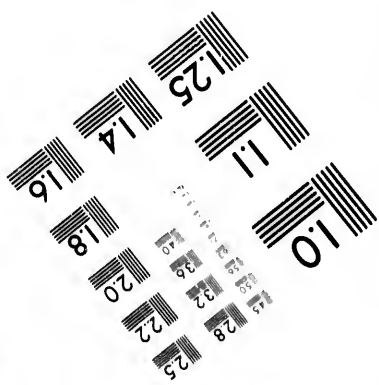
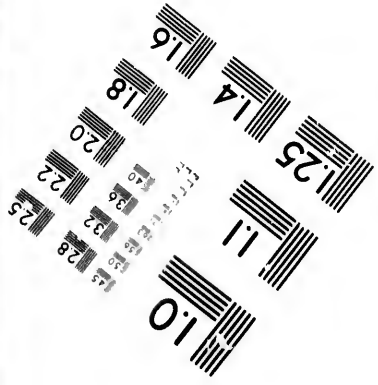
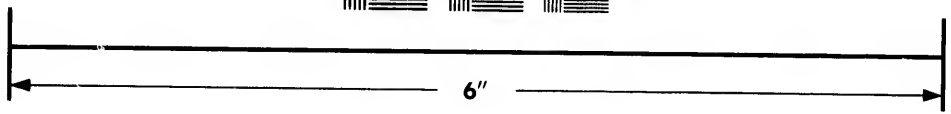
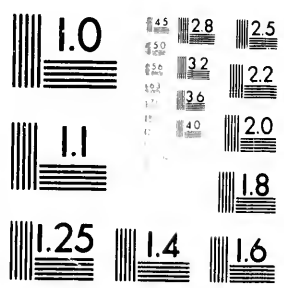


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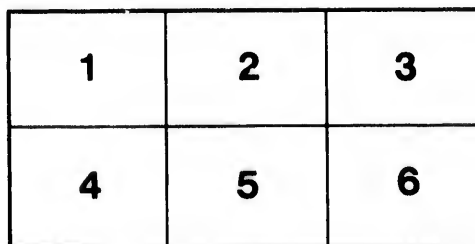
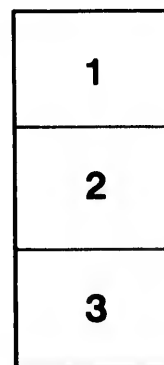
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# LIFE-SAVING HAND-BOOK

OF THE

## ROYAL CANADIAN HUMANE ASSOCIATION

CONTAINING SPECIAL DIRECTIONS FOR RESCUING DROWNING PERSONS;  
WITH SUGGESTIONS AS TO THE BEST MEANS OF RESUSCITATING  
THE APPARENTLY DEAD, EITHER FROM DROWNING,  
LIGHTNING, DYNAMIC ELECTRICITY, ETC.



AND FROM THE PUBLICATIONS OF THE ROYAL HUMANE AND THE NATIONAL  
LIFE-SAVING SOCIETIES OF ENGLAND, AND FROM OTHER SOURCES.

BY  
J. GEORGE HODGINS, M.A., LL.D.,  
HONORARY SECRETARY OF THE ASSOCIATION.

TORONTO:

PRINTED FOR THE ROYAL CANADIAN HUMANE ASSOCIATION BY  
WILLIAM BRIGGS, WESLEY BUILDINGS,

1895.

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*Hodgins, John G.*



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# LIFE-SAVING HAND-BOOK

OF THE

## Royal Canadian Humane Association

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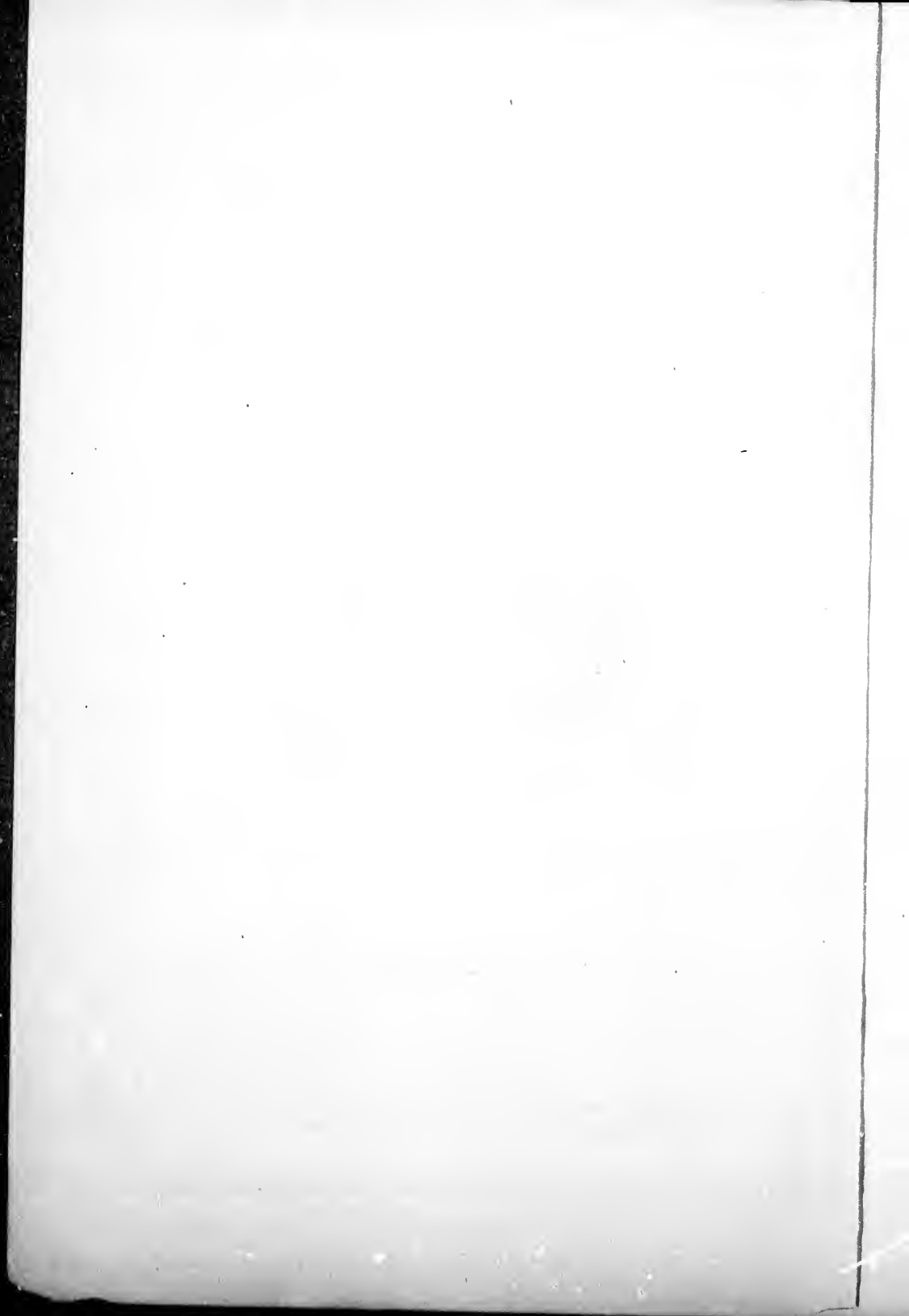
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1895.





## PREFATORY NOTE.

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IN ADDITION to the Large Sheet, with illustrations on Life-Saving, issued by the Royal Canadian Humane Association, it has been thought desirable to insert the illustrations on that Sheet in a separate Hand-Book.

This has been done; and full and explicit directions in regard to Life-Saving have also been given, as will be seen in this Hand-Book.

It is clear that in the hurry and excitement attending the rescue of a person from drowning, it would be difficult to promptly act upon the directions given on the Large Sheet—although they are in large, clear type—without some previous knowledge of them. It is, therefore, with a view to enable persons to make themselves acquainted with the various modes of rescue of the drowning, and also with the three best methods of resuscitating the apparently dead—either from drowning or electricity—that this Hand-Book has been prepared.

In this Hand-Book—with its larger space available—amplified details are given than was possible to give in the Large Sheet; while the three-fold method of resuscitation therein given by medical experts is more fully described.

One Chapter is devoted to an explanation, with detailed suggestions, of the recently-discovered method of restoring to consciousness persons struck with lightning, or who may have come in contact with dynamic electricity, in the shape of "live wires," etc.

Another Chapter contains an explanation of Dr. De Baun's apparatus for restoring the lost action of the lungs. This is a subject which has engaged the earnest attention of medical men, and its consideration is full of interest.

A brief Chapter is devoted to suggestions as to how to deal with the case of a rescued person before the arrival of a doctor or other skilled expert. In such cases, promptitude may be life, the want of it may be death. Immediate measures are, therefore, absolutely necessary in order to insure success. Delays in such cases are truly dangerous, as life then hangs upon a very slender thread, the clue to which may be lost if there is any hesitation in applying the prescribed remedies at once.

It is due, in issuing this Hand-Book, to refer to the noble efforts of Mr. Thomas Tinning, and those of Capt. W. D. Andrews, of Toronto; of Mr. F. W. Fearman and Captain Campbell, of Hamilton, who devoted some of their best years to saving the lives of others from drowning in Toronto and Burlington Bays and elsewhere, and in resuscitating them when rescued. The heroic act of Mrs. Abigail Becker, of Long Point, Lake Erie (now Mrs. Henry Rhorer, of Walsingham), in rescuing, at the risk of her own life, seven shipwrecked sailors off Long Point Island, Lake Erie, should also be remembered and recorded, as it has been made memorable in a poem by Miss Amanda T. Jones, which has been reprinted in the "High School Reader," an authorized book for use in these schools of Ontario. There was then no society or association in existence in "this Canada of ours" to reward these brave men for their heroic deeds. They had to look to the chance sympathy and generosity of their fellow-citizens, or to the Dominion Government, the Royal Humane Society in England, and other similar organizations elsewhere.

J. G. H.

TORONTO, *May*, 1895.

FORMS  
OF THE  
ROYAL CANADIAN HUMANE ASSOCIATION.

---

1. GOVERNOR FOR THE YEAR  
OF THE  
ROYAL CANADIAN HUMANE ASSOCIATION.

---

*To Henry McLaren, Esq., Treasurer of the Royal Canadian Humane Association, Hamilton :*

DEAR SIR,—You will please place my name on the Roll of your Humane Association as one of its Governors for the year 189..

I enclose herewith, in a registered letter, my annual subscription of FIVE DOLLARS (\$5) for that purpose.

.....  
Dated at.....Post-office.

---

2. GOVERNOR FOR LIFE  
OF THE  
ROYAL CANADIAN HUMANE ASSOCIATION.

---

*To Henry McLaren, Esq., Treasurer of the Royal Canadian Humane Association, Hamilton :*

DEAR SIR,—You will please place my name on the Roll of your Humane Association as one of its Governors for Life.

I enclose herewith, in a registered letter, my subscription of FIFTY DOLLARS (\$50) for that purpose.

.....  
Dated at.....Post-office.

3. FORM OF BEQUEST

FOR THE BENEFIT OF THE ROYAL CANADIAN HUMANE ASSOCIATION.

I, A. B., do hereby give and bequeath to the Honorary Treasurer, for the time being, of the

ROYAL CANADIAN HUMANE ASSOCIATION,

established in this Dominion in the year of our Lord one thousand eight hundred and ninety-four, the sum of . . . . . dollars, to be applied to the uses and purposes of the Association. And I declare that the receipt of the said Treasurer, for the time being, shall be a full and sufficient discharge for the amount of the said bequest herein made by me.

Witnesses:

Dated at . . . . ., this }
. . . . day of . . . . ., 18.. }

4. FORM OF PARCHMENT CERTIFICATE FOR LIFE-SAVING, ETC.

The Committee on Awards having considered certain cases laid before it, and reported thereon,

THE ROYAL CANADIAN HUMANE ASSOCIATION

have unanimously resolved that . . . . . is justly entitled to this Honorary Testimonial of the Association, inscribed on parchment, which is hereby awarded to the said . . . . . for . . . . .

Treasurer.

President.

