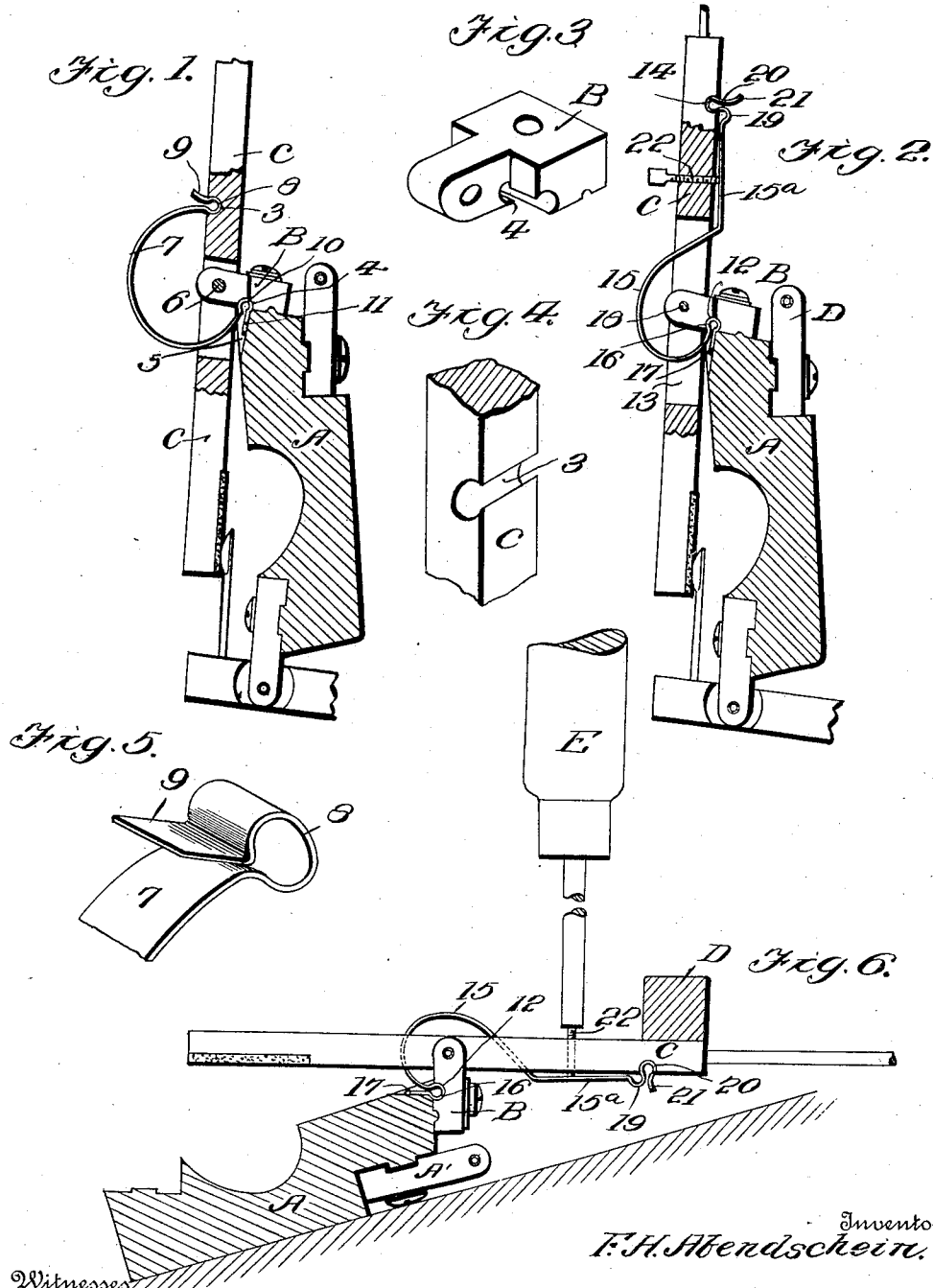


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PIANO ACTION SPRING.
APPLICATION FILED MAR. 24, 1911.

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Patented June 3, 1913.

2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

FREDERICK H. ABENDSCHEIN, OF NEW YORK, N. Y.

PIANO-ACTION SPRING.

1,063,311.

Specification of Letters Patent.

Patented June 3, 1913.

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To all whom it may concern:

Be it known that I, FREDERICK H. ABENDSCHEIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Piano-Action Springs, of which the following is a specification.

My invention relates to piano actions and particularly to the springs whereby the various reciprocating members or levers, as for instance the damper levers, wippens, hammers, repetition levers, trapworks or like parts are held in their normal position or returned thereto after actuation.

