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(54) Lock mechanism

(57) The invention relates to a lock mechanism comprising a rotatable input member, a reciprocally moveable output member and an intermediate member having ends which are linked to the input and output members. One end of the intermediate member linked to the output member is arranged to be selectively moveable between one of two positions in which it can either transmit force from the input member to the output member or not. Control means are provided for controlling the said position which is selected for the intermediate member.

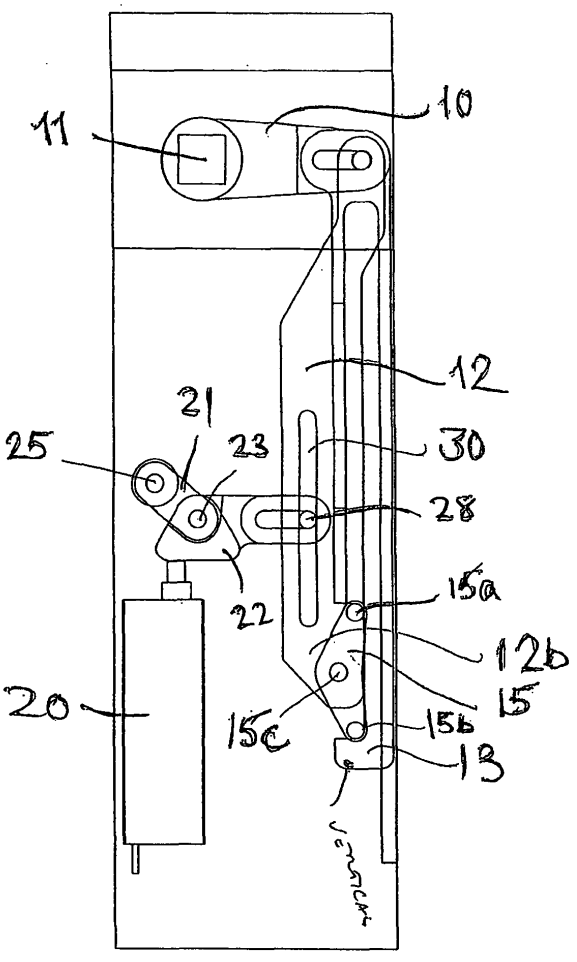

FIG 1

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Description

[0001] The present invention relates to a lock mechanism and more particularly to a lock mechanism which has a large motion but minimal free-play.

[0002] There are many instances where a lock mechanism is required which requires a large motion but one of the problems associated with a large motion is that such mechanisms often have a relatively large amount of free-play which is disadvantageous from a number of points of view.

[0003] It is an object of the present invention to provide a lock mechanism with reduced free-play and more particularly to a lock mechanism having a bi-directional coupling with little or no free-play in either direction.

[0004] It is a further object of the present invention to provide a lock mechanism which can be electrically latched and/or unlatched in a convenient manner.

[0005] The above two objects can be present either individually or in combination in a preferred lock mechanism.

[0006] In order that the present invention be more readily understood, an embodiment thereof will now be described by way of example with reference to the accompanying drawings in which:-

Fig. 1 shows a lock mechanism in a first condition;
Fig. 2 shows the lock mechanism of Fig. 1 in a second condition; and
Fig. 3 shows the mechanism of Fig. 1 in an intermediate condition.

[0007] There are many instances where locks are required which operate output members having relatively large movements. Often this results in quite large forces needing to be generated or transferred within the lock mechanism. One such instance is the locks which are used for PVC windows and/or doors where the complete lock mechanism fits inside the frame of the window or door. Such mechanisms also often have long bars so as to provide for a plurality of locking points along the length of one of the elements of the door or window.

[0008] Such mechanisms have a number of constraining features one of which is that the complete mechanism must be located within the thickness of the door or window frame and the other is that it would be advantageous to provide a mechanism which is capable of being adapted to a number of different situations such as a handle on only one side, handles on both sides, or a handle on one side which is not connected to the handle on the other side of the window or door.

