

First aid to the injured : with special reference to accidents occurring in the mountains : a handbook for guides, climbers and travellers / by Oscar Bernhard ; tr. from the German by Michael G. Foster.

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Oscar Bernhard M.D.



FIRST AID
TO THE INJURED

With special reference
to
Accidents
Occurring in the Mountains.



Samaden
Printed and edited by
Simon Tanner

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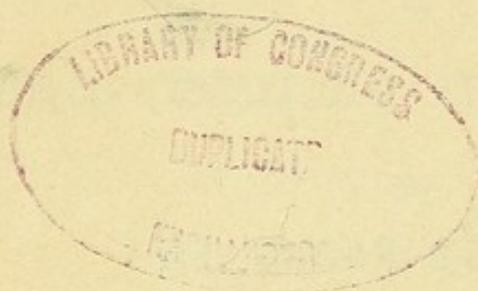
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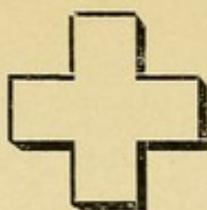
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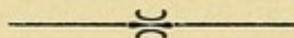
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First Aid to the Injured.



With special reference
to
accidents occurring in the Mountains.

By

DR. OSCAR BERNHARD

Head-Physician and Surgeon to the Engadine Hospital Samaden.

A Handbook for Guides, Climbers and Travellers.

Translated from the German

By

Michael G. Foster M. A. M. D. (Cantab).

Formerly Resident Physician at Maloja, Engadine.



LONDON

T. FISHER UNWIN

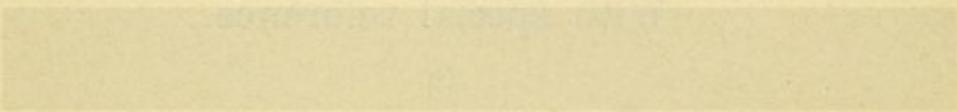
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First Aid to the Injured

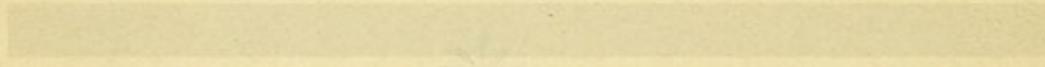
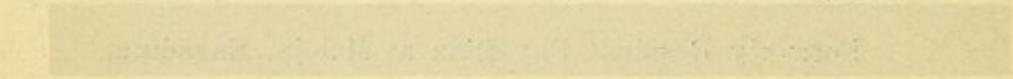


W. B. BEHN

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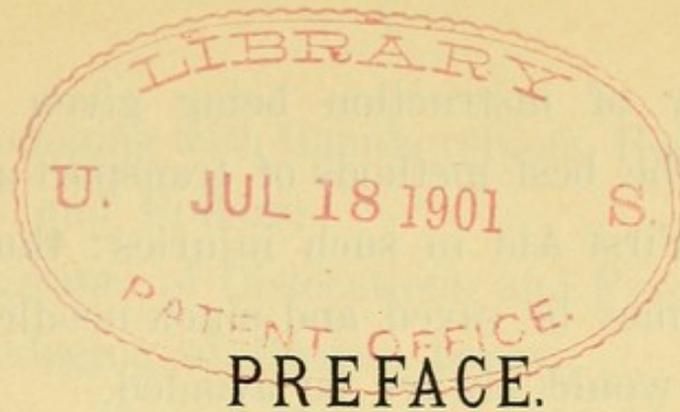
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W. B. BEHN

1900



PREFACE.

Books innumerable on ambulance work have appeared in the last few years; none, however, attaining or likely to attain to the excellence of Esmarch's classical text book*). Under these circumstances it would appear advisable to state the reasons why this modest little book, written in an Alpine valley, comes to swell the already large crowd of such works. In the first place it is written with a special view to contingencies arising in the mountains, and is intended for the use of the inhabitants of those regions and more especially for guides. But even so it was not in the first instance the author's intention to produce such a work. The history of undertaking it is as follows. Years of practice in the Upper Engadine, and in the climbing centre of Pontresina have afforded me special opportunities of studying and treating Alpine accidents. Such experience has impressed me with

*) First Aid in Accidents.

the necessity of instruction being given to the **guides** as to the best methods of transport and the methods of First Aid in such injuries: thus lives might sometimes be saved and much needless pain and anxiety would always be avoided.

