E. A. P. HENNIG.

BOW FOR SELF PLAYING VIOLINS.

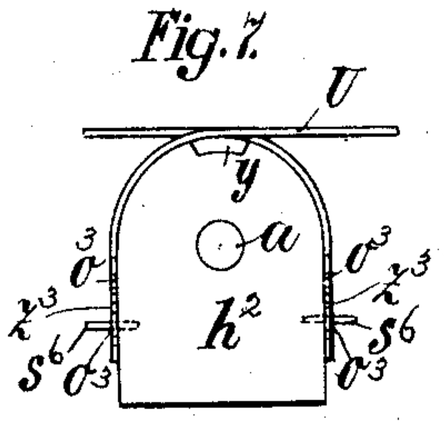
APPLICATION FILED JULY 13, 1910.

978,373

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

Fig. 7.



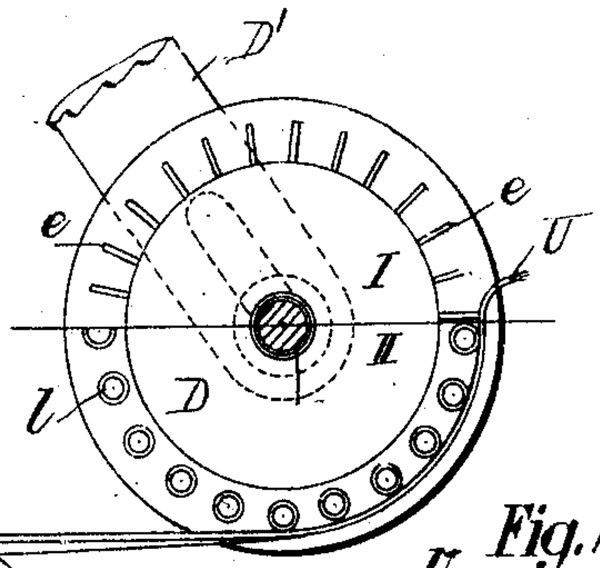
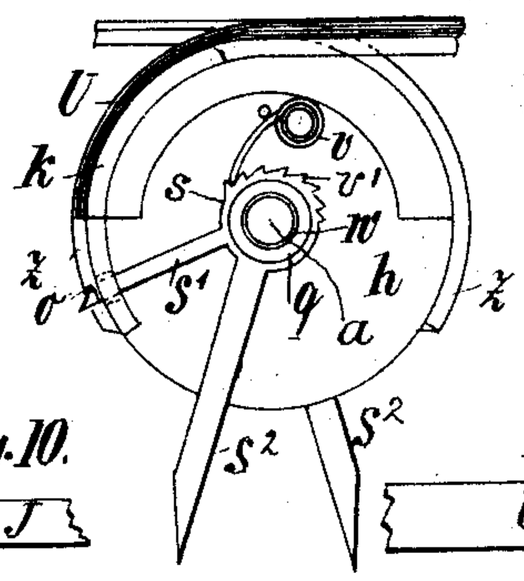


Fig. 3

Fig. 1



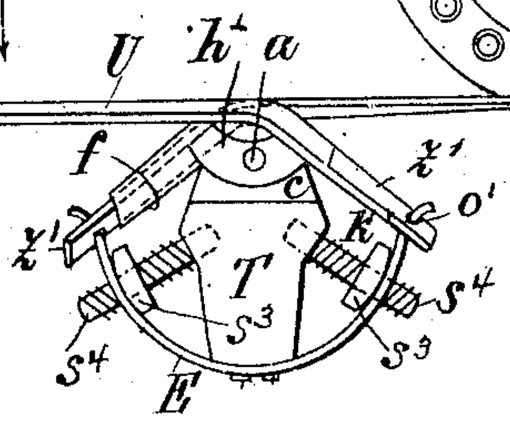


Fig. 2

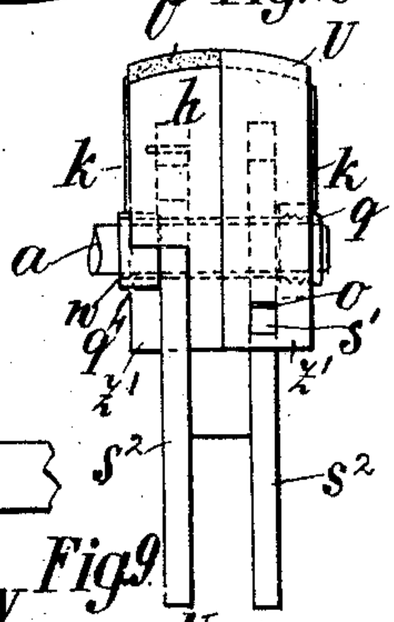


Fig. 10.

