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(54) FASTENING FOR FREIGHT STOWAGE

(71) We, SOCIETE D'EXPLOITATION DES ETABLISSEMENTS H. PELLETIER, a French Limited Company, of 8, rue des Gardinous, 93300 Aubervilliers, France, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a fastening for the stowage of freight in a vehicle, and especially for the stowage of containers or pallets in the bay of an aircraft.

In vehicles, such as aircraft, which have to travel at high speed, the containers or pallets containing the cargoes to be carried may weigh up to several tons and must nevertheless be solidly stowed on the platform of the bay of the vehicle by suitable devices in order to reduce to an absolute minimum the risk of movement of these pallets during flight or in the event of rough landings.

Fastenings are known which comprise two fastening arms arranged transversely pivotally between two supporting spars and which are provided with anchor flanges for containers or pallets. Fastenings of this type also comprise means for making the fastening arms pivot between a fastening position in which the fastening arms project with respect to the spars and hold the pallets solidly by their anchor flanges and a releasing position in which the fastening arms are depressed between the spars.

In one of the known fastenings the fastening arms are controlled by a stop which is actuated manually and is located between the spars, this stop being able to slide by engagement of its opposite ends in slides arranged inside the spars and having locking notches for the stop. Under certain conditions of transport of the freight, for example at the time of a violent shock, there is a risk of the stop coming out of the notches and moving inside the slides, so that this lock does not ensure maximum safety in the transport of cargo. Again, the operations of fastening and releasing must be carried out manually. They are therefore lengthy and not very convenient for the operator, who must bend down for each operation. In the case of a freight aircraft, the length of time for the operations necessary for the correct positioning and fastening or releasing of the pallets increases the time necessary for intermediate stops, and this is injurious to optimum utilization of the freight line concerned.

An object of the present invention is to provide a fastening in which the safety of the fastening is increased as compared with the known types of fastening.

According to the invention, a fastening for stowage of freight in a vehicle, such as the stowage of containers or pallets in the bay of an aircraft, comprises two supporting spars; two fastening arms arranged longitudinally between the spars and hinged pivotally about a common transverse axis so that they can be pivoted between a fastening position and a releasing position, each fastening arm having a flange for anchorage of the freight; a handle mounted to pivot about said common transverse axis between the fastening arms, the handle including a foot portion having a first surface for contact with a bearing surface of the flange of one of the fastening arms, and a second surface for contact with a bearing surface of the flange of the other of the fastening arms, so that the foot portion is wedged by its two surfaces between the bearing surfaces on the fastening arms when said arms are in the releasing position, and another portion at the opposite end of the handle from the foot portion and offset from the surfaces of the foot portion so that said other portion is located in an accessible position when the fastening arms are in the releasing position

so that the handle can be moved for actuating the fastening arms to their fastening position.

In a fastening in accordance with the invention the handle may therefore be easily manipulated by an operator in order to enable him to pull the fastening arms up to their fastening position without difficulty.

Preferably, one of the two fastening arms is mounted pivotally about a fixed transverse spindle carried by the spars of the fastening, and the second fastening arm cooperates with a locking lever which is able to rock about a transverse pivot fixed to the spars.

When the handle is pulled manually, the locking lever turns about its pivot and engages with the second fastening arm when the latter has reached its fastening position.

In a preferred embodiment of the invention the second fastening arm is provided at its foot with a transverse pin the ends of which are engaged slidingly in two slideways arranged inside two side arms of the locking lever, and each slideway includes at its end adjacent to the latches a notch which forms a stop for receiving the pin at the time of fastening of the fastening arms.

When the handle is pulled, starting from the releasing position of the fastening arms, the pin on the second fastening arm slides in the slideways in the lever which turns about its pivot. The pin then comes into engagement with the notches to hold the fastening arms in their fastening position whilst the lever returns to its starting position.

