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PREFACE.

After drafting this subjoined Thesis, the writer had the privilege of reading amongst the transactions of the British Association, 1904 at Oxford, an address of very great popular interest given by the President of the section of Anthropology, Mr Henry Balfour, the subject being the Theory of Evolution in the material arts as expounded by the late General Pitt Rivers and illustrated in the Pitt Rivers Museum at Oxford. In appreciating and expounding the work, it was explained that the latter "during his investigations conducted with a view to ascertaining the best methods whereby the service firearms might be improved at a time when the old Tower musket was being finally discarded, he was forcibly struck by the extremely gradual changes whereby improvements were effected. He observed that every noteworthy advancement in the efficiency, not only of the weapon, but also of every individual detail in its structure was arrived at as a cumulative result of a succession of very slight modifications each of which was but a trifling improvement upon the one immediately preceding it. Through noting the unfailing regularity of this process of gradual evolution in the case of firearms, he was led to believe that the same principles must probably govern the development of the other arts appliances and ideas of mankind".

This quotation from this address has seemed so very apposite to what may have been endeavoured in the following Thesis, that no further encouragement is needed to its submittal nor any better introduction possible.

R.J.

SOME GENERAL CONSIDERATIONS AND A PLEA RELATING
TO METHODS OF APPLYING POWER FOR TRACTION IN INSTRUMENTAL LABOUR.

It may be reckoned a fair question if Members of the Medical Profession are not sometimes, even in modern days, so very well pleased with present prowess to equalise things for nature at fault that we rest and be thankful far too often and in peculiar ways and particular fields come too short of legitimately high standards and especially of any near approach or conscientious imitation to nature's own adroitly intercomposite and most often self contained methods of conducting vital processes, and who when the chances are equal can hardly be improved upon; This is not least noticable in those instances where products that are no longer necessary but perhaps harmful, have to be delivered or cast off.

Modern human diseases present degrees of severity. Remedies also must admit of degrees in efficiency, and consequently the best sifted and most approved will often bear some blending or minor addition. If this be at all granted imperfection may frequently be suspected and should not be too fondly embraced if ease of accomplishment in our remedial actions is not already to our hands and which must on the average encourage promptitude in the application and some degree of expedition in securing the desired benefit. Not that we over-estimate the value we attach to expedition which might seem a little unorthodox as to some stages of parturition, but nevertheless with justifiable expedition especially before our eye there must be, as opposed to hasty, such a thing as prompt and fairly active assistance. Time cannot be neglected in any kind of efficiency whatever but least, we think, where vital tissues are concerned, speaking broadly, and, with particular reference to parturition - given a normal, as our ultimate goal of progress we might be allowed to calculate a normal not only upon the averages of natural processes so called of civilised conditions, but also upon higher grades of expedition that are said to obtain by common report in savage states the most fortunate of all being the negro woman.

If it be argued that the use of the midwifery forceps as at present practiced, say in the hands of an expert leaves nothing to be desired in the matter of combining power with dexterity, we no doubt have more ground to stand on than men

who faithfully upheld worthless traditions, but at the same time, untill the following, or let us hope any better suggestions have been proved of no value and capable of no development into value the writer must beg to contest any such assumption regarding the finality of our present modus for overcoming ordinary stiff resistance in the second stage of labour by direct manual traction.

As to what we ought to know already, we have like the rich man's earthly relations "Moses and the Prophets" to fall back upon for that so we may dismiss for the time being both discursive authorities and text book tenets. The balancing of energetic action against masterly inactivity it is in their sphere to teach, and often the fighting practitioner's great difficulty to follow, however much he may respect. We pass to a well known tax on any individual of the Medical Profession namely: any given case of labour where a justifiable conclusion has been come to that strong manual traction on inserted midwifery forceps is the proper thing, easy traction most likely having failed and the various alternatives out of court including, transcendently speaking the more reasonable a timely caesarean, and the less reasonable and more lamentable perforation or the like.

With the defects and advantages of its qualities, the turning process is not here referred to nor in the meantime the delivery of the head afterwards by forceps. The case referred to is where the **forceps** are applied to the cephalic end of the child, the mother in the left lateral position and not in the dorsal position, which perhaps with all advantages will give place and prove inferior in certain cases by improved means that may come to our hands for making the most of the left lateral position. For the sake of clearness we may confine our attention to cases normal so far as variety of head presentation goes.

The question now asked is this: Are the direct or more or less direct methods of applying manual power to forceps for traction really fair or the best that can be tried in the interests not only of the mother but incidentally of the nurse or friends in attendance and particularly of the Physician himself? Referring to the need for any amount of power, one has heard a physician of large and varied experience in a case like this say of the child that "it has to come out". But at the same time as to this process that is to follow it must be confessed that we have here something (beyond Hogarth) more violently strenuous actually and in appearance than any other

surgical or medical proceeding whatever. There is only one thing the least like it: the rupturing of strong fibrous adhesions in stiff, or around old dislocated joints, and in this case the work is done both quickly and violently according to need and with the help of long and strong levers ready to hand in the shape of the bones concerned, much benefit ensuing in proper cases and even in un-professional hands as witness our bone setters, but here of course we have no sepsis to combat afterwards as in parturition cases and all of which while not exactly an apt comparison may yet appear significant enough and without dwelling on the impropriety of submitting any joint to a freeing process drawn out through the time occupied by many a so called normal second stage of ordinary labour.

