This invention relates to the saving of human life by the so-called "prone method" of artificial respiration.

It is known that to be successful, the respiration must be maintained at one definite rate, to wit, 15 respirations per minute, for adults and another definite rate, namely 30 respirations per minute, for children; it is known furthermore, that the action, at the rate required should be continuous and in the same continuous rhythm. Under present methods, the operator endeavors to maintain the proper timing and continuity of rhythm by counting. The ability to accomplish this result naturally varies with different operators and as the operation is tedious requiring a change of operators approximately every 15 minutes, it is a fact that variations in rhythm are unconsciously or accidentally introduced, often prejudicial to the recovery of the victim.

The objects of this invention are to obviate, so far as possible, these irregularities and variations in the rhythm and to provide means of a simple practical nature for enabling operators in the prone method of resuscitation to maintain continuously through prolonged periods the rhythmic respiration required for the patient under treatment.

These objects and others of like desirable character are accomplished in the present invention by the novel features and combinations hereinafter disclosed.

The drawing accompanying and forming part of the specification illustrates one of the practical commercial embodiments of the invention but it is to be understood that the actual structure may be modified and changed as regards this disclosure all within the true intent and broad scope of the claims.

Fig. 1 is a perspective view illustrating a form of the invention as incorporated with the inhalator and as in use in the prone method of resuscitation.

Fig. 2 is a face view of the rhythm instrument as removed from the case of the inhalator.

Fig. 3 is a vertical sectional view of the instrument as on substantially the plane of line 3—3 of Fig. 2.

Fig. 4 is a broken sectional view showing in particular the control for changing the rhythm from 15 to 30 respirations per minute or vice versa.

The construction herein shown comprises a suitable motor indicated at 5 in Fig. 3 and which may be a clock motor, electric motor or the like, it being requisite that the same be capable of running continuously and uniformly over a period of four hours or longer. A spring actuated clock movement is shown, adapted to be wound by a suitable key 6, projecting from the side of the instrument case 7 in position to be readily and quickly actuated.

The motor drives a timing train, shown as two gears 8, 9, the first of half the number of teeth of the other, both loosely confined on the motor drive shaft 10 and adapted either to be coupled in driven relation on the shaft by a sliding jaw clutch collar 11, keyed or splined, as by working on a squared portion 19 of the shaft and having jaw teeth 13, 14, at its opposite ends for engagement respectively with jaw teeth 15, 16, on the opposing hubs of the gears 8, 9, which mesh respectively with the gears 17, 18, on shaft 19.

In the manner described, the shaft 19 is driven at a rate corresponding to either 15 respirations per minute or 30 respirations per minute, depending upon which of the gears 8, 9, is clutched to the motor shaft.

For indicating purposes, the shaft 19 is shown as extended out through the front of the case and as carrying an indicator or pointer 20, which by cooperation with a suitable marker 21 will afford an indication of the rhythm necessary to be maintained for either the adult or the infant rate of respiration.

Control of the clutch and hence change-over from one rate of respiration to the other is effected in the illustration by a turn button 22, journaled in the front of the case carrying a pointer 23, to register with either the 15 or the 30 indications 24, 25, on the front of the case and coupled by screw connection.
26, with a sleeve 27 pivoted to one end of the lever 28, pivotally mounted at 29 and having a shipping fork 30 at its opposite end entered in the groove 31 of the clutch collar. The screw coupling is pitched so that a quick turn of the control button will be effected to change the mechanism from one rhythm to the other. Stop pins 32 are shown provided for the pointer 23, requiring the turning of the control button in the proper direction for effecting the change from one rate to the other and avoiding any question or loss of time through unfamiliarity with the apparatus.

To make the rhythmic action more real and more easily followed by the operators, there is provided in the illustration, a complete picture of the proper rhythmic action by a miniature representation on the front of the case of both the proper position of the victim and the proper action of the operator. This consists in the disclosure of the representation 33 on the front of the case of a victim in the proper prone position and an operator 34 exercising the proper prone method on such victim. The figure of the operator is for such purpose shown pivoted at the knee at 35, so that it may rock up and down over the back of the other figure and as having the arm 36 in a straight condition pivoted to the body of the figure at the shoulder at 37 and the hand portion as working over the small of the back by a pin 38, sliding in an inclined guide slot 39 in the wall of the case. The knee pivot 35 is shown provided by a rocking shaft 40 journaled in the case and rigidly attached at its outer end to the knee portion of the figure and said shaft is shown as operated by means of a lever arm 41 on the shaft connected by pivoted link 42 to a crank 43 on the time shaft 19.

The construction described provides a visual indication of both the proper positions and of the necessary rhythmic motions, for either rate of respiration. The instrument is preferably supported, as by mounting it in the cover 44 of the inhalator case 45, so that it will be in proper position for natural and easy observation of the same by the operator. The inhalator case is usually located at the head of the victim, directly in front of the operator, which position makes the case a convenient and practicable support for properly positioning the rhythm maintaining instrument. For the purpose, the case of the instrument is shown as having a back flange 46 perforated for screws to fasten the device in the cover of the inhalator case.

