No. 695,958. Patented Mar. 25, 1902.

W. G. SPIEGEL.

MUSICAL INSTRUMENT.

(Application filed June 11, 1901.)

(No Model.) 3 Sheets—Sheet 1.

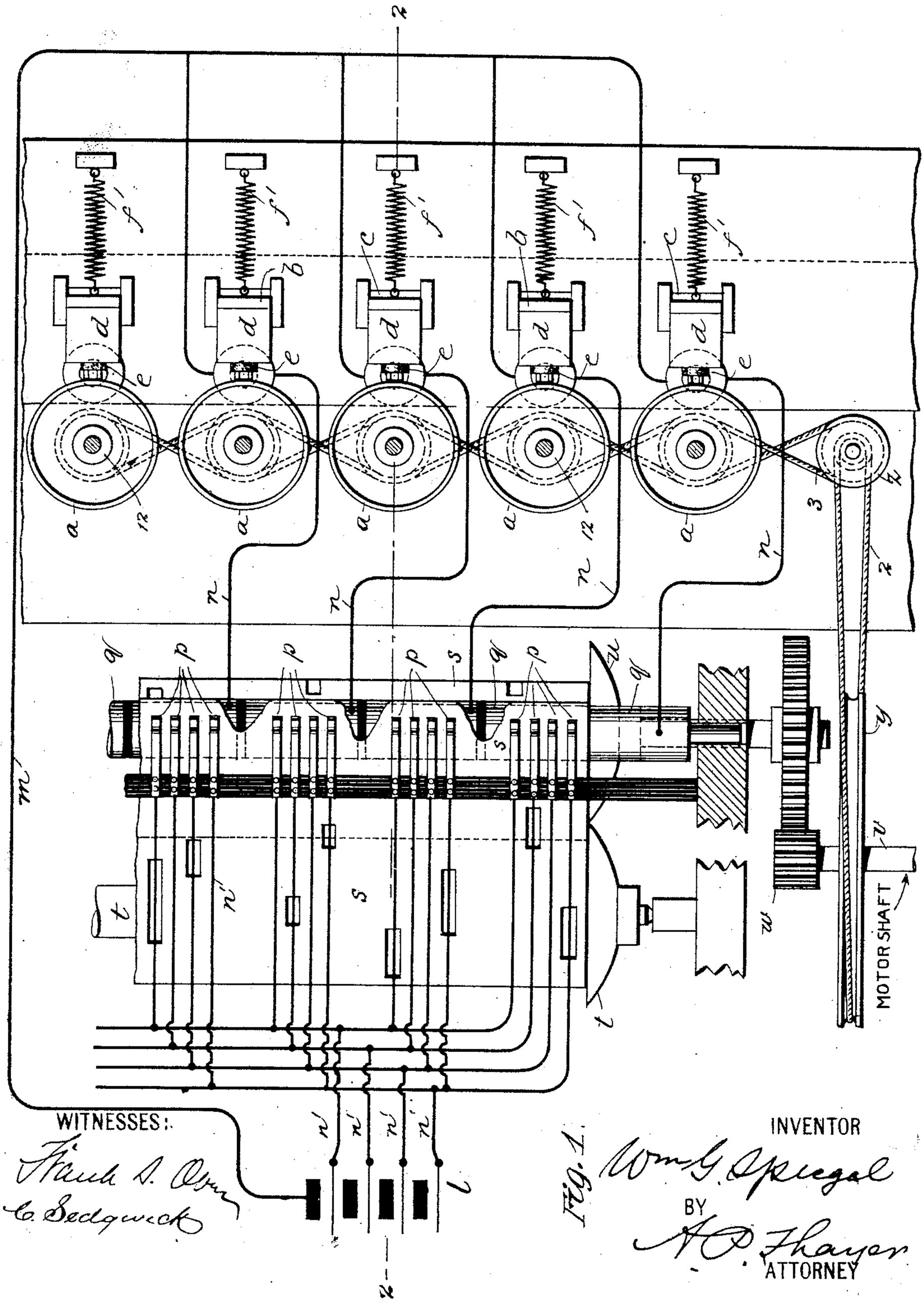

Fig. 1.

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3 Sheets—Sheet 2.

Fig. 1.

