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M. F. STEPHENS
SURGICAL OR FRACTURE NAIL

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Fig. 1.

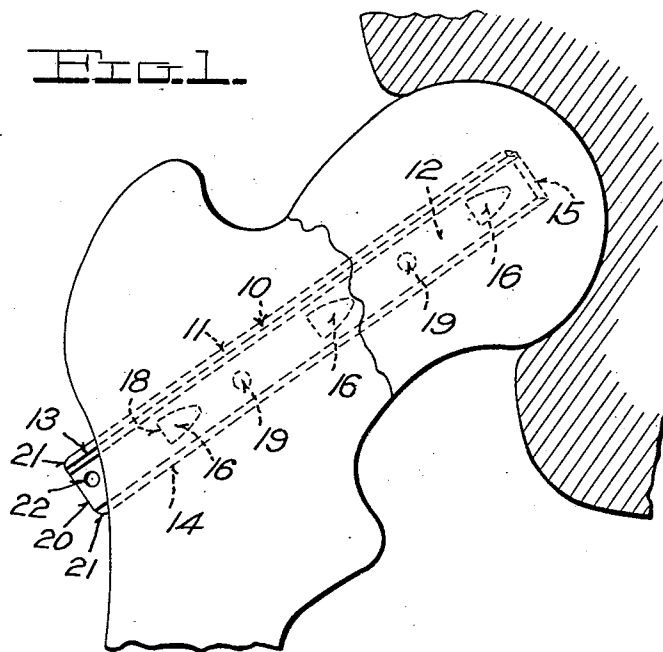


Fig. 2.

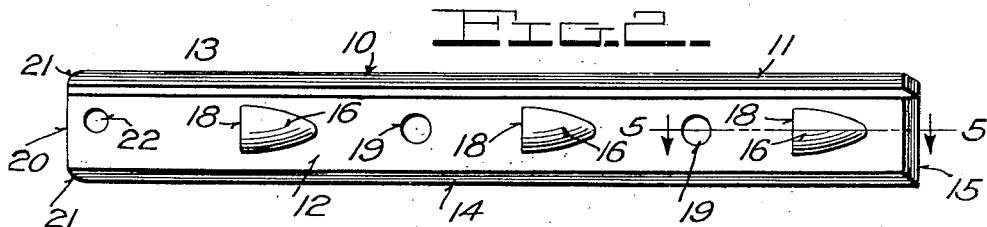


Fig. 3.

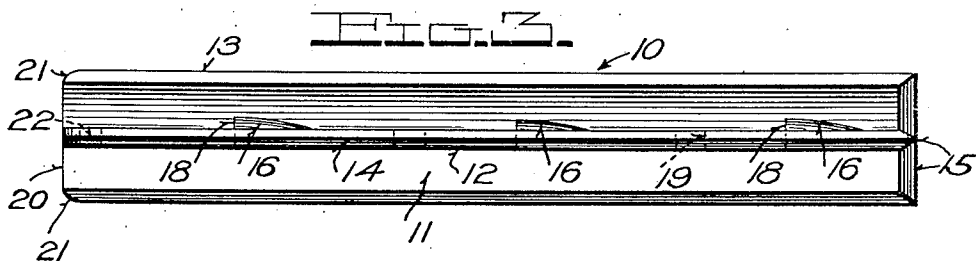


Fig. 4.

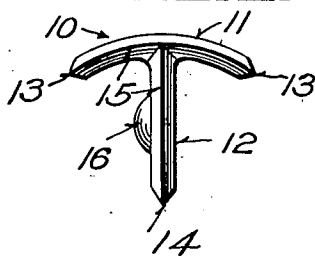
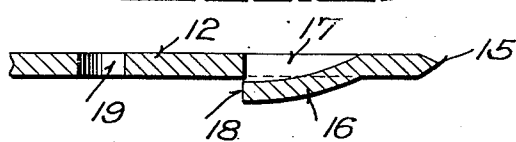


Fig. 5.



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SURGICAL OR FRACTURE NAIL

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1

My invention relates to surgical nails for use in the fixation of fractured bones, and particularly to fracture nails used in the healing of fractures of the neck of the femur.

In the past practice of hip-nailing a guiding pin or pilot wire has usually been inserted in the shaft of the femur to guide the fracture nail as it is driven into a hole drilled in the hard outer portion of the femur and extending through the fractured neck and into the head or ball-like portion of the hip joint. Such fracture nails which have usually been flanged pins of generally triangular shape in cross section, must be positioned nearly in the direct weight-bearing line of the joint, and so positioned that they receive the support of the dense corticle bone on both sides of the distal fragment. For the best results the X-ray or fluoroscope must be used to determine the length of and the exact location or position of the nail; and in my Patent No. 2,454,680 November 23, 1948 I have disclosed a precision instrument for guiding the drill and the nail, and also the pilot or guide wire when the latter is used, although the use of the instrument eliminates the necessity for the use of the guide wire.

In the use of the prior fracture nails, it has been found that in some cases the nail does not properly support and hold the broken fragments together, and has a tendency to change its positions and slide out. It is therefore an object of the present invention to provide an improved nail of substantially T-shape in cross section with its top or head transversely curved and its depending web portion provided with longitudinally tapered lugs, so that when the nail is positioned in the fractured bone, its curved top will fit the neck of the femur and properly support the fractured parts while the lugs on its web or depending flange will effectively hold the parts together and prevent the nail from sliding out.

