

Tuning Instruments,

Patented Aug. 2, 1864.

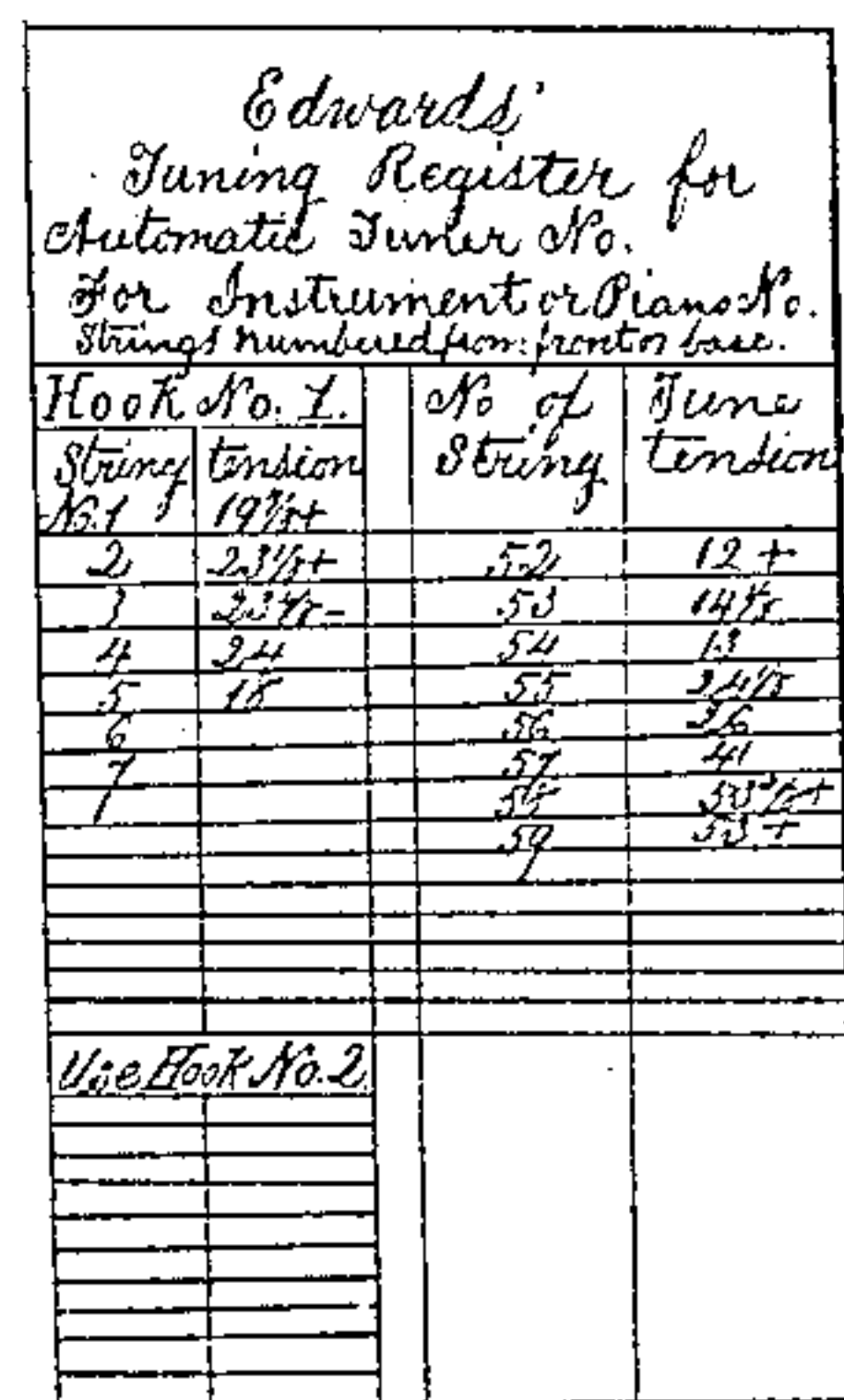
