Feb. 20, 1951 A. P. BROWN 2,542,306

PIANO ACTION

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Fig. 1.

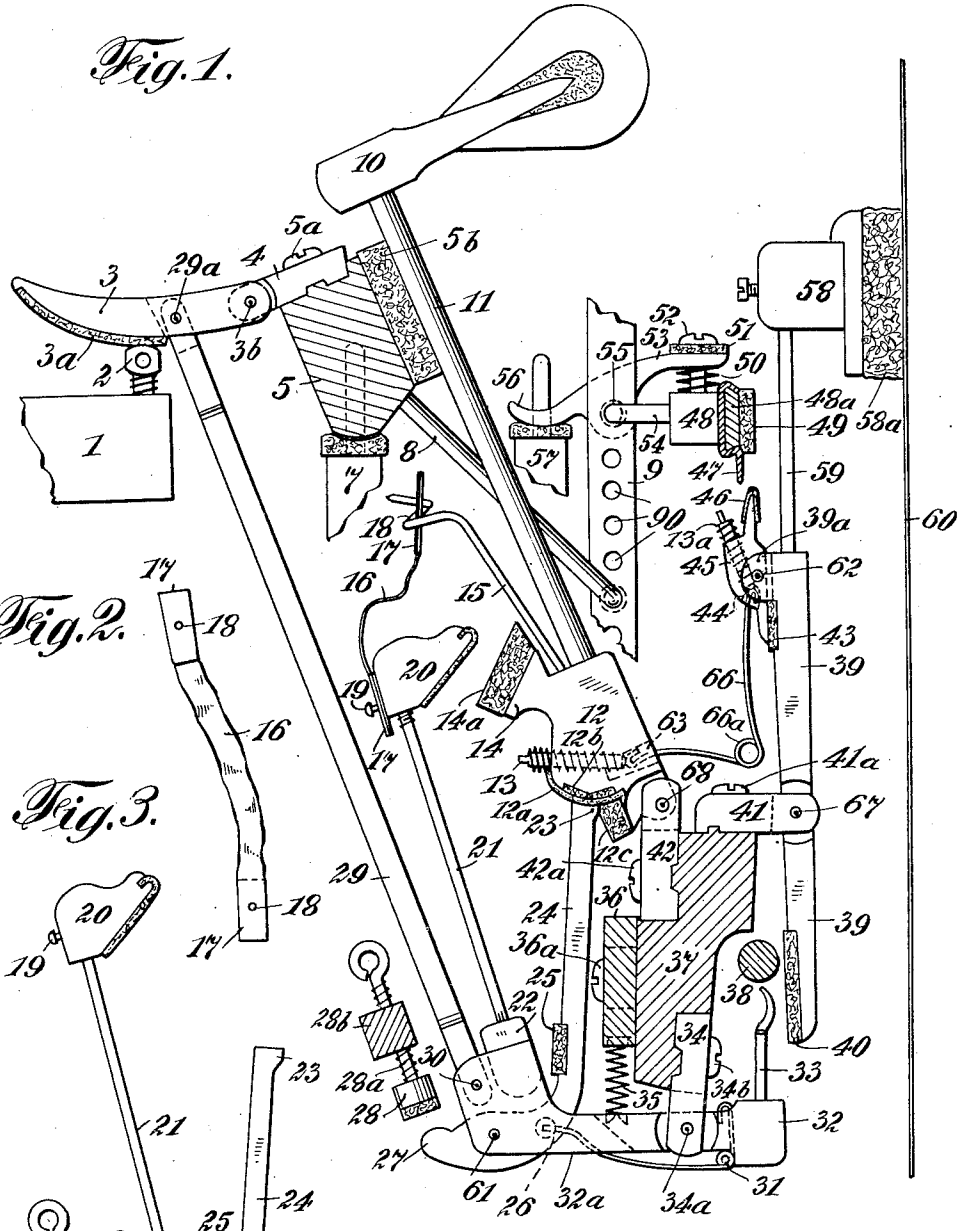


Fig. 2.

