and passing through a lug 27 on the tensioning lever 21 and is adjustably held therein by means of a nut 28. There are four of these tensioning levers 21, 21^a, 21^b and 21^c corresponding to the four strings, G, D, A and E of a violin. The outer ends of these levers are provided with extensions 29, 29^a, 29^b and 29^c upon which are slidably mounted weights 30 which are adjustably secured thereon by means of screws 31 so that the weights may be moved in and out to obtain the desired

adjustment of tension on the strings to which they are applied.

The tremolo device according to the present invention is applied to these extensions and comprises a weighted piston 32 connected by means of a rod 33 and a pin 34 to each extension as 29. This piston is slidably mounted within a cylinder 35 the latter being connected by a passage 36 with a pump 37 which has a plunger 38 which is movable up and down by means of an arm 39 which is carried by a shaft 40, the latter being journaled in supports 41 and 42. The shaft 40 has keyed thereon an operating lever 43, the lower end of which has a hole 44 passing under a pin 45 on a solenoid core 46. A suitable liquid, such as oil, fills the space between the piston 32 and the plunger 38. The piston 32 is weighted to give approximately the necessary tension to the string, the weights 30 giving the finer adjustment.

This core is mounted in aligned solenoids 47 and 48. The two adjacent ends of these solenoid coils are connected by means of leads 49 and 50 to a main trunk wire 51 which leads to the console or other device (not shown) which has therein a key by which this tremolo device is controlled. A lead 52 from the opposite end of the solenoid 47 is connected with a series of brushes 53 which bear upon the cylinder control while a similar series of brushes 55 bear on the opposite end of the controllers and are connected by means of a lead 56 with the opposite end of the solenoid coil 48. The controller comprises a segment 57 of insulating material which comprises slightly more than half of the cylinder while the controller segment 58 is of metal. The end 59 of the cylinder 54 is covered with a continuous metal band integral with the segment 58 and the brush 60 bears thereon and is connected by means of a lead 61 which like the lead 51 is carried to the switch or other control means in the console.

The controller cylinder 54 is suitably journaled and carries a worm wheel 62 which is driven by a worm 63 on the shaft of the motor 64. The lead 51 is connected to the binding post 65 of the motor while the binding post 66 is connected to a lead 67 which is connected to the lead 61 through

a resistance 68. The latter is shunted by means of a switch 69 which is located in the console.

It will be understood from the foregoing that with the main tremolo switch in the console closed and the switch 69 open the motor 64 will be driven at slow speed thereby causing the controller cylinder 54 to be slowly rotated. As it rotates the solenoids 47 and 48 will be alternately arcuated due to the flow of current through the metallic segment 57 through one or the other of the brushes 53 or 55, thereby causing the soft iron core 46 to be drawn first to the left as shown in Fig. 3 and then to the right. This motion is transmitted through the shaft 40 to the lever 43 and thence to the pump plungers 38. As this motion is quite fast the result is a rapid fluctuating pressure within the pump 38 which is transmitted to the cylinder 35 through the passage 36. These rapid fluctuations are then transmitted through the piston 32 and extensions 39 to the tensioning lever 21 which is thereby caused to move up and down, thereby rapidly varying the tension on the string 23. The result is that when this string is simultaneously vibrated the note produced will be given a tremolo.

The core 46 is provided with end caps 46^a which are screwed on the ends of the core and provide a means for adjustably limiting the longitudinal throw of the core, since these caps strike the ends of the electro-magnets. Any suitable sound deadening means, as felt washers 46^b may be used.

If desired the leads 51 and 61 may be permanently placed in circuit during the time the instrument is in operation so that a slow tremolo effect will be produced at all times. To obtain a fast tremolo effect the switch 69 is closed thereby short circuiting the resistance 68 and driving the motor 64 at a much higher rate of speed.

It has been found by experiment that to obtain the best tremolo effects certain strings on the violin must be varied more than others. Thus the strings G, D and E can be given a much greater longitudinal variation than the A string and will maintain what to the listener appears to be a proper balance between the tremolo effects in the several strings.

In order to provide for this I have made a pump cylinder 37^b much smaller (a proportion of three and one-fourth to one being found to be very satisfactory) so that for a given movement of the arm 39^b the amount of air moved by the pump plunger 38^b will be correspondingly much less, with the result that the variation in tension in the A string will be correspondingly smaller.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modi-

fications. Changes therefore in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as possible in view of the prior art.