In accordance with a further preferred embodiment of the invention, the upper face of the lever is substantially in the same plane as the upper face of the spars, the fastening being assumed horizontal. By virtue of this feature, a pallet fixed by means of the fastening in accordance with the invention rests on the lever, which cannot be released as long as the pallet remains in position. The safety of the fixing of the freight is thus significantly improved.

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

Figure 1 is a perspective diagram of the platform of a freight bay in an aircraft,

Figure 2 is a plan view of one form of freight stowage fastening in accordance with the invention,

Figure 3 is a front elevation of the lock of Figure 2,

Figure 4 is a longitudinal section along a line IV-IV of Figure 2, showing the fastening in the released position,

Figure 5 is a longitudinal section similar to Figure 4, showing the fastening in the fastening position, and

Figure 6 is a transverse section along a line VI-VI of Figure 4.

Figure 1 shows a platform 1 of a freight bay for a vehicle which has to move at high speed, such as a freight aircraft. The platform 1 includes parallel longitudinal rails 2 equipped with transverse rollers and side guides 4 which frame a central platform 3 provided with a set of balls (not shown) spaced uniformly over its whole area. Fastenings 5 are distributed at the ends of the roller rails 2 as well as in the central platform 3. In the embodiment shown, five transverse rows of fastenings 5 are thus distributed from one end of the platform 1 to the other.

In order to load and fix containers or pallets on to the platform 1, they are in general brought through a side door of the vehicle on to the platform 3, then they are pushed along the roller rails 2 up to a predetermined location between two rows of fastenings 5. These are then locked in order to fix the pallet solidly at its location for the whole of the time of shipment.

Referring to Figures 2 to 6, an example of a fastening 7 in accordance with the invention will now be described, with which the freight bay platform 1 shown in Figure 1 may be equipped.

The fastening 7 comprises two fastening arms 8 and 9 arranged transversely and pivotally between two parallel metal supporting spars 11 and 12 formed integrally with interconnecting end brackets 10 and 20. The fastening 7 is attached to the platform 1 of the bay by a device 13 which is fixed to the bracket 20 through which it passes. The device 13, which is known per se, includes a handle 56 for moving two fingers 53. These fingers cooperate with two fixed fingers 54 and are associated with two return springs 55. The fingers are engageable in a suitable channel in the platform 1. The arms 8 and 9 comprise flanges 14 and 15, respectively, which are used for anchorage of the pallets, which to this end are equipped with projecting edges which engage under the flanges 14 and 15. The arm 9 is equipped with two side flanges 15 which frame the central flange 14 of the arm 8.

The arms 8 and 9 can pivot between a fastening position shown in Figure 5 in which they are projecting vertically with respect to the spars 11 and 12, and a releasing position shown in Figure 4 in which the arms 8 and 9 are retracted between the spars 11 and 12.

The fastening also includes a handle 16 mounted to rotate about a transverse axis about which the arms 8 and 9 are hinged pivotally on opposite sides of the handle 16. The flange 14 has a bearing surface 18 (Figures 4 and 5) which acts as a bearing for the handle 16 in its fastening and releasing positions. The handle 16 includes a foot 21,

one of the faces of which is offset from a loop portion 22 at an angle of about 120° in the embodiment shown, the bearing surface 18 of the flange 14 having a sufficient area for receiving the foot 21 when the arms 8 and 9 are in the fastening position (Figure 5). The area of the bearing surface 18 is slightly inclined to the horizontal, if the fastening 7 is assumed horizontal.

The other face of the foot 21 of the handle 16 is shaped so as to come into contact with a bearing surface 19 on the second arm 9 in the releasing position. The bearing surface 19 is formed substantially at the centre of a crossbar 52 connecting the side flanges 15 on the arm 9. In this releasing position shown in Figure 4, the foot 21 is therefore wedged by its two faces between the bearing surface 18 on the arm 8 and the bearing surface 19 on the arm 9. The dimensions of the foot 21 and the slopes of its faces and of the bearing surfaces 18 and 19 are chosen so that the arms 8 and 9 are completely retracted in this position. Moreover, the angle between the foot 21 and the loop 22 of the handle 16 is such that in this unlocked position the loop is inclined slightly upwards and is easy to grasp with the finger so that during the fastening operation the ring 16 is easily accessible and can properly play its part as an actuating lever for the latches 8 and 9.

