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Fred.Haslam & Co., Inc.,
Brooklyn, N.Y.

Dear Sirs;

By this mail I am sending a paper, Obstetrical Forceps, for your examination. While it may be unnecessarily simple at times, this simplicity may carry my idea even though my nomenclature may have errors.

A mechanical drawing of the forceps is being sent which I hope is complete enough to permit the accurate construction. There are not the usual dimensions that are considered a part of a properly made drawing but the drawing is full size and any dimension not stated with a numeral can be scaled off with sufficient accuracy.

A paper is also being sent marked Suggestions for the construction of safety forceps blades. It is to be read in connection with the drawing marked Construction steps&c This is a method that can be used and avoid working it as a forging.

Five templets of galvanized iron are being sent also and they are labelled to show where they would fit, and determine the correct shape of the blades.

I am also sending a model of each blade which has a rather long shank but I did not take the trouble to construct any handle because the ones now in use are very satisfactory, especially the Simpson. These models are not accurately constructed by these templets but are possibly near enough to be able to illustrate how the templets would be used in making the blades. Blades exactly like the models would be safe and serviceable however.

It will be noted that only one blade has the circular fenestra but I would want them in both blades.

The shank on the models is unnecessarily stout I think and should be as shown on the drawing to be welded to the Simpson shank.

In my conversation with Mr. Harvey in Charlotte he mentioned the name of Mr. Ludwig Wittimer with the idea that he might be in particularly close oversight of the actual work.

My desire in this matter is to get one pair of correctly made forceps. With one pair made, I could check them for any undesirable feature and then you could give me an estimate of what they would cost.

In as much as I would be glad to realize something from them, I know it would depend upon my securing a patent which I think could be done.

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If the appearance of the instrument and the description are such that you feel it to be a superior instrument that you would be willing to push, I would be glad to know to just what extent you would be interested.

If it seems to you to be just another of the numerous models that have been made and it really has no special merit, I would be glad for you to send me two pieces of metal that would be suitable material for the forceps to be made of, as shown by the sketch Fig.2 or Fig.1 and let me know the cost. After grinding it to form as I can do here, I would be glad for you to weld the blade to a Simpson shank and polish it properly for me.

This ought not to be a very costly procedure, and I will certainly appreciate, and pay promptly or in advance, if you so desire.

If there are points that I have not made clear, I will be glad to try to clarify the obscurities.

Yours very truly,

J.W.Farrior

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OBSTETRICAL FORCEPS.

A pair of obstetrical forceps is made up of two parts so designed that they may grasp and exert traction on the head of the fetus and effect its delivery through the birth canal of the mother.

These two parts are symmetrical with regard to a plane between the two blades and each consists of three portions. 1. A handle 2.A shank and 3.A blade, which is the only portion that touches the head of the fetus in the operation of a delivery.

The designs of handles and shanks vary in different models now used and none seems definitely superior to other models.

The blades in various models show different curves or angles &c. The cephalic curve of the well known Simpson is less concave than the same curve in the equally popular Elliot and both have their advocates. Both of these models are of the skeleton type and have a rather large fenestrum in each blade. Another type of forceps has a blade with a cephalic curve but no fenestrum at all and a straight edge moved along the inside of the blade perpendicular to the cephalic curve will touch the entire width of the blade. One recent model has a scooped out depression on the inner surface which merely fails to open a complete fenestrum,as the description states.

Owing to the direction of the birth canal of the mother, a pelvic curve or angle is usually present and this varies from 0 to 30 degrees or possibly more in some. This angle is the one formed by the axis of the blades with the direction of the handles.

Study of the cephalic curve shows that it has several divisions which have entirely different uses. These divisions mayn be readily understood if we imagine the forceps applied to the head of the fetus as it is in the uterus with the shank and handle passing to the outside throught the birth canal. Following the course of the cephalic curves of two blades from the tips toward the handle, we see that they diverge for some distance but soon are nearly parallel with each other. This parallel direction changes and the curves converge as they approach the shank.

It is plain that if the blades lacked the first or diverging portion, no extracting force could be exerted. We can therefore consider this as the extracting portion.

The second or near parallel portion will merely press on the maximum diameter but will exert no extracting force except for the slight drag of friction. This portion is called the compressing portionof the blade.

The third portion of the blades is that in which the cephalic curves converge toward each other. This portion exerts a dilating influence on the birth canal of the mother. This may be called the dilating portion

From this we see that the blade has three divisions that may be aptly named,1 an extracting portion,2 a compressing portion and 3,a dilating portion.

