J. N. VASEY AND B. R. KIESSIG.

MUSICAL INSTRUMENT OF THE STRING TYPE.

APPLICATION FILED NOV. 29, 1919.

1,383,500. **Patented July 5, 1921.**

Fig. 2.

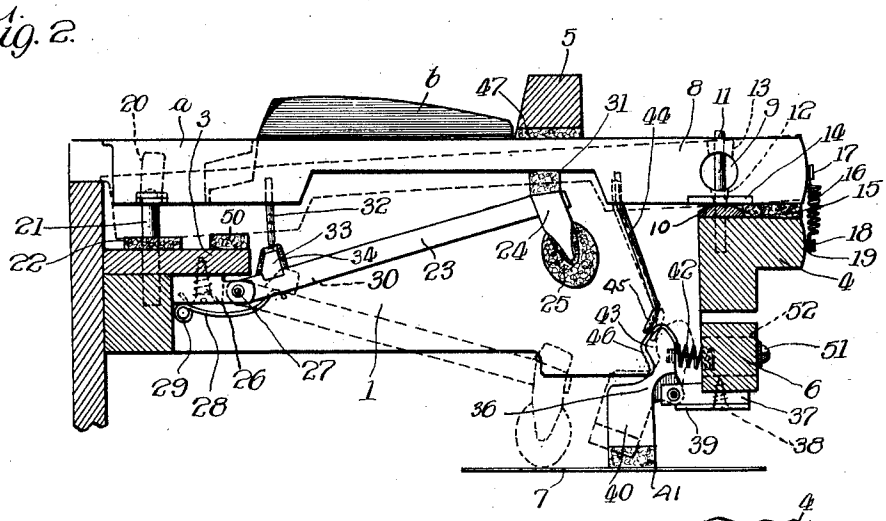


Fig. 1.

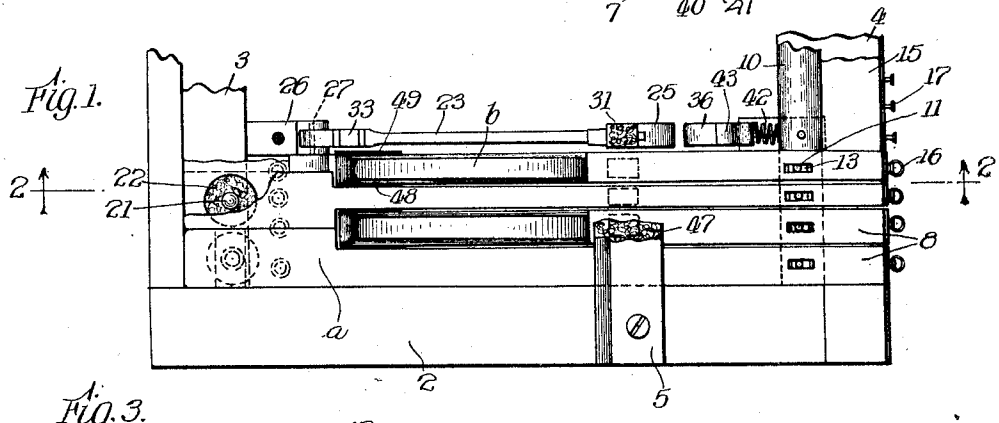


Fig. 3.

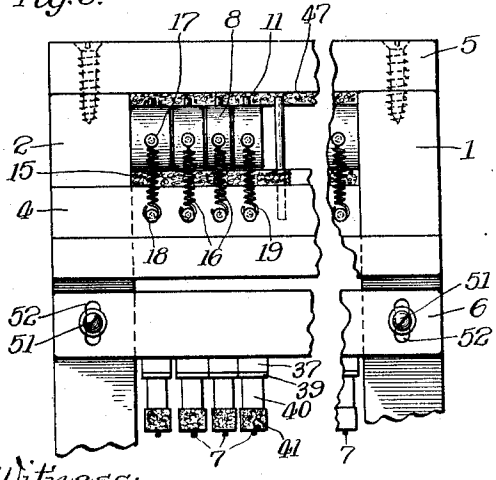
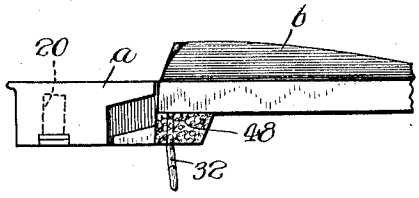


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MUSICAL INSTRUMENT OF THE STRING TYPE.