The arm 8 includes a central portion 23 (Figure 2) connecting the flange 14 to a tubular foot 24 mounted pivotally about a fixed transverse spindle 25, the ends of which are retained in the spars 11 and 12. A helical spring 26 is wound round the tubular foot 24 and includes a central part 27 which straddles the central portion 23 of the arm 8, forcing it resiliently towards the inside of the fastening in the direction indicated by the arrow F (Figure 5). The arms 8 and 9 are therefore urged by the spring 27 towards the releasing position shown in Figure 4. The central portion 23 of the arm 8 is hinged about the spindle 17 between two side arms 28 and 29 of the arm 9, whilst the foot 21 of the handle 16 is recessed into the flange 14 as is clearly seen in Figure 2. The arms 28 and 29 are connected at the level of their end flanges 15 by a crossbar 52 (Figure 2) in the centre of which is arranged the bearing surface 19. The handle 16 is wedged between the bearing surface 19 and the bearing surface 18 in the releasing position (Figure 4).

The arm 9 cooperates with a locking lever 31 which can rock about a transverse pivot 32 fixed to the spars 11 and 12. The arm 9 is provided at its foot 33 with a transverse spindle 34 the ends of which slidingly traverse two similar slideways 35 (Figures 4 and 5) arranged inside two parallel side arms 36 of the lever 31. The ends of the spindle 34 are engaged slidingly in two longitudinal recesses 45 formed in the spars 11 and 12 between the spindle 25 and the pivot 32. The arms 36 arranged between the arm 9 and the spars 11 and 12 are urged continuously against the ends of the spindle 34 under the action of resilient means which will be described later.

Each slideway 35 includes at its end adjacent to the arms 8 and 9 a semi-circular notch 37 (Figure 5) forming a stop for receiving the spindle 34 upon locking of the arms 8 and 9. The notches 37 are elongated in the direction of the pivot 32 by planes 38 which are inclined with respect to the upper faces of the arms 36 of the lever 31. In the embodiment illustrated, the inclined planes 38 extend over substantially half the length of the arms 36.

The upper face of the lever 31 is located substantially in the same plane as the upper face of the spars 11 and 12, the upper faces being those which are at the top when the lock is located horizontally as shown in the drawings.

The fastening 7 further includes means for urging the lever 31 resiliently to rotate in the direction which is opposite to unlocking of the arms 8 and 9, that is to say in the direction indicated by the arrow G (Figure 5). In the embodiment illustrated, the urging means consists of two rigid blocks 39*a* and 39*b* connected at their top portions by a bridge 39*c* and fixed on to the end bracket 10 under a recess 30 in that end 41 of the lever 31 which is opposite to the notches 37 (Figure 6). A helical spring 42 is fixed to the bracket 10 under the bridge 39*c* between the two blocks 39*a*, 39*b*. The spring urges a small transverse metal plate 50 away from the bracket 10. This plate engages, under the bridge 39*c*, with the feet of two side arms 51 which bound the recess 30 in the end 41 (Figure 6). The end 41 is attached to the arms 36 by bolts 40.

Under the action of the spring 42, the plate 50 thrusts against the arms 51 of the end 41 of the lever 31, which tends to make the lever 31 turn about its pivot 32. Hence, the arms 36 are forced against the ends of the transverse spindle 34 of the arm 9, the bridge 39*c* forming a stop for the plate 50 in order to limit the rotation of the lever 31.