To answer the foregoing question, we beg leave to submit that combined mode and mechanism could stand improvement and addition and that very considerable advantage might therefrom accrue to the Accoucheur, with incidentally enhanced ease to the nurse in attendance and no damage but occasional benefit to the mother and the Foetus besides, and all this by a nearer approach to sound principles obtaining in natural parturition.

As we stand at present, the writer looks on the often resorted to expedient of entering the patient's couch as quite a justifiable proceeding when increased purchase is to be obtained for traction, the question of bad taste never arising in proportion to the need. Laterly while cognisant of one or two crude expedients adopted by accoucheurs to get a standing ground on the actual pelvis or gluteal region, the writer has followed the method now to be described for his better traction in stiff cases, and in many working class practices outside of Glasgow (however) and in the Midlands of England, finds that things can be managed, if not so very much easier, still with a good deal more confidence and certainty of getting power applied and the work done properly. We detail it in the interests of comparison:-

With the patient in the ordinary left lateral position but further in and higher up the couch, the Accoucheur designedly and at once places himself in exactly the same plane and attitude as the patient but in the opposite direction and at a level immediately lower than the patient. The nurse supports the patient's right leg from outside when necessary and in the proper direction pulls towards her in the long axis of the thigh during traction. The patient's left thigh is adjusted to the axis of pull thought to be right at any given time and against the semiflexed knee of this left leg he adapts his own. Being now on level with his work - and which would seem a fairly sensible thing - he is also in a position of rest and all the

more co-ordinative for that. Moreover vertical weight of the Accoucheur has been excluded as a factor for lending energy for traction and this same factor should resistance suddenly give has proved more than once in the hands of some to be somewhat difficult of control especially in the interests of the perineum. Again, add to this, his shoulder and thorax and even head are in contact with the couch and by frictional brake action on the same most materially check the Accoucheur's musculo elastic spring recoil on resistance suddenly being overcome as mentioned. If we might be excused for putting it briefly, we have here an operator who lies down to quietly watch the exercise of his whole strength taking place properly. It is not difficult the writer finds to keep his own knee applied to the patient's left hand through the thigh of the same he may be said to virtually plant his foot in the acetabulum. With the forceps grasped and elbow joints extended, the traction work now belongs more to the various large muscles that extend the spine which are strong and ought from that effect to contract slowly and relax quickly owing to reserve of strength generally supplying a co-ordination basis as is well known. With this arrangement indeed the Physician as nearly approaches nature as possible whether it be the musculo hydraulic action of the uterus itself in the first stage of labour or whether we have regard to careful arrangements for expulsive efforts in the second stage since even his posture which is not dropped into but designedly taken up comes nearer in imitation to the very safe instructive procedure witnessed in most of the lower animals when they assume the lying attitude for the more expulsive final act of parturition and no man can deny that he is the direct proxy of maternal powers in a case like this, and again we repeat maternal powers can best be helped by being properly imitated both as to what they do and as to method and position they work in for the best and safest performance of their object.

Now if delivery were an easy matter and if we were to argue from the position that allows of most abdominal purchase, the conclusion might be come to that the crouching attitude may have been meant as nature's true position for second stage delivery, but this however is certain, that in the natural process as we know it at any rate, weight forms no part of the driving programme. It will not matter much perhaps with the marsupials and their tiny offspring* but in all the ordinary lower animals this is so even if we have to admit the incidental benefit of foetal weight as a stimulus to first stage pains and not always a safe stimulus when the erect attitude is persisted in during the second stage in the case of the human mother. And in this method we have described weight for traction purposes if not wholly, is yet pretty much excluded

* (Claus & Seddwick)

as we have seen. There may or may not be anything novel in all this, and it is not the least likely that all accoucheurs are too timid to assume a working position that would be considered thoroughly sound in an engineering shop. On the other hand we have seen a general practitioner of very large experience drag a light patient from one side of the confinement couch to the other adopting other and much less easy tactics for his own sake yet afterwards find nothing but great amusement from an attempt to explain the tactics described. We need not labour that point. What we have described has served to suggest what follows and which has arisen from the conviction that all this and much more or more fashionable falls short for the very simple reason that nothing is fashionable that attempts to really meet the case and because we find most exact and powerful though at the same time gently acting devices in daily use for the lifting and shifting of our merchandise, and, on the other hand, for this important foetal extraction business our best apparatus involves often only two component parts and not infrequently entails our best energy and very last pound of strength to actuate those two combined parts at all. Ought this thing to be and must it always be?

For the next generation of medical men we would almost hope that some continued attention to the subject might gradually evolve simple and sound means, and, whether present methods be true martyrdom or no, we think that the present practitioner for his own sake might find some small sin of procedure to confess when he finds himself strained on such a rack as this kind of case so often proves to be. Some slight relief might be welcomed. In spite of unavailing doubts, therefore regarding what general reception personal proposals might meet with, reflection on the subject leaves us no alternative but to deferentially submit our own opinions on the matter with just such emphasis as is born of personal conviction.

In the first place as leading consideration we find that physiological anatomists (Professor Clelland, Animal Physiology) have fully appreciated and set forth the fact that amongst the peculiarities of the human skeleton, the length of the femur is a very remarkable one and in the interests of certain natural human functions permitted thereby.