Fig. 3.

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Fig. 4.

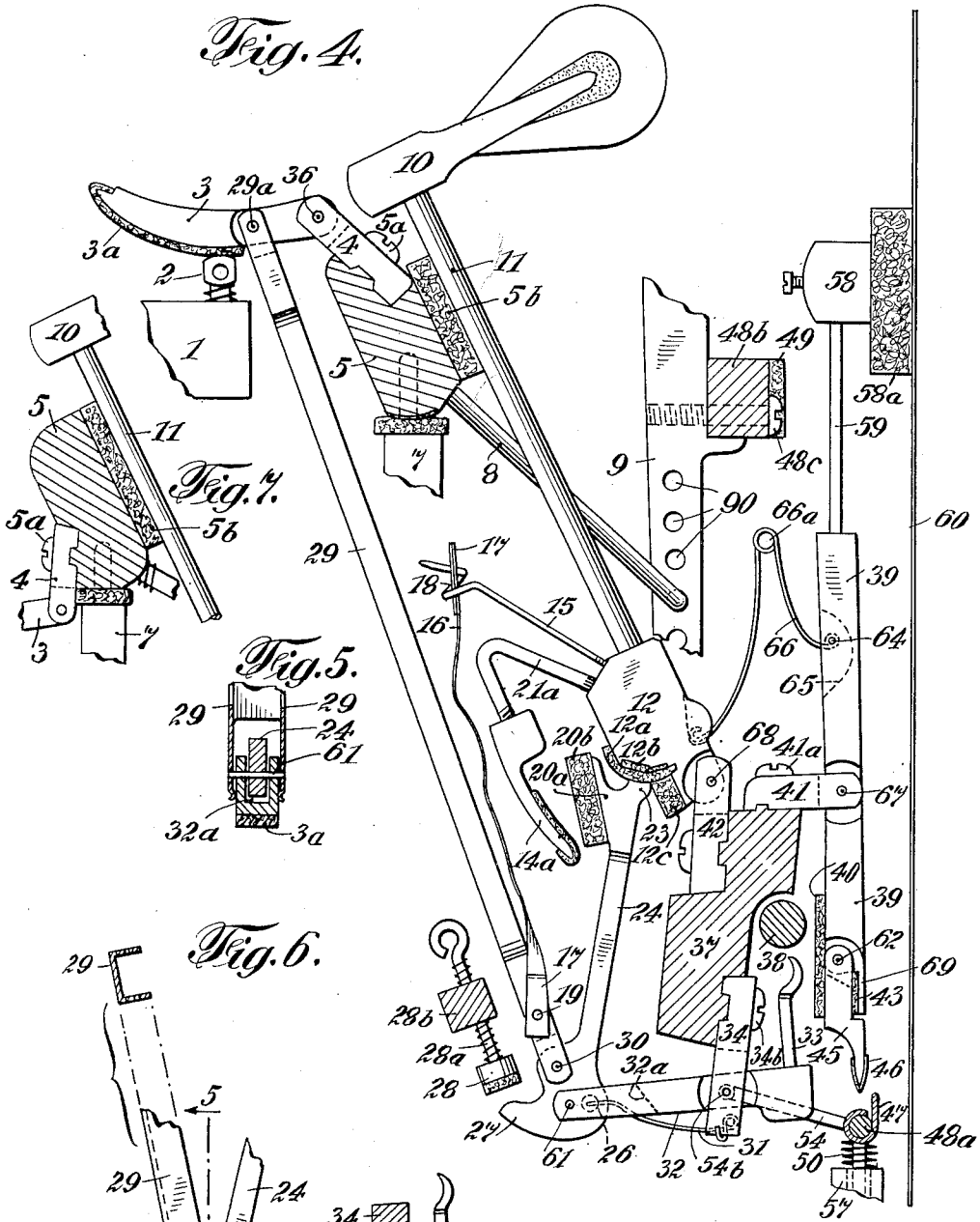


Fig. 7.