In a manner already known per se, attachments 43 are secured in the bracket 10 and in the blocks 39*a* and 39*b*, and when the fastening 7 is in service enlarged heads of the attachments 43 are engaged in a cavity rail in the platform 1 of the freight bay. Any suitable number of attachments may be used. For example four are used in the embodiment illustrated.

The end 41 of the lever 31 has a trapezoidal upper area (Figure 2) for receiving the foot of an operator for releasing the arms 8 and 9. The area advantageously has trans-

verse grooving 46 to reduce slipping of the foot on the area.

The lock 7 is also provided, in a known fashion, with a transverse roller 49 attached to the spars 11 and 12 between the fixing device 13 and the arm 8.

Operation of this fastening in accordance with the invention is as follows.

In the releasing position shown in Figure 4, the arms 8 and 9 and the handle 16 are held retracted inside the spars 11 and 12 under the action of the spring 26. The handle 16 rests against the bearing surface 19 on the arm 9, the spindle 34 of which is located adjacent the ends of the slideways 35 opposite to the notches 37. Under the action of the spring 42, the arms 36 bear against the spindle 34, and the handle 16 is, in addition, forced by way of its foot 21 into contact with the bearing surface 18.

When a first pallet is loaded into the freight bay of the vehicle and is brought up against a fixed end-stop which is in itself known, the fastenings 7 which must fix the pallet in the desired location have to be locked. The operator engages one or two fingers inside the triangular loop 22 of the handle 16 and pulls it up in the direction of the arrow H (Figure 4). The handle pivoting about its axis 17 remains in contact, at its foot 21, with the bearing surface 18, so acting as an actuating lever which simultaneously raises the arms 8 and 9 by making the arm 8 pivot about the transverse spindle 25. At the same time, the spindle 34 of the arm 9 slides along the slideways 35 towards the arm 8. During the course of this movement, the spindle 34 bears along the inclined planes 38 and thereby slightly raises the lever 31 which rocks about its pivot 32.

The arms 8 and 9 therefore effect a rotation of 90 degrees in a vertical plane against the opposing action of the spring 26, and they are held in this fastening position (Figure 5) when the transverse spindle 34 is engaged in the notches 37. The action of the spring 42 against the lever 31 urges it firmly against the two ends of the spindle 34 which are engaged in the notches 37 and are retained in the recesses 45. In this position the flanges 14 and 15 are substantially horizontal, whilst the handle 16 may rest either against the bearing surface 18 as shown in full line in Figure 5, or against the bearing surface 19, or in intermediate positions, such as those shown in dash-dot lines in Figure 5, for supplementary stowage of packages. The bottom of the pallet is then engaged under the flange 14 of the fastening 7. When the same operations have been repeated for all the fastenings constituting one line of storage, a second pallet may be engaged under the flange 15 on the side opposite to the preceding ones. The pallets are thus solidly stowed despite the longitudinal stresses which they may undergo during their transport, that is to say, against stresses in the direction of the longitudinal axis of the fastening.

The pallet fixed by the arm 9 rests along the whole length of the lever 31 at the same time as on the upper faces of the spars 11 and 12, due to the fact that the latter are at the same level as the upper faces of the arms 36 of the lever 31. Hence, the arms 8 and 9 can no longer be released once the pallet has been fixed by the fastening 7, which very substantially improves the safety of transporting the pallets.

On the other hand, the handle 16 and the arrangement of the bearing surfaces 18 and 19 facilitate fastening of the arms 8 and 9 as compared with known devices, especially the aforesaid known device with a sliding stop. Releasing is also facilitated, since it is sufficient to exert pressure with the foot on the end 41 of the lever 31 to make the latter turn about the pivot 32, which frees the spindle 34 from the notches 37. The action of the spring 26 against the arm 8 then tends to fold it and the arm 9 down inside the spars 11 and 12 as far as their releasing position shown in Figure 4. During the course of this movement the arm 8 pivots about its spindle 25, whilst the spindle 34 slides along the inclined planes 38 up to the vicinity of the end of the slideways 35 adjacent the pivot 32. The handle 16 prevents the tilting of the arms 8 and 9 from continuing beyond their position shown in Figure 4, by coming to a stop against the transverse crossbar 52 connecting the arms 28 and 29 of the arm 9.

