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Technical note— a patient propelled variable—inclination prone stander

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Abstract
A self-propelled mobile standing device is described with the facility of patient-operated inclination of the support platform, enabling objects on the floor to be reached. The device is provided with a removable tray at the level of the occupant's chest.

Introduction

Prone standers which can only be moved with the aid of an attendant are in common use. They are used mainly by children, except for some very specialized applications. The stander pictured here is believed to be unique in having both its mobility and its angle of inclination under the control of the patient using it. It was built for a four year old boy with cerebral palsy. He was able to operate it himself as soon as he was strapped into it (Fig. 1, left).

The advantage of a prone stander for a small child is that it places his head and arms at a higher level than does a wheelchair. For a child of four years, the capacity to play with objects on the floor is an advantage, and this variable-inclination device provides it (Fig. 1, right).

Fig. 1. Left, patient strapped into mobile prone stander. Right, mobile stander lowered to permit access to objects on the floor.

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Design details

The frame of the stander consists of hollow steel members of 19 mm (¾ in) square cross-section, with welded joints. It is mounted on two wheels of diameter 0.61 m (24 in), with hand rims, and has two Shepherd castor wheels of diameter 10 cm (4 in) at the rear. The patient can move the stander manually by rotating the main wheels.

The tray at the front is removable; it can also be swung to one side about a pivot point at the left rear corner (Fig. 2). Either operation permits the patient to turn a crank handle on the right side to reduce the angle of inclination of the support board continuously from its maximum value of 75°. The minimum angle of inclination achievable is −10°, in which position the patient can reach objects on the floor. During lowering of the board the centre of gravity of the patient moves forward of the main wheels, causing a pair of auxiliary castor wheels at the front of the stander frame to contact the floor. With the

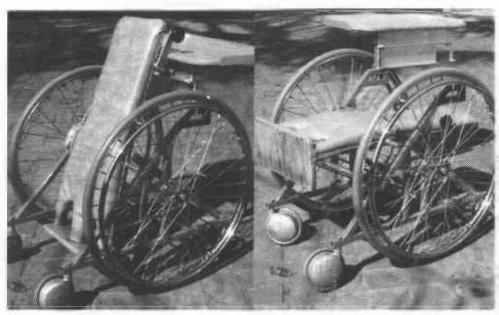

Fig. 2. Left, the mobile prone stander in the fully raised position with the tray in place, and right, fully lowered with tray swung aside.

board in the raised position these castor wheels are clear of the floor by 13 mm (½ in).

The inclination of the board may be adjusted by means of the crank handle to any desired angle between its two extreme values. A flexible cable transmits the rotation of the crank handle to a worm gear engaging a gear wheel fixed to the frame of the stander. This mechanism ensures that the board is firmly locked at all angles of inclination.

A tension spring connects the footing of the stander board to a fixed point of the frame. During lowering of the board the spring is stretched, and the energy thus stored in it assists the patient when raising his weight against gravity.

Further details of the design of the device may be obtained by applying to either of the authors of this paper.

Conclusion

This prone stander's dual capacities of mobility and variable inclination should make it useful for a large number of cases. Versions of it without either the self-propulsion or the variable inclination feature could easily be made.