

object by passing a noose of tape or wire ribbon around the limb, by which traction is made downward and backward; at the same time the other hand is passed into the vagina to displace the shoulder and push it out of the brim. It is evident that this cannot be done as long as the limb is held by the left hand, as there is no room for both hands to pass into the vagina at the same time. By this manoeuvre version may be often completed when the foetus cannot be turned in the ordinary way. Various instruments have been invented both for passing a fillet around the child's limb and for repressing the shoulder, but none of them can compete, either in facility of use or safety, with the hand of the accoucheur.

Mutilation of the Foetus.—Should all attempts at version fail, no resource is left but the mutilation of the child, either by evisceration or decapitation. This extreme measure is, fortunately, seldom necessary, as with due care version may generally be effected, even under the most unfavorable circumstances.¹

CHAPTER III.

THE FORCEPS.

Use of the Forceps in Modern Practice.—Of all obstetric operations the most important, because the most truly conservative both to the mother and child, is the application of the forceps. In modern midwifery the use of the instrument is much extended, and it is now applied by some of our most experienced accoucheurs with a frequency which older practitioners would have strongly reprobated. That the injudicious and unskilful use of the forceps is capable of doing much harm, no one will for a moment deny. This, however, is not a reason for rejecting the recommendation of those who advise a more frequent resort to the operation, but rather for urging on the practitioner the necessity of carefully studying the manner of performing it, and of making himself familiar with the cases in which it is easy or the reverse. Nothing but practice—at first on the dummy, and afterward in actual cases—can impart the operative dexterity which it should be the aim of every obstetrician to acquire, and without which there can be no assurance of his doing his duty to his patient efficiently.

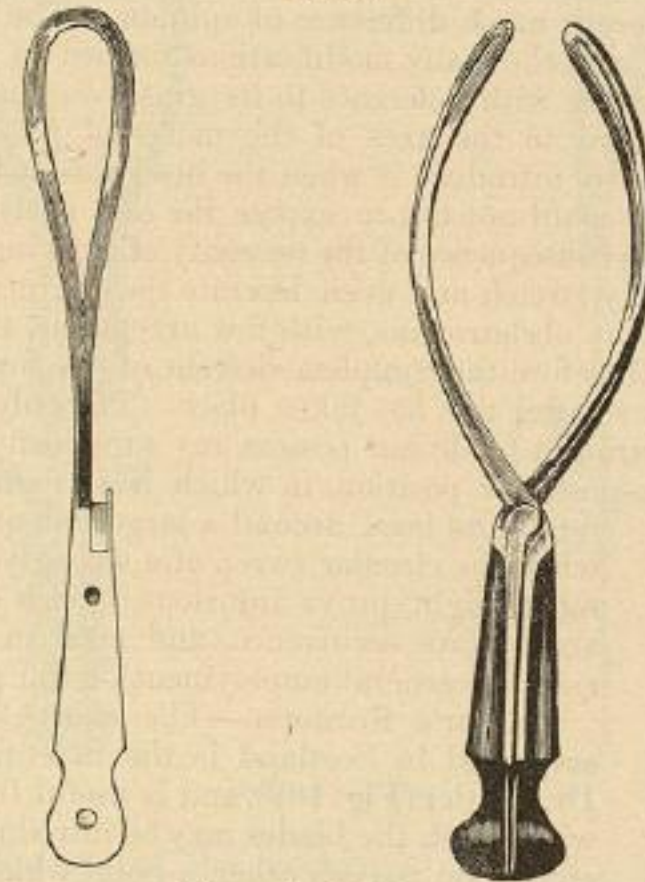
Description.—The forceps may best be described as a pair of artificial hands by which the foetal head may be grasped and drawn through the maternal passages by *vis à fronte*, when the *vis à tergo* is deficient. This description will impress on the mind the important action of the instrument as a tractor, to which all its other powers are subservient.

¹ See note, p. 536.

The forceps consists of two separate blades of a curved form, adapted to fit the child's head; a lock by which the blades are united after introduction; and handles which are grasped by the operator, and by means of which traction is made. It would be a wearisome and unsatisfactory task to dwell on all the modifications of the instrument which have been made, which are so numerous as to make it almost appear as if no one could practise midwifery with the least pretension to eminence, unless he has attached his name to a new variety of forceps.

The Short Forceps.—The original instrument, invented by the Chamberlens, may be looked upon as the type of the short straight forceps, which has been more employed than any others and which, perhaps, finds its best representative in the short forceps of Denman (Fig. 168). Indeed, the only essential difference between the two is

FIG. 168.



Denman's short forceps.

the lock of the latter, originally invented by Smellie, which is so excellent that it has been adopted in all British forceps; and which, for facility of juncture, is much superior to either the French pivot or the German lock, while for firmness it is, for all practical purposes, as good as either. In this instrument the blades are seven and the handle four and three-eighths inches in length; the extremities of the blades are exactly one inch apart, and the space between them at their widest part is two and seven-eighths inches. The blades measure one and three-fourths inches at their greatest breadth and spring with a regular

sweep directly from the lock, there being no shank. The blades are formed of the best and most highly tempered steel, to resist the strain to which they are occasionally subjected, and they are smooth and rounded on their inner surface, to obviate the risk of injury to the scalp of the child.

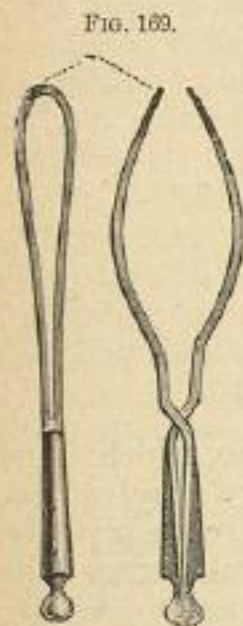
The special advantage claimed for this form of instrument is that, the two halves being precisely similar, no care or forethought is required on the part of the practitioner as to which blade should be introduced uppermost—an advantage of no great value, since no one should undertake a case of forceps delivery who has not sufficient knowledge of the operation, and presence of mind enough, to obviate any risk from the introduction of the wrong blade first. On account of its shortness, and the want of the second or pelvic curve, it is only adapted for cases in which the head is low down in the pelvis, or actually resting on the perineum.

The Pelvic Curve.—The question of the second or pelvic curve is one on which there is much difference of opinion. The forceps we are now considering, and the many modifications formed on the same plan, is constructed solely with reference to its grasp on the child's head, and without regard to the axes of the maternal passages. Consequently, were we to introduce it when the head was at the upper part of the pelvis, we could not fail to expose the soft parts to the risk of contusion, and (in consequence of the necessity of drawing more directly backward) unduly stretch and even lacerate the perineum. Hence it is now admitted by obstetricians, with few exceptions, that the second curve is essential before the complete descent of the head, although it is not absolutely so after this has taken place. The only circumstances under which a straight blade can possess any superiority are in certain cases of occipito-posterior position, in which it is found necessary to

rotate the head around a large extent of the pelvis, when the circular sweep of a strongly curved instrument might prove injurious. Such cases, however, are of rare occurrence, and need in no way influence the general employment of the pelvic curve.

Zeigler's Forceps.—The short forceps usually employed in Scotland is the invention of the late Dr. Zeigler (Fig. 169), and is useful from the facility with which the blades may be introduced in accurate apposition to each other, a point which in practice is of no little value. In general size and appearance it closely resembles Denman's forceps, but the fenestra of the lower blade is continued down to the handle. In introducing, the lower blade is slipped over the handle of the other blade already *in situ*, and thus it is guided with great certainty into a proper position, locking itself as it passes on. This instrument has the disadvantage of not having the second curve, but the facility of introduction

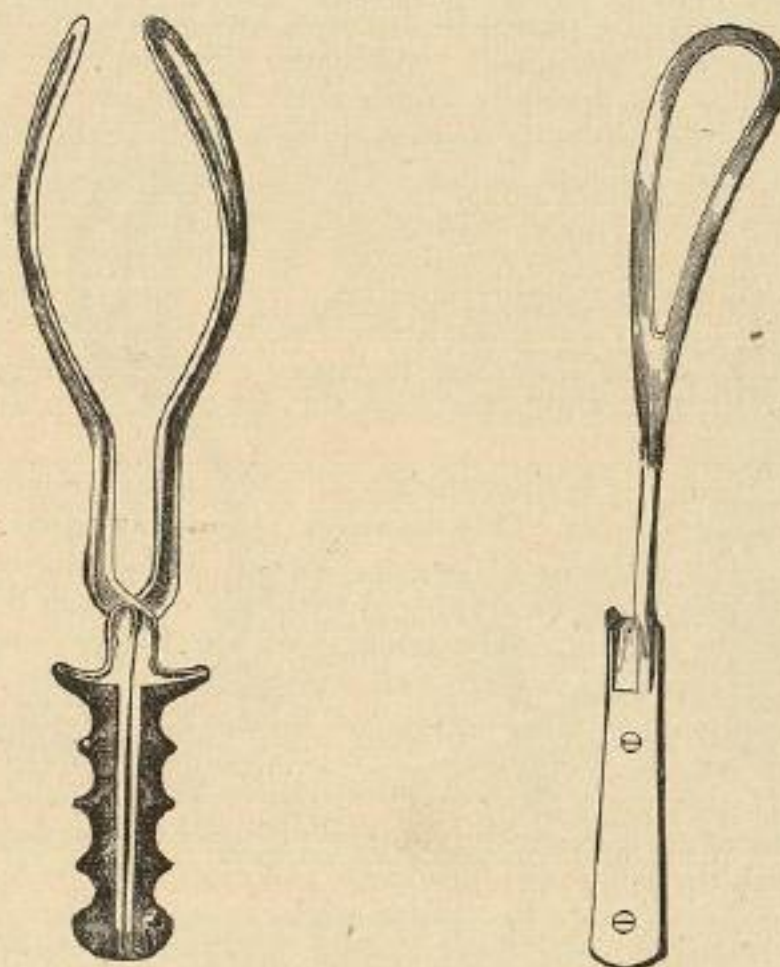
has rendered it a great favorite with many who have been in the habit of employing it.



