TECHNOLOGY

Electronic Eyes For The Blind

Scientists are developing new devices to guide the blind along busy streets. Early laboratory models show promise for indicating step-downs and warning of nearby mail boxes.

By ALLEN LONG

➤ SCIENTISTS ARE developing electronic "eyes" for the blind. Designed for those who prefer an instrument to seeing-eye dogs, canes and friends, the devices warn their users of hazards which the blind person encounters on busy sidewalks and around the house.

One such instrument is being created by Dr. Clifford M. Witcher of the Massachusetts Institute of Technology's research laboratory of electronics.

Dr. Witcher calls his device a "step-down detector." When the user approaches a curb, a flight of steps or the edge of a subway platform, the detector buzzes a warning.

The step-down detector is only half of the instrument a blind person needs, Dr. Witcher believes. The other half should be some sort of an obstacle finder—something that could warn the user that he is about to walk into a pole.

Excited Over Progress

Prof. Thomas A. Benham of Haverford College, Haverford, Pa., is working on the obstacle detector. Under sponsorship of the Veterans Administration, Prof. Benham has taken a U. S. Signal Corps sensory aid, tested it, discovered its weaknesses, modified it and now is supervising its development at Biophysical Instruments, Inc., in Philadelphia.

A laboratory bench model has been redesigned to omit some of the weaknesses of the original Signal Corps model. Using transistors for vacuum tubes, the obstacle detector has no moving parts, less battery drain, a lighter battery supply and an overall weight about 40% less than the original model.

Dr. Witcher and Prof. Benham are keeping close contact with each other. Each is excited over the progress the other is making in improving his device. The two experts hope both aids can be combined into a single unit in about a year.

Even if this goal is attained, however, it will be two or three years before a completely satisfactory laboratory model will be obtained. The device might then go into commercial production if some means of financing the venture can be worked out.

The two scientists have plenty of problems to untangle before their devices will meet the general specifications for such aids. As stated by Dr. Witcher and Prof. Benham, travel aids should: weigh no more than four pounds; cost no more than $250; present warning signals that will not interfere with normal use of the ears; work as well on miserable days as in bright sunny weather; indicate step-downs at least five feet ahead of the user; warn of obstacles about 10 feet away, indicating the position of each and presenting the indication at such a speed that the user can walk at four to five feet a second.

Furthermore, it should not be conspicuous or require great physical or mental effort. It should provide more useful data about the user's immediate surroundings than he can get by listening or tapping with a cane. It also should not require the user to have exceptional abilities or to undergo an unduly rigorous training period.

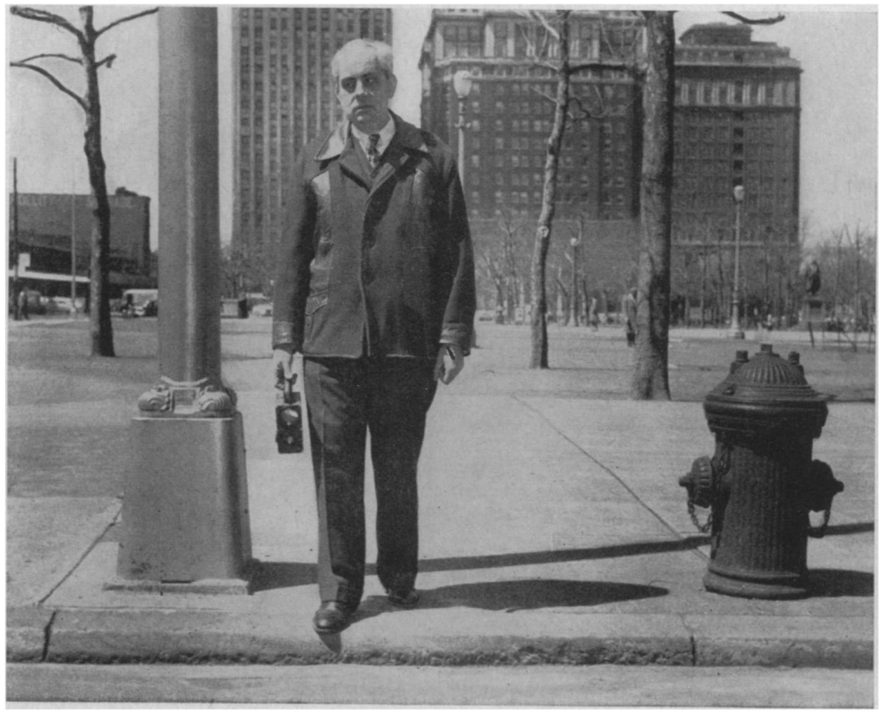
Dr. Witcher's step-down detector is housed in a slender box-like case and is carried by a big handle on one end. A flashlight bulb and reflector vibrate in a quiet purr to modulate the light picked up by the optical system in the top of the case. When a curb is approached, no modulated light is reflected into the lens for a moment. This triggers the buzzer.

When the device was first completed, Dr. Witcher was puzzled by tricks played on him by puddles and ice. Neither of these reflected enough light to prevent the alarm from buzzing. He increased its sensitivity so that puddles and ice did not confuse the instrument. Then it was too sensitive, he said. The shadow of a picket fence or the shadows cast by tree leaves triggered the alarm. Now he is searching for "the happy medium," where trees and fences will not say "Step down!" to the blind user, nor will mud puddles and ice.

Blind Testers Enthusiastic

To get the "feel" of the Signal Corps device, Prof. Benham called in 67 blind or near-blind subjects to give the obstacle detector a workout over a period of time. The subjects were enthusiastic over the device, making such comments as "much better than a cane; the instrument needs improvements and then it will be wonderful."