Dated at . . . . ., this }
. . . . day of . . . . ., 18.. }

Secretary.

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## THE ROYAL CANADIAN HUMANE ASSOCIATION

FOR THE DOMINION OF CANADA. INSTITUTED IN 1894.

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<i>Patron</i>	-	-	GOVERNOR-GENERAL, HIS EXCELLENCY THE EARL OF ABERDEEN.
<i>President</i>	-	-	ADAM BROWN, ESQUIRE, Hamilton.
<i>Secretary</i>	-	-	J. GEORGE HODGINS, LL.D., Toronto.
<i>Treasurer</i>	-	-	MAJOR HENRY McLAREN, Hamilton.

---

### PRELIMINARY—CHAPTER I.

#### OBJECTS OF THE ROYAL CANADIAN HUMANE ASSOCIATION.

This Association rewards persons who, with promptitude and bravery, and at personal risk or hazard of their own lives, save, or make strenuous efforts to save, the lives of others, in any of the following cases:—

1. That of Drowning.
2. That of Boat Accidents.
3. That of Railway Accidents.
4. That of Accident at Fires.
5. That of Ice Accidents.
6. That of Freezing Exposure.
7. That of Asphyxia, in Mines or Wells.
8. That of Asphyxia from Escaping Gas.
9. That of Accidents from Lightning and Dynamic Electricity.
10. Other unenumerated cases.

The Association has added this ninth (and an entirely new) case of reward for attempts at life-saving of persons struck by lightning, or by dynamic electricity ("live wires," etc.)—it having been recently ascertained by experiments in France and in the United States, that persons so affected can be restored, as in the case of drowning, and are set forth in this Hand-Book.

In addition to this, the Royal Canadian Humane Association seeks to stimulate and help the local affiliated Humane Societies, in the various Provinces of the Dominion, in their good work. It also supplies lists and prices of appliances for life-saving in case of drowning, ice accidents, and those from live wires, etc. It has also carefully prepared a large sheet (36 x 26 inches) of illustrations of life-saving in the case of drowning and drowned persons, based upon the latest systems adopted by the Royal Humane Society of England and of the Life-saving Society of the same country. (See list at the end of this pamphlet.)

The Officers strongly appeal for aid to all those who sympathize with the truly beneficent objects of the Royal Canadian Humane Association, to reward the heroic efforts of life-saving, and the many noble acts of self-devotion in life-saving, which are so constantly taking place in the wide area of this Dominion of Canada, and the practice of which tends so much to develop among our Canadian people a lofty spirit of self-reliance and manly courage.

Persons can become Governors for the year at \$5, or for life at \$50, which should be sent to Major McLaren, Treasurer of the Association, Hamilton.

A FEW WORDS TO THOSE WHO SYMPATHIZE WITH THE OBJECTS  
OF THE ROYAL HUMANE ASSOCIATION.

Life-saving is heroic work, but the Royal Canadian Humane Association cannot reward it without generous financial support.

The Association desires the hearty co-operation of all humane persons in the prosecution of the noble work of life-saving.

Sympathy is very pleasant, but generous help will enable the Association to show a good record of rewards for heroism.

Canada should generously reward her own sons for their personal risk and hazard in saving the lives of others.



## CHAPTER II.

## COMMITTEE OF THE ROYAL CANADIAN HUMANE ASSOCIATION ON AWARDS FOR LIFE-SAVING.

The Constitution of the Association provides that "There shall be a Committee of five Governors of the Association—one of whom shall act as Secretary—who shall enquire into the particulars of all acts of bravery, personal risk, or hazard of life in saving others, or attempting to do so, which may be reported to them, or, on whose behalf, application for reward for such bravery, risk, or hazard, has been made. This Committee, or any three of them, shall have full power, upon due enquiry, to decide upon all cases brought before them, and may make awards upon all such cases at their discretion. The particulars of each case of award shall be fully reported to the Association."

The Committee of Governors appointed under this section of the Constitution is as follows: Messieurs A. S. Irving and H. P. Dwight Toronto; Richard Fuller and Joseph Greene, Hamilton; and Charles Black, Niagara Falls, Ontario.

## NATURE OF THE REWARDS GRANTED BY THE ASSOCIATION.

For the present, the rewards granted by the Association in terms of the foregoing extract from the Constitution are: (1) Bronze Medals; (2) Certificates on Parchment; (3) Resolutions in the form of Minutes.

Should special donations be made to the Association, or legacies be given specifically for that purpose, gold (as in the case of the Sunford Medal) and silver medals may be awarded, or money grants made, as the case may be.

NOTE.—The medals shall have the words: "Royal Canadian Humane Association," engraved or embossed on one side; and the name of the recipient and his, or her, act of bravery, personal risk and hazard of life, inscribed in brief on the other. The Parchment Certificates shall also have the particulars of the act for which they are given engrossed upon them.

## CHAPTER III.

## THE ROYAL HUMANE AND THE NATIONAL LIFE-SAVING SOCIETIES OF ENGLAND.

## 1. THE ROYAL HUMANE SOCIETY OF ENGLAND: INSTITUTED 1774.

PATRON: HER MAJESTY THE QUEEN.

The art of resuscitating the apparently dead does not appear to have been known to the ancients.

Some instances of recovery from drowning and hanging, mentioned in the notes to "Derham's Physico-Theology," are the first on record. These cases happened at Tronningholm and at Oxford about the year 1650, and the means used for the recovery of the persons in question were similar to those recommended by the Royal Humane Society. It does not seem, however, that these instances excited any public interest, or that any serious investigation of the subject of "Suspended Animation" took place till about the middle of last century. At this period the penetrating genius of Dr. J. Fothergill, which had already in other branches of his profession developed new and important modes of treating disease, led him to perceive "the fallacy and dubiousness of the received criteria of dissolution;" and in a paper which he addressed to the Royal Society he maintained, as the result of his inquiries, "*the possibility of saving many lives without risking anything.*" To us it must appear extraordinary that this publication excited little interest and attention among the medical philosophers of his time. He had, however, propounded a most important theory, although the glory of putting it to the test of experiment was reserved for a later period. This was first attempted by M. Reaumer,\* an ingenious foreigner: that gentleman, having succeeded in several attempts at resuscitation in Switzerland in the year 1767, transmitted reports of his cases to the Academy of Sciences at Paris. Soon after this period, in the same year, a Society for the Recovery of the Apparently Drowned was instituted at Amsterdam, and, as if by a simultaneous movement, several similar associations were formed in different parts of Europe. The Memoirs of the Dutch Society were translated into English in 1773, by Dr. Cogan, for the purpose of convincing the people of this country of the practicability of resuscitating the apparently drowned. His

---

\* The Secretary has received a letter from Monsieur De Guittaume, Professor of Hygiene at the Academy of Neuchatel, who states that the method for recovering persons apparently drowned was first initiated by Bourquet, Professor of Philosophy in Neuchatel, where he was living from the year 1705 until his death in 1742.

work fell into the hands of the late Dr. Hawes, M.D., to whose ardent and indefatigable mind it opened a career of public usefulness, which he pursued until his death. Finding that a strong and general prejudice existed against the *practicability* of resuscitation, and that the idea was even ridiculed as hopeless and chimerical, he determined to *demonstrate* it. With this view he publicly offered rewards to persons who, between London and Westminster bridges, should, within a certain period from the occurrence of an accident, rescue the bodies of drowned persons and bring them to places appointed on shore for their reception, in order that the means of resuscitation might be tried. At these places he and his friends restored several lives. During a whole year Dr. Hawes continued to pay these rewards himself. At the end of this period Dr. Cogan represented to him the injury his private fortune must sustain by such continued expenses, and kindly offered to unite with him for the formation of the Humane Society, which at first consisted of thirty-two individuals, their respective private friends.\* Until the end of Dr. Hawes' life the institution continued to receive his unremitting attention and vigilant care. To the persevering exertions of this gentleman, and especially to his disinterested early efforts, the English nation is indebted for the formation of a society which, whether we reflect on its purposes or success, does honor to our country and exhibits most impressively the power of a single mind to accomplish objects of the most benign character and extensive utility.

The specific objects of the Royal Humane Society are stated to be: To collect and circulate the most approved and effectual methods for recovering persons apparently drowned or dead; to provide suitable apparatus in and around the Metropolis for rescuing persons from drowning; to bestow rewards for the preservation and restoration of life; and to encourage swimming exercises at Public Schools and training ships with reference to saving life from drowning.

## 2. THE NATIONAL LIFE-SAVING SOCIETY OF ENGLAND: INSTITUTED 1891.

PATRON: HIS ROYAL HIGHNESS THE DUKE OF YORK.

The last report of the National Life-Saving Society of England gives no historical account of its formation, etc., but it gives the following as "the main objects" of its establishment:

- (a) To promote technical education in life-saving and resuscitation of the apparently drowned.
- (b) To stimulate public opinion in favor of the general adoption of swimming and life-saving as a branch of instruction in schools, colleges, etc.

---

\* Royal Humane Society's Report for 1893-94.

(c) To encourage floating, diving, plunging and such other swimming arts as would be of assistance to a person attempting to save life.

(d) To arrange and promote public lectures, demonstrations and competitions, and to form classes of instruction, so as to bring about a widespread and thorough knowledge of the principles which underlie the art of natation.

### 3. THE ST. JOHN AMBULANCE ASSOCIATION

(ST. JOHN'S GATE, CLERKENWELL, LONDON, ENGL.),

Publishes First Aids to the Injured, Esmarch's Bandages, the Wooden Tee Ball, etc.,\* and various Ambulance requisites.

---

## CHAPTER IV.

### METHOD OF DEALING WITH DROWNING PERSONS IN THE WATER.

#### 1. RESCUE OF THE DROWNING.

##### PRELIMINARY REMARKS.

The Hand-Book of the National Life-Saving Society of England contains the following "general explanation" of its method for the rescue of the drowning:

Everyone should consider it his duty to learn to swim, not only to save himself, but to be able to render assistance to others who are in danger of drowning.

A great many more persons might be saved from drowning were swimming more generally taught or practised, and the proper method of rescue and resuscitation of the apparently drowned better understood and acted upon by the public, who, for want of this knowledge, are frequently deterred from attempting a rescue. In many cases, where help has been at hand and persons have been brought to land apparently drowned, they have subsequently died; whereas, if the proper treatment had immediately been put into force, animation might have been restored.

This Hand-Book has been compiled to furnish information as to the saving of life from drowning in a practical and easily understood form, and a drill has been arranged and included as a means of readily learning, teaching and remembering the details which may prove invaluable in an emergency.

---

\* These can be supplied by the Royal Canadian Humane Association; see list of various requisites on page 52 of this Hand-Book.

## ACTION OF A DROWNING PERSON IN THE WATER.

When a person unable to swim falls into the water he usually rises to the surface, throws up his arms and calls for help. This, with the water swallowed, will make him sink, and if the arms are moved above the head when under the water he will, as a natural consequence, sink still lower. The struggles will be prolonged a few seconds and then probably cease for a time, allowing him to rise again, though perhaps not sufficiently to obtain another breath of air. If still conscious, he will renew his struggles, more feebly perhaps, but still with the same result. As soon as insensibility occurs, the body sinks altogether, owing to the loss of air and the filling of the stomach with water. The general belief that a drowning person must rise three times before he finally sinks is a fallacy. The question whether he does so at all, or how often he rises, entirely depends upon the circumstances.

## NECESSITY FOR PROMPT RESCUE.

On seeing a person struggling in the water, in danger of drowning, the first thing to be remembered is *to lose no time*. As already stated, the drowning person may sink and not rise again, and in that case it may be very difficult for the rescuer to find the object of his search. If the person attempting to save life is unacquainted with the proper methods of rescue and release he should exercise great caution, because through ignorance two lives may be placed in jeopardy. It is a well-known saying that a drowning person "catches at every straw." If grasped by a drowning person the rescuer, if he lost his presence of mind, and did not know how to effect a release, would stand but a poor chance of getting away.