* If now with a patient requiring this degree of assistance and very likely under an anaesthetic, the thighs as she lies on the left side and away from the Accoucheur are separated by a sufficiently long crutch bar engaging at each end by broad inclusive adjustable straps with the semiflexed knees, we get for our present purpose a rigid sided oblong composed as to the sides of the two femurs, and, as to the ends, of the crutch

* See page 16.

bar on the one hand and a transverse measurement between the two acetabuli on the other. This oblong may be slightly loose jointed but on the whole will be kept from collapsing in its own plane by the limiting weight of the patient's pelvis and trunk which will also fix the proximal end of the oblong. Suppose a cord to be fixed to the middle of each end of this oblong it will be quite possible by suitable means used to shorten this cord to exercise traction on the supposed points of fixture. Let the proximal point of fixture now be the child's head per the inserted forceps to the neck of which forceps we have attached the proximal end of the cord and we have the basis of a traction scheme to facilitate delivery which will be sensible if successive points of resistance fall within the compass and near the plane of the aforesaid oblong. Now, the highest level of our artificial plane is a shifting line joining we think the higher circumference of both acetabuli or where the femur head presses in its socket with thighs extended, and since a reference to the skeleton will assure us that this level is higher than we are apt to imagine and leaves only a small depth of pelvic cavity above this level, we may rest assured that all cavity resistance will fall within the compass of our tractional frame and if not exactly into the same plane as this frame we may content ourselves with the opinion that in natural birth the axis of maternal propulsion, on the head and mostly through the neck as we take it, passes anterior in typical cases to the axis of the parturient tract or the central axis of the foetal head mass-and a good thing too at that for getting an occiput intermittently elbowed well down and in front of the face dragged after in barb like fashion. In other words, we have no very great respect for what is called pure axis traction as a principle for cavity progress and if, like what the writer has noticed to occur in the direct manual method he has described at length, it occur that the lower pelvis should tend to recede forwards through pelvic extension on the femurs when traction is exercised through our contractile cord then that may be just what the average man wants and does do as he must in ordinary methods almost always pull in successive tangents of the curved canal when pulling strongly,* so, as to this traction cord shortening method, we will have in it also the same advantage of an occiput edged decently downwards and backwards or sufficiently in advance of the face through the relative tangential fixture of the head by the forceps. On the other hand as the pelvis is comparatively fixed by body weight and is "no straight tube" the lighter unfixed knee end of the oblong may tend slightly to shift in most axis of cord traction and this want of mathematical coincidence to the plane of traction we will have to make good since the anterior ileofemoral ligaments, however powerful, may not even be a convenient check during the one position of complete thigh

extension. A knob-handled skewer passing moveably through the whole length of the crutch bar and designed to be held steady at its top end by the nurse while the lower end transfixes the couch disposes of this last small difficulty besides supplying a very easily shiftable and refixable contrivance as different axes of traction come to be dealt with. With the nurse's hand helping, we have now a fairly steady arrangement of parts and apparatus combined whereon and wherein traction in the middle line may be made to take place to move the foetal head onwards past resistance encountered in the cavity of the pelvis the most frequent site of resistance the writer has encountered in his own experience.

There is still another thing, which is this and will apply even more perhaps in its own way to the second grade of traction to be dealt with later. Suppose it be only during upper cavity resistance and when the femurs may be said to push somewhat upwards into the acetabulum from below, we are inclined to raise the question, but not dogmatically, if a scheme such as this that we submit does not tend to make good in some degree a slight defect likely to occur, however unobserved in most cases of ordinary manual traction with a patient either weak or under an anaesthetic; we refer to the want of anterior pelvic fixation upwards brought about by flaccidity of the abdominal muscles occurring typically in complete anaesthesia, and on the other hand never in good maternal second stage expulsive efforts or in any allied process for that part of it where one and another of the agencies that fulfil this purpose (including the hamstrings as an adjunct power) can have a chance. If in this connection it be argued that there is no true likeness between outside traction and maternal expulsion, then the answer to this is that there ought to be and that is just the very door we are knocking at as well as we can. Anterior pelvic fixation for traction within the lower reaches of the parturient tract must be less necessary for the simple reason that in any method of traction the pull takes place more forwards and in a direction more or less transverse to the pelvis as a whole and in that case posterior pelvic fixity suffices. Indeed we might go the length of suggesting, if on mathematical grounds only, that in natural maternal expulsion also, just possibly, the agencies that fix the pelvis upwards are relieved a little towards the end, as far as the relative progress of the head is concerned, through mechanical advantage coming into play. This will be the less difficult to imagine if we think of foetal shoulders as they descend coming just a little more into the anteroposterior position through their own rotation which will carry the root of the neck between them further back twisting it meanwhile and thus imparting end on rigidity, which rigidity like that of a "strut" or "shore" will become valuable when the movement of extension begins to pass into that of extreme extension for

then we may expect that the reflected force increasingly comes to be reflected not from the perineum which is merely the dilatable part of an orifice but from the solid, more posterior resistance higher up, and the belief is (a harmless one) that here in those final expulsion tactics, we have a very interesting example of the mechanical advantage that is illustrated in the lower reaches of the "frictionless ladder problem" known to mechanical students.

Parenthetically this intervention of higher mechanical arrangements as we think for the more certain and deliberate final expulsion of the foetal head in parturition may suggest to us that any good system of traction should embrace some means of mechanical advantage and if possible, control and in this way we come round to the conclusion that, if we can in this scheme of traction that we are submitting, include a sound mechanical advantage, then we will have some imitation of nature and a method suitable for outlet traction also, provided we care and find out how to adapt it to that particular level of resistance. This we had not at first intended to suggest, but, if our steps towards this conclusion are correct, we may, in a speculative way, allow it to stand. It might arise as practicable with the short forceps, but, at any rate, we greatly incline to the idea, that, while an expert hand on the handles of ordinary forceps, long or short, may be a safeguard and guide against perineal ploughing, a traction cord if properly used from nearer the forceps neck would have less lever power at its command to disturb natural egress and the perineum.

