Electric Sleep Machine Devised

Transistorized Unit Is Successful in Clinical Tests

By STACY V. JONES
Special to The New York Times

WASHINGTON, April 29—A professor of electrical engineering has invented a portable electric sleep-inducer. The effect has been compared with that of phenobarbital

Patents of the Week

Dr. Omar Wing, at present on sabbatical leave from Columbia University, will receive a patent June 14 for the device, which is called the Electrosom.

The National Patent Development Corporation, New York, to which the patent is assigned, is arranging for clinical tests on about 100 human subjects, to supplement an earlier study.

After the tests, the company hopes to market a hospital model at about $300. Eventually, with approval by the Food and Drug Administration, a simpler design for individual use is planned, to sell under $100.

National Patent holds the American rights to a sleep machine patented in 1964 by three Russian engineers, but regards the Wing instrument as much superior.

The Russian version was considerably heavier and more expensive, required vacuum tubes instead of transistors, and had to be left plugged into the wall.

The new sleep inducer fits in a light case, about the size of a cigar-box. It is transistorized and powered by a rechargeable cadmium - nickel battery, about flashlight-size. A timer will turn it off after 20 or 30 minutes.

Electric pulses are applied to the head through pads. The patent describes a wave train of 30 or 40 cycles a second, with brief pulses at 18 or 20 volts, which enter at the nape of the neck and exit through the eyelids.

The pulses are adjusted "until the patient barely feels discomfort, and experiences

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The New York Times

Prof. Omar Wing with sleep-inducing apparatus he devised

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alternate black and white color sensations."

In the earlier study, Dr. Bernard Straus, professor of medicine at New York Medical College, employed the Wing device on 34 voluntary patients suffering from insomnia and regularly receiving medication.

Both the subjects and the attending nurse reported that there were "more good nights' sleep" when the instrument was employed.

In Dr. Straus's opinion, the instrument had efficacy in inducing sleep, but he thought further study was needed to determine whether the nurse was right in pronouncing it as effective as phenobarbital. He said the extremely low-power source made it safe for patients.

While on leave, Dr. Wing is in the Computer Science department of the I.B.M. Research Center, Yorktown Heights, N. Y. He is co-inventor of a method of converting a television receiver to provide simultaneous sound in several languages. The new patent will be 3,255,753.

ELECTRIC SLEEP THERAPY

by F. Rubin

Sleep, induced by means of short electrical pulses, closely resembles natural sleep and is probably the most innocuous form of artificial sleep. This form of therapy is widely practised in Russia, and to some extent elsewhere, and a special clinic has opened in London this week

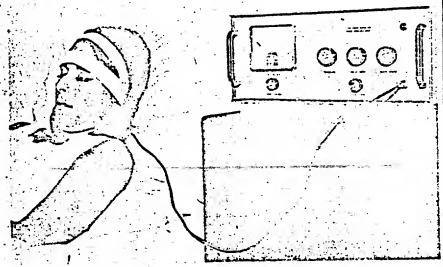
Man has appreciated the curative value of sleep in various diseases for at least 2000 years. One of the earliest records of a deliberate attempt to induce sleep for such purposes—a votive tablet from Epidaurus dated 372 B.C.—tells of successful "temple sleep". The "sleeping draught" referred to on the tablet seems to be the ancestor of narcotic treatment widely applied in modern medicine.

Insomnia has always been a medical problem—increasingly so in modern times. The most diverse resources have been called upon to overcome it. The endeavour to induce sleep artifically has received a considerable impetus over the past century, with the advent of appropriate drugs. However, it was very soon recognized that such pharmacologically-induced sleep is not always harmless. This kind of sleep treatment, better termed "prolonged narcosis", has had adherents in Europe, Russia and North America. Drawbacks include side-effects such as rashes, increased temperature, bronchopneumonia, nerve and liver damage and, finally, drug addiction. Thus it became expedient to develop a sleep therapy which would physiologically resemble natural sleep.

Researchers in several countries now claim that this has been achieved with the new method of electrotherapeutic sleep. Furthermore, it is believed that it may prove useful not only for the treatment of insomnia but also for many other diseases like bronchial asthma, high blood pressure, nervous dermatitis and duodenal ulcers.

Electrotherapeutic sleep, which received its first practical applications and success in Russia more than a decade ago, has been investigated by a number of scientists in Western Europe and the United States. The results of these investigations are promising from the medical viewpoint.

