

No. 668,604.

R. S. RUSSELL.

Patented Feb. 19, 1901.

TREMOLO ATTACHMENT FOR BANJOS OR SIMILAR INSTRUMENTS.

(Application filed Feb. 6, 1900.)

(No Model.)

2 Sheets—Sheet 1

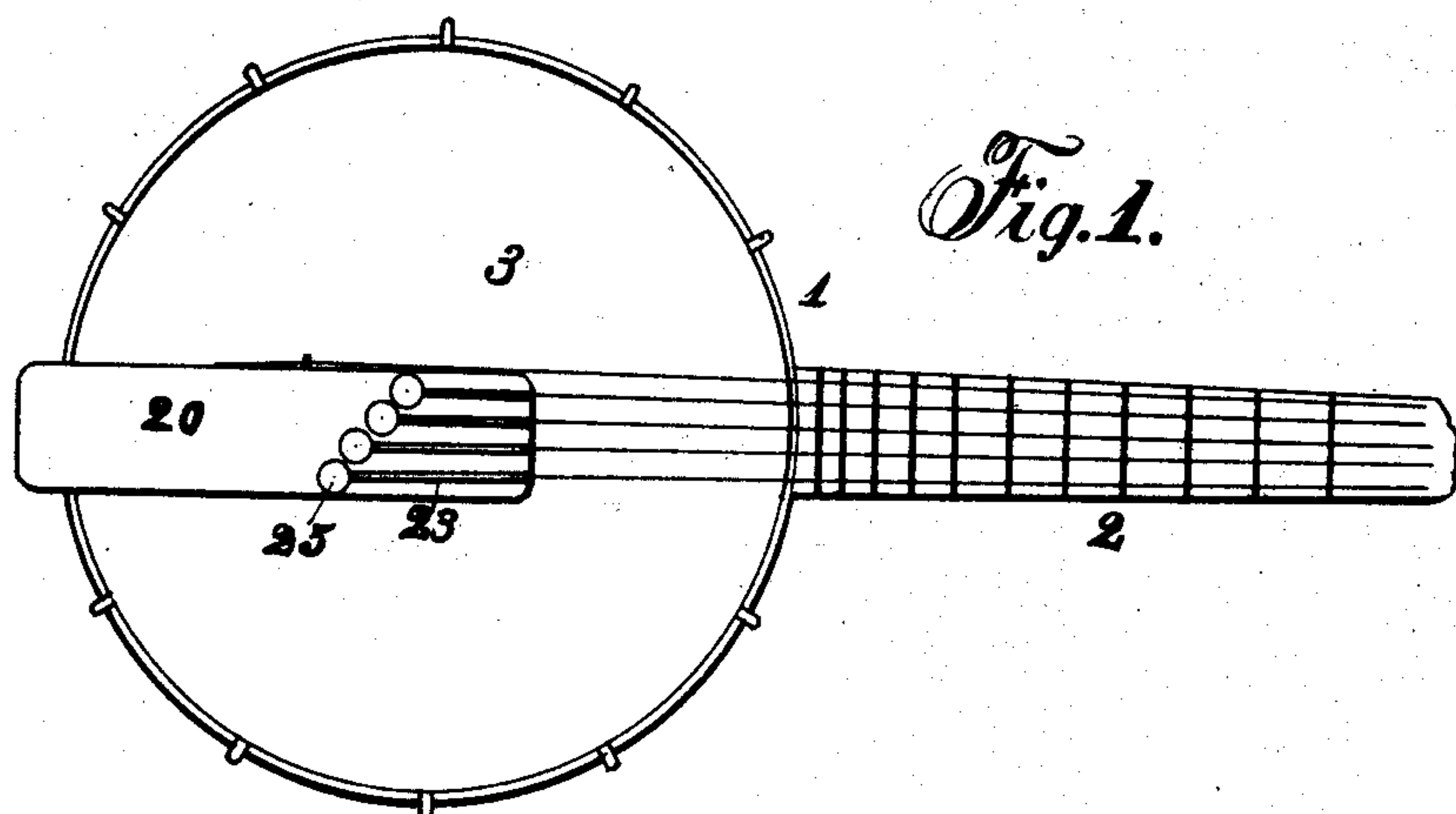


Fig. 1.