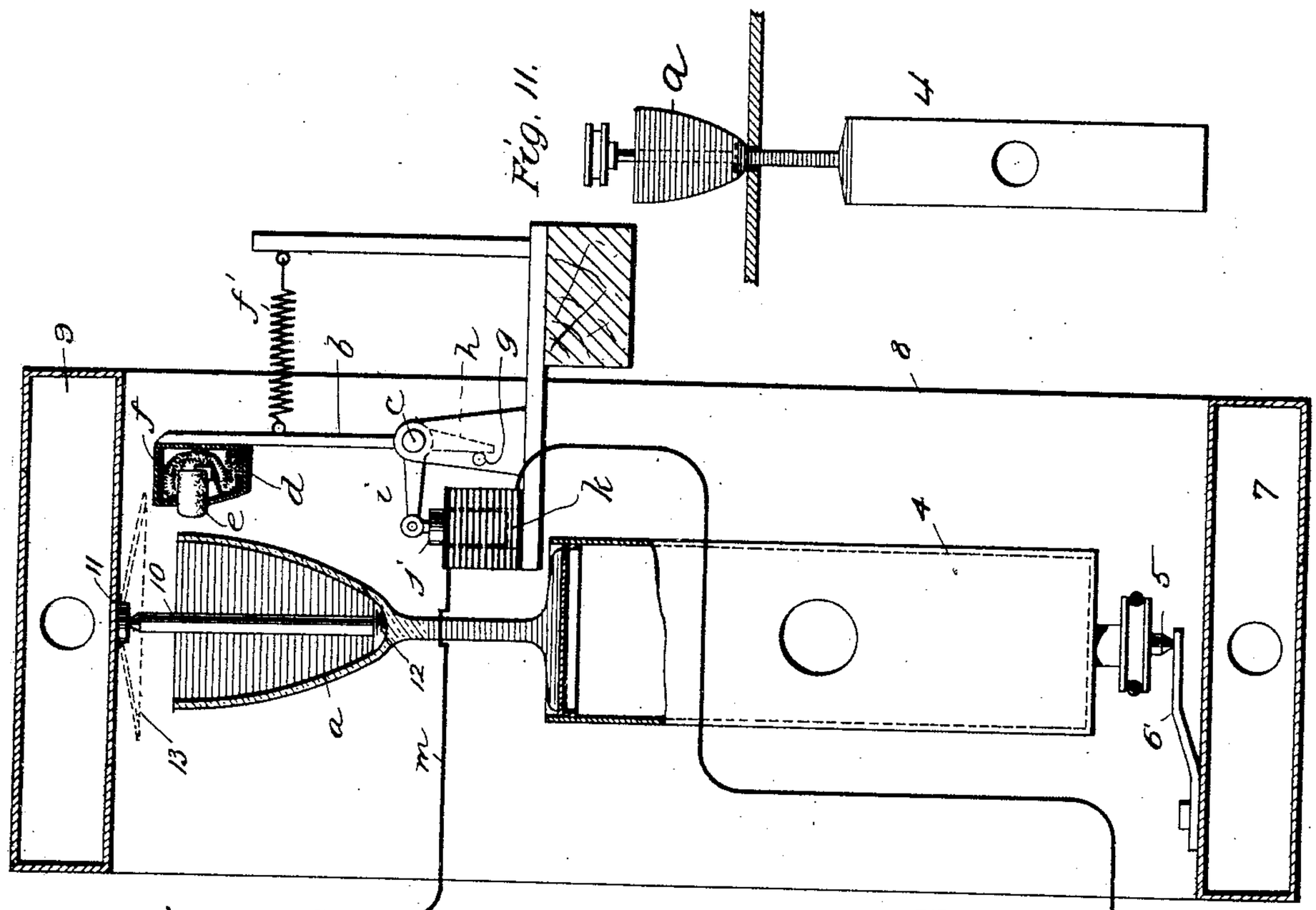
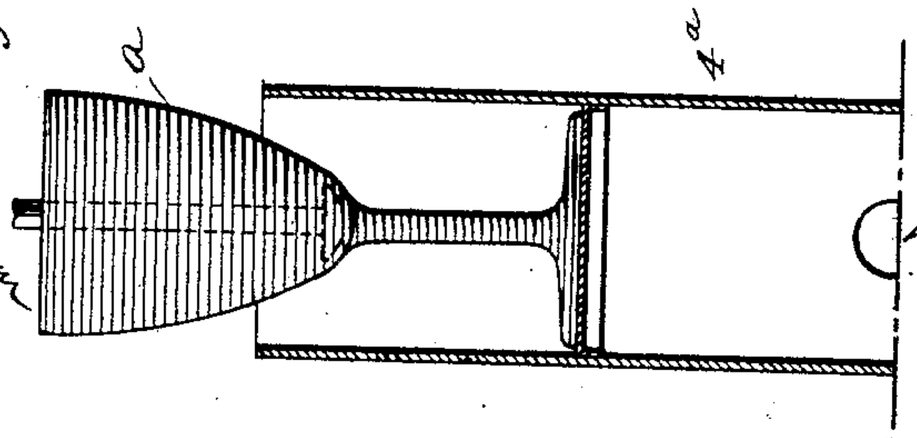


Fig. 2.

