Dec. 31, 1940. C. SCHULZE 2,226,877

PIANO ACTION

Filed Aug. 29, 1939 2 Sheets-Sheet 1

Fig. 1

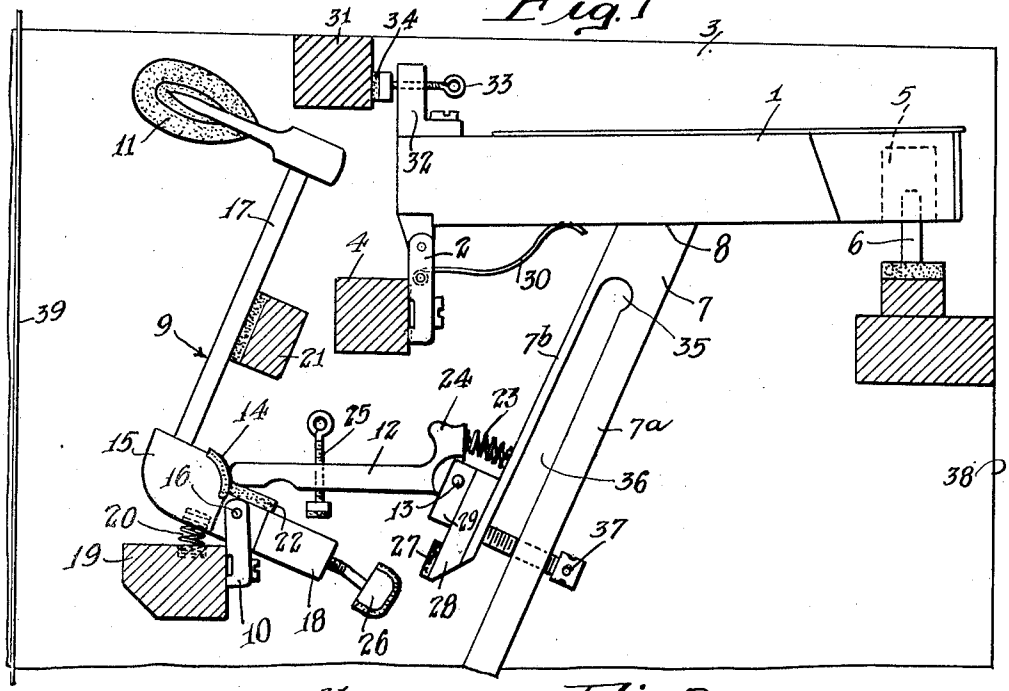
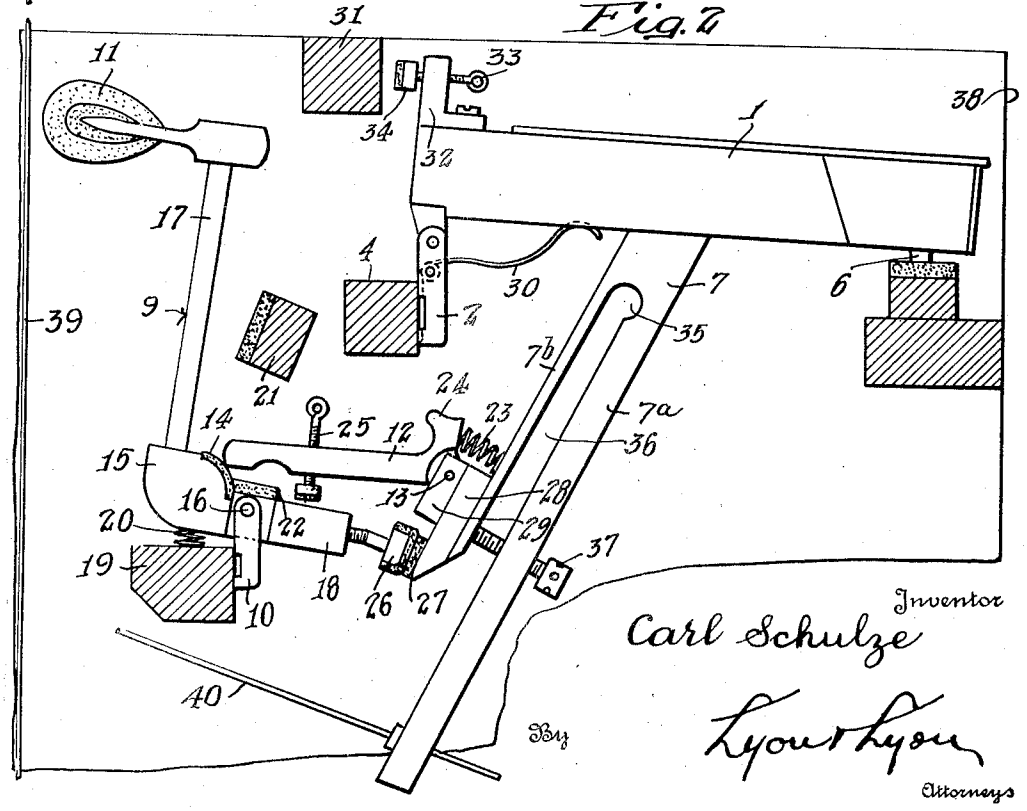


