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PNEUMATICALLY OPERATED STRING INSTRUMENT.

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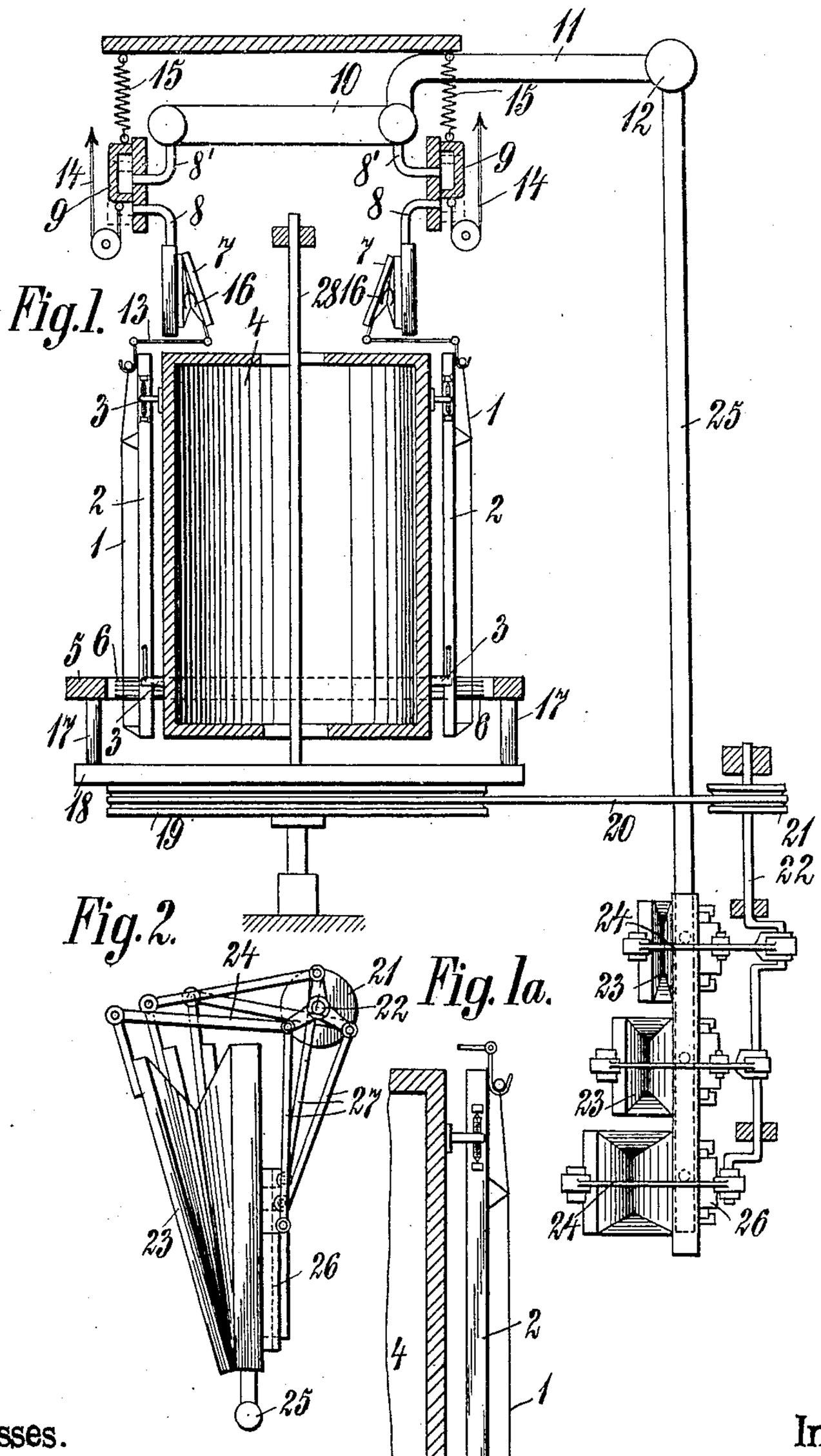

Fig. 1.

Fig. 2.

Fig. 1a.

Witnesses.

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PNEUMATICALLY-OPERATED STRING INSTRUMENT.

964,013. Specification of Letters Patent. Patented July 12, 1910.

Application filed January 10, 1908. Serial No. 410,268.