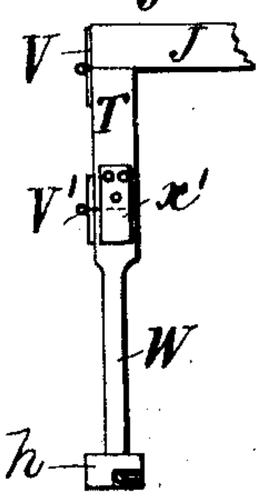


Fig. 4.

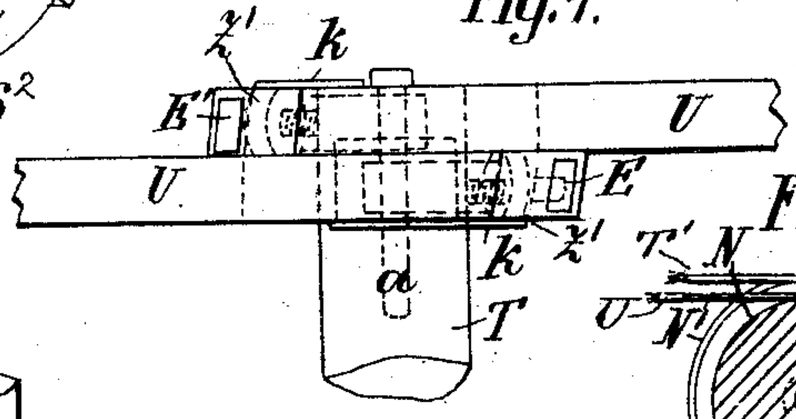


Fig. 9

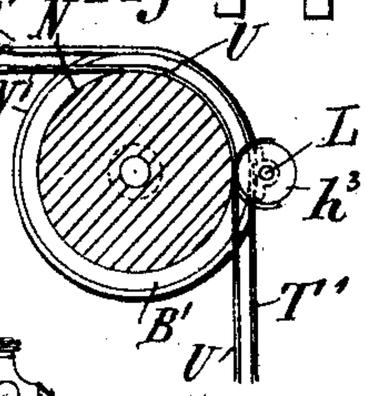


Fig. 5.

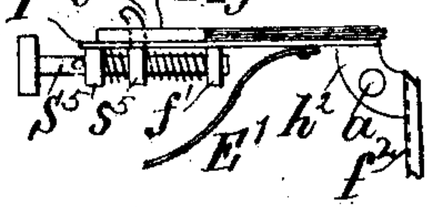


Fig. 11

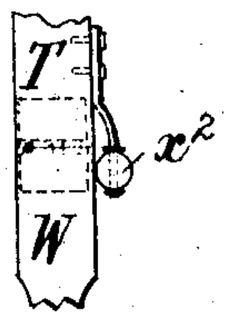


Fig. 8.

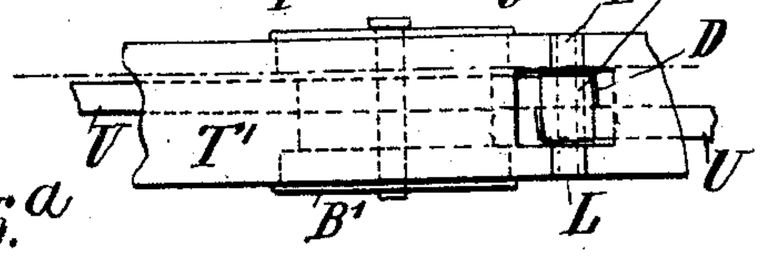
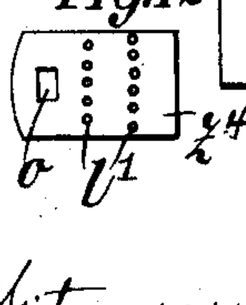


Fig. 6. a

Fig. 12



Witnesses

B. Sommers

May Ellis.