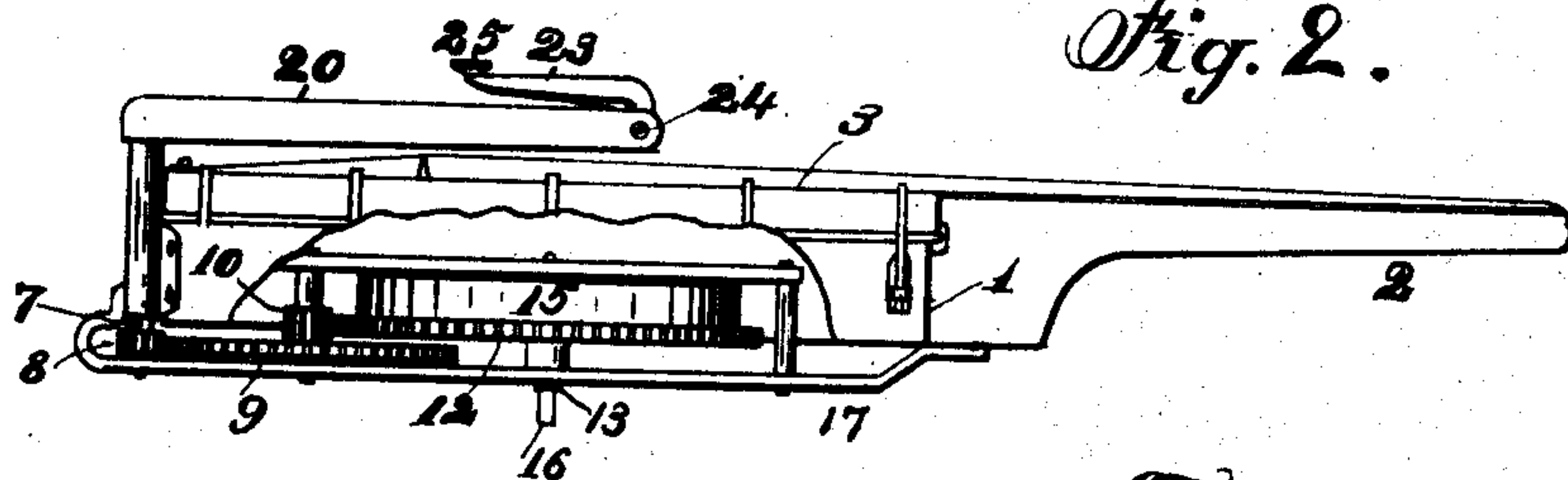


Fig. 2.