Zeigler's forceps.

The Long Forceps.—For cases in which the head is not on the perineum, or at least not quite low in the pelvis, a longer instrument is essential. To meet this indication Smellie invented the long forceps, which, like the shorter instrument, has been very variously modified. The most perfect instrument of the kind employed in Great Britain is that known as Simpson's forceps (Fig. 170), which combines many excellent points selected from the forceps of various obstetricians, as well as some original additions, and which, as a whole, was never surpassed, until Tarnier's or its modification was invented.

FIG. 170.



Simpson's forceps.

The curved portions of the blades are six and one-quarter inches long, the fenestra measuring one and one-quarter inches in its widest part. The extremities of the blades are one inch asunder when the handles are closed, and three inches at their widest part. The object of this somewhat unusual width is to lessen the compressing power of the instrument, without in any way interfering with its action as a tractor. The pelvic curve is less than in most long forceps, so as to admit of the rotation of the head when necessary, without the risk of injuring the maternal structures. Between the curve of the blade and the lock is a straight portion or shank, measuring two and three-eighths inches, which, before joining the handle, is bent at right angles into a knee. This shank is a useful addition to all forceps, and is

essential in the long forceps to insure the junction of the blades beyond the parts of the mother, which might otherwise be caught in the lock and injured. The knees serve the purpose of preventing the blades from slipping from each other after they have been united. They also admit of one finger being introduced above the lock, and used as an aid in traction; a provision which is made in some other varieties of long forceps by a semicircular bend in each shank. The handles, which in most British forceps are too small and smooth to afford a firm grasp, are serrated at the edge, and flattened from before backward, so as to fit the closed fist more accurately. At their extremities, near the lock, there are a pair of projecting rests, over which the fore and middle fingers may be passed in traction, and which greatly increase our power over the instrument. Although this and other varieties of the long forceps are specially constructed for application when the head is high in the pelvis, it answers quite as well as the short forceps—indeed, in most respects, better—when the head has descended low down. It is a decided advantage for the practitioner to habituate himself to the use of one instrument, with the application and power of which he becomes thoroughly familiar. It is a mere waste of space and money for him to encumber himself with a number of instruments of various shapes and sizes, and he may be sure that a good pair of long forceps will be suitable for every emergency, and in any position of the head.

The chief argument against the use of such an instrument in simple cases is its great power. This, however, is entirely based on a misconception. The existence of power does not involve its use, and the stronger instrument can be employed with quite as much delicacy and gentleness as the weaker. The remarks of Dr. Hodge¹ on this point are extremely apposite, and are well worthy of quotation. He says: "Certainly no man ought to apply the forceps who has not sufficient discretion to use no more force than is absolutely requisite for safe delivery. If, therefore, there is more power at command, he is not obliged to use it; while, on the contrary, if much power be demanded, he can, within the bounds of prudence, exercise it by the long forceps, but with the short forceps his efforts might be unavailing. Moreover, in cases of difficulty, the short forceps being used, the practitioner would be forced to make great muscular efforts; while with the long forceps, owing to the great leverage, such effort will be comparatively trifling, and, of course, the whole force demanded can be much more delicately, and at the same time efficiently, applied, and with more safety to the tissues of the child and its parent."

Continental Forceps.—The forceps usually employed on the Continent and in America differs considerably, both in appearance and construction, from those in use in England. As a rule it is a larger and more powerful instrument, joined by a pivot or button-joint, and it always possesses the second or pelvic curve. Of late years Simpson's forceps has been much employed in some parts of Germany. The chief objection to the Continental instruments is their cumbrousness.

¹ System of Obstetrics, p. 242.

This is chiefly in the handles, which in many of them are forged in a piece with the blades, the part introduced within the maternal structures not being materially different from the corresponding part of the English instrument.

Tarnier's Forceps.—The forceps invented by Professor Tarnier (Fig. 171) has attracted considerable attention, and is highly esteemed by all who have used it. In this instrument traction is not made on the handles by which the blades are introduced as in ordinary forceps, but on a supplementary handle (*a*) subsequently attached to the blades near the lower opening of their fenestræ (*b*). The advantage claimed for this arrangement is that less force is required in traction, which can

FIG. 171.

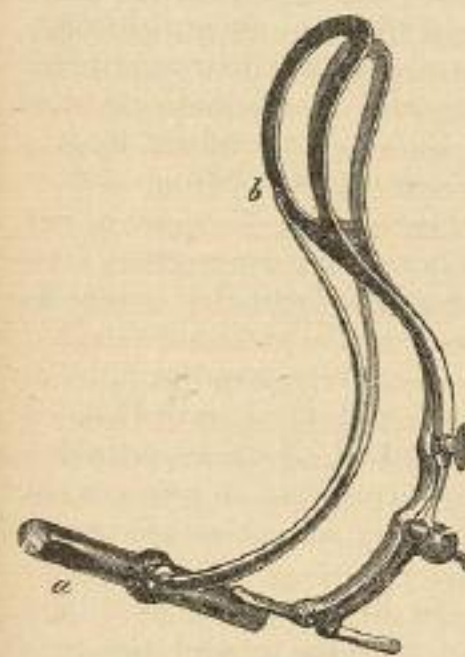
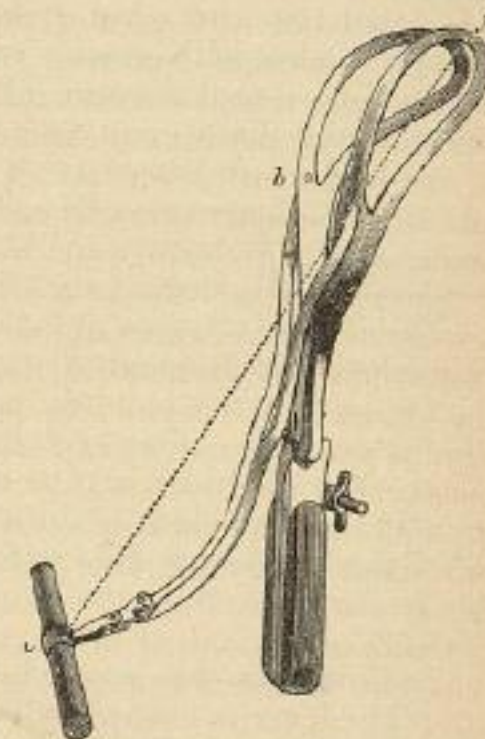
Tarnier's forceps.[¹]

FIG. 172.

Simpson's axis-traction forceps.
c, b. Traction handle. *c, f.* Line of traction.

always be made in the proper axis of the pelvis; that the blades are not likely to slip; and that rotation of the head is not interfered with. The handles of the forceps, moreover, guide the operator to the direction in which he ought to pull, since all that is required is to keep the traction rods parallel to them. This instrument, however, although theoretically excellent, is somewhat too complicated for general use.

Simpson's Axis-traction Forceps.—Prof. A. R. Simpson, of Edinburgh, has invented a modification of Tarnier's instrument, which he calls the "Axis-traction Forceps" (Fig. 172). The supplementary handles are fixed to the blades, and the whole mechanism is much simpler than in Tarnier's forceps. Dr. Simpson reports very favorably of this forceps, and it is certainly well adapted for the object aimed at.

[¹ The original Tarnier forceps had blades somewhat like those of Davis, and was much better than his present style, in the estimation of many accoucheurs.—Ed.]

For some years I have used it to the exclusion of every other form, and have every reason to be satisfied with it, especially in the high forceps operation, in which it seems to me superior to any other instrument. Indeed, the facility with which it effects delivery in such cases is often very striking.

Action of the Instrument.—The forceps is generally said to act in three different ways:

First. As a *tractor*.

Second. As a *lever*.

Third. As a *compressor*.

It is more especially as a tractor that the instrument is of value, and it is used with the greatest advantage when it is employed merely to supplement the action of the uterus which is insufficient of itself to effect delivery, or when, from some complication, it is necessary to complete labor with greater rapidity than can be accomplished by the unaided powers of Nature. In most cases traction alone is sufficient; but in order that it may act satisfactorily, and that the instrument may not slip, a proper construction of the forceps, and a sufficient curvature of the blades, are essential. The want of these is the radical fault of many of the short, straight instruments in common use, which have a tendency to slip during our efforts at extraction.

The forceps acts also as a lever, but this action has been greatly exaggerated. It is generally described as a lever of the first class, the power being at the handles, the fulcrum at the lock, and the weight at the extremities. There may possibly be some leverage power of this kind when the instrument is first introduced, and the handles held so loosely that one blade is able to work on the other. But, as ordinarily used, the handles are held with a sufficiently firm grasp to prevent this movement, and then the two blades practically form a single instrument.

Galabin, who has studied this subject in detail, points out¹ that: "1. The lever is formed by both blades of the forceps and the fetal head united in one immovable mass. As soon as the blades begin to slip over the head, the lever is decomposed, and the swaying movement ceases to have any mechanical advantage. 2. The power is applied to the handles in a slanting direction. The resistance or weight does not act at a point either between the former and the fulcrum, or beyond the fulcrum, but at a point in a plane nearly at right angles to the line joining these two points, and its direction is a line perpendicular to that plane of the pelvis in which the greatest section of the head is engaged; that is to say, in the case of straight forceps, nearly parallel to the handles. The lever formed does not, therefore, strictly speaking, belong to any one of the three orders into which levers are commonly divided. 3. The fulcrum is fixed partly by friction, partly by the combination of traction with oscillatory movements—in other words, by the power being directed in great measure downward, and only slightly to one side."

