MEDICINE

Quick Repair

New type of splint, developed originally because a veterinarian wanted to make injured pets more comfortable, now saves lives of Navy men and spares them agony.

By ELSIE McCORMICK

➤ A RECENT visitor to the Naval Hospital at Philadelphia was startled by the sight of three sailors—one with a leg broken six days before, another with an arm broken two days before, and a third with a jaw that had been broken only a week—having a little game in the recreation room.

The man with the broken arm was dealing the cards, the man with the fractured leg was walking — without crutches—around his chair to change his luck, and the man with the broken jaw was enjoying a consoling chew of tobacco.

No plaster casts, slings, or bandages were to be seen, and the tobacco chewer did not have his jaws fastened together or wear the usual plaster skull-cap with wires attached. Instead of any of these traditional devices, all three patients wore, over the broken part, a "Stader splint." This consists of a short metal bar, each end of which is firmly anchored, so as to bridge the fracture, by two stainless steel pins skewered into the bone. With the ingenious aid of screws, the broken ends can be drawn together and adjusted accurately, quickly, painlessly. Though it weighs only a matter of ounces, and therefore is no burden to the patient, it is strong and rigid enough to carry the strain normally put on the bone. It is at once a bone setting mechanism and a substitute bone.

Developed by Veterinarian

This splint was developed by a veterinarian, Dr. Otto Stader. After a long experience with animals, it was applied to human beings for five years by two leading surgeons at Bellevue Hospital in New York. Since last December it has been in use at the Philadelphia Naval Hospital. Results of these trials have just been reported in *Annals of Surgery* and *Surgical Clinics of North America*. Judging from results so far, the Stader splint is likely to bring about a tremendous change in the treatment of broken jaws and of the long bones of the arms and legs.

Pain and discomfort are very much lessened. Time lost from work is cut down to an extraordinary degree. In most leg fracture cases, the usual weeks and even months in bed are reduced to days; a few patients have even walked without crutches the very day after the bone was set. Provided that their teeth still meet as they should, jaw fracture patients can blithely eat solid food 24 hours after the Stader splint has been applied—a striking contrast to the five or six weeks of tube-feeding and the months of soft victuals usually endured. Instead of hanging immobile in a sling, a fractured arm can generally be used within a day or two. At the Philadelphia Naval Hospital, a sailor was photographed carrying a forty-pound suitcase with an arm that had been set only 24 hours before.

Dog Tragedy

The invention resulted from the tragedy of a dog. Dr. Stader, gray-haired and intensely serious, was a specialist in the diseases of cattle until the depression. Then he took over a small animal hospital at Geneva, Illinois. On his first day there, a widow brought in a wire-haired terrier with a broken leg. Dr. Stader, who had not treated a dog since he left college, took it to a colleague for consultation. First they put the leg in a plaster cast, which the dog promptly ate away. When they tried an aluminum splint, the terrier chewed off the adhesive tape. Next they cut into the leg and wired the two ends of bone together. But the patient tore away the bandages, an infection developed, and, to the great grief of its owner, the little terrier had to be destroyed.

Much chagrined, Dr. Stader set to work in his basement to devise a splint that would be comfortable, allow free use of the joints above and below the break, and hold the fragments in place without the use of plaster.

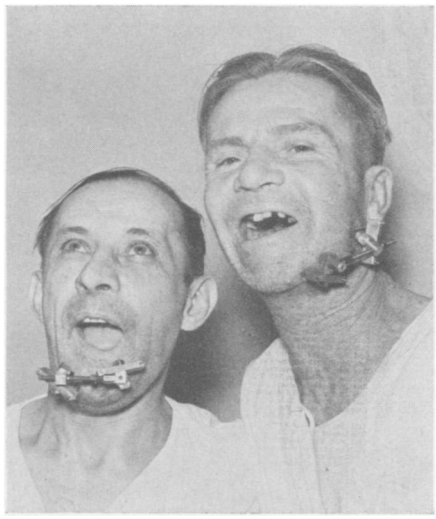
The principle of the metal splint fastened to the bone with pins was not new. The "Steinmann pins," invented by a Swiss surgeon, were introduced into this country by Dr. A. Codivilla in 1904. But the fact that they had to go through the entire limb, coming out on the other side, and that plaster was still necessary, prevented them from being widely used.

Other surgeons — among them the Americans, Dr. Roger Anderson and Dr. H. H. Haynes — contributed improvements, such as shorter pins set in the bone at an angle. But the veterinarian felt that there were drawbacks to the devices that existed. After weeks of trial and error, he produced the Stader splint substantially as it is today.

