

No. 670,732.

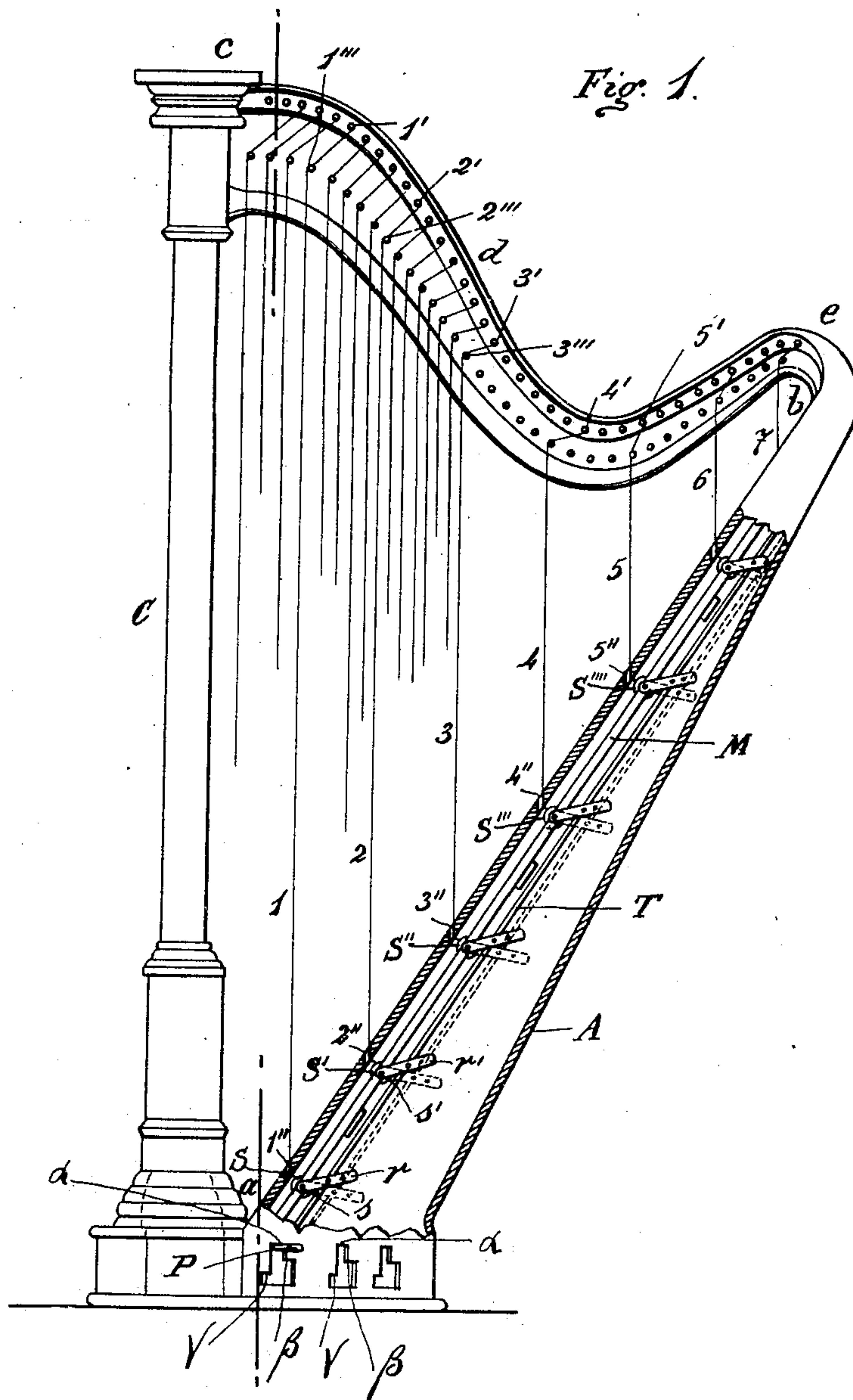
Patented Mar. 26, 1901.

S. RAFFAEL.
HARP.

(Application filed Feb. 28, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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By *[Signature]*
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2 Sheets—Sheet 2.

Fig. 2.