We will leave over in the meantime however the best means of applying contraction to the cord and of consequently raising traction on the forceps and head. This will be dealt with later.

If it should be contested that some such mechanical advantage during, let us say the second part of final head extension does not occur in the human species, that will seem to our mind simply an assertion that design in the arrangements made for child birth at the best falls very far short of the very simple and efficient arrangements obtaining in the large uniparous ungulates (Bovinae Equidae) where the foetus makes progress through the parturient track in the form of one long tapering single wedge, continuously unbent, and progressively effective till the maximum diameter, of its two parallel components (forelimbs, head and neck) culminating about the shoulder level has been successfully passed - a singular conclusion, tantamount to saying that human parturition always consists of making the best of a bad job which we do not admit.

It might be easily admitted that a scheme such as this would hardly deal with the axis of pull required for engagement of the head into the brim, at the same time it is best we think not to attempt to lay down any law further than this that the direction of the handles of the forceps when inserted are to roughly indicate the proper line of pull and it is quite enough to say that no matter where the head exactly is, if this line intersects or nearly intersects the crutchbar of our apparatus., traction by this scheme as it stands, may be justified. If however this line indicated by the forceps handles falls behind any comfortable degree of thigh extension (which of course, will always be limited by the anterior ileo-femoral ligaments) then we may have to bethink us of other means or a step further in our apparatus to ensure not only convenient disposition of maternal crura but also proper traction at the same time. The pull in this case must take place with the tuber ischii as the standing ground instead of the acetabuli and instead of the femurs and crutch bar we have to supply an artificial frame of such a form as will allow free access for the essential manipulations arising in connection with the forceps handles and the progression of those themselves and which following other examples are curtailed. They will also have to be screw clamped, although, if a ring were supplied on the posterior aspect of each of the two handles of the blades after the manner of the guiding ring of an eustachian catheter, and which is supplied to that instrument in the interests of easy and handy introduction, we cant for the world see how, by attaching the traction cord firstly to one ring and then threading once round through both, the traction cord could not easily be made to automatically act as good as a clamp on traction, with automatic relaxation each time afterwards. (See note *page 20*).

* For this second grade we plant each of two sufficiently cupped or roundly flanged and inwardly free bases on each tuber ischii joined posteriorly in rigid, or adjustably rigid fashion by a recurvent junction segment. The lower or left base sends away at the proper axis from the breach in rigid continuity a bar which in turn supports similarly at right angles a spindle bar parallel to but perhaps only half the length of the basal pads width. Round a small flanged roller or hook towards the upper end of this spindle standard passes the traction cord which now if contracted will be capable of acting in the proper direction if the frame is properly adjusted to the right direction, while the whole device is kept steady by a bar passing forwards from a joint which allows rigid adjustment as to length and rotation either on the lower base or at the root of the spindle standard as is designed. This steadying bar engages the shoulder of a ferrule surrounding the lower end of

the crutch bar in such a way as to allow easy dis-engagement of the whole addition, after which we have room for the first described simpler apparatus to be used if necessary let alone the greater local freedom needed by the head presenting at the perineum and the usual manipulations attendant. It need hardly be remarked here that the patient's body may be disposed as best to suit circumstances, and this doubtless will be somewhat transversely on the couch and in a direction away from the Accoucheur, and some distance in the couch.

Having now a fairly comprehensive scheme of traction it only falls to be remarked that if this scheme presents two grades of simplicity, the more complex grade may be made to over-lap the simpler; at any rate each will supplement the other in applicability for the different axis of traction desired. For the sake of clearness let us confine ourselves more particularly to the simpler apparatus as a sound scheme for translating the Accoucheur's powers acting in any convenient attitude into terms of traction that will act within a given field, and in other respects properly as to position and plane and there still remains the very important question of the exact means that will be most useful for shortening the length of the afore-mentioned traction cord.

Preliminary to this difficulty, let us indulge ourselves as the writer has in a very simple experimental problem. With a weighted object say for instance a box of books weighing about 4 stone or thereby planted on the floor at one end of a room, let us now place ourselves in front of this and endeavour after an act of prehension to move this weight slowly, firmly and steadily through short distances intermittently towards or after us. It will not be found an easy problem to fulfil those conditions which bear some distant resemblance to those that ought to constitute proper acts of traction for foetal delivery. If on the other hand we take a fixed object lying in the direction we wish movement in and attach a traction cord stretched between, we venture to say that some rough form of the means we now submit for shortening the tractional cord between crutch bar and forceps will very greatly simplify the problem.

