

Nov. 2, 1926.

1,605,304

J. N. VASEY

MUSICAL INSTRUMENT

Original Filed July 7, 1922

Fig. 1.

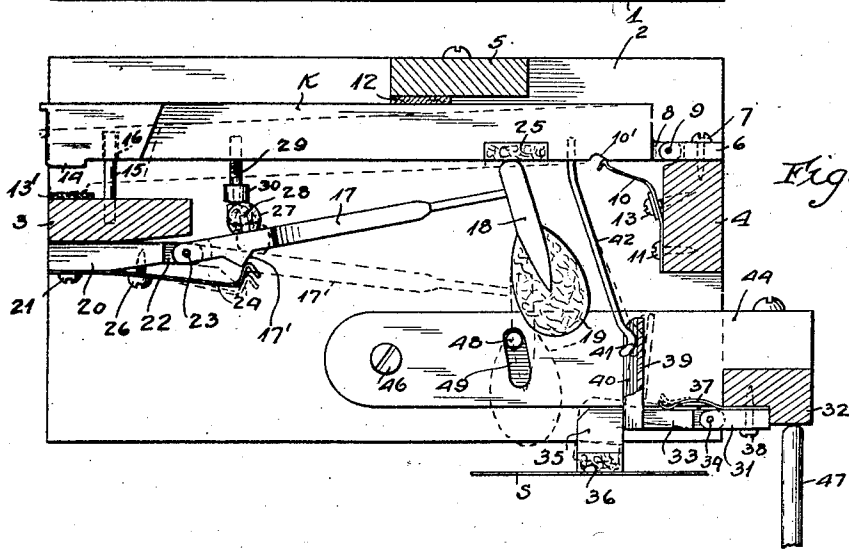
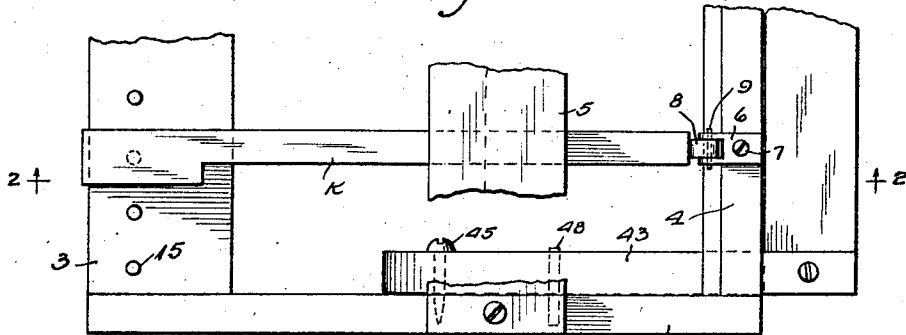


Fig. 2.

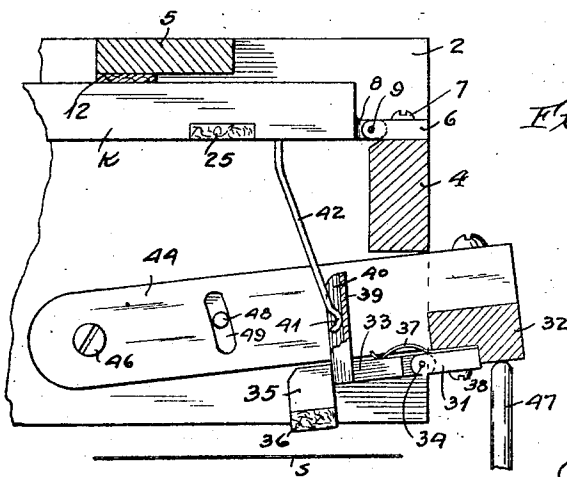


Fig. 3.

Inventor,
Joseph N. Vasey
By Charles J. Schmidt
Att'y.

UNITED STATES PATENT OFFICE.

JOSEPH N. VASEY, OF BROOKFIELD, ILLINOIS.

