Aug. 10, 1965 M. L. KAMM 3,199,507

BLOOD LOSS MEASURE

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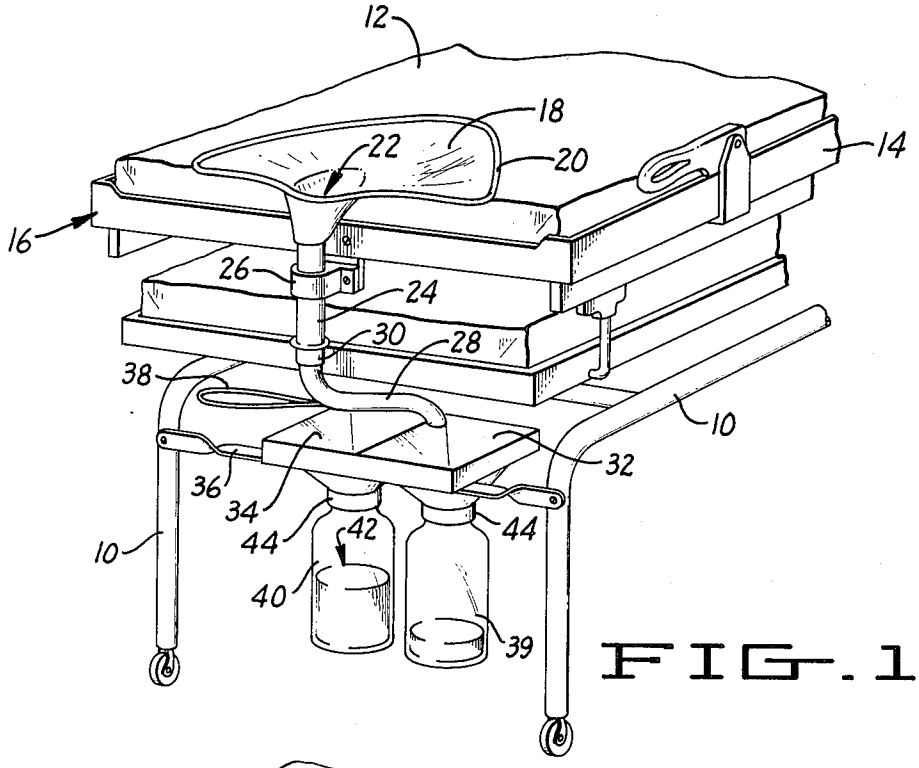

FIG. 1.

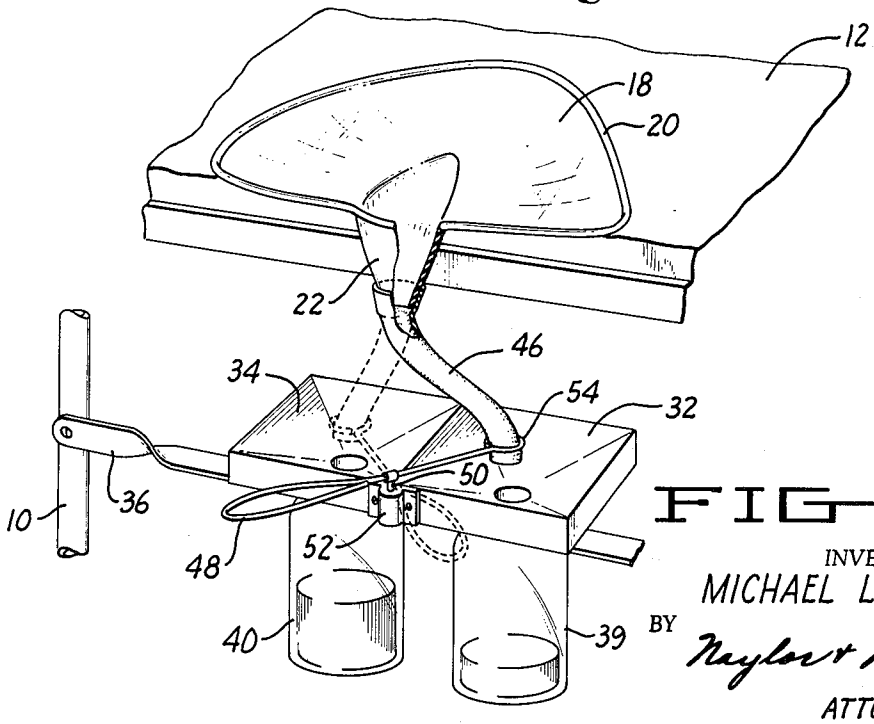

FIG. 2.

INVENTOR.
MICHAEL L. KAMM
BY Naylor & Neal
ATTORNEYS

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BLOOD LOSS MEASURE

Michael L. Kamm, 62 Panoramic Way, Berkeley, Calif.

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This invention relates to surgical implements and more particularly to apparatus for measuring blood loss during obstetrical operations.