He further shows that the pendulum motion of the forceps is super-

¹ Galabin: "Action of Midwifery Forceps as a Lever," *Obst. Journ.*, 1876-77, vol. iv. p. 508.

fluous in all ordinary forceps operations, in which traction alone is amply sufficient for delivery; but that when the head is impacted, and great force is required for its extraction, a mechanical advantage may be gained from having recourse to an oscillatory movement, which should, however, be very limited, and only continued if found to effect distinct advance of the head.

Regarding the compressive power of the instrument there has been much difference of opinion. There is no doubt that the forceps, especially some of the foreign instruments in which the points nearly approach each other, is capable of exerting considerable compression on the head. It is, however, extremely problematical if this action be of real value. It is to be borne in mind that in cases of protracted labor the head has been already moulded and compressed, and the bones have been made to overlap each other to their utmost extent, by the sides of the pelvis. We can scarcely, therefore, expect to diminish the head much more by the forceps without employing an amount of force that will seriously endanger the life of the child. It is in cases of disproportion between the head and the pelvis, depending on slight antero-posterior contraction of the pelvic brim, that diminution of the child's head by compression would be most useful. Then, however, the pressure of the forceps is exerted on that portion of the head which lies in the most roomy diameter of the pelvis, where there is no want of space. If this pressure does not increase the opposite diameter, which is in apposition to the narrower portion of the pelvis, it can at least do nothing toward lessening it, and diminution of any other part of the child's head is not required.

Dynamical Action of the Forceps.—The mere introduction of the forceps sometimes excites increased uterine action, through the reflex irritation induced by the presence of a foreign body in the vagina. This has been called the dynamical action of the forceps; but it cannot be looked upon in any other light than that of an occasional accidental result.

The circumstances indicating the use of the forceps have been separately considered elsewhere, and to recapitulate them here would only lead to needless repetition. I shall, therefore, now merely describe the mode of using the instrument.

Before doing so it is well to repeat what has already been said as to the difference between what may be termed the high and low forceps operations. The application of the instrument when the head is low in the pelvis is extremely simple; and when there is no disproportion between the head and the pelvis, and some slight traction is alone required to supplement deficient expulsive power, the operation, in the hands of any ordinarily well instructed practitioner, ought to be perfectly safe both to the mother and child. It is very different when the head is arrested at the brim, or high in the pelvis. Then the application of the forceps is an operation requiring much dexterity for its proper performance, and must never be undertaken without anxious consideration. It is because these two classes of operations have been confused that the use of the instrument is regarded by many with such unreasonable dread.

Preliminary Considerations.—Before attempting to introduce the forceps, there are several points to which attention should be directed.

1st. The membranes must, of course, be ruptured.

2d. For the safe and easy application of the instrument, it is also advisable that the os should be fully dilated, and the cervix retracted over the head. Still these two points cannot be regarded, as many have laid down, as being *sine quâ non*. Indeed, we are often compelled to use the instrument when, although the os is fully dilated, the rim of the cervix can be felt at some point of the contour of the head, especially in cases in which the anterior lip is jammed between the head and the pubes. Provided due care be taken to guard the cervical rim with the fingers of one hand, as the instrument is slipped past it, there need be no fear of injury from this cause. If the os be not fully dilated, but is sufficiently open to admit of the passage of the forceps, the operation, under urgent circumstances, may be quite justifiable, but it must necessarily be a somewhat anxious one.

3d. The position of the head should be accurately ascertained by means of the sutures and fontanelles. Unless this be done, the operation will always be hap-hazard and unsatisfactory, as the practitioner can never be in possession of accurate knowledge of the progress of the case. It may be that the occiput is directed backward; and, although that does not contra-indicate the application of the forceps, it involves special precautions being taken.

4th. The bladder and bowels should be emptied.

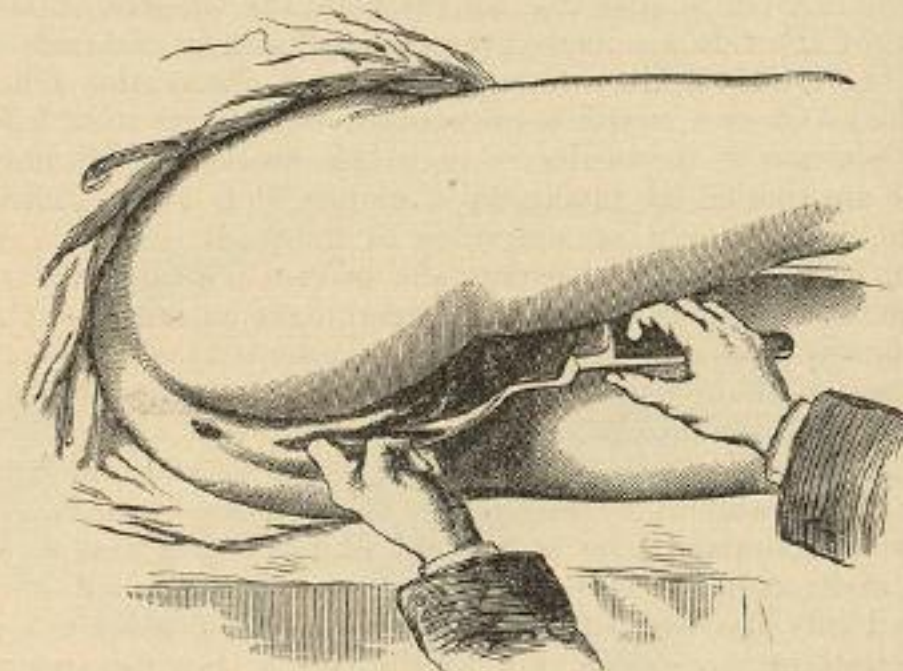
Question of Administering Anæsthetics.—Before proceeding to operate, the question of anæsthesia will arise. In any case likely to be difficult it is of the greatest assistance to have the patient completely under the influence of an anæsthetic to the surgical degree, so as to have her as still as possible; but, whenever this is deemed necessary, another practitioner should undertake the responsibility of the administration. In simple cases I believe it is better to dispense with anæsthetics altogether, partly because they are apt to stop what pains there are, which is in itself a disadvantage, but chiefly because, under partial anæsthesia, the patient loses her self-control, is restless, and twists herself into awkward positions, which gives rise to the utmost difficulty and inconvenience in the use of the instrument. Moreover, if no anæsthetic be given, the patient can assist the operator by placing herself in the most convenient attitude.

Description of the Operation.—In describing the method of applying the forceps, I shall assume that we have to do with the simpler variety of the operation, when the head is low in the pelvis. Subsequently I shall point out the peculiarities of the high operation.

As to the position of the patient, I believe there can be no doubt of the superiority of that which is usually adopted in Great Britain. On the Continent and in America the forceps is always employed with the patient lying on her back, a position involving much needless exposure of the person, and requiring more assistance from others. In certain cases of unusual difficulty the position on the back is of unquestionable utility, but we may, at least, commence the operation in the usual way and subsequently turn the patient on her back if desirable.

Much of the facility with which the blades are introduced depends on the patient being properly placed. Hence, although it gives rise to a little more trouble at first, I believe that it is always best to pay particular attention to this point, whether the high or low forceps operation be about to be performed. The patient should be brought quite to the side of the bed, with her nates parallel to and projecting somewhat over its edge. The body should lie almost directly across the bed, and nearly at right angles to the hips, with the knees raised toward the abdomen (Fig. 173). In this way there is no risk of the handle of the upper blade, when depressed in introduction, coming in contact with the bed.

FIG. 173.



Position of patient for forceps delivery and mode of introducing lower blade.

Antiseptic Precautions.—Previous to use the blades should be carefully disinfected. This is best done by thoroughly heating them in the flame of a spirit lamp, and then placing them in hot water and creolin. They should then be lubricated with carbolized vaseline and placed ready to hand.

These preliminaries having been attended to, we proceed to the introduction of the blades, sitting by the side of the bed, opposite the nates of the patient.

The important question now arises, In what direction are the blades to be passed? The almost universal rule in our standard works is, that they must be passed as nearly as possible over the child's ears, without any reference to the pelvic diameters. Hence, if the head have not made its turn, but is lying in one oblique diameter, the blades would require to be passed in the opposite oblique diameter; in short, the position of the forceps, as regards the pelvis, must vary according to the position of the head. Some have even laid down the rule that the forceps is contra-indicated unless an ear can be felt—a rule that would very seriously limit its application, as in many cases in which

it is urgently required it is a matter of great difficulty, and even impossibility, to feel the ear at all. It is admitted that in the high forceps operation the blades must be introduced in the transverse diameter of the pelvis, without relation to the position of the head. On the Continent it is generally recommended that this rule should be applied to all cases of forceps delivery alike, whether the head be high or low, and I have now for many years adopted this plan, and passed the blades in all cases, whatever be the position of the head, in the transverse diameter of the pelvis, without any attempt to pass them over the bi-parietal diameter of the child's head. Dr. Barnes points out with great force that, do what we will, and attempt as we may to pass the blades in relation to the child's head, they find their way to the sides of the pelvis, and that the marks of the fenestræ on the head always show that it has been grasped by the brow and side of the occiput. [1] Of the perfect correctness of this observation I have no doubt; hence, it is a needless element of complexity to endeavor to vary the position of the blades in each case, and one which only confuses the inexperienced practitioner, and renders more difficult an operation which should be simplified as much as possible. While, therefore, it is of importance that the precise position of the head should be ascertained in order that we may have an intelligent notion of its progress, I do not think that it is essential as a guide to the introduction of the forceps.