Fig. 2



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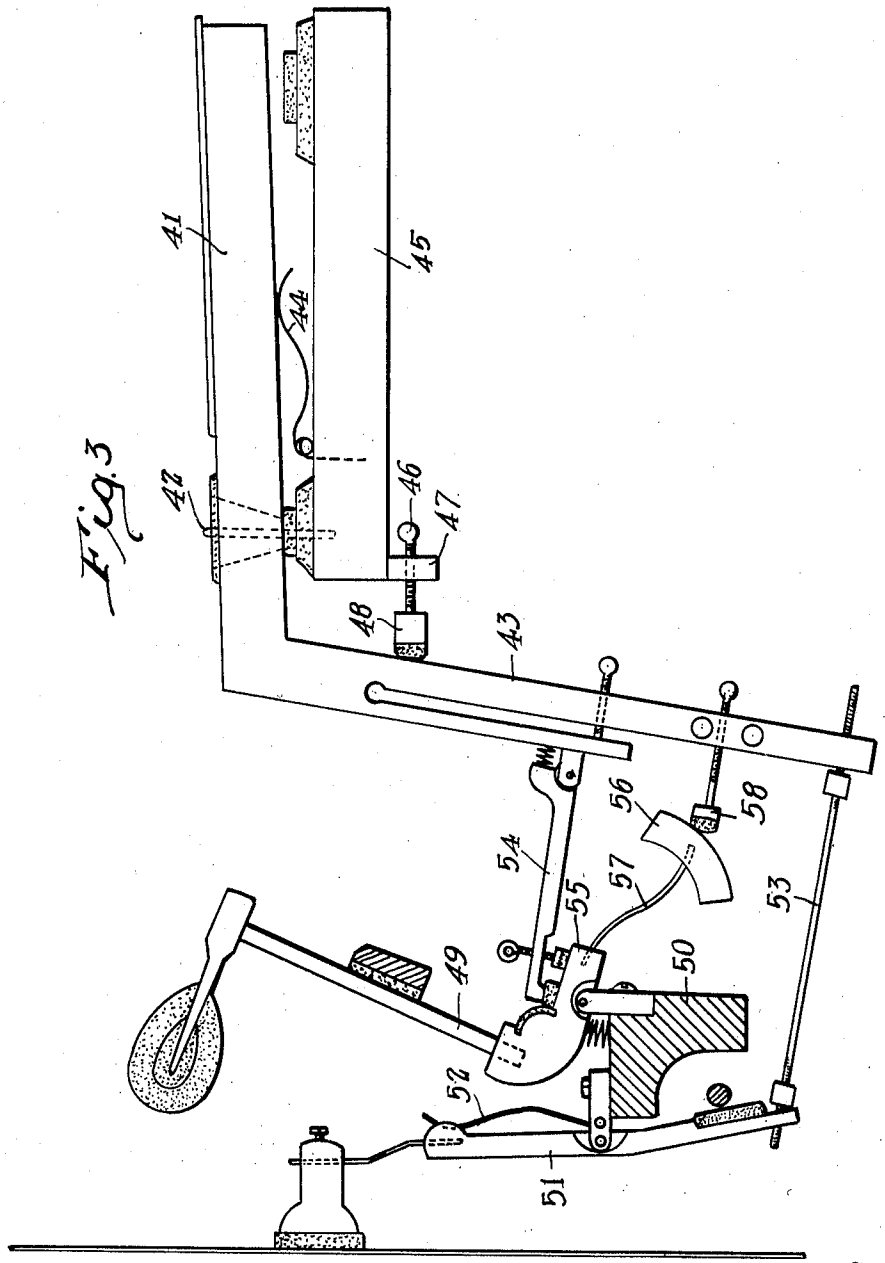
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Fig. 3



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UNITED STATES PATENT OFFICE

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PIANO ACTION

Carl Schulze, Santa Barbara, Calif.