MUSICAL INSTRUMENT.

Application filed July 7, 1922, Serial No. 573,363. Renewed March 6, 1926.

My invention relates to musical instruments, particularly to improved key controlled string striking mechanism for use in juvenile instruments such as pianos.

5 One of the important objects of the invention is to provide striking mechanism which is sensitive and responsive to the touch on the keys and which can be readily and accurately adjusted. Another important
10 object of the invention is to provide improved individual damper mechanisms which are released from the strings upon striking of the respective keys, together with
15 a common means for simultaneously raising all of the individual damper mechanisms from the strings when it is desired to sustain the tones after striking of the keys. Another important object is to so simply
20 the construction that the apparatus can be inexpensively manufactured and yet at the same time be practical and highly efficient.

The various features of my invention are incorporated in the apparatus shown on the accompanying drawing, in which—

25 Figure 1 is a plan view of one end of the mechanism,

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

30 Fig. 3 is a sectional view showing the individual damper supporting structure in raised position.

The supporting framework for the keys and operating and controlling parts comprises the side walls 1 and 2, the front abutment and supporting shelf 3, the rear bar 4, and the top bar 5, the shelf and bars extending between the side walls 1 and 2. I have shown only one key, namely a white key K of the keyboard, it being understood
35 that black keys are also used and that a hammer structure and damper mechanism is associated with each key.

The keys are all hinged at the rear end from the bar 4. For each key is provided
45 a pivot bracket 6 detachably secured on top of the bar by a screw 7 and bifurcated at its front end to receive the tail piece 8 of the respective key, a hinge pin 9 extending through the tail piece and bracket as clearly shown in Fig. 1. Below each key is a flat
50 leaf spring 10 which is secured at its lower end against the front of the bar 4 as by the screw 11, the upper end of the spring deflecting forwardly and engaging against the under side of the respective key, the

spring tending to hold the key upwardly in horizontal position and in abutment against the bar 5, a strip of abutment felt 12 being provided on the under side of the bar to deaden the sound of impact. To ad-
60 just each spring 10 a screw 13 extends there-through and threads into the bar 4, tightening of a screw drawing the spring above its anchored end toward the bar to increase
65 the pressure of the outer end of the spring against the key, and loosening of the screw permitting relaxation of the spring to reduce its pressure against the key.

The keys at their front ends terminate over the shelf 3 which is provided with a
70 strip 13' of abutment material such as felt or leather which receives the abutment ridges 14 at the under sides of the keys when depressed. When the keys are de-
75 pressed they abut against the shelf and the keys are guided and held in horizontal alignment by pins 15 secured in and extending upwardly from the shelf and engaging in pockets 16 provided in the keys.

Below each key and parallel therewith is
80 a hammer structure comprising a rod 17, a head 18, and the felt end or facing 19 for striking one of the strings s which are extended below and parallel with the ham-
85 mer structures. The hammer structures are hinged at their front ends, a supporting bracket 20 being provided for each structure and secured against the under side of the shelf 3 by a screw 21. The rod 17 of each
90 hammer structure is bifurcated at its front end to receive the tongue 22 on the respective bracket, the hinge pin 23 being provided which extends through the bifurcated end and tongue. Secured at its front end
95 against the under side of each bracket 20 is a flat leaf spring 24, the spring being secured by the screw 21 which also secures the bracket to the shelf 3. The inner end of each spring engages against the under
100 side of the respective hammer structure rod 17, the purpose of the springs being to hold the hammer structure normally upwardly with the heels of the heads 18 against the felt or leather abutment inserts 25 at the
105 bottom of the respective keys. These springs 24 thus assist the springs 10 in normally holding the keys up against the bar 5 and in resisting downward pressure on the keys. To adjust the pres-
110 sure of the springs 24 against the keys

an adjusting screw 26 is provided for each spring which extends through the spring intermediate its ends and threads into the respective bracket 20. By tightening the
 5 screw the pressure of the spring against the key is increased and by loosening the screw the pressure is diminished.

