Sept. 9, 1930. V. HULL 1,775,462

HARP ACTION

Filed Feb. 4, 1929 3 Sheets-Sheet 1

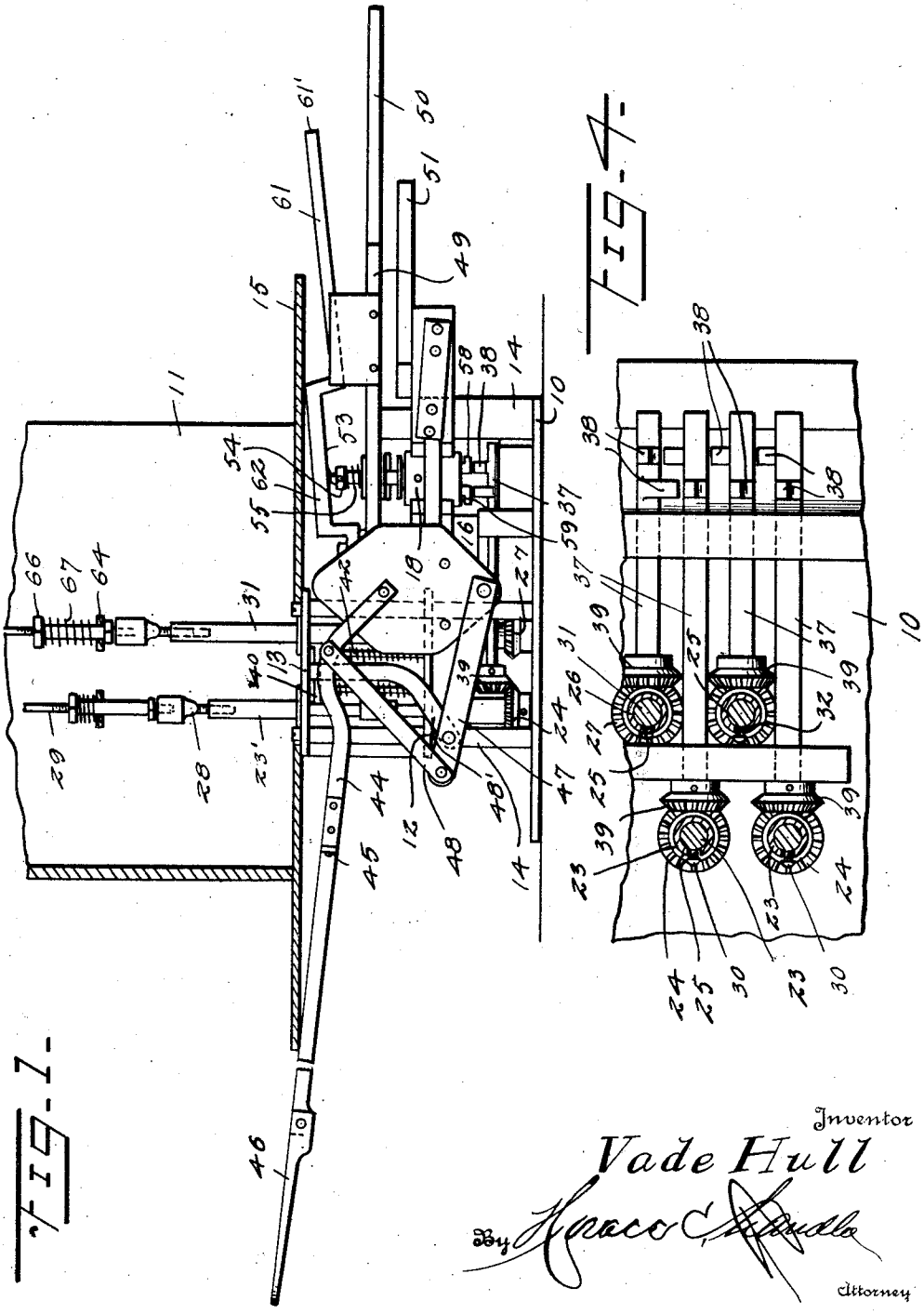


FIG. 1.