Fig. 5.

Fig. 6.

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Patented Feb. 20, 1951 2,542,306

UNITED STATES PATENT OFFICE

2,542,306

PIANO ACTION

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Application September 30, 1947, Serial No. 776,987

17 Claims. (Cl. 84—240)

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This invention relates to piano actions.

It is well known in the arts of small vertical pianos that the piano actions are large, deep and much below the level of the manual keys; these are known as underslung actions. It is known that in most of these types it is necessary to have certain levers or connections from the key down to the wippen. These connecting levers are known to have a flexibility or a give, which causes an unsatisfactory mushy touch.

Further, the present backstop parts with the extension shank in the butt takes up considerable space. Further, the bridle tape is glued in to the butt with the back stop shank, and it is well known that these leather tipped bridle tapes rapidly deteriorate, and it is very difficult to replace them in the same way as originally applied; consequently, the piano technicians are compelled to carry many kinds of tools, adhesives tacks and tapes for the replacement of the present bridle tapes.

Further, the present actions for upright pianos have a spring for the hammer and one separate spring for the damper lever.

Further, when the present sostenuto pedal is in use, a certain awkward and annoying resistance occurs in the touch by the subsequent keys being played, which is due to the unyielding sostenuto rail or its cord when the sostenuto rail meets edge to edge with the sostenuto lever, or to the unyielding sostenuto lever and its rail contacting portion.

The piano-fortes to which the following invention is applicable though they all belong to the same class may still be of various construction.

The improvements include (1) the provision of the jack regulation screw in an exposed position permitting easy access for regulating it, by placing the abstract, the demountable bridle tape, the bridle wire, and the back check behind the said regulation screw, in which the pivoting of the lower portion of the abstract may be either directly to the jack or directly to the wippen; (2) the provision of a jack spring acting on the rear portion of the jack and supported by the wippen or its flange; (3) the radius head on the jack, enabling a fuller and solid blow, and step by step movement with a more rapid trip; (4) the demountable bridle tape, with one end engaged on a bridle tape wire which is secured in the hammer butt, and the other end is secured either to the front part of the back check, or to the lower portion of the abstract; that is, to say, that the other end secured to a component part

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of the wippen. whereby the combined weight will give faster repetition by the backward pull of the hammer, and besides this form of construction requires smaller space for the action; (5) the back stop unit as part of the hammer butt, instead of separate widely spaced assembled parts of the present hammer butt, and a synchronizing back check; (6) the combination abstract guide and lost motion compensator; (7) this combination supported by a flange secured to the hammer lift rail; (8) the action frame with holes to regulate the height of wippen guide lever and its rail and acting as an adjustment for different heights of pianos, still retaining the standard key board height; with this, it will not be necessary to use different sizes of action frames for different heights of pianos; (9) the improved combination sostenuto lever and damper lever using only one regular damper lever spring, this improvement having application to many types of pianos.

The improved compact action of small compass still retains the time tested full length hammer shanks and the full size component parts. The straight pull of the abstract avoids the mushy touch and its new lower pivoting located in back of the jack trip regulation screw, requires less space. The hammer is driven more directly and comes back faster than that of the old type of action. With the set of flanges on the hammer lift rail supporting the activating levers, a variable output of volume of tone is achieved, and a constant touch depth is obtained, and the lost motion is compensated and taken up.

The invention will be more fully described hereinafter, embodiments thereof shown in the drawings, and the invention will be finally pointed out in the claims.

