

(Model.)

2 Sheets—Sheet 1.

G. B. KELLY.

KEY BOARD ATTACHMENT FOR MUSICAL INSTRUMENTS.

No. 261,360.

Patented July 18, 1882.

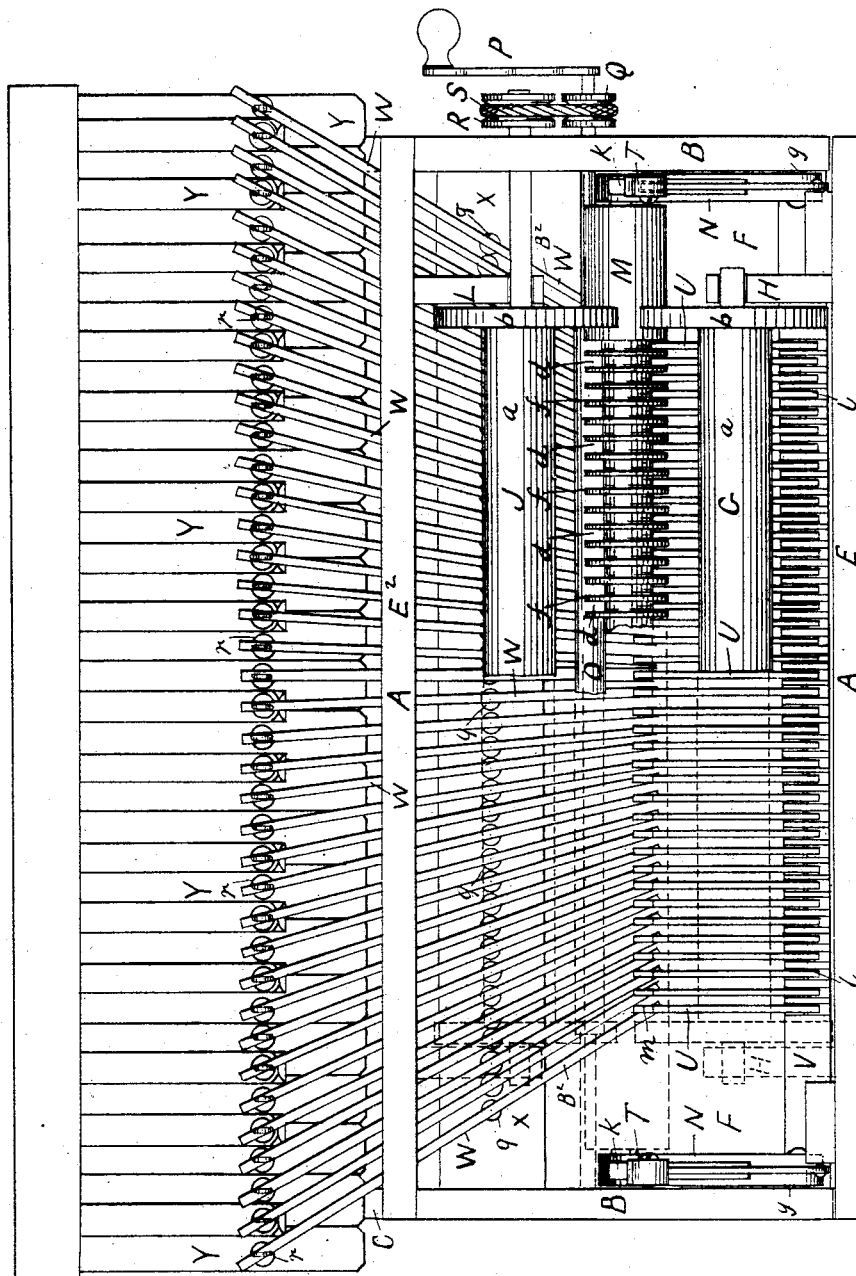


Fig. 1

WITNESSES.