FIG. 4.

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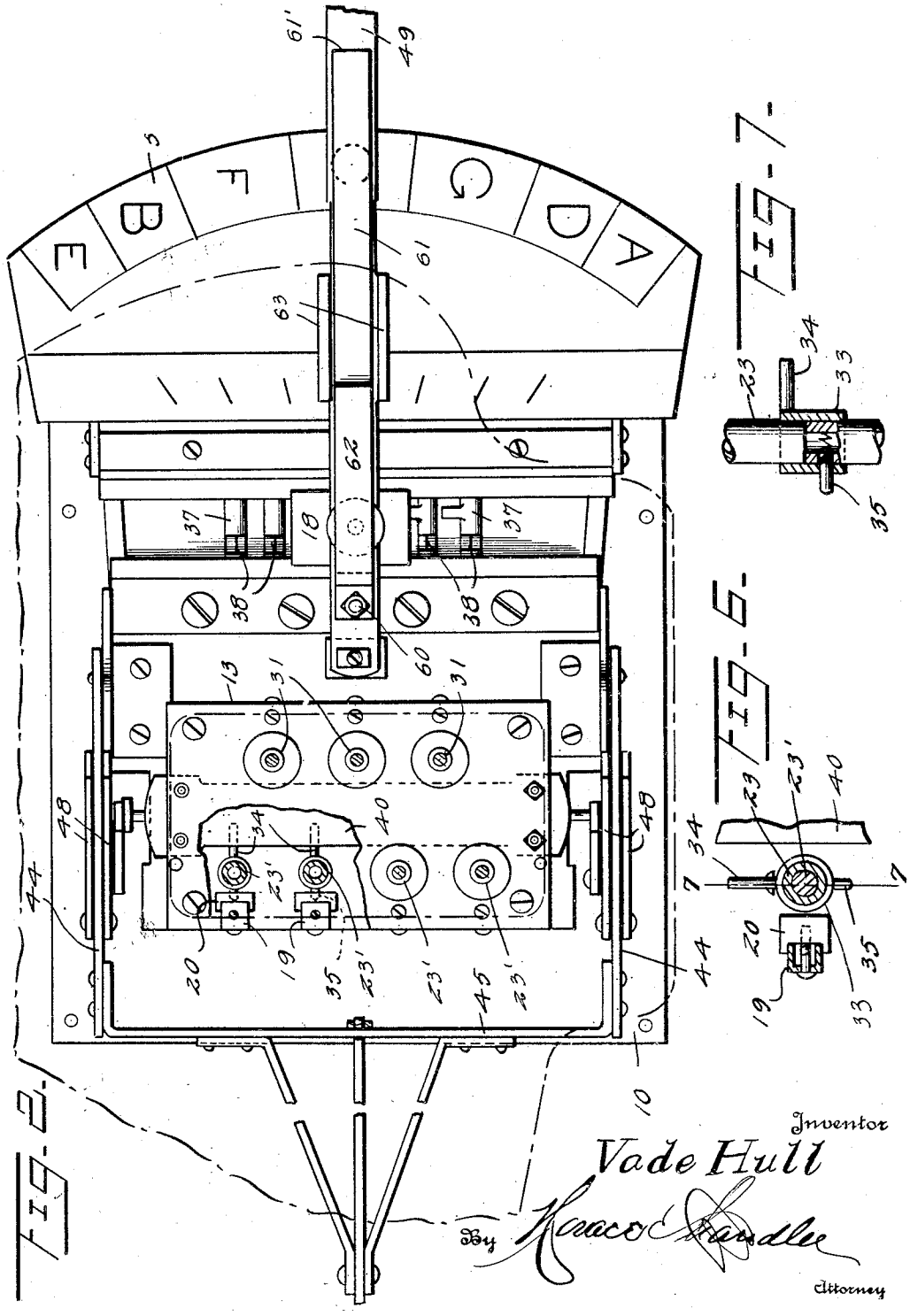


FIG. 2.

