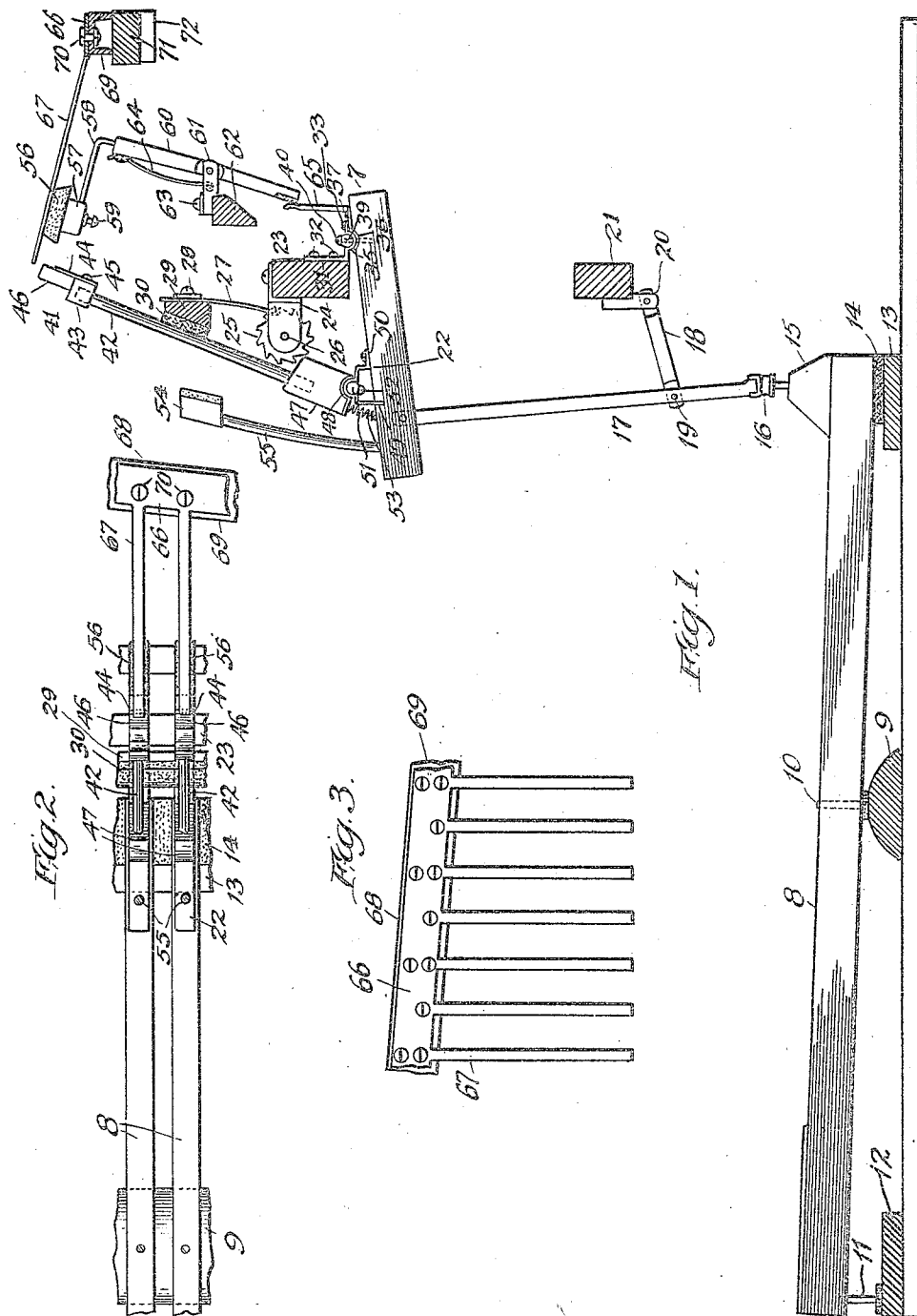


950,794.

M. NOETH.
PIANO WITHOUT STRINGS.
APPLICATION FILED JUNE 10, 1907.

Patented Mar. 1, 1910.
2 SHEETS—SHEET 1.