To all whom it may concern:

Be it known that I, ROBERT FRÖMSDORF, a subject of the King of Saxony, residing at Leipzig-Eutritzsch, Germany, have invented certain new and useful Improvements in Pneumatically-Operated String Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

In bow-operated string instruments the strength of tone is altered by varying the pressure of the bow against the strings and simultaneously altering the speed with which the bow is drawn over the string. In playing on a hand violin, this is readily accomplished, but in intruments having mechanically operated bows for example a ring bow, set into operation by means of pedals and in which the strings are moved into contact with the bow by means of suitable keys, the required degree of alteration of the pressure and of the speed of the bow is more difficult, since it is necessary to exert a greater pressure on the keys or to exert a correspondingly more rapid pedaling or both, to produce a like effect. This difficulty I overcome by providing pneumatically operated means to move the strings against the ring bow and also by providing pneumatic mechanism for rotating the ring bow. In such apparatus, a more rapid pedaling will cause the bellows to produce the necessary air pressure or if constructed as suction apparatus the necessary amount of vacuum, whereby the atmosphere has a greater or less pressure on the devices or it may be that a pressure bellows produces the necessary over pressure in a pressure chamber. With such a structure the force with which the strings are pressed against the bow is independent of the pressure of the keys, and the speed of movement of the air motor and of the ring bow is correspondingly increased consequently the regulation of the strength of tone will result by a more rapid or slower operation of the bellows or pedals. My invention embodying these features is shown in the accompanying drawings in which,

Figure 1 indicates a ring bow together with the strings operated in relation thereto actuated by a suitable pneumatic mechanism. Fig. 1[a] is an enlarged detail elevation of the string mounts and partial section of the sounding board. Fig. 2 is a side elevation of a motor.

For convenience in illustrating my invention, I have assumed a pedal actuated suction bellows to be used to produce the necessary suction for actuating the several mechanisms, the structure of said bellows forming no part of the present invention. The several strings 1 are strung on holders or mounts 2 mounted by means of hinges 3 on the cylindrical sounding board or resonating chest 4. These string mounts 2 are swung outward on their hinges 3 by means of pneumatic devices hereinafter to be described so that the strings 1 contact with the hair 6 of the ring bow 5. Each string support 2 is connected by rod 13 to a movable member of the bellows 7 situated above the sounding board 4, which bellows is connected by conduits 8 to the valve seat and by a slide valve 9 and conduits 8′, 10 and 11 with the main suction conduit 12.

The slide valves 9 are retracted by springs 15 and in all conditions of operation close their respective conduits 8′. The valve 9 is capable of being moved against the stress of the spring 15 by a cord 14 connected to a suitable key lever in order to connect the conduits 8 and 8′ of the respective bellows and thereby cause the same to collapse and move the rod 13 to swing the string mount 2 on its hinges 3 to bring the string 1 into contact with the hair 6 of the ring bow 5. As soon as a key is released the valve 9 pertaining thereto is retracted by its spring 15 to uncover the end of conduits 8 and permit atmospheric air to enter the bellows controlled by said valve whereupon the movable member 7 thereof is moved to normal position under the influence of the spring 16. The ring bow 5 is carried by suitable supports 17 mounted on the ring 18 that carries a belt pulley 19 mounted on a vertical shaft 28 passing centrally through the sounding board or box 4. The belt or cord pulley 19 is connected by a belt or cord 20 to the driving pulley 21 on a crank shaft 22, said crank shaft being actuated by suitable wind motor.

I have illustrated by way of example a suction motor having three bellows 23 connected 120° apart to a shaft by means of connecting rods 24. These bellows 23 are suc-

cessively connected to a pipe 25 leading to the main suction conduit 12 by means of suitable valves 26 actuated by valve rods 27 as indicated in Fig. 2. This motor is of the usual construction.

The manner in which the varying air pressure or suction is produced is immaterial as this may be done by any of the well known mechanisms. Instead of operating the bellows by a variation in pedaling to produce the varying pneumatic pressure the main conduit may be provided with a throttle device in order to more or less throttle the main conduit whereby the same result can be obtained as above described.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a string instrument the combination with a bow and strings, of pneumatic mechanisms for operating the strings and bow respectively in interdependent pneumatic relation with one another to vary the speed of the bow in accordance with the pressure of the strings against it.

2. In a string instrument, the combination with a bow and strings movable to and from the bow, of pneumatic mechanism for operating the strings, pneumatic mechanism for moving the bow, and a pneumatic source common to said mechanisms.

3. In a string instrument the combination with a moving bow and strings capable of being moved into contact with said bow, of pneumatic mechanism for actuating the bow and pneumatic mechanism for moving the strings into contact with the bow, both mechanisms connected to the same pneumatic conduit.

4. In a string instrument, the combination with a ring bow, and strings capable of being swung into contact therewith, of pneumatic bellows one for actuating each of said strings, a pneumatic motor for rotating the ring bow, a pneumatic conduit connected with the pneumatic bellows and with the pneumatic motor, and a key-operated valve controlling the connection of each bellows with the pneumatic conduit.

5. In a string instrument, the combination with a ring bow, and strings capable of being swung into contact therewith, of suction bellows one for actuating each of said strings, a suction motor for rotating the ring bow, a suction conduit connected with the suction bellows and with the suction motor, and a key-operated valve controlling the connection of each bellows with the suction conduit.

6. In a string instrument, the combination with a ring bow, of movable string mounts, strings thereon, a pneumatic for each string mount to move the strings into contact with the bow, and a pneumatic motor for rotating the bow in interdependent pneumatic relation with the aforesaid pneumatics.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ROBERT FRÖMSDORF.

Witnesses:

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