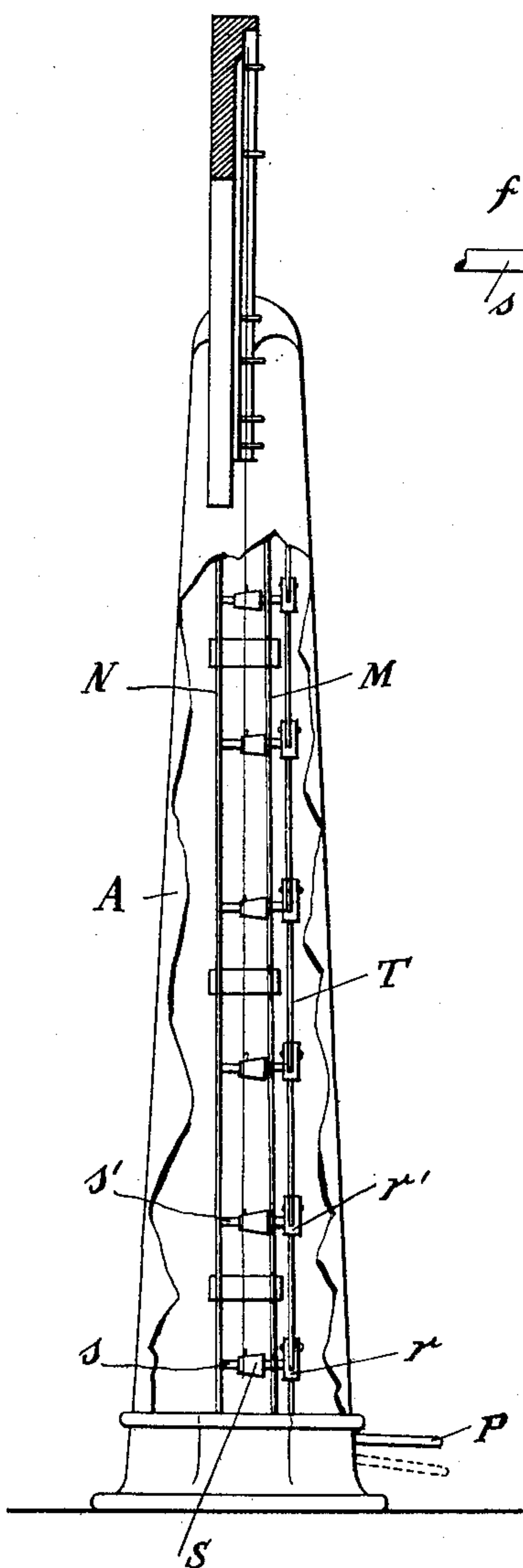


Fig. 5.

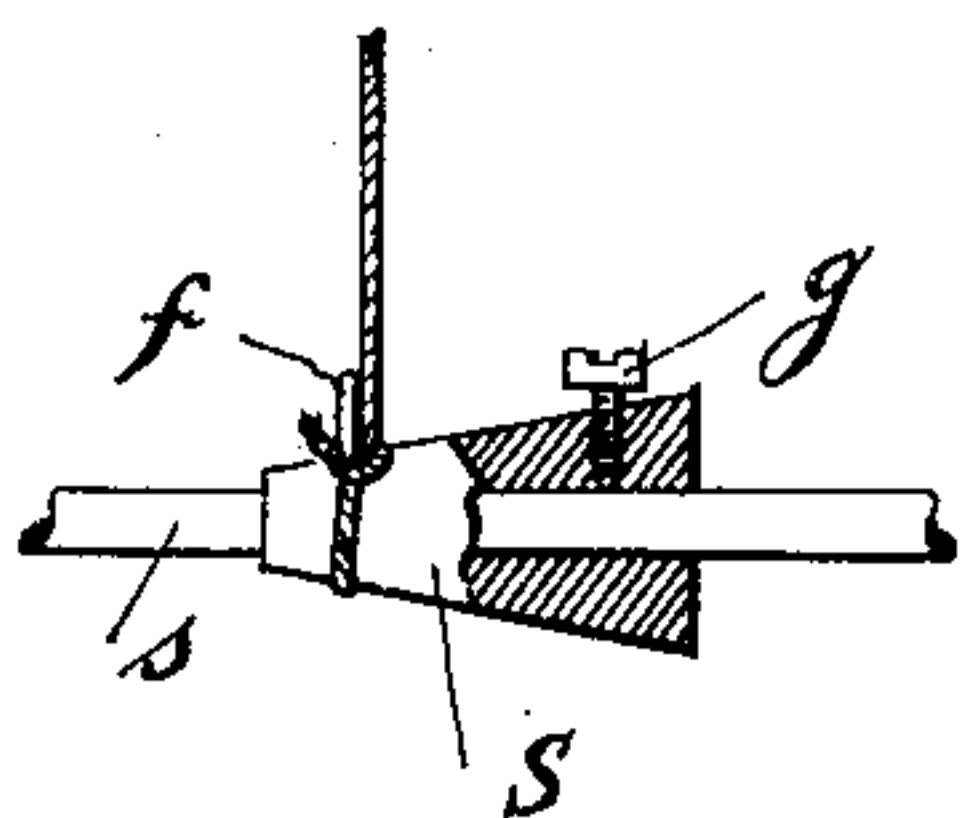


Fig. 3.