For many decades, the triad of infection, toxemia and hemorrhage have been responsible for most of the maternal mortality recorded in this country. In the past two decades the mortality from toxemia of pregnancy has shown a steady and progressive decline. This is due in part to more expert obstetrical care, to the steady increase in the use of hospitals, and in no small measure, to the establishment and increase in the residency training program of specialists. As a result, the incidence of toxemia is only a fraction of what it formerly was. In similar fashion, puerperal infection has declined dramatically because of the growth and development of antibiotics and the widespread use of careful sterile techniques.

As a by-product of this development, postpartum hemorrhage with irreversible shock, followed by tragic maternal mortality looms ever larger in the overall picture of medical care for the parturient. Adding to this the phenomenal rise of deliveries all over the world, the dimensions of this problem begin to be meaningful and urgent.

In the past, although recognized by all authorities in obstetrics as the single most important factor in the prevention of material mortality, the actual estimation of blood loss was fraught with many practical difficulties. Without exception, the known techniques for measuring blood loss are either too complicated, too cumbersome, too slow, or literally interefer mechanically with delivery of the infant. For instance, if the obstetrician relies upon secondary manifestations such as falling blood pressure and rapid pulse, the patient may easily be on the verge of irreversible shock and death, since these indications are symptoms of the late or "critical" period.

Accordingly, it is a principal object of this invention to provide means whereby an obstetrician can during delivery estimate total blood loss directly by collecting the lost blood rather than by reliance upon secondary manifestations.

It is another object of the invention to provide such apparatus which will permit the operator to know at a glance the total blood loss the patient has sustained.

It is another object of the invention to provide such apparatus which will not interfere with operative deliveries such as manual removal of the placenta, repair of lacerations, breech extractions, etc.

It is another object of the invention to provide such apparatus which will not interfere with sterile techniques and which may employ sufficiently inexpensive components that sterile components can be disposable and used for only one delivery.

It is another object of the invention to provide such apparatus with which blood loss can be measured reasonably accurately without substantial personal estimation.

It is another object of the invention to provide such apparatus for measuring blood loss during delivery that is sufficiently simple to install and use that obstetricians will resort to its use even for non-hospital deliveries and that hospitals will not object to its use on expensive obstetrical tables.

It is another object of the invention to provide such apparatus with which the obstetrician can separate blood from other fluids very efficiently during delivery while his hands are occupied with other tasks.

Other objects and advantages of the invention will become apparent from the following description read in conjunction with the attached drawings in which:

FIG. 1 is a perspective view of an obstetrical table on which is mounted the apparatus of this invention, and

FIG. 2 is a perspective view on an enlarged scale of a slightly modified form of the apparatus.

Referring now in detail to the drawings and particularly to FIG. 1, there is illustrated therein a conventional obstetrical table having a floor engaging frame 10 supporting a sterile table top 12 which is surrounded by a rigid frame 14 and has a normal operating end 16 at which the obstetrician is normally positioned.

Mounted on the table top 12 adjacent to the end 16 is a fluid impervious web 18 which is shaped and positioned to be located underneath the patient and receive all fluids given off by the patient during delivery. The web 18 is surrounded by a peripheral raised portion 20 which functions as a dike to prevent fluid flow off the web 18, and a sump cavity 22 is integrally formed with the web 18 and extends downwardly therefrom over the end 16 of the table to convey downwardly all fluids which are deposited on the web. The web 18 with its raised portion 20 and sump 22 is preferably constructed of a substantially flat relatively rigid material such as a relatively thick sheet of high temperature polyethylene. The sump 22 terminates in a downwardly extending tube 24 which is mounted on the frame 16 by a bracket 26, the bracket 26 holding the web 18 firmly in place.

The lower end of the tube 24 is provided with a lateral tube 28 connected to the tube 24 by a swivel joint 30, and a pair of hoppers 32 and 34 are mounted on the table frame members 10 by a cross bar 36. A laterally projecting arm 38 is mounted on the lateral tube 28 by which the obstetrician may manipulate the tube 28 to position it over either one of the hoppers 32 and 34.

A glass receptacle 39 and 40 is mounted on each of the hoppers 32 and 34 respectively, to receive the fluids delivered thereto, the receptacle 40 carrying a peripheral graduation 42 thereon to indicate the liquid level position in the receptacle 40 at which the receptacle will contain five hundred cubic centimters (500 cc.) of fluid. The hoppers 32 and 34 may be formed together with receptacles 39 and 40 as integral cast plastic bodies which may be disposed of after each operation, but as indicated in FIG. 1, the hoppers are made of metal with the receptacles threaded therein at 44.