In ice accidents, as a rule, a person precipitated into the water comes to the surface close to where he went in, so that he can extend his arms over the broken edge of the ice and hold on until help arrives, or, by breaking the ice in front, keep moving forward by taking a fresh hold. It is possible where the ice is very thin to reach shore in this way. The ice in the vicinity of a break is seldom strong enough to climb upon, when encumbered with wet heavy clothing and skates. To get out in that way is not an easy task, and it is generally best to wait for assistance. The easiest way to render help is to use a long ladder, board, or pole, or a number of persons might crawl along the ice, holding each other, thus forming a human ladder. By this means the weight is distributed over a larger surface, and the ice therefore able to bear a greater weight. If the break in the ice is only local, assistance could be rendered by a rope held at each end and the centre allowed to drop, or, if that cannot be done, a skate with a rope attached to it might be slid within reach of the drowning person.

## TAKING OFF SUPERFLUOUS CLOTHING.

The question whether the rescuer, before entering the water, should remove a portion of his clothing is a matter of judgment. If the drowning person is on the surface and close to the shore, the rescuer will probably be in the water for a very short time. There is no need to remove much clothing, for, although it may somewhat impede his movements, yet the clothes being inflated with air will assist floating until saturated with water. In all cases it is advisable to remove as much clothing as time will permit. Commence with the heavy garments and boots, which are the greatest hindrance to swimming; but use judgment, as a moment's delay may mean the loss of a human life. If the rescuer has to enter the water from a great height, as from a bridge, vessel or pier, and is not used to diving and plunging, it is best to drop in feet first.

## CAUTIOUS APPROACH NECESSARY.

The next thing to consider is how best to approach any one in danger of drowning. There is an element of risk from the clutch of a drowning person, unless the rescuer has been properly instructed how to effect a release. Many writers on the subject state that it is sheer madness to approach a drowning person from the front. With some it might lead to disaster, but with a swimmer who knows the right way to deal with a man struggling in the water there is no danger. In advocating the approach from the front, it does not necessarily follow that this should be done in every case; indeed, as a general rule, it may be better not to do so; but it is necessary to know what to do if face to face with a drowning person. If a person in distress is approached from the front and grasped firmly when being turned on his back, he will probably give up his struggles and submit quietly, finding himself supported and able to breathe freely.

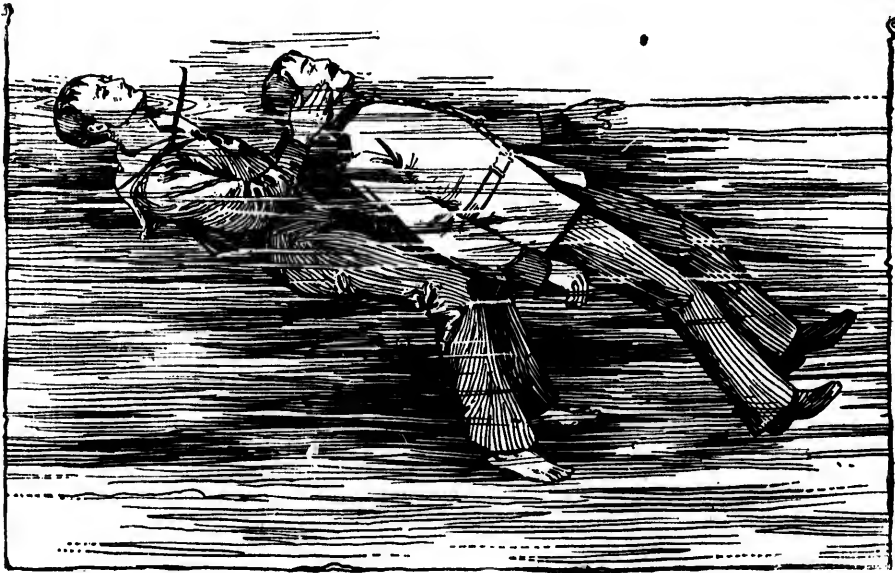
## PROMPT ACTION IN DEALING WITH THE DROWNING CLUTCH.

The rescuer may, through some mistake, find himself seized by the drowning person, who will probably not let go until forced to do so. If this should happen, there must be no hesitation or scruple to use any means necessary to obtain release. One necessary thing for the rescuer to do is to take advantage of his knowledge of the water and keep uppermost. This will be of material service, as it will weaken the drowning person, and make the difficulty of getting away much easier.

## CHAPTER V.

## FOUR METHODS OF RESCUING DROWNING PERSONS.

There are four practical methods of rescuing a person in the water, and those who are ignorant of what to do in cases of emergency can, in the course of ten or twelve practical lessons, become thoroughly proficient and able to render valuable aid in saving life without risk or danger to themselves. The methods are as follows :



FIRST METHOD OF RESCUE. (Illustration No. 1.)

FIRST METHOD.—*When the drowning person is not struggling turn him on his back, provided he does not struggle, place your hands on either side of his face. Then turn on your back, hold him in front of you, and swim with the back stroke, taking care to keep his face above the water.*



SECOND METHOD OF RESCUE. (Illustration No. 2.)

SECOND METHOD.—*In the event of much struggling, rendering the drowning person difficult to manage, turn him on his back as before, and take a firm hold of his arms just above the elbows. Draw the arms upwards at right angles to the body, and swim with the back stroke. This hold will put the drowning person under the control of the rescuer, who can prevent him from turning round, clutching, or even struggling.*





THIRD METHOD OF RESCUE. (Illustration No. 3.)

THIRD METHOD.—*If the arms be difficult to grasp or the struggling so violent as to prevent a firm hold, slip your hands under the armpits of the drowning person and place them on his chest or round his arms. Raise them at right angles to the body, thus placing the drowning person completely in your power. Then turn on your back.*



FOURTH METHOD—IN CASE OF CRAMP. (*Illustration No. 4.*)

FOURTH METHOD.—To render assistance to a swimmer attacked by cramp, or exhausted, as well as those in danger of drowning, who may be obedient and remain quiet; the person assisted must lie upon his back, face upwards, perfectly still, placing his hands on your shoulders close to the neck, with his arms at full stretch, and the head turned well back. Being uppermost, and having arms and legs free, swim with the breast stroke. It is by far the easiest method of the four, and the rescuer who swims with the breast stroke can, without undue exertion, carry a person a much longer distance than by any other method.

IMPORTANT POINTS TO BE REMEMBERED BY RESCUERS.

Rescuers must always remember that it is most important to keep the face of the drowning person clear of the water, even if their own does at times become immersed. They should avoid all jerking, struggling or tugging, and swim with a regular, well-timed kick of the legs, husbanding their strength for continued effort. If this be properly done, much confidence is imparted, as the drowning person is able to breathe with freedom, and may cease all struggling, feeling that he is in safe hands.

In carrying a person through the water it will be of much advantage to keep the elbows well out from the sides, as this expands the chest, inflates the lungs and adds to his buoyancy. The legs should be kept well up to the surface, the whole body being as horizontal as possible, thus avoiding the drag which would naturally result from a perpendicular position. The legs may be kept straight by the rescuer occasionally putting them up with his own feet.

Rescuers should at all times be governed by circumstances, using their judgment as to which method they shall adopt in conveying

the drowning person to shore, always taking care to avoid wasting their strength hopelessly against an adverse tide or stream, but rather floating with it and gradually making for shore, or else waiting until a boat or other aid may arrive.

## CHAPTER VI.

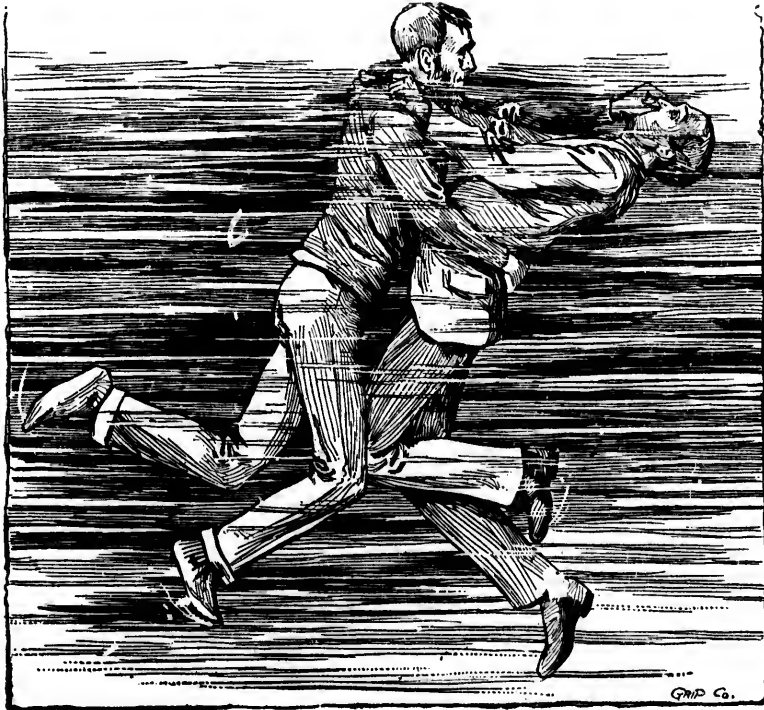
### THREE METHODS OF RELEASE FROM THE CLUTCH OF THE DROWNING.

The following are the methods recommended for releasing one's self from the clutch of a drowning man :



FIRST METHOD OF RELEASE. (Illustration No. 5.)

**FIRST METHOD.**—*If the rescuer be held by the wrists, turn both arms simultaneously against the drowning person's thumbs, outwards, and bring the arms at right angles to the body, thus dislocating the thumbs of the drowning person if he does not leave go.*



SECOND METHOD OF RELEASE. (Illustration No. 6.)

**SECOND METHOD.**—*If clutched round the neck, take a deep breath and immediately bring the knees up against the lower part of the chest, and then, by means of a strong and sudden push, stretch the legs straight out, throwing the whole weight of your body backwards. This sudden motion will break the clutch, and leave the rescuer free.*



THIRD METHOD OF RELEASE. (Illustration No. 7.)

**THIRD METHOD.**—*If clutched round the body and arms rather low down, lean well over the drowning person, take a breath as before, and withdraw one arm in an upward direction in front of his body. Then with the thumb and forefinger pinch the nostrils close, and at the same time place the palm of the hand on the chin, and push it away with all force possible. The holding of the nose will make the drowning man open his mouth for breathing. Being under, choking will ensue, and the rescuer will gain complete control.*

**FOURTH METHOD.**—*If clutched round the body and arms high up, lean well over and raise one arm, thereby making the arm of the drowning person slip on to your shoulder, and leave your arm free to proceed as in the case of Methods 2 and 3, or either one of them.*

Many a gallant life has been lost, in the attempt to rescue a fellow-creature from drowning, through a want of knowledge of these simple methods. All that is necessary is careful study and frequent practice in the water. If this be properly done even a moderate swimmer can fearlessly go to the aid of the drowning.

#### RECOVERY OF A DROWNING MAN FROM THE BOTTOM.

In some cases it may be that the drowning person has sunk to the bottom and does not rise again. In that case the rescuer should look for bubbles rising to the surface before diving to the rescue. In still water the bubbles will rise perpendicularly. In running water they will rise obliquely, so that the rescuer must look for his object higher up the stream than where the bubbles appear. It must also be remembered that in running water a body will be carried along, and must be looked for in a straight line in the direction in which the current is running. A swimmer who wishes to be thoroughly proficient must therefore know something of plunging and diving. Before diving take a full inhalation of fresh air, and avoid staying under water for long periods, as it exhausts the powers for fresh effort. Where weeds abound, and there is danger of entanglement, progress should be made by gentle motions in the direction of the stream.

On reaching a drowning person who has sunk to the bottom, seize him by the head or shoulders. Place the left foot on the ground, and the right knee in the small of his back. Then give a vigorous push, which will cause both to rise easily to the surface.

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## CHAPTER VII.

### THREE BEST-KNOWN METHODS OF RESUSCITATION.

When a person is lifted out of the water in an apparently drowned condition, there must be no loss of time in attempting restoration, as a moment's delay may prove fatal. The means used to restore life must be carried out with caution, perseverance and continuous energy, as life has, in many cases, been restored after long hours of unceasing work.

There are three well-known methods of restoring natural respiration by artificial means. The methods of Dr. Silvester and Dr. Marshall-Hall are best known and generally practised in Great Britain and the Continent, while that suggested by Dr. Howard, of the New York Life-Saving Association, is practised by humane societies and life-bout institutions in the United States of America.

