wound diverticula in the manner above described. The disposition of other standards is immaterial, always providing that a wide circle is obtained, and that the distance between the wound margin and ligature is always greater than the deepest part of the wound.

To summarize what has been said, the elevation of a wound in this manner furnishes the following advantages:

It allows of a complete toilet. The bactericidal serum enhances the defensive properties of a wound, which, as is well known, are at a high state of development at the time of infection. During the progress of healing the perfect immobility of the compressed area, since all circumferential forces are inhibited at the line of constriction, gives the best condition possible for the building up of healthy scar tissue. The part inside the constricted area is free from any kind of traction, and the edges of the wound are quite flaccid and tend to fall together.

Of equal importance in the healing process is an avoidance of anything that would tend to depreciate the vitality of the growing cells. The practice of packing a wound with an unabsorbable dressing, such as sterilized gauze, is a familiar example of the continued disturbance of growing granulations wherever such a dressing is removed; not only is the proceeding exceedingly painful, but a layer of germinal tissue is taken away in the dressing to which it has adhered. This of course means delay, and what causes delay will eventually show in the final cicatrix. It is urged, too, that germicides in destroying bacteria must in some measure impair the vitality of the surrounding cells; it is considered improbable that the bacterial protoplasm should be killed outright, and that the protoplasm of the neighbouring cells should escape untouched.

Many years ago I invented a dressing from cancellous tissue of bone. This is deprived of fats, decalcified and bleached, and forms a soft white sponge-like tissue which adapts itself readily to the soft parts. It is both absorbent and absorbable. Though its utility has been circumscribed and limited, it is still a most serviceable dressing for chronic wounds, as I have had the opportunity of witnessing in this war. It fails in freely secreting wounds, as it does not provide sufficiently for drainage. I still think that if modified the matrix of bone tissue will ultimately form a basis for dressings. The need for a dressing which can be removed without disturbance of the granulations and without causing pain has been greatly felt in this war. Xylonite and celluloid dressings have been invented to meet this requirement. I have made the suggestion that cancellous tissue might still be utilized by a modification of the method adopted in making the dressing in its present form. Briefly, it would consist of only partially decalcifying the bone in the first instance until it was of such soft consistence as would enable it to be planed into exceedingly fine films. The face of these films could then be perforated. The films could then be completely decalcified and subsequently hardened in formalin to make them more adaptable and to secure the perforations from collapsing.

Any dressing which is to be applied to a granulating surface should possess three qualities: It should be absorbent, absorbable, and perforated. Absorbent, so that the plastic lymph could be held in its meshes for the nourishment of the ingrowing plasma cells. Absorbable, so that the dressing could yield, and be gradually replaced by the new tissue. Perforated, so that drainage could be obtained in the early stages, and the graft would thus be enabled to adhere to the granulations; otherwise the dressing is liquefied and prematurely absorbed. Healing by granulations should be "continuously progressive," and there should be no pauses in the process and no "retrograde movements," such as must always occur when a wound is treated with unabsorbable dressings.

For the development of perfect scar tissue one factor is essential—absolute rest in the healing zone. A healthy scar should be smooth, elastic, free from adhesions, and non-contractile. Contractility in a scar presupposes undue traction in the wound, against which it is an opposing force. It is the presence of this quality in a scar that is responsible for so many disabling conditions that remain after healing, such as deformities, intractable neuralgias, paralysis of nerves—such as ulnar paralysis where the symptoms are late in developing—chronic oedema, etc.

WEISSENBACH and BOUTTIER have reported to the Société de Biologie of Paris that the inflammation following penetrating wounds of the brain is usually due to the *Streptococcus pyogenes*, and that this is specially true of diffuse cerebro-meningeal inflammation arising at an early stage—that is to say, during the first two weeks after receipt of the wound.

A BED AND SOME APPLIANCES FOR GUNSHOT WOUNDS OF THE FEMUR AND BACK.

BY

MAURICE G. PEARSON, M.B., B.Sc.LOND., F.R.C.S.,
MAJOR SOUTH AFRICAN MEDICAL CORPS,
OFFICER IN CHARGE OF FEMUR WARDS, — BASE HOSPITAL, FRANCE.

THE accompanying illustrations show a special bed and some other apparatus found useful in the femur wards of a base hospital in France. Most of it has been in use for over a year, and all of it long enough to have proved its value.