The extracting portion should exert only force on the head of the fetus to move it along the birth canal to the outside.

The compressing portion transmits the pull from the handles to the extracting portion. It may also press on the sides of the head to minimize its cross section.

The dilating portion transmits the force from the handle to the compressing portion which,as stated above,transmits the force to the extracting portion.It also presses the sides of the birth canal outward to

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assist the emergence of the head which is to follow. This dilating force on the sides of the birth canal is met by the strain of the dilating canal and this force is transmitted to the compressing and the extracting portions to keep the blades from opening and failing to extract the head. This force minimizes the pressure the operator must make to close the handles.

It is well to consider that the cephalic curve touches the sides of the head of the fetus in the extracting and compressing portions but does not in the dilating portion as it approaches the shank.

The application of forceps is rightly considered as having a certain hazard that should be avoided unless certain conditions make the risk justifiable. The application calls for extreme care with skill and good judgment.

Certain undesirable things may occur and seem to come at times with all They must be guarded against constantly if more or less disastrous results are to be avoided.

Common undesirable occurrences may be laceration of the skin of the head of the fetus or slipping of the forceps from its head which may injure the fetus and lacerate the mother to a deplorable extent. Intracranial hemorrhage of the fetus is an injury that is reported as more frequent than is generally thought. Laceration of the mother in the application of the forceps has occurred where some force was used as the blades were inserted.

Study of various types of forceps shows that one would be inclined to cause one injury rather than another.

Laceration of the skin of the head of the fetus would be prone to occur with the skeleton type of forceps, since the skin bulges through the fenestra and is pressed between the bone of the skull and the edge of the fenestra. This condition may cause a laceration.

Bruising of the skin may occur when the pressure per unit area exceeds a safe limit. The extracting portion of the skeleton type forceps has little more area than a flattened wire loop and this small area must bear the entire force needed for delivery. The extracting portion of the solid type blade would touch the round head only along the line of the cephalic curve unless it flattened the sides of the head. The pressure along this central line would be maximum and grow less toward the ~~edges of the~~ flat edges of the blade. This effect would bruise unduly and might distort the normal convexity of the skull bone involved. Such distortion might easily result in intracranial hemorrhage.

Tendency to slip off has been reported excessive in the solid blades and it is easy to understand why it would be for it is doubtful if a wooden ball could be securely grasped with a solid blade. Traction from the handle, being out of the plane of the cephalic curves would tend to draw the blade to the side nearest the handle.

Laceration of the mother in the application of the forceps might occur because the os being circular is in tight contact with the round head and the blade passing between these two is a kind of tangent on the head and the edges of the blade stretch two points of the os. The wider the blade the more marked this difficulty would be.

Now let us consider the compressing portion of the blade. The skeleton type has little more than two flat rigid wires which would have scarcely any effect to shape the sides of the head and influence the condition of the skin here. When pressure is made by the extracting portion it is opposed by the undilated birth canal ahead. This would make the skin tend to bulge between these two forces and would increase the circumference of the emerging head-- plainly a disadvantage. The skin of

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the emerging head would rub directly against the wall of the birth canal.
The solid blade in the compressing portion would exert flattening pressure on the sides of the head and the edges of the blades would force the wall of the birth canal to a tangent relation instead of a concentric one.

The dilating portion seems to approach the thinness of a wire in all models and, while doing no special harm, they lose the opportunity of some advantages which could be obtained without creating any disadvantages

Now let us consider the action of the several portions of the blade of the Safety forceps.

The tip of the blade with its vaginal concavity slips readily in a concentric manner between the head and the encircling os or birth canal if the head is partly down. This should certainly be easier than having the edges of the blade stretch the os at two points and press the circumference of the head at one. This concentric entrance action continues as the blade moves in to the position where it grasps the head. If the blade must be rotated, it is evident that the rotation of a concentric blade would be easier than to have the advancing edge digging against the vaginal wall.

When traction is made the concave shape of the blade makes even contact with the curvature of a cross section through the child's head and the cephalic curve divergence brings pressure on the head from the tip of the blade to the compressing portion. This inner surface of the extracting portion fits evenly against the head and maximum surface causes minimum pressure per unit area by the force which must be made to effect delivery. No fenestrum allows a lacerating condition and the concavity has no tendency to flatten the normal convexity of the bones of the head.