In the accompanying drawings,

Fig. 1 is a side view with parts in section showing embodiments of the improvements;

Fig. 2 is a plan view of the demountable bridle tape, with its laminated ends;

Fig. 3 is a detail side view of the connection of the jack with wippen, substantially like the parts shown in Fig. 1, but somewhat modified in the construction eliminating the abstract and showing a modification in the rear jack wippen connecting spring;

Fig. 4 is a side view with parts in section, showing a modified embodiment of the invention disclosed in the embodiment of Fig. 1;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 6;

Fig. 6 is a side view like that of Fig. 3, showing a common pivot for the abstract, jack and wippen, though the abstract may be omitted, and a modified construction of the rear spring; and

Fig. 7 is a view showing the flange at the lower part of the rail.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawings, and more particularly to Fig. 1, the known key 1 of a piano has a capstan screw 2. A lost motion compensating abstract guide lever 3 has a felt lining 3*a*, and rests upon the capstan screw 2. The curvature of the lever permits a compensating action. The lever 3 is pivoted at 3*b* to a flange 4, which is supported by and secured to the hammer rail 5, by screws 5*a*, which rail 5 has a felt layer 5*b* thereon. The rail 5 is movable upwardly and towards the string 60 by a lift dowel 7 as known, and returns by gravity. To the rail 5, a pivot rod 8 is pivoted at one of its ends, and the other end of the rod 8 is pivoted to a fixed action frame 9 having spaced ports or openings 90, any one of which may be selected for the proper piano keyboard height regulation of the rail 5. Only a portion of the action frame 9 is shown as it is well known without the spaced openings. All of these parts are so constructed that their location is at the rear or back of a jack trip regulation screw 28*a* and button 28.

The jack 24 has a felt inlay or blocking felt 25, to soften the thrust of the jack against the wippen, and has a knuckle portion 27 to impinge against the felt covered regulating button 28 of a screw 28*a*, supported on a rail 28*b*. To the jack 24 at its lower rear portion at 26 is movably inserted one end of a rear jack spring 31, which is preferably bent up to form a convolution, and has its other end secured to the wippen 32. The wippen 32 is pivotally supported at 34*a* to a wippen flange 34 secured by screws 34*b* to an action rail 37. The wippen 32 supports a spoon 33. A spring 35 preferably of the coiled type is disposed between the wippen 32 and a touch spring regulating rail 36 held movably by a screw 36*a* on the rail 37.

The butt 12 is pivotally connected at 68 to a hammer butt flange 42 secured by screws 42*a* to the rail 37. The lower part of the butt 12 is curved and to it, the upper end of the jack 24 abuts. A full motion butting or radius jack head 23 extends laterally of the upper end of the jack. The upper end of the jack 24 and the lateral extension or radius jack head 23 serves to press the butt upwardly and is released from the butt when the jack knuckle 27 abuts against the trip regulation button 28. A buckskin 12*a* with a cushioning felt 12*b* softens the pressure of the jack. A felt 12*c* limits the movement of the jack, so that the abutting end of the jack with its radius extension fits directly under the curved portion of the butt. The curved surface of the butt and the pivot 68 lie substantially on a horizontal line. The jack 24 moves substantially in a vertical direction, and thus swings the butt 12 on its pivot 68 to the extent of its thrust. When the jack is tripped, its upper end is moved completely out of contact with the buckskin 12*a*, while the butt is being held by the back check. The spring 31 returns the jack 24, when the pressure on the key 1 has been released as known.

A spring 66, preferably coiled at 66*a*, has one end engaged with the rear part of the butt 12 at port 63, being controlled by the spring tension regulating screw 13, and its other end engaged with at the port 44 of the sostenuto lever 45, having also a spring tension regulating screw 13*a*. The lever 45 is pivoted at 62 to the flange portion 39*a* of the damper lever 39 and extends upwardly to form the sostenuto lever engaging head 46, and one portion extends downwardly to engage the sostenuto lever rest felt 43 inlayed on the damper lever 39. This damper lever 39 is pivoted at 67 to a flange 41 secured by screws 41*a* to the rail 37, and extends downwardly and is provided with a felt inlay 40, adapted to be engaged by the spoon 33, above which a damper lifting rod 38 is disposed. The damper lever 39 supports a wire 59, which supports the damper block 58 and felt 58*a*, which dampens the string 60 as known.