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13 Claims. (Cl. 84—240)

This invention relates to a piano action and while the invention is primarily an improvement in an upright piano action intended particularly for use in spinet pianos, certain features of the invention may be employed in any type of piano action.

In the construction of spinet type pianos, considerable difficulty has been experienced in the past in keeping the depth from the front of the keyboard to the back of the piano case within reasonable limits. Ordinary upright piano actions are not adapted for use in spinet type pianos under circumstances where it is desirable to have the horizontal depth of the spinet maintained below a definite limit.

One of the objects of the present invention is to produce a piano action of simple construction which is particularly adapted for spinet type pianos and which may be said to be condensed considerably in a horizontal front-and-rear plane, thereby conserving the space required to accommodate the piano action, and enabling the case of the spinet to have a relatively reduced dimension measured from the front edge of the keyboard to the back of the case.

In the preferred embodiment of the invention, the key is provided with a downward extension that actuates the jack that actuates the hammer, and one of the objects of the invention is to provide a new location for this downward extension which will result in a very compact piano action and obtain, as it were, an overlapping of the parts in the front-and-rear plane that heretofore have required considerable clearance between each other.

A further object of the invention is to provide a spinet type piano action in which the height of the keys and the relation of the jacks to the hammer can be readily adjusted without necessitating the removal of any parts of the action.

The invention also includes a special adjusting feature for determining the relation of the jack to the hammer that is applicable to types of piano action other than spinet types, and as regards this feature of the invention, my object is to provide a very simple adjustment means that can be readily incorporated in an extension of the piano key.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient piano action.

In the drawings:

Fig. 1 is a vertical section taken through the upper portion of the case of a spinet type piano and illustrating my piano action in side elevation, certain parts being broken away. This view shows the parts of the action in a state of rest;

Fig. 2 is a view similar to Fig. 1, but showing the parts of the action in the relation they have when a key has been struck and held down, and with the hammer resting against the back-check; and

Fig. 3 is a view similar to Fig. 1, but illustrating a modified form for the key and its extension that actuates the hammer.

Before proceeding to a more detailed description of the invention, it should be stated that in practicing the invention, I provide the key with a downward extension, and this extension operates a jack that has an operative connection with the hammer that strikes the string or other vibrator. In the preferred embodiment of the invention, this extension projects from the key at an intermediate point on the key, and this enables the mounting for the jack to be placed forwardly a considerable distance as compared with its location in an ordinary upright piano action.

In the other embodiment of the invention illustrated in the drawings, the downward extension from the key is located at the inner end of the key. In either case the jack extends in a general horizontal direction toward the hammer hub, and the end of the jack thrusts against a shoulder to impart the impulse to the hammer. In the preferred construction, as the hammer moves forwardly it operates an automatic set-off for disengaging the jack from the shoulder.

My invention also includes a construction whereby a very nice adjustment may be effected for adjusting the jack with relation to the hammer shoulder, but it should be understood that this improvement can be used on any piano action, and is not limited in its use to a condensed type of action such as is desirable in a spinet type of piano. This improvement, as regards the adjustment, involves the use of a body portion and a tongue portion in the extension or part that carries or operates the jack, and involves the use of adjusting means for regulating the distance of the tongue from the body portion. This adjustment is particularly desirable in a spinet type piano, because it can be readily reached from the front of the action and without removing any parts of the action.

Another improvement consists in an adjustable stop which I employ, preferably located at the inner end of the key, which enables the keys of

the keyboard to be accurately aligned with each other in a horizontal plane. This improvement overcomes the difficulty in old pianos, where it is sometimes found that some of the keys drop down below their proper level. In my improvement the keys are all held up by springs, to a level determined by their adjustable stops.