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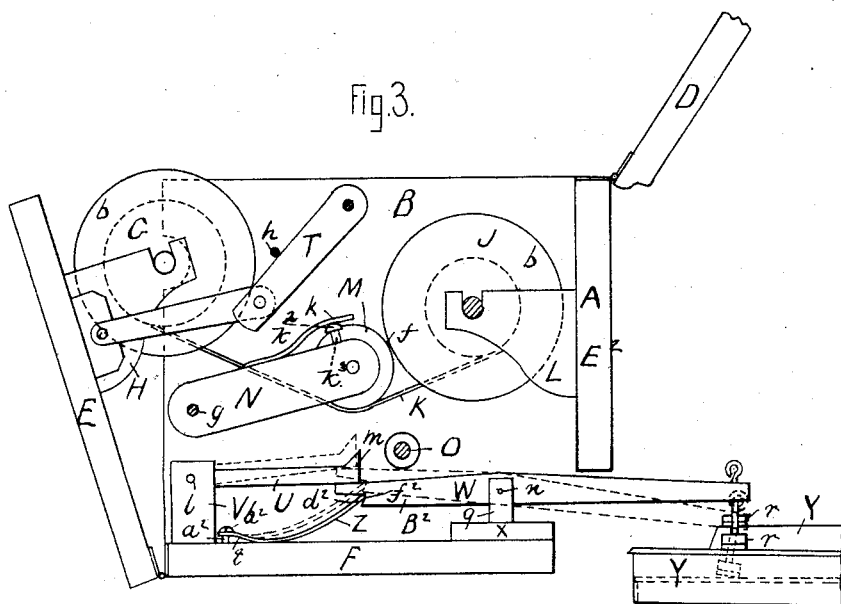
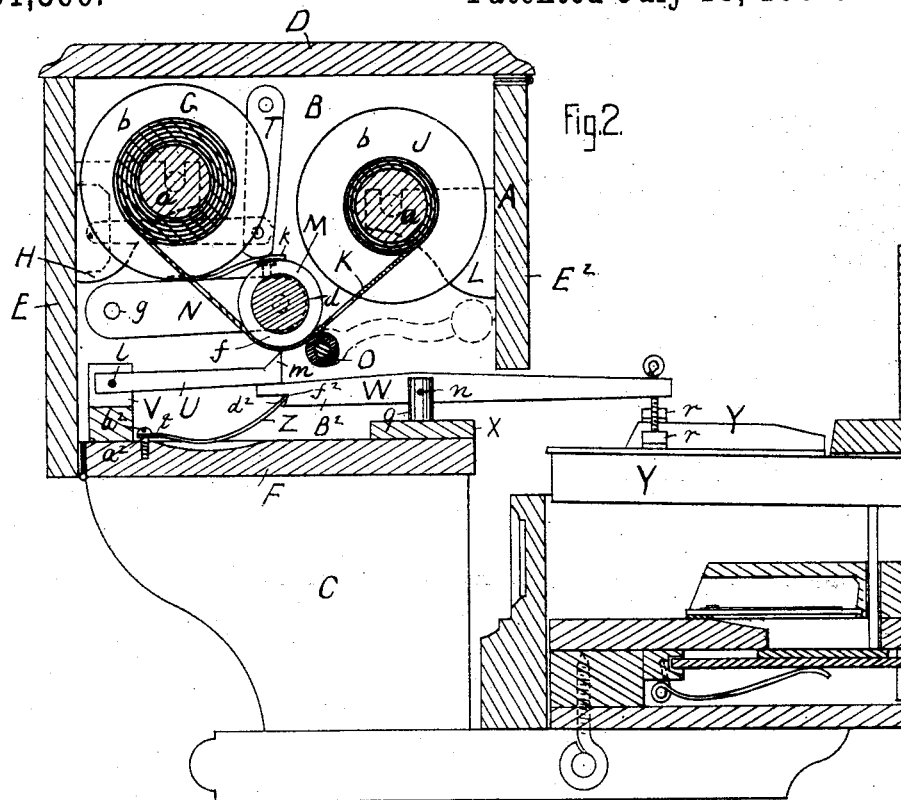
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# UNITED STATES PATENT OFFICE.

GEORGE B. KELLY, OF BOSTON, MASSACHUSETTS.

## KEY-BOARD ATTACHMENT FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 261,360, dated July 18, 1882.

Application filed April 10, 1882. (Model.)

