

(No Model.)

R. B. WATSON.  
PIANO.

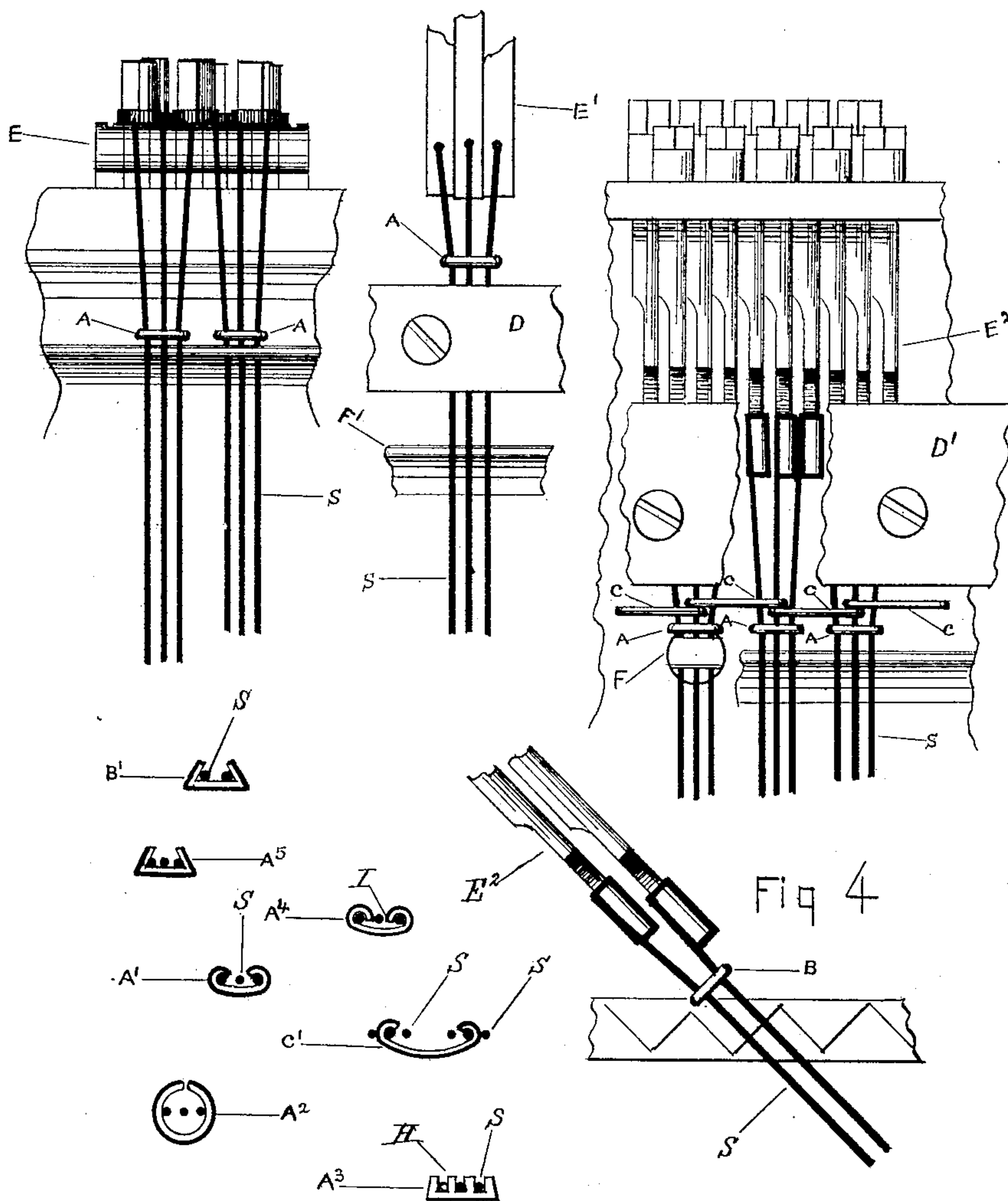
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Fig 1

Fig. 2

Fig 3



WITNESSES

Lyman J. Browning.  
Chas E Wendell

INVENTOR

PK Watson

# UNITED STATES PATENT OFFICE.

ROGER B. WATSON, OF DENVER, COLORADO.

## PIANO.

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*To all whom it may concern:*

Be it known that I, ROGER B. WATSON, a subject of the Queen of Great Britain, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Pianos, for which I desire to obtain Letters Patent, and of which the following is a specification.

The objects of my invention are to provide a means of spacing the upper ends of the strings of a piano where no means of spacing are provided at or upon the stringers, and at the same time to avoid undue friction or resistance to the motion of the string at the agraffe which must accompany any such means when applied at the agraffe, bridge, or pressure-bar.

In the drawings similar letters refer to similar parts.