Method of Introducing the Lower Blade.—As a rule, the lower blade, lightly grasped between the tips of the index and middle fingers and the thumb, should be introduced first. Poised in this way, we have perfect command over it, and can appreciate in a moment any obstacle to its passage. Two or more fingers of the left hand are introduced into the vagina, and by the side of the head, as a guide. The greatest care must be taken, if the cervix be within reach, that they are passed within it, so as to avoid the possibility of injury.

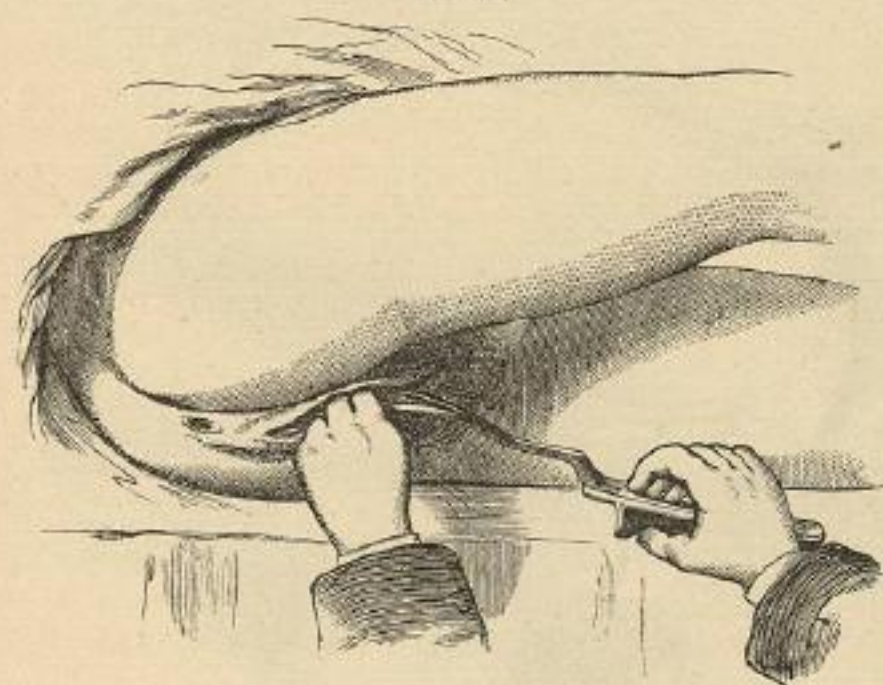
The handle of the instrument has to be elevated, and its point slid gently along the palmar surface of the guiding fingers until it touches the head (Fig. 173). At first the blade should be inserted in the axis of the outlet, but as it progresses the handle must be depressed and carried backward. As it is pushed onward it is made to progress by a slight side-to-side motion, and it is of the utmost importance to bear in mind that the greatest gentleness must always be used. If any obstruction be felt, we are bound to withdraw the instrument, partially or entirely, and attempt to manoeuvre, not force, the point past it. As the blade is guided on in this way, it is made to pass over the convexity of the head, the point being always kept slightly in contact with it, until it finally gains its proper position. When fully inserted the handle is drawn back toward the perineum, and given in charge to an assistant. The insertion must be carried on only in the intervals between the pains, and desisted from during their occurrence; otherwise there would be a serious risk of injuring the soft parts of the mother.

[1] If the forceps has a form to fit the sides of the head, it will not rotate within the blades.—Ed.]

Introduction of the Upper Blade.—The second blade is passed directly opposite to the first, and is generally somewhat more difficult to introduce, in consequence of the space occupied by the latter. It is passed along two fingers directly opposite the first blade, and with exactly the same precautions as to direction and introduction, except that at first its handle has to be depressed instead of elevated (Fig. 174).

The handle which was in charge of the assistant is now laid hold of by the operator, and the two handles are drawn together. If the blades have been properly introduced, there should be no difficulty in locking; but, should we be unable to join them easily, we must withdraw one or other, either partially or entirely, and reintroduce it with the same precautions as before. We must also assure ourselves that no hairs, or any of the maternal structures, are caught in the lock.

FIG. 174.



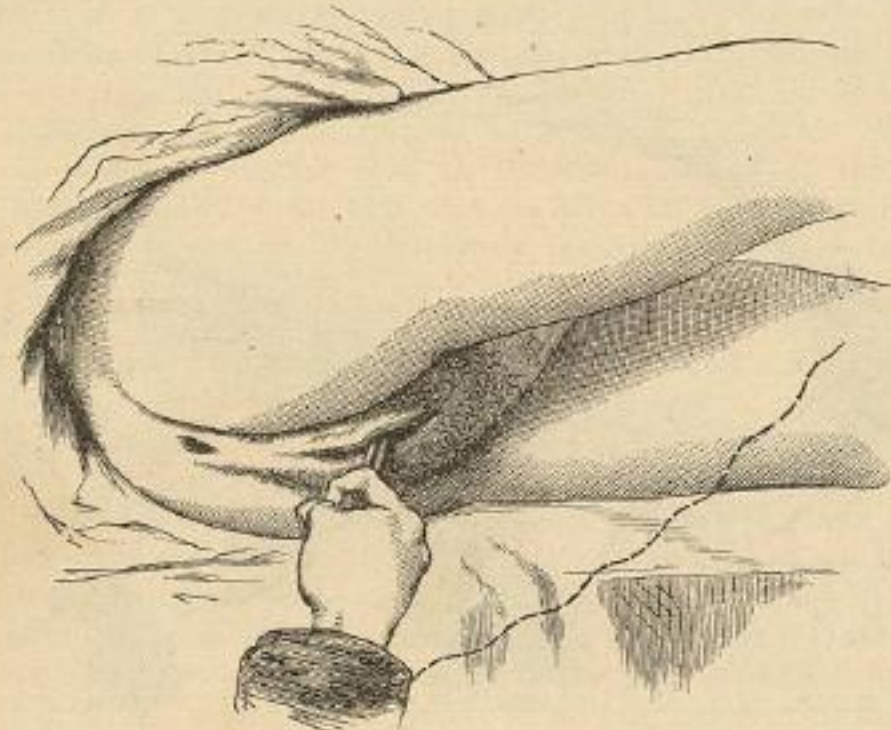
Introduction of the upper blade.

Method of Traction.—When once the blades are locked we may commence our efforts at traction. To do this we lay hold of the handles with the right hand, using only sufficient compression to give a firm grasp of the head and to keep the blades from slipping. The left hand may be advantageously used in assisting and supporting the right during our efforts at extraction, and, at a late stage of the operation, may be employed in relaxing the perineum when stretched by the head of the child. Traction must always be made in reference to the pelvic axes, being at first backward toward the perineum (Fig. 175), in the direction of the axis of the brim, and as the head descends and the vertex protrudes through the vulva, it must be changed to that of the outlet (Fig. 176). If the axis-traction forceps is used, it is to be borne in mind that traction is to be made by the traction handle only, the handles of the instrument itself being left untouched

after they are locked and the traction rods are united. By keeping these latter parallel to the handles of the forceps, traction can always be made in the proper direction. We must extract only during the pains; and, if these should be absent, we must imitate them by acting at intervals. This is a point which deserves special attention, for there is no more common error than undue hurry in delivery.

The only valid objection I know of against a more frequent resort to the forceps in lingering labor is, that the sudden emptying of the uterus, in the absence of pains, may predispose to hemorrhage; and it cannot be denied that it is one of some weight. However, if due care be taken to operate slowly, and to allow several minutes to elapse between each tractive effort, while at the same time uterine contractions are stimulated by pressure and support, this need not be considered

FIG. 175.



Forceps in position. Traction in the axis of the brim, downward and backward.

a contra-indication. Besides direct traction we may impart to the instrument a gentle waving motion from handle to handle, which brings into operation its power as a lever; but this must be done only to a very slight extent, and must always be subservient to direct traction.

Proceeding thus in a slow and cautious manner, carefully regulating the force employed according to the exigencies of the case, we shall perceive that the head begins to descend; and its progress should be determined, from time to time, by the fingers of the unemployed hand.

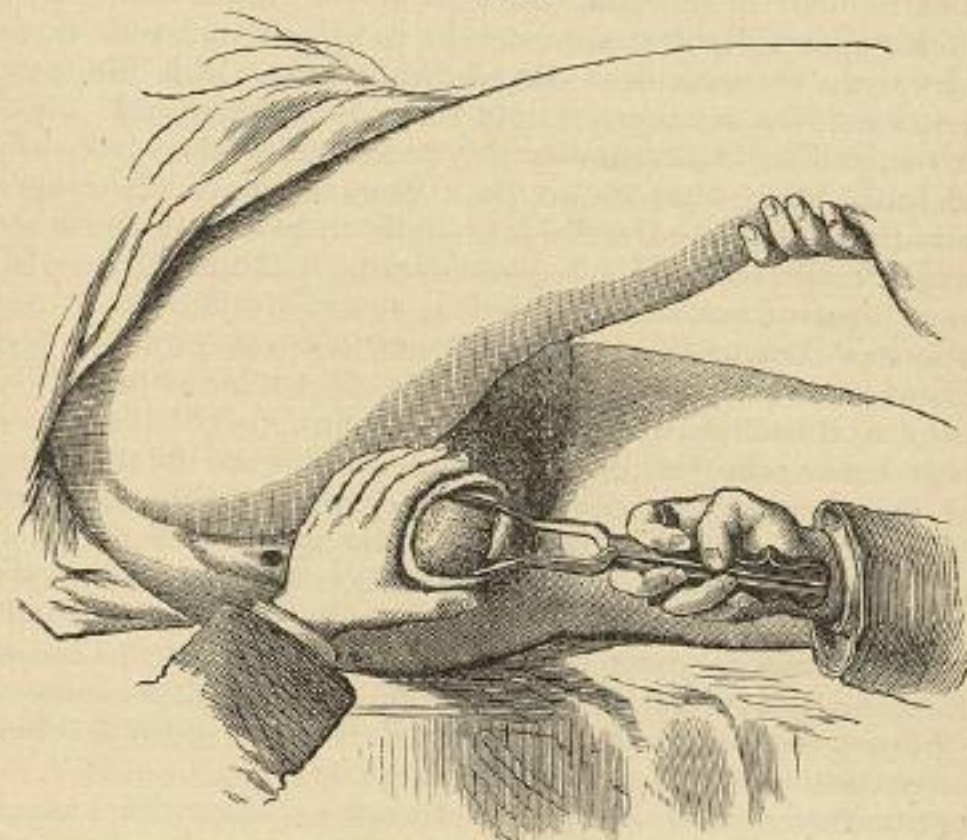
When the head lies in the oblique diameter, as it descends, in consequence of its perfect adaptation to the pelvic cavity it will turn into the antero-posterior diameter without any effort on the part of the operator, provided only that the traction be sufficiently slow and gradual. As the head is about to emerge, it is necessary to raise the