In the preferred embodiment of the invention illustrated in Figs. 1 and 2, 1 indicates the key, and this key is pivotally mounted on a suitable pivotal support 2 toward the rear and within the frame or case 3 of the instrument. These pivotal supports are secured alongside of each other on a horizontal bearing rail 4. The outer end of the key is provided with the usual felted bushing 5 that receives an upwardly extending fixed guide pin 6. The key is provided with a downward extension, and in this embodiment this extension is in the form of a downwardly extending bar 7 that is disposed in an inclined position with its upper end secured at a point such as the point 8, located at an intermediate place along the length of the key. The hammer 9 is mounted to swing on a pivotal support 10 that is located to the rear and below the pivotal support 2 for the key 1, so that the hammer head 11 is located only slightly above the level of the keyboard. Between the extension 7 and the hammer, a jack 12 is provided for imparting the impulse from the key to the hammer, and in the present instance this jack is pivotally supported on a pivot pin 13 that is supported on the extension 7.

The outer end of the jack 12 thrusts against a rounding shoulder 14 formed on the hub 15 of the hammer, and the pivotal support 16 for the hammer is preferably considerably out of line with the hammer shank 17. In other words, the pivot pin 16 is applied to a back-check lever 18 that extends toward the extension 7. The pivotal supports 10 are secured to a horizontal hammer rail 19. Each hammer is preferably provided with a return spring 20 between the hub 15 and the upper face of the rail 19, and when the hammers are at rest, these springs hold the hammer shanks 17 back against the padded rest 21.

The jack 12 is preferably provided with resilient means for holding its outer end down against a pad or rest 22 on the upper side of the back-check lever 18, and the rounded shoulder 14 is preferably formed with a pad so as to make the action substantially silent.

The resilient means for holding down the end of the jack 12 preferably consists of a light spring 23, one end of which thrusts against the forward side of the extension 7, and the other end of which thrusts against a shoulder or facing formed on the hub 24 of the jack.

The parts described lend themselves very readily to the operation of a set-off or kick-off to disengage the end of the jack from the shoulder 14 after the impulse has been given to the hammer. For this purpose I prefer to provide an adjustable set-off screw or pin 25 that is threaded and passes down through the jack so that its tip lies a short distance above the upper face of the back-check lever 18.

The back-check lever 18 is provided with a back-check pad 26 that is preferably felted; and in the operation of the action, if the key 1 is held down, the return of the hammer will be arrested when this back-check pad 26 strikes against a back-check rest 27 that is mounted on the extension 7. For this purpose the back-check block 28 may be provided on the forward and upper face of the extension 7, and a similar block 29 may be provided for carrying the pivot 13 for the jack.

Each of the keys 1 of the keyboard is provided with a return spring such as the spring 30 that normally holds the key in an elevated position. In order to enable all of the keys of the keyboard to align in a horizontal plane, I prefer to provide a back stop rail 31, and I provide each key with a small bracket 32 on its upper side, said bracket carrying an adjustable stop screw 33, the forward end of which is provided with a padded head 34 to seat against the stop rail 31. By adjusting the screws 33 of the keys, it will be evident that the position of rest for the keys can be nicely adjusted.

In order to provide for effecting an adjustment of the jack 12 with relation to the hammer hub 15, I prefer to construct the extension 7 so that it has a body portion 7^a and a tongue portion 7^b. If the extension 7 is formed of wood, I prefer to drill an opening transversely through the extension at the point 35 and then form a slot 36 extending in from the end of the extension to connect with this drilled hole at 35. In this way the tongue 7^b can be formed so that it is relatively thin and can readily be sprung away from the body portion 7^a, but the resiliency of the wood will always tend to bring the tongue 7^b back to a normal position though it is held out of line. In order to facilitate making this adjustment, I provide a capstan screw 37 that is threaded through the body portion 7^a, and the tip of this screw rests against the tongue 7^b near the outer end of the tongue. The parts should be designed so that the jack 12 will be about in the correct position when the tongue 7^b is slightly deflected toward the hammer by the adjusting screw 37. This will provide for making an adjustment in either direction, either toward the hammer or away from it, by slightly unscrewing the capstan screw.