Fig. 3.



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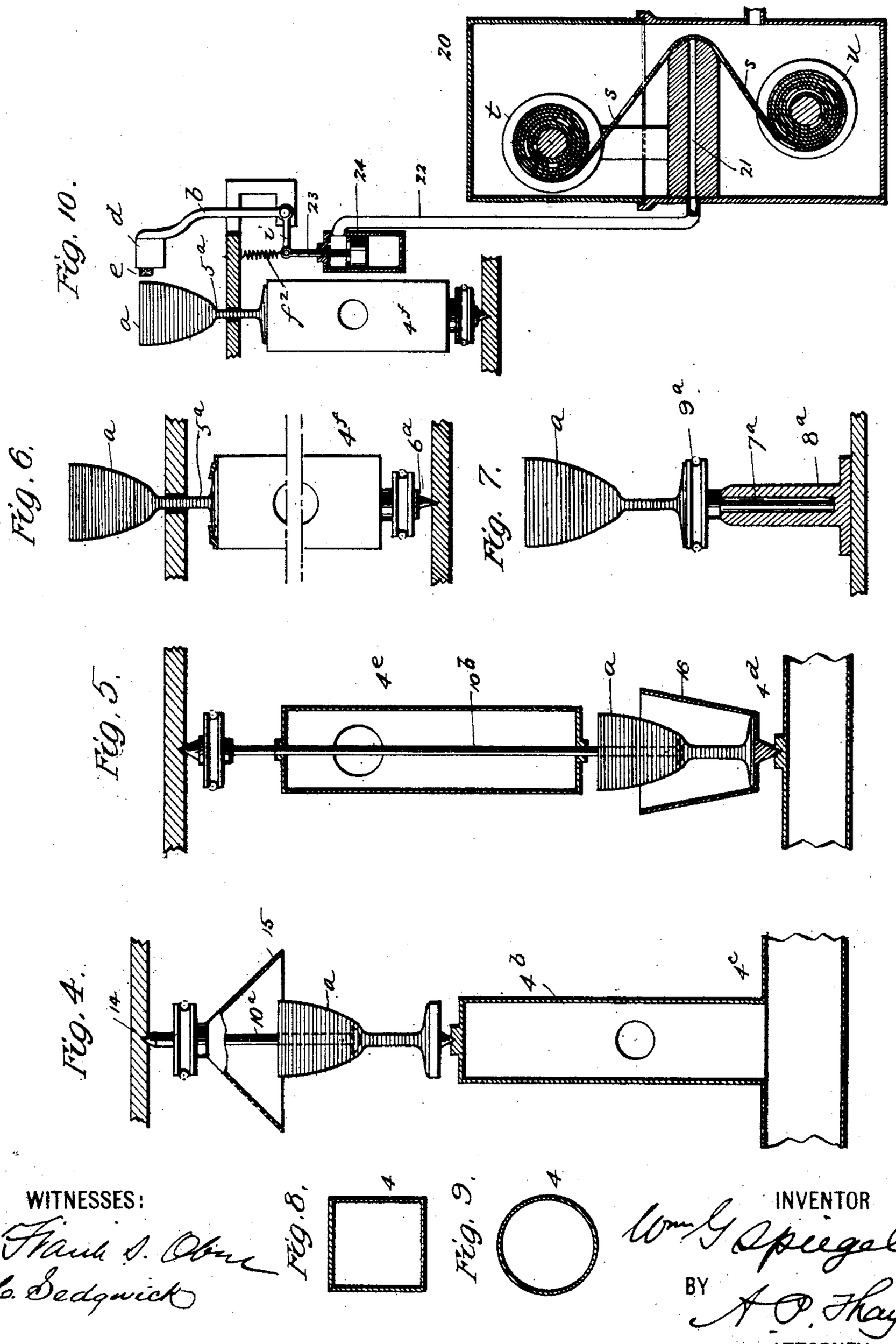

Fig. 10.

Fig. 6.

Fig. 7.

Fig. 5.

Fig. 4.

Fig. 8.

Fig. 9.

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MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 695,958, dated March 25, 1902.

