

# Engineers, Doctors Devise Brace For Crippled

ANN ARBOR—The engineering theories of stress and loading can be applied to the human leg as well as to a structural beam. Because of this, a team of University of Michigan physicians and engineers may help patients with severe arthritis in the knee to walk comfortably again.

Bioengineering, a relatively new program in U-M's College of Engineering, unites the fields of medicine and engineering.

"More specifically," said Robert C. Juvinal, professor of mechanical engineering, "we are working in orthotics." This is the use of artificial devices to assist diseased limbs, it is distinct from prosthetics, in which artificial devices replace missing limbs.

JUVINAL, WORKING WITH Dr. Edwin M. Smith, associate professor of physical medicine and rehabilitation, recently de-

veloped a brace for the painfully unstable rheumatoid knee. The device permits normal movement of the knee while providing force at seven points on the leg, analogous to seven loading points on a structural beam. The combination of the seven forces restores enough knee stability to enable patients to walk with relative comfort and freedom.

However, the knee brace will not be commercially available

until faster, more efficient methods of fitting and adjusting it are perfected.

But another orthotic device, developed several years ago by Juvinal, Smith and their colleagues is currently being sold. This is a modified balanced forearm support for severely paralyzed wheelchair patients. It attaches to the patient's wheelchair and balances the paralyzed arm, relieving the patient of the gravity load and

enabling him to perform such everyday tasks as feeding himself.

TO WORK IN orthotics, Juvinal had to supplement his engineering background with a study of anatomy. This included "spending many hours dissecting cadavers with Dr. Smith to find out more about the mechanisms of the musculo-skeletal system, and particularly the hand."

Juvinal first became involved in orthotics about 10 years ago when the U-M Medical School's department of physical medicine and rehabilitation received a research grant from the Vocational Rehabilitation Administration.

Dr. James W. Hae Jr., chairman of the department, asked J. Raymond Pearson, Juvinal and mechanical engineering professors for their help. Juvinal said he became interest-

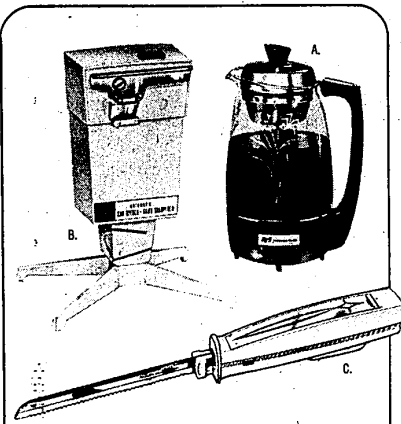
ed at once because of "the immediate, tangible rewards in terms of human welfare."

Since 1955 Juvinal and Pearson have also held appointments as professors of physical medicine and rehabilitation in the Medical School. In the same year, a full time research engineer, Dr. James L. Crocetti, was added to the orthotics research team.

ONE OF THE MORE impor-

tant findings to come out of orthotics research, Juvinal believes, is an explanation of the nature of the deformity of the rheumatoid hand.

"An understanding of what causes the diseased hand to deform into a characteristic pattern influences the exercises prescribed, the nature of the surgical repair procedures, and the design of corrective braces," he noted.



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