It will be observed that by reason of the fact that the downward extension 7 is attached to the key 1 at an intermediate point, the outer end of the jack 12 can be brought a considerable distance toward the front so that it actually lies under the rear end of the key. This greatly condenses the combination of parts composing the piano action, and greatly reduces the depth of the case 3 from its front line 38 to the string 39. Although the weight of this extension and the jack are added to the key, it will be observed that the pivotal support 13 for the jack is not far out of line with the pivotal support 2 for the key, so that the weight of the jack is of little consequence; but whatever weight the jack has and the weight of the extension 7 with the key, it is counterbalanced by the return spring 30.

In Fig. 2 the action is illustrated with the key 1 in its depressed position, at which time the back-check pad 26 rests against the back-check pad 27, thereby holding the hammer with its head only slightly removed from the string. The instant the finger pressure on the key ceases, the spring 30 will return the key, and this will rotate the pivotal support 13 for the jack toward the right on a radius extending from the pivotal support 2 to the pivotal support 13. This permits the end of the jack which is preferably slightly rounded as shown, to drop down back of the shoulder 14, and in a position close to the shoulder, to enable the jack to impart another impulse to the shoulder 14. This enables a string to be struck in rapid succession.

A suitable connection is made from the action to the damper. This may be accomplished by utilizing the lower end of the extension 7 and providing the same with a damper rod 40 to extend over to operate the damper (not illustrated in Figs. 1 and 2). A damper, however, is illustrated in Fig. 3, which will now be described in detail. In the embodiment of the invention illustrated in Fig. 3, the key 41 is mounted on a rocking pin 42 in a common manner employed in piano actions, but in this instance the downward extension 43 is connected to the forward end of the key. The key 41 is held up by a return spring 44 attached to the upper side of the keyboard support 45. The keys 41 are aligned in a horizontal position by means of an adjusting screw 46 passing through a bracket 47 extending down from the back end of each key, the forward end of the adjusting screw being provided with a padded head 48 to engage the rear side of the extension 43. In the construction shown in Fig. 3, the hammers such as the hammer 49, are pivotally supported on the hammer rail 50 to which the damper levers 51 are pivotally attached. The dampers 51 are held on by springs such as the spring 52, and the dampers are released by the actuation of the damper rod 53 that connects with the lower end of the extension 43. The mounting of the jack 54 is the same in this construction as in the embodiment illustrated in Figs. 1 and 2, but if desired, the back-check arm 55 of the hammer can be made much shorter, and the back-check pad 56 can be carried on a light wire arm 57. This back-check pad 56 may be made of arc-form as shown, to cooperate with a back-check rest 58 adjustably mounted in the lower end of the extension 43. In other respects the construction would be substantially identical with that shown in Figs. 1 and 2.

In the operation of the action (referring particularly to Figs. 1 and 2) when the key 1 is depressed, the movement of the key is imparted through the jack 12 to the shoulder 14, thereby giving an impulse to the hammer 9 that drives it forward toward the string 39. At the proper point in the movement of the hammer, the back-check arm 18 will engage the set-off screw 25 and disengage the forward end of the jack from the shoulder 14. The hammer will then travel on by its own momentum and strike the string. If the key 1 is held depressed, the hammer will rebound and be held by the back-check 26 in about the position illustrated in Fig. 2. It will be evident that the relation of the jack 12 to the hammer can be readily adjusted by removing the front board of the case, which will give access to the adjusting screw 37. It will also be evident that the height of the case 1 can be readily adjusted through the agency of the adjusting screw 33.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack in the form of a bar extending in a general horizontal direction anad substantially at right angles to the said extension, located between the said extension and the hammer for imparting by means of a thrust force acting longitudinally through the jack, an impulse to the hammer, and set-off means for deflecting the jack during the movement of the hammer to discontinue the impulse to the hammer.

2. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension, a jack pivotally connected with said downward extension and extending in a general horizontal direction toward the hammer, said hammer having means supporting the adjacent end of the jack and having a shoulder against which the said jack thrusts in imparting an impulse to the hammer, and set-off means for deflecting the jack during the movement of the hammer to move the same off the shoulder and discontinue the impulse to the hammer.

3. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack, a pivot bearing support for the jack carried on the said extension and supporting the jack so that it extends in a general horizontal direction toward the hammer, said hammer having a shoulder to take a thrust of a force exerted longitudinally through the jack to impart an impulse to the hammer, set-off means for deflecting the jack during the movement of the hammer to discontinue the impulse to the hammer, and means for adjusting said pivot bearing support to adjust the relation of the end of the jack to said shoulder.

4. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack, said downward extension having a body portion, and a tongue portion located between the body portion and said supporting means for the hammer, a pivotal support on the tongue for the jack, said jack extending from the pivotal support toward the hammer, and operatively connected with the hammer for actuating the same, and adjusting means mounted in the body portion for adjusting the tongue portion to regulate the position of the jack with respect to the hammer.

5. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack, said downward extension constructed of wood and having a body portion and a tongue portion integral with the body portion and located between the body portion and said supporting means for the hammer, a pivotal support on the tongue for the jack, said jack extending from the pivotal support toward the hammer, said hammer having a shoulder engaged by the end of the jack for imparting the impulse to the hammer for actuating the same, and adjusting means mounted in said body portion and engaging said tongue

to adjust the position of the tongue and thereby to regulate the relation of the end of the jack with respect to said shoulder.

6. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack, said downward extension constructed of wood and having a body portion and a tongue portion integral with the body portion and located between the body portion and said supporting means for the hammer, a pivotal support on the tongue for the jack, said jack extending from the pivotal support toward the hammer, said hammer having a shoulder engaged by the end of the jack for imparting the impulse to the hammer for actuating the same, adjusting means mounted on said body portion and engaging said tongue to adjust the position of the tongue and thereby to regulate the relation of the end of the jack with respect to said shoulder, and set-off means for deflecting the jack off of the shoulder during the forward movement of the hammer.

7. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack, said downward extension constructed of wood and having a body portion and a tongue portion integral with the body portion and located between the body portion and said supporting means for the hammer, a pivotal support on the tongue for the jack, said jack extending from the pivotal support toward the hammer, said hammer having a shoulder engaged by the end of the jack for imparting the impulse to the hammer for actuating the same, adjusting means mounted in said body portion and engaging said tongue to adjust the position of the tongue and thereby to regulate the relation of the end of the jack with respect to said shoulder, said hammer having a back-check arm; and a back-check rest supported on said tongue to cooperate with the back-check arm.

8. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension extending beyond the pivotal support for the key, a jack in the form of a bar extending between the said extension and the hammer for imparting a thrust force acting longitudinally through the jack to give an impulse to the hammer, set-off means for deflecting the jack during the movement of the hammer to discontinue the impulse to the hammer, a return spring for the key, and adjustable stop means for the key to enable the keys of the keyboard to be adjusted into horizontal alignment with each other.

9. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension secured to the underside of the key at an intermediate point on the length of the key, a jack pivotally attached to said downward extension and extending toward the hammer for actuating the same, said hammer having an actuating shoulder to receive the thrust of the end of the jack, resilient means for urging the free end of the jack downward, and a return spring for the hammer.

10. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer and having a downward extension attached to the underside of the key at an intermediate point on the length of the key, a return spring for the key engaging the underside of the key forward of the said downward extension, a jack pivotally supported on the downward extension, projecting toward the hammer and operatively connected with the hammer for actuating the same.

11. In a piano action, the combination of a hammer, a jack operatively connected with the hammer for actuating the same, a key having a body portion and a flexible tongue portion, means for pivotally supporting the jack on the tongue portion, and adjusting means mounted on the body portion for adjusting the tongue portion to regulate the relation of the jack with respect to the hammer.

12. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension, a jack in the form of a bar pivotally connected with said downward extension and extending in a general horizontal direction toward the hammer, said hammer having a shoulder against which the said jack imparts a thrust force passing longitudinally through the jack in imparting an impulse to the hammer, and set-off means for deflecting the jack during the movement of the hammer to move the same off the shoulder and discontinue the impulse to the hammer.

13. In an upright piano action, the combination of a hammer, means for supporting the same to swing on a substantially horizontal axis with the hammer's head located above the said axis, a key pivoted above and to the rear of the hammer, and having a downward extension secured to the under side of the key at an intermediate point on the length of the key, a jack pivotally attached to said downward extension and extending toward the hammer for imparting a thrust force acting longitudinally through the same, said hammer having an actuating shoulder to receive the thrust of the end of the jack, resilient means for urging the free end of the jack downward against the hammer, and a return spring for the hammer.

CARL SCHULZE.