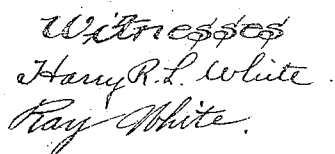


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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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PIANO WITHOUT STRINGS.

950,794.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed June 10, 1907. Serial No. 378,046.

To all whom it may concern:

Be it known that I, MICHAEL NOETH, citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pianos without Strings, of which the following is a full, clear, and exact specification.

My invention relates to improvements in pianos without strings and has for its prime object generally, the adaptation of the principal parts thereof to and for the operation of the teeth of a musical comb by keys corresponding with those of the keyboard of a piano forte, both in operation and arrangement.

A further object of my invention is to vibrate the teeth of a musical comb by a picker corresponding in its general construction and arrangement to the body of the ordinary piano hammer, which when actuated through the medium of a piano key, shall pick the free ends of the teeth of the comb in substantially the same manner that the ends of the fingers and nails of a person are utilized to pick the strings of such instruments as the banjo, guitar, etc.

Another object of my invention is to provide means whereby the picker, after picking a tooth, is positively maintained from contact therewith, until it has returned to the position which it must have to again pick the teeth.

A further object of my invention is to impart to the picker, a picking action and after such action, direct it to its normal operative position by means of successively moving devices, actuated by the picker-stem.

Further objects of my invention are to provide the several teeth with dampers actuated through the medium of the actuating devices for the picker, and primarily by the key, to provide the picker and also the supports for its rotatable devices with anti-friction bearings which are adjustable for the purposes of their adjustment and after a time, taking up wear.

With these ends in view, my invention consists in certain features of novelty in the construction, combination and arrangements of parts, by which the said objects and cer-

tain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In said drawings: Figure 1 illustrates in side elevation an action and a musical comb, in full lines, with the several rails therefor in cross-section and the picker in its operative position in line with its comb tooth. Fig. 2 is an enlarged top-plan view of the same with the outer end of the keys broken off and in a detail showing two of the teeth of the comb. Fig. 3 is a plan view of a portion of the comb showing the graduation of the teeth. Fig. 4 a detail top-plan view of the adjustable bearing and support for the picker. Fig. 5, a bottom-plan view thereof with the hammer-rail shown in cross-section. Fig. 6 a side elevation of the movement with the picker at the extreme end of its upper stroke and in the position it assumes after picking a tooth and just before it descends to its normal operative position. Fig. 7, a vertical section of the adjustable bearing and support for the picker.

Similar characters of reference indicate the same parts in the several figures of the drawing.

8 indicates a piano key fulcrumed on the convex-bar 9 by a pin 10 projecting therefrom and maintained in alinement by a pin 11 projecting from a bar 12 through the key, the depression of the rear end of which key is limited by a bar 13 between which and the key is a cushion 14, all of which parts are of the construction and operate in the same manner as is now common in pianos. On the end of the key is the usual lug 15 supporting from the bar a capstan screw 16 in turn supporting the abstract 17, the movement of the abstract being limited by a link 18 pivoted to the abstract at 19 and to a lug 20 depending from a link-rail 21.

The upper end of the abstract of each key, however many there may be, is pivoted toward the forward edge of a wippen or jack lever 22, which toward its rear end is hinged to a rail 23 which forms the support by means of a bracket 24 for a series of rotatable devices 25 on a shaft or pin 26 supported by the bracket 24, the movement of

which levers 25 is limited to one direction by means of a spring pawl 27 secured by a screw 28 to the check-rail 29, limiting the rearward movement of the picker and between which and the check-rail is a cushion 30.

The hinge connection and bearing between the wippen 22 and rail 23 (see Figs. 4, 5 and 7) consists of an angle plate 31, one arm of which is secured to the rail 23 by screws 32—32 or other suitable means, and has in its projecting-arm 33, a transverse slot 34 extending from the arm 31 through its outer edge. Transversely of said slot is a concavo-convex bearing 35 engaging on its under side in a concave-bearing 36 in a plate 37 secured to the wippen 22 by one or more screws 38, the concave portion of the arm 33 in turn forming a bearing for a cylinder 39 provided with a perforation, through which and through the slot 34 in the convex-bearing 35 and a corresponding slot in the plate 37 and into the wippen 22, is passed a screw 40, the function of which screw is to adjust and after a time take up wear in the opposing arms of the hinge connection.