Prof. Benham is trying to make the improvements suggested. The latest, transistorized model now nearing completion uses a pulsed gas-discharge lamp with relatively small power demands. Modulated



OBSTACLE DETECTOR IN ACTION—A blind subject is shown here testing the obstacle detector now being improved by Prof. Thomas A. Benham of Haverford College. Through a modulated light and optical system, the device has guided the man safely between the light pole and the fire hydrant.

light reflected into the optical system of this instrument causes the handle to vibrate a warning. Eventually Prof. Benham wants to perfect a system using little pins in the detector's handle. The number and location of the vibrating pins would tell the user how near the obstacle is and whether it is in front or to one side of him.

When these two instruments, the step-down indicator and the obstacle detector, are combined into a single unit, the blind should have a new, marvelous tool at their command. Even so, the two scientists warn that it will have its limitations.

They both should know. Each has been blind virtually since birth.

Many Other Aids

Creating adequate travel aids for the blind is merely one aspect of the problem of equipping these handicapped persons for living in a world where over 95% of the information about a person's surroundings comes to him through his eyes.

Other aids have been created to help the sightless live as normal a life as possible. Some were modified from existing market products. Others were developed specifically for the blind. They range from kitchen utensils to technical tools.

There is, for instance, a flapjack flipper for the blind housewife. Its aluminum blade is slipped under the pancake and then the handle is squeezed. When held a few inches from the pan, the flapjack is turned expertly and deposited directly under the blade.

Elastic bands with clips also help the blind housewife identify canned food on her shelves. The bands and clips receive Brailled labels that distinguish cans of peaches from cans of tomatoes.

Tape measures, hem gauges, needle threaders and magnetic pin finders have been devised for the nimble-fingered seamstress. One five-foot cloth tape measure features paper staples which mark off the inches. Cross-staples divide the tape into feet. The first inch of the tape is marked in quarters.

For the blind electronics expert, an auditory multimeter has been created. Through earphone sounds and a raised-dot scale, it tells the user what current, voltages or resistance is in the circuit under test.

Blind men who enjoy drafting have been aided by a raised-line drawing set. Using a ball-point pen and special cellophane "paper," the person can feel the lines he draws.

A circular slide rule has been created which can do multiplication, division and extract roots of numbers. The scale is embossed with large Arabic numerals which the blind can feel and read.

To measure air pressure in automobile tires, the blind can use a special, oversized gauge developed for the purpose. Notches on the sides of the plunger reveal the pressure in the tire to an accuracy of one pound.

For blind persons with an interest in weather, a special thermometer and an aneroid-type barometer can reveal the heat and atmospheric conditions. The thermometer has an extended pointer and a dial with dots at each ten degrees. The barometer has Braille dots at each inch. It can be adjusted to compensate for the altitude of the user's home town.

Bathroom scales also have been modified to tell the blind whether they are putting on too much weight. Braille dots are stamped at each five-pound interval on the dial, and the pointer makes three complete sweeps before the scale's capacity of 300 pounds is reached.

Talking Books Popular

An unusual alarm clock attachment has been devised for those who are both deaf and blind. Placed under the mattress of the bed, the device buzzes and shakes the springs when it is time to get up.

Games for the blind include chess sets with plastic pegged men; "goal," a sort of tic-tac-toe played by two persons with nine pegs each, and playing cards with Braille dots.

Five-o'clock shadow can be scraped away with a special razor that requires neither a face-lathering nor electricity. With a little patience and the proper technique, it also can be used for that tough-as-nails morning stubble.

And for the sportsman there is a fishing bob made of white plastic. When the fish bites, the bob whistles. The stronger the strike, the louder the bob squeals.

These devices are among many special and general-purpose aids available through the American Foundation for the Blind, Inc., New York.

Other devices that bring entertainment to the blind are talking books. The talking books are an early type of long-playing record. They spin on a phonograph turntable at 33 1/3 revolutions a minute while a trained speaker reads from popular works.

Currently scientists are experimenting with the "speech compressor" in hopes of improving talking books. The speech compressor is a new electronic device that "squeezes" recorded words so they come out faster but without the Donald Duck effect usually obtained when a record merely is played back at above-normal speed. Since normal speech is slower than most sighted persons can read, the speech compressor should help by permitting the reproduced words to skip along at a faster pace. Now scientists are trying to find out whether listening to this speeded-up speech is too fatiguing.

And of course there are books in Braille. Although many persons read Braille, it is a slow process—so slow, in fact, that you would not expect a sighted person to learn to read it. But at least one such person has.

A doctor once told a sighted businessman that he could never learn to read Braille.

"It's far too much trouble to learn, and it's too slow to read," the doctor said. "That's why I doubt that you or any other sighted person can learn Braille."

This slur on the businessman's intellect and persistence was too much for the spirited man. He resolved he could—and by gosh he would—learn to read Braille.

And he did.

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WILDLIFE

Farm Swamp Drainage May Reduce Duck Flocks

➤ DUCK HUNTERS and waterfowl biologists wonder when extensive drainage of swamps, marshes and wetlands for farm use will begin to reduce the numbers of ducks and geese.

Work with waterfowl now is hampered by the fact that biologists do not know how much wetland habitat is available to birds and fur animals, C. Gordon Fredine, Fish and Wildlife Service, told the North American Wildlife Conference in Chicago.

The Service is conducting an extensive survey of wetlands in every state. By July, 90% of all the important wetlands in the nation will have been surveyed, Mr. Fredine said.

"We are fearful that continued drainage will come at the expense of waterfowl," he said. One object of the survey is to develop a multiple-use program for wetlands helping the farmer and protecting the ducks.

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