handles toward the mother's abdomen. More than usual care is required to prevent laceration of the perineum, which is always much stretched (Fig. 176). If, as often happens, the pains have now increased, and the perineum be very thin and tense, it may even be desirable to remove the blades gently and leave the case to be terminated by the natural powers; but if due precautions are used this need not be necessary.

The peculiarities of forceps delivery in occipito-posterior positions have already been discussed (p. 335), and need not be repeated.

High Forceps Operations.—When high forceps operation has been decided on, the passage of the blades will be found to be much more difficult, from the height of the presenting part, the distance which

FIG. 176.



Last stage of extraction. The handles of the forceps are being gradually turned upward toward the mother's abdomen.

they must pass, and, in some cases, from the mobility of the head interfering with their accurate adaptation. The general principles of introduction and of traction are, however, identical. This operation will very rarely be attempted before the head has entered or become fixed in the pelvic brim, for if it be freely movable above the brim, turning is preferable. If, however, from long draining away of the waters, or rigidity of the uterus, we are induced to attempt the operation before the head has entered the brim, it must be fixed as much as possible by abdominal pressure. In guiding the blades to the head special care must be taken to avoid any injury of the soft parts, especially if the cervix be not completely out of reach. For this purpose it may even be advisable to introduce the entire left hand as a guide,

so as to avoid any possibility of injuring the cervix from not passing the instrument under its edge.

Peculiar Method of Introducing the Blades.—Some authors advise that, in such cases, the blade should be introduced at first opposite the sacrum, until the point approaches its promontory. It is then made to sweep round the pelvis, under the protecting fingers, till it reaches its proper position on the head. This plan is advocated by Ramsbotham, Hall Davis, and other eminent practical accoucheurs, and it is certainly of service in some cases of difficulty; especially when, from any reason, it is not possible to draw the nates over the edge of the bed, when the necessary depression of the handle of the upper blade is difficult to effect. It involves, however, a somewhat complicated manœuvre, and it is seldom that the blades cannot be readily introduced in the usual way.

In locking, the slightest approach to roughness must be carefully avoided, for the extremities of the blades are now within the cavity of the uterus, and serious injury might easily be inflicted. If difficulty be met with, rather than employ any force, one of the blades should be withdrawn and reintroduced in a more favorable direction. If the blades have shanks of sufficient length, there should be no risk of including the soft parts of the mother in the lock, which, in a badly constructed instrument, is an accident not unlikely to occur.

Method of Traction.—After junction, traction must at first be altogether in the axis of the brim, and to effect this the handles must be pressed well backward toward the perineum. As the head descends it will probably take the usual turn of itself, without effort on the part of the operator, and the direction of the tractive force may be gradually altered to that of the axis of the outlet. If the pains be strong and regular, and there be no indication for immediate delivery, we may remove the forceps after the head has descended upon the perineum, and leave the conclusion of the case to Nature. This course may be especially advisable if the perineum and soft parts be unusually rigid; but generally it is better to terminate labor without removing the instrument.

Possible Dangers of Forceps Delivery.—Before concluding this subject, reference may be made to the possible dangers of the operation. I would here again insist on the importance of distinguishing between the high and low forceps operations, which have been so unfortunately and unfairly confounded. Reasons have already been given for rejecting the statistics of the risks attending forceps delivery in the latter class of cases (p. 363). A formidable catalogue of dangers, both to mother and child, might easily be gathered from our standard works on obstetrics. Among the former the principal are lacerations of the uterus, vagina, and perineum; rupture of varicose veins, giving rise to thrombus; pelvic abscess from contusion of the soft parts; subsequent inflammation of the uterus or peritoneum; tearing asunder of the joints and symphyses; and even fracture of the pelvic bones. A careful analysis of these, such as has been so well made by Drs. Hicks and Phillips,¹ proves beyond doubt that the

¹ *Obst. Trans.*, 1872, vol. xiii., p. 55.

application of the instrument is not so much concerned in their production as the protraction of the labor, and the neglect of the practitioner in not interfering sufficiently soon to prevent the occurrence of the evil consequences, afterward attributed to the operation itself. Many of these will be found to arise from the prolonged pressure on the soft parts within the pelvis and the subsequent inflammation or sloughing. To these causes may be referred with propriety most cases of vesico-vaginal fistula (p. 459), peritonitis, and metritis following instrumental labor.

Lacerations and similar accidents may, however, result from an incautious use of the instrument. Slight lacerations of the mucous membrane of the vagina are probably far from uncommon. But if these cases were closely examined it would be found that the fault lay not in the instrument, but in the hand that used it. Either the blades were introduced without due regard to the axes of the pelvis, or they were pushed forward with force and violence, or an instrument was employed unsuitable to the case (such as a short straight forceps when the head was high in the pelvis), or undue haste and force in delivery were used. It would be manifestly unfair to lay the blame of such results upon the forceps, which, in the hands of a more judicious and experienced practitioner, would have effected the desired object with perfect safety. The instrument is doubtless unsafe in the hands of anyone who does not understand its use, just as the scalpel or amputating knife would be in the hands of a rash and inexperienced surgeon. The lesson to be learnt seems to be, clearly, not that the dangers should deter us from the use of the forceps, but that they should induce us to study more carefully the cases in which it is applicable and the method of using it with safety.

Possible Risks to the Child.—The dangers to the child are, principally, lacerations of the integuments of the scalp and forehead; contusion of the face; partial, but temporary, paralysis of the face from pressure of a blade on the facial nerve; depression or fracture of the cranial bones; injury to the brain from undue pressure of the blades. These evils are of rare occurrence, and, when they do happen, generally result from improper management of the operation—such as undue compression, the use of improper instruments, or excessive and ill-directed efforts at traction—and cannot, therefore, be considered as in any way contra-indicating the use of the instrument. Many of the more common results, such as slight abrasions of the scalp or paralysis of the face, are transitory in their nature and of no real consequence.

[The Forceps in America.]—Although the obstetrical forceps was first used in England, other countries in the march of improvement have made great changes, not only in the original forms, but in the manner of use, and various shapes, as well as different positions of the woman in application, have become in a measure national. With the exception of having adopted almost exclusively the French and German dorsal decubitus in making use of the instrument, we have become in a measure eclectic in the selection of the latter: medical schools, accoucheurs, and local obstetrical societies influencing students and the junior

members of the profession to adopt the French, German, English, or American style, as the case may be, the forceps themselves bearing the names of the several inventors or compilers; for some are a true compilation—the blade from one contriver; fenestral openings, another; pelvic curve, a third; width, a fourth; shanks, a fifth; method of locking, a sixth, etc. For this reason the late Prof. Hodge named his forceps the *eclectic*, although in some respects entirely original, particularly in the long superimposed shanks—a great improvement for operating at the superior strait and avoiding the painful stretching of the posterior commissure of the vulva. Dr. Hodge expended a great deal of thought and money in perfecting his forceps, and the various steps in the process were marked by a new form, until, from a heavy, clumsy instrument, he gradually evolved what was at one time regarded as a wonderful improvement upon the forceps of France and England.

A contemporary of Prof. Hodge, the late Prof. David D. Davis, of London, was equally anxious to perfect the instrument, and turned his attention especially to making the blades light, open, and to fit the sides of the fetal head so as to enable traction to be made without much pressure or leaving any mark on the child's scalp. There is a principle of mechanics involved in his instrument which he studied to perfect by moulding the blades upon an iron fetal head so as to obtain considerable coaptating surface, and thus by increase of friction to avoid undue and dangerous pressure. The Davis blade soon began to effect changes in the form of American forceps, and by the addition of long handles and some alterations of shape, weight, and curve became a leading feature in those bearing the names of Prof. Wallace, of the Jefferson Medical College, Dr. Bethel, and Albert H. Smith, all of this city. The short Davis instrument was a great favorite with the late Prof. Meigs and Dr. William Harris, both largely engaged in obstetrical practice as well as teaching; and many a delicate woman with wasting forces was aided in her delivery at their hands, and was surprised to find no mark on the baby's head, and that her own sufferings could be so gently and safely relieved.