The "Marshall-Hall" method is the mildest, though perhaps the least efficacious, of the three, and requires considerable practice and care to be successfully put into operation. The "Silvester" and the "Howard" methods, being simple, but vigorous, are more generally used. In the latter method there is a danger of injuring the patient by too forcible a pressure if practised by unskilled persons. The Life-Saving Society, after careful consideration, recommends the use of Dr. Silvester's method, which has been approved by the Royal Medical and Chirurgical Society, and adopted by the Royal National Life-Boat Institution and the Royal Humane Society of London. The following are a few reasons for recommending its use :

1. The process is to a great extent in harmony with that of Nature.
2. The expansion of the thorax is artificially insured and wholly under the control of the operator.
3. The patient is not liable to be injured by the manipulations.
4. Both sides of the chest are equally inflated, and a large amount of air inspired.
5. It is most easily adopted and remembered ; can be put into operation by one person.

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## CHAPTER VIII.

### THE SILVESTER METHOD FOR RESTORING THE APPARENTLY DEAD, RECOMMENDED BY THE ROYAL HUMANE SOCIETY OF ENGLAND.

#### IF FROM DROWNING, OR SUFFOCATION.

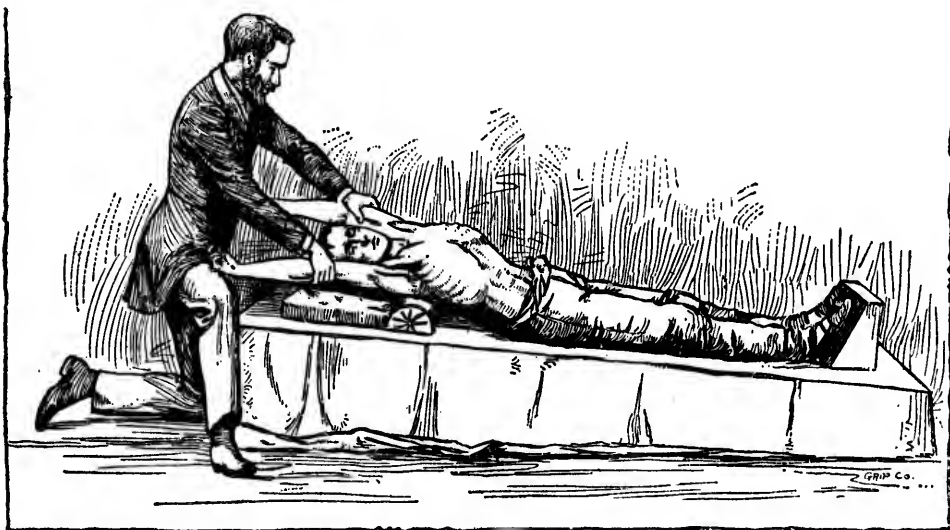
Send at once for medical assistance, blankets and dry clothing, but proceed to treat the patient *instantly*.

The points to be aimed at are—first, and immediately, the *restoration of breathing*; and secondly, after breathing is restored, the *promotion of warmth and circulation*.

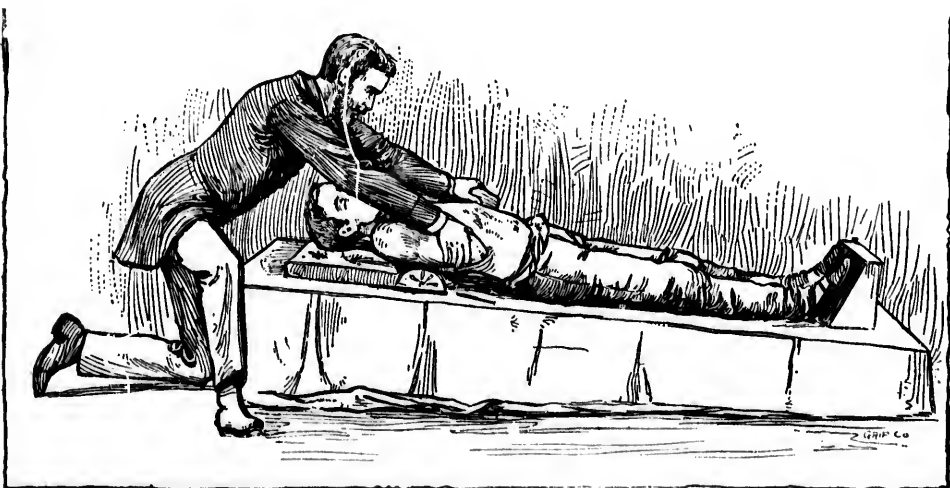
The efforts to restore life must be persevered in until the arrival of medical assistance, or until the pulse and breathing have ceased for an hour.

#### DR. H. R. SILVESTER'S METHOD OF RESTORING NATURAL BREATHING.

**RULE 1.**—*To adjust the patient's position.*—Place the patient on his back on a flat surface, inclined a little from the feet upwards ; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades. Remove all tight clothing from about the neck and chest.



INSPIRATION—THE SILVESTER METHOD, No. 1. (*Illustration No. 8.*)



EXPIRATION—THE SILVESTER METHOD, No. 2. (*Illustration No. 9.*)

*To illustrate the position of the body during the employment of Dr. H. R. Silvester's Method of Inducing Respiration.*



**RULE 2.**—*To maintain a free entrance of air into the windpipe.*—Cleanse the mouth and nostrils; open the mouth; draw forward the patient's tongue, and keep it forward; an elastic band over the tongue and under the chin will answer this purpose.

**RULE 3.**—*To imitate the movements of breathing:*

*First.*—**INDUCE INSPIRATION.**—Place yourself at the head of the patient, grasp his arms, raise them upwards by the sides of his head, stretch them steadily but gently upwards, for two seconds.

[*By this means fresh air is drawn into the lungs by raising the ribs. See Engraving No. 8—INSPIRATION.*]

*Secondly.*—**INDUCE EXPIRATION.**—Immediately turn down the patient's arms, and press them firmly but gently downwards against the sides of his chest, for two seconds.

[*By this means foul air is expelled from the lungs by depressing the ribs. See Engraving No. 9—EXPIRATION.*]

*Thirdly.*—**CONTINUE THESE MOVEMENTS.**—Repeat these measures alternately, deliberately and perseveringly fifteen times in a minute, until a spontaneous effort to respire be perceived.

[*By this means an exchange of air is produced in the lungs similar to that effected by natural respiration.*]

When a spontaneous effort to respire is perceived, cease to imitate the movements of breathing, and proceed to induce circulation and warmth (*as below.*)

**RULE 4.**—*To excite respiration.*—During the employment of the above method, excite the nostrils with snuff or smelling salts, or tickle the throat with a feather. Rub the chest and face briskly, and dash cold and hot water alternately on them. Friction of the limbs and body with dry flannel or cloths should be had recourse to. When there is proof of returning respiration, the individual may be placed in a warm bath, the movements of the arms above described being continued until respiration is fully restored. Raise the body in twenty seconds to a sitting position, dash cold water against the chest and face, and pass ammonia under the nose. Should a galvanic apparatus be at hand, apply the sponges to the region of the diaphragm and heart.

## CHAPTER IX.

DIRECTIONS FOR RESTORING THE APPARENTLY DROWNED  
(SILVESTER METHOD).

The National Life-Saving Society of England strongly recommend that the following directions be inserted in all Boat-club books :—

**RULE 1.** If no sign of life can be observed, nor the heart's action heard, lay the patient flat on the back and place a roll of clothing under the shoulder blades.



THE SILVESTER METHOD—ENGLISH LIFE-SAVING SOCIETY. (Illustration No. 10.)

**RULE 2.** Immediately release all tight clothing round the neck and chest, especially the braces or corsets, and at once proceed to clear the mouth and throat.

**RULE 3.** To do this, turn the patient face downwards, the head resting on one of the arms, and wipe the mouth and nostrils.

**RULE 4.** Replace the patient on the back, and place the roll of clothing under the shoulder blades.

**RULE 5.** Draw the tongue forward, and keep it projecting beyond the lips by fastening it in position with piece of handkerchief or string tied under chin.

**RULE 6.** Kneeling at patient's head, lean forward and grasp the arms below elbows, draw them steadily upwards at full length above and level with the head.

**RULE 7.** Having held the arms in this position for about two seconds carry them back to the body, folding them on each side, and press them firmly against the sides and front of the chest for about two seconds.

**NOTE.**--These movements must be repeated carefully and deliberately about fifteen times a minute, and persevered with until natural respiration is established, upon which cease to imitate breathing, and proceed to induce circulation and warmth.

**TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED.**

1. Rub the limbs upwards with firm pressure, using handkerchiefs, flannels, etc.
2. Dry the hands and feet, and as soon as dry clothing can be procured strip the patient and re-clothe or cover.
3. Continue friction over dry clothing or under blanket.
4. After respiration has been restored, carry patient to a house.
5. Promote warmth by the application of hot flannels, bottles, heated bricks, etc., to pit of stomach, armpits, thighs, and to soles of the feet.
6. If the power of swallowing has returned, small quantities of warm water, warm brandy and water, or coffee, should be administered; the patient kept in bed and sleep encouraged.

**GENERAL NOTE ON RESUSCITATION.**--Treatment to restore animation should be persevered in for at least three or four hours.

**TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED.**

*To induce circulation and warmth.*--Wrap the patient in dry blankets, and rub the limbs upwards energetically. Promote the warmth of the body by hot flannels, bottles or bladders of hot water, heated bricks, to the pit of the stomach, the armpits, and to the soles of the feet.

On the restoration of life, when the power of swallowing has returned, a teaspoonful of warm water, small quantities of wine, warm brandy and water, or coffee, should be given. The patient should be kept in bed, and a disposition to sleep encouraged. During reaction large mustard plasters to the chest and below the shoulders will greatly relieve the distressed breathing.

**NOTE.**--In all cases of prolonged immersion in cold water, when the breathing continues, a warm bath should be employed to restore the temperature.

To these valuable and necessary suggestions the Life-Saving Society of England has added the following:

TO PROMOTE WARMTH AND CIRCULATION.

When once natural breathing has been restored, friction by the assistant over the surface of the body should be resorted to, using handkerchiefs, flannels, etc. (*by these means the blood is propelled along the veins towards the heart*), while the operator attends to the mouth, nose and throat, seeing also that warmth is properly encouraged.

Wrap the patient in blankets or some dry clothing.

The friction on the legs should all be upward, and along the arms towards the body, and must be continued under the blankets or over the dry clothing.

Promote warmth by the application of hot flannels, bottles or bladders of hot water, heated bricks, etc., to the pit of the stomach, the armpits, between the thighs, and to the soles of the feet.

If the patient has been carried to the house, be careful to let the air circulate freely about the room and prevent crowding round the patient.

On the restoration of life, a teaspoonful of warm water should be given; and then, if the power of swallowing has returned, very small quantities of wine, warm brandy and water, beef tea or coffee should be administered. The patient should be kept in bed, and a disposition to sleep should be encouraged.

If there be pain or difficulty in breathing, apply a hot linseed-meal poultice over the chest.

Watch the patient carefully for some time to see that breathing does not fail; should any signs of failure appear, at once resume artificial respiration.

SUGGESTIVE AND USEFUL REMARKS.

In all cases send for medical assistance as soon as possible.

Avoid rough usage, especially twisting or bending of limbs, and do not allow the patient to remain on the back unless the tongue is pulled forward.

Under no circumstances hold the patient up by the feet, nor allow him to be carried face downwards.

In laying the patient down on the back, the head should be at a slightly higher level than the feet.

In the event of respiration not being entirely suspended when a person is lifted out of the water, it may not be necessary to imitate breathing, but natural respiration may be excited by the application of irritant substance to the nostrils and tickling the nose. Smelling salts, pepper or snuff may be used in doing this, or hot and cold water alternately be dashed on face and chest.

These various hints, instructions and explanations are here given in order that the drills which follow may be better understood and more easily acquired, so that the risks which attend the efforts of a rescuer in rendering humane aid in the hour of danger may, to a great extent, be obviated.