FIG. 7.

FIG. 6.

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HARP ACTION

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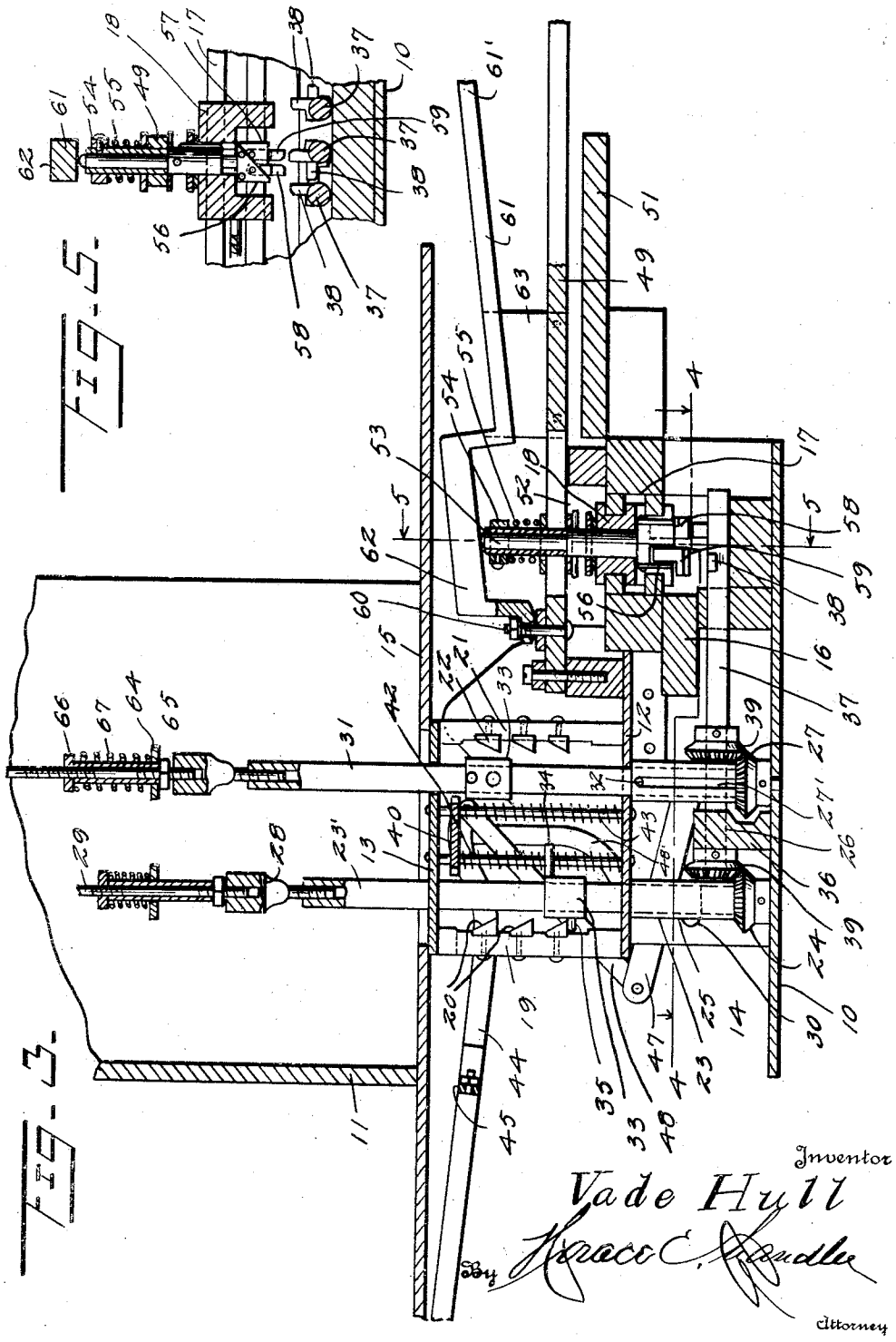


Fig. 3.

