Swiss firm helps to fight arthritis

have made me feel so heartily attached to the country that thinking of it looks to me like homesickness".

That was in 1941. Eleven years later Mann settled in Kilchberg, near Zurich, where he lived until his death in 1955.

The glimpses we have given of this excellent cultural panorama only reveals the small details of a wide landscape. We can only recommend a book which will probably inspire a comment similar to this one by Max Frisch:

"He who already knows and likes to live with the cliché that Switzerland has, above all, produced cheese and clocks and mountains need not read this book: its wealth of surprising and profound information about theology, architecture, pedagogy, theatre, painting, music, literature and so forth could easily deprive him of his cliché for ever".

Swiss Firm Helps to Fight Arthritis

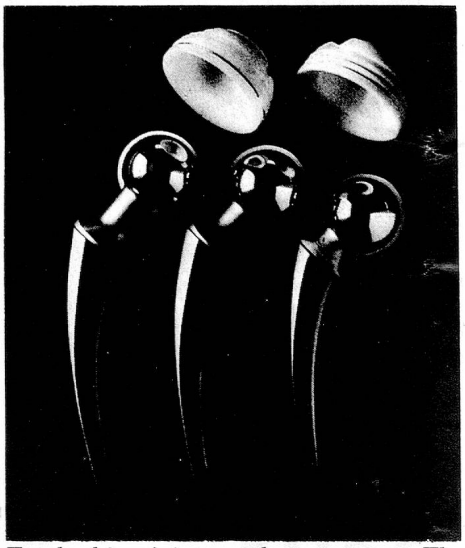
Spare-parts surgery is one of the fastest moving fields of medicine, not least because of the rise of road traffic accidents and the application of various electronic devices to the regulation of the human organism, one example being the heart-pacemaker. However, problems of rejection not unlike those raised by organ transplants appear if these foreign bodies react in any way with the acceptor organism. The implant, whether it is used for fixing bone fractures or replacing worn parts from joints, must be of a chemically inert material. This appears simple, but, as the last issue of the *Sulzer Technical Review* emphasises in an interesting article, this requires years of painstaking tests and research.

Sulzer brothers of Winterthur are better known as the makers or licensors of two-thirds of the world's marine diesel engines and of a sizeable fraction of the world's spinning and weaving machines. However, they have also established their reputation in the technology of casting and forging complicated workpieces of metal into precise shapes. Sulzer's have forged the pump and boiler casings of Switzerland's nuclear reactors. In a somewhat less bulky domain, they have developed the technology of manufacturing so-called *joint endoprostheses* (see picture) which allow total hip joint replacement for people suffering from arthritis. Sulzer's are a world leader in a technology which has already helped tens of thousands of people to lead near-normal lives.

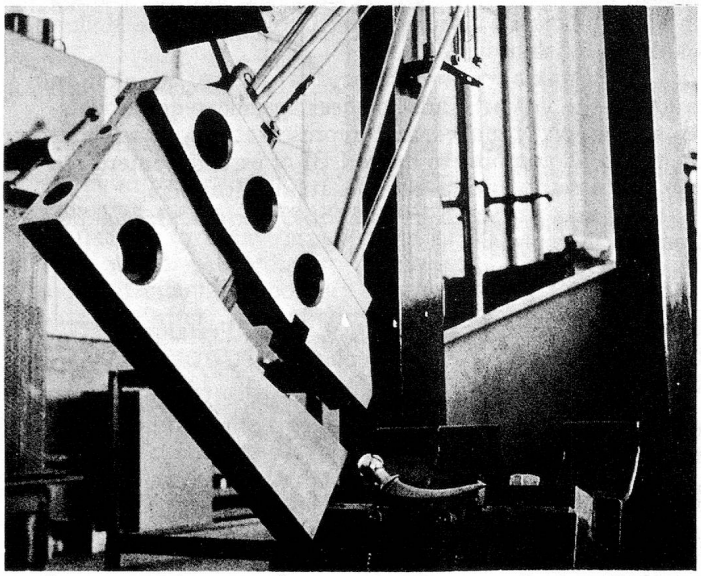
The total hip joint replacement is made up of three parts: a prosthesis shaft which is embedded in the thigh-bone, a hollow-ball and a socket. Each are manufactured from different and highly sophisticated materials satisfying very strict specifications. The prosthesis shaft must be extremely strong, sufficiently flexible and, of course, completely "inert". It must be remembered that fixing these devices in an arthrititic patient requires a long operation followed by a lengthy period of convalescence. For all practical purposes, an implant is therefore inserted once and for all and must be able to sustain the 200 million cycles of flexural and torsional stress which that piece of metal can be expected to sustain during the patient's life-time. This calls for complicated stress calculations and tests, like the ones shown in the photographs below.

The hollow-ball must also have special qualities. It must first of all be absolutely smooth. This requires the most refined forging or casting techniques. It must be extremely resilient, "bio-compatible" and "corrosion resistent" or inert indefinitely. Cobalt-base chromium/molybdenum alloys have been developed to this end. Sulzer's have come out with a highly technical substance called *Protasul-10* which is used in the forged state for producing implants. Finally, the material of the socket must be such that friction with the metal ball is reduced to a minimum and at the same time be extremely strong. New kinds of high-density plastics presenting the required characteristics have been developed over the years.

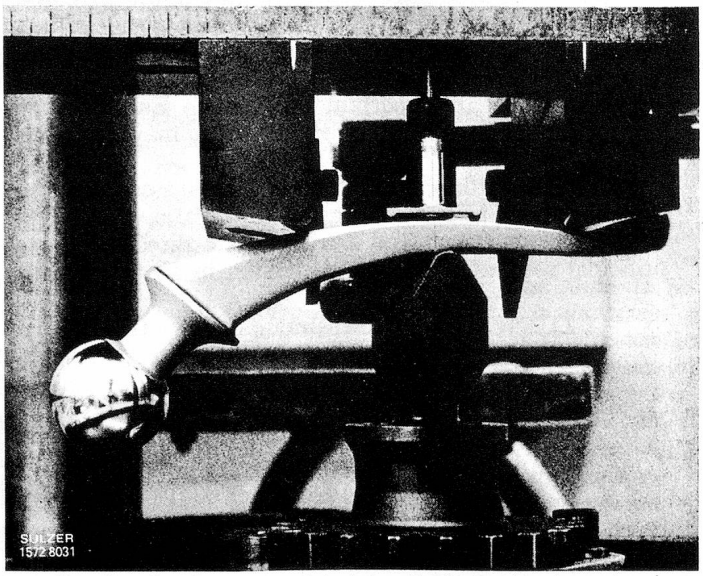
All these devices are subjected to elaborate mechanical and chemical tests before being tried on animals – and then on human beings. One is however never quiet sure that an implant that has proved adequate on a guinea-pig will not cause problems on a human patient. Clinical experience is therefore indispensible to complete the knowledge obtained in the laboratory.



Total hip joint replacements. The picture shows prostethis shafts of various sizes of the kind which are embedded in the thigh bone of patients suffering from arthritis. Articulation consists of a hollow ball made of a special casting alloy and a socket of high-density polyethylene (by courtesy of Sulzer Brothers Ltd.)



Impact test hammer for testing impact toughness of hip joint shaft at its middle.



Bending load test on a hip joint shaft designed to plot a load-deflection curve.