On each hammer structure near its hinged end is an abutment block 27 of leather, felt,
 10 or other suitable material. The block shown is cylindrical and held in place by a pin 28 extending upwardly from the rod 17. Above each abutment the corresponding key has a screw 29 adjustably threaded therein
 15 and extending downwardly and terminating in an abutment head 30 for cooperating with the abutment block 27. With this arrangement when a key is struck the hammer structure is thrown downwardly to strike the
 20 corresponding string *s*. In Fig. 2 the dotted lines show the positions of the parts after a key has been pushed down and the hammer structure has recoiled after striking the string. When a key is struck the hammer
 25 structure is thrown downwardly, its abutment block leaving the abutment head 30 while the hammer felt 19 strikes the string, and after striking of the string the spring 24 immediately raises the hammer structure
 30 away from the string and holds it with its abutment block against the abutment head until the key is released, whereafter the parts return to their normal upper positions indicated by the full lines. The engagement
 35 of the abutment head 30 along the cylindrical surface of the abutment block 27 as the key is depressed prevents the hammer structure from being thrown down too suddenly and permits it to be thrown easily or heavily
 40 against the string as desired. The abutment connection, together with the springs 24 and 10 when properly adjusted, affords a very sensitive and responsive touch for the keys.

With each string a damper mechanism is associated and normally held against the string to dampen it. These damper structures are automatically controlled upon depression of the respective keys to be raised
 50 to release the strings so that they may be sounded by the hammer structures. Each damper mechanism is supported on a bracket 31 and the brackets are secured side by side against the under side of a bar 32. Each
 55 bracket is bifurcated at its front end to receive the rear end of the rod 33 of the damper mechanism, a hinge pin 34 extending through the rod and bracket end. At the front end of each rod is a head 35 having
 60 the pad 36 of felt or leather on its under side for engaging with the respective string. A flat leaf spring 37 is provided for each damper mechanism and is secured at its rear end between the respective bracket and the
 65 bar 32, a screw 38 serving to hold the bracket

and spring in place. Each spring at its front end engages against the top of the respective rod 33 and tends to hold the padded head against the string. On each
 70 rod is a vertical arm 39 having the groove 40 in which engages the curved end 41 of a wire finger 42 extending downwardly from the respective key. When the keys are up the fingers 42 release the arms 39 so that the
 75 damper structures may engage with and dampen the strings. However, when a key is struck its finger 42 swings rearwardly against the arm 39 and raises the respective damper structure against the force of its
 80 spring 37 to release the string while it is struck by the hammer structure. The strings are thus automatically freed from their damper structures when the respective keys are struck and as soon as the keys are
 85 restored to upper position the damper structures are reengaged with the strings to dampen them.

I preferably provide means for simultaneously raising all of the damper structures from the strings when it is desired to play loud and to sustain the tone after striking and releasing of the keys. As shown I
 90 support the bar 32 at the rear ends of arms 43 and 44 which engage respectively against the inner sides of the end walls 1 and 2 and are hinged at their front ends on screws or pins 45 and 46, respectively, extending from
 95 the side walls 1 and 2. Vertical rods 47 connected with suitable pedal mechanism (not shown) engage at their upper ends against the side of the bar 32 so that when the pedal is depressed the rods 47 will be raised and the arms swung upwardly to
 100 raise the bar 32 and with it all the damper structures, from the strings, as indicated in Fig. 3. During such simultaneous raising of the damper structures their vertical arms 39 will still engage against the fingers 42 so
 105 that the springs 37 cannot throw the damper structures down. When a key is struck the respective damper structure is free to swing relative to the bar 32 but when the key is restored to normal position the damper structure is still prevented from damping
 110 the string by virtue of the raised bar 32.