The first patient was a chow dog with a badly fractured thigh bone. Using careful operating room technique, Dr. Stader fixed the pins in the dog's bone, above and below the break, and adjusted the screws and bar until the jagged ends had meshed. A few minutes after the chow came out of the anaesthetic, it got to its feet and walked across the room. It recovered without apparent pain, going through its normal cat-chasing routine while the leg bone knitted. Not once did it attempt to tear away the splint.

Since then, at Geneva and at his present animal hospital in Ardmore, Pennsylvania, Dr. Stader reports, he has

NORMAL STRENGTH—Although this man's arm was fractured only one day before this picture was taken, he is carrying a forty-pound suitcase.



***JAW FRACTURE** doesn't prevent these men from opening their mouths, chewing a regular diet and talking at will in spite of their injury. This is of extreme importance to men in the services.*

treated more than 1,200 dogs with broken bones. The vast majority of them were able to stand, walk and run normally almost as soon as the operation was over.

He has also treated cats. And about three months ago he used an enlarged form of his splint on a mare, who grazed serenely in a meadow while her leg was healing. Formerly a broken leg meant that a horse had to be destroyed. If further cases confirm this first success, it will be possible to save the lives of many valuable and beloved horses.

In 1937, six years after Dr. Stader began using the splint on animals, his work came to the attention of Dr. Kenneth M. Lewis and Dr. Lester Breidenbach, both on the faculty of New York University's College of Medicine and in charge of much of the fracture work at Bellevue Hospital. Watching Dr. Stader put the splint on a police dog, Dr. Lewis was surprised at the simplicity and mechanical accuracy of the operation. He was even more amazed when he returned next day and saw the dog dashing 'round the kennels. A careful study of the splint convinced him and Dr. Breidenbach that it could be used successfully on human beings.

But an enormous amount of preliminary labor had to be done. The veterinarian worked nights in the basement of his animal hospital, adapting the splint to human arms and legs. Patiently, day after day, the two surgeons broke bones in the autopsy rooms and fitted the apparatus to every possible variety of fracture.

A few months later, the splint was tried on their first human case—a merchant seaman who had fallen through a hatchway and badly broken his right leg between knee and ankle. He was not much impressed with his new splint; in fact he looked at the wires, pulleys and plaster casts that bedecked his ward mates and felt that he was being neglected. The doctors kept him in bed ten days before letting him bear his weight upon the broken limb. Moving pictures taken a few days later show him walking briskly up and down stairs. Not long after that he went to work at a new job on the waterfront. Ordinarily a man with his injuries would have been disabled for at least three or four months.

Even more striking was the case of a nineteen-year-old baker who had broken the lower bones of his left leg during a soccer game. At first his leg was placed in the usual plaster cast. Two weeks after the cast had been put on, the ends of the broken bone slipped and he returned to the hospital in agonizing pain.

This time Dr. Breidenbach put on a Stader splint. Two days later the young man was walking. Within a week he was back at work standing eight hours a day before his ovens, the instrument hidden from sight under his trouser leg.

In a third case, a woman who had slipped and broken her leg while mopping the kitchen floor was doing her housework again five days after the splint had been applied.

Shock Affects Some

Of course, not all patients with fractured legs are back in the running as soon as that. Many are kept in bed for several days by shock and by injury to the soft tissues resulting from their accident. Others cling stubbornly to crutches because they simply can't believe that it would be possible to step on their injured legs so soon.

But despite their early successes, for five years Dr. Lewis and Dr. Breidenbach proceeded cautiously, working out improved techniques, studying long-term results, publishing nothing. Not until the October, 1942, *Annals of Surgery* were the results of their work announced to the medical world.

Stirred by Pearl Harbor, Dr. Stader brought one of his splints to the Philadelphia Naval Hospital the very next day. After careful study, the Navy surgeons were sufficiently impressed to begin using it on trial.

Fractures have always been a nightmare at sea. Unless a special steadying device is used, legs supported by traction sway back and forth with the motion of the ship. In case of sudden disaster, men with legs supported by wires or encased in plaster casts are sometimes tragically handicapped. Transferring a broken-limbed sailor over the side of a ship in a canvas sling or bringing him down a ship's ladder in a full-length basket is a ticklish business.

Just after the splint was put in trial, a young service man was brought into the hospital with a compound fracture of the leg and a severe concussion of the brain. Temporarily out of his head, he thrashed about so much that there was no question of wires or pulleys. But after one of the new splints had been applied, his frenzied tossing did not harm the broken bones.