Projecting above the wippen 22 is a picker 41 mounted upon a picker-stem 42 to the inner side of which or to an enlargement 43 thereon is secured a metal-plate 44 by means of a screw 45 or other fastening which is preferably brass to reduce wear upon the picker-tooth and which is provided on its forward side with a cushion 46 rising in a plane slightly above that of the upper edge of the plate 44. The lower end of the picker-stem 42 or of an enlargement 47 thereon, is provided with a concavo-convex plate 48 secured thereto, which opposes a correspondingly formed portion fitting therein, of a plate 49, one end of which is secured to the wippen 22 by a screw 50 and the other end of which projects into a cross-cut in said wippen as clearly shown in Fig. 1. Bearing against the under side of the plate 47 is a cylinder 51, through which and opposing slots in the plates 48 and 49, passes a screw 52 for adjusting the bearing thus formed and to take up wear, the only difference between the construction of this adjustable bearing for the picker-arm and that for the wippen is that necessary to conform it to the difference in position and operation of the picker-stem as compared with that of the wippen, and for accessibility to the adjusting screw 52, by loosening the screw 50 and either turning or lifting the plate 49 out of the cross-cut when for any reason adjustment is desirable or necessary.

The purpose in elevating the bearing for the lower end of the picker-stem is to provide space for the interposition and operation of a coiled-spring 53 between the end of

the picker-stem and the wippen 22 for automatically actuating the picker to contact with the cushion 30 and normally maintain the picker when at rest on a line inwardly from the point of the opposing comb tooth.

The movement of a picker away from its tooth is limited by a stop 54, the stem 55 of which is secured in the wippen 22 which check is of the usual construction.

Opposing each comb tooth is a damper 56 mounted upon a block 57 removably and adjustably sleeved on a bent rod 58 by a set-screw 59, which projects into and is secured to a lever 60 pivoted to a lug 61 projecting from the damper-rail 62, to which the lug 61 is secured by means of a set-screw 63, the damper being maintained normally in contact with the tooth by means of a curved spring 64, one end of which is secured to the lug 61 or the damper bar, with its free end pressing the lever 60 near its upper end. The lower end of the lever 60 projects in the path of movement of the spoon 65 secured in and projecting from the wippen 22 and in such relation thereto that immediately the picker 46 engages the tooth, the damper moves away from the tooth out of the path of its vibrating movement until, by the action of the key, the wippen moves away from and then downwardly to its normal position releasing the lever 60 from the spoon 65 and thereby permitting the spring 64 to perform its operation of forcing the damper against its tooth.

In its normal operative position, the picker-stem rests against the check-rail cushion 30 in which position the picker opposes the tooth at a point slightly inwardly of its free end, and its stem is engaged by one of the rotatable devices 25, so that when the key is depressed, and the picker is thereby caused to rise to contact with the comb tooth, the rotatable device next below forces the picker away from the tooth immediately after its contact therewith. The picker stem remains in its elevated position away from the comb until the key is released when it descends by gravity to the limit of its downward stroke and then moves inwardly to its normal position as above described. As the picker recedes toward its depressed position it is maintained by one of the rotatable devices from contact with the tooth, but after the picker has passed to a plane below its tooth, it is then moved inwardly beneath the tooth by the action of the spring 53, when it will be moved thereby into engagement with the rotating device next below that which had just pushed it from engagement with the tooth, the movement of the picker away from the tooth being limited by the stop 54.

It will be observed that the rotating devices are rotated in but one direction owing

to the operation of the spring pawl 27, and that such a movement is essential, not only in order that after one of the rotating devices has moved the picker to contact with
 5 and away from the comb, but that the next rotating device will be moved to a position to repeat that operation, and without there being any lost motion between the picker and the rotating devices. Again if it were
 10 not for this action of the pawl, the weight of the descending picker would depress the device below the plane necessary for engagement with the picker-stem, and as a result, the next preceding rotating device
 15 would not be in a position to force the picker away from contact with its tooth.

