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(54) **IMPROVEMENTS IN PIANO ACTIONS.**

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Description

The present invention relates to an upright piano and the like stringed keyboard instrument.

Figure 1 of the accompanying drawings shows the action of a typical known prior art piano. The string 10 is struck by a hammer 12 of which the movement is controlled by a key 14 pivoted at a point 16. When the key 14 is depressed it acts by way of a distance piece 18 to raise a wippen 20 which is in turn pivoted at a point 22. The wippen 20 carries a jack 24 which is pivoted at its lower end 26 and at its upper end engages in a recess 28 in the base 30 of the hammer 12.

It is necessary to ensure that the drive connection between the key 14 and the hammer 12 be disengaged before the hammer makes contact with the string 10. This is accomplished in the arrangement illustrated by providing a limb 32 on the jack which engages a fixed stop 34 after the jack has risen a predetermined distance. This engagement causes the jack to rotate clockwise as viewed so as to release the upper end of the jack 24 from the recess 28. After this, the jack continues travelling under its own inertia to strike the string 10.

The disadvantage of this construction is that each note requires a separate stop 34 which when the piano is first assembled requires individual adjustment. Thus apart from the complexity of the action, its assembly is very time consuming and this has contributed to the high cost of such instruments.

It is also necessary to ensure that the hammer 12 does not bounce during its return after striking the string 10. To absorb the energy of the hammer 12, a check 36 mounted on the wippen 20 includes a felt pad 38 which rubs against a similar pad 40 mounted on a foot 42 projecting from the base 30 of the hammer 12. This stops the hammer silently and when the key 14 is released the hammer 12 is brought to rest on a support bar 44 common to all the hammers. This construction, however, further complicates the hammer action.

The present invention seeks to mitigate the above disadvantages and to provide a piano in which the disengagement of the jack from the hammer does not require a separately adjustable stop and in which the construction of the hammer check may be simplified.

According to the present invention, there is provided a piano comprising a pivotably mounted hammer, a manually operable key, a wippen coupled to the key, a jack movably supported by the wippen and movable therewith, a recess in the hammer engageable by the jack and means for disengaging the jack from the recess prior to the hammer striking the string, characterised in that the jack is operative to re-engage in the recess in the hammer and to cooperate with the lower edge of the recess to couple the hammer to the wippen as the wippen returns to its rest position, in that the means for disengaging the jack from the recess in the hammer comprises an abutment on the hammer engageable with a surface of the jack

when the hammer is in a predetermined position and in that the wippen and the hammer are each formed of a plastics material and an extension of the wippen is operative to slidably and frictionally engage with a surface on the base of the hammer to check the return motion of the hammer.

It will be noted that the disengagement from the jack in the invention is achieved by the hammer itself. It might at first be considered undesirable to take energy from the hammer to effect this disengagement from the jack but it has been found in practice that the kinetic energy imparted to the hammer prior to disengagement is very substantially greater than the energy absorbed by the abutment with the jack and the effect on the hammer is not noticeable.

An advantage of the construction of the wippen from a plastics material is that the wippen may be formed integrally with the jack, the two being connected by a plastics flexible hinge. This makes for a particularly simple and inexpensive construction of the piano action requiring a minimum of separately moulded components.

After a key is released, it is important to ensure that the string stops resonating. In the prior art arrangement of Figure 1, the damping is effected by means of a pivoted damper 46 which is pivoted out of engagement with the string 10 by a so-called spoon 48 mounted on the wippen 20. In other known constructions, the damper is moved by an extension of the piano key 14. Each of these constructions has its attendant disadvantages. If the damper is operated by the key, then the keyboard cannot be readily separated from the action of the piano, making therefore for a more complex assembly. On the other hand, the wippen and spoon construction illustrated adds substantially to the inertia of the moving parts.

Accordingly in the preferred embodiment of the invention, the wippen of plastics material has an extension which acts both as a hammer check and as the means for lifting the damper off the string when the piano key is depressed. Because the hammer check is serving the dual function of raising the damper and checking the hammer, the inertia of the moving parts is minimised, while still permitting the action and the keyboard to be made and assembled separately.

It is necessary to ensure that the hammer be returned to its rest position when the piano key is released in order to permit staccato playing of the instrument. This forcible retraction of the hammer is achieved in the arrangement of Figure 1 by a length of slack string or tape 50, extending from the wippen 20 to the hammer 12. During normal playing, this tape is ineffective, but if the wippen during staccato playing drops before the hammer 12 has returned to its rest position, then the tape 50 becomes taut and pulls the hammer 12 down with the wippen.

In the preferred embodiment of the invention, the jack is operative to re-engage in the recess in the hammer and to cooperate with the lower edge of the recess to couple the hammer to the wippen

as the wippen returns to its rest position.