Supported on the frame 9 and pivoted at 55 is a sostenuto rail actuating lever 53, one end 56 of which is accommodated to a dowel 57 suitably operated by a foot pedal in the known manner and not shown. The other end of the lever 53 has a felt washer 51 disposed between it and the screw head 52, and below that end of the lever, and between it and block 48, is a spring 50. A pivot rod 54 engages one of the ports 90 of the frame and is connected with the block 48 on a rail 47 having a re-inforcing part 48*a* and a bumper felt 49 against which the damper wire 59 strikes. The sostenuto rail 47 extends downwardly to cooperate with the sostenuto lever engaging head 46.

In the sectional view, Fig. 3, is shown the cutout 32*a* in the wippen 32 to provide movement space for the lower part of the jack 24 which is curved as shown at 24*a*, a similar construction being used in Fig. 1. The modification shown in Fig. 3 is in the attachment of the spring and in the absence of the abstract 29, lever 3 and flange 4, and the provision of the felt 3*a* when actuated by a key in the well known manner. The end of the rear jack spring 31 which engages the wippen 32 directly in Fig. 1, now is secured in the flange 34 supporting the wippen 32.

In Fig. 4, the modification in respect to Fig. 1 consists in this: The damper bumper rail 48*b* with its felt layer 49 is fixed to the frame 9, by a screw 48*c*. The demountable bridle tape 16 has its lower end secured to the pin head 19 located on the lower end of the abstract 29 by a fastening pin 19. The butt 12 has a wire 21*a* bent downwardly to form a back stop portion 14*a* to abut against the felt 20*b* of the back check head 20*a*, now part of the jack 24. The rear jack spring 31 has one end now secured to the lower end of the wippen supporting flange 34. The spring 66*a* has one end now secured at 64 to the damper lever 39, provided with a spring channel 65. At the lower end of the damper lever 39, the sostenuto lever 45 is pivoted at 62, and is adapted to be pressed against the felt 43, which is secured to the damper lever 39, and extends downwardly to form the sostenuto engaging head 46. The sostenuto pedal operating rail 47 is supported on a sostenuto safety bumper spring 50, on the pedal operated dowel 57. The rail 47 is supported by a sostenuto pivoting rod 54, pivoted at 54*b* to a flange 34. A spoon bumper felt 40 is applied to the damper lever 39 to cooperate with the damper lifting rod 38 and damper spoon 33.

In Fig. 6, the modification consists in having the jack 24 and the lower end of the abstract 29 pivoted to the wippen 32 at 61, and the rear jack spring 31 extends from the rear end of the wippen 32, having its extreme end secured as at 31*a* to the lower end of the wippen 32 extending movably into the rear jack spring port 26 of the jack 24.

A section taken on line 5—5 of Fig. 6, is shown in Fig. 5, to show the connection of jack 24 and abstract 29. The lower side of the wippen 32 has a felt 3a to coact with the keys 1, when the abstract 29, lever 3 and flange 4 of Figs. 5 and 6 are omitted.

In the improved constructions, the spring 66 in Fig. 1 is caused to perform three or less important distinct pressure functions, one pressure to bear a very light pressure on the sostenuto lever 45, at spring port 44 to hold the sostenuto lever 45 yieldingly in its motion and in its position. Another function is to indirectly bear its full strength upon the damper lever 39, which exerts the required pressure through felt 58a against the note strings 60 to stop the string vibration. Another function is the medium regulatable pressure exerted on the hammer 10 through the butt 12, the spring 66 contacting the butt spring port 63 and is regulatable by screw 13.

This spring action principle is adaptable to any model piano action. Whenever it is desired to sustain the tone of any given numbers of keys, the performer strikes the piano keys 1, and immediately follows by depressing the sostenuto or center pedal, not shown, which activates the sostenuto rail 47. This rail 47 engages and holds the sostenuto lever tip 46, and the damper felt 58a away from the note string 60, as long as the pedal is held down by the performer's foot; during this interval other notes may be played to the performer's desire or content. The sostenuto lever tip 46 yieldingly contacts with the sostenuto rail 47 without the feel of that objectionable resistance or sluggish feeling in the keys as in the present sostenuto piano touch. This resistance is avoided because of the very light spring pressure upon the sostenuto lever 45 through the spring 66 in the port 44 and in the arrangement shown in Fig. 4. The sostenuto lever tip 46 yields against the sostenuto rail 47, thus the performer will have a smooth, even, satisfactory touch in the manual keys 1.