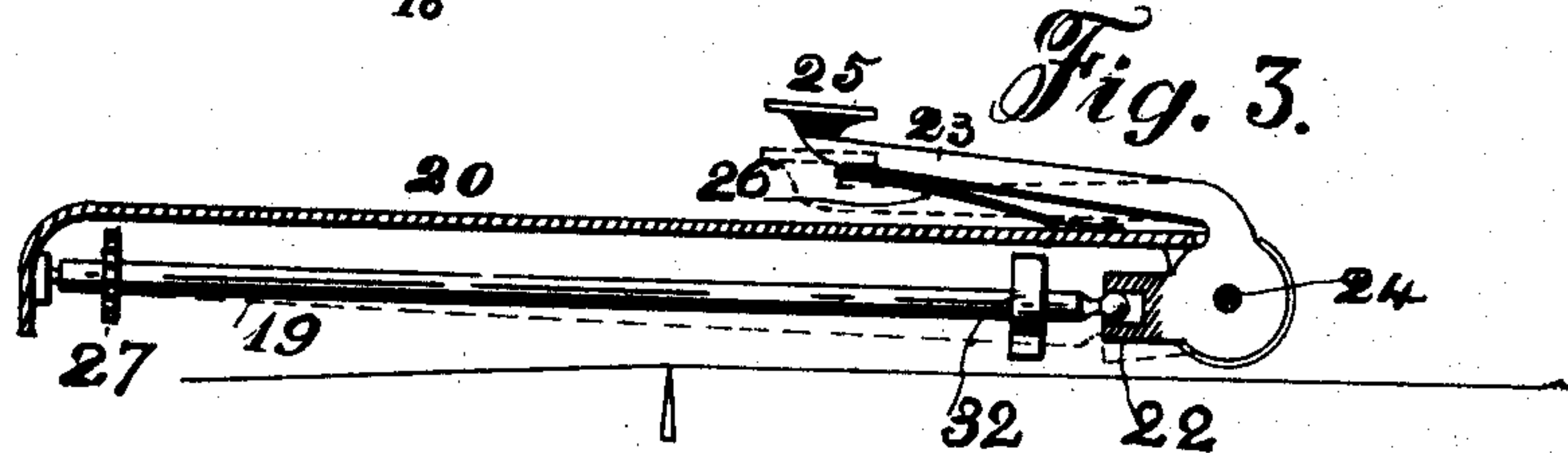


Fig. 3.

Fig. 4.