A description of the "Marshall-Hall" and "Howard" method will be found further on in this Hand-Book.

#### DESCRIPTIONS OF THE ORGANS OF RESPIRATION.

In order to convey to the non-professional mind some general idea why certain methods are adopted in life saving and resuscitation of the apparently drowned, it is thought desirable to give as briefly as possible a general outline of the structure of the human chest, as well as to explain the process by which breathing is accomplished, and the great necessity for a good supply of pure air to enable respiration to be carried on properly.

One of the chief impurities taken up by the blood in its passage through the body is a gas called Carbonic Acid. If this be allowed to remain in the blood, it will soon cause suffocation. To get rid of it the blood passes through the lungs. The process by which this purification is completed is called respiration, and is divided into two parts, viz., inspiration and expiration.

The lungs are two large bodies, which, with the heart, fill the cavity of the thorax, or chest. They rest upon an arched muscle called the diaphragm, or midriff, which divides the thorax or chest from the abdomen. The trachea, or windpipe, is a flexible tube which runs down the front of the neck from the root of the tongue to the top of the breast-bone, where it divides into two branches, one running to the right, the other to the left; these again divide and sub-divide until they form very small closed tubes. At their termination, the tubes bulge out, forming air cells. The lung is made up of these cells, covered by a net work of capillaries, formed by the division of the pulmonary arteries. Inspiration is the act of filling the lungs with air. It is performed by all the muscles which raise the ribs contracting and drawing them upwards, thus increasing the depth of the thorax (or chest) from the breast-bone to the spine. At the same time the diaphragm acts and becomes flattened instead of curved, thus increasing the depth of the thorax from above downwards; the air then rushes in through the trachea, and fills the air-cells. Expiration, or the act of emptying the lungs of air, is caused by the muscles relaxing, and allowing the ribs, by their elasticity and weight, to fall, and by the diaphragm resuming its arched position.

While passing through the capillaries round the air-cells, the

blood is brought into close relation with the air in them. The air contains a gas called oxygen, which is taken up by the blood, while the carbonic acid passes from the blood into the air-cells, thus rendering the air in them impure. At the next expiration this is forced out of the lungs, and a supply of pure air is taken in at the next inspiration.

## CHAPTER X.

### THE MARSHALL-HALL METHOD OF RESUSCITATION.

Provided there appears to be no sign of life the operator may proceed with the Marshall-Hall Method, as follows :

**RULE 1.**—The chief operator should lean forward and take hold of the patient's left shoulder with his left hand, and with assistance, turn the patient (as for clearing the throat) over on his right side until he is lying face downwards with his chest supported on a pillow or roll, and the head resting on the right arm. Then turn the patient gently on to his right side by pulling the latter up towards himself by the left shoulder and hip. Again push the patient back until he is again lying face downwards and supported as before. (See Illustration No. 11.)

**RULE 2.**—As the patient's body is resting on the pillow and the head upon his right arm, the operator with his left hand will press firmly upon the back between and on the shoulder blades. These movements, as directed in Rule 1 above, and in this Rule 2, are to be continued in regular time, twice in succession.

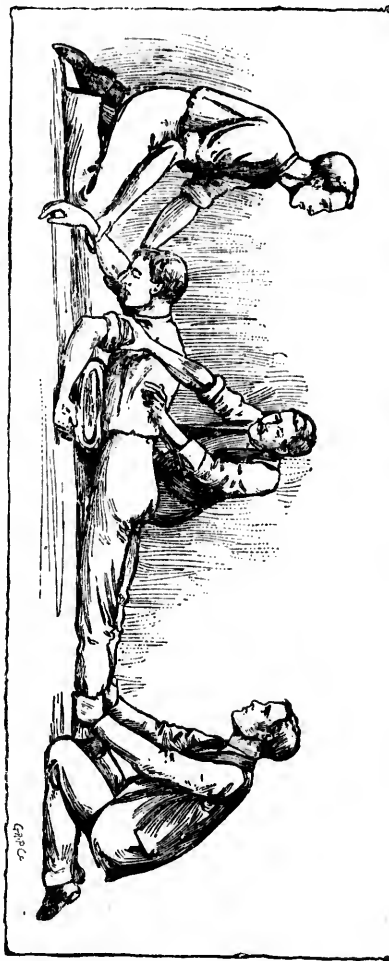
**RULE 3.**—The operator will now step over to the patient's right side, kneel down and take hold of the patient's right shoulder with his left hand, and the right hip with his right hand. The assistant will take hold of the patient's left arm with his right hand, supporting his head with his left hand, and place the patient's left arm under his head so that it may rest upon it. (See Illustration No. 12.)

**RULE 4.**—After completing this last motion, the operator will replace the patient upon his back face upward, and his arms laid quickly at his sides. He will then step over the patient and resume his first kneeling position. The assistant will then aid in removing the pillow or roll to its original position, and continue as before.

**NOTE.**—The motions directed in Rules 1 and 2 above will be continued in regular time twice in succession—the right hand (in Rule 2 above) to be substituted for the left in pressing firmly on the back between and on the shoulder blades.



THE MARSHALL-HALL METHOD, No. 1. (Illustration No. II.)



THE MARSHALL-HALL METHOD, No. 2. (Illustration No. 12.)

## CHAPTER XI.

THE HOWARD METHOD OF RESUSCITATION—AMERICAN  
LIFE-SAVING SOCIETY.

There are only two movements in this method which is of a very simple nature, and can be easily put into practice, but there is great danger of injuring the patient by too forcible pressure, if great care is not exercised.



THE HOWARD METHOD, No. 1. (*Illustration No. 13.*)

**RULE 1.**—While the principal operator raises the patient, who is laid flat on his back, another should fix the pillow or roll (larger than the "Silvester" one), from the left side under the back, in order that the stomach may be the highest part. After adjusting the roll under the back, the operator takes his place, kneeling astride of the patient's thighs, and the assistant should go to the head, and lift the patient's arms beyond the head, cross the wrists and hold them to the ground with his left hand, while, with his right, he cleans the mouth and nose and attends to the tongue. With the fingers extended the operator should then place his fingers wide apart on the lower ribs on each side of the body. Then lean forward and gently and steadily push upwards with both hands, throwing the body forward over the patient.





THE HOWARD METHOD, No. 2. (Illustration No. 14.)

**RULE 2.**—The operator, being astride of the patient, by a firm push should then spring back to his first position, and lift his hands off the patient's body, and so on. Artificial respiration is thus effected.

**NOTE.**—These movements must be continued, as in the other methods, at the rate of fifteen times a minute, and when the natural breathing has been restored the treatment should be the same as in the "Silvester" method.

## CHAPTER XII.

### EMERGENCY TREATMENT IN THE ABSENCE OF THE DOCTOR.

Very often in drowning cases, when rescue has been effected, no doctor is near, and promptitude of treatment is absolutely necessary in order to possibly save the life of the rescued person. The following suggestion, in case of such an emergency has been made, Mr. James E. Pitcher, in a late number of the *New York Christian Advocate*, in an introductory paragraph, says :

We do not yet know how long a person requires to have been submerged under water before he becomes dead. Esmarch says life may not be extinct even after hours spent in the water, and recommends that all drowned persons be considered as only apparently drowned. When death occurs, it is due to suffocation either with or without water in the lungs. In the former case the water is breathed

into the lung cells instead of air, and recovery in this case is very doubtful; in the latter and much rarer case faintness comes on at once, and the opening to the windpipe closes, so that but little water can pass into the lungs, which renders recovery much more hopeful if rescue be not delayed too long.

The practical advice which the writer gives is as follows:

When an apparently drowned person has been rescued from the water, some bystander should be despatched for a medical man with the least possible delay, although the number of those engaged in applying prompt aid should not be crippled by so doing. The patient should not be left alone while the rescuer runs for a doctor, and, if possible, not less than two persons should remain with him. If another messenger is available, he should be despatched for dry clothes, sheets and blankets. If the weather is not too inclement, it is best to apply the manoeuvres of resuscitation in the open air. Lungs which have been submerged in water cannot get too much fresh air.

But in order to enable the fresh air to gain access to the lungs, the water must be emptied out. This is done simply by turning the patient on his face, and, standing astride, gently lifting him up by his hips, the water, seeking the lowest level, then flowing out of the mouth. It is a barbarism to hold a patient up by the heels or to roll him upon a barrel, as is still sometimes done in portions of darkest America. The gentle means described is amply sufficient for the purpose.

The mouth and nostrils should be cleared of mud or other debris, so that the air may pass freely. All tight clothing should be loosened, collars opened, and belts or corsets removed. The tongue should be drawn out, and held by the finger of an assistant, if available, to prevent its slipping back and plugging up the opening of the windpipe.

The great end to be sought is the restoration of the functions of life which have been suspended because of the cessation of breathing, and which can only be called into existence by the resumption of that act. Where the submersion has been very brief, a whiff of smelling salts may be sufficient, or the breath may return in obedience to tickling the nostrils with a feather. But these cases are unusual, and time would be wasted in repeating them.

Artificial respiration then should be resorted to promptly, and maintained persistently. Artificial respiration is the forced alternate contraction and expansion of the chest in imitation of actual breathing. The expansion of the chest produces a vacuum into which the air rushes, very much as in the inspiration of actual breathing, and the contraction of the chest forces the air out of the nostrils, as in the respiratory act of breathing. There are numerous methods of

producing artificial respiration, known as Marshall-Hall's, Satterthwaite's, Howard's, Silvester's, and the like. The latter is, perhaps, the most readily applicable and the most easily applied. It is as follows, and is here repeated for convenience :

1. Place the patient on his back with his shoulders somewhat raised by a pillow of folded clothing or other suitable material, allowing the head to fall back, thus rendering the windpipe as clear as possible.

2. Kneel at the head of the patient, and, grasping the elbows, draw the head gently and slowly up and back over his head as far as possible, and hold them there long enough to count "one, two," very slowly—about two seconds.

3. Then slowly and steadily carry the arms back on to the chest, pressing them firmly down long enough to count "three, four," very slowly—about two seconds.

4. Continue these manœuvres steadily, not only until the patient begins to breathe naturally, but until the natural breathing is fully established.

5. If an assistant is available, he may take his position kneeling astride of the patient's hips, and placing his hands, palms downward, upon the lower ribs, and press downward at the same time with the return of the arms to the chest, slowly, gently and firmly. As the arms are drawn up over the head, he slowly and steadily withdraws his pressure upon the ribs in the same time as does the chief operator with the arms.

The first evidence of the restoration of the functions of life is a change in color. The pallid face assumes a pinkish hue, a purplish countenance begins to fade to a lighter shade. There is a little trembling of the nostrils, perhaps a fluttering of the eyelids, preliminary to the actual resumption of vitality. When the natural breathing is finally resumed the artificial method should be abandoned, and other methods of assisting the vital functions inaugurated. Rubbing the body dry, wrapping it in warm blankets and applying hot water bags or bottles, hot bricks or flat-irons about the body to keep it warm, are now more serviceable. As soon as he becomes able to swallow, hot drinks should be given, not freely, but a teaspoonful at a time. There is nothing better than hot milk or coffee for this purpose.

He should be placed in bed and kept there until the shock has been relieved and his normal condition restored.

By these simple measures, and without any special professional study, anyone may, without previous experience, be the means of saving lives that would otherwise be unnecessarily lost, and it is emphatically urged that they be learned by all.

## CHAPTER XIII.

MISCELLANEOUS REMARKS AND SUGGESTIONS IN REGARD  
TO LIFE SAVING, ACCIDENTS, DEATH, ETC.

The Royal Humane Society of England has issued the following instruction for the resuscitation of persons who are unconscious from the effects of "Intense Cold," "Intoxication," "Apoplexy," or "Sunstroke":

**IF FROM INTENSE COLD.**—Rub the body with snow, ice or cold water. Restore warmth by slow degrees. It is highly dangerous to apply heat too early.

**IF FROM INTOXICATION.**—Lay the individual on his side on a bed with his head raised. The patient should be induced to vomit. Stimulants should be avoided.

**IF FROM APOPLEXY OR FROM SUNSTROKE.**—Cold should be applied to the head, which should be kept well raised. Clothing removed from the neck and chest. Stimulants avoided.