1,383,500. Specification of Letters Patent. Patented July 5, 1921.

Application filed November 29, 1919. Serial No. 341,510.

To all whom it may concern:

Be it known that we, JOSEPH N. VASEY, a citizen of the United States, residing at Brookfield, in the county of Cook and State of Illinois, and BERNARD R. KIESSIG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Musical Instruments of the String Type, of which the following is a full, clear, and exact description.

Our invention relates to musical instruments of the string type and concerns particularly improved hammer, key and damper mechanism construction, arrangement and operation.

The various features of our invention are clearly disclosed in the following specification together with the accompanying drawings, in which drawings—

Figure 1 is a plan view of one end of the supporting structure for the key mechanism and a plurality of keys mounted thereon,

Fig. 2 is a sectional view on plane 2—2, Fig. 1,

Fig. 3 is a rear elevational view, and

Fig. 4 is a side view showing the relative arrangement of the black and white keys.

The drawings show the inside supporting frame structure for the string striking and controlling mechanism of a piano, the frame comprising end walls 1 and 2, a front key abutment shelf 3, a rear key pivot shelf 4, a key abutment bar 5, and a damper supporting bar 6. This supporting frame work is supported over a suitable sounding board structure (not shown) on which are stretched the strings 7 in the well known manner. The white and black keys *a* and *b* are arranged in the usual manner and are hinged for vertical swing on the rear shelf 4 and extend forwardly underneath the abutment bar 5 and terminate over the abutment shelf 3. The rear or body part 8 of each key is in the form of a rectangular block having the transverse opening 9 therethrough preferably formed by boring. Mounted on the shelf 4 along the front edge thereof is a pivot strip 10 having the convex top surface from which pivot pins 11 extend vertically upwardly, these pins being securely anchored in the shelf 4. Below the opening 9 each key body has the vertical cylindrical opening 12 and above the opening 9 it has the longitudinally elongated opening 13. Each key receives one of the pins 11 through the openings 12, 9 and 13, the lower opening forming a pivot connection with the pin and the upper opening sides coöperating with the pin to guide the key in its vertical swing and hold it in a vertical plane. In order to strengthen the pivot connection of the key with the pin and to prevent wear at the opening 12 and also to prevent wear of the keys on the strip 10 a wearing plate 14 is secured to the under side of each key, being preferably countersunk. This plate has an opening therethrough which registers with the opening 12 and the plate being of hard wood or metal there will be little wear and the friction on the strip 10 will also be reduced.

On the shaft 4 behind the pivot strip 10 is secured a strip of felt or other cushioning abutment material 15, the keys when in horizontal position abutting at their rear ends against this felt strip. Tension springs 16 tend to hold the keys in horizontal position with their ends against the felt. These springs are preferably secured at their ends to the keys and shelf 4 by nails 17 and 18. One set of nails, as for example those on the shelf 4 are not driven in full distance so that the loops 19 at the lower ends of the springs can be readily removed over the nail heads thus disconnecting the lower ends of the springs from the nails when it is desired to remove the key structures from the instrument. At their front ends the keys have the vertical pockets or openings 20 for receiving the guide pins 21 extending upwardly from the shelf 3, each pin being surrounded at its base by a cushioning abutment washer 22 of felt or other suitable material, such washers cushioning the downward impact of the key against the shelf when depressed and also preventing noise.

The construction of hammers shown comprises a shank 23 and a striking head 24, a heavy facing 25 of felt being secured around the end of the head forming a pad for striking the strings. For each hammer a hinge fitting 26 is provided, these fittings being secured against the under side of the shelf 3 and each fitting having the bifurcated inner ends which receive the front ends of the corresponding hammer structure to be pivot-

ally secured by a pin 27. Each hammer is normally held upwardly by a spring 28 shown in the form of a spring wire having spring convolutions 29 therein and secured at its front end in the shelf structure 3 and engaging at its inner end in the longitudinal guide notch 30 formed on the under side of the hammer shank. On the head of each hammer is secured a piece of felt 31 which normall engages against the under side of the hammer actuating key. Extending downwardly from the front end of each key is an abutment member 32 preferably in the form of a screw eye which coöperates with the projection 33 on the hammer shank to swing the hammer downwardly when the key is depressed. The projection 33 is faced with leather 34 and when the key is depressed the stud 32 engages with the top and then with the front side of the projection and quick response of the hammer and striking of the respective strings by the pad 25 results. This coöperation of the keys and the hammer is fully disclosed in Patent No. 1015896 of January 30, 1912, to Bernard R. Kiessig. After depression of a key and release thereof, the spring 28 will return the hammer upwardly, its felt abutment 31 striking against the under side of the keys.