Inventor

Ernst Alfred Paul Hennig

By Henry Orth & Co. Atty.

E. A. P. HENNIG.

BOW FOR SELF PLAYING VIOLINS.

APPLICATION FILED JULY 13, 1910.

978,373.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 2.

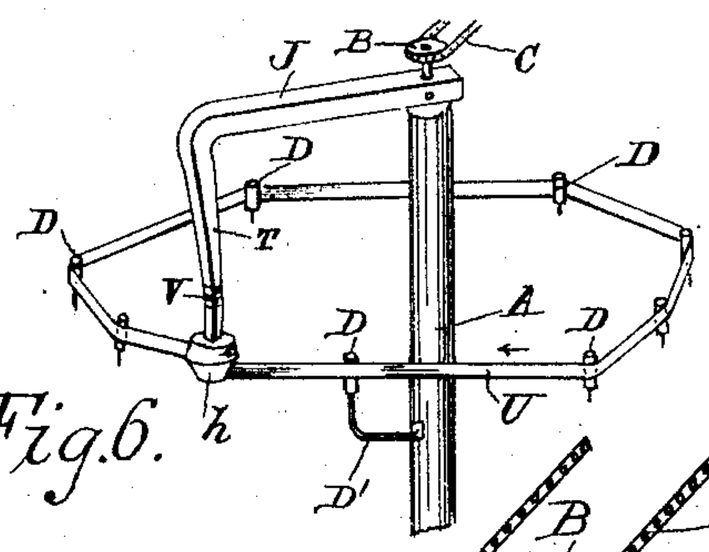


Fig. 6.

Fig. 13.

