A Ladder

The present invention relates to a ladder and more particularly relates to a ladder for use with an aircraft.

A conventional aircraft ramp ladder comprises a base that supports an inclined set of steps to provide user access from the ground to the door switch panel of an aircraft. The ladder incorporates wheels which are mounted to the base so that the ladder can be moved along the ground to a desired position.

A conventional ladder usually incorporates a single lever locking mechanism which, when operated by a user, locks the wheels to prevent the ladder accidently moving along the ground when it is being stored or when it is in use. The problem with this arrangement is that users often forget to lock the wheels after moving the ladder. Ladders are therefore frequently left unlocked and free to move along the ground. This can be dangerous for a person using a ladder because the ladder is unstable and also for a person on the ground who might be struck accidently by the ladder if the ladder is moved by the wind. An unintentionally unlocked ladder might also move accidentally and hit an aircraft in the vicinity; thereby posing another serious aviation safety risk at the airport.

The present invention seeks to provide an improved ladder.

According to one aspect of the present invention, there is provided, a ~~ladder for use with an aircraft, the ladder comprising: a base carrying a set of steps; first and second movement devices which are carried by the base, each movement device configured to support the ladder and to permit movement of the ladder along the ground; a braking device which is configured to support the ladder and to resist movement of the ladder along the ground; and an activation mechanism configured, upon activation by a user, to move one of the braking device and the second movement device relative to the base, wherein: when~~

~~the activation mechanism is not activated by a user, the ladder is supported on the ground by the first movement device and the braking device such that the braking device provides a frictional engagement with the ground which resists movement of the ladder along the ground, and wherein: when the activation mechanism is activated by a user, the ladder is supported on the ground by the first movement device and the second movement device, but not the braking device, such that the movement devices permit movement of the ladder along the ground, the ladder further comprising: a biasing arrangement which biases one of the braking device and the second movement device so that when the activation mechanism is not activated by a user the ladder is supported automatically by the braking device to resist movement of the ladder along the ground.~~ ladder for use with an aircraft, the ladder comprising: a base carrying a set of steps; first, second, third and fourth movement devices which are carried by the base, each movement device configured to support the ladder and to permit movement of the ladder along the ground; a first braking device and a second braking device which are each configured to support the ladder and to resist movement of the ladder along the ground; and a first activation mechanism configured, upon activation by a user, to move one of the first braking device and the second movement device relative to the base; and a second activation mechanism configured, upon activation by a user, to move one of the second braking device and the fourth movement device relative to the base, wherein: when the activation mechanisms are not activated by a user, the ladder is supported on the ground by the first and third movement devices and the first and second braking devices such that the braking devices provide a frictional engagement with the ground which resists movement of the ladder along the ground, and wherein: when the first and second activation mechanisms are activated simultaneously by a user, the ladder is supported on the ground by the first, second, third and fourth movement devices, but not the braking devices, such that the movement devices permit movement of the ladder along the ground, the ladder further comprising: biasing arrangements which bias each braking device or each of and the second, and fourth movement devices so that when the activation mechanisms are not activated by a user the ladder is supported automatically by the braking devices to resist movement of the ladder along the ground; wherein each of the first and second activation mechanisms comprises an activation lever which is configured to be operated manually by a user to activate the activation mechanism, such that a user must operate the activation levers of both the first and second activation mechanisms at the same time to activate the activation mechanisms to move the ladder along the ground.

Preferably, each of the ~~first and second~~ movement devices is a wheel assembly.

Conveniently, each~~the~~ braking device is an elongate element which is carried at one end by the base of the ladder, the other end of the braking device comprising a braking surface which is configured to contact the ground and provide a frictional engagement with the ground.

Advantageously, the weight of the ladder is greater than ~~200~~ 100kg.

Preferably, the ladder is a ramp ladder for providing user access from the ground to the door switch panel of an aircraft.

Conveniently, each~~the~~ activation mechanism comprises: ~~an activation lever which is configured to be moved by a user to activate the activation mechanism; and~~ a linked lever arrangement incorporating a plurality of pivotally connected levers which are configured to be moved by the activation lever, the linked lever arrangement being configured to amplify a force exerted by a user on the activation lever and to apply the amplified force to a respective one of the first or second braking devices or a respective one of ~~and~~ the second or fourth movement devices.

Advantageously, eachthe activation mechanism comprises a flexible cable which is connected between the activation lever and the linked lever arrangement to transfer force from the activation lever to the linked lever arrangement.

In one embodiment, the activation mechanisms areis configured, upon simultaneous activation by a user, to move the second and fourth movement devices away from the base of the ladder so that the second and fourth movement devices contacts the ground and areis biased against the ground by a force from the activation mechanisms, such that the force from the activation mechanism lifts part of the ladder so that the braking devices does not contact the ground.