Extraordinary Cases

Soon there were other extraordinary cases—a young sailor walking around the hospital the day after the splint had been placed on a compound fracture of the lower leg; a gob caught by a movie camera in the act of picking up a 50-pound oak chair with an arm that had been set only 24 hours before.

At the Philadelphia Naval Hospital, the Stader splint was used for the first time on broken jaws. At sea, the usual treatment for such cases can be dangerous. A sailor whose jaws are clamped together must always carry a pair of clippers tied 'round his neck, so that he can cut the wires at once and avoid choking to death in case of a sudden attack of seasickness.

Six cases of broken jaws treated by the new method have been reported by Navy doctors. Patients whose teeth meet correctly have been able to eat, smoke, and chew gum almost as soon as the splint has been applied. If these good results are borne out by further tests, the horror of jaw fractures at sea may disappear forever.

Navy surgeons have also used a variation of the splint which Dr. Stader has worked out for broken heels. Heretofore, about ninety per cent of the victims have gone through life with an unnatural walk because it hurt to put their full weight on the damaged foot. Navy men so injured were nearly always discharged from the service. So far, Navy surgeons have used the new splint on six cases of fractured heel. Instead of having (*Turn to page 318*)

• New Machines and Gadgets •

⚙ *A ROBOT that distinguishes colors in the same way that the human eye does, has been developed for accurate measurement and matching of colors. Three color filters and three photoelectric cells or electric eyes measure the intensities of the three primary colors in the sample the color of which is being determined. Fading can thus be measured without preserving an unfaded piece of the sample. Whiteness or yellowness of near-white surfaces can also be measured.*

Science News Letter, November 14, 1942

⚙ *HOW TO KEEP your carpet smooth with lamp cords running under it in every direction is shown by a recent patent. The invention is an under-carpet pad with grooves in it running lengthwise and crosswise. The wires are laid in these grooves and are then not only out of sight but cannot even be felt. At intersections of the grooves, curved spaces are provided so that the direction of a wire may be changed without making a sharp bend.*

Science News Letter, November 14, 1942

⚙ *THE CARRYING CASE of a hand movie camera is made to provide support for the camera in an invention recently patented. As the camera is drawn from the case, its lower front edge becomes hinged to the upper front edge of the case. Consequently, when the camera is held at eye level, the back of the case drops down and and rests on the chest of the operator. The case thus forms a diagonal brace which supports and steadies the front end of the camera.*

Science News Letter, November 14, 1942

⚙ *A PLASTIC FUSE for a trench mortar shell is what the young lady in the picture is holding. Every such fuse saves a pound of aluminum for our airplanes. Since they are being manufactured in*

huge quantities, the saving of aluminum is considerable. The plastic used was specially developed for the purpose. It had to be extra hard, and maintain its dimensions accurately in all weathers.

Science News Letter, November 14, 1942

⚙ *NEW CHEMICALS stimulate the germination of seeds, induce new root formation of cuttings, improve the general growth, and prevent premature dropping of fruit. They act in the same way that synthetic hormones do, but are safer. The hormones are tricky. A little too much or too long a treatment, and growth is stunted rather than promoted and other damage is done. The chemicals accomplish all that hormones do, the inventor claims, but allow a much wider margin of safety.*

Science News Letter, November 14, 1942

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 130.*

From Page 311

their legs in plaster casts for from 16 to 20 weeks, the men began stepping guardedly about the ward on the second or third day. Every one was able eventually to walk normally and without pain.

Weary of years of limping, a 45-year-old ex-service man came to the Naval hospital for help. His right thigh bone had been broken 17 years before. The injured leg was two and a half inches shorter than the other, and extremely painful to walk on. The bone was cut through obliquely, and a Stader splint applied. By turning the screws a little every few days, the bone and the muscles were gradually and painlessly lengthened. In the first two weeks, the veteran's leg gained one and a quarter inches. Now he can walk in comfort and without the trace of a limp—for the first time in 17 years.

Applying the splint requires anaesthesia, but once it is in place only very small dressings are necessary, and sometimes even these are not used after the first 48 hours. The tissue which closes around the pins keeps the holes free of infection. The splint should be applied only by surgeons who have had training in its use.

Few, if any, Stader splints will be available to civilians until after the war, for the entire output of the instrument company now making the splints is being reserved for our service men. But once it is available for civilian use, the splint will be of incalculable benefit to people with broken legs, arms and jaws. It will mean less pain, less expensive nursing and hospital care, less time lost from precious jobs. Hundreds of planes, tanks, and anti-aircraft guns could be

built in the time lost each year by workers with broken bones.