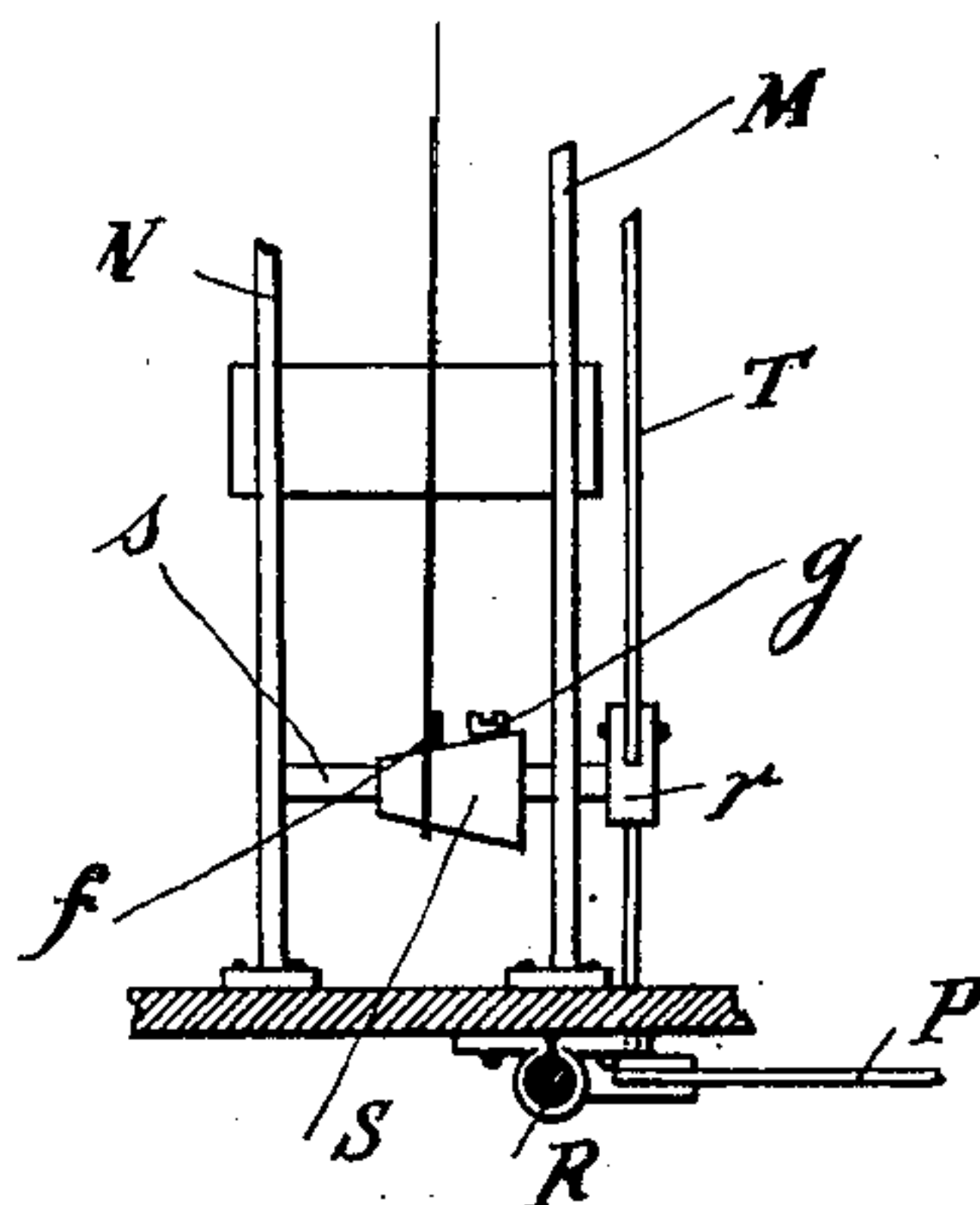