In another embodiment, the activation mechanisms areis configured, upon simultaneous activation by a user, to move the braking devices towards the base of the ladder to lower part of the ladder so that the second and fourth movement devices contacts the ground and the braking elements does not contact the ground.

~~Preferably, the ladder comprises at least one further movement device, at least one further activation mechanism and at least one further braking device.~~

So that the present invention may be more readily understood, embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic perspective view of a ladder of an embodiment of the invention,
Figure 2 is a side view of the ladder of figure 1,
Figure 3 is an end view of the ladder of figure 1,
Figure 4 is a diagrammatic exploded view of an activation mechanism of an embodiment of the invention,

CLAIMS

1. A ladder for use with an aircraft, the ladder comprising:

a base carrying a set of steps;

first, ~~and~~ second, third and fourth movement devices which are carried by the base, each movement device configured to support the ladder and to permit movement of the ladder along the ground;

a first braking device and a second braking device which are each~~is~~ configured to support the ladder and to resist movement of the ladder along the ground; and

a~~n~~ first activation mechanism configured, upon activation by a user, to move one of the first braking device and the second movement device relative to the base; ~~,~~and

a second activation mechanism configured, upon activation by a user, to move one of the second braking device and the fourth movement device relative to the base, wherein:

when the activation mechanisms are~~is~~ not activated by a user, the ladder is supported on the ground by the first and third movement devices and the first and second braking devices such that the braking devices provide~~s~~ a frictional engagement with the ground which resists movement of the ladder along the ground, and wherein:

when the first and second activation mechanisms are~~is~~ activated simultaneously by a user, the ladder is supported on the ground by the first, ~~movement device and the~~ second, third and fourth movement devices, but not the braking devices, such that the movement devices permit movement of the ladder along the ground, the ladder further comprising:

~~a~~ biasing arrangements which bias~~es~~ each~~one of the~~ braking device or each of and the second, and fourth movement devices so that when the activation mechanisms are~~is~~ not activated by a user the ladder is supported automatically by the braking devices to resist movement of the ladder along the ground; wherein

each of the first and second activation mechanisms comprises an activation lever which is configured to be operated manually by a user to activate the activation mechanism, such that a user must operate the activation levers of both the first and second activation mechanisms at the same time to activate the activation mechanisms to move the ladder along the ground.

2. The ladder of claim 1, wherein each of the ~~first and second~~ movement devices is a wheel assembly.

3. The ladder of claim 1 or claim 2, wherein ~~the~~each braking device is an elongate element which is carried at one end by the base of the ladder, the other end of the braking device comprising a braking surface which is

configured to contact the ground and provide a frictional engagement with the ground.

4. The ladder of any one of the preceding claims, wherein the weight of the ladder is greater than ~~200~~100kg.

5. The ladder of any one of the preceding claims, wherein the ladder is a ramp ladder for providing user access from the ground to the door switch panel of an aircraft.

6. The ladder of any one of the preceding claims, wherein ~~the~~each activation mechanism comprises:~~an activation lever which is configured to be moved by a user to activate the activation mechanism; and~~

a linked lever arrangement incorporating a plurality of pivotally connected levers which are configured to be moved by the activation lever, the linked lever arrangement being configured to amplify a force exerted by a user on the activation lever and to apply the amplified force to a respective one of the first or second braking device~~s~~ or a respective one of~~and~~ the second or fourth movement device~~s~~.

7. The ladder of claim 6, wherein each~~the~~ activation mechanism comprises a flexible cable which is connected between the activation lever and the linked lever arrangement to transfer force from the activation lever to the linked lever arrangement.

8. The ladder of any one of the preceding claims, wherein the activation mechanism~~s~~ are~~is~~ configured, upon simultaneous activation by a user, to move the second and fourth movement device~~s~~ away from the base of the ladder so that the second and fourth movement device~~s~~ contact~~s~~ the ground and are~~is~~ biased against the ground by a force from the activation mechanism~~s~~, such that the force from the activation mechanism lifts part of the ladder so that the braking device~~s~~ do~~es~~ not contact the ground.

9. The ladder of any one of claims 1 to 7, wherein the activation mechanisms are~~is~~ configured, upon simultaneous activation by a user, to move the braking devices towards the base of the ladder to lower part of the ladder so that the second and fourth movement devices contact~~s~~ the ground and the braking elements do~~es~~ not contact the ground.

~~10. The ladder of any one of the preceding claims, wherein the ladder comprises at least one further movement device, at least one further activation mechanism and at least one further braking device.~~