The operations of fastening and releasing are therefore facilitated and accelerated as compared with known fastenings, which enables a reduction in the time which is necessary for loading and stowing of the freight, and consequently a reduction in the staff necessary for these operations. The result is that the time taken by intermediate stops in the case of freight aircraft can be reduced, which tends to improve the profitability of transporting freight.

The invention is not limited to the embodiment described, and may include other embodiments. Thus, the inclined planes 38 might be prolonged practically up to the end of the slideways 35. The grooves or scores 46 on the lever 31 might be replaced by a non-skid substance. The blocks 39*a* and 39*b* and the spring 42 might be replaced by any other system tending to make the lever 31 pivot towards the inside of the spars 11 and 12.

Besides its use in aircraft, the invention is applicable, for example, to the lorries used for transferring "air-road" pallets or to the transport of goods in trains running at high speeds.

WHAT WE CLAIM IS:-

1. A fastening for stowage of freight in a vehicle, such as the stowage of containers or pallets in the bay of an aircraft, the fastening comprising two supporting spars; two fastening arms arranged longitudinally between the spars and hinged pivotally about a common transverse axis so that they can be pivoted between a fastening position and a releasing position, each fastening arm having a flange for anchorage of the freight; a handle mounted to pivot about said common transverse axis between the fastening arms, the handle including a foot portion having a first surface for contact with a bearing surface of the flange of one of the fastening arms, and a second surface for contact with a bearing surface of the flange of the other of the fastening arms, so that the foot portion is wedged by its two surfaces between the bearing surfaces on the fastening arms when said arms are in the releasing position, and another portion at the opposite end of the handle from the foot portion and offset from the surfaces of the foot portion so that said other portion is located in an accessible position when the fastening arms are in the releasing position so that the handle can be moved from actuating the fastening arms to their fastening position.

2. A fastening as claimed in Claim 1, in which said other portion of the handle comprises a loop, and in which the loop makes an angle with the foot portion such that in the releasing position of the arms the loop is inclined upwards to be grasped with a finger.

3. A fastening as claimed in Claim 1 or Claim 2, in which the bearing surface of said one fastening arm when cooperating with the foot portion of the handle is slightly inclined to the horizontal when the fastening is held horizontal and is in the fastening position.

4. A fastening as claimed in any preceding claim, in which the flange of one of the fastening arms is a central anchor flange having said bearing surface for the foot portion of the handle, and wherein the flange of other fastening arm includes side anchor flanges framing the central anchor flange and connected by a crossbar at the centre of which is the bearing surface of said other fastening arm.

5. A fastening as claimed in any preceding claim, in which one of the fastening arms is mounted pivotally about a fixed transverse spindle carried by the spars, and the other fastening arm cooperates with a locking lever which is able to rock about a transverse pivot fixed to the spars.

6. A fastening as claimed in Claim 5, in which the transverse spindle cooperates with slideways which are arranged inside side arms of the locking lever and include at their end adjacent the fastening arms a notch which forms a stop and is provided for receiving the transverse spindle when the fastening arms are in the fastening position, the notches being movable upwards by pivoting of the lever to enable freeing of the transverse spindle and releasing of the fastening arms.

7. A fastening as claimed in Claim 6, in which the free end of the lever is provided with non-skid means for receiving the foot of an operator for releasing the fastening arms.

8. A fastening as claimed in Claim 6 or Claim 7, in which the notches are elongated towards the pivot of the lever by planes inclined with respect to the upper faces of the arms of the lever.

