We (a) ROY MAJOR HARRIGAN

(b) Insert full address of applicant(s).

(c) Insert title of invention

(d) Insert number of first basic application.

(e) Insert country in which first basic application was made.

(f) Insert date of first basic application.

(g) Insert number of first basic application.

(h) Insert country in which first basic application was made.

(i) Insert date of first basic application.

(j) Insert date.

(k) Signature(s) of applicant(s).

(l) Seal of the Company (if any)

I hereby apply for the grant of a patent for an invention entitled External Cardiac Resuscitation Aid which is described in the accompanying provisional complete specification.

We request that the patent be granted as a patent of addition to the patent applied for on application No. 541762 in the name of ROY, MAJOR, HARRIGAN in the U.S.A. on 17th January 1975.

We request that the term of the patent of addition be the same as that of the patent for the main invention or so much of the term of the patent for the main invention as is unexpired.

This application is a Convention application and is based on the following application or applications for a patent or patents or similar protection made in the following country or countries on the following date of dates:

No. 541762 in U.S.A. on 17th January 1975.

No. 609109 in U.S.A. on 29th August 1975.

My address for service is care of CLEMENT HACK & CO., Patent Attorneys, 414 Collins Street, Melbourne, Victoria, Australia.

Dated this 30TH day of DECEMBER 1975

ROY, MAJOR, HARRIGAN

CLEMENT HACK & CO.
COMMONWEALTH OF AUSTRALIA

Patents Act 1952-1962

DECLARATION IN SUPPORT OF A CONVENTION OR NON-CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the application No. (a) 10011/76

made by (b) ROY MAJOR HARRIGAN

for a patent/patent-of-addition for an invention entitled (c).

External Cardiac Resuscitation Aid

I, (d) ROY MAJOR HARRIGAN

of (e) Bromley Mountain Road

Manchester, Vermont 05254 U.S.A.

do solemnly and sincerely declare as follows:

1. (f) I am/we are the applicant(s) for the patent/patent-of-addition.

1. (g) I/am authorized by the above-mentioned applicant for the patent/patent-of-addition to make this declaration on its behalf.

2. The basic application(s) as defined by Section 141 of the Act was/were made in the following country or countries on the following date(s) by the following applicant(s) namely:

   in (i) U.S.A. on (j) 17th January 1975
   by (k) Roy Major Harrigan

   in (i) U.S.A. on (j) 29th August 1975
   by (k) Roy Major Harrigan

   in (i) . . . . . on (j) . . . .
   by (k) Roy Major Harrigan

3. (l) I/am/we are the actual inventor(s) of the invention.

3. (m) . . . . . . . . . .

of (n) . . . . . . . . .

is/are the actual inventor(s) of the invention and the facts upon which the applicant(s) is/are entitled to make the application are as follows:

   as regards entitlement under Section 34 of the Act:-(o)

   as regards entitlement under Part XVI of the Act:-(q)

4. The basic application(s) referred to in paragraph 2 of this Declaration was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Declared at Vermont U.S.A. this 22nd day of DECEMBER 1975

(r) Roy Major Harrigan

To: The Commissioner of Patents, Commonwealth of Australia
EXTERNAL CARDIAL RESUSCITATION APPARATUS AND METHOD.

HARRIGAN, R.M.

CLAIM 1. Apparatus for use in administering cardiopulmonary resuscitation comprising:

- cushion means for placement by the user on the chest of a patient for cushioning and distributing the forces applied by the user to the patient's chest during cardiopulmonary resuscitation;

- means in operative relationship with said cushion means for sensing the force applied to said cushion means by the user; and

- means in operative relationship with said sensing means for indicating the force applied to said cushion means by the user.
This document contains the amendments made under Section 49, and is correct for printing.

This document contains the amendments made under Section 49, and is correct for printing.

Name of Applicant(s): ROY MAJOR HARRIGAN

Address of Applicant(s): Bromley Mountain Road, Manchester, Vermont 05254 U.S.A.

Actual Inventor(s): SAME AS APPLICANT

Address for Service: CLEMENT HACK & CO.
414-Collins-Street
Melbourne, Victoria, 3000
Australia.