Although such was the estimation of the Davis blade, and still is in many parts of our country, it does not appear to have retained its popularity or been adopted, as its mechanical perfection would lead one who appreciates it to suppose it would have been. In Great Britain the favorite forms now in use are but a very slight improvement upon the forceps of a hundred years ago except in finish and material, the open fenestræ and bevelled blades of Davis being declined in favor of the looped fenestræ and flat-edged blades in use when he made his experiments and changes. This appears to have grown out of a practice which has been largely adopted in Germany, Great Britain, and many parts of the United States in applying the forceps to the fetal head, the blades being introduced at the sides of the pelvis without much reference to the position which the head occupies. As compression is objected to, the blades are made long and widely separated (three and a quarter to three and a half inches), and the handles short, so as not to allow of much leverage. As the blades do not fit the head, the mechanism of labor as taught by Hodge has been

much simplified, as it is not necessary to learn all the oblique fittings of the fenestræ over the parietal protuberances or ears. Dr. Meigs used to tell the students that the forceps was *the child's instrument*, and should be used as a tractor; and for this reason he advocated the use of the Davis blades against those of Siebold, Levret, Baudelocque, and Haighton, employed generally in our country fifty years ago. His language is not very complimentary to what he denominates by distinction *the mother's instrument*, the form being better adapted for saving the woman than the fetus.^[1]

At the present day we have two general orders of forceps in use in the United States, under each of which may be placed a vast number of special varieties which are simply changes upon one or the other general type according to the fancy of the inventor. At the head of one type may be placed the long forceps of Prof. Hodge, designed to be adapted to the sides of the child's head in all possible cases; and of the other, those of Prof. James Y. Simpson, of Edinburgh, or their modification by Profs. Elliot and Bedford, of New York, intended to be used as tractors, and applied in reference to the sides of the mother's pelvis, rather than to those of the infant's head.^[2]

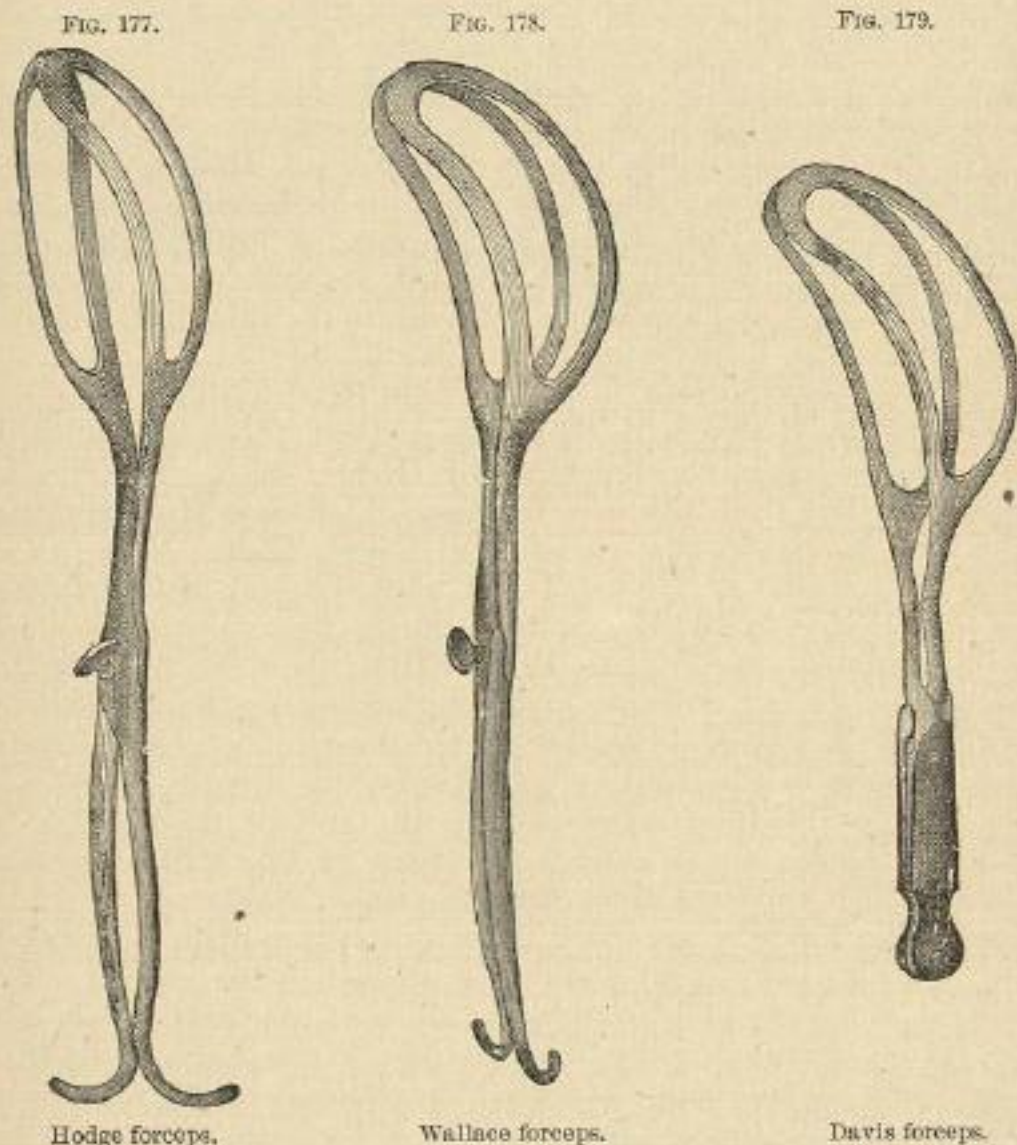
Taking the long forceps of Levret and Baudelocque as improved and modified by Hodge, with the blades of Prof. Davis as a substitute, and handles of less curve than those of Hodge, and we have the long forceps of the late Prof. Ellerslie Wallace, of Jefferson Medical College, at one time a very favorite variety and largely used. Next in order are the instruments of Hodge, Davis, and Simpson, Elliot, Bedford, and a few others—in all about a dozen forms that vary in popularity. The improvement of the late Prof. Elliot upon the instrument of Simpson consists in narrowing and lengthening the shanks, widening somewhat the fenestræ, elongating the blades, giving greater security against slipping in the handles, and gauging the distance between the blades by a milled-head screw-stop in the end of the handles; the shanks and blades are an exact counterpart of the Miller forceps of England, which appeared about the same time (1858).

The Hodge forceps was based in its contrivance upon the following points: 1. The instrument should be shaped to the contour of the fetal head, and have sufficient play to allow of compression where the pelvis is too narrow for the head to pass in its normal condition. 2. The blades should be so arranged in reference to the shanks and handles as to enable them to seize the head of the fetus in its bi-parietal diameter at the superior strait, and be drawn upon in the direction of the curve of the pelvic canal until the delivery is complete. 3. The long forceps ought to be competent to act either at the superior strait of the pelvis, in its cavity, or at its outlet, so as to avoid a multiplicity of instruments and their attendant expense. And, 4. The instrument should not cut the scalp of the child if properly adjusted, or injure the soft parts of the mother.

It would be folly to claim that all this could be or has been accom-

[1] *Obstetrics*, p. 540.
[2] The Simpson forceps, and the method of application in reference to the pelvis instead of the head, appear to be growing very largely in favor in America.—ED.]

plished, as there must necessarily be exceptional cases in all the points given; hence the contrivance of the forceps of Tarnier and Cleemann for certain presentations above the superior strait, and the long and short convertible instruments of a few inventors. There are many cases of labor in the higher walks of life where, although there is no obstruction, still the women require manual or instrumental assistance, as they cannot deliver themselves for want of sufficient contractile muscular force. Such women require that the forceps used should be



easily introduced—should act simply as tractors, control the movement of the fetal head by being well fitted to its shape, and leave no effect upon the scalp or vulva. Although these requisites may be filled by the Hodge instrument, it is this class of cases that has demanded a lighter and more roomy pair of forceps, such as that devised by Davis.

As the teaching of the Jefferson Medical College under Dr. Meigs favored, as we have stated, the forceps of Davis, so his successor, Prof. Wallace, in carrying out in a measure the same views, combined the blades of the Davis pattern with the long handles of Hodge in contriving what is known as the "Wallace forceps." As compared with

the Hodge instrument, it is one inch shorter (fifteen inches against sixteen); the blades are of the same length (six inches); the fenestræ are more open; the shanks are only half the length, giving much greater compressing power; and the handles are of the same measurement from pivot to hooks. Both have the Siebold lock, over which we believe the broad-topped button and notch to possess some advantages; and the Wallace is somewhat heavier than the Hodge, which should weigh seventeen ounces.

The short Davis instrument made for Prof. Meigs under direction of the inventor weighed ten and three-quarters ounces and measured twelve inches in length; fenestræ, five inches long, two inches wide; blades separated two and three-quarters inches; handles, four and one-quarter inches to lock, which was of the Smellie or English pattern. A pair in possession of the editor is thirteen and one-half inches long, with five-inch handles, a button lock, two-inch close-set shanks, and six and one-half inch blades. I believe the changes are decided improvements, especially the lock and elongated handles. It has answered admirably in adynamic cases requiring only a few pounds of tractile assistance. The Davis blades have been added to long handles, and the whole made of steel and marvellously light, at the special request of a few accoucheurs, who wished them to aid in some cases of arrest at the perineum.

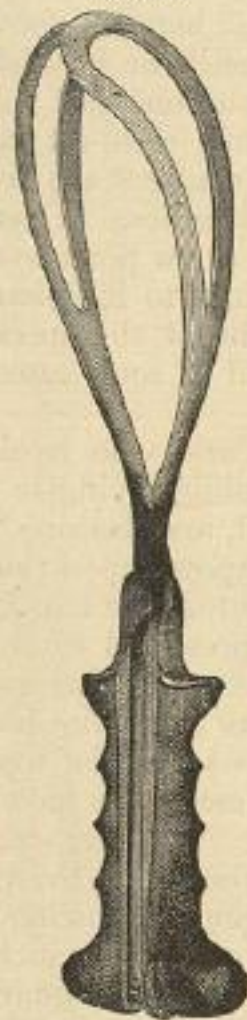
The late Prof. George T. Elliot, of New York, who received much of his practical obstetrical training in the Dublin Lying-in Hospital, imbibed the teachings of the English school, and became impressed with the value of the system as taught by Simpson, upon the principle of whose forceps, modelled somewhat after that of the late Prof. Gunning S. Bedford, of New York, he in 1858 presented to the medical profession the instrument that bears his name. The forceps of Prof. Bedford has a traction-ring on each side where the Elliot has a cornu, has a button joint instead of a Smellie, has no screw top, and has diverging instead of superimposed shanks; these points have generally been considered as improvements.