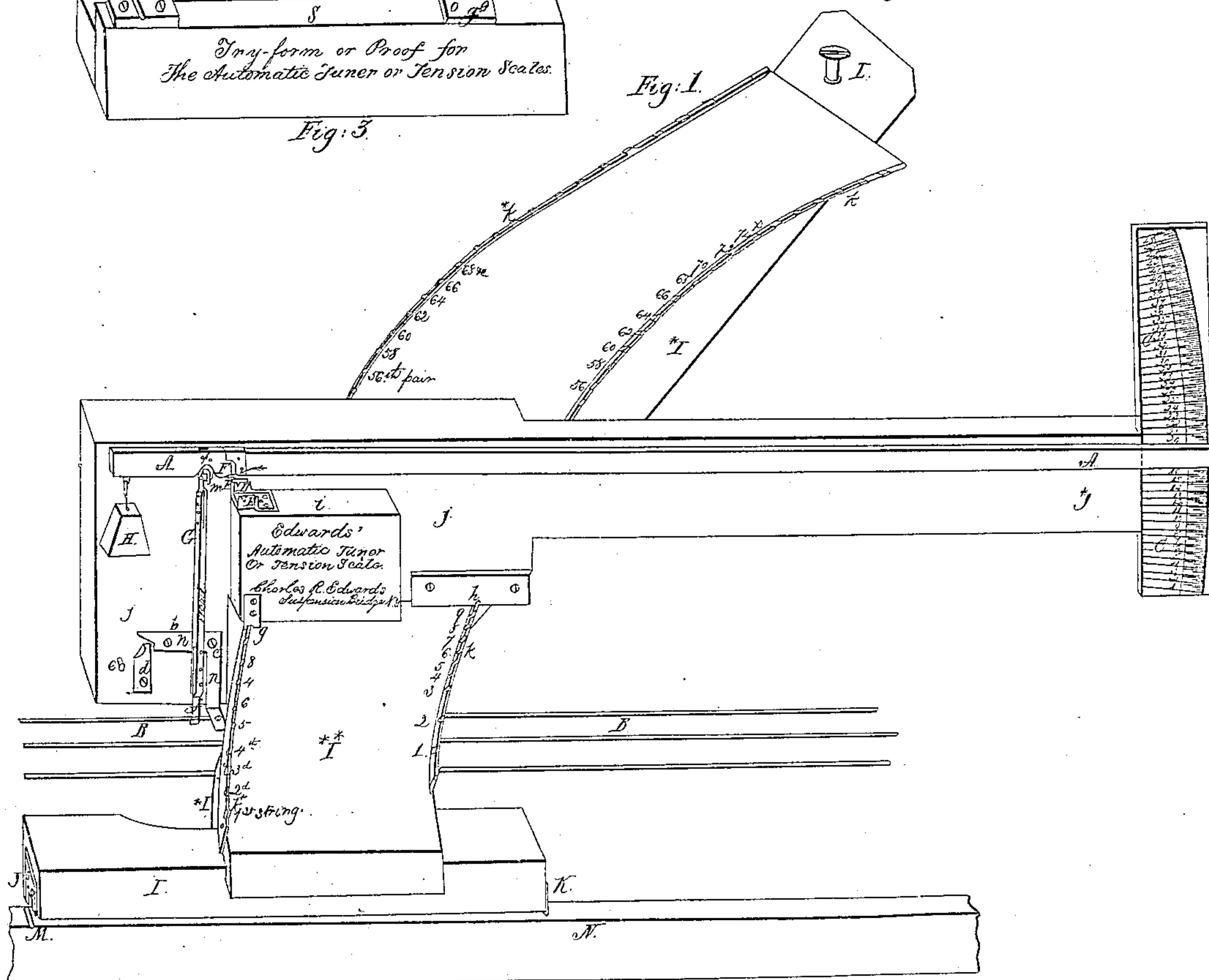


Fig: 2.