[0009] Turning now to the drawings, the same reference numerals are used throughout the drawings to represent the same parts. Referring firstly to Fig. 1, this shows a mechanism in which the originating force is provided by a rotable lever 10 which is mounted on a square section shaft 11 which in turn is capable of rotation by a user operating a handle or knob. The free end of the lever 10 is linked to an end 12a of an intermediate member 12 by means of a pin and slot arrangement which provides for true reciprocation of the intermediate member 12 as the arm 10 rotates. The other end 12b of the member 12 is linked to an output rod 13 by a specially constructed linkage which will be described in more detail later. The output rod 13 transmits the reciprocal motion of the intermediate member 12 to an output linkage or mechanism which, depending on the use to which the lock is to be put, may amplify the motion of the member 13.

[0010] The intermediate member 12 is linked to the output rod 13 by means of a controlled linkage. The controlled linkage comprises a pivotally mounted rocker element 15 on the end 12b of the member 12 which engages with the output member 13 at two pivot points 15a and 15b. It will be noted that the main rocker pivot 15c is not in line with the pivot points 15a and 15b. It is to be further noted that the pivot points 15a and 15b are not fixed to the output member 13. Rather, they constitute additional axis about which the rocker 15 may pivot depending on the constraints placed upon the intermediate member 12. This will now be described in more detail.

[0011] Let us consider that the pivot points 15a and 15b are in fact constituted by circular cross-section pins which are received in arcuate recesses in the ends of a slot 18 in the output member 13. If a force is applied to the main pivot 15c in a direction such that the pins 15a and 15b are held in the recesses, then any linear movement of the intermediate member 12 parallel to the length of the slot in the output member 13 will result in reciprocation of the output member 13. Consequently, it will be apparent that any rotation of the handle or knob attached to the square section shaft 11 will result in reciprocation of the output member 13 in this condition.

[0012] Conversely, in the absence of a holding force on the main pivot 15c, because the main pivot 15c is out of line with the line joining the pivot points 15a and 15b, the rocker 15 will pivot about either the pin 15a or the pin 15b depending upon the rotational direction of the arm 10. This is clearly shown in Fig. 3 where the rocker 15 is seen to be pivoting about the pin 15a and also in Fig. 2 where the arm 10 is seen to be fully rotated which has, in turn, fully rotated the rocker 15 about the pin 15a. In this condition the output member 13 has not been moved despite the rotation of the knob or handle attached to the shaft 11.

[0013] It will be apparent, however, that if a force is applied to the intermediate member 12 in a direction to maintain the rocker 15 in the condition shown in Fig. 1, any rotation of the knob or handle attached to the shaft 11 will result in reciprocation of the output member 13.

[0014] The pin 15b is provided so as to enable the output shaft to be moved either upwards from the position shown in Fig. 1 or additionally in a downwards direction from the position shown in Fig. 1.

[0015] It will also be appreciated that the above-described mechanism could be modified by the application of a biasing mechanism which will return the arm 10,

intermediate member 12 and rocker 15 from the position shown in Fig. 2 to the condition shown in Fig. 1.

[0016] If we now turn to the situation where it is desired to reciprocally move the output member 13, this is achieved, as mentioned above, by providing a force on the intermediate member in a direction to maintain the rocker 15 in the condition shown in Fig. 1 with the pins 15a and 15b in the slot in the output member 13. This can be achieved in a number of ways but in the present embodiment, it is preferred to do this under the control of an electrically operated member 20 which is arranged to act on a toggle mechanism in the form of two pivotally linked arms 21 and 22 which are pivotally connected together by pivot 23. The link 21 is pivotally moveable about a fixed pivot point 25 and the free end of the link 22 is coupled to the intermediate member 12 by means of a pin 28 fixed to the free end of the link 22 and received in a slot 30 in the intermediate member 12. The pin 28 is constrained to move in a direction transverse to the direction of reciprocation of the output member 13 by being received in a transversely directed slot provided in a fixed part associated with the overall lock mechanism.

[0017] In the absence of any other forces such as those generated by the electrically operated device 20, and because the fixed pivot 25 is not aligned with the slot in the fixed portion of the housing, the linkage formed by the links 21 and 22 will be free to collapse to the condition shown in Fig. 2. However, if a force is applied to the linkage 21, 22 so as to resist or inhibit the collapsing of the linkage, the intermediate member 12 cannot move in a direction to permit rotation of the rocker 15 about the pin 15a and consequently rotation of the square section shaft 11 will result in reciprocation of the output member 13. In the preferred embodiment, the device 20 is in the form of an piezo ceramic actuator such as the one sold as the AL2 by Servocell Limited which can be electrically controlled to either permit collapsing of the linkage 21,22 or inhibit collapsing of the linkage 21,22 by contacting a suitable part of the linkage.