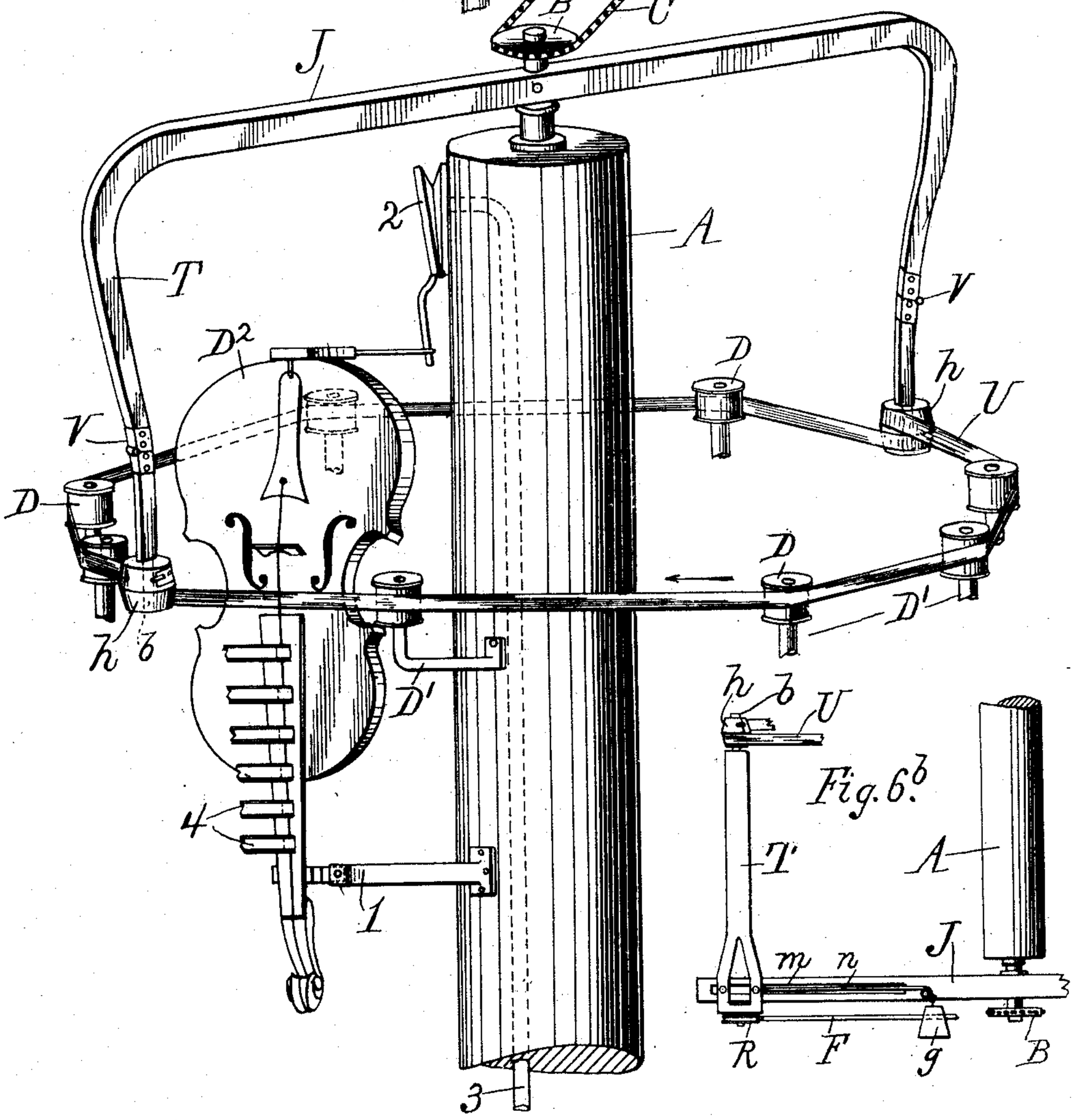


Fig. 6b.

Witnesses:

B. Sommers

Mary Ellis.

Inventor:

Ernst Alfred Paul Hennig.

By Henry Orth & Co

Atty.

UNITED STATES PATENT OFFICE.

ERNST ALFRED PAUL HENNIG, OF DRESDEN, GERMANY, ASSIGNOR TO LUDWIG HUPFELD, AKTIENGESELLSCHAFT, OF LEIPZIG, GERMANY.

BOW FOR SELF-PLAYING VIOLINS.

978,373. Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed July 13, 1910. Serial No. 572,060.

To all whom it may concern:

Be it known that I, ERNST ALFRED PAUL HENNIG, a subject of the King of Saxony, and a resident of 10 Forststrasse, Dresden-N., Germany, have invented certain new and useful Improvements in Bows for Self-Playing Violins; 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 or figures of reference marked thereon, which form a part of this specification.

In manual bowing of string-instruments the same part of the string is not always touched by the bow as is the case in the well-known mechanical string-instruments. Perhaps certain fluctuations continuously take place which only cause certain variations in the color of the tone, but which in their totality can still materially contribute in making audible the difference between the tone effect of the two kinds of instruments as a certain monotony is present in the playing of mechanical string-instruments.

The present arrangement and construction of bow, which is particularly adapted for instruments in which the string-support and its strings are pressed against the bow, remedies these defects. It also enables an unserviceable bow or merely a portion of a bow to be conveniently and inexpensively exchanged and optionally tensioned and tightened.

The band of the bow, which may be formed of stranded silk, or the like, or by a strand of horsehair or an imitation of the same, is guided around the string-supports by means of guide rollers or the like arranged on a frame within the bow, so that when the violins or other string-supports properly approach the band the strings are bowed at the proper place.

In the accompanying drawings:—Figure 1 is a plan and Fig. 2 an end elevation of one form of tensioning device. Fig. 3 is a plan view of another form of tensioning device and of one of the guide rollers. Fig. 4 is an elevation of the tensioning device shown in Fig. 3. Fig. 5 is a detail view of another form of tensioning device. Fig. 6 is a perspective view of a complete bow, the guide rollers and a standard on which the violins are mounted one violin only being shown for the sake of clearness. Fig. 6[a] is an enlarged detail view of a modified form of bow. Fig. 6[b] shows the relation of the parts shown in Fig. 6[a] to the standard. Fig. 7 is a plan of still another form of tensioning device. Fig. 8 is a detail plan and Fig. 9 is a sectional view of a modified form of band support. Figs. 10 and 11 are detail views of a modified form of bow-frame. Fig. 12 is a detail view of a modified means for fastening the ends of the band. Fig. 13 is a perspective view of the bow showing a modification of the band.