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TENSION-SCALE FOR TUNING PIANOS.

Specification forming part of Letters Patent No. 43,674, dated August 2, 1864.

To all whom it may concern:

Be it known that I, CHARLES R. EDWARDS, of the village of Niagara City, (Suspension Bridge P. O.,) in the county of Niagara and State of New York, have invented a new and useful instrument and method for tuning piano-fortes and other stringed instruments by the aid of the eye instead of the ear, and for weighing the tensions of any musical or other strings or wires for many useful purposes, and for registering the tensions of said strings; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In order that the description may be better understood, I will first remark that I tighten the strings of any musical instrument or change the tensions of the strings in the usual way for a piano-forte, using the key commonly used for tightening the strings; but to determine when each string is to that tension which makes it in tune, I use the instrument herein described, which I will call the "automatic tuner or tension-scales."

I will also state here that before I use the automatic tuner to determine when the strings of a piano-forte are each in tune I require the strings first to be put in tune once in the usual way, and so that the best qualified judges shall decide them to be in the most perfect tune. I then first use the automatic tuner to discover the tune-tensions of said strings, and register said tensions on a card or paper in a manner so that by help of the said register and the automatic tuner the tune-tensions now discovered may be restored whenever they shall any of them become out of tune, and said strings may be restored to mathematical exactness. While a string was yet in tune, I detected a variation in tension so slight with the automatic tuner that it could not be detected by the ear of the piano-tuner who witnessed it.

Figure 1 shows a perspective view of the automatic tuner placed on its platform over the strings of a piano-forte. Fig. 2 shows how a tuning-register may be made on a card or paper. Fig. 3 represents a try-form or proof on which the automatic tuner may be placed at any time to show whether any accident has

made the tuner vary from the register, and if so, the scale will show how much, so that the proper allowance may be made.

In Fig. 1, M N is a section of the front upper edge of the iron frame of a piano-forte. At B B is shown a section of three strings. I I I is the platform on which the automatic tuner may be moved and used over each string. Said platform stands on three feet, J, K, and L, the foot L resting on the iron frame of the piano-forte back of all the strings. A screw may be used for said foot L, if made firm. It must be long enough to make the said platform stand about level. The automatic tuner rests on said platform on three feet, also, one at *g*, one at *h*, and the third opposite *g*. (Not seen.)

A A, Fig. 1, is a lever, represented raised a little above its fulcrum D D to show the construction of the bearings.

At F is a band firmly fastened around the lever. On either side of this band there is a projection at a right angle with the lever. On these projections the lever is to rest or turn on its fulcrum D D. Its fulcrum D D is a piece of sheet-brass bent up, as shown, on either side, with a notch filed in the upper edge of each of the two projections, as at D. It is in these notches that the projection on either side of the band, as at F, is to rest, being made so as to turn with as little friction as practicable. To make the lever always work or turn on the same points of bearings, a second piece of sheet-brass is bent up on the outside of D D, as shown at E E. The projections on the band F on the lever are made dull-pointed at their lower edges, as shown by the one at the point of the arrow. These dull points touch the inside of the pieces E E, and thus prevent any change of bearings. The pieces E E and D D are fastened to the block *i*, which block is fastened to the part *j j*.

At *x x* will be seen how a piece of sheet brass or steel is fastened in the lever. In the lower part of this piece a hole is first punched, and then in the lower edge of the hole is filed a notch with a square corner of a file and the edges filed a little rounding. A notch similar is also filed in the hook *m*, so that the hook always hugs to the same spot. The hook G is also hooked by a flat hook, as shown at *f*,

to the string B B. This flat hook should not be too loosely fitted for the strings, yet one hook for the smaller strings and one for the larger strings will generally be sufficient. The weight H is only to be heavy enough to prevent the long end of the lever from bearing down so hard as to pull too much on the string. I have used a lever with a pressure on the string of two ounces with good success, and I have used half that pressure with success. I have used levers twenty-six inches long with the hook G hooked one-third of an inch from the fulcrum, and I have used shorter levers, and in both cases with success, and when made of wood, as shown.