As the hammer and the jack are both preferably made of a plastics material, the re-engagement of the jack in the recess may cause a slight click. It is therefore preferred that a cushioning pad be incorporated in the recess to muffle any such noises.

Brief description of the drawings

The invention will now be described further by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic representation of a known piano action as described above, and

Figure 2 is a similar view of an embodiment in accordance with the present invention.

Detailed description of the preferred embodiment.

In Figure 2, there is illustrated an action in which the wippen 120 is coupled to the piano key 114 by means of a prolong 118 rather than a distance piece. The appropriate selection in any case will depend on the dimensions of the frame and the desired height of the keyboard relative to the action. It is simpler to employ distance pieces if the construction permits it since the keys are then totally separate from the action. However, in the described embodiment it is assumed that the keys are arranged higher than the mechanism.

The wippen 120 is constructed in one piece with a jack 124 and with a mounting block 125 which is secured to the body of the piano. The wippen may pivot relative to the mounting block 125 about a film hinge 127 and the jack may pivot relative to the wippen about a film hinge 129.

The hammer 112 is pivoted at 115 relative to the piano frame the pivot not being shown in detail. This bearing must be free and it may include a bearing insert. However, to simplify the assembly, the pivot may be formed by a keyhole slot so that it may be simply pushed into place over a pivot rod.

The base 130 of the hammer 112 is formed with a recess 128 engageable by the head of the jack 124. The recess is lined with a sound muffling pad 123. The base of the hammer 112 is also formed with a check surface 142 which cooperates with a check surface 136 formed on an extension 137 of the wippen 120.

The damper comprises a felt pad 147 mounted on a pivoted lever 146 which is biased by means of a spring (not shown) towards the string 110. The lower end of the lever 146 is not illustrated, in the interest of clarity, but is actuated by the extension 137 to lift the pad 147 off the string 110 when the wippen is in a raised position. The lower end of the lever 146 has, in known manner, a second limb operable by means of the loud pedal which enables all the dampers to be raised simultaneously off the strings 110.

In operation, when a note is to be played, the player depresses the key 114 raising the end seen in the drawing. The wippen 120 is pivoted clockwise, as viewed, about the film hinge 127, raising the jack 124 relative to the hammer 112. The nose

124a of the jack 124 acts on the upper edge of the recess 128 and pivots the hammer anti-clockwise, as viewed, about the bearing 115. When the hammer is near vertical, as viewed, a heel portion 143 of the base 130 of the hammer 112 abuts a limb 124b of the jack 124. Because of the inertia in the hammer, the jack is pivoted by this abutment clockwise about the film hinge 129 retracting its nose 124a from the recess 128. Consequently, the jack is disengaged from the hammer and the latter continues under its own inertia to move in the direction of the string.

After striking the string 110, the hammer 112 bounces back while the wippen 120 is still in a raised position. The surface 136 of the check and surface 142 on the base of the hammer then slidably and frictionally engage one another to absorb the energy of the hammer and bring it smoothly and silently to a stop. It has been found, surprisingly, that the plastic surfaces suffice to achieve silent and effective checking of the return motion and the surfaces are not subjected to excessive wear.

As the wippen rises, the extension 137 lifts the damper pad 147 off the string 110. When the wippen 120 again drops to its rest position, the lever 146 pivots counterclockwise to damp the string once again.

During staccato playing, the wippen returns to its rest position before the normal return of the hammer. Thus, while the hammer is near a vertical position, as viewed, the jack drops and the nose 124a again enters the recess 128. The cushion 123 prevents any clicking from occurring during this movement. During the continued descent of the jack 124 its nose 124a engages the lower edge of the recess 128 and forcibly pulls the hammer back to its rest position so that the key may be played in rapid succession.

It is not essential that the wippen be designed to operate the damper as the latter may, as already known, be operated directly by the key.

Claims

1. A piano comprising a pivotably mounted hammer (112), a manually operable key (114), a wippen (120) coupled to the key (114), a jack (124) movably supported by the wippen (120) and movable therewith, a recess (128) in the hammer (112) engageable by the jack (124) and means for disengaging the jack (124) from the recess prior to the hammer striking the string, characterised in that the jack (124) is operative to re-engage in the recess (128) in the hammer and to cooperate with the lower edge of the recess to couple the hammer to the wippen as the wippen returns to its rest position, in that the means for disengaging the jack (124) from the recess (128) in the hammer (112) comprises an abutment (143) on the hammer (112) engageable with a surface of the jack (124) when the hammer (112) is in a predetermined position and in that the wippen (120) and the hammer (112) are each formed of a plastics material and an extension (137) of the wippen (120) is operative to slidably and

frictionally engage with a surface (142) on the base (130) of the hammer (112) to check the return motion of the hammer.