## WHAT TO DO IN CASE OF CERTAIN ACCIDENTS, ETC.

Professor Wilder, of Cornell University, gives these short rules for action in the cases mentioned:

Remove insects from the ear by tepid water. Never put a hard instrument into the ear.

For dust in the eyes, avoid rubbing; dash cold water in them; remove cinders, etc., with the round point of a lead-pencil.

If an artery is cut, compress it above the wound; if a vein is cut, compress it below.

If choked, go upon all fours and cough.

For slight burns, dip the parts in cold water; if the skin is destroyed, cover with varnish.

For apoplexy, raise the head and body; for fainting, lay the person flat.

## APPEARANCES WHICH GENERALLY INDICATE DEATH.

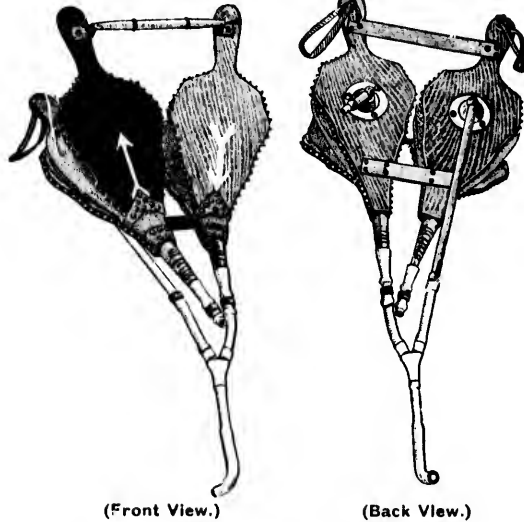
The Royal Humane Society has described, as follows, the appearances which indicate death:

There is no breathing nor heart's action; the eyelids are generally half closed; the pupils dilated; the jaws clenched; the fingers semi-contracted; the tongue appearing between the teeth, and the mouth and nostrils are covered with a frothy mucus. Coldness and pallor of surface increases.

The treatment recommended by the society is to be persevered in for three or four hours. It is an erroneous opinion that persons are irrecoverable because life does not soon make its appearance, as cases have come under the notice of the society of a successful result even after five hours' perseverance, and it is absurd to suppose that a body must not be meddled with or removed without permission of a coroner.

#### CHAPTER XIV.

##### METHOD FOR RESUSCITATION FROM AN ELECTRIC SHOCK, ETC.



(Illustration No. 15.)

APPARATUS FOR RESUSCITATING PERSONS FROM AN ELECTRIC SHOCK, .  
INVENTED BY PETER J. GIBBONS, M.A., M.D., OF SYRACUSE, N. Y.

The following articles on the subject of restoration of persons struck by lightning, or dynamic electricity, first directed the attention of Dr. Hodgins, the Honorary Secretary of the Royal Canadian Humane Association, to the subject:—

1. The first was from the *Popular Science Monthly* for August,

1893. At the conclusion of an article in that magazine by Mr. Alexander McAdie, headed, "Protection from Lightning," the writer said:—

"If you are near a person who has been struck by lightning, go to work at once to try and restore consciousness. Try to stimulate the respiration and circulation, and do not cease in the effort to restore animation for at least an hour." (Page 463.)

In *Current Literature* for September, 1893, the statement and exposition of a theory on the same subject by Professor d'Arsouval,\* "one of the most distinguished scientific men of France," is published. He maintains that the use of dynamic electricity produces in man a kind of anæsthesia, under cover of which he is mangled alive by the knives of the surgeons who make the autopsy. (Page 121.)

Recently Professor d'Arsouval reported a case to the French Academy of Science on which he bases his theory. The case is as follows, and it has become noteworthy from the fact of the successful employment of artificial respiration to resuscitate the victim:—

"A sudden sparkling on one of the dynamos of the electric-light station of St. Denis, near Paris, indicated a short circuit on the line. The dynamo was quickly cut out and stopped. The voltmeter reading was 4,500 volts between two wires, and the ammeter read 750 mille-amperes on the wire,

"The accident occurred at a place where the three wires were supported eighteen feet above ground on a bracket fastened to a stone wall. The bracket carried several cross-pieces, and on the lowest one sat the laborer who had received the shock, holding the conductor with one hand. He had been sent up to fasten a telegraph wire, had touched the live wire with the wire he held, and thus short-circuited the current through his hand and back to earth. The man had, therefore, received a 4,500-volt current of fifty-five alternations per second perhaps for several minutes, and when he was found fully a quarter of an hour had elapsed since he received the shock. He gave no sign of life, and it took another half hour to remove him from his perilous position and stretch him on the ground.

"The attempt was at once made to cause the lungs to act by moving the arms alternately up and down, but without avail. The mouth was then forcibly opened and the tongue was pulled out and allowed to recede. This being the best method of producing respira-

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\* Having written to the Editor of the *Popular Science Monthly* for information in regard to Professor d'Arsouval, the Editor replied to Dr. Hodgins as follows: "We find M. d'Arsouval frequently quoted in our French journals, and have no doubt he would be glad to give you the information you are seeking."

tion artificially, the lungs actually began their functions almost immediately. Two hours later the man was able to speak. He had burns on his hand and back, but otherwise not injured."

Commenting upon these facts, Professor d'Arsoval considers electrocution objectionable, and of doubtful effect.

Another field of experiment in which most interesting result have been attained is that instituted by Dr. J. Kratter, of Graz, Austria. His researches extend to the physiological and pathological effects on the animal organism of currents of 2,000 volts or less. He experimented on white mice, rabbits, guinea pigs, cats and dogs, and in his recently published paper, read before the International Medical Congress, at Rome, his conclusions are thus stated:—

"The death of the animals resulted mostly from the sudden stoppage or primary cessation of the respiration. The functional disturbance lasted in some cases a sufficient length of time after the end of the irritation to produce death by suffocation. During the asphyxia the heart action still continued; but if the respiration is allowed to stop for about two minutes, secondary cessation of the heart action ensues, the same as in cases of mechanical suffocation. Not infrequently, however, an animal would spontaneously begin to breathe again, and would fully recover after awhile."

The narrative proceeds:—

"Dr. Kratter believes that danger of an electric shock for the animal organism appears to increase in degree with the higher development of the brain and the central nerve system. In this way he explains the death of man by currents which do not effect rabbits or guinea pigs, though both electrodes be fastened to the head.

"In none of the animals was it possible to produce experimentally the protracted and gradual diminution of the functions of the heart which was observed in the case of the laborer. Nor was it possible to detect anatomical changes which might have been the cause of death. The doctor supposes that molecular, perhaps chemical, changes take place in the ganglion cells of the lungs and heart, and is now following up this clue with experiments."

In the *New York World* (1894) appears a reference to the apparatus to restore persons struck by lightning, or dynamic electricity, invented by Dr. Gibbons, of Syracuse, N.Y.\* The extract from the *World* is as follows:—

"Notwithstanding the decision of Attorney-General Hancock,

\* Dr. Gibbons received the degrees of B.A. and M.A. from the University of Ottawa.

said Dr. Gibbons, 'I still have some hope of being allowed to perform my experiment upon the body of an electrocuted man. I am perfectly confident that the alternating current, as now applied in the death chamber, does not kill. Animation is suspended, of course, and the knives of the autopsy surgeon are the real executors of the law.

"I do not claim that this apparatus which I brought here to place in Bellevue Hospital will bring the dead to life; but I am satisfied, as the result of a long series of experiments upon animals, that it will resuscitate any man who has received in his body the alternating current now applied at executions in the State prisons, viz., 1,700 volts. As you see, the contrivance is merely a double bellows, one-half of which will send pure air into the lungs, while the other half will pump out the bad air.

"This rubber tube can be placed in the mouth of the subject, or, preferably, in the trachea after the operation of tracheotomy has been performed. The latter condition is usually most favorable for working of the apparatus, because often in cases of suspended animation it is necessary for nourishment to be given by mouth.

"Of course I do not say that the alternating current will not kill men provided enough power is applied; but at present 1,700 volts are used, and this is not deadly.'

"Dr. Gibbons has experimented largely on dogs, rabbits, cats, and even sheep and cattle. He has applied a current of from 1,500 to 2,500 volts, and these animals have permanently recovered as full possession of their faculties as before the current was turned into their system. The periods of apparent death had varied from a few moments to several hours. Dr. Gibbons has still in his employ an assistant who received 1,500 volts in Cleveland in 1885."

Dr. Hodgins having written to Dr. Gibbons for an explanation of his method of resuscitation from the effects of lightning, etc., he replied as follows, under date of February 16th, 1895:—

"Your request for my 'Method of Resuscitation from Electric Shock' was received in due time.

"You will find enclosed in brief form what I think will answer the purpose for which you wish it. I also send you a photograph of the front and back views of the apparatus itself.

"With best wishes for the Royal Canadian Humane Association," etc.



The following is—

A METHOD FOR RESUSCITATION FROM ELECTRIC SHOCK.

BY PETER J. GIBBONS, M.A., M.D., SYRACUSE, N.Y.

“When a person receives an electric shock sufficient to produce suspended animation, the breathing and heart’s action cease; the eyelids are generally half closed, the pupils dilated; the tongue approaches to the under edge of the lips; finally coldness and pallor of the surface increase.

“When one in whom the vital spark may possibly not yet have fled is found, two objects should be aimed at, viz., first, to restore breathing; and second, to promote warmth and circulation.

“When an electric-shocked person is found, he must be treated on the spot in the open air. On no account waste precious time by removing him to a house, unless the weather is intensely cold. Secure a return of breathing, first protecting him from the severe cold by coats, blankets, etc., if necessary. Keep bystanders off fifteen or twenty feet, place him on his back, loosen all tight clothing, remove false teeth and foreign bodies from mouth and nose. To excite breathing, resort to Silvester’s method, or any of the well-known methods, for resuscitation from drowning, remembering there is no water to be expelled. If no success follow, imitate breathing by inserting the distal end of the tube of my apparatus into the nostrils or the mouth, preferably the nostrils, as in this way the air, during inspiration and expiration, comes in contact with the lining membrane of the nasal chambers. In doing so, it allows the membrane to carry out its normal physiological action, and by this means we get so much nearer a normal respiration. The air thus breathed is both warmed and saturated to a certain extent with watery vapor, and much of the dust and other foreign matter floating in the air is removed by adhering to the moist mucous membrane. The nostrils should be excited with snuff, hartshorn and smelling salts. This can be readily done without the removal of the tube, by allowing the exciting agent to enter the bellows with the fresh air or oxygen.

“TO RESTORE CIRCULATION.—The above measures are directed wholly to restoring the breath. This is the first necessity. There should be no rubbing of the surface while this is going on. Should the inclemency of the weather demand the removal of the patient indoors, the above movements must be kept up, even while he is being removed; and on no account should he be taken into a warm or crowded room. When the patient begins to breathe, commence rubbing the limbs. Rub them upward with considerable briskness and pressure. Use silk somewhat warmed; throw a quilt or blanket

over the patient, and continue friction under this. The friction in this way will create electricity and heat. Put warm bricks or bottles of warm water at the feet, between the thighs, and under the armpits; but be very careful not to have these things too warm, or much above the temperature of the healthy body.

"The above rules are for laymen.

"PHYSICIANS may insert the distal end of my apparatus through the mouth, into the laryngeal entrance, as they would introduce a tube for intubation of the larynx. Some will probably find it more convenient to do tracheotomy, and insert the tube into the trachea. He can also use electric batteries to keep up body heat, body electricity, and to excite the heart and the lungs to action.

"My method, or any other used, should not be discontinued for at least three to six hours, and the operator should not be discouraged if he saw no symptoms of returning life, until this amount of time has elapsed. Why no symptoms of life are seen for one or two hours, and may be shown later, I shall not attempt to explain; but such is the case in my experience. Before giving up all hope I recommend the injection of an alkaline solution into the body, such as has been tried upon people who have bled to death.

"When we cease artificial respiration nature may refuse to perform its duty, and we might be obliged to resort to the artificial method again. Sometimes it is necessary to carry on artificial respiration from ten to forty hours after life has been restored. During this time we might test nature four or five times and find it not able to be self-sustaining. Therefore we should keep up the artificial aid until that time arrives when nature will perform its functions.