Application filed June 11, 1901. Serial No. 64,123. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. SPIEGEL, a citizen of the United States of America, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

My invention relates to musical instruments in which the musical-sound-producing instrumentalities consist of rotatory glass tumblers and means for causing rubbing friction on them to produce the sounds; and my invention consists of means for automatically operating, regulating, and controlling said sound-producing means and in improved means of utilizing sound-boxes in connection with the tumblers for amplifying, toning, and otherwise varying and modifying the sounds, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view of an instrument constructed in accordance with my invention with electric mechanism for controlling the sound-producing elements. Fig. 2 is a transverse section of the instrument on line 2 2 of Fig. 1. Fig. 3 is a detail, partly in side view and partly in sectional elevation, illustrating one arrangement of sounding-box and tumbler. Figs. 4 to 7, inclusive, represent various other arrangements of sounding-boxes and tumblers that may be employed with good effects in carrying out my invention. Figs. 8 and 9 are horizontal sections of different forms of sounding-boxes. Fig. 10 is a vertical section of part of an instrument of my invention in which pneumatic control of the sound-producing elements is employed. Fig. 11 represents the sounding-box suspended from the bottom of the tumbler, which is pivoted by its stem so that the box may swing also.

With a series of glass tumblers *a* tuned to a musical scale as nearly as may be conveniently selected and further graduated by the employment of water or any other approved liquid substance, as glycerin or compositions of the same, and mounted and suitably geared with any approved impelling apparatus for continuous uniform rotation and connected in any approved way with one or more sound-boxes for modifying the tones I arrange a friction-producing rubber to each, with means to automatically cause the rubber to have contact with its tumbler, subject to a contact-interrupting device, such as the moving perforated paper used in æolian instruments, and thus provide an instrument in which the well-known sweet tones thus produced are more readily available than by the application of the fingers of the operator in the common way.

In the application of electrical appliances for operating and controlling the rubbers I have in this example of my invention provided with each tumbler a lever, as *b*, pivoted to a support, as *c*, and carrying a rubber-holding box or socket *d*, from which a rubbing device, as *e*, protrudes at one side, so as to have contact with the tumbler near its upper edge when the lever is swung toward the tumbler. Said rubber may consist of a composition of natural rubber and steatite, soapstone, rosin, or any suitable substance that will not smear the glass, but which has a tendency to cause friction on the glass, preferably such as may be termed "sucking" friction, and in each socket a sponge *f* is provided to be supplied with water for moistening the surface of the rubber to increase its frictional effects as the effect of the fingers is increased by them. The lever *b* has a retracting-spring *f'*, normally holding the rubber free of the tumbler and limited in its action by a stop-stud *g* and a stop-finger *h*, lodging against said stud, and the lever has a horizontal arm *i*, from the free end of which a solenoid-core *j* hangs within a solenoid-coil *k*, one end of which is connected with the positive pole of a battery *l* by a wire *m*, and the other end is connected with the negative pole of said battery by the wire *n n'*, brushes *o p*, and the circuit-closing roller *q*. Between the brushes *o p* and the circuit-closing roller *q* is a moving perforated paper sheet *s*, running from a spool *t* to another spool *u*, the latter being rotated by any approved means, as a motor-shaft *v*, geared by a pinion *w*, with a reducing-wheel *x* on the shaft of spool *u*. When the perforations of the paper sheet permit contact of the brushes with roll *q*, the circuit closes and current passes, pulling down the

solenoid-core and making contact of the rubber with the tumbler, and the unperforated parts of the paper sheet passing between the brushes and the roller interrupt the current.

In order to vary the pressure of the rubbers on the tumblers for varying the sound effects, I provide a plurality of circuit-wires n' and brushes p, connected with the battery in series, whereby the strength of the current will vary according as the paper sheet permits simultaneous contact of two or more of the brushes p. The circuit-closing roller q is constructed in insulated sections for the wire systems of each tumbler, respectively, to avoid interference.

The tumblers are set upright on vertical pivots and geared for rotation at high speed on said pivots. Such gearing may be of any suitable contrivance; but in this case I represent a master-pulley y on the motor-shaft v and operating a multiplying-pulley z by a belt 2, from which pulley z the tumblers are driven by a belt 3, so applied as to operate the whole series.

The sounding-boxes may be in various forms and sizes and applied in various ways. The preferable way may consist of an upright round or angular box in cross-section of suitable length applied as a part of the rotatory spindle of the tumbler and pivoted on another sounding-box or between two such boxes, or the box may be suspended from the bottom of a tumbler pivoted above the box, so as to swing as well as to rotate. Two or more tumblers may be pivoted on a sounding-box of large size adapted for the support of a plurality of tumblers with or without sounding-box spindles.