The primary object of my invention is the elimination of rubbing friction between an action spring and the parts to which it is connected, and with which it engages.

A still further object is the provision of an action spring in which the stress of the spring is more uniformly distributed than it is in the springs ordinarily used.

A further object is the provision of means whereby an action spring may be readily attached to and detached from the part to which it is engaged without the use of screws.

A further object is the provision of a spring which shall be disposed concentrically to the pivot of the part operated upon by the spring.

A still further object is the provision of an action spring, the stress of which may be very delicately and exactly regulated, and which is particularly adapted for dampers and for the repetition levers of grand actions, though capable of use on other parts of a piano.

A still further object is the provision of a spring particularly suitable for damper levers which permits the operation of "weighing the damper levers" to be easily accomplished when the action is placed upon a bench for the purpose of regulating the springs or "weighing the damper levers," as it is called.

Various applications of my improved spring are shown in the accompanying drawings wherein:

Figure 1 is a side elevation, partly sectional, of a portion of an action rail and a damper lever mounted thereon with my improved spring. Fig. 2 is a like view to Fig. 1 but showing a preferable form of spring. Fig. 3 is a detail perspective view of a

damper flange. Fig. 4 is a perspective view of a fragment of the damper showing the nearly circular recess therein to receive the spring. Fig. 5 is a perspective view of one end of the spring. Fig. 6 is a side elevation of an action rail and damper in the position taken by the parts when the damper lever springs are being tensioned. Fig. 7 is a side elevation of a portion of a grand action with my improved springs applied to the jack and repetition lever thereof, the supporting rails being shown in section. Fig. 8 is a fragmentary side elevation of a portion of a repetition lever and the jack of a grand action showing a modified manner of attaching the springs thereto.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

In order that the operation of my spring may be clearly understood, I will first describe it in its simple form and as applied to the damper lever of an upright piano.

Referring to Fig. 1, A designates an action rail of any suitable character and B the damper flange of the usual form. The damper lever C is of the usual form but is provided upon its outer face with a transverse groove 3. This groove is nearly a full circle, this circular groove opening by a contracted mouth upon the face of the damper lever (see Fig. 4). The under face of the flange B is also formed with a groove 4 which has the same characteristics as the groove 3. The groove extends transversely across the under face of the flange. This groove is nearly circular in form and opens by a contracted mouth upon the under face of the flange. Preferably the adjacent face of the action rail is cut away as at 5. The damper lever C is pivoted upon the flange B by means of the usual pivot pin 6 and the damper operates in precisely the same manner as usual in piano actions. The spring 7 is approximately semicircular in form. One end of the spring is formed with a circular bead or fold 8 to engage with the nearly circular groove 3 on the face of the damper. The material of the spring beyond the bead 8 is extended for a short distance as at 9 so as to form a lip whereby the bead may be compressed. It will be understood that this circular bead tends to expand but that when it is compressed, the circular bead may be inserted

within the nearly circular groove 3, and that then the resilience of the material will cause the bead 8 to expand, thus holding it in place within the groove 3. The opposite end of the spring 7 is provided with a circular bead 10, exactly like the circular bead 8 previously described and provided with the lip 11. This circular bead 10 is adapted to be inserted within the nearly circular groove 4 and to expand within this circular groove. It will be seen that when expanded, these beads hold the ends of the spring in rigid engagement with the parts to which the ends of the spring are attached and that the spring can only be removed by compressing the beads or folds 8 or 10 and shifting the spring laterally out of the grooves 3 or 4. By folding or bending the ends of the springs in circular form to fit in the borings or grooves 3 and 4, I positively and absolutely avoid any rattling that would occur from shrinkage in the wood were the springs fastened to the members with screws or other like means. It will be seen that pressure is required to insert the circular beads forming the terminal ends of the springs into the borings and that the moment the pressure is released after the insertion of these terminal ends of the spring, the elasticity of the metal causes the beads to expand and hug the walls of the borings or grooves, insuring a positive contact under all circumstances. It will likewise be noted that the spring extends in approximate concentricity to the pivot pin 6 and that it partially surrounds the center of movement of the member acted on by the springs, namely, the damper lever C.