It will be noted that the vertically disposed damper lever adjacent the vertical strings forms one lateral boundary member of the improved action. The abstract forms the opposed lateral boundary member. The wippen forms the lower boundary member. Centrally disposed between the boundary members, is the jack, butt, hammer and back check. The jack tripping regulation button is exterior of this grouping and laterally exterior to the abstract, that is, to the entire action. This compact small spaced assembly is made possible by pivoting the abstract direct to the jack or direct to the wippen; by providing the jack with a rear spring engaging portion into which a curved spring (in distinction to coiled springs) fits to operate the jack; and by the springs for the butt and damper lever.

As stated the abstract guide 3 supports the abstract 29, and the curbed surface 3a acts as a lost motion compensating lever. The distance from pivot 29a to pivot 36 is fixed, but by shifting the contact point between the surface 3a and the capstan screw 2, the leverage between said contact point and the pivot 29a is changed to the distance of the hammer from the string, thus maintaining a constant touch depth between the key and the touch punching or bumper (not shown in the drawings) as these parts are known. Thus, the part 3, has the functions of an abstract guide, a lost motion compensator, and a constant touch depth governor, combined in one structure. With a constant input of

energy upon the key, a variable output of tone is obtained by shifting the flanged hammer rail to its desired position, while lost motion, abstract guiding, and constant touch depth is obtained in every position of the hammer rail.

Certain subject matter is being claimed in a divisional application filed June 2, 1949, under Serial No. 96,793.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a piano action, the combination of a plurality of spring pressed damper levers, a sostenuto rail, means for actuating said rail to sostenuto position, and a pivoted sostenuto lever on each of said damper levers, said rail when in sostenuto position holding certain of said damper levers for sostenuto, said damper levers not held in sostenuto having their sostenuto levers yielding on their pivots against said rail.

2. In a piano action, the combination of a pivoted damper lever, a sostenuto rail, a sostenuto lever pivotally supported on said damper lever, for engaging said rail, a pivoted hammer butt, and a spring having one end in the hammer butt and its other end in the said sostenuto lever, for controlling the butt, sostenuto lever and damper lever movements, said spring having three different pressures, one very light regulatable pressure for the sostenuto lever, the full pressure on the damper lever, and a medium regulatable pressure on the hammer butt.

3. In a piano action for a piano string, a damper lever having a string damper supported thereby, and operated by a spoon on a wippen, the combination of a pivoted yieldable sostenuto lever on the damper lever, acted upon by said spoon, a spring supported by said damper lever and acting upon the damper lever, a sostenuto rail for engaging said sostenuto lever, and means for actuating said rail to hold the desired damper lever in sostenuto, other damper levers moving their sostenuto levers yieldingly against said rail and against the action of the spoon and the spring.

4. In a piano action a damper lever, a sostenuto lever pivoted to the damper lever, a damper spoon, and a spring for the damper lever acting in the same direction as said spoon, said sostenuto lever being free to yieldingly act on its pivot with an indirect bearing but without direct contact with the said spring, and a sostenuto rail to engage the said sostenuto lever.

5. In a piano action for a piano string, a damper lever having a string damper supported thereby, and operated by a spoon on a wippen, the combination of a yielding pivoted sostenuto lever supported by said damper lever, a damper spring acting upon the sostenuto lever for yieldingly holding said lever in position, a sostenuto rail for engaging said lever, and means for actuating said rail, whereby the rail engaging the lever prevents the string damper from dampening the strings enabling a continued vibration while the foot pedal controlled sostenuto rail is kept in action, a safety spring for yieldingly acting on the sostenuto rail to prevent the damage of the sostenuto lever when colliding tip to tip with the said sostenuto rail.