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1,775,462

UNITED STATES PATENT OFFICE

VADE HULL, OF GREAT FALLS, MONTANA

HARP ACTION

Application filed February 4, 1929. Serial No. 337,396.

This invention relates to new and useful improvements in harps, and particularly to the pedal actions therefor.

The ordinary harp is equipped with seven or more pedals, on the base, which are connected, by means of rods to rocking elements, and these rocking elements are connected with rotary members which stretch and release the strings, whereby to produce the proper sharps and flats, for the different keys in which the harp may be played. To raise or lower the pitch of the strings, to produce the desired and required sharps or flats of the key in which the player is to play, the player must quickly depress certain of the pedals, in succession, to actuate the proper rotary members to raise or lower the proper strings. This requires considerable skill, on the part of the player.

The principal object of the present invention is to provide a harp action wherein a single pedal serves to set certain mechanism in proper position to actuate the required rods, which will be pulled, when another pedal is operated, to operate the rotary members associated with said rods, to produce the desired sharps or flats.

Another object is to provide a mechanism of this character wherein a single pedal serves to set the harp action to produce the sharps and flats of a certain key, and a second pedal fixes such mechanism so that the said sharps or flats are fixed, and can only be released, and the normal pitches of the strips restored by operation of the first pedal.

Another object is to provide a pedal mechanism for a harp which is adapted to be applied to the ordinary harp without radical changes in the harp action other than the removal of the regular pedals of the instrument, and the substitution of the mechanism of the present device, such mechanism being adaptable to single or double action harps.

Other objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings.

In the drawings:

Figure 1 is a side elevation of the operating mechanism of the invention, portions of the pitch changing rods being shown associated therewith.

Figure 2 is a top plan view of the mechanism, certain parts being shown in horizontal section.

Figure 3 is a vertical sectional view on the line 3—3 of Figure 2.

Figure 4 is a fragmentary horizontal sectional view on the line 4—4 of Figure 3.

Figure 5 is a fragmentary vertical sectional view on the line 5—5 of Figure 3.

Figure 6 is an enlarged horizontal sectional detail view on the line 6—6 of Figure 3.

Figure 7 is a vertical sectional view on the line 7—7 of Figure 6.

Referring particularly to the accompanying drawings, 10 represents a base which is properly secured to the base of a harp, beneath the hollow post 11, and disposed in parallel relation above this plate is a second plate 12, while a third plate 13 is disposed above the plate 12. Vertical spacing posts 14 are disposed between and through the plates, for holding them in position. The upper plate 13 is secured to the lower face of the wooden plate 15, of the frame of the harp, which supports the lower end of the hollow post 11, said plate 13 being somewhat narrower than the plates 10 and 12. Extending outwardly from the plate 12 is a frame 16 in which is formed a transverse slideway 17, and slidable in said slideway is a block 18, to which more particular reference will be made later herein.

Disposed vertically between the plates 12 and 13, along one edge thereof, are the posts 19, for formed in the inner vertical edge face of each of said posts are the ratchet teeth 20, while a similar series of posts 21 are disposed between the said plates, along the other longer edge, said posts being formed with the ratchet teeth 22, on their inner vertical edge faces. Disposed vertically between the plates 10 and 12, adjacent one longer edge thereof, are the tubular members 23, each having a bevel gear 24 on its lower end, and a vertical longitudinal slot 25, extending upwardly from the gear. Disposed in corresponding positions along the other edge of the plates 10 and 12, and arranged there-