I will here explain that in this specification and claims the word "spacer" or "coupler" refers to the essential part of my improvement, which is marked in the drawings as A, B, and C, and represents the means described and claimed by which the strings are drawn together or regulated to the desired distance apart. The word "stringers" refers to that part of a tuning device to which the string is fastened. By the words "set of two strings" or "set of three strings" is meant a set which together form one note and have the same pitch. By the terms "spacing the strings" I mean the adjusting or maintaining of the strings at the desired distance apart from each other, as shown in Figure 3. The term "upper ends of the strings" refers to the parts shown in the drawings and as located in an upright piano; and, finally, the term "agraffe" or "bridge" refers only to the agraffe or bridge near the upper ends of the strings and is shown at F and F' and does not include an agraffe or bridge upon the sound-board, the function of which is to communicate the vibrations of the strings to the sound-board.

In Fig. 1 two of my spacers A are shown clasping and drawing together the two outer strings of each of the two sets of three strings. In Fig. 2 a similar spacer A is shown applied in the same manner; also in Fig. 3 similar spacers A are shown applied to the three sets of strings; but in this figure there is also a series of spacers C applied to the middle strings, connecting each middle string with the mid-

dle string of the adjacent set. Fig. 4 shows one of the spacers B applied to two strings only.

Five different forms of the spacers are shown in the drawings at A', A<sup>2</sup>, A<sup>3</sup>, A<sup>4</sup>, and A<sup>5</sup>. A<sup>1</sup> is shown having its ends turned inward sufficiently to pass between the middle and outer strings, and so form a guide or spacer for the middle string also. The spacers C of the middle strings are shown in Fig. 3, and are also shown in suitable form in the drawings at C'. They are attached in a similar manner to spacers A, except that they overlap each other, the one middle string being held by opposite ends of independent spacers. Spacers B are applied similarly to spacers A, but to two strings (bass) only, as at Fig. 4, and are shown also at B'. The spacers are all shown as being independent of the stringers or the agraffe; but they may, if preferred, have suitable fixed guides or checks above and below them to limit their movement when the strings are being drawn up or let down. In such cases the position of the spacers between the checks should be so arranged by raising or lowering the strings that in bringing the string to exact tune it will at the same time carry the spacer away from the check against which it had been forced, so leaving it free to move without friction in positions corresponding to harmonic nodal points.

The arrangement of the couplers or spacers upon the strings will greatly depend upon the positions of the string-fastenings in relation to each other. They may be coupled, as shown, Fig. 3, or instead the one outer string of one set may be coupled with the opposite outer string of the next set. If it is desired to bring the two outer strings of adjoining sets closer to each other instead of as shown, these two outer strings may be coupled together. If each adjoining middle string inclines toward their stringers in opposite directions, each alternate middle-string spacer may be dispensed with. In most cases where the string-fastenings are equally distant the middle-string spacers will not be required.

The spacers may be made of any suitable material, preferably of piano-string wire, as this is always available to a tuner, if one should get broken or lost. They may also be

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of various forms, as shown, and they may be arranged side by side, as shown, or in any other position in relation to each other or to the stringers or to the agraffe, and may be  
 5 either above or below the pressure-bar, if one is used on the strings. It will be seen that the method shown is practically without frictional resistance to the motion of the strings in tuning, and consequently does not cause  
 10 unequal tension of the two parts of the string above and below the agraffe. Unless it is desired to retain the spacers at points upon the strings corresponding to the nodes of one of their harmonics, the checks or guides before  
 15 referred to will not be necessary, as the spacers will not slip upon the strings, and when once placed in position they will not be materially displaced by the small motion of the strings in tuning.

20 I have shown my improvement as applied to three different forms of stringing devices, Fig. 3 differing slightly by having the pressure-bar pressing upon the stringers instead of upon the strings, and having lugs upon its  
 25 under and lower sides to press upon the main plate between each set of strings and keep it from contact with the strings. This bar would be preferable in lengths of from three to six inches for convenience in restringing.

30 I am aware that various methods of spacing the strings have been before used; but I am not aware of any method in which any two adjacent strings may be coupled together by means independent of other parts of the  
 35 piano and free to move with the strings, and also capable of spacing any one of them to the position required. If it is desired to retain the spacers at any one position without the use of checks, suitable marks may be made  
 40 upon the plate under the strings to indicate the position of the spacer.

The advantages of my spacing device will be readily understood by attending to the following considerations, viz: In tuning devices  
 45 of the class shown in the drawings the best results are obtained in practice when the parts to which the strings are fastened are brought as near as practicable into one row and side by side; but in order to do this they are crowd-  
 50 ed so close together as to allow barely sufficient thickness for strength of the stringer and space for the string-fastening, so that this part of the stringer is usually made of the same shape and thickness in all, and the  
 55 strings are all fastened thereto in the same manner. This results in the strings being equally distant from each other as they leave the stringer, whereas they are required to be grouped into sets of three where the hammers  
 60 strike them by means of some spacing device. This usually consists of grooves or holes in the agraffe F, the bridge F', or the pressure-bar D; but this and all similar means are objectionable, because being fixed in relation to  
 65 the strings these grooves or holes offer considerable resistance to the motion of the strings

when the latter are being tuned, thereby producing unequal tension of the two parts of the string above and below the grooves or holes, and as this unequal tension tends to  
 70 balance itself slowly after the strings are tuned, a change of tension results in the sounding portion of the string, and consequently a change of pitch, putting the string again out of tune.