It will be seen that the construction as above described provides no means whereby the stress of the spring may be regulated, and therefore I prefer to use the spring in the form shown in Fig. 2. In this form the under side of the flange B is formed with the nearly circular groove or boring 12, this groove or boring being located approximately at the junction of the flange with the action rail A. The damper lever C is the usual form of damper lever but is longitudinally slotted as at 13, this slot extending equally above and below the flange B. The inner face of the damper lever near the upper end thereof is formed with a nearly circular groove 14 having a contracted mouth opening upon the inner face of the damper lever, that is, the face toward the hammer flange D. The spring 15 at its lower end is provided with the circular bead or fold 16, as previously described, and with the projecting lip 17. This circular bead 16 is adapted to be inserted in the nearly circular groove or boring 12 on the under face of the flange B. The spring is then curved outward and upward and around the pivot pin 18 of the damper lever

and is then extended upward and through the slot 13, the spring being slightly less in width than this slot. The spring is then bent upward parallel to the inside face of the damper lever C, as illustrated in Fig. 2. At its upper end, the spring is preferably curved outward and inward as at 19 and is then formed into a circular bead 20, the material beyond the bead being extended to form the lip 21. This circular bead 20 is adapted to be inserted in the groove or boring 14. The bend 19 and the lip 21 form means whereby the circular bead may be compressed so as to permit the bead to be withdrawn laterally from engagement with the groove or boring 14. The expansive action of the spring metal bent as at 20 acts to hold the circular fold or bead 20 in snug engagement with the groove 14. It will be seen that the action of this spring is to force the upper end of the damper lever toward the strings of the instrument and force the lower end of the lever toward the adjacent face of the action rail.

In order to regulate the stress of the spring 15, I provide a stress-regulating screw pin 22 which passes through the damper lever and engages the inside face of the straight portion 15^a of the spring 15. By screwing inward on this pin 22, the lower end of the portion 15^a will be forced away from the damper lever and this will act to draw upward upon the bowed or semicircular portion of the spring 15, thus increasing the stress of the spring. By means of the screw pin, the stress of the spring may be very delicately regulated in a manner not heretofore possible with damper springs, and, furthermore, by placing the portion 15^a on the face of the damper lever toward the hammer and extending the screw 22 through from the opposite face of the damper lever, I provide for a very easy adjustment of this spring when the parts are laid upon a bench, in the position shown in Fig. 6 to permit the damper levers to be weighed. The manner of adjusting this spring is easily seen from Fig. 6 wherein D indicates the weight used in weighing the levers and E a screw-driver. It will be seen that this construction is particularly advantageous to the workman weighing the damper levers, inasmuch as the tension of the spring may not only be regulated to a hair's weight, but the placing of the screw in this position makes it easy of access, entirely obviating the necessity of reaching down between and under the levers to the spring while the action lies flat upon a bench, and bending the wire spring ordinarily used in or out with a tool used for that purpose according to the stress required. In the old construction not only is the spring difficult of access, but the bending back and forth of the damper spring to

regulate the stress tends to destroy the resilience of the spring, and is also a very poor way of securing a delicate and accurate adjustment.

5 I attain a more equal distribution of tension in the spring by affixing the lower end of the spring below the damper lever center and permitting the bow of the spring to extend downward and through the slot 13 and then upward in a curve to a point above the damper lever center. It will be noticed that the line of movement of the spring is in an arc around the damper lever center, in other words, approximately concentric to the pivot on which the damper rocks.

15 While my improved spring is particularly adapted to the actuation of dampers as above described, it is not limited to this use as it may also be applied to other parts of a piano action. For instance in Fig. 7 I have shown the spring as applied to a grand wippen. In this figure I have illustrated a grand wippen, jack, repetition lever, etc., of the usual construction to be found in grand 25 actions. In this figure, F designates a wippen and G the capstan screw operating it; I the key, J the action rail, K the hammer rest and L the jack having a let-off arm M. All these parts are of the usual construction. The repetition lever N is pivoted upon the upper end of a supporting member O and the jack L passes up through the usual slot in the repetition lever N and into operative engagement with the hammer, as is 35 usual. The hammer P is mounted as usual upon the hammer rail Q which is provided with the regulating button R which contacts with the let-off arm M when the wippen rises, thus tripping the jack. It is particularly noted that the repetition lever N does not extend beyond the pivot *n* toward the hammer rest K.

45 The face of the supporting member O toward the hammer rest K is formed with the nearly circular groove 25 which opens upon the face of the support O. The under face of the repetition lever N is also formed with a nearly circular groove 26 opening upon the under face of the lever. The 50 spring 27 has the same form as the spring previously described for the damper lever. It is formed at one end with the circular bead 28 having a lip 28^a and extends approximately concentrically around the center or pivot *n*. It then extends through a slot 29 in the repetition lever N and extends up under the face of the repetition lever to the groove 26. This end of the spring is formed with a bead 30 having a 60 lip 31 forming means whereby the bead may be compressed in order to permit it to be withdrawn from the groove or bore 26. A stress screw 32 passes through the lever N from the upper face thereof and engages 65 with the inner face of the flat portion 27^a