*To all whom it may concern:*

Be it known that I, GEORGE B. KELLY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Key-Board Attachments for Musical Instruments, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in that class of attachments for musical instruments which consist essentially of a mechanical apparatus adapted to be readily secured to or removed from the key-board of the musical instrument, and provided with the following elements—viz., a series of spring-actuated hammers, each adapted to vibrate about a fulcrum and to strike against or to depress one of the keys of the instrument, a strip or sheet of flexible material having a series of rows of perforations arranged to represent the different notes of a tune, and a mechanism for feeding said music-sheet in proper relation to the hammer-levers to secure mechanically from the hammer-levers the striking or depression of the keys in accordance with the perforations of the music-sheet. In these attachments the hammer-levers, either directly or indirectly, bear upon the unperforated portions in line with the rows of perforations and enter into the perforations of the music-sheet, according as one or the other of the same comes into position from the travel of the music-sheet, and all because of the spring-pressure upon the hammers. As heretofore arranged, the spring-pressure of the hammers is the greatest when the hammers are at their bearing upon the unperforated portions and the least when they are in the perforations of the music-sheet, and as a consequence there is great friction upon and wear of the unperforated portions of the music-sheet, requiring for protection a music-sheet of considerable thickness and hardness, and more especially when the surface used to confine the music-sheet in its proper relation to the spring-hammers is recessed for the entrance therein of the spring-hammers, which arrangement is considered advantageous and desirable.

One object of this invention is to overcome this great pressure of the hammer-levers upon the unperforated portions of the music-sheet

and to reduce it to the minimum, and at the same time obtain all the necessary pressure upon the hammer-lever when perforated portions of the music-sheet are in proper position therefor; and to that end this invention consists in a disposition of each spring in relation to its hammer-lever to press thereon in a manner that such pressure will be the lightest or at its minimum when the hammer-lever is at rest upon an unperforated portion of the music-sheet and will be capable of immediate action with its greatest or maximum power when a perforation of the music-sheet comes in proper position therefor.

This invention also consists in other arrangements and combinations of parts constituting the present key-board attachment for musical instruments, all of which will hereinafter be fully described.

The invention is illustrated in the accompanying plates of drawings.

In Plate 1, Figure 1 is a plan view of a key-board to a reed-organ and of the present attachment therefor, which is shown as cased, but the top of the casing removed and in some of its parts broken away for better illustration of all its parts. In Plate 2, Fig. 2 is a cross-vertical section through the attachment and sufficient parts of the reed-organ and its key-board to illustrate the operation of the attachment in connection therewith. Fig. 3 is an elevation at one end of the attachment with the end pieces of its casing removed.

In the drawings, A represents a case which is to be adapted in any suitable manner to be readily secured to and removed from the key-board of a musical instrument, such as an organ, melodeon, piano-forte, &c.

The case A is substantially of rectangular shape, and it has at each end piece, B, a bracket-arm, C, for convenience in attaching it to the instrument, a hinged top or cover, D, and one, E, of its side pieces, E E', hinged at its lower edge to the bottom board, F.

G is a horizontal music-roll, hung by end journals in notched bearings of bracket-arms H on inside of hinged side E of the case A, all for easy insertion and removal of the roll.

J is a horizontal take-up roll for the perforated music-sheet K.

The take-up roll J is hung by end journals

in notched bearings of bracket-arms L on inside of stationary side E<sup>2</sup> of the case A, all for easy insertion and removal of the roll.

Each roll G and J is made of a barrel, *a*, which has a head, *b*, at each end, and between these heads the rolls are of equal length and a length equal to the width of the music-sheet.

The hanging brackets H L for the rolls G J are arranged for the music-sheet K to travel from one roll to the other in a direct and straight line when such sheet is drawn from the music-roll and wound upon the take-up roll, as will hereinafter appear.

M is a presser-roller, which has a series of equidistant parallel circumferential grooves or recesses, *d*, and flanges, *f*. The several grooves are of similar shape and size, as also the several flanges, and the grooves correspond in position to the parallel and equidistant rows of perforations and the flanges to the unperforated portions of the music-sheet as the music-sheet is drawn from the music-roll and wound upon the take-up roll. This presser-roller is horizontal, and it is hung by its end journals on horizontal arms N, which are arranged to swing upon center pins, *g*, of the ends B, located near the hinged side E of the case A, and the presser-roller itself is between and below the bearings for the music and take-up rolls, and when in operation it bears by its several flanges, *f*, along the length of a horizontal feed-roller, O.

The feed-roller is located below and at one side of the axis of the presser-roller M, toward the axis of the take-up roll J, and it turns in bearings of the ends of the case A, from which it projects, and is there provided with a winch or hand-crank, P, for convenience in turning it, and through pulley-wheels Q R and belt S, or other suitable mechanism, thereby turning the take-up roll J, all in a manner to draw the music-sheet from the music-roll under and partially around the presser-roller M and between it and the feed-roller and wind it upon the take-up roll.