In the action of the compressing portion there is pressure by the inner surface to prevent the bulging of the skin on account of the traction being opposed by the resistance of the undilated birth canal ahead and this skin is forced ahead of the maximum cross section of the head into the space opened by the dilating portion of the blades. This results in a lessening of the stretching of the vaginal wall required for birth. The vaginal concavity in this portion causes even pressure on the convex bones of the skull with little or no tendency to cause intracranial hemorrhage.

It should be noted here that the maximum diameter of the head is within the vaginal concavity and in the compressing portion of the blade where the cephalic curve grips it also. The head could not slip from the forceps in any direction without opening the blades and yet no edge exists that might lacerate the skin. The head is grasped like a ball would be between two cup shaped grips.

The outside surface of the compressing portion is a smooth surface conforming to the shape of the birth canal and offering minimum friction to the exit of the grasped head. Two small circular fenestra in each blade permit small areas of skin to be pressed into the holes. This would increase the friction to prevent the forceps slipping on the head but the fenestra are so small that lacerating conditions are not present.

The pressure of the vaginal wall on the blades here tends to prevent the opening of the forceps.

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The dilating portion of the blade converges according to the cephalic curve and it is to be borne in mind that this does not make contact with the head of the fetus here as it did in the extracting and the compressing portions. The dilating influence with ordinary blades would act like a two bladed cervical dilator which would merely change a slit like opening from a fore and aft direction to one from side to side. The width of the blades of the safety forceps would cause more effective dilating. The slim wedge shape of the dilating portion of the two blades would facilitate the dilating necessary to permit the head to follow through. The stronger the dilating portions are pressed together the greater is the effect to keep the forceps from opening unless held closed by the compression of the handles by the operator.

The outer surface of the dilating portion has a convexity to conform to the concavity of the vagina. This surface is smooth and has minimum friction against the wall of the birth canal. The width of the blades shields the following head and offers a potential space for the caput succedaneum and other loose skin to hide and so be out of the way when the maximum cross section comes on along the birth canal.

The vaginal concavity may be discontinued on the inner surface when the shank is approached and the resulting thickening of the blades will give increased strength, at the blade-shank union. The vaginal concavity stiffens and strengthens the entire blade just as corrugating thin metal always does.

This explanation and reasoning clearly shows that laceration is practically out of the question and the chance of bruising is greatly reduced. It shows that the bones of the skull are unchanged in their curvature and intracranial hemorrhage should not occur. The possibility of the forceps slipping off is minimized by the cup like grip of the two blades on the round head. The strain of the dilated birth canal acts to keep the forceps closed on the head with very little pressure by the operator on the handles. The ease of application is evident when we think of the difficulty of forcing a flat object between a ball and a close fitting concentric circle.

All these advantages are secured without sacrificing any good point of any other type.

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Suggestion for the Construction of the Safety Forceps Blades.

Figure 1 on the drawing shows the side elevation of a block of metal containing the dotted outline of the side elevation of one blade of the Safety forceps. There is also the plan of this block containing the dotted plan of the forceps blade.

The width of this block has waste which could be reduced by bending the shank tip to the desired pelvic angle.

The thickness of the block is about what it must be if grinding is the only shaping operation.

Figure two shows a side elevation of the width of the finished blade with the shank tip extending away at the pelvic angle. The plan of the cephalic curve is shown and also a cross section at the line X-X.

It might be advisable to bend a thin bar to conform with Fig.2 instead of so much grinding.

Figure 3 shows the side elevation of the blade with certain corners shaped as desired.

Figure 4 shows the change of cross section made by grinding or filing the outer surface of the blade to conform to the circular outline as drawn.

In the plan views the lower curve is virtually the cephalic curve though the true cephalic curve would be the line along the inner side of the blade midway between the two sides of the blade.

The upper curve is the line of the inner edges of the sides.

The middle curve shows the thickness of the edge of the blade.

The remaining operation is shown in Fig.5 where the cross sectioned portion shows the thickness of the blade and there are three dotted circles to represent the action of three positions of that size emory wheel.

The middle circl shows a position that could grind out as shown by the solid line from the edge to the portion of the circle and on to the other edge.

This would leave the edges too thick and the upper and lower circles show how new positions of the stone could shape the inner surface so that a disc with four inches diameter would touch the inner surface of the blade from one edge to the other.

This disc following the direction of the cephalic curve would make the desired vaginal concavity of the blade.

Since the cephalic curve does not touch the head of the child as it approaches the shank the thickness of the blade here should be greater here to give increased strength and the thickening should be effected by not grinding out the concavity.

If the shank tip is now shaped and welded to the shank of a Simpson handle with the length of the forceps the same as the long Simpson, polishing will make the instrument ready for use.