The bow comprises a carrier frame composed of a girder J having supporting arms T and a flexible band U connected with the latter. The girder is pivotally mounted on a standard A, Fig. 6, and is rotated on the axis of the standard by any suitable means, such as a sprocket B and chain C. The band U travels on a series of guide rollers D journaled on brackets D′ projecting radially from the standard A. The string supports D[2], one of which is shown in the form of a violin, are mounted within the band U on brackets 1 which also project radially from the standard. These string supports are hinged on the brackets 1 so that said string supports can be moved to and from the bow-band by means of a pneumatic, as 2. The latter is connected by a wind conduit 3 to a division of the wind chest (not shown) and when the note sheet connects said division of the wind chest, in a well known manner by means of a valve, with a source of suction, the violin string is pressed against the band. The pressing of the string onto the finger-board is accomplished by pneumatically operated fingers 4 in a well known manner, and any number of violins may be simultaneously operated. When the girder J is rotated, the arms T and the band are simultaneously moved, and the joints of the band U at the supporting body must be one uninterrupted plane friction surface. The flexibility of the bow frame admits the tensioned band to move radially, and the rotatable flexible supporting arms allow it to move laterally when passing the guide rollers. As shown in Fig. 6, the flexibility of the arms T is obtained by providing a hinge V near the middle of said arms, so as to permit the lower ends to move radially.

Fig. 10 shows a modification of this arrangement wherein the flexibility is obtained by hinging the arms T at their upper ends to the girder J and connecting the extensions W to the lower ends of the arms by hinges V′ and spring plates x' or the like.

The plates may be provided with rollers, as x^2, as shown in Fig. 11. to reduce friction and wear of the parts produced by the lateral movement of the arms.

As shown in Figs. 6^a and 6^b, the position of the girder J may be reversed, and the band U and the supports h mounted at the top of the arms T. In this construction the arms T are slidably mounted in the girder J which is provided with longitudinal slots m in which are mounted rollers r r journaled in the lower ends of the arms T.

Although it appears to be impossible that the band can have a bend at the joint with the carriage and the supporting body move radially when the tension of the band is suitable, in order to exclude the possibility of such a bend I provide a second guide parallel to the band guide. This second guide consists of an endless guide-rail F arranged on the frame, and on which a roller R, journaled on the lower end of each arm T, runs. These rollers R are held against the guide F by means of weights q which are connected to the arms T by bands n which pass over pulleys n' journaled on the girder J.

The flexible band U has its adjacent ends connected to tensioning devices on the arms in such a way that the band is inclined whereby the rubbing point of the band on the strings successively changes. The band, shown in Fig. 6, is formed of two sections each connected with the two arms T, while the band shown in Fig. 13 is continuous and has its two ends connected with one of said arms. The tensioning devices shown in Fig. 1 comprise a support in the form of a roller h which is journaled on a bushing n mounted on a pin a fixed in the end of each arm T, and said pins are arranged either vertically or slanting according to the position of the violin string. The ends of the band are fixed in clips z two of which overlap and lie side by side on the periphery of each roller and are movable in opposite directions thereon by means of adjusting devices. These latter each consist of a hub or ring s, mounted on the bushing n on each side of the roller, and have diverging arms s', s^2 the former of which takes into an eye o formed in the free end of the clip. The rollers are recessed on each side to receive the adjusting devices which are held against longitudinal movement by means of collars q on the bushing. The arms s^2 act as levers and when they are moved toward each other the clips are by means of the arms s' moved on the roller and a tightening of the strands is effected. The adjusting devices are each held in locked position by means of a spring pawl v which is mounted on the roller and engages a ratchet v' formed on the hub of the ring s. In order to facilitate transition at the point where the ends of the strands meet on the periphery of the roller, the latter is beveled from its center toward the sides so that approximately only the inner half of the breadth of the strands at each end of the bow is located in the bowing plane. The possibility of the clips sliding off the support is prevented by providing the support with an abutment k.