"My apparatus is a simple double bellows, so constructed that when the handle of the bellows is raised the air rushes from the patient's lungs into one apartment of the bellows; simultaneously the other apartment is filled with fresh air through a tube on the reverse side. This air is forced into the lungs by the compression of the handles.

"The apparatus is designed to resuscitate people who have undergone electrical shock, taken poison, been long immersed in water, pressure on the centre of respiration, or have suffered from similar misadventures.

"My instrument is designed to restore suspended animation more expeditiously and more certainly than any method now in use.

"P. J. GIBBONS.

"No. 324 Warren Street, Syracuse, N. Y."

## CHAPTER XV.

DR. DE BAUN'S APPARATUS TO RESTORE THE LOST ACTION  
OF THE LUNGS.

Dr. Edwin De Baun, of Passaic, New Jersey, has given a great deal of attention to the problem of successfully restoring suspended animation, a subject to which the attention of medical men is constantly directed. This matter has been taken up by the *New York World*. The following are its remarks on this subject :

From time immemorial physicians have directed their ingenuity toward an effective application of the wealth of air about us, but without satisfactory results. Cases of suspended animation come under their notice every day. Men are rescued from the water after a hard battle with the waves, their lungs filled with water, the life's action suspended. In the majority of instances restoration of animation cannot be effected. The lungs may be emptied of the water ; the life-giving air, so abundant, is at hand, and, if it could only be forced into the organs and respiration started, life could be renewed. Physicians' efforts to solve the problem have been unceasing, but not always with success.

## USUAL EFFORTS AT RESUSCITATION.

When a man is rescued from the water, the first thing sought to be done is to empty the lungs of water by lifting him from the ground head downward, and in other ways. Then he is laid on his back, the arms raised to expand the lungs, and a rhythmic contraction and expansion of the chest walls effected by alternate pressure and relaxation. Sometimes the forcing process has been kept up for hours with ultimate success ; but considering the possibilities recognized in artificial respiration the results have been, in many cases, far from encouraging.

Dr. De Baun has worked on an entirely new line, and the result of his experiments and observation is a method of internal respiration which, he claims, cannot possibly fail. His attention was first directed to the subject by a case of suspended animation in a newly-born child. It has been the practice in such cases to force air into the lungs of the infant by breathing into its mouth and then contracting the lungs by pressure upon the chest. But this is a disagreeable, and not always a successful operation.

Dr. De Baun decided to try a new expedient. He passed a small rubber tube through the nose of the infant and down into the throat. Closing the mouth, he forced air through the tube from a rubber bag,

inflating the lungs; then, releasing the pressure from the mouth, found, as expected, that the elasticity of the muscles of the chest caused immediate contraction of the lungs, forming a complete respiration. This was kept up for forty-five minutes, when natural respiration had been restored, and a life had been saved. Since then Dr. De Baun has perfected this hastily-improvised apparatus, and finds that animation may be often restored within fifteen minutes.

#### NATURE OF THE APPARATUS EMPLOYED.

The apparatus is as simple as it is ingenious. It consists of a long rubber tube, near one end of which is a piece of soft rubber with which to cover the mouth and nose. At the other end are two rubber bulbs. After the tube has been inserted between the teeth, and the mouth and nose covered slightly, the lower bulb is compressed, forcing air into the second bulb, which acts as a reservoir. This second bulb is much more elastic than the other and maintains a steady pressure of air through the tube. It is covered with loose netting, which acts as a sort of safety valve against over-pressure. The tube is fitted with a stopcock, that may be used to lend force to the first few respirations.

A few compressions of the lower bulb are sufficient to fill the lungs. Then the pressure on nose and mouth is relaxed, and the lungs are emptied by the natural elasticity of the muscles of the chest. This elasticity remains even after death, and with this instrument it is quite possible to make even a dead man breathe regularly as long as the application continues. In some of the doctor's experiments on dead bodies this simulation of life has been absolutely startling.

It is not for dead men, however, that the "insufflator," as it is called, has been devised, but for men who have been brought apparently to death's door by asphyxiation from gas and water. In the latter case the lungs must first be emptied. The apparatus weighs but a few ounces. It is not patented, as Dr. De Baun is a strict observer of medical ethics, which declare that the discoveries of a physician belong to the world. He is Treasurer of the State Board of Medical Examiners of New Jersey, and has invented several valuable surgical instruments and devices.

## CHAPTER XVI.

VARIOUS HINTS AND DIRECTIONS TO BATHERS, ETC., BY  
THE NATIONAL LIFE-SAVING SOCIETY OF ENGLAND.

## I. HINTS TO BATHERS.

Avoid bathing when the body is cooling after perspiration.

The most suitable time to bathe is about an hour or two before a meal, when food taken at a previous meal will have become partially digested.

On no account should anyone bathe shortly after a hearty meal, when exhausted from vigorous exercise, when much heated; or, on the other hand, when shivering.

No bather should stand or wait at the water's edge until the warmth of the body has passed off.

Avoid bathing in quiet or secluded spots, as should an accident occur, and no help be near, a very obvious state of matters may follow.

Cleanse the mouth and nostrils before entering the water. Breathing will then be easy, natural and unimpeded.

Do not gasp or catch the breath suddenly, spasmodically, or make short inhalations or expirations. Breathe freely, naturally, and regularly.

It has been frequently noticed that a great many bathers take very little care with regard to breathing whilst engaged in swimming. It is most important for everyone to breathe with freedom and regularity; should this be attended to the staying powers will be increased and the bather feel much better for the exercise.

Persons unaccustomed to cold water bathing should exercise great care and not stay long in the sea at the beginning.

The good effects of a bathe in the sea are in proportion to the vigour of the reaction experienced after leaving the water.

Avoid bathing altogether in the open air, if, after having been a short time in the water, it causes a sense of chilliness, with numbness of the hands and feet.

Bathe when the body is warm, provided no time is lost in getting into the water.

In cases of accidental immersion it should be borne in mind that weight of clothes will not hurriedly drag one under water, or cause one to sink sooner than if undressed—in fact, the air that is in one's clothes will help to buoy up as well as enable the immersed to resist the effects of cold water for a longer time than if quite naked. Of course one cannot swim fast with clothes on.

Those subject to attacks of giddiness or faintness, or who suffer from palpitation or other sense of discomfort at heart, should not bathe without first consulting a physician.

NOTE. —If the foregoing hints were more generally known and attended to, many fatalities and unpleasant consequences might be avoided during the bathing season.

## 2. THE ACT OF DIVING.

A person need not be a good swimmer to become an expert diver, and like every branch of the art practice is a *sine quâ non*. The best method of learning to dive is to stand on the side of the bath or on the bank of a river, then stoop down until the body is nearly double, stretch out the arms in front of the head, sink the head between them, and gradually tumble over into the water.

The great difficulty is to make the first dive. Once that be accomplished, proficiency will come with practice, which should be commenced close to the surface of the water, and the height of the dive gradually increased.

After the learner has taken a few headers he should attempt to enter the water correctly. To do this the legs should be placed together, and the body kept erect; then a few short inspirations should be taken and the lungs cleared and inflated as for plunging. The arms should be swayed to the front, and the spring made from the diving base. As the feet leave the board they are thrown up above the level of the head, the body is straightened, and the head placed between the arms. These are kept at full stretch, beyond the head, with the hands palm downwards, and the thumbs touching so as to act as a cutwater. Immediately the diver enters the water the hands should be turned up, and the body will at once come to the surface.

In high diving a leap is made into mid air, the body straightened almost to a horizontal level, the arms and head then declined towards the water, and the legs brought up. This action causes the body to shoot towards the water at the proper angle, and a clean and effective dive is the result.

Great care must be exercised in taking high headers, especially if the water be shallow, in which case they should only be performed by practised divers, who are thoroughly acquainted with the proper angle at which the dive should be made.

## 3. THE ACT OF PLUNGING.

A plunge is a standing dive made head first from a firm take-off, free from spring. The body must be kept motionless, face downwards; no progressive action must be imparted other than the impetus of the dive. Such plunge must terminate when the competitor raises his face above the surface of the water.

When practising a towel should first of all be laid down on the spot from which the "take-off" is to be made, so as to prevent slipping.

The plunger should stand erect with the toes slightly overlapping the edge of the bath, and the ball of the foot resting firmly upon the diving base. When prepared, special attention should be devoted to the inflation of the lungs. The knees should be kept together, and the body poised upon the ball of the foot. Then the arms should be swung backward and forward, and a few short inspirations taken, the heels being raised from the ground at each forward swing of the arms. The inspiration should be short and the expiration long. As soon as the lungs are well cleared, a spring forward should be made and a deep inspiration taken. The body should be shot as far in the air as possible before touching the water. When once the body has entered the water, the chest should be hollowed and hands laid flat with the thumbs locked, and the whole body rigidly stretched into one straight line and kept perfectly motionless, care being taken that the soles of both feet are facing upwards and perfectly level. In this position one will move close to or along the surface of the water. The plunge will terminate when the face is raised above the surface. A plunge is best made from a height of three or four feet above the surface of the water.

The first thing to learn is to dive clean, with a happy medium between flapping on to the water and diving too deep.

The body should not go lower than from two to two-and-a-half feet under the surface at the deepest point, and in a gradual curve, so that the surface is not reached for from thirty to forty feet from the start.

The balance of the body should be learnt so as to maintain a position that will counterbalance the weight of the feet with the head and hands, and prevent them from sinking.

The holding of breath is the principal item in plunging, as well as the most difficult one, and the only strain on the system, after the body has risen to the surface and the drift forward begins, but careful attention in clearing the lungs will help the plunger to "hang on" and accomplish a good performance.

The air should be forced well down into the lungs and not kept in the throat, as is usually the case with most swimmers.

To practice how to keep straight in plunging, place some colored objects on the bottom of the bath in a straight line, at intervals of about ten feet.

Steering can be accomplished by an almost imperceptible side curve of the body, but this must be done directly the plunger begins to deviate in his course.

## I. MOTIONLESS FLOATING.

In order to learn to float properly it is best to practise in deep water; the depth increases the density and floating power, but if once learnt floating is easy in water only a foot deep.

In beginning practice one should take a long breath, so as to completely fill the lungs, and thereby add to the power of displacement; then turn on the back, spread the legs wide apart, hands and arms extended in a line with and beyond the body, with the palms turned upward, throw as much weight beyond the head as possible, and lie perfectly still and for a time quite rigid. One may sink for an instant, but if the breath is held the lips will come above the surface of the water, when easy breathing may be indulged in. In this position the face, chest and toes should appear above the surface, but should it be found that the feet have a tendency to sink, more weight should be thrown above the head by turning the palms and head well back, by which means the feet are raised.

The supreme difficulty in floating is to overcome the perverse tendency of the legs to sink, and if after frequent trials they are found still to sink, get someone to hold them up, or else place them on the step or behind the rail of the bath, thus assisted, learn to balance the body on the surface. As soon as the body appears to float, release the feet from the step or rail; this must be done in such a manner as not to cause them to drop on the water, because a downward grade will be imparted, which will be hard to counteract until the true balance be found.

Remember that frequent practice is required, and so long as there is weight beyond the head, in order to balance the feet, one may lie on the surface without any muscular effort. Of course, it is much easier to float in salt water on account of its greater density.

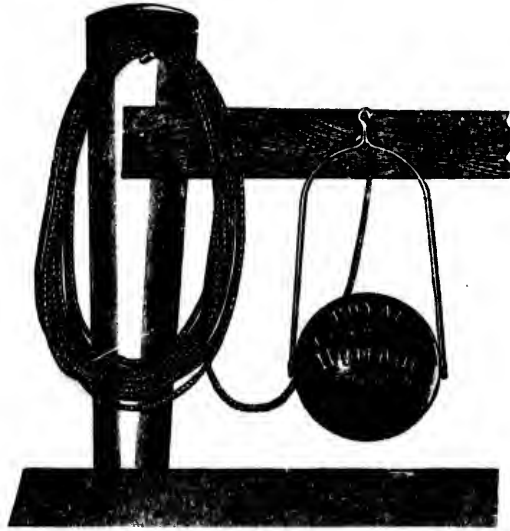
A knowledge of floating is very useful to those attempting to save life, and its acquirement vastly increases the confidence of a swimmer when in the water. There are occasions when, beset with danger and difficulty, such knowledge becomes extremely useful in saving life, and it is then that the value of self-confidence in the water is fully appreciated. Every person who can swim should learn to float.