The dampers for stopping vibration of the strings after the respective keys have been returned to normal are all supported from the bar 6 extending below the shelf 4. Each damper comprises the body part 36 of L shape pivoted at its bend in the bifurcated end of a supporting bracket 37, these supporting brackets being all secured against the under side of the bar 6 by screws or other suitable means 38. An abutment plate 39 on each bracket extends forwardly a distance below the bifurcated end and prevents the base of the damper from swinging downwardly beyond the horizontal. The base member of the damper has the extension 40 at whose lower end is secured the pad 41 of felt or other suitable material, this pad engaging with a string under normal conditions to prevent vibration thereof. Between the vertical members of the damper and the bar 6 a compression spring 42 is inserted, this spring tending to swing the damper to hold the damping pad 41 against the corresponding string. The front face of the vertical member of each damper has the convex or V shaped projection 43, and extending downwardly from the corresponding key is a wire arm 44 which has the loop 45 in its lower end for coöperating with the convex or cam part 43 of the damper. When the key is in normal position the arm 44 does not exert any pressure on the damper and the spring 42 holds the damper with its pad 41 against the associated string. Upon depression of the key the end 45 of the arm swings rearwardly and also travels downwardly along the convex portion 43, the result being that the damper is quickly rotated in clockwise direction to remove its damping pad from the string so that the string is free to vibrate when struck by the hammer which is thrown downwardly upon depression of the key. To reduce friction and noise the cam portion 43 is faced with felt, leather or other suitable material 46. When a key is struck the hammer is quickly flung downwardly toward the associated string and the string must be free to vibrate before being struck. With our improved construction and arrangement a slight downward movement of the key will cause sufficient rotation of the damper to remove its pad from the string.

The under side of the abutment bar 5 if faced with a strip 47 of felt or other suitable material and such abutment assists the abutment 15 on shelf 4 in holding the keys normally in a horizontal position, the abutment 47 serving particularly to receive the upward recoil of the keys when released after a depression.

As before described the white keys at their front ends receive the guide pins 21 which keep the keys in horizontal alinement. The black keys are not provided with such guide pins but are kept in horizontal alinement by their abutment against the adjacent white keys, the sides of the black keys having preferably facings 48 and 49 of felt which engage with the adjacent white keys, the black keys being then kept from lateral displacement and the felt preventing noise as the keys move relatively vertically. Below each of the black keys the shelf 3 supports an abutment cushion 50 which yieldingly stops the key when depressed. Each black key, like the white key has associated therewith hammer and damper mechanism.

With our improved construction and arrangement assemblage of the various parts can readily and accurately be made, and any part can be readily removed for inspection, repairs or replacement. When the top abutment bar 5 is removed any key will be free to be removed when its spring 16 is unhooked from the corresponding nail 18. A hammer structure can be readily removed by withdrawing the screw which secures its supporting bracket 26 to the shelf 3. Any damper structure is also readily removable by withdrawing the screw which secures its supporting bracket 37 to the bar 6. Or if desired the bar 6 supporting all the damper mechanisms can be readily removed by withdrawing the screws 51 which secure the bar to the end walls 1 and 2. The screw holes 52 in the bar are preferably elongated vertically in order that the bar may be adjusted vertically when applied to bring the dampers into operative position. Adjustment can also be readily made without re-

moving any of the parts from the supporting frame work. For example if it is desired to adjust the abutment stud 32 on one of the keys access to such stud can readily be had by swinging the spring 28 of the corresponding hammer laterally to permit the hammer to drop downwardly to expose the stud, whereupon such stud can be readily turned and adjusted.