[0018] As before, this arrangement is bi-directional as long as one dimensions and positions the slot 30 appropriately and biasing of the mechanism can also be provided in this condition also.

[0019] The above mechanism is the basis mechanism which can be utilised in situations when a handle need be provided on only one side of the door or window or where it is appropriate to have single solid shaft 11 with handles on both the inside and outside. It is possible to modify the above construction so as to provide for the situation where one wishes to have a handle on the inside which is not rigidly coupled to handle on the outside so as to permit a number of different operational facilities. This is achieved by means of utilising a common output member 13 which has an increased dimension into the thickness of the paper and providing two intermediate members 12 and control linkages 21,22 with associated electrical control, if desired. Each of the intermediate members 12 would be connected to its own shaft 11 and handle or knob.

Claims

1. A lock mechanism comprising a rotatable input member, a reciprocally moveable output member and an intermediate member having ends which are linked to the input and output members, the one end of the intermediate member in engagement with the output member is arranged to be selectively moveable between one of two positions in which it can either transmit force from the input member to the output member or not, and wherein control means are provided for controlling the position selected for the intermediate member.

2. A lock mechanism according to claim 1 wherein the control means includes two pivotally linked members located between a fixed point on the mechanism and the intermediate member.

3. A lock mechanism according to claim 2 wherein the control means includes an electrically operable device arranged to control rotation of the linked member pivotally mounted to the fixed point.

4. A lock mechanism according to claim 3 wherein the electrically operable device is a piezo ceramic actuator.

5. A lock mechanism according to any one of the preceding claims wherein the intermediate member is provided with a rocker element having two spaced pivot members for engagement with the output member.

6. A lock mechanism according to claim 5 wherein the two spaced pivot members are formed by pins arranged to be received in recesses in the output member.

7. A lock mechanism according to claim 5 or 6 wherein the output member is formed with a slot, the length of which is substantially the same as the distance between the pivot members.

FIG 1.

