DYNAMIC CHILDBIRTH SIMULATOR FOR TEACHING MATERNITY PATIENT CARE

The invention described herein was made in the course of work under a grant or award from the Department of Health, Education, and Welfare.

BACKGROUND OF THE INVENTION

The training of students in the art of maternity patient care has long been handicapped by the artificial nature of the construction and operation of the models which are employed by the instructor to illustrate the sequence of labor and delivery in childbirth. For example, models of the type shown in Jacobs Pat. No. 2,127,774 and Graves Pat. No. 2,551,433 lack realism in that the fetal doll must be manually moved by the instructor and no close similitude to the real life steps of childbirth can be taught to the student, due in large part to the non-dynamic nature of the equipment.

Moreover, optimum value of the instruction being offered requires that the student handle the model as by palpating the uterus, listening to the heart beat of the doll, and observing the degree and frequency of uterine contractions. Preferably, this also requires the use of a life size model of manikin having a natural appearance and providing to the student a life like tactile sensation when being handled. It is a purpose of the present invention to provide an improved childbirth simulator in which these and other disadvantages of conventional equipment will be overcome and by means of which a more realistic and accurate teaching of maternity patient care may be given to the student.

SUMMARY

The invention is embodied in a dynamic manikin simulating the torso of a pregnant human female and in which a fetal doll is located within a uterus housed in the manikin. Automatic means for controllably applying fluid pressure to the uterus serves to move the doll from the uterus and from the manikin, and the operation of this means is used to simulate labor during childbirth and to provide instruction for students in the art of maternity patient care.

Among the objects of the invention are the provision of an improved training device for teaching maternity patient care; the provision of an improved method of teaching maternity patient care; the provision of a fetal doll; the provision of an improved uterus device; the provision of an improved manikin; the provision of a placenta with attached umbilical cord and amniotic sac; the provision of means simulating the breaking of an amniotic sac; and the provision of an improved method of manufacturing the several elements of the training device.

These and other objects and advantages of the invention will become more apparent as the description proceeds and when considered in conjunction with the accompanying drawings in which

FIG. 1 is a diagrammatic view of a system for effecting responses in the dynamic manikin during the teaching procedure.

FIG. 2 is a portion of the electrical circuit under the control of the instructor at the control console.

FIG. 3 is a longitudinal sectional view of the manikin with parts shown in elevation.

FIG. 4 is an end elevation of the manikin indicating the position of the pelvic bone.

FIG. 5 is a side elevation view of the uterus.

FIG. 6 is a face view of the fetal doll with interior parts indicated by dotted lines.

FIG. 7 is a back view of the doll of FIG. 6.

FIG. 8 is a diagrammatic view indicating the molding of the placenta and showing the placenta with attached umbilical cord and amniotic sac.

FIG. 9 is a diagrammatic view of the uterus and its associated members in position within the manikin.

FIG. 10 is a chart indicating the timed rocking of the uterus of FIG. 9 during the teaching procedure.

FIG. 11 is a chart indicating the timed cervical dilation and position of the doll during the teaching procedure.

FIG. 12 is a chart indicating timed intra uterine pressures during the teaching procedure; and

FIG. 13 is a chart indicating the curve of the timed pressures applied to the uterus during the teaching procedure.

Referring first to FIG. 1, the primary electrical and pressure fluid elements of the control system are indicated in relation to the childbirth simulator and are actuated in accordance with a prearranged pattern which represents physiological data offering the maximum of beneficial instruction to the student, it being understood that instructor-operated override controls may be employed to aid in the instruction procedures. A conventional two-channel data track follower **10** (such as the Data-Trak available from Research, Inc.) delivers a voltage proportioned to the curves scribed on its rotating drum through conductors **11, 12,** and upon closing of a switch **8** will also establish a circuit through conductor **13.** Conductors **11** and **12** lead respectively to electro-pneumatic transducers **14** and **15** (such as the type available from Conoflow Corp.) through conventional match packs **15, 17** serving to provide current supply consistent with the rating of the transducers. The conductor **9** extending from the control console circuit of FIG. **2** is connected to a heart sound simulator **18** from which a conductor **19** leads to a speaker **111** (FIG. **6**) embedded in the fetal doll, as later to be described.

A compressed air reservoir **20** with a cut off valve **21** and with separate throttling valves **22, 23** supplies air through conduits **24, 25** to the valve associated with and controlled by the transducers. From transducer **14,** which governs the operation of the uterus rocking member **26,** later to be described, a conduit **27** leads to a conventional Fairchild-Hiller ratio relay **28** which may be adjusted as by means of a manually operable control **29.** A conduit **30** in parallel with conduit **24** also leads to this relay and from this relay a conduit **31** leads to the rocking member; venting of thus described pressure system being through the vent **32** of the transducer housing.

Transducer **15** which governs the pressures applied to the uterus, includes a vent **33** in its housing as well as a conduit **34** leading to a second ratio relay **35** having a control means **36.** A conduit **37** in parallel with conduit **25** leads to the relay **35** and from relay **35** a conduit **38** leads to the fundus chamber of the uterus. In addition, a branch conduit **40** controlled by transducer **15** leads to a third ratio relay **41** having a control means **42.** A conduit **43** in parallel with conduit **37** also