CHAPTER15

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A Walking Aid for a Handicapped Child

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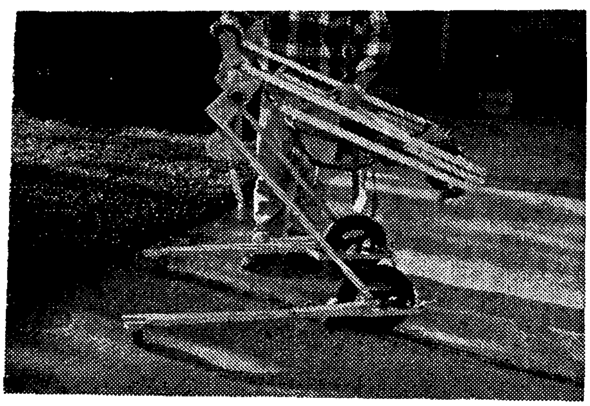
INTRODUCTION

A walking aid for a multihandicapped student has been designed, built and tested. The intention of the device is to assist a student who is physically capable of walking but may lack the confidence, coordination or willingness to do so. The device is designed to satisfy the special requirements of a particular student, but, in general, it is useful for training anyone weighing up to 100 kilograms with similar handicaps.

A variant design of a commercially-available walking aid led to an A-shaped gantry fabricated from welded square aluminum tubing. A manual winch with suspension straps support the body harness that keeps the student in place within the device. Large diameter front wheels, rear swivel casters and caliper brakes are also incorporated in the design to control the motion of the walking aid. To encourage the student the walk, the device is equipped with a motion-sensitive music system. The entire system, along with a test subject, is shown below.



SUMMARY OF IMPACT

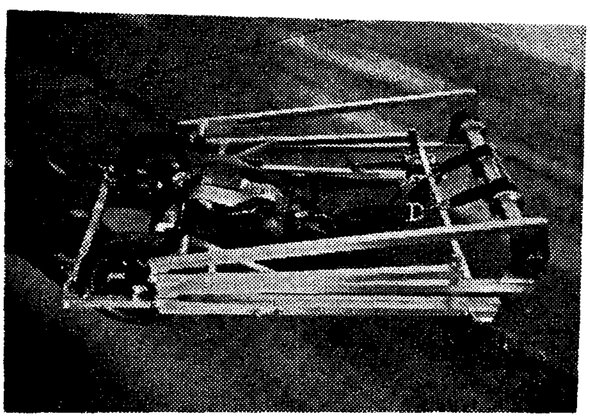
A walking aid has been designed, built and tested to help a multihandicapped student walk independently. With such a device, it is hoped that this student, and perhaps others like her, can learn to walk without assistance or supervision for extended periods of time. The primary contribution of this device is that once a subject is secured in the walking aid, the probability of falling over is very small because the system is statically and dynamically stable independently of the actions of the subject. In addition to providing a safer environment for the subject, attending staff members or family members do not have be on constant alert for safety concerns. Finally, by adjusting the height of the support harness, it is hoped to teach the student to gradually support her own weight and become more independent.

TECHNICAL DESCRIPTION

The walking aid consists of four subsystems: gantry frame, suspension, motion regulation and electronic circuit. Each subsystem is described below:

The **gantry frame subsystem** consists of the welded aluminum structure, to which all other subsystems are attached. The aluminum used, 6063-T52, was chosen because of its weldability, excellent finishing characteristics, machinablility, corrosion resistance and relatively high (21,000 psi) yield strength. The frame is capable of supporting a load in excess of the 200 pound design load. The physical dimensions of the walking aid are 73.75" high x 31" wide x 46" long. The frame is tall enough to accommodate a subject 68" tall and long enough to provide a full walking stride of 24." Although the width and height of the frame are constrained by standard interior door dimensions (80" x 32"), the frame dimensions have proven to be stable during loading, operation and unloading. As shown below, the erect gantry frame may be collapsed for transporting or storage by removing eight pins (two at each side link, two at the bottom of each of the lower front links near the front wheels).

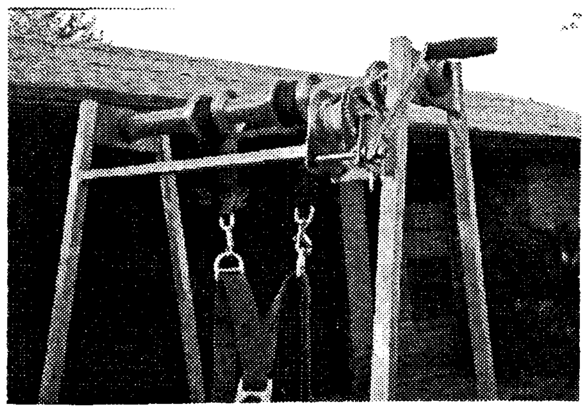
The **suspension subsystem,** depicted below, consists of a manual winch, suspension straps and a full body safety harness. The harness has an ANSI Class III rating, which adjusts to fit subjects ranging in height from 58" to 68." One inch wide straps that attach radially to the gantry frame serve to confine the subject's center of gravity to a safe limit. The manual winch is a typical boat-trailer winch. The winch controls the elevation adjustment of the student as well as providing a simple way of placing the subject into and out of the walking aid. The winch has a gear ratio of 3.2 and a crank handle length of 6.75." The mechanical advantage of 36 allows a 200 pound subject to be lifted and lowered using a force of less than six pounds.

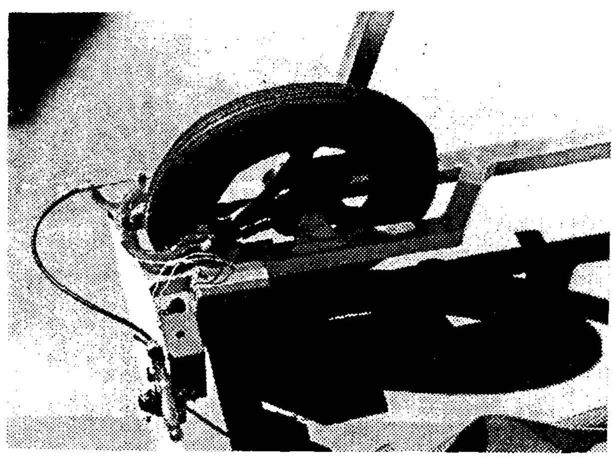


The **motion regulation subsystem** consists of two 12.5" diameter front wheels, two rear caster wheels and the brake system. The combination of wheels were selected to prevent the walking aid from tipping over if a change in ground elevation is encountered. It has been determined that a 1" high obstacle can be overcome with a force of 23 pounds with no danger of tipping. The brake system has been incorporated to keep the walking aid stationary during unexpected or undesirable situations.

The **electronic circuit subsystem,** depicted below, consists of a transistor radio, a timing circuit and a magnetic proximity switch. The timing circuit is powered by a standard nine volt battery and includes an adjustable playing time. The purpose of the this motion-sensitive system is to provide a musical incentive for the subject to walk.

The material cost of the walking aid is close to $1,000.



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