Historical REVIEW-

Hard Hat Divers received positive mask pressures with air exchange to compensate for the increasing positive baro pressures during deep sea diving.

Barach et al in the 1940’s employed mechanical devices to retard physiological expiratory flow by means of mechanical expiratory flow metering. As a method directed toward decreasing the left ventricular pressure by impairing venous return to the right heart, these devices were employed to increase the mean intrathoracic pressure in spontaneously breathing patients with advanced left sided heart failure.

During WWII, US ARMY AIR FORCES employed a form of a mechanical inspiratory physiological demand oxygen flow generation with a positive expiratory pressure to increase altitude tolerance in pilots flying at higher altitudes with a critical reduced oxygen partial pressure.

Petty et al in the 1960's employed a positive end expiratory pressure (PEEP) in apneic patients receiving continuous mechanical ventilation to mechanically increase the Functional Residual Capacity (FRC) as a means of enhancing the pulmonary blood gas interface.

F. M. Bird introduced in 1975 a selectable semi automatic mechanical form of continuous positive airway pressure (CPAP) during spontaneous respiration in his IMVbird®.

In 1985 F. M. Bird introduced an advanced form of a selectable automatic DEMAND continuous positive airway pressure (D-CPAP) with "precise, near instantaneous proximal airway flow servoing" during spontaneous ventilation.

In 1986 F. M. Bird, introduced OSCILLATORY DEMAND CONTINUOUS POSITIVE AIRWAY PRESSURE (OD-CPAP/PEEP) in apneic or spontaneously breathing patients receiving mechanical ventilation.

DEFINITIONS:

HARD HAT DIVING PRESSURES- employed a form of vented Continuous Positive Pressure Breathing (CPPB) in the divers hard hat suit during deep sea diving operations.

PHYSIOLOGICAL EXPIRATORY FLOW RETARD- can be used to maintain an increased mean intrathoracic pressure as well as to maintain an increased endobronchial airway patency toward end expiration in spontaneously breathing COPD patients.
POSITIVE END EXPIRATORY PRESSURE (PEEP)- is the lowest intrapulmonary pressure during a mechanically scheduled "trach positive" pressure ventilation occurring during the cyclic programmed inspiratory expiratory ventilatory phases in an apneic patient. This is generally created by mechanically obstructing the proximal airway toward end expiration.

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)- the lowest intrapulmonary pressure reached during the inspiratory and expiratory phases of a spontaneous respiration.

DEMAND CONTINUOUS POSITIVE AIRWAY PRESSURE (D-CPAP)- the mechanical ventilation of a patient by satisfying the peak physiological demands for inflow; decreasing the work of breathing during a spontaneous respiration while maintaining a selected expiratory positive pressure baseline.

Clinically, D-CPAP is directed toward stabilizing the pulmonary airways during both the tidal inspiratory and expiratory phases of either spontaneous or controlled mechanical ventilation or a combination thereof. By enhancing an improved cross sectional pulmonary airway patency, preferential airway can be reduced, thus enhancing a more effective alveolar gas exchange.
The novel applied fluidic technology which is used to create a D-CPAP employs a millisecond mechanical (inflow-outflow) response to the near instantaneous physiologically induced changes in proximal airway pressures during tidal exchanges.

D-CPAP requires a low inertia, high response servo mechanism which can accommodate (peak and ebbing) physiologically generated inflow demands (from sub ambient to maximum physiological inflow demands) with near instantaneous flow/no flow responses

The technological means for creating a high response flow triggering device servoed by proximal airway pressure change employs an ambient pressure as a diaphragmatic reference, with the physiological induced proximal airway pressure alterations acting upon the servoing side of the "Flow Accelerator diaphragm".

Manually adjustable diaphragmatic torque (counter) spring pressures allow a MEAN selected continuous (end inspiratory) positive airway pressure CPAP to be maintained at the proximal airway during spontaneous or mechanical respiration.

The servoing diaphragm of the Flow Accelerator is directly coupled to a valve stem which causes the Flow Accelerator valve to open or close as the servo diaphragm is caused to move by physiologically induced pressure changes.

Functionally, the physiologically generated proximal airway pressure changes are transmitted against the servoing side of the diaphragm, which overrides the manually selected MEAN CPAP. As the physiological inspiratory demand for in-flow exceeds the manually established MEAN CPAP value, the potential proximal airway pressure drop causing the diaphragm to move toward the area of low pressure which (near instantaneously) increases the flow from the diaphragm controlled Flow Acceleration valve. This increase in flow is in proportion to the potential proximal airway pressure drop or rise.

Essentially, a diaphragmatically controlled "flow acceleration valve" is manually adjusted to maintain a specific MEAN positive pressure at the proximal airway. Whenever the proximal airway pressure is reduced or increased by physiological means (below or above the selected MEAN CPAP value), flow acceleration is increased or decreased (in milliseconds) to satisfy the variable physiological in-flow/outflow demands while attempting to maintain the selected MEAN proximal airway CPAP/PEEP selection.
THE PHASITRON®, IN ACTUALITY, IS A TIME CYCLED, VARIABLE FLOW VENTILATOR LOCATED AT THE PROXIMAL AIRWAY. IT SERVES AS A PHYSICAL/PHYSIOLOGICAL INTERFACE FOR ANY COMBINED TYPES OF MECHANICAL PULMONARY VENTILATION.

A Selected MEAN Demand Continuous Positive Airway Pressure (D-CPAP) is maintained by the constant interplay between the Flow Accelerator valve and the Phasitron flow amplification system; which are both RELIABLY servoed by physiologically generated proximal airway pressure changes.

THE UNIQUE PATENTED PHASITRON COMBINES VARIOUS INTEGRATED FORMS OF VENTILATION WHILE PROVIDING FOR A LUNG PROTECTIVE STRATEGY BY MEANS OF "FLUID CLUTCHING"
OD-CPAP PROVIDES FOR PROXIMAL AIRWAY PRESSURE SUPPORT WHILE PROVIDING FOR AN INTRAPULMONARY MECHANICAL GAS MIXING ENHANCING DIFFUSION

OSCILLATORY DEMAND CONTINUOUS POSITIVE AIRWAY PRESSURE (OD-CPAP/PEEP)- can be defined as the super imposition of a high frequency INTRAPULMONARY PERCUSSIVE VENTILATION (IPV®) upon a selected DEMAND CONTINUOUS POSITIVE AIRWAY PRESSURE (D-CPAP).

OSCILLATORY DEMAND/ CPAP (OD-CPAP/PEEP) HAS PROVIDED AN EXPONENTIAL INCREASE IN CLINICAL EFFICACY OVER D-CPAP/PEEP SYSTEMS BY PROVIDING A CONTINUOUS PERCUSSIVE ENDOBRONCHIAL GAS MIXING WITHIN THE PULMONARY STRUCTURES.

THE PRIME COMPONENTS OF IPV® ARE THE TIME CYCLED PERCUSSIONATOR®️, PHASITRON®️ and AEROSOL GENERATOR

THE PATIENT CAN ALWAYS OVERRIDE ANY IPV®️ OR D-CPAP AND/OR COMBINATION PROGRAMS BY SPONTANEOUS BREATHING
PERCUSSIONAIRE® OD-CPAP PROGRAMMING CAN BE INITIATED ON THERAPEUTIC IPV®, INTENSIVE CARE VDR®, AND OSCILLATRON® PERCUSSIONATOR® VENTILATORS BY MEANS OF BOTH INVASIVE AND NON-INVASIVE AIRWAYS