9. A fastening as claimed in any one of Claims 6 to 8, in which the ends of the transverse spindle which slide in the slideways are engaged slidingly in longitudinal recesses arranged inside the spars.

10. A fastening as claimed in any one of Claims 6 to 9, including two blocks connected by a bridge and attached to a member interconnecting the spars, which bridge acts as a stop for limiting the rotation of the lever.

11. A fastening as claimed in Claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.

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1568515 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

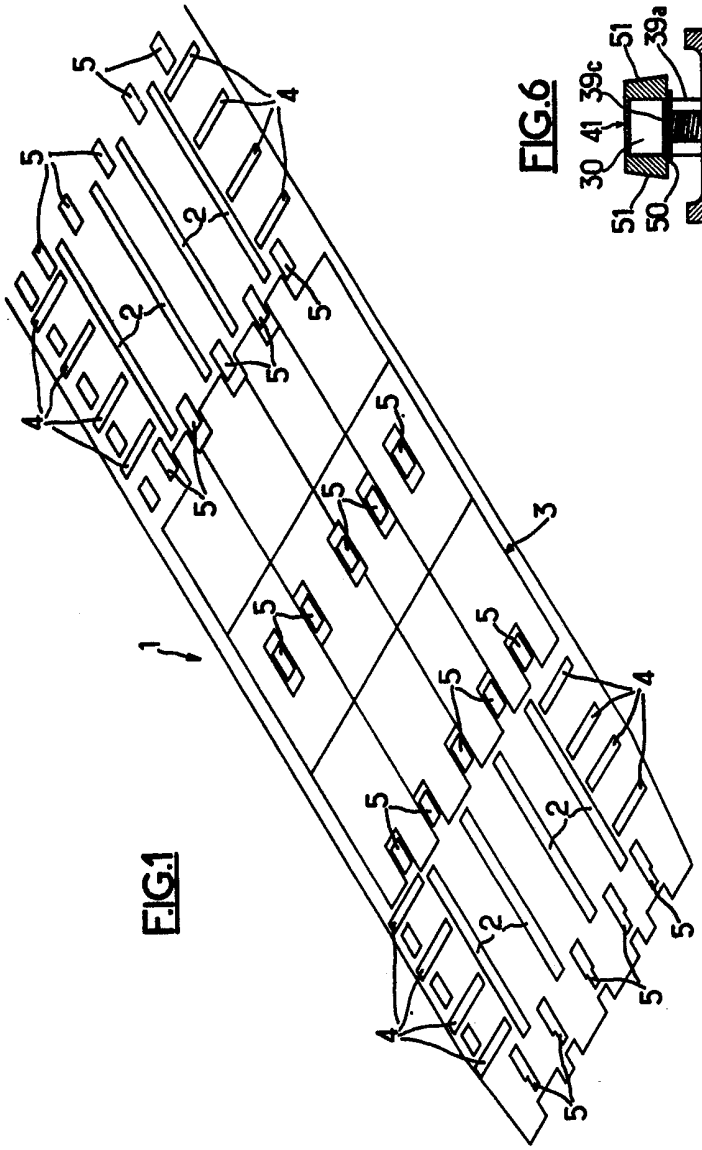


FIG.1

FIG.6

FIG.2

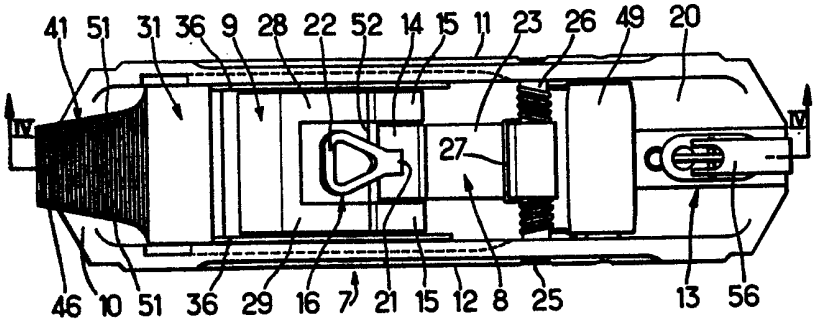

41 51 31 36 9 28 22 52 14 15 11 23 26 49 20
27
46 10 51 36 29 16 7 21 15 12 8 25 13 56