The bed is intended primarily for gunshot wounds of the femur, but is also useful for any wound of the shoulder, back, or pelvis where turning the patient is difficult. It is an extension of the "sectional mattress" idea, with this addition—that not only the mattress, but the whole of that part of the bed that underlies the wound, can be removed altogether, giving unimpeded access either for dressing the wound, for radiography, or for ordinary nursing purposes, so that it is unnecessary to move the patient at all.

FIG. 1.—Femur bed stripped: one movable section with "quick-release" attachment let down as for dressings or radiography; the plank underneath is to support a dressing bowl.

It consists of an ordinary tubular frame army bedstead with the spring mattress removed and replaced by tight canvas slings, 11 in. wide, fastened by straps and buckles to one side-bar of the bedstead, and by metal hooks or a "quick-release" contrivance to the other.

Upon the tight slings lie the mattresses in three or more sections. For a femur case, one square "biscuit mattress" is under the patient's head and body, another under the lower part of the legs, and a small piece of mattress similar in shape and size to the canvas slings lies immediately under the wound and is the one that is removed, with its corresponding canvas, for dressing purposes.

As a matter of convenience the bed stands 36 in. high, the head of it supported on a wooden trestle, the foot either on a trestle or hung from the roof by chains, the length of which can be easily regulated to tilt the bed, if wished. In flimsily-floored huts the vibration is also much reduced by this means. A movable arch of round iron resting on the side-bars of the bed affords means for suspending the Thomas splint, or the pelvis of the patient if it is necessary to expose a large part of the back or buttock at one time. I would like to lay great stress on the value of the suspension of the ring of the Thomas splint: it prevents slipping of the ring, thus adding to the efficiency of the splint and the comfort of the patient.

Fig. 2 shows the other femur apparatus which is in ordinary use here. The patient arrives at the base hospital with his leg generally very well put up in a Thomas splint with strapping or glue extension applied below the knee. Our object is to retain the complete immobilization and extension of the thigh while securing the greatest possible freedom of the knee and ankle. Both of these objects can be attained without disturbing the adjustment made at the casualty clearing station, and without removing the Thomas splint there applied.

After the patient has had a good rest and been radiographed, Besley's or other callipers with weight and pulley extension in the line of the thigh are, as a routine procedure, applied to the femur just above the knee, and the points are inserted down to the bone, but not penetrating into it; any tendency to subsequent penetration is limited by placing a light check-bar between the handle-ends of the callipers; a subsidiary hinged splint, exactly similar to the

FIG. 2.—Femur bed with patient on it; Thomas's splint with large ring as sent down from the casualty clearing station, with knee-flexion piece added. Lower end of bed suspended by chains.

one used by Major Sinclair for elbow flexion, is attached to the Thomas by a thumb-screw at the level of the knee-joint, and the weight of the leg below the knee is transferred to this. The strapping or glue extension is then removed altogether. The femur thus has very direct and efficient extension through the callipers in its own long axis, while the leg below the knee has, and needs, no extension at all, and can be flexed as much as desired, the amount being regulated by a light chain and hooks between the foot of the Thomas and the subsidiary splint. The patient's foot is suspended from a foot-piece, as shown. The leg is bare below the knee and is massaged and moved daily.

In upper-fourth fractures, where wide abduction of the limb is necessary, two of the vertical suspension posts shown in the figure are attached to the foot of the bed and a third one bolted across the top of the other two, projecting as far as is necessary beyond the side of the bed.

FIG. 3.—Thomas's splint with knee-flexion piece added.

The patient with the whole apparatus—bed, splint, extension post, weights, etc.—being compact and self-contained, can be carried as a whole without any difficulty in case of a fire alarm, or out into the garden if wished.

Measurements of both thighs are taken once a week by means of a sliding scale, such as shoemakers use, and any shortening is charted as regularly as the temperature. Very few have a centimetre of shortening. All have moveable knee-joints. Secondary haemorrhages are extremely rare.

With these beds one nurse can dress a case easily without assistance; the actual dressings of a ward of femur cases are much lighter than those of an average general surgical ward, though, of course, there still remains more fetching and carrying and washing.

I submit these particulars for publication in the hope that some of them may be useful or suggestive to others working in special femur hospitals. They have very greatly lightened the work and increased the efficiency of our wards.

I am greatly indebted to Captain Renwick, of the Army Ordnance Department, for valuable advice and assistance in making these appliances, all of which are now available through ordinary army sources or from the British Red Cross Society.