between, are the tubular members 26, each having a bevel gear 27 on its lower end, and a vertical slot 27′ extending upwardly from the gear. It will be noted that there are four of the tubular members 23, while there are only three of the tubular members 26, which fact will be explained later herein. Disposed slidably in each of the tubular members 23 is a rod 23′, the upper end of which is provided with a ball and socket joint 28, which connects the rod with the lower end of one of the pitch changing rods 29, of the harp. The lower end portion of each of the said rods 23′ is provided with a radially extending pin 30, which plays in the slot 25 of a tubular member. Slidable in each of the tubular members 26 is a rod 31, which is provided with a radial pin 32 playing in the slot of the tubular member. Mounted on each of the rods 23′ and 31 is a collar 33, and fixed in said collar, and extending radially from one side thereof, is a pin 34, while projecting from the opposite side of the collar, in a plane slightly below the pin 34, is a spring pressed pin 35, said latter pin being arranged to engage with the before mentioned ratchet teeth of the posts 19 and 21, when the rod is rotated, as will be explained later herein. Mounted on the base 10, longitudinally thereof, and between the rows of tubular members 23 and 26, is a bearing block 36, in which are supported the adjacent ends of a series of horizontal shafts 37, said shafts having their other ends journaled in the said frame 16. On each of shafts 37, directly beneath the slideway 17, are the oppositely directed radial arms 38. On each of the said shafts 37 is mounted a bevel gear 39 which meshes with one of the gears of the tubular members 23—26. When one of the shafts 37 is rotated by a means to be later described, the tubular member with which it is geared, will be rotated whereby to place the spring plunger 35 in position for engagement with the ratchet teeth of the adjacent post, and disposes the fixed pin 34 in a position extending diametrically opposite thereto. Extending longitudinally beneath the upper plate 13 is a plate 40, which is arranged to move vertically between the plates 12 and 13, and formed in said plate 40 are the openings 41 through which are disposed the vertical guiding rods 42, said rods having their lower ends secured in the base plate 10, and their upper ends secured in the upper plate 13. On each of the guide rods 42, between the plate 40, and the base plate 10, is a coil spring 43, which serves to urge the plate into its normal uppermost position, against the lower face of the plate 13. When one of the shafts 37 is rotated, as above explained, the fixed pin 34 is disposed beneath the said plate 40, whereby when the said plate is lowered it engages the pin and moves the plate downwardly, carrying the rod 23′ with it so that the spring pressed pin 35 passes over the ratchet of a post 19 or 21, and is held by one of said teeth, upon release of the plate 40, said plate being returned to its uppermost position by the springs 43. Pivotally mounted on each end of the frame 16 is an arm 44 of a yoke 45, said yoke extending transversely of the mechanism, at the side opposite to the slideway 17, and secured on the intermediate portion of the yoke is the outwardly extending pedal 46. Pivotally mounted on said frame, directly beneath the pivots of the yoke 45, are the arms 47, each being movably connected with an arm of the yoke, outwardly of the pivot of said arm, by means of a link 48. Pivotally connected to each end of the plate 40 is a link 48′, having its other end pivotally connected with an arm 47, whereby to cause the downward movement of the plate 40, when the yoke is depressed.