6. In a piano action, a piano key capstan screw, a compensating guide lever provided with a curved and felted surface portion slidable on said capstan screw, an abstract pivoted to the guide lever, a jack activated through the abstract, and

a butt activated by the jack, a hammer shift rail, a flange on said rail pivoted to said guide lever to support the same, the movement of the hammer shift rail sliding the curved surface portion of the guide lever on the piano key capstan screw, guidingly activating said abstract and compensating lost motion between the jack and the butt, thus providing a constant touch depth of the keys.

7. The structure of claim 6, and a rear jack spring, a wippen, a knuckle on the jack extending laterally beyond the wippen, and a jack trip regulating screw button disposed above the knuckle and engageable by the knuckle of the jack for tripping the jack, said abstract and jack being within the regulating screw button, and said abstract being intermediate the regulating screw button and the jack, said jack trip regulating button suddenly tripping the jack after the jack has operated the butt and its hammer before touching the strings.

8. The structure of claim 6, in which said jack is pivoted to the wippen, and said abstract is pivoted to said jack.

9. The structure of claim 6, in which said jack is pivoted to the wippen, and said abstract is pivoted to said wippen.

10. The structure of claim 6, in which said jack is pivoted directly to said abstract, and said wippen is pivoted directly to the jack.

11. In a piano action having a key, a hammer shift rail, an abstract, a jack activated by the lower end of the abstract, and a butt activated by the jack, the combination of a compensating guide lever provided with a curved surface at one end forming a contact with the key, a connection at the other end for supporting it on said hammer shift rail, and a connection with the upper end of the abstract, the movement of the hammer shift rail shifting said contact point of said curved portion on the key and varying the leverage action of the guide lever, whereby lost motion between the jack and the butt is taken up, and whereby a constant touch depth of the keys is retained regardless of any position of the shift rail.

12. The structure of claim 11 having a jack regulation screw with a button, said abstract and jack being between the hammer shift rail and the regulating screw button, and said abstract being between the regulation screw button and the jack.

13. The structure of claim 11, having a wippen, the end of said abstract being connected with said wippen, the lower end of said jack being connected with said wippen, said abstract connection with said wippen being above said jack connection with said wippen, said abstract providing a direct straight line action between said guide lever and said wippen.

14. The structure of claim 11, said jack pivoted to the wippen, and having one part extending to the hammer butt, and another part extending beyond the wippen, a back check wire supported on the wippen above the jack pivot, a one piece shankless back stop on the hammer butt forming a unit therewith, adapted to be engaged by the back check, said abstract connected with the wippen above the jack, pivot, and a jack regulation screw with a button, said abstract and back check wire being between said button and the jack, said extending part of the jack engaging the button to trip the jack.

15. The structure of claim 11, said jack pivoted to the wippen, and having one part extending to the hammer butt, and another part extending beyond the wippen, a back check wire supported on the wippen above the jack pivot, a one piece shankless back stop on the hammer butt forming a unit therewith, adapted to be engaged by the back check, a bridle tape supporting wire on said butt, a bridle tape having one end connected with said last named wire, and with the back check, said abstract being connected with the wippen above the jack pivot, and a regulation screw with a button, said abstract and back check wire being between said button and the jack, said extending part of the jack engaging the button to trip the jack.

16. In a piano action having a hammer and means for actuating it, the combination of a hammer shift rail, a key, and a lever having one end pivoted to said rail and the other end activated by said key, said lever being connected with said hammer actuating means, for activating the same by the striking of the key in any position of the shift rail.

17. In a piano action, the combination of a pivoted damper lever, a pivoted hammer butt, and a knee action spring having a joint portion and two legs extending from the joint portion, one leg contacting the hammer butt above its pivot and the other leg contacting the damper lever above its pivot for controlling the butt and damper lever, the joint portion of the spring floating without contact with the butt or damper lever.

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