A CASE OF SEPTICAEMIC MENINGITIS, WITH RECOVERY.

By JOHN DUNBAR, M.B. GLASG.,
LIEUTENANT R.A.M.C.

SINCE it is well known that cases of septicaemic meningitis are almost invariably fatal, and that cases of recovery are extremely doubtful, it is well to place on record a case in which recovery is not doubtful, and which shows an absence of certain signs and symptoms generally found in this condition.

S. S. was admitted to hospital on July 14th, 1917, suffering from a shrapnel wound of the right scapular region received seven days previously. The wound was superficial, very septic, and the spine of the scapula was exposed for three inches of its length. Except for a slight cough he was very comfortable.

Two days later, and for the following three days, he had a feeling of malaise. Rise of temperature was slight, and not of a septic character.

On the evening of July 19th he had an attack of syncope, following which he complained of severe pain in the eyes. Next morning he had a slight rigor—temperature 102.2° F., pulse 104, respirations 36—followed by pains in the calves and stiffness of the lower jaw. The jaw could be opened fairly widely; the tongue was coated with a brownish fur. As some of the signs and symptoms resembled those of tetanus, it was considered safer to treat the complication as that disease. The wound was in good condition.

He was very restless on the following day, and bilious vomiting preceded by nausea occurred. The pains in the legs were now severe, and the stiffness of the jaw was increased. In addition there was slight stiffness and tenderness of the neck, and slight headache. The temperature was 101.6° F., pulse 104. He continued in this condition until July 22nd, when lumbar puncture was performed, 20 c.cm. cerebro-spinal fluid withdrawn, and as it was still doubtful whether tetanus was the cause of the condition, 17 c.cm. antitetanic serum were injected. Although the cerebro-spinal fluid was clear, it was under slightly increased pressure.

The following organisms were found: Cocci, some of which were Gram-positive, others Gram-negative, but shaped like pneumococci. Small Gram-negative bacilli were also present. Culture gave a very abundant growth of the latter. No meningococci were found. Practically no polymorphonuclear leucocytes were present. The fluid contained no evidence of inflammatory reaction. The same organisms had been found in the pus from the wound.

The pain and stiffness in the back of the neck still continued on July 23rd, but the headache was now localized to the occipital region, and was severe. Kernig's sign was well marked, although previously it had been absent. Slight generalized twitchings were observed. He was given morphine $\frac{1}{4}$ gr. that night, as he was very restless and his headache was very severe. There was no improvement in his condition on July 24th.

On July 25th 20 c.cm. cerebro-spinal fluid were withdrawn. It was still under slightly increased pressure, and on this occasion it was faintly opalescent. The same organisms were found as before, except that the bacilli were now very scanty. There was distinct evidence of meningitis, abundant polymorphonuclear leucocytes being present. Immediately after the lumbar puncture he became much brighter and the pains in head and neck were less severe. Slight congestion of the right side of the throat was present. No meningococci were found on bacteriological examination of the throat swab. He developed phlebitis of the left long saphenous vein.

Apart from a syncopal attack during the night of July 26th nothing of any importance was noted, except that his general condition was improving, until July 29th. On that day the pain and stiffness of the neck were absent, as was also Kernig's sign, and pain in the head was less severe. The phlebitis was still present. He continued in this condition until August 2nd, on which day his temperature was 101° F. Lumbar puncture was performed, 20 c.cm. cerebro-spinal fluid being withdrawn. The cocci and bacilli were still present, but were much scantier than on the previous occasion. Extremely few polymorphonuclear leucocytes were found. The fluid was practically clear.

As the headache was now much less severe, lumbar puncture was not performed until August 13th, when 10 c.cm. were withdrawn. Although practically under normal pressure the fluid contained a few organisms. Polymorphonuclear leucocytes were very scanty.

After August 13th the headaches were not constant. Lumbar puncture was again performed on August 28th. The fluid was under slightly increased pressure—greater than on previous occasions—but on bacteriological examination it was found to be sterile. The swelling and pain of the leg had disappeared, but the glands were still enlarged, although not painful. The patient was allowed up on August 31st. Oedema appeared in the leg on September 4th, and he was confined to bed until the swelling had disappeared.

On September 25th the following was noted as his condition: Weight increasing rapidly. Mentally bright. Slight frontal headaches of a very transient nature present. The eyes were examined by Major Fergus, R.A.M.C.(T.), who could find no