When this apparatus is used in the course of a delivery, the obstetrician continuously observes the quality of fluid entering the sump 22 and depending upon the quantity of blood which is apparent therein, he manipulates the arm 38 to deliver the fluid to the receptacle 40 when a substantial quantity of blood is present in the fluid and to divert to the receptacle 39 any other fluids which do not contain substantial quantities of blood. The arm 38 is efficiently positioned adjacent to the obstetrician's knees so that he can manipulate it continuously while his hands are freed to aid in the delivery. The obstetrician periodically inspects the receptacle 40, or directs an assistant to do so, so that he is instantly advised of the total blood loss by the patient with the blood loss being indicated directly by the quantity of fluid collected. Of course, due to some mixing of fluid on the web 18, the fluid in the receptacle 40 will be part blood and part other fluids, but the simple separation which is made by manipulation of the arm 38 provides a quantity of fluid in the receptacle 40 which is very accurately indicative of the total blood loss by the patient and the separation which is made by manipulation of the arm 38 is sufficiently simple that it can be accomplished very efficiently by the obstetrician without diverting his attention. When the liquid level in the receptacle 40 approaches

the graduation 42, the obstetrician is advised of a condition which is incipiently dangerous and can administer blood to the patient and take such other preventative procedures which will avoid further danger to the patient.

The form of apparatus illustrated in FIG. 2 is quite similar to the apparatus of FIG. 1 but differs in that the web 18 is integrally cast with its peripheral raised portion 20 and sump 22, and the sump 22 has connected thereto a length of flexible transparent tubing 46 in which the color of the fluid stream can be viewed right up to the point of deposit in one of the hoppers 32 and 34. In this form of apparatus, a separate manipulating handle 48 is pivotally mounted on the double hopper by an axle 50 received in a bracket 52 on the hopper assembly. The free end of the flexible tube 46 is received in a loop 54 on the end of the manipulating handle whereby the tube is guided to discharge its contents into the hoppers by manipulation of the handle. This form of the apparatus is particularly advantageous in providing components which may be manufactured as inexpensively as possible and disposed of after a single delivery, and this form of the apparatus is adapted for use on a delivery table or other location in non-hospital deliveries with the apparatus being very easy to install. Additionally, the double hopper mechanism may be mounted on a separate stand which the obstetrician can position at any place he desires below the table to facilitate use of the apparatus when a child must be delivered under adverse conditions.

While two specific embodiments of the apparatus of this invention have been illustrated and described in detail herein, it is obvious that many modifications thereof may be made without departing from the spirit and scope of the invention.

I claim:

1. In combination with an obstetrical table, an obstetrical apparatus for measuring blood loss during an obstetrical operation which comprises: a fluid impervious web positioned on said table adjacent to one end thereof and having a peripheral raised portion thereof forming a dike against flow of fluids off said web and a sump conduit for directing fluids downwardly from said web, means supporting a pair of receptacles below said table for the receipt of different bodies of fluid, and manually operable means positioned below said table at said end thereof and manipulatable by the knees of the obstetrician for permitting the obstetrician to direct the fluid flow in said sump conduit into either of said receptacles, one of said receptacles being translucent and calibrated to indicate a content of about five hundred cubic centimeters.

2. In combination with an obstetrical table having a top surface and a normal operating end, an obstetrical apparatus for measuring blood loss during an obstetrical operation which comprises: a removable fluid impervious web covering a substantial area of said table adjacent to said end and having a peripheral raised portion thereof forming a dike against fluid flow off said web and a drain well at one side thereof extending downwardly over said end of said table, a pair of hoppers mounted side by side under the top of said table adjacent to said end thereof, a fluid receptacle mounted under each of said hoppers with one of said receptacles being translucent and calibrated to indicate a fluid content of about five hundred cubic centimeters, a flexible conduit extending from said drain well to a position over said hoppers, and a manipulating arm connected to said conduit and swingable responsive to pressure of an obstetrician's knees between alternate positions where said conduit is positioned over alternate ones of said hoppers.

3. An obstetrical apparatus adapted to be mounted on an obstetrical table for measuring a patient's blood loss during an obstetrical operation which comprises: a large area fluid impervious web adapted to be placed on said table under one end of a patient and adjacent to an end of said table with said web having a peripheral raised portion forming a dike against fluid flow off said web and a delivery sump for carrying fluids downwardly from one end of said web, a flexible tube connected to said sump, a pair of hoppers mounted together side by side and adapted to be removably mounted on said table below said web, a fluid receptacle connected to each of said hoppers to receive fluid deposited therein with one of said receptacles being translucent and calibrated to indicate a fluid content of about 500 cubic centimeters, and means connected to said tube for permitting said tube to be swung to alternate positions over said hoppers.

4. An obstetrical apparatus adapted to be mounted on an obstetrical table for measuring a patient's blood loss during an obstetrical operation which comprises: a fluid impervious web adapted to be placed on said table under one end of a patient and adjacent to an end of said table with said web having a peripheral raised portion forming a dike against fluid flow off said web and a delivery sump conduit for carrying fluid downwardly from said web, a pair of receptacles adapted to be positioned below said web in fluid communication with said sump conduit for the receipt of different bodies of fluid from said sump conduit, and means for directing the fluid flow in said sump conduit into either of said receptacles, one of said receptacles being translucent and calibrated to indicate a content of about 500 cubic centimeters.

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RICHARD A. GAUDET, *Primary Examiner.*

LOUIS R. PRINCE, RICHARD C. PINKHAM, *Examiners.*