In the practical foetal extraction case we are dealing with this means consists of nothing more nor less than the interspersal upon the cord of a length shortening lever in the form perhaps of a simple bar perforated near the end and again a little further up from this, and through those perforations the cord threaded. The mode of using will be sufficiently clear with the help of the diagrams and the slack may be quite handily taken up after each advancement through the simple device of having the cord reflected after it passes round a

groove or other device on the bar and then having it re-threaded through the lever perforations after which it may pass through still another proximal hole in the lever and be afterwards retained from slipping by the mere act of being grasped along with the lever or by a clip or equivalent device on the same by preference; this can easily be made a little less simple, (See page 17.)

and, if we adopt in place of a rod a hollow bar instead, we get a very handy adaptation of the principle, and where as in the diagram the traction cord passes away through the distal end and back through the perforations which are intentionally roughened and rounded preventing slipping and cutting of the cord. It is submitted that a lever such as this will give both every required power and every possible chance of control besides (if we do not mis-use it as a twitch) being necessarily intermittent and thus imitating more nearly the instalment methods so to speak of uterine propulsion. Any other mechanical arrangement the writer can think of including time honored block pulley arrangements will fall short in this particular as an essential feature to proper use. Besides, with a block pulley arrangement, we have but an enhanced tendency and increased power to unlimited movement away from our work as in ordinary traction methods (the quality of action is just the same) and instead of conducting this work in a given field and as obtains in the expulsion efforts of nature herself. Add to this that the use of an artificial lever especially a moderate sized lever is almost instinct to the wrist and fingers of man and the case is no less strong without referring to the fact that powers of manual prehension and traction apart from leverage, are held more in common with the lower primates, and are much less allied to man's sense and capability of art than his

* There was evidently 50 years ago an exception to this statement. That may be a reasonable inference from what we read of the lowest form of human race known to history; evidently amongst them acts of unalloyed prehension as apart from the use of instruments involving a lever of some kind is one of the things associated with their low development and poverty in art. This however may have been a matter of degree.

"Mr Henry Balfour on the native Tasmanian".

British Association Address, 1904.

* See also Genesis concerning the act of prehension and traction and its relation to immediate industry and the compensating arts later.

daily use of levers in all forms, tools and utensils. The power of this lever moreover, is applied ingravescently but lessens in velocity towards the end of each actuation through the 180° it is meant to act through. Any block pulley arrangement is more clearly allied to power purely and less to the sense of its results, and consequently graduation to the needs or cautions of the case by the sentient hand of the user. In this connection we will find the key to what is the most desirable rate at which to overcome resistance by a consideration of some of the things that constitute the resistance or the work that has to be done in traction by any method. Firstly: there is foetal head moulding, which amongst other things means the interstitial friction of fluids semi-solids and solids during the process. Secondly: there is dilatation of maternal soft parts and one very important thing in making many succulent plant tissues, or, oedematous and even natural soft animal tissues stretch or bend is by some slow and comfortable process partially expressing or extracting all fluids that interstitially distend and so leave just as much fluid as lubricate what we might call the microscopic interstices. Anyone who has ever expressed fluid by pressing on an oedematous limb must know that pressure by the finger must be slow, so slow indeed as to be almost insensible to the Physician unless it is to be rather too sensible to the patient, especially if there be venous engorgement accompanying.

This reflection then should be an encouragement when progress in traction by any means is insensible for the reason that we may be unconsciously preparing tissues for the more sensible progress permitted as a result of what actually happens in the first instance with proper traction. While it might not perhaps be very practicable to investigate this on a rigid os uteri before the instruments are applied, we have thought for a long time that any benefit to be got from supporting a perineum ought partly to arise by some approach to this principle of initially expressing all possible lymphatic fluid by compression of the tissue between the foetal head and hand of the Accoucheur and this though the perineum be even normal and non-oedematous to all appearance. As regards the relative friction between foetal head and maternal parts, we dont think that need bulk the least in considerations of caution for in fact we think it is a very small part of the work to be done as compared with the first and second elements of resistance we have dwelt on.

To return, should it be argued that a lever may be too strong the answer to that is that we are supposed to be dealing with overcomeable resistance which in any case demands care and

method too in the overcoming, and, if we are not dealing with overcomeable resistance then we ought to be doubtfully studying perforators or more confidently demanding a "Caesarean" in -- stead of mis-placed, and often no doubt, too prolonged efforts of extraction, no easy question nor any light matter but after all excuses our own look out and no way out of it.

The important fact that we have a precedent for this lever in the shape of the lever use of the vectis (a *usé dwelt on* as important in its day by the late Professor Leishman Q.V.) need not be dwelt upon further than to justify this more plausible use of a lever outside of injurable parts instead of inside as in the case of the vectis. The lever we have described is not a machine; the action takes place in consonance with what might be called mathematics on the loose, without any dependence on articulate joints and any principle of this kind must always be directly allied to simplicity permitting of expertness and when this is understood and experienced by the user, attractiveness of the process to the user will be realised - no small consideration. The article is a tool or instrument.

Just possibly in exercising traction by this means, deflection of the cord will take place depending on the length of the "business" end of the lever. This will be no disadvantage but possibly a slight advantage and some safe degree of that swaying lever motion we are permitted to impart to forceps when exercising traction - incidentally just one of those things that we have found to be a little difficult to blend when the traction effort is very strong and absorbing all powers and attention.

It might be advisable to supply some comparative scheme that would indicate so far as they will allow points of resemblance and difference between maternal powers and artificial help. This will be quite possible if we exclude details and represent for the most part broad principles and net results only. It will save repetition and be much clearer to put this in diagram form as in Figure where differently coloured notes are appended to analogous parts and principles. If we have been at all justified in our comparative arrangement, then with the help of this condensed diagram, some things will gain enhanced value: The relative merit and the near analogy of the tractional scheme we have submitted to the maternal scheme, will appear rather remarkable in particular. (See page 19.)