In many cases the operator, called upon to start resuscitation at once may have to work in a dark place or darkness may come on in the course of the operation, without immediate light available. To meet such situations, an illuminated or audible signal may be given as by means of an electric circuit governed by the timing train and including a lamp, a buzzer or the like. In the illustration, such signal is shown as a miniature lamp 47 in back of a window 48 in the front of the case desirably positioned to illuminate the rhythm indicator or indicators, having circuit connections 49 connected with a battery or other electrical source and having normally separated switch contacts 50, designed to be connected by a switch or contact element 51 on the timed rocking shaft 40, Fig. 3. If desired, the buzzer or audible signal may be included in this same circuit as indicated at 52, or the audible signal alone be used. The light may be preferred however, as giving both a visible rhythmic signal and at the same time a rhythmic illumination of the indicator or indicators.

Control of the starting and stopping of the apparatus is effected in the disclosure by a push button or plunger 53, set in the front of the case and carrying at its inner end a spring brake 54, for engagement with a part 55 of the clock movement, said control plunger having suitable spring detent mechanism 56 by which it is held in either the running or stop position.

In addition to its use in the field, the invention is of special value in the schooling of operators for rescue squads, especially in that it demonstrates to the student in readily assimilable fashion both the method of procedure and the necessary rhythm to be continuously maintained.

What is claimed is:

1. Rhythm maintaining apparatus for prone methods of resuscitation, comprising a motor, respiration rhythm indicating means driven at constant uniform speed by said motor and means for arbitrarily setting the rhythm of such indicating means for either adult or infant rates of respiration, said indicating means including the figure of an operator in the position for prone method of resuscitation and movable in simulation of the correct movements for the prone method of resuscitation.

2. Rhythm maintaining and instructing means for prone methods of resuscitation, comprising a movable figure occupying the position and simulating the movements of a prone method operator and motor mechanism connected to drive said figure at a continuously uniform movement rhythmically representing the proper movements to be followed by the operator.

3. Rhythm maintaining and instructing means for prone methods of resuscitation, comprising a movable figure occupying the position and simulating the movements of a prone method operator, motor mechanism connected to drive said figure at a continu-
ously uniform movement rhythmically representing the proper movements to be followed by the operator and including means for arbitrarily setting the movements of the figure for the proper respiration rates for either adults or infants.

4. Apparatus for making certain proper application of the prone pressure method of resuscitation, comprising a motor capable of running uniformly and continuously as long as approximately four hours, an indicator for making known to the operator the timing of the prone pressure movements, gearing from the motor for driving said indicator either at the rate of fifteen strokes per minute or at the rate of thirty strokes per minute and a quick change-over control for said gearing for immediately setting the indicator either for respiration movements of fifteen strokes per minute for an adult patient or for the rate of thirty strokes per minute for a child patient.

5. Apparatus for making certain proper practise of the prone pressure method of resuscitation, comprising a manikin posed in the proper position for prone pressure resuscitation and having arm and body portions movable in simulation of an operator practising the prone pressure method of resuscitation and a motor connected to drive said manikin uniformly at a speed corresponding to the rhythm necessary for such mode of resuscitation.

6. Apparatus for making certain proper practise of the prone pressure method of resuscitation, comprising a manikin posed in the proper position for prone pressure resuscitation and having arm and body portions movable in simulation of an operator practising the prone pressure method of resuscitation, a motor, gearing from said motor for driving said manikin at either the speed for adult resuscitation or the speed for child resuscitation and means for immediately setting said gearing for either timing of the manikin and including a plainly visible indicator to show at once the necessary position of the control for either class of resuscitation.

7. Prone pressure resuscitation apparatus, comprising a kneeling figure hinged at the knee and having a pivoted arm, means for rocking said figure to simulate the body bending, hand and arm movements of a prone pressure operator and a motor for driving said means at continuous uniform speed throughout the protracted periods of resuscitation.

8. Prone pressure resuscitation apparatus, comprising a kneeling figure hinged at the knee and having a pivoted arm, means for rocking said figure to simulate the body bending, hand and arm movements of a prone pressure operator, a motor for driving said means at continuous uniform speed throughout the protracted periods of resuscitation and control means combined with said motor to effect an immediate change-over from a rhythmic speed for adult resuscitation to a rhythmic speed for child resuscitation.

9. Apparatus for making certain proper application of the prone pressure method of resuscitation, comprising a motor capable of running uniformly, an indicator for making known to an operator the timing of the prone pressure movements, gearing from the motor for driving said indicator at the rates of approximately fifteen and thirty strokes per minute, for adult and child patients, a quick change-over control for effecting the setting of said indicator for operation for said respiration movements of substantially fifteen or thirty strokes per minute, and indicating means in conjunction with said control to show to an operator the proper position of said control for either class of resuscitation.

In testimony whereof I affix my signature.

FRED KNAPKE.