In the modified form of tensioning device shown in Figs. 3 and 4 I have substituted the part h' for the roller h. This angle lever has arms f over which clips z' are placed in opposite directions and hooked by eyes o' to the free ends of bowed springs E which are secured to each depending arm T of the girder J. The tension of the strands is regulated by spreading the ends of springs E by means of nuts s^3 working on bolts s^4 which are fixed in the arm T and project through slots in the spring E.

In the tension device shown in Fig. 5, set screws S^5 are substituted for the bow springs E shown in Figs. 3 and 4. These screws work in bearings f' formed on the arms f^2 and carry sliding heads s^5 which project through perforations o^2 in the ends of the clips z^2. Springs E′ are secured to the arms f^2, and press against the arm T so as to balance the device. The arm T, one set screw and one spring have been omitted from Fig. 5 as they are not essential to a clear understanding of the device. Said springs E′ may however be dispensed with, and when the tension of the springs E, Fig. 3 is sufficient the bolts s^4 and nuts s^3 may also be dispensed with.

In order to make the strands yielding at the point where the ends cross, the support for the clips may be provided with a recess as y shown in Fig. 7. In this figure the clips z^3 are adjustably connected to the support h^2 by means of pins s^6 in the support taking through perforations o^3 in the clips.

By means of the described arrangement the bow can readily be put in and out of operation, its tension can be optionally regulated, a varying stroke can be obtained, and the band must move in a slightly slanting direction against the strings. If the band consists of two sections, which is preferable, the sections may be arranged either parallel to one another, which causes periodic change only between two stroking places, or inclined one toward the other as shown in Fig. 6, so that each portion of the band would have a higher and a lower end.

In Figs. 8 and 9 I have illustrated a bow-band carrier in the form of a strip T′, made of leather, woven wire or other suitable flexible but firm material, and mounted on

driving and guiding pulleys B′. Each of these pulleys is provided with a wide shallow groove N′ to receive the strip and a central deeper groove N for the bow-band which is mounted on supports h^3 journaled on pins L in recesses formed in the strip.

The periphery of the guide rollers D must be at least twice the breadth of the band on account of the position of the band. As the resined side of the band contacts the rollers it is preferable to arrange pins *e* at intervals as illustrated in the upper half I of Fig. 3, or to provide small rollers *l* as shown in the lower half II of said figure. The distance of the pins from one another depends on whether a more or less rhythmical trembling stroke is to be obtained. The axles of the rollers are made adjustable in their supports D′ in any well known manner for the purpose of permitting an exact radial adjustment of the band.

Fig. 12 illustrates a modification of the means for fastening the ends of the band. Instead of clips, plates as z^4 with perforations *l*′ for introducing the hairs may be provided.

I claim:—

1. A revolving bow for musical stringed instruments comprising a band support and a band having overlapping adjacent ends arranged edge to edge, on the support for the purpose specified.

2. In a self playing violin, the combination with a string support, of a revolving band carrier, a band support thereon, and a band or bands surrounding the string support having overlapping adjacent ends arranged edge to edge on the support.

3. In a self playing violin, the combination with a string support, of a revolving band carrier, a band support thereon, and a band or bands surrounding the string support having overlapping adjacent ends arranged edge to edge on the support and means to adjust the tension of the band.

4. A revolving bow for musical stringed instruments, comprising a rotatable member, band supports connected therewith, a band connected with the supports, means on the supports to adjust the tension of the band, said supports mounted to yield radially.

5. A revolving bow for musical stringed instruments, comprising a rotatable member, band-supports connected therewith having peripheral faces inclined in opposite directions, bands connected to both faces of the supports, said supports mounted to yield radially.

6. A revolving bow for musical stringed instruments, comprising a rotatable member, supporting arms connected therewith, bands, and band supports carried by said arms, each support composed of two relatively movable parts, the ends of said bands connected respectively to said parts.

7. A revolving bow for musical stringed instruments, comprising a rotatable member, radially movable supporting arms connected therewith, bands, adjustable band supports carried by said arms, each support composed of two relatively movable parts the ends of said bands connected respectively to said parts, and means to hold the parts in adjusted position.

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

ERNST ALFRED PAUL HENNIG.

Witnesses:

JOHANNES HEIN,

HENRY HASPER.