Now as to all this, if ever all this were to reach common atmosphere in any unassayed condition some doubt and no small

opposition would certainly be met with. The apparatus at the simplest would be called complicate, not easily manufactured or at any rate not easily used. Quite so! we will all have to change essentially (even if we do not become wholly American and which we trust not) before we can wax quickly enthusiastic over anything else than monetary gain or weapons of destruction— which this is not. One has only to mention such a device as the ordinary ladies safety bicycle and the opposition it encountered. Except with some care it is only a moderately safe apparatus even at the best now, but that it could ever be a healthy and agreeable vehicle of locomotion or allow of personal or local adaptability for female use was very gravely doubted by not a few. In it we have another lesson that often small details will help us and keep us within laws and thus allow us more latitude than prejudice would permit and small ground to lament a structural design which arranges strong and callous elements in close proximity to more easily injured. In the application of the traction scheme we have submitted we hope the remark will apply.

We might briefly summarise our contentions:- It is submitted Firstly: That the following are sound in principle.

- A. Improved means for facilitating the justifiable overcoming of resistance encountered by the foetal head during its passage through the pelvic cavity (or after), and consisting of devices designed to act within a self contained field, viz: a crutch bar separating the thighs and firmly yet comfortably adjusted at each end to any most suitable aspect of the knees (preferably semiflexed). This suitably fixed extraheously in such a way as to allow adjustment to desired axis of traction which last is to take place through the shortening of a traction cord stretched between the centre of the crutch bar and short handles or neck level of the forceps in due axis and this by the agency of a length shortening lever interspersed on the length of said shortening cord and manually actuated in intermittent fashion while slack may be taken up in any most suitable manner, after each actuation, or just before, with a special preference to taking up this slack by methods or devices connected with the lever itself.
- B. Improved means of traction as submitted in "A" but designed by reason of being a more artificial addition to meet axis of pull necessary at the pelvic inlet and this consisting of a suitable frame adapted by broad applied basis to each tuber ischii and to the correct angle of pull by free adjustment and suitable fixing preferably in common with the device as in "A" through an intermediate steadying bar and with the traction cord carried round the frame or fixed

to a spindle roller or the like disbally on the frame. In the second place, it is submitted that, with special reference to the aforesaid text and diagrams, there are reasonable grounds and a sufficient basis for investigation as to practical application or a development to that end in the hands and at the convenience of the most fit.

In conclusion the foregoing reflections and proposals arise out of experiments and out of the writer's own experience with some general methods and his own particular sense of a need.

With many men there is a very natural pleasure in exercising muscular strength consciously great and even a sense of heroism in a great difficulty overcome by muscle unassisted. As for the naturally weak, overtired or at any time convalescing practitioner with little of this unscientifically variable muscle strength the case is rather hard if he knows very well how to meet post partum emergencies and unfortunately finds himself after severe traction efforts an unfit subject for anything of the kind.

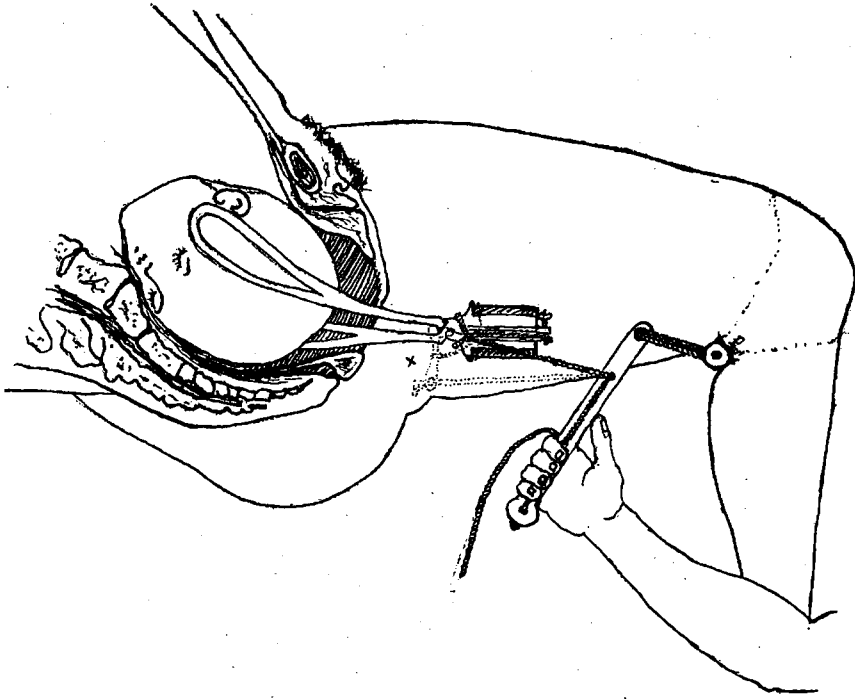
The writer denies the propriety of those cases as a fit field for the "strong man" and since it must always occasionally be a lamentable field for the weaker with present methods, some attempt to supply wise means of rendering all men of the same stature (like firearms) may not be looked on as utterly extravagant.

There are bound to be some men capable of being got to think so while all men ought who have had to come away from even fortunately accomplished cases and leave veritable traces in no better condition than the overdriven draught animal.

If we have stumbled, others may achieve better progress in this right direction. Practical results from our suggestions must firstly be denied, weighed or assayed by our respected Court of Appeal. Theirs is the crucible and theirs the expert hand. It does not lessen the strength of our ideals that the most fit should carry the standard of progress in midwifery methods, if it is agreed that the goal includes - whole children prompt and safe measures for the Mother, more power and ease to the Accoucheur, and, with the limitations of those rendered more definite, some opportunity for the caesarean section as not the very last thing we are to think of as practical.