In Fig. 2 the base of the tumbler is set on the top of a vertical box 4, closed at both ends and forming part of the rotating spindle and having a pivot 5 on its lower end supported on a spring-seat 6, which is attached to the upper side of the lower part 7 of a stationary sounding-box comprising besides said base an upright part 8, supporting an overhead part 9, under which a pivot 10 is adjusted in a suitable bearing 11, with its lower end, having a convex head 12, bearing in the bottom of the cup of the tumbler. The dotted lines 13 indicate a concavo-convex disk-shaped sounding-board, that may be mounted over the tumbler with good effects.

In Fig. 3 a like sounding-box 4^a, but open at the top, is represented with the tumbler set lower in the box.

In Fig. 4 the tumbler is pivoted on the top of a stationary box 4^b, which is an upwardly-extending member of a base-box 4^c, with a pivot-stem 10^a resting in the tumbler and fitted to a pivot-bearing 14 above, and a hollow conic sounding-board 15 is attached to the pivot-stem over the tumbler.

In Fig. 5 the tumbler is seated in a sounding-cup 16, which is pivoted on a sounding-box 4^d, with a pivot-stem 10^b resting in the bottom of the tumbler, said pivot-stud having a sounding-box 4^e mounted on it.

In Fig. 6 the tumbler is attached to the upper end of the sounding-box 4^f, so that its stem 5^a serves as a pivot for the upper end of the sounding-box, and said box has a suitable lower end pivot 6^a.

In Fig. 7 a spindle 7^a, mounted in a vertical spindle-step 8^a, has the tumbler mounted on its upper end, which has a pulley-head 9^a, to which a cord may be applied for applying the motion.

In Fig. 10 the tumbler is mounted in the same manner as in Fig. 6.

Figs. 8 and 9 represent sounding-boxes of square and round form, respectively, in cross-section.

In Fig. 11 the sounding-box 4^b is suspended from the base of the tumbler, the stem of which, 5^a, constitutes the upper pivot, the lower end of the box being free to have slight swinging motion, which has a modifying effect on the tone, giving a seeming swinging action to it.

It will be seen that so far as the size, shape, and other conditions of the sounding-boxes are concerned they may be modified indefinitely.

The rubber-levers may be operated by means of a pin-barrel, such as employed in barrel-organs, and in Fig. 10 I represent pneumatic apparatus which may be employed for operating them.

For the pneumatic action the paper-carrying spools $t\,u$, together with the paper 5, may be located in a compressed-air chamber 20, with the paper drawn over escape-passages 21 of the tracker-range for the air, one to each lever, which passages communicate through pipes 22 with pneumatic motor-engines, in which the rods 23 of pistons 24 connect with the arms i of the rubber-levers b, so as to press the rubbers on the tumblers when air from the chamber 20 is admitted to act on the pistons, which occurs when the perforations of the paper sheet open communication through the passages 21. The springs f' retract the rubbers in this arrangement.

Although I have represented the rubbers as bearing against the sides of the tumblers, I do not limit myself thereto, for they may bear on the top or both on the side and top.

What I claim as my invention is—

1. The combination with a rotatory tumbler and a rotatory sound-box connected therewith, of a friction-rubber to take effect on the tumbler, means to automatically press the rubber on the tumbler, and means to automatically interrupt the pressure of the rubber on the tumbler.

2. The combination with a rotatory tumbler and a rotatory sound-box connected therewith, of a friction-rubber to take effect on the tumbler, means to automatically press the rubber on the tumbler and means to automatically interrupt the pressure of the rubber on the tumbler, said means to cause and inter-

rupt the pressure controlled by a movable perforated paper strip.

3. The combination with a plurality of rotatory tumblers graduated in a musical scale, rotatory sound-boxes incorporated with and forming parts of the spindles of said rotating tumblers, means to automatically press the rubbers on the tumblers successively, and means to automatically interrupt the pressure of the rubbers on said tumblers.

4. The combination with a rotatory tumbler, a friction-rubber for said tumbler and means for automatically pressing the rubber on the tumbler and releasing said pressure, of a rotatory and swinging sound-box connected with the tumbler.

5. The combination with a rotatory tumbler, of a friction-rubber for said tumbler, means for automatically pressing it on the tumbler and releasing its pressure therefrom, and means for automatically supplying moisture to the rubber.

Signed at New York city this 25th day of May, 1901.

WILLIAM G. SPIEGEL.

Witnesses:

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A. P. THAYER.