The weight of the bar 32 and the arms 43 and 44 is communicated by the springs 37 to the damper structures and these structures are thus kept in secure damping engagement with the strings while the keys are up. To
 120 limit the application of the weight of the bar and arms to the damper structures stop pins 48 are provided which extend through the slots 49 in the arms 43 and 44. The felt damper pads 36 permit the supporting bar
 125 32 to move down until the pins 48 abut against the upper ends of the slots. The slots are elongated so that the arms 43 and 44 may be swung upwardly when it is desired to remove all of the damper structures from
 130

the strings. The upward movement of the arms is limited by their engagement with the bar 4.

It is very desirable to have the keys respond accurately and efficiently to a light touch of the fingers thereon. Downward movement of the keys is resisted by the flat springs 24 and 10, and the resistance of the springs increases with their flexure. To make the spring resistance more uniform I provide the inclined engagement surface 17' on each hammer bar 17 for the corresponding spring 24, and an inclined engagement surface 10' on each key for the corresponding spring 10. When a key is depressed the corresponding springs, by traveling along the inclined surfaces, will not be flexed to any considerable extent and their resistance to depression of the keys by the fingers will be practically uniform.

I thus produce a simple, sensitive and reliable action for controlling the sounding of strings of musical instruments. The sensitiveness can be easily and readily adjusted for by means of the springs 10 and 24. The damper structures which normally respond individually when the keys are struck may be raised simultaneously and their degree of damping controlled by pressure on a foot pedal which causes raising of the bar 32.

I do not desire to be limited to the exact construction, arrangement and operation shown and described as modifications are possible which would still come within the scope of the appended claims.

I claim as follows:—

1. In a musical instrument of the class described, the combination of a row of keys, strings below said keys, striking mechanisms between said keys and strings, a supporting bar, individual damper structures hinged to said bar, connections between said damper structures and said keys for raising said damper structures from said strings when the keys are depressed, and means for raising said bar to simultaneously raise all of said damper structures from the strings.

2. In a musical instrument of the class described, the combination of keys, strings below said keys, string striking mechanisms between said keys and strings, a supporting bar, individual damper structures hinged from said bar and engaging with the respective strings, means controlled by depression of the keys for raising the corresponding damper structures from the strings, and means for raising said supporting bar to simultaneously disconnect all said damper structures from said strings.

3. In a musical instrument of the class de-

scribed, the combination of keys, strings, striking mechanisms between said strings and keys, a supporting bar, individual damper structures hinged on said bar, connections between the individual keys and the corresponding damper structures for raising said structures from said strings when the keys are depressed, hinged arms to which said supporting bar is secured, and means for swinging said arms to raise said bar to thereby lift all of said damper structures from said strings.

4. In a musical instrument of the class described, the combination of strings, keys above said strings, striker mechanisms between said keys and strings, a damper structure for each string, a supporting bar to which said damper structures are hinged, springs tending to press said damper structures against said strings, fingers extending from said keys for cooperating with the respective damper structures to swing them away from the strings when the keys are depressed, and means for raising said supporting bar to simultaneously raise the damping structures from said strings.

5. In a musical instrument of the class described, the combination of a lever forming part of a string sounding train, said lever being hinged at one end, a flat spring secured at its outer end and extending with its inner end below said lever, a formation on said lever providing a surface against which the inner end of said spring presses, said surface being inclined to the direction of swing of said lever at an angle to maintain engagement of said surface with said spring when the lever is depressed but to prevent material flexure of said spring whereby the pressure of said spring against said lever will be maintained uniform during operation of the lever.

6. In a musical instrument of the class described, the combination of a key, a string, a string striking lever between said string and key, said lever being hinged at one end, a flat spring secured at its outer end and extending with its inner end under said lever, said lever having a slot providing a surface to be engaged with pressure by the inner end of said spring, said surface being inclined to the direction of swing of said lever at an angle to prevent material flexure of said spring when the lever is swung downwardly whereby to maintain uniform resistance of said spring when said lever is operated.

In witness whereof, I hereunto subscribe my name this 26th day of June, A. D., 1922.

JOSEPH N. VASEY.