The scale C C, Fig. 1, may be printed on paper and pasted on a wood piece fastened to the end of the arm *j, which arm is fastened to the part j j. If the string to which the hook G is hooked shall be unstrained, it will allow the long end of the lever to drop down the scale. If tightened, the string draws on the hook, as if taking up the slack, thereby forcing the lever up the scale.

In putting the platform I I I, Fig. 1, on the piano-forte over the strings, the foot J is to be set in the notch M, with the tongue-piece of J against the inside of the frame at M. Then the foot K is to set on close up to its tongue, (but no notch is to be made here in the frame N,) then the foot L is to be set carefully down. It will come right if the feet J K are carefully kept in place. If the platform be made of wood, piece I may be of one-and-a-half inch stuff, piece *I of inch board, and piece *I *I of inch board fastened with glue and screws. On the edge of said platform, *k and *k, Fig. 1, is to be well fastened a strip of brass or iron about five-eighths of an inch wide, and thick enough to be firm, the edge to project above the platform about an eighth of an inch.

For the purpose of placing the automatic tuner always in the same spot and in the same relation to the strings as when their tensions were registered, notches are to be made with rounded edges in said strip, in which to set the notched foot g, which is a piece of sheet brass or iron fastened to the piece i, as shown; also, a notch is made, as shown in the foot g, so that it will hug the notch in which it is set; also, on the opposite edge of the said platform is to be a like strip with notches filed or otherwise made, as shown at k k. The foot h, having only a smooth bevel-edge, is to be set in these notches. The third foot of the automatic tuner is a piece of sheet-brass about the size of foot h, but is fastened opposite g on the bottom and outer edge of piece j j, so as to rest flat on or over the notches in the rail-piece *k *k. For each of the larger strings, if needed, a notch is to be made for the foot g in the rail-strip *k *k, as also corresponding notches in the opposite rail, k k, to be made so that the hook G will hang over or nearly over the string to be tuned, to which it is to be hooked, and so that the lever will work about parallel to said string, the

notches in both rails to bear corresponding numbers to the number of the strings, except that each pair of the smaller strings can be weighed in a single notch, and the notches may be numbered, as 56 58, &c. The said platform on the edge *k *k should be so shaped, and the feet J K so set on the iron frame M N, that the hook G will hang over about the centers of the strings, but more nearly so over the short strings.

In Fig. 1, at n a b c d e, is shown a device for placing the hook f always at the same point on the string as in relation to the points where the string begins at either end to vibrate.

The piece n n a, Fig. 1, has a hole at b larger than the screw at b, and the screw-head is not screwed tightly against it. The pieces n n a and d are made of sheet brass or iron thick enough to perform their office. The piece n n a turns by its own gravity on the screw at c. The piece d turns at d back to pin e. Now, if the hook f be pushed against the arm a, being first hooked to the string, while the button d holds b from dropping, thus keeping the arm a firmly in its place, we may, after pushing the hook f to the arm a, turn the button d back to pin e, when the part at b drops as far as the hole at b will allow, and the part or arm a will thus be pushed back from the hook, leaving the hook in the place designed. In putting strings in tune which have been much unstrained, it will be well to set the hook a second time just before the string is brought to tune-tension. In weighing the tension it is also well to start the lever in motion slightly over the scale. The tension will be indicated on the scale by sighting across the top of the lever. We may call it "weighing the tension," but it is, in fact, measuring the angle which a given pressure produces on a string at some unknown power straining it endwise.

Some styles of piano-fortes may require a second platform different from I I I, Fig. 1, for some of the strings, and also a longer hook G. It is not necessary to hook to the middle of the string, yet the platform or support for the tuner will have to be somewhat varied for different styles of musical instruments.