T T are toggle-jointed levers connecting the hinged side E with the ends B of the case A, and arranged so that when the side E is closed one arm of each will press upon the upper edge of the carrying-arms N for the presser-roller in a manner to confine, through such roller, the music-sheet in close contact with the feed roller O; and when the side E is opened said downward pressure upon the arms N will be relieved, and thus the presser-roller left free to be lifted from and above the feed-roller by the music-sheet which is under it, as the hinged side E swings open, carrying with it the music-roll G.

*h* is a stop-pin at each end B of case A, and there arranged as an abutment for the toggle-levers T to limit the opening of the hinged side E.

*k k* are metal strips, each secured by one end to the upper edge of the carrying-arms for the presser-roller, their other ends extending up-

ward and resting upon a head, *k*<sup>2</sup>, of a screw, *k*<sup>3</sup>, screwing into the arms N, making bearings for the toggle-levers upon the presser-roller arms N, by which the presser-roller is held firmly against the music-sheet and feed-roller, the screw *k*<sup>3</sup> being turned to regulate such pressure.

U is a horizontal jack-lever, of which there are a series, arranged alongside of but separated from each other and to turn upon a common horizontal fulcrum-pin, *l*, of a fixed rail, V, which is grooved to receive each lever and is attached to the bottom F near the hinged side of the case. These jack-levers extend from the hinged side of the case toward the feed-roller, and are in line with and below the grooves of the presser-roller, and each jack-lever rests upon the upper edge at one end of a separate but similar horizontal hammer-lever, W, and each is in position for its upward-projecting wedge-shaped piece *m*, provided the presser-roller is against the music-sheet and feed-roller, to be capable of movement toward the under side of the music-sheet, and there to be entered into the perforations thereof and its proper groove of the presser-roller.

Each hammer-lever is of the first order, and the several hammer-levers turn upon a horizontal fulcrum-pin, *n*, of separate lugs *q*, all of which lugs are attached to a common fixed horizontal rail, X, of the bottom of the case.

The hammer-levers severally project beyond the stationary side E<sup>2</sup> of the case A, and at their outer ends each is provided with an adjustable tappet or button-head, *r*, through which to rest upon its proper key, Y, of the keyboard of a musical instrument—in the present instance shown as a reed-organ—all substantially as usual in attachments of the class to which this invention relates.

Z is a spring, made of a band or strip of metal, one for each hammer-lever W. Each spring rests by its notched end *t* against and interlocks with a fixed abutment-pin, *a*<sup>2</sup>, below head *b*<sup>2</sup> to the pin. These abutment-pins *a*<sup>2</sup> are all on the bottom board, F, and the end rest of all the springs Z against their pins *a*<sup>2</sup> is in a common plane and one below that of the fulcrum *n* of the hammer-levers W.

Each spring Z engages by its end *d*<sup>2</sup> with a notch, *f*<sup>2</sup>, in that end of its hammer-lever making the rest for the jack-lever, as has been described.

Each spring, arranged as above stated, is in a corresponding line or direction with its hammer-lever. Its length is greater than the distance between its said two points of connection in all positions of the hammer-lever under operation, which gives it a bow or curved shape from end to end, and thus a spring force or pressure to act upon the hammer-lever, and, again, it, with one arm of the hammer-lever, makes, as it were, a toggle-lever having three points of articulation—to wit, two which are fixed and one which is moving—and two arms—to wit, the spring Z and that portion B<sup>2</sup> of the

hammer-lever between its fulcrum and the spring—and obviously the spring will exert substantially and practically its minimum or least pressure upon the hammer-lever to swing it upon its fulcrum when the moving point of articulation is substantially and practically coincident with a line drawn through the two fixed points of articulation and its greatest or maximum pressure upon the hammer-lever to swing it upon its fulcrum when the moving point of articulation is at one side of and as it moves away from a line drawn through the two fixed points of articulation.