FIG.3

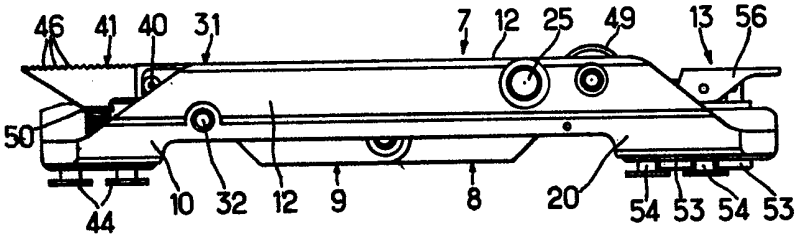

46 41 40 31 7 12 25 49 13 56
50
44 10 32 12 9 8 20 54 53 54 53

FIG.4

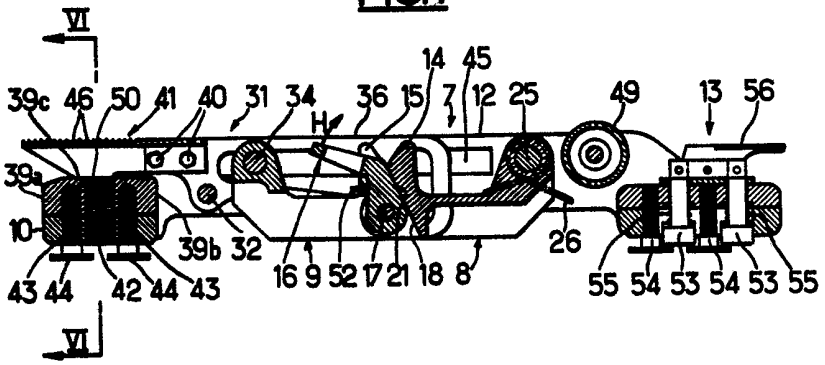
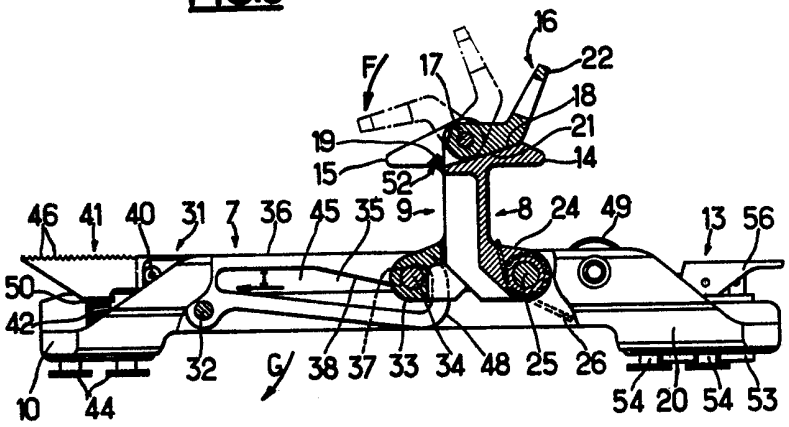

VI
14 45
39c 46 50 41 40 31 34 H 36 15 7 12 25 49 13 56
39a
10
39b 32
26
43 44 42 44 43 16 9 52 17 21 18 8 55 54 53 54 53 55
VI

FIG.5


16
F 17 22
18
19 21
15 14
52
46 41 40 31 7 36 45 35 9 8 24 49 13 56
50
42
10 44 32 G 38 37 33 34 48 25 26 54 20 54 53