the speculum gently pushed into position. The lateral blades (Fig. 2) are next introduced in like manner (Fig. 3).

In removing the instrument, the lateral blades are removed first by withdrawing them one-half or two-thirds and then compressing the distal ends as when introducing. The antero-posterior blades are sufficiently withdrawn, but the distal ends can be compressed in like manner.

In office examinations, in many instances, there is difficulty in securing satisfactory exposure of the cervix without the aid of an assistant. The lateral blades or retractors used in conjunction with any suitable bivalve speculum, as in Figure 5, constitutes a thoroughly efficient quadvalve speculum insuring complete exposure of the cervix, particularly in cases of laceration or of enlargement of the cervix or of undue relaxation of the vaginal walls (Fig. 6).

A NEW SAW ESPECIALLY ADAPTED TO CRANIAL SURGERY.*

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It is a matter of common knowledge that the present instruments for opening the skull in cranial surgery are crude and unsatisfactory from many points of view, and some months ago, in making certain bone sections, the idea of utilizing the circular saw occurred to me. This new saw which I have devised (Fig. 1) has a handle heavy enough to prevent vibration, and of such shape as to permit a firm grasp with the hand. On the upper part of the handle there is a shoulder to accommodate the thumb. On the lower aspect of the handle are grooves for the fingers, with a ring for the index finger. This ring protects the finger absolutely from the rapidly revolving saw, and also gives a rigid base to brace, when desired, the handle against the head. I originally provided a sharp pin on the lower edge of this ring to press into the bone to anchor the instrument, thereby preventing slipping of the saw in starting the incision. This was found in practice, however, to be unnecessary, the saw proving to be under perfect control. The gauge to regulate the depth of cut of the saw slides at the side of the saw, and is accommodated in a dovetailed groove at the side of the handle. The end of the gauge shaft is threaded and accommodates a nut set in a recess in the handle. By turning this nut, the gauge slides in or out and permits the saw to cut to any depth, to the finest fraction of an inch.¹ The saw is set in a recess in the handle, and this, with the gauge just described, protects the operator's fingers perfectly from any injury. The saw is attached to a short shaft held in place by a set-screw through the top of the nose-piece of the handle. A thread on the other end of the shaft, with a surrounding threaded collar permits of connection with the flexible shaft and its sheath respectively of an electric motor or dental engine.

This instrument will cut as rapidly as desired through bone of any density. I have had the saw revolving 3,400 revolutions a minute with all vibration a negligible quantity. With a circular saw, of course, one must make incisions in a straight

line, but a moment's reflection will show that the curved incision has no real advantage, and is but an inheritance of the compulsory cut of the obsolete trephine. With this new saw, a bone flap of any size may be made, with the least possible amount of bone destruction, and without interference with the vitality of the flap. By making a triangular flap, and then instead of cutting through the last angle breaking it off with a chisel, the periosteal connection is preserved. By tilting the saw a beveled cut can be made, thereby securing a shelf and preventing undue sinking of the bone flap after replacement.

This instrument makes an incision of but one millimeter in width, and it can readily be seen that this promises the very greatest likelihood of union occurring in the healing process.

Inasmuch as the saw can be regulated to cut the finest shades of difference in depth we have ample protection against injuring the brain substance. Even when there are internal ridges of bone if the operator does not choose to spring these loose with his chisel, he can pass a delicate curved probe around the ridge between the dura and the skull and then by pressing the dura away cut the obstructing ridge with impunity (Fig. 2).

I have thus far refrained from referring to the inside guard because many surgeons feel confident enough to control their cuts without its use. However, I have devised it in order to answer every requirement that might arise. This guard is composed of the protecting arm with a T-shaped end, a pivot joint and a handle arm. The joint is of the French lock pattern,

with a sufficiently wide bearing surface to prevent lateral motion. The French lock permits the ready removal or placing of the guard in position. The handle arm turns up over the instrument to the shoulder where it is operated by the thumb.

To operate this guard an opening is first made to admit the T-shaped tip, the tip is then adjusted in position between the skull and the dura. Constant pressure of the thumb is necessary to keep the tip in proper apposition to the inner wall of the skull. Suitable stops placed at the joint prevent the arm from contact with the teeth, and also from unnecessary motion in the opposite direction. A spring² attached to the arm assists the thumb in constantly drawing up the tip toward the saw. It is necessary to withdraw the tip and to readjust it when starting on a new line of incision, as the narrow cut made prevents the guard from turning corners. A contrivance has been devised for transmitting the power through the handle to the short saw shaft. As, however, the mechanism for this is more complicated and less durable, and as by experience the lateral transmission has not proved objectionable, it has appeared wiser to use the simpler construction.

To sterilize the instrument here shown, it is only necessary to unthread and withdraw the guard, loosen the set-screw holding the shaft, and then to draw out the saw and shaft; all the parts are then exposed and can be thoroughly cleansed.

In closing I might say that though this saw was primarily devised for cranial surgery it will no doubt prove useful in operations on various bones. Its usefulness in removing the calvarium at autopsy is apparent.

An instrument dealer thought that this instrument would prove an admirable saw to cut plaster-of-paris casts.

* Shown before the Philadelphia County Medical Society, Jan. 25, 1905. The discussion by members of the society was printed in THE JOURNAL, February 18, p. 569.

1. Not desiring to obscure the view the inner guard spring is not shown in Figure 1.