The Sawyer Forceps.—This is the lightest of all the varieties of the short forceps, weighing but five ounces, and measuring nine and three-quarters inches in length; the handle being three inches, shank one and a half, and chord of blade-curve five and a quarter. The blades are one and a half inches wide, with oval fenestræ seven-eighths of an inch wide, and separated two and five-eighths inches at their widest part and three-quarters of an inch at the tips. This instrument was invented twelve years ago by Prof. Edw. Warren Sawyer, of Rush Medical College, Chicago, and has been highly commended by Prof. Byford and others. The forceps has the blades of Davis, superimposed shanks of Hodge, and lock of Smellie, with hard-rubber plates moulded hot upon the handles. The several parts have been somewhat modified, the object being to secure a tractor for cases of deficient expulsive force where the fetal head is low in the pelvis.

Professor Sawyer says: "In the labors to which my forceps is applicable it is not necessary for the operator's body to be in line with the pelvic axis. My mode of procedure is the following: The woman

is placed upon her back and drawn to the edge of the bed; the outside leg is now flexed; beneath this flexed extremity and the bed-covering I apply the forceps—often using but one hand in the operation. When the instrument is locked, I grasp the handle in such a manner that the palm of the hand looks upward; one hook then rests naturally upon the extensor surface of the first phalanx of the index finger, while the other hook rests upon a corresponding part of the thumb. When thus adjusted, I lift the head from the pelvic outlet, at the same time invoking the pendulum movement if desired. At this

FIG. 180.



Elliot forceps.

FIG. 181.



Sawyer forceps.

moment the advantage of the hooked handle is very apparent to the operator." . . . "All practitioners must have often felt, during the last moments of labor, when the uterus and the mother seemed fatigued, the need of a little help to the expulsive powers. The ordinary instruments are too formidable to be used at the last moment, and it is then that this little forceps is useful."

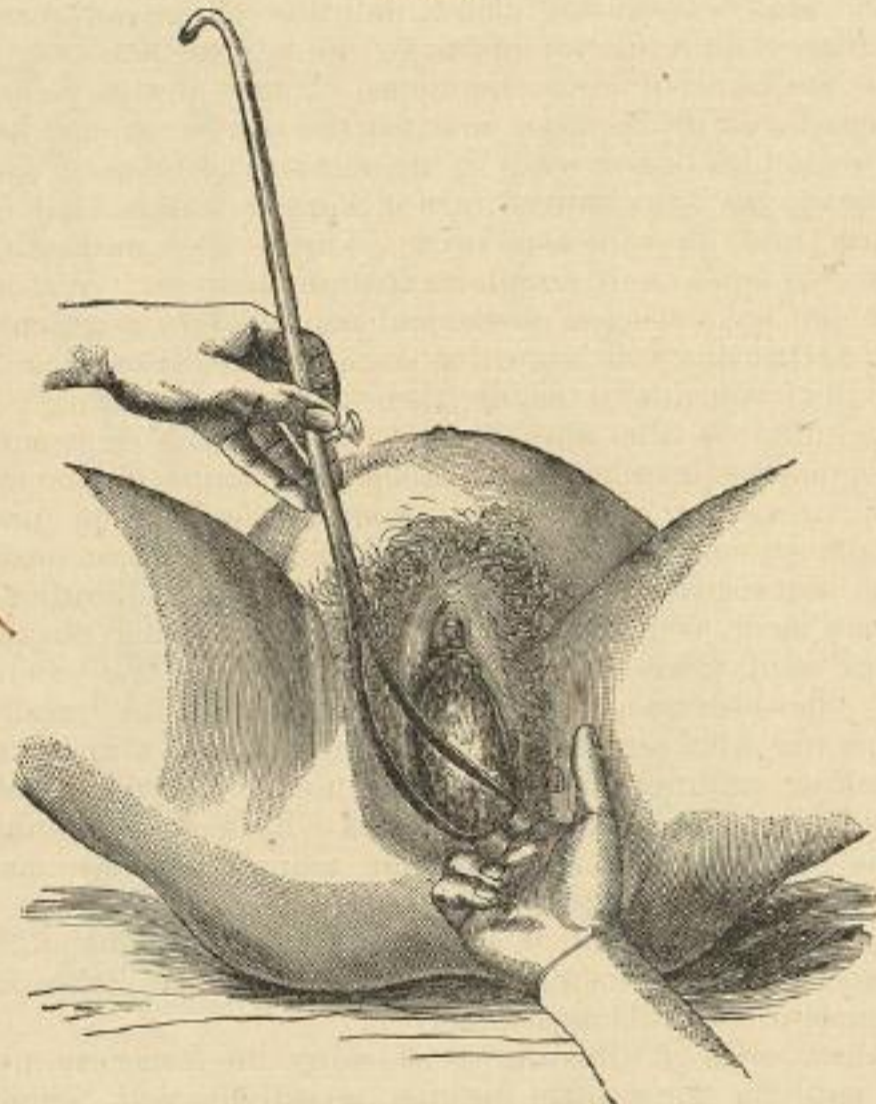
The mechanism of instrumental delivery is much simplified by applying the forceps to whatever parts of the fetal head may be opposite the sides of the pelvis, but it is very questionable whether it is the scientific method or the safer for the child. With one blade over the side of the occiput, and the other over that of the forehead—which is

the manner of seizure in oblique positions of the vertex—we certainly have not a very secure hold and run some risk of injury to the fœtus. The advocates of this system claim that they use no compression, only a simple traction; which may be true in one sense, but amounts to the same in effect, else how could Dr. Elliot, by traction with great force, straighten out one of the blades of his Simpson forceps, as related in the *New York Journal of Medicine* for September, 1858, p. 161, in the paper which he presented describing his new forceps and a number of cases in which he had tested them? It makes but little difference whether we compress the head before we begin to pull, or pull so as to wedge the head between the blades, and thus compress it, except as to the difference of fit in the two instances; the adjusted and even pressure being the less likely to injure the fœtus. I have always believed that the forceps should fit the head, and that the student should be taught how to accomplish it correctly in the various positions of the fœtus. If the student has a mechanical turn of mind, a delicate sense of touch, and a clear head, he will soon learn; if he is not a mechanic, he will be forced to adopt a more simple method of delivery. In a large city there are but few first-class obstetrical manipulators as a general rule, and they are usually well known as such, for the reason that but few have all the requisites to enable them to achieve notoriety; and yet there are hundreds who can deliver a woman with forceps moderately well. To one the mechanism of Hodge is a simple matter and soon mastered; to another it is a useless complication, and he prefers the more simple system. Hence the great differences between obstetricians as to the best instrument and the best method of application. Some of the vast array of patterns have decided merit and display much mechanical skill, while others serve only to amuse the educated examiner. One obstetrician, after the manner of Elliot, uses a variety of forceps one after another in the case, and pulls with great force, while another confines his work almost to one instrument, adjusts it easily, pulls moderately, and seldom fails. There are no doubt exceptions, but certainly the most delicate manipulators we have seen believed in and practised the teachings of Hodge and Meigs. There may be cases where it might be well to practise the method of Simpson, but we cannot see why his plan of delivery should be exclusively used on any mode of scientific reasoning.

I present a series of illustrations showing the American method of delivery with the forceps, the position, as will be seen, being that of France and Germany—on the back. When it is decided to use the forceps, in almost all cases in the United States the patient is brought to the edge of the bed on her back, with her nates close to the edge, her feet on two chairs, and her knees widely separated, as in the illustration. The patient is covered with a sheet, or with a heavier covering if in winter, and there is no necessity of exposure, as the whole manipulation may be done by the sense of touch. The position is by far the most convenient for the obstetrician, and enables him much more easily to keep in his mind all the anatomical relations of the fœtus and pelvis than when in the English decubitus. We study the anatomy with the subject on the back, and the mechanism of labor in

front of the pelvis or manikin; then why complicate matters by a change of position, which, to say the least, is a very awkward one, particularly in introducing the long forceps, setting it according to the instructions of Hodge, and carrying it forward between the thighs as the head emerges? I have used the short forceps in an exhausted case with the woman on her side, but found it much less convenient for the various movements, although I soon delivered the fetus. As to the question of exposure, there is less in appearance than, in fact, in the

FIG. 182.