WITNESSES

Geo. G. Pilden
J. Ord. Kilbuck

INVENTOR

Robert S. Russell
By (Mark H. Pilden & Philip M. Pilden)
Attorneys

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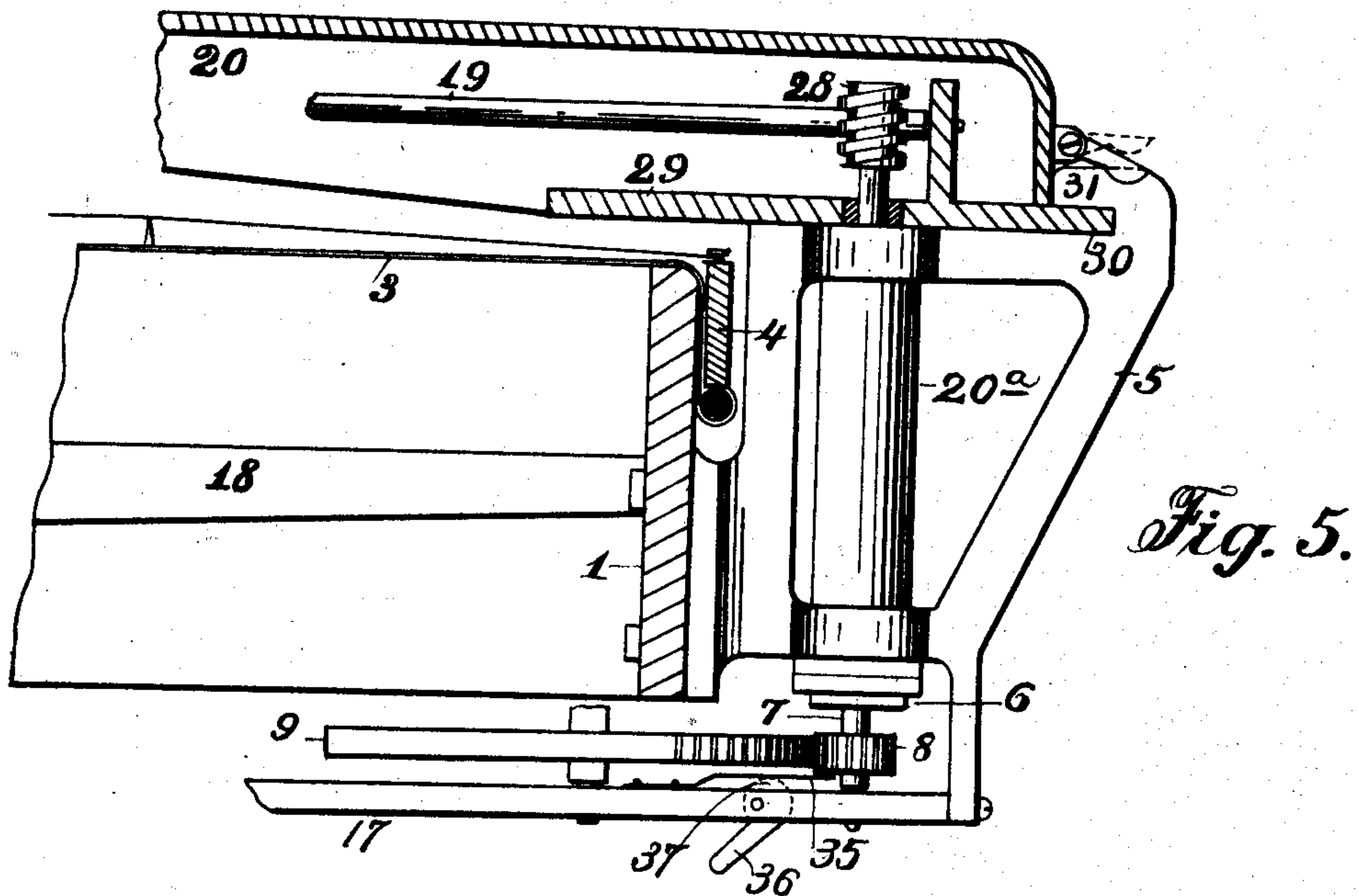
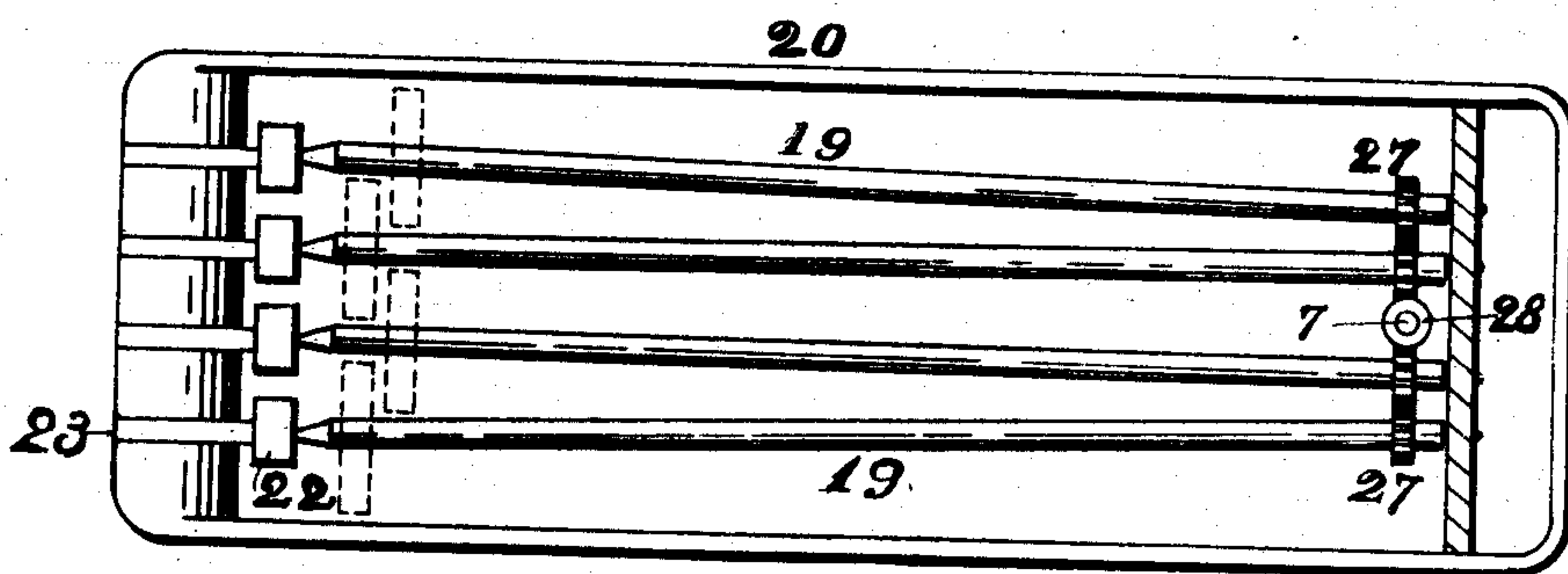


Fig. 6.



WITNESSES
Geo. G. Pilden
J. O. Gilbert

INVENTOR
Robert S. Russell
By Chas. B. Pilden & Philip W. Pilden
Attorneys

UNITED STATES PATENT OFFICE.

ROBERT S. RUSSELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

TREMOLO ATTACHMENT FOR BANJOS OR SIMILAR INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 668,604, dated February 19, 1901.

Application filed February 6, 1900. Serial No. 4,163. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. RUSSELL, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Tremolo Attachments for Banjos or other Instruments, of which the following is a specification.