The chronicle of **Alpine** accidents affords but too many instances where life and limb might have been saved had the bystanders possessed even a rudimentary knowledge of Ambulance work. In the winter of 1894 I delivered in Samaden a course of Ambulance lectures to Guides, Members of the Alpine Club and others interested in Ambulance work. The aim of these lectures was to describe the different kinds of accidents likely to occur on mountains, to teach their appropriate immediate treatment, and the best methods of transporting the sufferer to the doctor's care. They were attended by all the members of the Pontresina Society of Guides, by guides from Sils and St. Moritz, and by many members of the Alpine Club.

The groundwork of my lectures was formed by 55 large sheets 1 ft. 8 in. by 2 ft. 2 in. with 173 coloured diagrams.

The individual sheets were devoted to:

Anatomy and Physiology.

Wounds and the Arrest of Bleeding.

Bandaging with Handkerchiefs, Head-Bandages
and Rollers.

Diagrams of Dislocations and Fractures.

Bandaging of Broken bones.

Restoration of the apparently Lifeless.

Ways and Means of Transport.

At the request of the Swiss Society of the "Red Cross", and of the Swiss Ambulance Association, I have published these sheets for use in Ambulance Classes.

The German-Austrian Alpine Club uses these sheets in their Courses for Guides and at a Central Committee this year they made the gratifying suggestion that I should reduce the size of the sheets and add an explanatory text, so as to form a pocket book suitable for the use of guides.

In writing the explanatory text I found that only half of it would apply directly to the illustrations, and so I was constrained to expand my explanations into this little book.

That it may prove useful to Guides and dwellers in the mountains and to all Ambulance pupils in times of danger and emergency is my earnest wish.

Samaden, May 1896.

Dr. OSCAR BERNHARD.

Translator's Preface.

When my former colleague invited me to undertake the translation of his book I could not but accept for some years of practice in the mountains had convinced me of the usefulness of such a work: and I was conformed in this opinion by the very practical character of my friend's treatise. The German text has been freely translated and slight descriptions of the different articles likely to be at hand have been added in order to obviate the use of purely local names which have no English equivalent. I can only hope that the little book may prove of service to my travelling fellow countrymen.

San Remo, Italy, December 1896.

Michael G. Foster.

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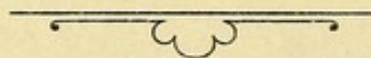
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INTRODUCTION.

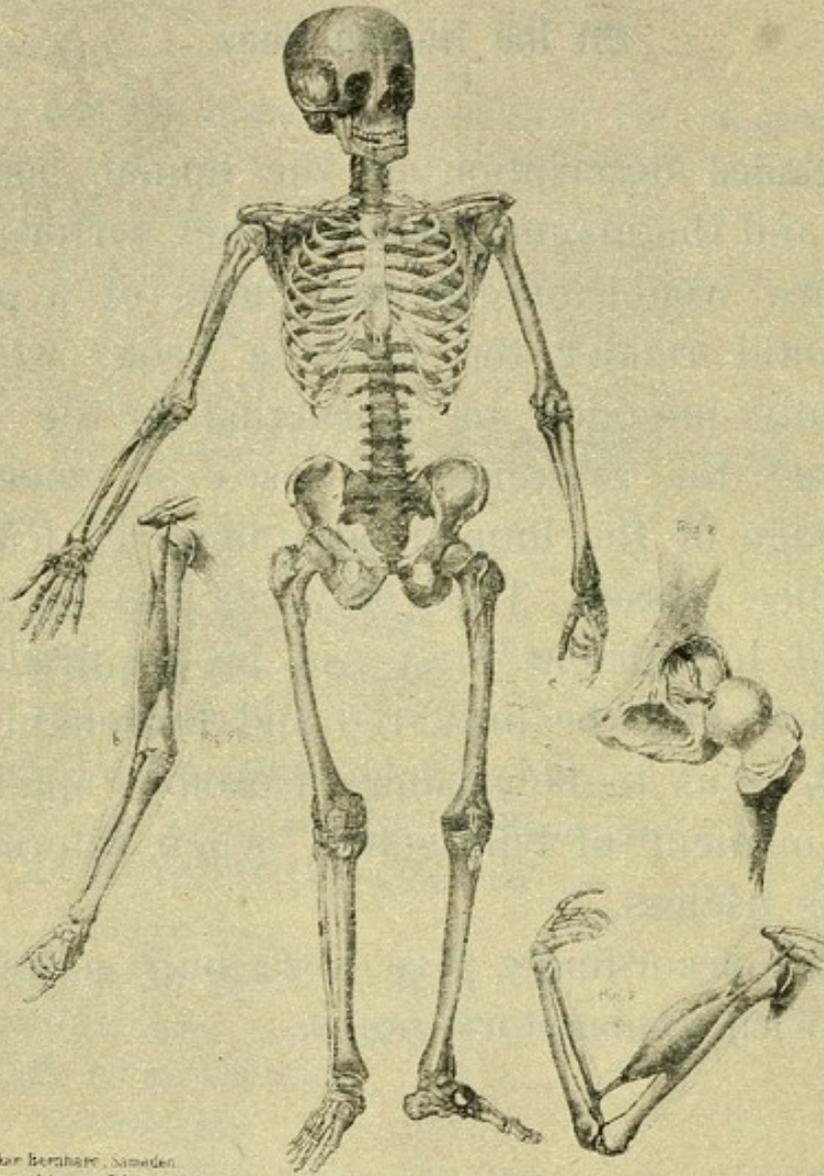
On the Human Body.