The pivot arrangement of the keys is a very solid one. The ends of the keys are of uniform width and height and therefor have substantial abutment on the pivot strip 10 and on the abutment felt 15 on the shelf 4. This substantial abutment of the keys behind their pivot posts will hold the keys in horizontal position when the bar 5 is removed, this abutment bar being provided principally for taking up the rebound of the keys after depression, the springs 16, 28 and 42 all coöperating to restore a key to its normal horizontal position. The pins or posts 11 by extending entirely through the keys serve to hold the keys vertical when they are in normal position, the posts 21 on shelf 3 assisting the pins 11 in keeping the keys in vertical plane when the keys are depressed.

We do not of course desire to be limited to the exact construction, arrangement and operation shown and described, as modifications can no doubt be made without departing from the scope of our invention.

We claim as follows:—

1. In a musical instrument of the class described, the combination of a key, a string, striking mechanism controlled by said key, a damper pivoted to rotate, a key engaging pad on said damper, a spring tending to swing said damper to hold said pad against said string, a cam projection on said damper and an arm extending from said key for engagement with said cam projection to cause rotation of said damper and release of said string when said key is struck to actuate the striking mechanism.

2. In a musical instrument, the combination of a supporting shelf, a plurality of keys pivoted on said shelf and extending forwardly therefrom, strings extending below said keys, striking mechanism associated with each key to be actuated to strike one of said strings when the key is depressed, a damper for each string, a bar below said shelf to which said dampers are pivoted, a damper pad on each damper, a spring extended between each damper and said supporting bar tending to swing said damper with its pad against the string, and an arm extending downwardly from each key for engagement with the respective damper to cause string releasing swing thereof when the key is depressed.

3. In a musical instrument of the class described, the combination of a supporting shelf structure, a plurality of keys hinged at their rear ends on said shelf structure and extending forwardly therefrom, strings supported below said keys, striking mechanism for each key controlled to strike the corresponding string upon depression of the key, a plurality of supporting brackets secured to said shelf structure below said keys, a damper pivoted on each bracket, one for each key, a damper pad on each damper, a spring interposed between each damper and the supporting shelf structure tending to swing said damper to hold its damper pad against the corresponding string, a cam projection on each damper, and an arm extending from each key to engage with the cam projection of the corresponding damper to swing said damper to release the string when the key is depressed.

4. In a musical instrument of the class described, the combination of a supporting shelf, a plurality of keys hinged at their rear ends on said shelf and extending forwardly, strings below said keys, striking mechanism controlled by said keys when depressed, a detachable supporting bar below said shelf, a row of supporting brackets on said bar, a row of damper members pivoted at the front ends of said brackets, one for each key, means normally holding said dampers in position to damp said strings, and an arm extending from each key for cooperating with the respective damper to cause it to release the string when the key is depressed.

5. In a musical instrument of the class described, the combination of a key, a string, damping mechanism controlled by the key for striking said string, a damper member of bell shape pivoted at its elbow, means engaging one arm of said damper for causing the other arm thereof to engage with the corresponding string, and an arm extending from said key for engaging with said damper to swing it to release the key when the key is depressed.

6. In a musical instrument of the class described, the combination of a rear supporting shelf, a plurality of keys pivoted on said shelf and extending forwardly therefrom, a front shelf, a plurality of brackets secured on said front shelf, hammer structures hinged at their front ends to said bracket members and extending rearwardly, a spring secured on each bracket at one end and engaging at its other end with the respective hammer structure to hold said hammer structure normally in upper position, an abutment projection on each hammer structure, a stud on each key for coöperating with said abutment projection to effect depression of the hammer structure when the key is depressed, and strings arranged to be struck by the depressed hammer structure.

7. In a musical instrument of the class

described, the combination of a rear supporting shelf, a plurality of keys pivoted on said shelf and extending forwardly, a front shelf below the front ends of said keys, hammer structures pivoted on said front shelf, an abutment projection on each hammer, a stud extending from the corresponding key to engage with said projection to cause depression of the hammer when the key is depressed, a spring secured at one end to said front shelf, there being one spring for each hammer, said hammers having longitudinal grooves in their lower sides for receiving the front ends of the respective springs, said springs tending to hold said hammers in upper position when the keys are up, and strings positioned below said keys to be struck by said hammers.

In witness whereof, we hereunto subscribe our names this 12th day of November, A. D. 1919.

JOSEPH N. VASEY.
BERNARD R. KIESSIG.