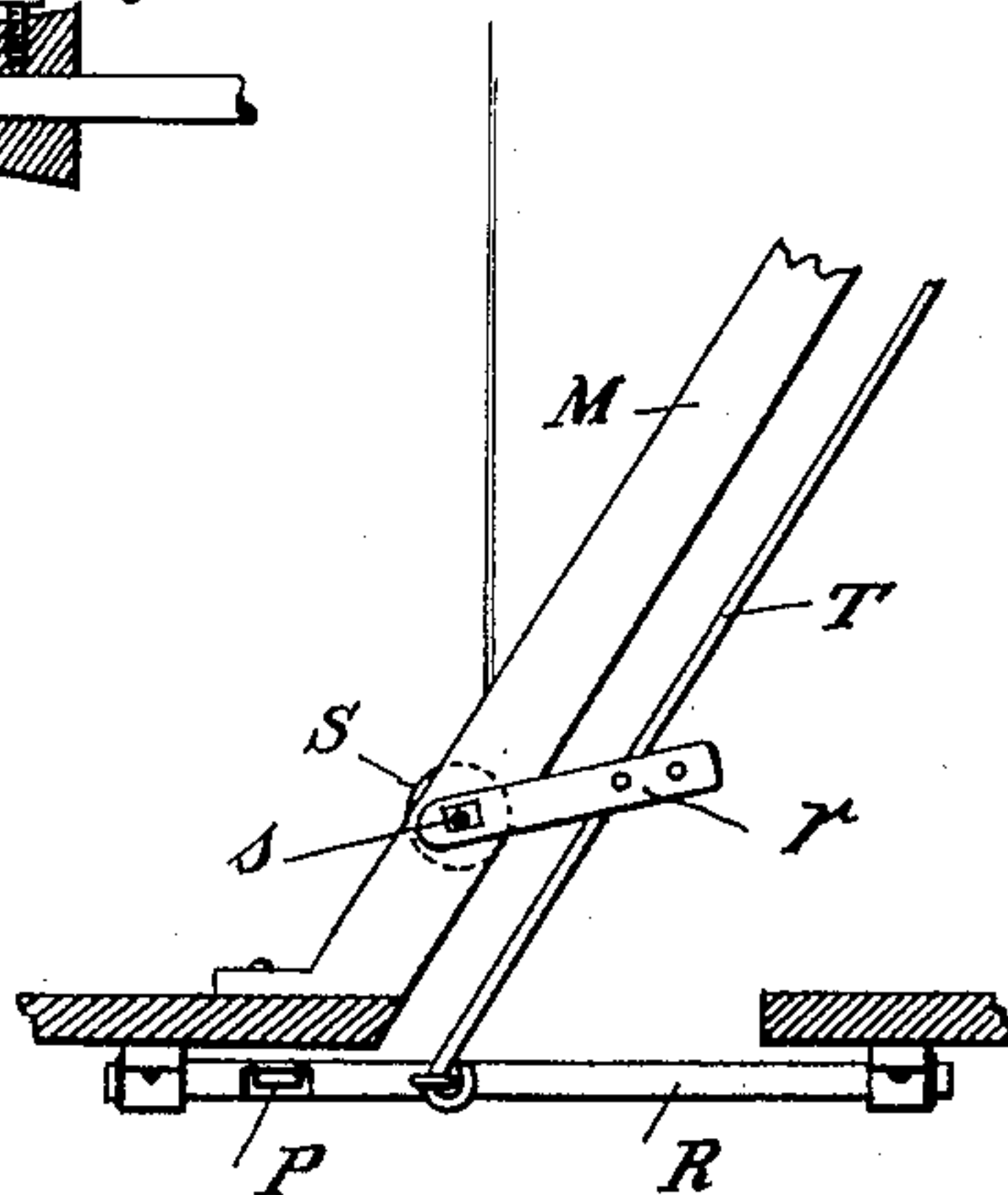