RECOMMENDATIONS FOR FORMING CLASSES OF INSTRUCTION  
OF EITHER SEX.

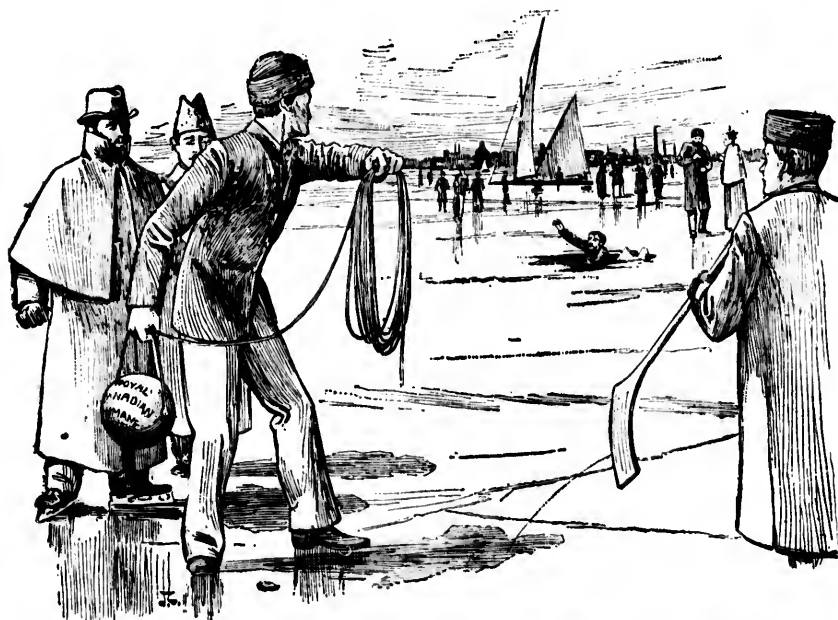
The best way to form a class is, first to make one's-self acquainted with all the details of instruction contained in the Society's Handbook. That this may be efficiently accomplished, the assistance of four friends should be obtained, who are willing to learn and aid the society in the promotion of its aims and objects. Each of them should take the position of instructor in turn, whilst the other four go carefully and deliberately through the drills at the word of command.



## CHAPTER XVII.

OTHER LIFE-SAVING APPLIANCES AND AIDS TO THE  
INJURED.WOODEN ICE BALL. (*Illustration No. 16.*)

The Royal Canadian Humane Association, knowing how frequently accidents occur to skating parties and iceboats at certain periods of the year (in the early winter and in the spring), have procured from the St. John Ambulance Association of London, England, an admirable Wooden Ice Ball, the use of which is shown in the accompanying illustration. The ball may be thrown as shown in that illustration, or it may be rolled as a ball at cricket, or at nine-pins. The latter is the better way. As the ball is wooden it will float when it reaches the water.



ACT OF THROWING THE ICE BALL ROLLER TO A MAN IMMERSSED IN THE WATER.

(Illustration No. 17.)

The other appliances which have been provided by the Royal Canadian Humane Association are as follows :

1. The noted "Esmarch Bandage," triangular in form and fully illustrated, showing every form in which the Bandage can be applied, including printed instructions as to how this Bandage should be used, 38 cents ; by post, 40 cents.
2. Shepherd's "First Aids to the Injured," in railway and other accidents, revised and illustrated. 38 cents ; by post, 40 cents.
3. Professor Esmarch's five Ambulance Lectures on "First Aids to the Injured," translated from the German by H. R. H. Princess Christian (Illustrated). 68 cents ; by post, 70 cents.
4. Small Anatomical Diagrams, showing where digital pressure may be applied to the arteries, in case of accidents. 9 cents ; by post, 10 cents.
5. In addition, the association is having prepared and printed a large Sheet, on special paper-cloth material, showing, by a number of

enlarged illustrations how persons can be rescued in the water, and how they may be resuscitated when rescued. In sheets, 35 cents; on rollers, 50 cents; in a frame, \$1. Carriage extra.

6. Dr. Gibbons' instructions how to resuscitate persons struck by lightning or dynamic electricity. 7 cents; by post, 8 cents; 10 copies for 50 cents, postage 5 cents extra.

7. Life-Saving Hand-Book of the Association, containing directions on these various matters. 68 cents; by post, 70 cents.

(NOTE.—When several things are ordered together or a number of copies of the Hand-Book, a reduction will be made in the prices quoted.)

## CHAPTER XVIII.

### HINTS ON THE TREATMENT OF THE INJURED.

From the Hand-Book of the St. John Ambulance Association, of London, England, the following useful chapter, prepared by Dr. E. MacDowel Cosgrave, is taken :

#### PREPARATION FOR RECEPTION OF ACCIDENT CASES.

When news of an accident comes, preparations should at once be made so as to have everything ready before the injured person is brought in. Of course the preparations needful will vary according to the nature and extent of the injury, but the following are the chief things which may have to be done :

#### CHOICE AND PREPARATION OF ROOM.

A room must be chosen. In a bad case this should be one easily reached, as it is difficult to carry an injured person through narrow passages and up stairs. Unless there is some such reason against it, the injured person's own room is best.

The way to the room must be cleared, projecting furniture and loose mats in the hall or in lobbies should be removed. If the injured person is carried on a door or shutter, or even on a stretcher, a couple of strong kitchen chairs should be placed ready to support it wherever the bearers would be likely to require rest.

Useless furniture should be removed from the bedroom. The bed should be drawn out from the wall so that both sides can be approached, and the clothes turned back to one side to their full length. A hot bottle should be got ready. If there is much collapse several hot bottles and hot blankets may be required; cover the hot bottles with flannel.

If the injury is very severe, if mud-stained clothes have to be removed, or if extensive dressings have to be applied, it may be necessary to have another bed, a couch, or a table placed near the bed to lay the sufferer on in the first instance. This should be so arranged that soiling may do no harm; old sheets, waterproof material, oil-cloths, or even newspapers, may be used as a protection.

#### LIFTING AND CARRYING.

If present at the place where the accident occurred, it will be necessary to see that the patient is carefully lifted after proper "First Aid" has been rendered.

The following rules should be remembered:—Select the proper number of persons to assist, and do not let them lift the patient until they thoroughly understand how they are to do it.

For ordinary cases, where the injured person has to be lifted a very short distance, three helpers are sufficient. Two (who should be as far as possible of equal height) are to bear the weight, the third is to support and take charge of the injured part. This is best done by a person who has been through a "First Aid" course.

## CHAPTER XIX.

### THE ESMARCH TRIANGULAR BANDAGE.

This bandage, known as the "Esmarch" Bandage, is a triangular piece of linen or calico, made by taking a piece of either of these materials, 37 inches square, and cutting it diagonally into halves. Of the three borders of the bandage the longer is called the *lower*, and the others the *side* borders. Of the three corners the upper one opposite the lower border may be named the *point*, the two others the *ends*. (See p. 52 of this Hand-Book.)

When not in use it should be folded perpendicularly down the centre, placing the two ends together. Then the ends and the point should be brought to the centre of the lower border or base of the perpendicular line, thus forming a square. This should be folded in half, and again twice, until it assumed the form of a small packet  $6\frac{1}{2}$  by  $3\frac{1}{4}$  inches.

For use it is folded *broad* or *narrow*. Having spread out the bandage, commence by carrying the point down to the lower border; when it is required broad, fold it lengthways into two, and when narrow into three.

The bandage is fastened either by pinning the ends together, or by tying them into a reef knot.

Before applying bandages, all blood and dirt should be removed from about the wound, either by wiping with some soft material, or by sponging with cold water, should it be available. The hair should also be cut away from the wound, if time and circumstances will permit. Next soak a piece of lint in cold water, double it, and place it over the wound, and bandage as hereinafter described.

**WOUND OF THE SCALP.**—Fold the lower border lengthways to form a plait like a hem  $1\frac{1}{2}$  inches wide, place the middle of the bandage on the head so that the plait lies crossways before the forehead, the point hanging downwards over the nape of the neck. Carry the two ends backwards above the ears, cross at the back of the head on the nape of the neck, bring forward and tie on the forehead. Then stretch the point downwards, and turn it up over the back of the head, and fasten it on the top with a pin.

**FRACTURED JAW.**—Fold the bandage narrow, place the centre under and slightly over the chin, carry the ends upwards, one at each side, passing one end over the top of the head until it meets the other above the ear, twist it behind this and take it across the forehead and the other end behind the head and tie over the opposite ear.

**WOUND OF THE EYES OR SIDE OF THE FACE.**—Fold the bandage narrow, place the centre over the injured part, and tie on the opposite side.

**WOUND OF SHOULDER.**—Lay the centre of the bandage on the top of the arm with the point up the side of the neck, and the lower border lying on the middle of the upper arm. Carry the two ends round the arm, and crossing them on its inner side, bring them back and tie on the outside. Take a second bandage, fold it and make a smaller arm sling of it; then draw the point of the shoulder bandage under the sling, fold it back on itself and fasten with a pin on the top of the arm.

**WOUND OF THE UPPER ARM.**—Place the centre of the broad-folded bandage on the front of the limb, carry the ends round to the opposite side, cross them, bring them back and knot them together. Next take a second broad-folded bandage, throw one end over the shoulder on the wounded side, carry it round the neck so as to be visible at the opposite side; then bend the arm carefully and carry the wrist across the middle of the bandage hanging down in front of the chest. This done, take the lower end over the shoulder on the sound side and knot the two ends together at the nape of the neck. This is called the smaller arm sling.

**WOUND OF THE FOREARM.**—Dress and bandage the wound as in the last case. Then take a second bandage, throw one end over the

shoulder at the sound side, and carry it round the back of the neck, so as to be visible at the opposite side, where it is to be held fast, place the point behind the elbow of the injured arm and draw down the end in front of the patient. Next bend the arm carefully and place it across the chest on the middle of the cloth. Then take the lower end upwards over the shoulder on the wounded side, and knot to the other end at the nape of the neck. This done draw the point forward round the elbow, and fasten it with a pin. This is called the larger arm sling.

**WOUND ON THE CHEST.**—Place the middle of the bandage on the chest with the point over the shoulder, carrying the two ends round the chest and knot at the back. Next draw the point over the shoulder downwards and tie or pin it to one of the ends.

**WOUND OF THE HAND.**—Take a bandage, spread it out, and lay the wrist on the lower border with the fingers towards the point. Next turn the point over the fingers and carry it over the wrist. This done take the ends round the wrist, fixing the point, cross them, carry them back again and knot together. Take a second bandage and support the forearm in the larger sling as above.

**WOUND OF THE HIP.**—Fold one bandage narrow, and tie it round the body as a waist-belt above the hips. Lay the centre of a bandage on the wound with the point upwards, pass the ends round the upper part of the thigh, cross and carry it to the front and knot them together, next pass the point under the waist-belt and fasten it with a pin.

**WOUND OF THE FOOT.**—Take a bandage, spread it out and place the sole of the foot on its centre, with the toes in the direction of the point. Draw the point upwards over the toes and instep of the foot; then take the ends forward above the ankles, and cross in front of the leg, carry them downwards under the sole of the foot, and knot them together above the ankle.

**TO SECURE FRACTURES.**—Surgical or improvised splints may be adjusted to a broken limb by taking two triangular bandages folded broad or narrow, according to circumstances, and tying them securely one above and the other below the fracture. As many more bandages can be added as may be considered necessary to *secure* the limb.

**FRACTURED COLLAR BONE.**—Place a pad in arm-pit on injured side, and suspend the arm in a large arm sling, then fix the arm to the side with a small narrow bandage passing round the chest and fastened under the sound arm.

The triangular bandage may be applied in many other ways: but the above directions are quite sufficient to indicate its different uses.