My invention relates to tremolo attachments for banjos, my purpose being to provide a simple arrangement of mechanical parts capable of giving rotary movement to a series of pickers which are normally out of contact with the strings, but capable of being brought, either singly or two or more in unison, into operative contact with said strings and with a variable pressure, their action being controlled by the fingers of one hand while the other is used to finger the strings in the usual manner.

It is my object also to provide a banjo or other similar instrument with a mechanically-driven tremolo attachment which shall be capable of being turned into or out of operative position at any moment, so that a player may either execute a tremolo movement by operating the keys of the attachment or may turn the latter aside and pick the strings with the fingers in the ordinary way, either movement being made without affecting the relations between the operative parts and the motor and without attracting the attention of an audience.

It is my object also to provide a tremolo attachment of this kind which shall consist of very few mechanical parts, having an extremely simple construction, the whole being of compact form and light weight and for the most part concealed by the body or rim of the banjo, to which it is attached without mutilating or defacing any part of the instrument and without producing any detrimental effects upon the musical qualities of the latter.

I aim, finally, to provide a stringed instrument like a banjo with a simple attachment whereby a player can at any moment execute tremolo movements, either upon a single string or on two or more strings in unison, with fully-sustained tones, with an infinite variety of expression, and with an almost unlimited variation in the volume of tone, which

may range from hardly audible pianissimo to fortissimo effects capable of filling the largest auditorium and which have never been possible with the banjo heretofore.

My invention also comprises other novel features, all of which will be fully explained hereinafter and then particularly pointed out and defined in the claims at the close of this specification.

For the purposes of the following description reference is had to the accompanying drawings, in which—

Figure 1 is a face or plan view of a banjo, showing my invention applied thereto and in position for use, the neck of the instrument being shown in part only. Fig. 2 is an edge view or side elevation, a portion of the instrument being broken away to show the picker-driving mechanism. Fig. 3 is a detail elevation upon a larger scale, showing a single string, a single picker and shaft, the key by which said picker is caused to engage said string, and the worm and worm-gear for giving rotary movement to said shaft. Fig. 4 is a detail view showing one of the pickers enlarged. Fig. 5 is a partial section of the rim and head of a banjo, taken in a line passing through the tailpiece and bridge, toward the neck, the scale being enlarged to show the manner of connecting the tremolo attachment to the banjo. Fig. 6 is an inverted plan view of the housing containing the pickers and their keys.

The reference-numeral 1 in said drawings indicates the rim of a banjo, having a neck 2 and head 3, all of the usual well-known construction.

Upon the rim of the banjo, in line with the tailpiece 4 and with the strings, I attach a small bracket 5, having a sleeve or tubular bearing 6 for shaft 7, which is near and parallel with the rim 1, its end rising somewhat above the head 3. Upon its other end is a small spur-gear 8, meshing with a larger spur-gear 9. Upon the shaft of the latter is a pinion 10, meshing with a driving-gear 12, the latter being on a shaft 13. This shaft is driven by a coiled spring contained in a barrel 15 and wound up by an ordinary key applied to the squared end 16 of the shaft. The train of gearing is arranged in a simple light

frame 17, placed directly beneath the extension-piece or sound-bar 18 and pivotally braced to hold it in position.

Each picker is mounted on an independent shaft 19, and these shafts—four in number—are arranged in a light housing 20, bearings for said shafts being provided at one end of the housing. Each shaft is supported at its other end in a lug 22, which projects through the other end of the housing and forms part of a key 23, having a pivotal support 24, the key-lever extending longitudinally over the top of the housing 20 and having at its end a suitably-shaped finger-plate 25. A light leaf-spring 26 supports each key normally in a raised position, leaving it, however, free to yield to a gentle pressure by which it can be caused to approach the housing 20, thereby giving such movement to the lug 22 that the end of the shaft 19, supported in said lug, will move toward the head 3 of the banjo, as shown in dotted lines in Fig. 3 of the drawings. Each shaft is provided with a small spur-gear 27, meshed with a like gear on the adjacent shaft. I prefer to gear these shafts together in pairs, as seen in Fig. 6, and to communicate rotary motion by a worm 28, mounted on the projecting end of the shaft 7 and arranged between the two coupled pairs of shafts. This worm will mesh with the teeth of the two spur-gears 27 on the two inside shafts 19.