Another object of the invention is the provision of a nail of this character which will be extremely strong in both vertical and horizontal directions considering the size of its parts, so that when the weight of the body is placed upon the heads of the femurs when the patient stands erect, the fractured portions of the neck will be held in proper alignment and effectively supported.

A further object is to provide a fracture nail with which no guide wire will be needed to direct placement of the nail.

With the above and other objects in view, the

2

invention resides in the novel features of construction and combinations and arrangements of parts hereinafter fully described, and illustrated in the accompanying drawings, in which:

Fig. 1 is a view showing the position of my improved surgical nail in the fractured neck of a femur,

Fig. 2 is a side view of the nail on an enlarged scale,

Fig. 3 is an enlarged bottom view,

Fig. 4 is an enlarged end view looking toward the outer end of the nail, and

Fig. 5 is a detail section on line 5—5 of Fig. 2.

My improved fracture nail comprises an elongated body or stem 10 preferably made of stainless steel although it may be formed from other material which has the required strength and which will not corrode or be irritating to the body tissues. It will be made in different lengths varying from about 2¾ to 6 inches. The body is of substantially T-shape in cross section, and when in position in a fractured femur as shown in Fig. 1, the cross member 11 is disposed uppermost and the web member 12 extends downwardly. The top surface of the cross portion or member 11 is transversely curved, the curve corresponding substantially to the average transverse curvature of the hard outer portion of the neck of the femur. When a person stands erect the weight of the body is carried by the heads of the femurs, and with the T-shaped nail positioned in a fractured femur as shown in Fig. 1, the curved top portion 11 will be in tension and the web 12 in compression. The nail will thus effectively support the broken portions of the bone. Preferably the entire top or cross portion 11 is transversely curved as seen in Fig. 4, and its longitudinal edges 13 are made sharp. These edges as well as the bottom edge 14 of the vertical web portion 12 may be beveled on either side or on both sides as shown so that said edges are V-shaped. The edges 15 of the portions 11 and 12 at the point or end of the nail which is driven into the drilled hole in the femur, are V-shaped or sharpened to facilitate the driving operation.

When the nail is driven in place both pieces of the bone will be firmly fastened together by reason of the shape of the nail and the provision of tapered lugs 16 provided on at least one side of the web 12. These nail anchoring lugs are preferably formed by stamping the web to laterally offset portions of it, as shown in Fig. 5, and thus form depressions or cavities 17 in the side of the web opposite the lugs. The lugs are out-

wardly pointed or tapered in the direction in which the nail is driven and the rear or inner ends of the lugs form vertically disposed shoulders 18 to effectively hold the nail against sliding out of the femur. During the knitting of the fracture the new bone cells or tissues will fill the cavities and assist in preventing any outward sliding movement of the nail. Any number of the lugs 16 may be provided depending upon the length of the nail, but one is preferably located $\frac{1}{2}$ of an inch from the pointed or outer end, one is located about $\frac{3}{4}$ of an inch from the inner or driving end, and one or more may be at intermediate points depending upon the nail length. If desired transverse openings or holes 19 of about $\frac{1}{8}$ of an inch in diameter may be formed at irregular intervals in the web 12 between the lugs 16 to permit of the circulation of blood, etc.

The improved nail has no driving head but at its inner end the flat extremities 20 of the cross and web portions are formed with rounded corners 21, the curve being on a radius of about $\frac{1}{8}$ of an inch. That will prevent the patient from feeling the inner end of the nail which is usually left projecting from the bone about $\frac{1}{8}$ of an inch. At said inner or driven end 20 may be formed an aperture 22 to receive the hooked end of an instrument by means of which the nail may be pulled out of the bone if such removal is necessary or desirable.

With the improved nail it is not necessary to use a guiding wire or pin, since an adaptor or driver may be slipped on the inner end 20 of the nail and used in the V-guide of the instrument of my above mentioned patent.

It is believed the manner of using and the advantage of the device will be understood from the above detailed description, but it is to be noted that due to the shape of the nail and its position in a fractured femur, the parts of the latter will be very effectively supported and held together so that there will be no displacement and the nail will not change its position or slide out.

Excellent results have been obtained from the details disclosed and they are preferably followed, but it will be understood that within the scope of the invention as claimed, numerous minor changes may be made.

I claim:

1. A fracture nail comprising an elongated body of substantially T-shape in cross section having a transversely curved cross member at its top and a depending web provided with longitudinally spaced lugs tapered toward one end of said body.

2. A surgical nail for the fixation of the fractured neck of a femur comprising an elongated body of substantially T-shape in cross section and of a size to be driven into the soft inner part of a femur neck longitudinally thereof across a transverse fracture, said T-shape body having its cross portion disposed uppermost and provided with a top surface which is transversely curved, the curvature of said top surface corresponding substantially to the average transverse curvature of the hard outer portion of the neck of the femur to effectively support the broken portions of the bone, the web portion of said T-shaped body being disposed vertically and projecting downwardly from the longitudinal center of said cross portion to prevent relative rotation of the broken portions of the neck of the femur.

3. A fracture fixation member of metal or other suitable material comprising an elongated body of substantially T-shape in cross section and of a length to extend across a transverse fracture in a bone to unite the two portions thereof, said T-shape body having its entire cross portion transversely curved throughout its length, the transverse curvature of said cross portion corresponding substantially to the transverse curvature of the hard outer portion of a fractured bone, the web portion of said T-shaped body being flat and straight, said web portion projecting from the longitudinal center of the concave face of said cross portion to prevent relative rotation of the broken portions of a bone.

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The following references are of record in the file of this patent:

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