75 My method of spacing the strings has the advantage of and is distinct from all others of which I am aware, in that the spacers or couplers are free to move with the strings and are independent of or unattached to any  
 80 part of the piano except the strings—that is to say, they (the spacers or couplers) are held in place and supported by the strings only, and are not hindered by other parts of the piano from following the motion of the strings  
 85 to which they are attached when the strings are being moved up or down in tuning, although of course they may accidentally be in slight contact with other parts. In other words, the  
 90 spacers or couplers perform their office by forcing apart or drawing together two or more strings, thus displacing the strings from their previous positions, bringing them into the po-  
 95 sitions desired, and at the same time balancing the force produced by the tendency of the strings to revert to their previous positions, without being fixed or attached to any part of the piano except the strings.

The advantage of my method consists in the fact that only a slight resistance (which is  
 100 chiefly by rolling friction) is offered to the motion of the strings, so that no material difference occurs from this cause in the two parts of the string above and below the agraffe or bridge.

105 These are the principles or modes of operation of my devices, the practicable application of which by any suitable means it is my intention to secure in the following claims; and it matters not whether the devices force  
 110 the strings apart or draw them together or operate at right angles to the direction shown in the drawings, the principle or mode of operation is still the same. Finally, H represents the projections of spacers A<sup>3</sup>, passing  
 115 between the middle and outer strings of a set of three. S represents the strings; D, the pressure-bar; D', my improved pressure-bar; E, E', and E<sup>2</sup>, the stringers; F, the agraffe, and F' the bridge.

120 Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method of spacing the upper ends of the strings of a piano by means of cou-  
 125 plers or spacers placed upon the strings between the agraffe or bridge and the tuning devices adapted to and moving with the strings, being independent of any other parts of the piano and connecting two or more of  
 130 said strings with each other.

2. The method of spacing the upper ends



of the strings of a piano by means of spacers or couplers placed upon the strings between the agraffe or bridge and the tuning devices, capable of following the motion of the strings and being independent of other parts of the piano, and adapted to clasp and couple any one string with any one of those adjacent to it.

3. The method of spacing the upper ends of the strings of a piano by means of spacers or couplers placed upon the strings between the agraffe or bridge and the tuning devices, capable of moving with said strings and disconnected from other parts of the piano, and adapted to clasp or hold two or more neighboring strings at fixed distances from each other.

4. The method of spacing the upper ends of the strings of a piano by means of spacers or couplers placed upon the strings between the agraffe or bridge and the tuning devices, being free to move with the strings and disconnected from all other parts of the piano, and adapted to clasp and draw two neighboring strings toward each other.

5. The method of spacing the upper ends of the strings of a piano by means of spacers or couplers placed upon the strings between the agraffe or bridge and the tuning devices, being free to move with the strings and unattached to any other parts of the piano, and adapted to clasp and connect any one string of a set of three or of a set of two with any one string of an adjacent set, drawing them toward each other and holding them at fixed distances apart.

6. The method of combining, in the spacers herein shown and described, the means of spacing the upper ends of the strings, with the means of re-enforcing any one of the harmonics of said strings, which consists in applying the spacers to the strings between the agraffe or bridge and the tuning devices at

points corresponding to the nodal points of said harmonics of said strings.

7. A spacer or coupler applied to the upper ends of the strings of a piano between the agraffe or bridge and the tuning devices and not fixed or attached to any parts of the piano except the strings, and capable of spacing two or more strings to a suitable distance apart by separating the strings from or drawing them toward each other.

8. In a piano, the combination, with two outer strings of a set of three, of the spacers A, placed upon the strings between the agraffe or bridge and the tuning devices for the purpose of spacing said two outer strings to a suitable distance apart, substantially as shown and described.

9. In a piano, the combination, with two middle strings, of the spacers C, placed upon the strings between the agraffe or bridge and the tuning devices for the purpose of spacing the two said middle strings to a suitable distance apart, substantially as shown and described.

10. In a piano, the combination, with a set of two bass-strings, of the spacers B, placed upon the strings between the agraffe or bridge and the tuning devices for the purpose of spacing the two said strings to a suitable distance apart, substantially as shown and described.

11. The combination, with the strings of a piano, of the spacers A, B, and C, placed upon the strings between the agraffe or bridge and the tuning devices for the purpose of spacing the said strings to a suitable distance apart, substantially as shown and described.

R. B. WATSON.

Witnesses:

SWAIN BACH,  
CHARLES E. WENDELL.