Complete Specification for the invention entitled:

"EXTERNAL CARDIAC RESUSCITATION AID"

The following statement is a full description of this invention, including the best method of performing it known to me/us:
This invention relates to an apparatus and method for use in administering cardiopulmonary resuscitation.

When the heart is stopped as a result of injury, poisoning, electric shock, heart attack or other causes, circulation sufficient to maintain life may be maintained by the rhythmic application of the correct amount of pressure to the chest.

In adult males, for example, the correct pressure is approximately ninety pounds. If too little pressure is applied the circulation created, if any, will not be sufficient to prevent brain damage or even death. On the other hand, if the pressure applied is too great, broken ribs, punctured lungs and other damage may result. Further, application of pressure on too small an area of the chest can more readily result in broken ribs and other damage, for example, if the knuckles of the rescuer's hand are pressing on the victim's ribs. Also, if the pressure is not applied evenly but applied in quick jabs, the likelihood of injury is increased, and if the pressure is not applied rhythmically and with proper timing, satisfactory results may not be obtained.
The present invention further provides apparatus for use in administering cardiopulmonary resuscitation comprising:
cushion means for placement by the user on the chest of a patient for cushioning and distributing the forces applied
by the user to the patient's chest during cardiopulmonary resuscitation;
means in operative relationship with said cushion means
for sensing the force applied to said cushion means by the user; and
means in operative relationship with said sensing means
for indicating the force applied to said cushion means by the user.
The present invention further provides a method for administering cardiopulmonary resuscitation to a patient with said apparatus as defined above having the use of a resilient cushion, comprising the steps of:
positioning the patient on his back;
placing the cushion onto the patient's chest and over the lower sternum of the patient;
applying a downward force to the cushion for a first predetermined time interval;
removing the application of said force to said cushion for a second predetermined time interval; and
repeating the application and removal of force to the cushion as necessary.
The present invention also provides a method for controlling the application of cardiopulmonary resuscitation by a rescuer to a patient, comprising the steps of:
placing a force sensing and indicating device on the patient's chest;
applying a force to the patient's chest via the device;
removing the application of force to the patient's chest and said device; and
repeating the application and removal of force to the patient's chest and to the device as necessary to effect resuscitation of the patient.

An embodiment of the present invention provides for an inflatable structure of heavy vinyl or other suitable material approximately three inches square and two inches high (when inflated) having a pressure of force indicating device such as a pressure gauge associated therewith. The structure is inflated by mouth through a suitable inflation valve such as are found on air mattresses. The gauge may be calibrated to indicate the pressure or force applied to a victim by placing the inflatable structure on a spring weight scale and applying various pressures, (especially in the range required for external cardiac resuscitation) on the structure and recording these pressures from the spring weight scale onto the face of the pressure gauge indicator face. In experiments it has been
found that a pressure of eight pounds per square inch on the gauge is representative of a downward force on the inflatable structure of ninety pounds.

In use, the above described external cardiac resuscitation aid is inflated by mouth and placed on a victim's chest over the lower sternum, and pressure is applied to the victim's chest through the device. The user will observe the gauge each time he applies pressure (about once per second) to be sure that the proper pressure is attained.

In another embodiment a timing device such as an easily readable stop watch may be attached to the device to enable the rescuer to maintain the proper rhythm. Any other suitable adjustable timing device can be used using audible and/or visual signals, as an example. Electronic or other timing means and even a compact metronome device could be used. For example, with two rescuers the rhythm should be one compression and relaxation per second (compression comprising one half second relaxation one half second).

In another embodiment, the timing means may be an integral part of the pressure gauge, for example, the pressure gauge may be designed so that an appropriate time interval, e.g., one half second, is required for the pressure indicator pointer to relax to zero. Ideally, this timing feature is adjustable to suit different circumstances.

The resiliency of the inflatable "pillow" or other pressure applying means is a valuable feature of the invention. This resiliency tends to reduce the chances of damage or injury to the patient when administering cardiopulmonary resuscitation (CPR) by virtue of the fact that it provides for an even distribution of pressure. Further, it tends to absorb the
harmful effects of improperly applied (CPR), such as sharp jabs rather than even, regular compressions. Accordingly, one embodiment of the invention would consist simply in an inflatable "pillow" or other similarly shaped structure of suitable material such as foam rubber for the application of CPR. Such a device would be of value even though it did not have the pressure sensing and pressure indicating means and other features described above. However, it could include these additional features or any combination thereof, including the use of the timing means.