The several points of articulation of the hammer-lever and its spring, herein described, are to be arranged in such relation to each other and to the fulcrum of the hammer-lever, and, furthermore, to the bearing of the jack-lever upon an unperforated portion and its entrance into a perforation of the music-sheet and a groove of the presser-roller, that with a hammer-lever, by its jack-lever, at rest upon an unperforated portion of the music-sheet, the moving point of articulation between the spring and the hammer-lever will be then substantially coincident with a straight line drawn through the two fixed points of articulation, and that with a hammer-lever, by its jack-lever, at a perforation of the music-sheet, the spring will be then free to act upon the hammer-lever in a direction to throw the jack-lever upward into such perforations and into the corresponding groove of the presser-roller and to depress the tappet end of the hammer-lever with sufficient force against its key of the keyboard as to cause the depression of the key, and thus the opening of the valve of the reed thereto, if the musical instrument be a reed-organ, or the striking of the strings, if the musical instrument be a piano-forte, &c.

With a combination and arrangement of spring Z and hammer-lever W such as above described it is plain that the music-sheet is substantially and practically relieved of all pressure upon it while its unperforated portions are passing by the jack-lever U, or, in other words, the spring-pressure thereon is at its minimum in lieu of at its maximum, as has heretofore been the case, and as a consequence the wear of and friction upon the music sheet are in a great measure obviated, enabling sheets of quite thin and flexible material to be used. Again, it is evident that when perforations of the music-sheet come into position at the jack-levers the entrance of the jack-levers into the same is insured from the then action of the springs Z with their maximum pressure upon the hammer-levers, thereby securing the depression of the keys of the musical instrument to which the attachment is applied, and as a consequence the sounding of the note represented by such key.

The arrangement of the pressure-roller to be held in operating position by closing the hinged side E of the case A, and to be released from such operating position by opening said hinged

side, all as herein described, is important, for the reason that the music-sheet and roller can be placed in and out of operating position with readiness and certainty, and when they are out of operating position obviously the music-sheet which is in the attachment can be rolled from the take-up roll upon the music-roll, or vice versa, or can be detached and removed and another one inserted with ease and dispatch and without interference with the jack-levers U.

A stationary presser-bar may be substituted for the presser-roller, or a plain and smooth presser-surface may be used in lieu of either the grooved and flanged presser roller or bar, but obviously the grooving of the presser-surface is important, for it allows the hammer-levers to be given a throw of increased length irrespective of the thickness of the music-sheet.

The hammer-levers, obviously, may be readily adapted to bear of themselves directly upon the music-sheet in lieu of bearing on it through jack-levers, as has been described.

It is intended that the opening swing of the hinged side E of the case A is sufficient not only to raise the music-sheet from the jack-levers, as has been described, but also to place the music-roll in position to receive a crank-handle by which to conveniently turn it to wind a music-sheet upon it from the take-up roll.

The side E may be arranged to be opened and closed by sliding in a direct straight line in lieu of swinging upon hinges, as described, and the levers T can be attached to any other part of the case arranged to be moved. The rest or bearing for the toggle-levers upon the arms N may be solid and attached to the lever, or the lever itself may be enlarged at such point for the incline and proper bearing of the toggle-levers in lieu of the strips and screw-head, as described.

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

1. In a mechanical apparatus adapted to be attached to a musical instrument, the combination, with the perforated music-sheet arranged to travel through said apparatus, of a hammer-lever, W, and a spring, Z, which spring is arranged to bear upon the end of said lever so that the pressure of said lever upon the music-sheet will be the least when such bearing and the fixed end of said spring and the fulcrum of said lever are substantially in line with each other.

2. In a mechanical apparatus adapted to be attached to a musical instrument, the combination, with the perforated music-sheet arranged to travel through said apparatus, of a jack-lever, U, a hammer-lever, W, and a spring, Z, which spring is arranged to bear upon the end of said lever W so that the pressure of the lever W upon the music-sheet will be the least when such bearing and the fixed end of said spring and the fulcrum of said lever W are substantially in line with each other.

3. A presser roller or bar, M, attached to  
arms N, in combination with levers T, con-  
nected to a movable part of case A so that  
said arms N will be operated, as described, by  
5 the opening and closing movements of said  
movable part, substantially as and for the pur-  
pose specified.

4. In combination with the arms N, carry-  
ing presser roller or bar M, the toggle-levers  
10 T, arranged to bear upon a raised portion of

said arms N, substantially as and for the pur-  
pose specified.

In testimony whereof I have hereunto set my  
hand in the presence of two subscribing wit-  
nesses.

GEORGE B. KELLY.

Witnesses:

EDWIN W. BROWN,

WILLIAM S. BELLOWES.