The end of the housing 20 distant from the keys 23 is pivotally supported upon the shaft 7 by a sleeve 20^a, having one end tapped into a bearing-plate 29, which is rigid with the housing 20. The sleeve 20^a incloses the tubular bearing 6, which surrounds the shaft 7. The bearing-plate 29 rests on the top of the bracket 5 and has a projecting lip 30, adapted to engage a hooked lug 31 on said bracket 5 when the housing is in the position shown in Fig. 5.

The operative position of the pickers is indicated in Fig. 3. They consist of small annuli 32, mounted on the shafts 19 and provided with spurs 33 of a shape suitable for producing vibration in the strings by their revolution whenever their shafts 19 are moved by the keys 23 in such manner as to bring said spurs into engagement with the strings of the instrument. I have used pickers having spurs of the form substantially as shown in Fig. 4; but their particular shape is subject to a wide variation without any departure from my invention. The construction illustrated I have found to answer every purpose, and it is subject to very small wear, both on the points of the spurs and on the gut strings of the banjo.

The pickers can be made of various material, such as metal, wood of a suitable hardness, vulcanized fiber, and other substances.

It should be noted that the pickers 32 should be of such form that in acting upon the strings of the instrument the latter should be pressed toward the head 3 by their rotary movement

and then released and allowed to vibrate freely, the force of vibration and the consequent volume or power of the tone produced being proportioned directly to the degree of pressure which the picker exerts upon the string, which is in turn controlled by the degree of force exerted by the player in operating the keys 23. I have found that a full clear tone with a maximum range of volume can by my invention only be obtained by causing the pickers to act upon the strings in lines substantially at right angles to the head of the banjo, pressing the strings toward the head with a force proportioned to the pressure which the player exerts upon the keys 23 and then suddenly releasing and permitting them to vibrate freely. The form of spur I have used to insure this action is shown in Fig. 4. It is substantially a scalene triangle in outline, the shorter side being set upon the periphery of a hub, the longer side a being tangent to the latter, or nearly so, and the third side a' being in the same line with a radius of the hub. The direction of revolution is shown by the arrow in Fig. 4. A string when pressed toward the banjo-head by the side a will be released when it reaches its maximum stress by the point of the spur passing off, and its vibration should be in a plane at a right angle to the head 3, or practically so. When the necessary conditions are observed, the banjo can be made by this invention to produce musical effects which have heretofore been considered wholly beyond the sphere and capacity of the instrument. Even by a moderate pressure on the keys 23 a tremolo movement can be produced having a fully-sustained volume of tone capable of filling the largest auditorium and may be gradually diminished to the softest pianissimo. Moreover, such movements can be executed upon a single string or upon two or more strings in harmony with fully-sustained tone, the volume of which is under the complete control of the player. The uniform action of the pickers both as to frequency and force, save as the latter is controlled by the keys 23, the great range over which this control can be extended, and the delicate variations in volume of tone which it can produce impart musical qualities to the tremolo movement which have never been supposed possible. A tremolo in thirds, in sixths, or in octaves, or a full harmony of four strings with fully-sustained tones and with a possible volume which is almost unlimited and with a practically infinite capacity for expression render the banjo in a musical sense a new instrument, the power and charm of which have been unknown and unsuspected.

To prevent the motor from running when the attachment is temporarily removed from operative position, any suitable stop may be used—such, for example, as the friction-brake 34. (Shown in Fig. 5.) Such a stop may also be utilized, should it be desirable, to retard the speed of the mechanism, and there-