For the shape of the platform between the notched rails *I, Fig. 1, patterns may be printed on paper, with lines showing the directions of the strings and their numbers printed. This pattern may be pasted on and remain on for use. It will also show where to file the notches in the rails, if properly made and pasted on.

In making the tuning-register, Fig. 2, it must be noted where the first and where the second hook is used, as shown in Fig. 2. The register must correspond to conditions.

To provide for the greatest possible accuracy in tuning piano-fortes, let the room be about the same temperature—say comfortably warm—at the different times the tuner is used. Do not allow persons to move about the

room. Do not lean the arm or hand upon the tuner or on the piano-frame on which it is placed when looking at the scale.

The parts of the try-form *s t* may be made of suitable wood, if firmly made. Pieces *o p q r*, are of metal, fastened as shown with screws; but instead of the piece *o* wire staples may be driven in, as shown at **o **o*. To make this try-form prove or correct the tuner, you must, just before making the tune-register, place the tuner on the try-form, as if *s*, Fig. 3, were the front edge of the piano-frame, placing the foot *J*, Fig. 1, in the notch *p*, Fig. 3, and the other two feet of the platform *K L* at *q r*. Now hook the large hook *G* to the wire staple **o*, or to piece *o*, as if to take the tension of the staple, then notice what the lever indicates on the scale. If it shows, say, 20 full on the scale, note it on the register as "try-form proof, hook No. 1, scale 20+." Then try the small hook, hooked to the small staple **o* and note it also. The hook *G*, Fig. 1, should be bent on an angle or so rounded as to hug strings of a little difference in size, but without wedging or pinching too tightly. Now when you wish to restore tune-tensions by the register it is well first to know that no injury has happened to the tuner, for if the lever has been bent by falling it would no longer agree with the tuning register; but by now placing it again on the try-form, as before, the scale will show if it indicates as before, but if it shows with hook No. 1, 21+, instead of 20+, you will know that the tune-tensions on the register must all be counted one whole number higher. From this it will appear how any variation of the tuner may be corrected.

The try-form, instead of being made large enough for the platform, need not be made to try the platform, but made small, and so as to take on the three feet of the tuner *g h*, and the foot opposite *g*, (not seen,) Fig. 1. The platform may be made so firm as not at all likely to be injured; hence the small try-forms may be generally used for the tuner alone.

In all parts where little wear is desirable, steel or any suitable metal may be used. I do

not confine myself to the precise construction of the parts or the material described. The lever, instead of wood, as shown, may be of metal, and the heavier parts may be cast in light skeleton frames of metal.

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

1. The scale *C C*, Fig. 1, or any marks or substitute therefor, which, in connection with the movement of the lever *A A*, or other mechanical arrangement, shall show to the eye the tune-tension of musical strings.

2. The hook *f* or other device made to press against a musical string or any wire or string between its two ends, for purposes substantially as set forth.

3. The notches in the rails **k *k* and *k k*, and the notched foot *g*, made to hug the notches in the rail **k *k*, substantially as and for the purposes set forth.

4. The platform *I I I*, resting at three points over the strings of a musical instrument, while on the platform is used the device to be moved over or nearly over each string, such device itself also resting at three points on said platform, and this substantially as and for the purposes set forth.

5. Attaching the hook *f*, or its equivalent, to the string always at the same place (in relation to either point where the end of the string begins to vibrate) by means of a gage or arm, *a*, by having it come in contact with the hook *f* or its equivalent till the same is set, and then the gage or arm removed gently.

6. A tuning-register in which is so recorded the tensions of musical strings, numbered or otherwise described, that a person by aid of the proper mechanical device may put such strings in tune by the eye instead of the ear.

7. The try-form, Fig. 3, substantially as and for the purposes set forth, whether adapted to the automatic tuner (with or without its platform *I I I*, Fig. 1) or not.

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