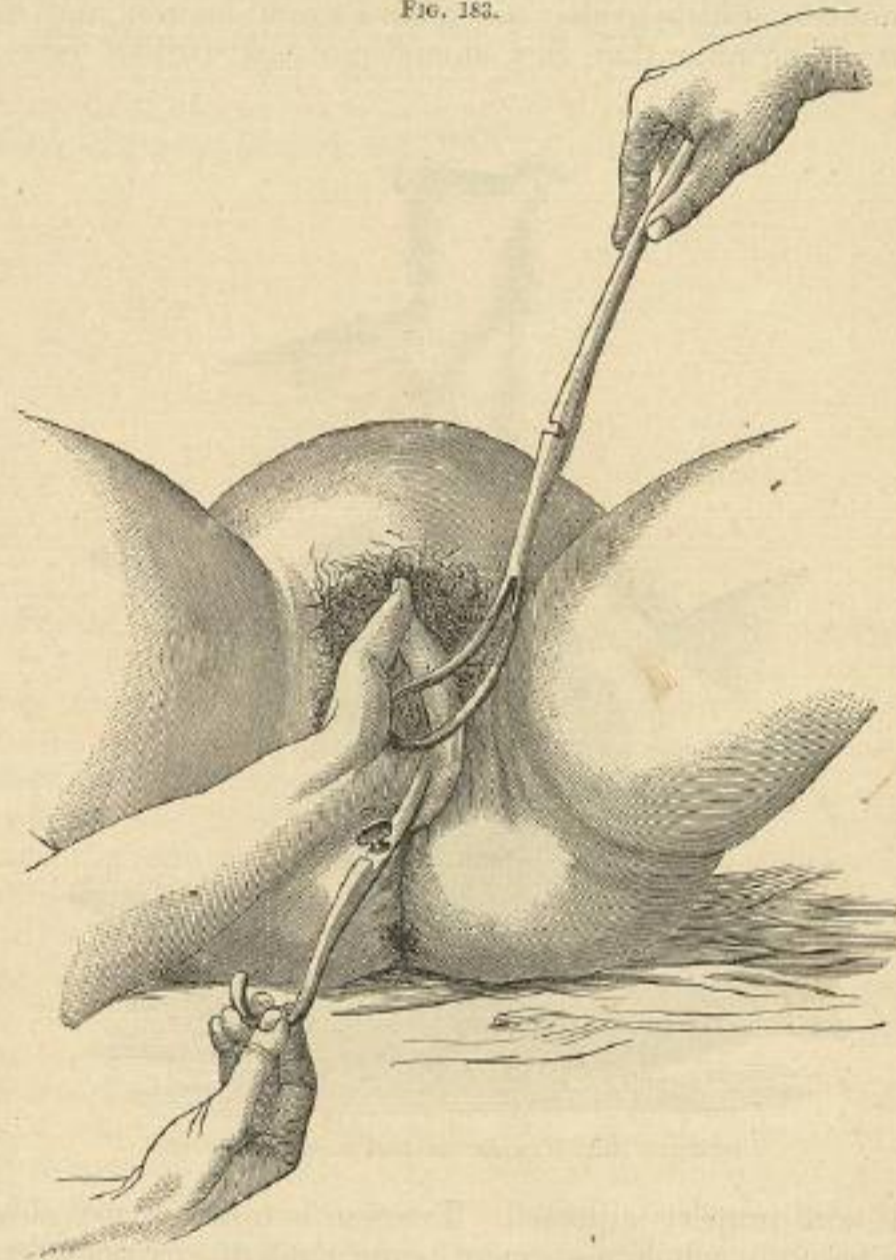
Application of the forceps at the inferior strait.

English position in many cases. If the patient and nurse are fastidious and careful during the use of the forceps, the accoucheur can manage without his eyes in a large proportion of cases; but the fault of exposure lies more frequently in the temporary reckless indifference begotten of pain and suffering in the woman, than in any act of the accoucheur if inclined to spare the feelings of his patient as much as possible.

The long forceps, with its pelvic curve, was specially designed for use at the superior strait of the pelvis, the curve of the blades, as in

the Davis instrument modified by Wallace, being intended to correspond with the direction of the occipito-mental diameter of the fetal head. The long superimposed shanks of several varieties of the long forceps will here be found valuable, as the lock is not introduced or the posterior commissure of the vulva widely stretched. If the head is entirely above the strait, the line of the blades must be changed

FIG. 183.

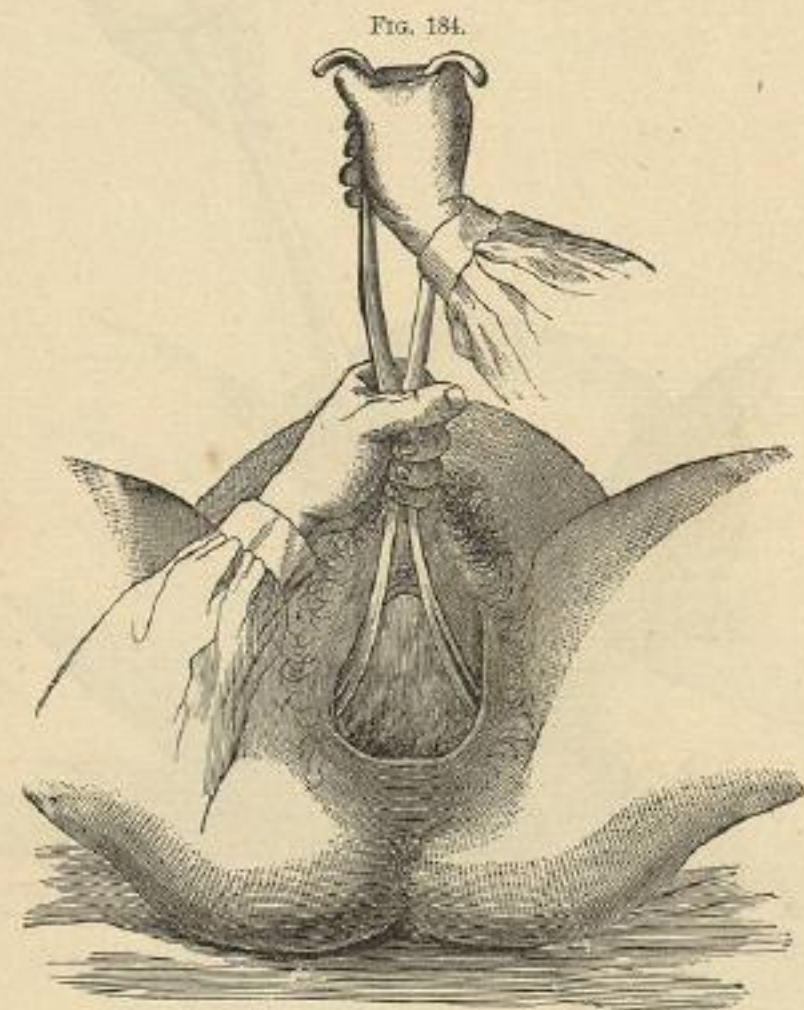


Application of the forceps with the head at the superior strait, the left blade held in place by an assistant.

correspondingly, in order to apply them properly and keep the line of traction within the coccyx; and even then, to draw in the proper direction, the left hand must act at first in a backward direction from the lock, while the right brings the handles downward, forward, and then upward; both hands describing a curve, but that of the right being much the greater. The peculiar forceps of Tarnier, Poulet, and Cleemann, being designed to meet this form of exigency, may be brought into requisition.

In latter years it has become much more common than formerly to introduce the forceps into the uterus before it is fully dilated, in consequence of the success claimed for the plan as carried out in the Dublin Lying-in Hospital. As this should never be done where the os is not readily dilatable, and requires much skill in execution, it is not safe to recommend its general adoption in cases of delay in private practice.

The forceps should not be introduced with any force, but the left blade should be slid in gently and with a spiral motion, and then the right, care being taken that they should also lock without force, which



Direction of the forceps as the head is being delivered.

they will do if properly adjusted. Traction is to be exerted slowly and during a pain, the whole movement being made to correspond with the natural one as closely as possible.

As the fetal head comes under the arch of the pubes the handles of the forceps must rise more and more from the bed, until at last they are over the abdomen as the head emerges from the perineum. This last movement of instrumental delivery should be a very slow one, for fear of rupture. It has been proposed to remove the blades before delivery is complete; but there is no occasion for this if the forceps is applied to the sides of the head over the parietal protuberances, as, where these protrude and the blades are flat and thin, there is very little additional space required. With such instruments as the old

Levret, Baudelocque, and Rohrer forceps, with looped or kite-shaped fenestræ and thick edges, this was a much more imperative direction than with the better instruments of the present day. With a Sawyer forceps the perineum ought to be safer and under better control than without. When the perineum is thought to be in danger, the process of distention should be retarded through two or three pains, or even more if required, instead of drawing the head through at once.

After the head is delivered, if the cord is not around the neck and therefore in danger from pressure, the body should be allowed to remain until the uterus has well contracted upon it, for fear of hemorrhage after delivery, from uterine inertia.—ED.]

CHAPTER IV.

THE VECTIS.—THE FILLET.

The Vectis.—In connection with the subject of instrumental delivery, it is essential to say something of the use of the *vectis*, on account of the value which was formerly ascribed to it, which was at one time so great in England that it became the favorite instrument in the metropolis; Denman saying of it that even those who employed the forceps were "very willing to admit the equal, if not superior, utility and convenience of the *vectis*." Even at the present day there are practitioners of no small experience who believe it to be of occasional great utility, and use it in preference to the forceps in cases in which slight assistance only is required. In spite, however, of occasional attempts to recommend its use, the instrument has fallen into disfavor, and may be said to be practically obsolete.

Nature of the Instrument.—The *vectis*, in its most approved form, consists of a single blade, not unlike that of a short straight forceps, attached to a wooden handle. A variety of modifications exists in its shape and size. The handle has been occasionally manufactured, for the convenience of carriage, with a hinge close to the commencement of the blade (Fig. 185), or with a screw at the point where the handle and blade join. The power of the instrument, and the facility of introduction, depend very much on the amount of curvature of the blade. If this be decided, a firmer hold of the head is taken and greater tractile force is obtained, but the difficulty of introduction is increased.

When employed in the former way, the fulcrum is intended to be the hand of the operator; but the risk of using the maternal structures as a *point d'appui*, and the inevitable danger of contusion and laceration which must follow, constitute one of the chief objections to the operation. Its value as a tractor must always be limited and quite