by produce a slower action of the pickers. This stop may be considerably varied in construction as well as in location in order to make it most conveniently accessible to the player. In the present instance I have shown the stop to consist of a simple leaf-spring 35, having one end arranged to bear against the flat surface of the small spur-gear 8. To press against said gear, a small lever 36 is pivoted to the frame 17, with a cam 37 on its end, which can be pressed with varying force against the spring. It will be readily understood that by moving the lever 36 to a given point the spring will be pressed against the gear 8 with sufficient force to arrest its revolution almost instantly, and it may be used to hold the gear, retaining the spring under tension until the tremolo attachment is to be used again. By applying a less degree of pressure between the friction-surfaces the device may also be utilized as a means for retarding the speed of revolution of the pickers, thereby causing them to engage the strings of the instrument at substantially uniform but longer intervals. The ability to control the frequency of operative engagement of the spurs of the pickers with the banjo-strings may be desirable in some cases—such, for example, as the execution of a diminuendo—when the effect of the harmony as it becomes fainter can be improved by giving the pickers a slower movement, accompanying the diminishing pressure with which they act on the strings.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A tremolo attachment for banjos, consisting of a series of shafts having intermeshing gears, means for driving said shafts simultaneously, a series of pickers mounted on said shafts and normally out of contact with the strings, and a common support for the shafts capable of being turned into and out of operative position, substantially as described.

2. A tremolo attachment for banjos, consisting of a series of shafts having pickers which are normally out of contact with the strings, a common support for said shafts, a series of movable bearings on said common support one for one end of each of the series of shafts, a motor to drive said shafts simultaneously and means for operating one or more of the movable bearings without affecting the others to bring one or more of the pickers into contact with one or more of the strings of the banjo, substantially as described.

3. The combination with a banjo, of a tremolo attachment consisting of a series of revolving pickers normally out of contact with the strings, means for pressing one or more of said pickers against the strings with variable force, and a common support for said pickers capable of being turned into, or out of, operative position, substantially as described.

4. The combination with a banjo, of a tremolo attachment, consisting of a series of shafts, a series of spurred pickers on said shafts, a corresponding series of pivoted keys having lugs in which said shafts have bearing at one end, a driving-shaft having bearing on the rim of the banjo, a gear on said driving-shaft to rotate the pickers and their shafts simultaneously, a suitable motor to operate said driving-shaft, a common support or housing containing the picker-shafts and keys, and a pivotal bearing for said housing whereby it can be turned into and out of position without affecting the operative relations of the gears, substantially as described.

5. The combination with a banjo, of a series of mechanically-driven shafts, a series of pickers carried by said shafts and normally out of contact with the banjo-strings, means for producing a variable contact of said pickers with the banjo-strings, and a common support for said shafts and pickers having a pivotal bearing on the banjo to enable the pickers to be brought into operative position at will, substantially as described.

6. The combination with a banjo, of a tremolo attachment consisting of a series of shafts, a common support for said shafts capable of being brought into operative position over the strings of the banjo, a pivotal bearing on the rim of the banjo for said support, a series of pickers on said shafts having spurs normally out of contact with the banjo-strings, a movable bearing for one end of each picker-shaft, a separate key for each of said movable bearings, to enable a player to bring any one, or more than one, of said pickers into contact with one, or more than one, of the strings, and a suitable motor to continuously revolve said pickers, substantially as described.

7. The combination with a banjo, of a common support, or housing, pivotally mounted on the rim of said banjo, a series of keys mounted on the common support, a series of shafts geared to revolve simultaneously and supported at one end by rigid bearings on said common support, a series of bearings on the common support for the other ends of said shafts, said bearings being capable of movement by the manipulation of the keys, a series of pickers on the shafts having spurs which are normally out of contact with the strings of the banjo but capable of being brought into such contact with variable force of action on said strings by the action of the keys, and a suitable motor to revolve the shafts and pickers, substantially as described.

8. The combination with a banjo of a suitable support having pivotal support on the banjo, a series of shafts mounted at one end in rigid bearings on said support, a series of keys pivoted on said support, a series of bearings for the other ends of said shafts, said bearings being on arms which move with the keys, and a series of pickers on said shafts which are normally out of contact with the strings of the banjo but capable of acting

thereon with variable force by the manipulation of the keys by the player, substantially as described.

9. The combination with a banjo of a series
5 of shafts arranged over the strings, a common support for said shafts having a pivotal bearing on the banjo, a driving-shaft having its axis coincident with the axis of said pivotal bearing, whereby said support can be turned
10 on its pivotal bearing without disturbing the relations of the gearing which connects it to

the series of shafts, and a suitable motor to operate said driving-shaft and revolve all the shafts driven by it simultaneously, substantially as described.

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In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT S. RUSSELL.

Witnesses:

GEO. W. POE,

E. E. OVERHOLT.