Further improvement to the above-described embodiments is the provision of a pressure sensitive adhesive surface, such as medical adhesive tape, on the bottom of the "pillow" or resilient cushion. This adhesive would have a peel-off cover. Thus, the rescuer need only locate the proper position for the device, peel off the cover and apply it to the victim's chest. Then, should the rescuer have to stop the CPR for an interval because of moving or transporting the victim or to apply mouth-to-mouth resuscitation (one man rescue) the rescuer will not lose time in reapplying CPR because the device will have remained in the proper position on the victim's chest. Further, the chance of causing the damage by inadvertently applying pressure in the wrong place will be greatly reduced.

Any type of suitable pressure-sensing device coupled with a suitable pressure indicating means may be employed in the practice of this invention. For example, an electrical transducer might be used to sense pressure in the inflatable "pillow" or might be used to sense the direct pressure applied through the resilient cushion to the victim. Pressure indicating means may be a visual and/or an audible signal.
The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate the invention, and together with the description serve to explain the principles of the invention.

Figure 1 is a perspective view of one embodiment of the invention;

Figure 2 shows a section of another embodiment of the invention;

Figure 3 is a cross-section of a further embodiment of the invention;

Figure 4 is a cross-section of still another embodiment of the invention; and

Figure 5 is a view illustrating the application of CPR using the cushion or pillow of this invention.

With reference now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figure 1 an inflatable "pillow" of vinyl or other suitable material 1 with an inflation valve 2, such as found in air mattresses and children's inflatable toys. The inflatable structure 1 is also provided with a pressure gauge 3 which measures the pressure inside the inflatable structure 1. The pressure gauge 3 indicates the downward force exerted on the structure 1, which force is related to but not necessarily equal to the pressure inside the structure 1. Optional instructions 4 may be printed on the top of the inflatable portion of the external cardiac resuscitation aid. In addition a timing means (not shown) may be used in conjunction with pressure gauge 3 to enable proper rhythmical application of CPR.

Figure 2 is a cross-sectional view of a similar
embodiment with optional improvements. Inflatable vinyl pillow 11 is provided with one way inflation valve and tube 13. Inflation valve 13 is optional if the device is provided with its own sealed-in supply of air or other fluid. An optional, resilient, porous, foam rubber or porous foam plastic pad 12 may be located inside the inflatable or inflated vinyl pillow 11 to permit continued use of the pillow even if it becomes punctured and unable to hold air. Optional adhesive layer 14 may be located on the bottom surface of the pillow covered by removable sheet 15. A flexible instruction sheet 16 showing detailed instructions for CPR is attached both to the pillow and to pressure gauge 17. Instructions 16 and the face of pressure gauge 17 may be provided with luminous lettering or other indicia for use when no light is available. Pressure gauge 17 may be optionally designed so that the pressure indicator needle requires one half second or some other predetermined time interval to relax back to zero to provide for a timing reference for the rescuer. Another optional feature may provide for this relaxation time interval to be adjustable. This timing feature is illustrated in Figure 2 by 17' and other timing means not specifically described herein may also be used. Hollow tube 18 conducts fluid pressure from the interior 11' of pillow 11 to pressure gauge 17 so that the force and pressure exerted by the rescuer on the pillow is registered on gauge 17.

With reference now to Figure 3, cushion or pillow 19 is constructed of suitably resilient foam rubber or foam plastic or other suitable material 12 to provide even pressure distribution in the application of CPR and to lessen harmful effects of improperly applied CPR. Optionally, instruction sheet 16 may
also be provided attached to cushion 19. Though not shown, adhesive layer and removable sheet 14, 15 of Figure 2 may be attached to the bottom of cushion 19.

Figure 4 shows an inflatable pillow 20 which has an inflation tube and valve 13. Instruction sheet 16 is also attached to inflatable pillow 20. The pillow may be constructed of vinyl or other suitable material. This embodiment has the advantage, that it may be deflated and easily carried on the person or stored in a small space. Though not shown, the adhesive features 14 and 15 of Figure 2 may also be provided with this unit.