D. Taylor.

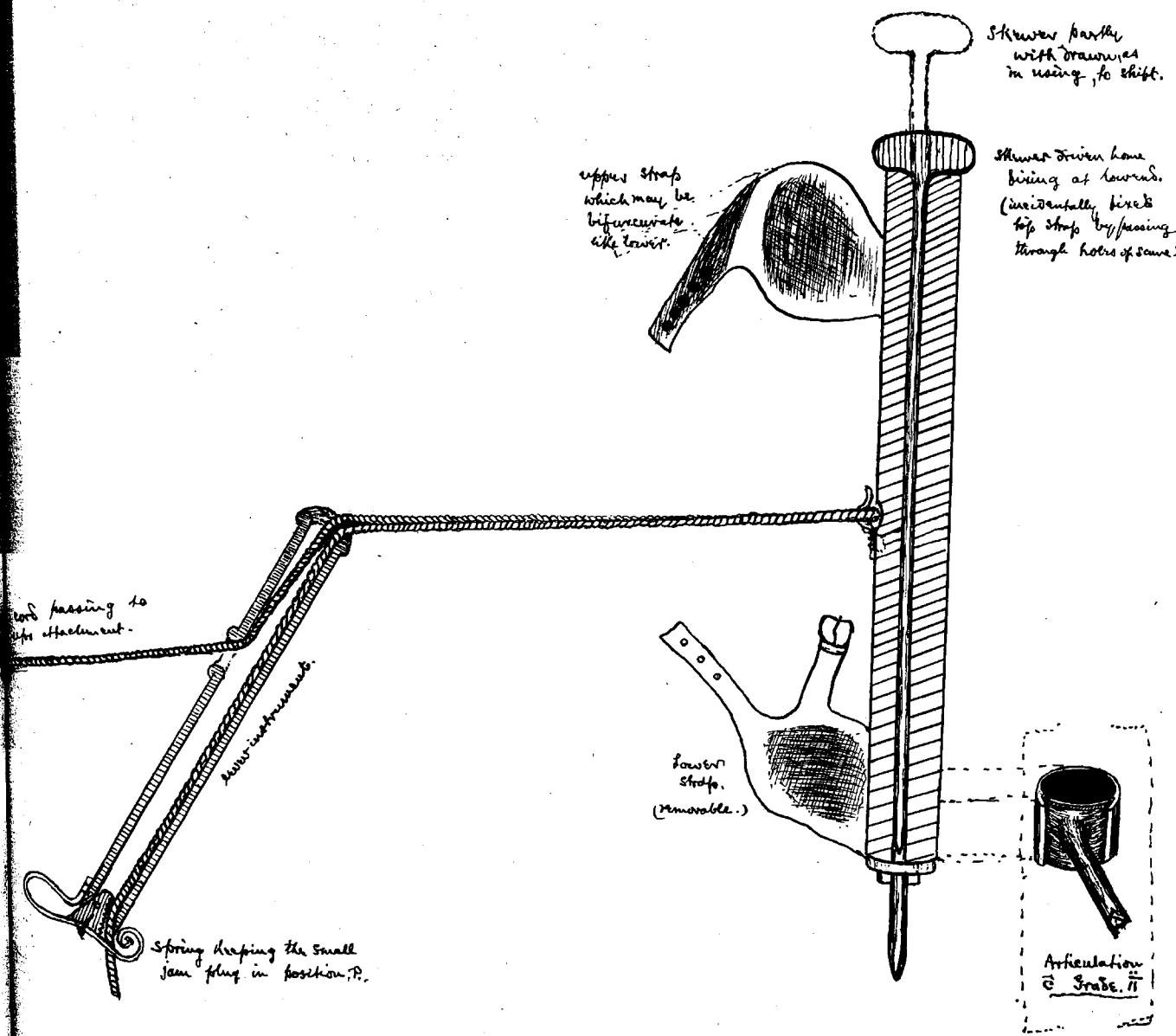
(Fig. 7. added to after Kaishman,)



rough margin

If a small axis traction device is desired it is an easy matter to supply such attachment the proximal end of which is furnished with a perforation for passing the cord in. This addition can be very easily kept in position by a ligature passing from handles to axis traction device ties round neck of the latter and ties round both of the former. It need hardly be pointed out that such an additional axis traction device would be in the direction of freedom + space for the actuation of the lever instrument posterior to the forceps handles. apart from simplicity & essential principle this may be an important working detail. This is roughly indicated by dotted lines at "x"

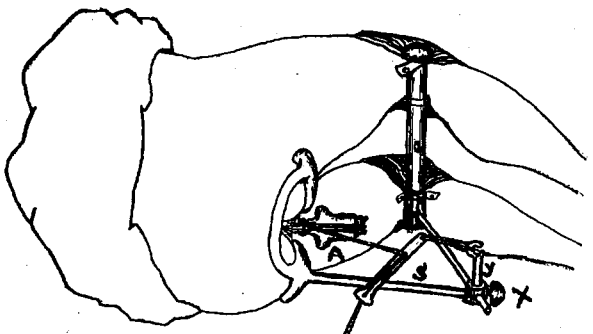
PD.



(traction cord no doubt open to the possibility of being standardised as to strength)

D.S.