Pivotally mounted on the plate 12, inwardly of the slideway 17, is the inner end of a horizontally movable lever 49, the outer end of which is provided with a foot-piece 50, which is adapted to be engaged by the foot of the player, for swinging the lever over an arcuate scale plate 51, mounted on the frame 16, said scale plate having letters printed thereon representing the notes to be flatted or sharped, in accordance with the key in which the player is playing. Formed longitudinally in that portion of the lever 49 which rides over the slideway 17, is a slot 52, and disposed vertically through this slot is the upper end portion of a plunger 53, the lower portion of which is slidably disposed through the block 18. On the upper end of the plunger 53 is a collar 54, and encircling the plunger, between the lever 49 and the said collar, is a coil spring 55, which normally urges the plunger upwardly. The lower end of the plunger, below the lower face of the block 18, is provided with the oppositely disposed depending flanges 56 and 57, and pivotally mounted on the lower end of the plunger, in position to engage with the radial arms 38, of the shafts 37, and with the said flanges 56 and 57, are the pawls 58 and 59, said pawls being arranged to engage said arms, whereby to rock said shafts, when the lever 49 is moved on its pivot, and the plunger 53 is depressed. Mounted on the lever 49, by means of the pivot 60, and extending outwardly, longitudinally of said lever, is a lever 61, the intermediate portion of which is formed with an arch 62 which engages with the upper end of the plunger 53, and is urged upwardly thereby. The outer portion of the lever 61 is provided with a foot-piece 61′, and inwardly of said foot-piece the lever is guided in its vertical movements by the guides 63, carried by the lever 49. Upon depressing the lever 61, when the lever is at one end of the arcuate scale plate, and moving the lever 49 to a position over one of the letters of the

scale, one of the depending pawls will engage an arm of the corresponding shaft 37, and rock said shaft, whereby to cause the rotation of one of the tubular members 23 or 26. The rotation of the tubular member causes the rotation of the associated rod and disposes its fixed pin 34 beneath the plate 40, and its spring actuated pin 35 in position to pass over the ratchet teeth of the adjacent post 19 or 21, with the result that when the yoke 45 is depressed the plate 40 will engage with the pin 34, moving the rod downwardly, so that the spring pin 35 will engage beneath one of said teeth, and hold said rod downwardly. The downward movement of the rod pulls the corresponding pitch changing rod 29, so that the proper strings of the harp are acted upon to produce the pitch desired.

When the lever 49 is swung in one direction, while the plunger 53 is depressed, one of the pawls, as for instance, the pawl 58, will engage the arms of certain of the shafts 37, and rock said shafts, whereby to cause the rotation of corresponding tubular members. When the lever 49 is swung in the other direction, while the plunger is depressed, the other arms of the shafts are engaged and the shafts rocked in the other direction, whereby to rotate the tubular members back to their original positions. If, however, the lever 49 is swung over the scale plate, without depressing the plunger, none of the shafts 37 will be affected.

Within the lower portion of the hollow post 11 there is disposed a transverse plate 64, having the openings 65 therein through which are slidably disposed the before-mentioned pitch changing rods 29, and carried by each of said rods 29 is a collar 66. Disposed on each rod 29, between the plate 64, and the collar 66, is a coil spring 67, which serves to draw the rod 19 or 21 upwardly, when the associated tubular member is rotated to disengage its pins 34 and 35, respectively, from the plate 40 and the ratchet teeth. It will be noted that the lower member of the ball and socket joint 28 is secured within the upper end of a rod 23′, while the upper member thereof receives the lower end of the rod 29. Threaded on the lower portion of the rod 29, just above the upper member of the joint 28, is a nut, and by rotating the upper member of the joint, which is designated by the numeral 28′, the rod 29 may be drawn down, or slackened, whereby to regulate the tension of said rod, to insure proper operation thereof.