2. A piano as claimed in claim 1, wherein the wippen (120) is formed integrally with the jack (124), the two being connected by a plastics flexible hinge (129).

3. A piano as claimed in claim 1 or 2, wherein a damper (146, 147) is provided for damping the vibrations of the string when the key (114) is released, and wherein the wippen (120) has an extension (137) which acts both as a hammer check and as means for lifting the damper (146, 147) off the string when the key is depressed.

4. A piano as claimed in any preceding claim, wherein a cushion (123) is provided in the recess (128) to prevent noise upon engagement of the jack (124) in the recess (128).

Patentansprüche

1. Ein Klavier, bestehend aus einem drehbar montierten Hammer (112), einer manuell betätigten Taste (114), einem mit der Taste (114) verbundenen Hebeglied (120), einer Stosszunge (124), die am Hebeglied (120) beweglich gelagert ist und mit diesem bewegt werden kann, einer Aussparung (128) im Hammer (112), in die die Stosszunge (124) eingreifen kann, und einer Vorrichtung, mit der der Eingriff der Stosszunge (124) aus der Aussparung freigegeben wird, bevor der Hammer die Saite anschlägt, dadurch gekennzeichnet, dass die Stosszunge (124) so ausgelegt ist, dass sie erneut in die Aussparung (128) des Hammers eingreift und im Zusammenwirken mit der unteren Aussparungskante den Hammer mit dem Hebeglied verbindet, wenn das Hebeglied in seine Ruhestellung zurückkehrt, dadurch, dass die Vorrichtung zur Freigabe des Eingriffs der Stosszunge (124) aus der Aussparung (128) des Hammers (112) eine Stossfläche (143) auf dem Hammer (112) umfasst, die in eine Oberfläche der Stosszunge (124) eingreifen kann, wenn der Hammer (112) eine gegebene Position einnimmt, und dadurch, dass sowohl das Hebeglied (120) als auch der Hammer (112) aus Kunststoff bestehen und eine Verlängerung (137) des Hebeglieds (120) so ausgelegt ist, dass sie gleitend und reibend in die Oberfläche (142) auf der Nuss (130) des Hammers (112) eingreift, um die Rückfallbewegung des Hammers aufzufangen.

2. Ein Klavier gemäss Anspruch 1, wobei das Hebeglied (120) und die Stosszunge (124) eine Einheit bilden und über ein flexibles Kunststoffgelenk (129) miteinander verbunden sind.

3. Ein Klavier gemäss einem der Ansprüche 1 oder 2, das einen Dämpfer (146, 147) aufweist, der die Schwingungen der Saite beim Loslassen der Taste (114) abdämpft, und bei dem das Hebeglied (120) eine Verlängerung (137) aufweist,

die sowohl die Funktion eines Hammerfängers hat, als auch dazu dient, den Dämpfer (146, 147) beim Niederdrücken der Taste von der Saite abzuheben.

4. Ein Klavier gemäss einem der vorstehenden Ansprüche, bei dem die Aussparung (128) mit einer dämpfenden Auflage (123) versehen ist, um Geräusche beim Eingriff der Stosszunge (124) in die Aussparung (128) zu verhindern.