The present invention provides for an inexpensive, portable, and compact device and method for assisting a rescuer in applying CPR by indicating the amount of pressure applied. The device may also provide for a predetermined time interval for relaxation to zero of the pressure gauge whereby a timing reference is also provided for the rescuer and whereby the correct rhythm can be followed in applying CPR. Studies have shown that up to 40% of persons trained in CPR forget the proper CPR techniques three months after having been trained. This invention enables anyone to properly administer CPR, even those who are untrained or those who have forgotten their training.

The invention in its broader aspects is not limited to the specific details shown and described, and departures may be made from such details without departing from the principles of the invention and without sacrificing its chief advantages.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Apparatus for use in administering cardiopulmonary resuscitation comprising:
   - cushion means for placement by the user on the chest of a patient for cushioning and distributing the forces applied by the user to the patient's chest during cardiopulmonary resuscitation;
   - means in operative relationship with said cushion means for sensing the force applied to said cushion means by the user; and
   - means in operative relationship with said sensing means for indicating the force applied to said cushion means by the user.

2. Apparatus as in Claim 1 further including timing means in operative relationship with said force indicating means for enabling said force indicating means to relax from any reading to a zero reading during a predetermined time interval.

3. Apparatus as in Claim 2 wherein said timing means is adjustable to selectively adjust said time interval.

4. Apparatus as in Claim 1 further including adhesive material affixed to said cushion means for enabling said cushion means to be fixedly positioned on the chest of the patient.

5. Apparatus as in Claim 4 further including a sheet removably positioned over said adhesive material.

6. Apparatus as in Claim 1 wherein said cushion means is inflatable and further including means attached to said cushion means for enabling inflation thereof.

7. Apparatus as in Claim 6 further including a porous, foam pad located within said inflatable cushion means to enable continued use of said apparatus even though said cushion means becomes punctured.
8. A method for administering cardiopulmonary resuscitation to a patient with the use of a resilient cushion as defined in claim 1, comprising the steps of:

- positioning the patient on his back;
- placing the cushion onto the patient's chest and over the lower sternum of the patient;
- applying a downward force to the cushion for a first predetermined time interval;
- removing the application of said force to said cushion for a second predetermined time interval; and
- repeating the application and removal of force to the cushion as necessary.

9. A method as in Claim 8 wherein said force applied to said cushion is a predetermined force as measured by a pressure gauge affixed to said cushion.

10. Apparatus for use in administering cardiopulmonary resuscitation, comprising:

- force sensing means adapted for placement by the user on the chest of a patient; and
- means in operative relationship with said sensing means for indicating the force applied by the user to the patient's chest via said force sensing means.

11. Apparatus as in Claim 10 further including timing means in operative relationship with said force indicating means for enabling said force indicating means to relax from a first predetermined force reading to a second predetermined force reading during a predetermined time interval when pressure is removed by the user from said force sensing means.

12. Apparatus as in Claim 11 wherein said timing means is adjustable to selectively adjust said time interval.

13. A method for controlling the application of cardiopulmonary resuscitation by a rescuer to a patient, comprising
the steps of:

placing a force sensing and indicating device on the patient's chest;

applying a force to the patient's chest via the device;

removing the application of force to the patient's chest and said device; and

repeating the application and removal of force to the patient's chest and to the device as necessary to effect resuscitation of the patient.

14. A method as in Claim 13 wherein said force is applied for a first predetermined time interval.

15. A method as in Claim 14 wherein said application of force is removed for a second predetermined time interval.

16. A method as in Claim 15 wherein said second predetermined time interval is measured and displayed by said force sensing and indicating device.

17. A method as in Claim 13 wherein said force applied is a predetermined force as measured and displayed by said force sensing and indicating device.

18. An apparatus for use in administering cardiopulmonary resuscitation substantially as hereinbefore described with reference to the accompanying drawings.

19. A method for use in administering cardiopulmonary resuscitation substantially as hereinbefore described with reference to the accompanying drawings.

DATED THIS 1ST DAY OF SEPTEMBER 1978

ROY MAJOR HARRIGAN
By His Patent Attorneys

CLEMENT HACK & CO