Assuming that a player wishes to play in the key of D, he places his foot on the lever 49, moves the same to a position adjacent the F on the scale plate 51, depresses the lever 61, with the same foot, and moves the lever 49 so that one of the pawls engages an arm 38, of the associated shaft 37, whereby said shaft will be rocked to impart rotary motion to the corresponding member 23′, which places its pin 34 in position to be engaged by the plate 40, and its pin 35 in position over the uppermost of the teeth of a post 19. The player then operates the pedal lever 49, in a similar manner, with respect to the C, of the scale plate. The player then places his other foot on the foot-piece of the yoke 45, and depresses said yoke, which pulls the members 23′ downwardly so that the attached rods 29 will actuate the pitch changing rods of the harp action to raise the pitch of all of the C-strings and F-strings, of the harp, thus enabling the player to play the harp in the key of D. If the player desires to play in the key of F (one flat), he depresses the lever 61, and swings the lever 49 completely across the scale plate, from one end to the other, which causes one of the depending pawls to rock all of the shafts 37, thereby setting all of the rods 29 for depressing actuation, after which he depresses the yoke 45, drawing all of the pitch changing rods down so that all of the strings of the harp are raised one-half tone. The player then swings the lever 49 to a position over the B, on the scale plate, and depresses the lever 61, while at the same time he moves the lever 49 to cause the other of the pawls to rock the shaft corresponding to the pitch changing rod for the B-strings, with the result all of the B-strings are lowered one-half tone, which produces the B♭, for the key of F. For other flat keys, the player operates the lever 49, and the lever 61, so as to release other strings so as to lower them one-half tone, for the corresponding flats of the keys desired.

It will, of course, be understood, that each time that the player operates the lever 49 to rotate one or more of the members 23′, he sets such member in a position which permits the associated rods to be drawn down, upon depressing the yoke 45.

What is claimed is:

1. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods for movement into pitch changing position, means for actuating said rods, and means for releasably fixing said rods in such position.

2. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods into position to be moved to change the pitch of certain strings of the harp, means for actuating said rods when so set, and means engageable with said rods when so actuated for holding the rods in pitch changing position.

3. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods for movement into pitch changing position including a single pedal lever, means for actuating said rods

when so set, and means for releasably holding the rods when so moved.

4. In a harp action, the combination with the pitch changing rods of the harp, of means for selectively setting said rods for actuation into pitch changing position including a single pedal lever, means for actuating said rods when so set, and means engageable with said rods for releasably locking the rods in the last-named position.

5. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods into position to be drawn down including a single pedal lever, means for drawing down said rods, and means for releasably locking the rods in such drawn position including detent means.

6. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods, means for drawing said rods, and means for locking said rods in such drawn position, including a detent.

7. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods, means for drawing the rods, and means for releasably locking the rods in such drawn position including detents, and means for engaging said detents.

8. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods including a single pedal lever and means associated with the rods for actuation by said lever, means for drawing said rods, and means for releasably holding said rods when so drawn.

9. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods in position to be drawn including a single pedal lever, means associated with the rods for actuation by said pedal lever including rotary members, means for drawing the rods, toothed members, and means on the rotary members for engagement with the toothed members when so rotated and drawn.

10. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods including a single pedal lever, rotary members associated with the said rods, means operable by the pedal lever for rotating said members selectively, means for drawing said rods, toothed members, and spring actuated means for engaging said toothed members when so drawn.

11. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods including a single pedal lever, rotary members associated with said rods, rock shafts operatively engaged with the rotary members and actuatable by said pedal, means for drawing said rods, toothed members, and detents on the rods for engagement with the toothed members when so drawn.

12. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting said rods including a single pedal lever, rotary members associated with said rods, rock shafts geared to said rotary members for rotating the latter, means on the lever for rocking the shafts, toothed members, and detent means on the rotary members positioned for engagement with said toothed members when said rotary members are rotated, and means for depressing the rods whereby to engage their detent means with the toothed members and draw the pitch changing rods.

13. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods including a single pedal lever, a secondary pedal lever for drawing the rods, and means for releasably holding the rods when so drawn.

14. In a harp action, the combination with the pitch changing rods thereof, of a primary pedal lever for selectively operating the rods into position to be drawn into pitch changing position, means for drawing the rods when so set including a secondary lever, and means engageable with the rods for releasably holding the latter when so drawn.

15. In a harp action, the combination with the pitch changing rods thereof, of means for selectively setting the rods in position to be drawn including a single pedal lever, means associated with the rods for actuation by said pedal lever including rotary members, projections on the rotary members, and means operable against said projections for drawing said rods.

In testimony whereof, I affix my signature.

VADE HULL.