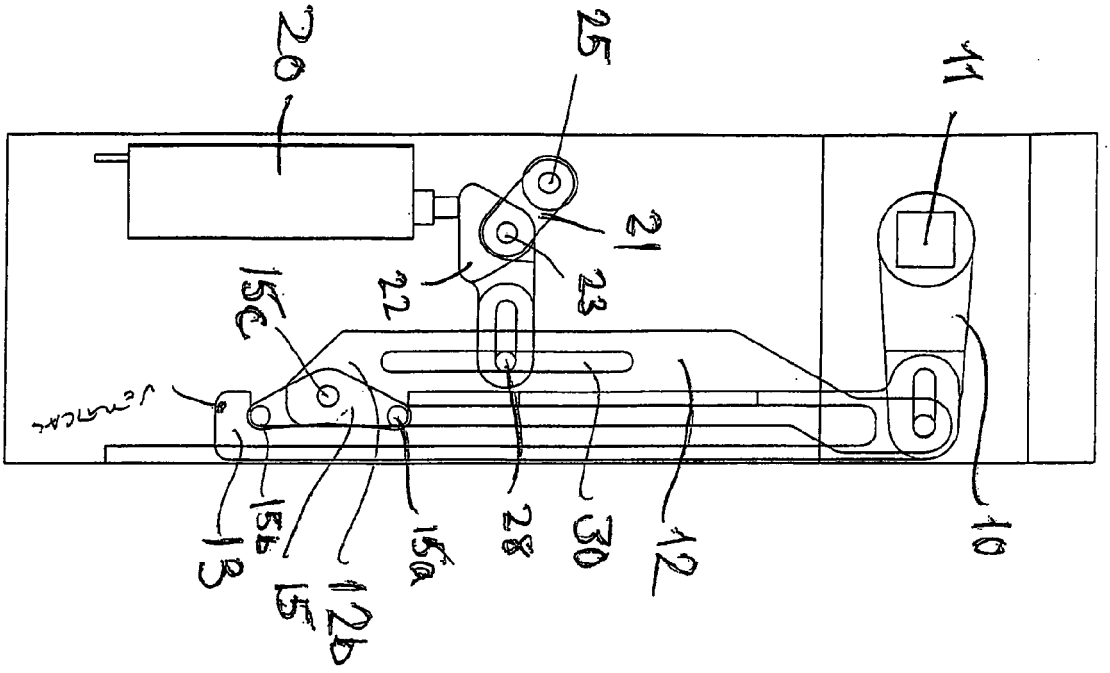


FIG. 2

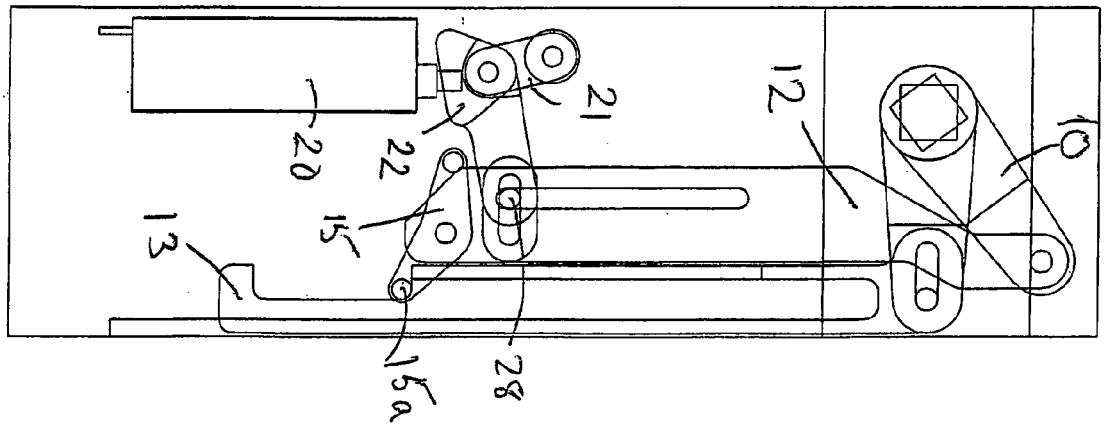
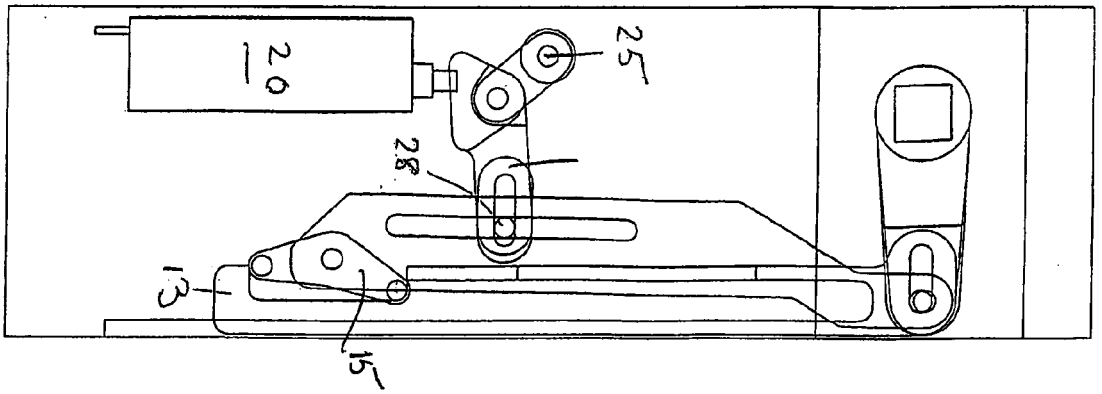


FIG. 3.



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EUROPEAN SEARCH REPORT

Application Number
EP 08 25 2028

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* page 3, line 1 - line 27; figures 1-3 *	2,3,5	
X	WO 00/61897 A1 (STROEBECH KRISTIAN DOGEL) 19 October 2000 (2000-10-19) * page 6, line 13 - page 8, line 4; figure 1 *	1	TECHNICAL FIELDS SEARCHED (IPC) E05B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 November 2008	Perez Mendez, J

CATEGORY OF CITED DOCUMENTS

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