In practice, electric sleep has been applied somewhat empirically on the general basis that the natural electrical activity of the brain of a sleeping person is known from electroencephalogram patterns, to differ from that which occurs when the person is awake. By interfering with the brain's waking electrical



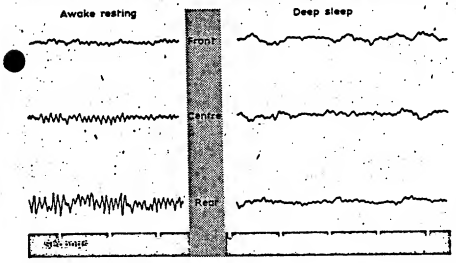


Figure 1 top *This electric sleep equipment is connected to a patient's head by special electrodes that conduct millisecond pulses with a current of about one milliamp at a frequency of between one and 130 c/s*

Figure 2 bottom *Electroencephalograms recorded at three points on the left side of the head of a person awake but relaxing with his eyes closed displays the typical alpha-rhythm, a fairly regular wave-form with a frequency of about ten c/s and amplitude some 50 microvolts. Eye opening or the resumption of other kinds of nervous activity inhibit this electrical behaviour. In deep sleep, however, the alpha-rhythm is replaced by the slower, irregular delta-waves which have a frequency of only one c/s or lower, though their amplitude may be as great as 200 microvolts. Electric sleep induces an exactly similar pattern in the sleeping patient*

activity with external electrical pulses, the argument runs, it should be possible to induce the appropriate sleeping pattern. It turns out that this procedure works, although the theoretical basis remains uncertain.

Theories of exactly what happens in natural sleep fall into two categories: the first—largely favoured by Russian workers—is due to Pavlov who maintained that the normal alternation of sleeping at night and waking during the day was a conditioned reflex. Sleep, in this context, resulted from the inhibition of nervous activity over the whole of the cortex of the brain. Nowadays such cortical changes can be associated with changes in the electrical rhythms recorded by electroencephalography (EEG). Electrical sleep induction may be simply the result of superposition of external pulses on the natural rhythms, bringing about a change in cortical activity.

The alternative theory is based upon numerous investigations that have pointed to the existence of specific "sleep-waking centres" in the brain—possibly in the hypothalamus—whose activity normally keeps the brain awake. Electrical sleep may be the outcome of localized control of these centres by currents passing through them.

The first electric sleep-inducing apparatus was designed in Russia at the Vishnievskii Institute for Experimental Surgical apparatus and Instruments, Moscow. Professors M. G. Anan'yev, N. Gilliarovsky and S. Roitenburg were the pioneers in applying electrotherapeutic sleep to patients.

The various types of electric sleep-inducing apparatus that are coming into use in different countries generate short, "square-wave" pulses of current of low intensity and low frequency to induce a state of deep relaxation and sleep. At present the types of pulsed current commonly used for achieving electric sleep have frequencies ranging from 1 to 130 c/s, with pulse lengths ranging from 0.2 to 1.2 millisecs and amplitudes of from 0 to 1.5 milliamps.

These pulses are produced by the main component of the apparatus which takes its current supplies from the mains or batteries. Patients are connected to the generator with special electrodes, placed on the head, contact being established via the forehead and the lower part of the skull just above the neck.

In studies conducted in Russia, Europe, the United States and Japan electric-sleep treatment has been employed either on its own or in combination with other forms of therapy in the following branches of medicine.

Psychiatry—in cases of depression, anxiety states, agitated paranoid conditions, catatonia (schizophrenic fixity of posture), alcoholic and narcotic withdrawal states, and for various forms of headache, as well as insomnia.

Internal medicine—for treating gastric ulcers and ulcer-like conditions, high blood pressure, asthma and the lung condition, emphysema.

Gynaecology—Russian and American sources have reported excellent results in the treatment of the early forms of sickness in pregnancy, particularly persistent vomiting.

Pediatrics—a number of cases are reported in the literature of success in the treatment of various nervous disorders following encephalitis in children.

Surgery—in the surgical department, sleep inducing apparatus can be used for putting the patient to sleep in the ward before operation to spare needless anxiety. In addition, for minor surgery, the combination of electric sleep with a local anaesthetic allows the dose of the latter to be greatly reduced, and helps the patient to tolerate the operation itself better.

On the basis of the electric sleep inducing apparatus, and the results of physiological investigations of electrically induced sleep, a separate piece of equipment has been designed in Russia for electronarcosis—a new proposal for inducing degrees of anaesthesia sufficient for any surgical intervention. The results of experiments are very promising, and this type of a anaesthesia may be used in the near future for actual surgery. It will greatly reduce the chemical agents used during operations.