Grade II
(Fig III-)

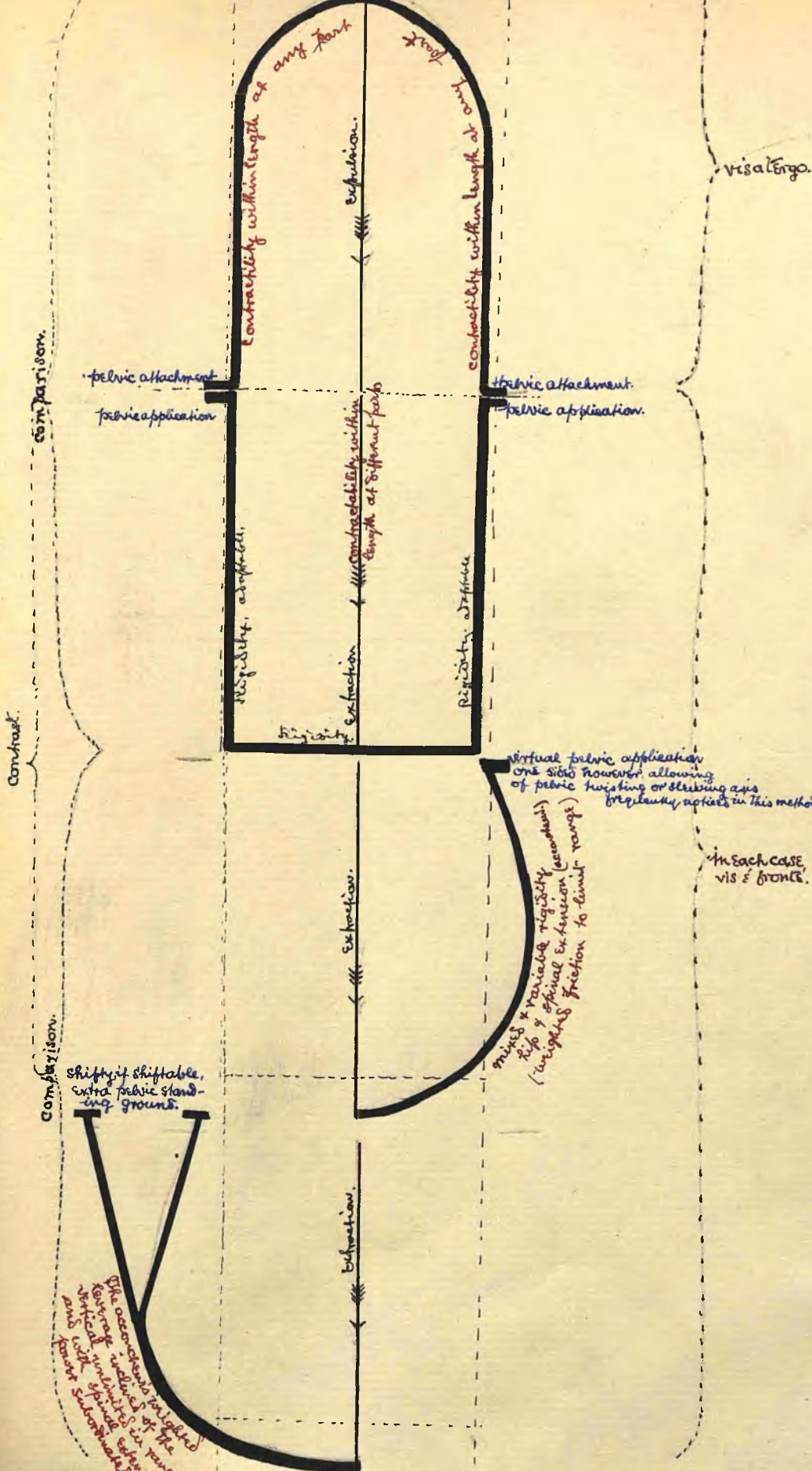


(shown suitable for threading through perforations, also, perhaps useful for fixing down bar S by being passed over "stitch fashion".

x alternative to the fixing screw "x" is to make the handle "y" constitute the fixing screw itself.

short axis traction attachment optional, see fig Grade T.

D.D.



A i
unassisted
mechanical
forces

A ii
The System
of assistants
submitted

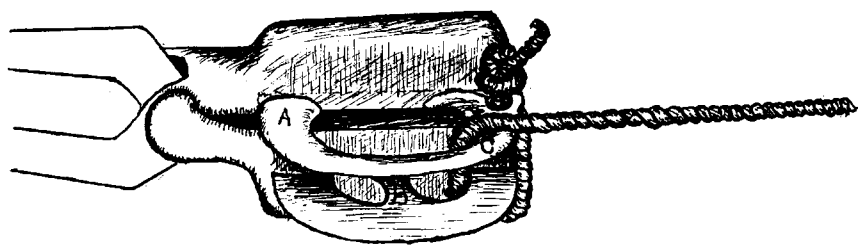
B.
 a method as
 followed by
Witell
 described in text.

C.
 The method
 often practiced
 the accouchement
 standing or
the like.

D.S.

NOTE.

Of interest only in those cases where head recession can take place, this could be studied no doubt in direct tractional methods. Also one has to remember in connection with this tentative mode of fixing a traction cord that the leverage for compression of the handles is short through curtailment of same; otherwise more than likely the compression would be too strong, although here, what is virtually the mechanical advantage of a loose pulley arrangement for compressing the handles, is lessened by cord friction.



To any objector to this arrangement as being too strong, and who unlike the writer should be qualified to lay down a standard compression power, it may be suggested that by attachment at "A" threading under "B" (which divides the lower ring) and then passing over "C" a much less degree of compressional power is allowed and this is so modifiable by making the B. bar nearer the plane of A.C. that we may have every range of power down to Zero for handle compression, say, by curving B. upwards towards said plane. A small supplementary ring underneath the knot and into which the cord is slipped through a small breach would be one of many ways of easy attachment. R.D.