As the limb fitted with a Stader splint can remain in use, the joints do not stiffen, the muscles do not become weak, and the blood, circulating more freely, can bring a richer supply of repair materials and thus speed up the knitting of the bones. Usually a fracture of the two bones of the lower leg means five or six weeks of traction treatment, with wires and pulleys, and from five to fourteen weeks more in a plaster cast. After that there is generally another two or three months of restricted action, while the weakened, flabby muscles are slowly brought back to normal.

But patients with such fractures seldom have to wear the Stader splint longer than nine weeks. When it is taken off, there is no dreary period of rehabilitation. As the patient has been walking or using his arm most of this time, the muscles are strong and able to carry on as usual.

Often the time wasted by a fracture goes far beyond the period of healing. Doctors have long been troubled by the mental effects of months in a hospital bed. Gradually a man with a slow-healing leg fracture loses his interest in the outside world, and takes on the resigned attitude of a permanent invalid. Sometimes it is a full year after leaving the hospital before he arouses himself enough to get another job. A patient able to leave his bed within a few days escapes this mental hazard.

This new method may be of immense benefit in a battle or a blitz. Patients with legs slung from wires or encumbered by plaster casts cannot quickly be moved to safety. From Bataan comes a story of Medical Corps men cutting traction wires and ordering soldiers with broken legs to get under the beds when Jap fliers bombed the hospital. But patients wearing the Stader splint can easily get away, in many cases under their own power.

According to a report by the Surgeon-General, in the last war, nearly one-third of all days lost from disability involved fractures. Over 46 per cent of discharges due to disability were the result of broken bones; the days lost for which fractures were responsible reached the staggering total of 5,125,220!

Because a veterinarian wanted, years ago, to make pet dogs more comfortable than was possible with the usual casts and splints, we now have a new weapon against suffering in peace and loss of time and men in war.

Science News Letter, November 14, 1942

BOTANY

NATURE RAMBLINGS

by Frank Thone

Not Always Latex

➤ "LATEX" and "rubber" have come to be practically synonymous in the minds of many persons. Any plant with milky juice is apt to be regarded as the grand solution to all our rubber problems. Contrariwise, any plant that doesn't "bleed white" when you cut it is dismissed as hopeless so far as rubber is concerned.

Nothing could be farther from truth. Some plants with milky sap, like dandelion and poppy, contain no rubber at all, or so little as not to count. Milkiness is not necessarily an indicator for rubber, but merely the mark of an emulsion, that is, of a liquid with millions of minute droplets of some other substance, like an oil or a resin, suspended in it. Common cow's milk is an emulsion: globules of butterfat and other substances suspended in watery whey. Non-rubbery plant latexes usually are emulsions of resins, which are exactly what a tire-maker doesn't want.

Wholly without latex are several of the plants now regarded as most promising alternative sources of natural rubber, notably guayule, kok-sagyz, rabbit-brush and goldenrod. Instead of being emulsified as minute droplets in a watery medium to form a latex, the rubber in these plants is embedded as small solid particles or shreds in the living tissues themselves.

Extracting rubber that occurs in this form is quite a different problem from that presented by the latex-producing group of rubber plants. Guayule and kok-sagyz (the only ones at present used on a practical scale) are harvested as whole plants, which are dried and then ground down to an impalpably fine pulp in pebble mills. The rubber particles are then separated out of this "soup" by suitable chemico-physical means. The whole process is tedious, and costlier than rubber manufacturers would like to have it. Department of Agriculture technologists are now hard at work, in efforts to simplify it and make it cheaper.

One curious thing about these plants that produce their rubber solid is that they belong to the same botanical family, the composites. This is the very large, evolutionally highly successful group that contains sunflowers, dandelions, wild asters, daisies, lettuce, thistles, artichokes and ragweeds.

By no means all composites contain rubber; only a few do. But all rubber-producing composites worth bothering with have it embedded as solid particles, not as latex. What this may signify nobody knows as yet; it just stands as a curious botanical coincidence.

Science News Letter, November 14, 1942

● RADIO

Saturday, November 21, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Charles R. Reed, senior meteorologist in charge of Des Moines Weather Observatory, will discuss "Bumper Crop Weather."

Tuesday, November 17, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04, 9.70 and 11.73 megacycles.

One in a series of regular periods, over this short wave station to serve science clubs, particularly in the high schools, throughout the Americas. Have your science group listen in at this time.

Monday, November 16, 9:15 a.m., EWT; 2:30 p.m., CWT; 9:30 a.m., MWT; and 1:30 p.m., PWT

Science at Work, School of the Air of the Americas over the Columbia Broadcasting System, presented in cooperation with the National Education Association, Science Service and Science Clubs of America.

"Explosives at Work" will be the subject of the program.