of the spring 27. By adjusting this screw, the stress of the spring 27 may be very delicately regulated as previously described for the damper spring. The jack L is also provided with a spring whereby the jack is 70 drawn inward toward the supporting member O. For this purpose the jack L on its inside face is provided with a bore or nearly circular groove 33 opening upon the inside face of the jack, and the under face of the wippen F at its end adjacent to the jack 75 is also provided with a nearly circular groove or bore 34. The spring 35 at one end is formed with the bead 36 and the lip 37, the bead being expanded within the bore 34. The spring then extends upward and through a slot 38 in the wippen F and its upper end is formed with a bead 39 and a lip 40, the bead engaging in the bore or groove 33 in precisely the same manner as 85 before described. It will be seen that the spring is applied both to the jack and the repetition lever and engages these parts without any rubbing contact. The ends of the spring are directly engaged with the 90 parts so that there is no chance of rattling and no chance for the spring to shift, and the tension of the spring 27 may be accurately and positively adjusted.

While I prefer to apply the spring 35 as 95 illustrated in Fig. 7, the spring may also be arranged as shown in Fig. 8 wherein the lower face of the wippen F is formed with a nearly circular groove or bore 41, and the under face of the let-off arm M is also 100 formed with a nearly circular groove or bore 42. The spring 43 is curved in an arc and the ends are formed with the beads 44 and 45 insertible into the grooves 41 and 42, each bead being extended to form the lip 105 46 whereby the beads may be compressed in order to withdraw them. It will be seen that the action of this spring 42 is precisely similar to the action of the spring 35.

While I have illustrated my improved 110 spring as applied to a damper lever and to the repetition lever and jack of a grand action, I do not wish to be limited to this as the same style of spring with the same fastening means might be applied to numerous 115 places in a piano. For instance, it could be used on a pedal lever or trapwork, as it is commonly called. I have applied my spring in practical use and find that it is extremely advantageous, not only because of the fact 120 that there is no friction, but because it presents an easy manner of attaching the spring to the parts to be actuated thereby, and means whereby the spring may be very 125 delicately and readily adjusted.

What I claim is:

1. In a piano action the combination with two members, one of said members being pivoted to the other, the last named member being formed with a transverse groove in its 130

face, said groove being circular in form and opening upon the face of the member, the opening having a width less than the diameter of the circular groove, of a spring fixedly attached at one end to one of said members and at its other end formed with a resilient open bead engaging in said groove, said bead having a lip projecting out of the groove whereby it may be contracted.

2. In a piano action, the combination with two members pivoted to each other, of a spring fixedly attached to one of said members, curved for a part of its length in an approximate semicircle around the pivot of the members, then extended parallel to one face of the other member, the adjacent end of the spring being fixedly attached to the last named member.

3. In a piano action, the combination with two members pivoted to each other, of a spring fixedly attached to one of said members, then curved for a part of its length in an approximate semicircle around the pivot of the members, then extended parallel to one face of the other member and attached at its end to the last named member, and a stress regulating screw passing through the last named member and engaging the inner face thereof.

4. In a piano action, the combination with two members pivoted to each other, one of said members being longitudinally slotted, of a spring fixedly attached to the other of said members extending through the slot of the first named member and curved for a part of its length in an approximate semicircle around the pivot of the members, then projecting through said slot and extending parallel to one face of the first named member and fixedly attached at its end thereto, and a stress regulating screw passing through the first named member and engaging the face of the parallel portion of the spring.

5. In a piano action, the combination with

two members pivoted to each other, one of said members extending at an angle to the other member, one face of each of the members being formed with a circular groove extending transversely to the length of the member, of a spring, one end of the spring having a circular resilient bead engaging with one of said grooves, the spring then being curved outward for a part of its length in an approximate semicircle around the pivot of the members, then extending parallel to one face of the other member and at its end having a circular resilient bead expanded in the groove of that member and snugly engaging the wall of the groove, and a stress regulating screw passing through the last named member and engaging the parallel portion of the spring.

6. In a piano action, the combination with two members pivoted to each other, of a spring fixedly attached to one of said members curved for a part of its length in an approximate semicircle around the pivot of the members, the end of the spring being fixedly attached to the other member, and means mounted upon one of said members and engaging said spring for increasing or decreasing the stress of the spring.

7. In a piano action, the combination with two members pivoted to each other, of a spring fixedly attached to one of said members curved for a part of its length in an approximate semicircle around the pivot of the members, then extended parallel to one face of the other member, the adjacent end of the spring being fixedly attached to the last named member, and means mounted on the last named member and engaging the spring for increasing or decreasing the stress of the spring.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK H. ABENDSCHEIN. [L. s.]

Witnesses:

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