Revendications

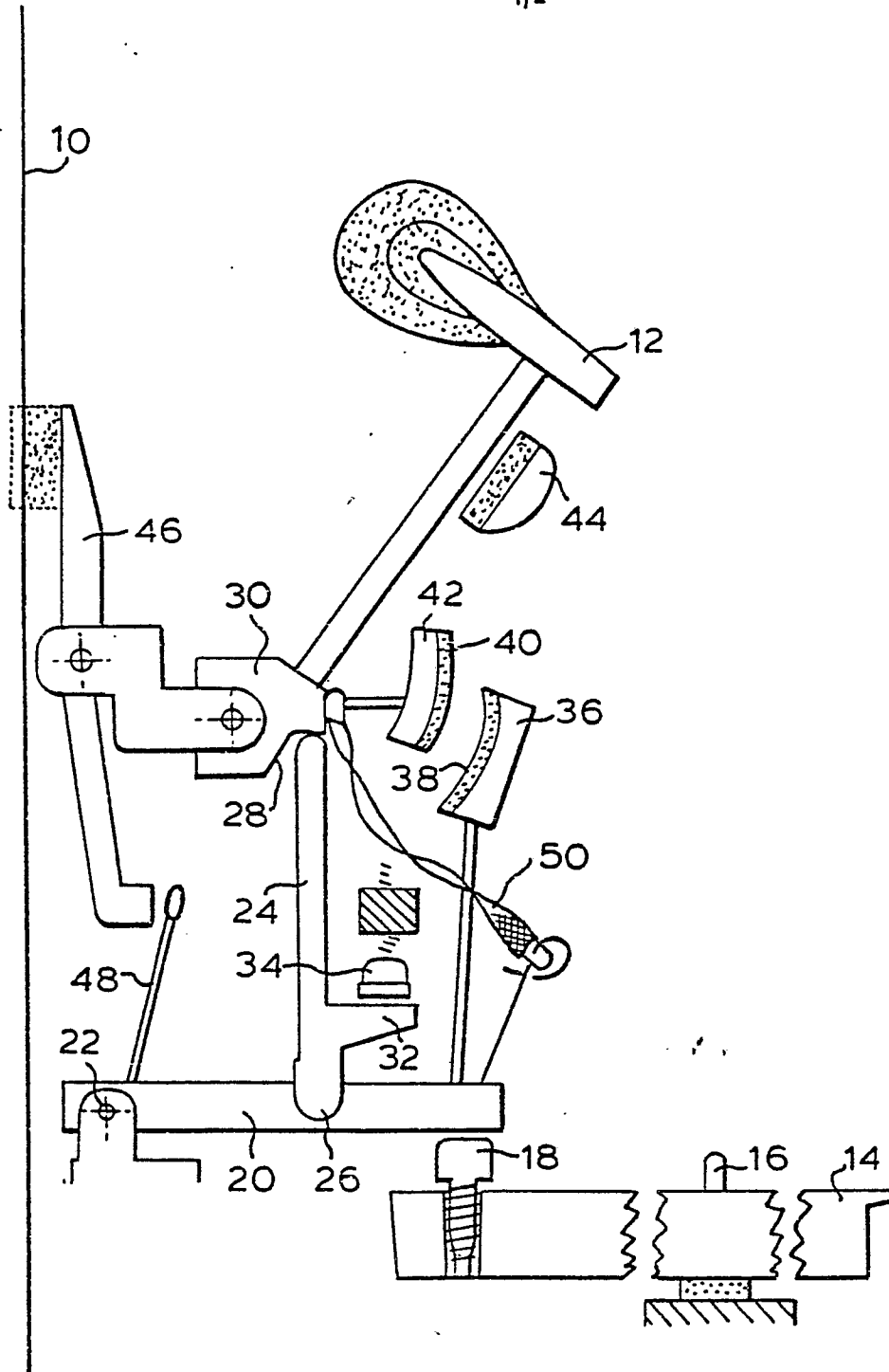
1. Piano comprenant un marteau monté de manière pivotante (112), une touche manœuvrable manuellement (114), un échappement (120) couplé à la touche (114), un sautereau (124) supporté de manière mobile par l'échappement (120) et mobile avec celui-ci, une cavité (128) ménagée dans le marteau (112) et avec laquelle le sautereau (124) peut venir en engagement, et des moyens permettant de désengager le sautereau (124) de la cavité avant que le marteau ne frappe la corde, caractérisé en ce que le sautereau (124) travaille de manière à se réengager dans la cavité (128) située dans le marteau et à coopérer avec le bord inférieur de la cavité afin de coupler le marteau à l'échappement lorsque l'échappement revient dans sa position de repos, en ce que les moyens permettant de désengager le sautereau (124) par rapport à la cavité (128) située dans le marteau (112) comprennent une butée (143) située sur le marteau (112) et pouvant venir en engagement avec une surface du sautereau (124), lorsque le marteau (112) se trouve dans une position prédéterminée et en ce que l'échappement (120) et le marteau (112) sont chacun réalisés en matière plastique et un prolongement (137) de l'échappement (120) travaille de manière à venir en contact de glissement et de frottement avec une surface (142) située sur la base (130) du marteau (112) afin de freiner le mouvement de retour du marteau.

2. Piano tel que revendiqué dans la revendication 1, dans lequel l'échappement (120) est réalisé venu de matière avec le sautereau (124), les deux pièces étant reliées par une articulation flexible en matière plastique (129).

3. Piano tel que revendiqué dans la revendication 1 ou 2, dans lequel un étouffoir (146, 147) est prévu pour amortir les vibrations de la corde lorsqu'on relâche la touche (114), et dans lequel l'échappement (120) présente un prolongement (137) qui agit à la fois comme frein de marteau et comme moyen pour soulever l'étouffoir (146, 147) à l'écart de la corde lorsqu'on enfonce la touche.

4. Piano tel que revendiqué dans une revendication précédente quelconque, dans lequel un coussin (123) est prévu dans la cavité (128) pour amortir le bruit lors de l'engagement du sautereau (124) dans la cavité (128).

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