While I regard at present the circular arrangement of the rotatable devices in the form of a toothed-wheel as the best means
 20 for the embodiment of that portion of my invention by which the picker is moved from contact with its tooth and thence above and away from the tooth, my invention is not limited to that particular form
 25 or arrangement nor to the number of the rotating devices shown, so long as they are in sufficient number to so move to contact with and maintain the picker away from the comb to successive engagement there-
 30 with, nor to the movement of the said devices in a circular or other path, nor to the means and connections by which the damper is actuated, for such means and constructions may be varied to the same extent they are
 35 now varied in piano forte actions..

As will be seen by reference to Figs. 1, 2 and 3, the comb 68 is formed from a sheet of metal cut out so as to form the back 66
 40 and teeth 67, the comb being secured for vibrating purposes to a channel-iron 69 by means of nut bolts 70, which channel-iron is supported on its ends, by blocks 71 which may be secured to the case of the piano by means of suitable brackets 72.

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

1. A piano without strings comprising in combination a musical comb, an action having
 50 pickers, means for moving said pickers to contact with the comb, and rotatable devices shifting the pickers from contact with the comb, substantially as described.

2. A piano without strings comprising in
 55 combination a musical comb, an action having pickers, oscillating wippens supporting said pickers, a rail, the wippens hinged to the rail and rotatable devices supported by said rail and adapted to move the pickers,
 60 substantially as described.

3. A piano without strings comprising in combination a musical comb, an action having
 pickers for operating said comb, oscillating wippens, adjustable bearings support-

ing the pickers, springs moving the pickers 65 along a line intersecting the comb, and rotatable devices for shifting the pickers from engagement with the comb, substantially as described.

4. A piano without strings comprising in 70 combination a picker, a pivotal support therefor, a musical tooth opposing said picker, means for raising the picker to picking engagement with said tooth and a rotating device maintaining the picker from 75 contact with the tooth after the picking operation, substantially as described.

5. A piano without strings comprising in combination a picker, a pivotal support therefor and an opposing musical comb, 80 means for raising said picker to engagement with a tooth thereof, a rotating device moving said picker laterally and maintaining the picker from contact with a tooth during its downward movement away from 85 the tooth, substantially as described.

6. A piano without strings comprising in combination a picker, means for elevating and depressing said picker, an opposing musical comb, a revolving toothed-wheel en- 90 gaging and moving said picker laterally away from said comb and a hinged support for said wheel, substantially as described.

7. A piano without strings comprising in combination a musical comb, a pivoted 95 picker, means for elevating said picker to contact with and depressing it below said comb, a toothed-wheel engaging said picker and actuating it laterally away from the comb and means by which said wheel is 100 prevented from revolving in more than one direction, substantially as described.

8. A piano without strings comprising in combination a musical comb, pickers, means for moving said pickers to contact with the 105 comb, rotatable devices actuated by the pickers for shifting the pickers from contact with the comb and means maintaining the pickers in the path of movement of the rotatable devices, substantially as described. 110

9. A piano without strings comprising in combination a musical comb, pickers, means for moving said pickers to contact with the comb, rotatable devices actuated by the pickers for shifting the pickers from contact 115 with the comb and stops maintaining the pickers in the path of movement of and in engagement with the rotatable devices, substantially as described.

10. A piano without strings comprising a 120 comb, pickers, means for moving said pickers to contact with the comb, rotatable devices actuated by the pickers for shifting the pickers from contact with the comb, and means maintaining the pickers in the path of 125 movement of the rotatable devices, substantially as described.

11. A piano without strings comprising a

comb, pickers, means for moving said pick-
ers to contact with the comb, rotatable de-
vices actuated by the pickers for shifting the
pickers from contact with the comb, and
5 stops limiting the movement of the pickers
away from the comb, substantially as de-
scribed.

In witness whereof, I have hereunto set
my hand and affixed my seal this fifth day of
June A. D. 1907.

MICHAEL NOETH. [L. S.]

Witnesses:

HENRY HAAG,
BELLE HAAG.