I claim:

1. In a tremolo device for self-playing stringed instruments, a lever movable about a pivot for imparting tension to each of the strings separately, adjustable weights on said levers for normal tensioning of the strings, and means for rapidly moving said levers about their pivots to increase and decrease the tension on said string.

2. In a tremolo device for self-playing stringed instruments, a lever for each string movable about a pivot to which the string is secured for imparting tension to each of the strings separately, normal tensioning means for each lever, and fluid operated means for rapidly moving said tensioning means about said pivot to increase and decrease the tension on said string.

3. In a tremolo device for self-playing stringed instruments, means movable about a pivot for imparting tension to each of the strings separately, a piston connected to said means, and fluid-operated means for rapidly moving said first mentioned means to increase and decrease the tension on said string.

4. In a tremolo device for self-playing stringed instruments, a member for imparting tension to each string, and means for moving said member for rapidly alternately increasing and decreasing the tension in its string, said means including a core operably connected to said member, two solenoids operably related to said core, and means for rapidly alternately actuating said solenoids.

5. In a tremolo device for self-playing stringed instruments, a member for imparting tension to each string separately, and means for moving said member for rapidly alternately increasing and decreasing the tension in its string, said means including a core operably connected to said member, two solenoids operably related to said core, and a rotatable controller for rapidly alternately actuating said solenoids.

6. In a tremolo device for self-playing stringed instruments, a member for imparting tension to each string separately, and means for moving said member for rapidly alternately increasing and decreasing the tension in its string, said means including a piston movable vertically in a cylinder, a core operably connected to said piston, two solenoids operably related to said core, and means for rapidly alternately actuating said solenoids.

7. In a tremolo device for self-playing stringed instruments, a lever movable about

a pivot for imparting tension to each of the strings separately, a weighted piston connected to said lever, a weight slidable on said lever for adjusting the tension on its string, a piston connected to said lever, and fluid-operated means for rapidly moving said piston to increase and decrease the tension on said string.

8. In a tremolo device for self-playing stringed instruments, a member for imparting tension to each string, and means for moving said member for rapidly alternately increasing and decreasing the tension in its string, said means including a core operably connected to said member, two solenoids operably related to said core, means for rapidly alternately actuating said solenoids, and means for limiting the endwise movement of said core.

9. In a tremolo device for self-playing stringed instruments, a member for imparting tension to each string, and means for moving said member for rapidly alternately increasing and decreasing the tension in its string, said means including a core operably connected to said member, two solenoids operably related to said core, means for rapidly alternately actuating said solenoids, and caps screwed on the ends of said core for adjustably limiting its endwise movement.

10. In a tremolo device for stringed instruments, individual tensioning means connected with an end portion of each string, and actuating means for rapidly varying the position of each tensioning means, said actuating means being adapted to vary the degree of tension of each string.

11. In a tremolo device for stringed instruments, individual tensioning means connected with an end portion of each string, and actuating means for rapidly varying the position of each tensioning means, said actu-

ating means operating normally to move the several tensioning means in different degrees.

12. In a tremolo device for stringed instruments, individual tensioning means for each string, actuating means for rapidly varying the position of each tensioning means, and means for varying the degree of movement of each tensioning means.

13. In a tremolo device for stringed instruments, individual tensioning means for each string, actuating means for rapidly varying the position of each tensioning means, and means for varying the rate of vibration of each tensioning means.

14. In a tremolo device for stringed instruments, individual tensioning means for each string, actuating means for rapidly varying the position of each tensioning means, and means for varying both the rate of movement and the degree of movement of each tensioning means.

15. In a tremolo device for stringed instruments, a pivoted tensioning member for each string, and means for vibrating each tensioning member, said means being provided with means for varying the rate of vibration.

16. In a tremolo device for stringed instruments, a pivoted tensioning member for each string, and means for vibrating each tensioning member, said means being provided with means for varying the amplitude of vibration.

17. In a tremolo device for stringed instruments, a pivoted tensioning member for each string, means for vibrating each tensioning member, and means for varying both the rate and the amplitude of vibration of said tensioning means.

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