Fig. 4.

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UNITED STATES PATENT OFFICE.

SALVATOR RAFFAEL, OF MILAN, ITALY.

HARP.

SPECIFICATION forming part of Letters Patent No. 670,732, dated March 26, 1901.

Application filed February 28, 1899. Serial No. 707,193. (No model.)

To all whom it may concern:

Be it known that I, SALVATOR RAFFAEL, a subject of the King of Italy, residing at Milan, Italy, have invented certain new and useful Improvements in Harps; 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 letters and figures of reference marked thereon, which form a part of this specification.

It is a well-known fact that in harps a system of rods, levers, and the like, which are set in motion by means of pedals arranged externally for the executant to depress with his foot, serve whenever required to press the strings against a series of nuts, whereby such strings are shortened to an extent regulated with mathematical precision, so that by changing the notes the tone or pitch is varied, each pedal operating all the notes of the same name. In the arrangements hitherto known the strings are retained below by means of buttons or studs secured to the sounding-board. The stretching-nuts are situated so as to follow the outline of the top bracket, the levers operating the stretching-nuts being located within the standard.

The novel arrangement is represented in the accompanying drawings, in which—

Figure 1 is a part-sectional side elevation of the improved harp. Fig. 2 is a front elevation thereof, partly in section, the section being taken on the dotted section-line seen at the left of Fig. 1, with part of the wall of the resonant body A broken away. Figs. 3 and 4 are enlarged sections corresponding to Figs. 1 and 2, respectively; and Fig. 5 is a detail view of one of the stretching-nuts.

The strings are passed through the sounding-board *a b*, being supported, but not secured, at the points 1'' 2'' 3''. The stretching-nuts are placed in close proximity to the lower ends of the strings, so that they are arranged along a straight line parallel to *a b* and not along a curve parallel to *c d e*. The system of levers operating the stretching-nuts is located within the resonant body A. The effect of these modifications is to protect the sounding-board *a b* from the tension of the strings,

thereby eliminating one of the most frequent causes of damage and considerably simplifying the whole combination of mechanisms serving to modify the tension of the strings, so that it becomes much easier than it has been hitherto to mount, set, and repair these devices. The drawings only show the three strings 1, 2, and 3 corresponding to the same note; but an identical arrangement will apply to each of the remaining notes. An arrangement relating to one of the other notes is represented in dotted lines in Fig. 1.

Each string 1 2 3 is attached at the top to a fixed point, such as 1' 2' 3', respectively, and simply resting upon (or against) a stud, such as 1''' 2''' 3''', passes across the sounding-board *a b*, whereon it is supported at a point, such as 1'' 2'' 3'', and, lastly, winds on the stretching-nut S, made in the shape of a truncated cone, Fig. 5, which a screw *g* adjustably connects with a spindle *s*, its lower end being fastened to a pin *f*, projecting from the surface of the cone. It is therefore only necessary to turn the spindle *s* and to secure it in either of, say, two different positions, besides the position corresponding to the normal tension of the string when not wound on S, to impart to the string any one of three different degrees of tension. It suffices to shift the cone *s* circumferentially on the spindle *s* to adjust the tension of the strings at will, and thereby to obtain the finest musical effects. Thus by turning the spindles *s* and coned stretching-nuts S, secured thereon, to wind the lower ends of the strings on said coned nuts, and also, if necessary, by adjusting the cone circumferentially on its spindle, any required tension can be readily imparted to the strings without subjecting the sounding-board to injurious strain. The entire mechanism for modifying the tension of the strings is thus greatly simplified, all necessary repairs or adjustments can be more readily accomplished, and the finest musical effects can be produced on the instrument.

As regards the arrangement for turning the cones S and S' in unison, the arrangement which is shown in the drawings is only given as an example, as it is capable of being modified in many different ways.

As all the cones S S' whereon the strings 1 2 3 are wound should be moved in unison,

they are mounted upon spindles $s s'$, turning between two inclined cheeks (or side pieces) M N. Upon each of the spindles $s s'$ a small crank $r r$ is rigidly secured, all cranks being
 5 operated by means of a single rod T. By securing the pedal P, which is adapted to turn or oscillate on the pivot R, Figs. 3 and 4, in any one of the three positions corresponding to the notches in the base of the instrument
 10 all the cones S S' inserted into the same pair of cheeks M N may be brought to any one of three different positions. When the pedals are released, the elasticity of the strings will constantly restore them to their raised position.
 15 The cranks r are provided with a series of holes which permit their effective length to be adjusted at will.

What I claim is—

20 In a harp, the combination with the sounding-board, and strings extended across the

same, side pieces arranged in parallelism in the sounding-board, a series of diagonally-aligned spindles supported by said side pieces, stretching-nuts rotary on the spindles, screws
 25 carried by the nuts for engaging the spindles to hold the nuts in their adjusted positions, cranks rigidly secured to the spindles and holes at their outer ends, a rod having pins to enter the holes in the cranks, a pedal connected to said rod for operating the cranks and
 30 thereby the stretching-nuts in unison, and pins for connecting the strings to said nuts.

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

SALVATOR RAFFAEL.

Witnesses:

L. FRETTE,
 MICHELE DE DRAGO.