A **detailed** description of the human body, its organs and the manner in which they perform their functions, would exceed the limits of a primer, and would render too bulky a book, which is essentially intended to be carried in the pocket and used for reference in cases of emergency. Knowledge of the human body must be learnt in ambulance classes. Thus only can the knowledge essential to efficient First Aid be acquired. And these facts must be mastered and thoroughly assimilated, so as to be capable of prompt application in the moment of emergency, when reference to books is useless.

I shall accordingly give here only a few diagrams with explanatory notes.

Tafel I

Fig. 1



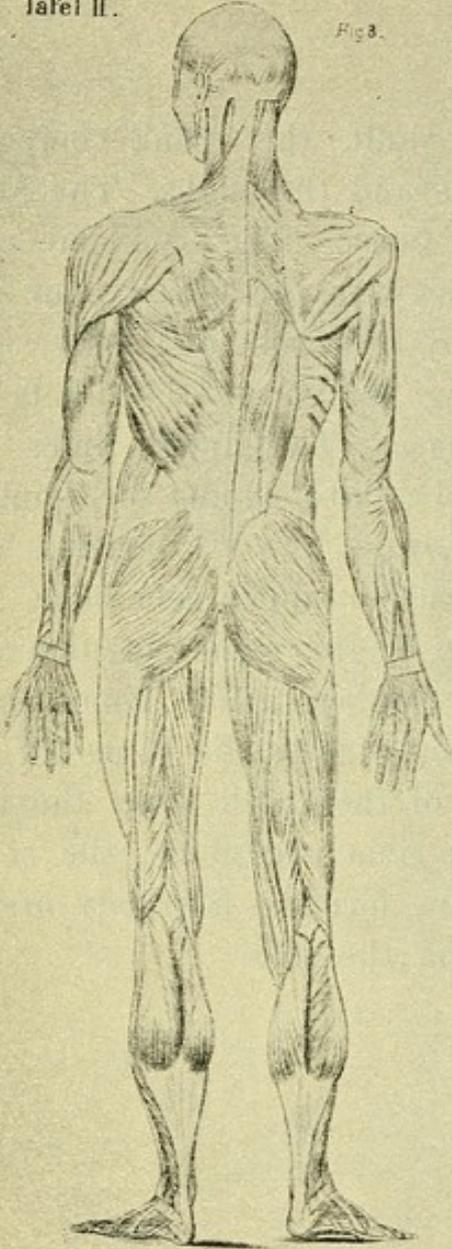
Dr. Oskar Bernhart, Sammler.
Samariterdienst
an der Universität zu Göttingen
— in Göttingen —

Verlag von Ernst Ziemer, Göttingen
Königsplatz Nr. 10, Tel. 111

The skeleton consists of the skull, the trunk composed of the Back bone, chest and Hips and the limbs. The Skull contains the brain and organs of sense. The backbone contains the spinal marrow; the ribs, with the breast bone and the pelvis, surround the organs of the chest and belly. The limbs serve for movements, being moved at the joints by means of the muscles Fig. a to c. The upper limbs are attached to the shoulder girdle (the collarbone and the shoulder blades) the lower to the pelvic girdle (the hip bones). The upper limbs consist of the humerus or upper arm bone, the two bones of the forearm, known by the names of ulna and radius, the small bones forming the wrist, the bones constituting the body of the hand, and finally the bones of the fingers. The lower limbs consist of the thigh bone, the two bones forming the leg, called the tibia and fibula, the bones forming the ankle joint, the bones forming the body of the foot, and lastly, the bones forming the toes.

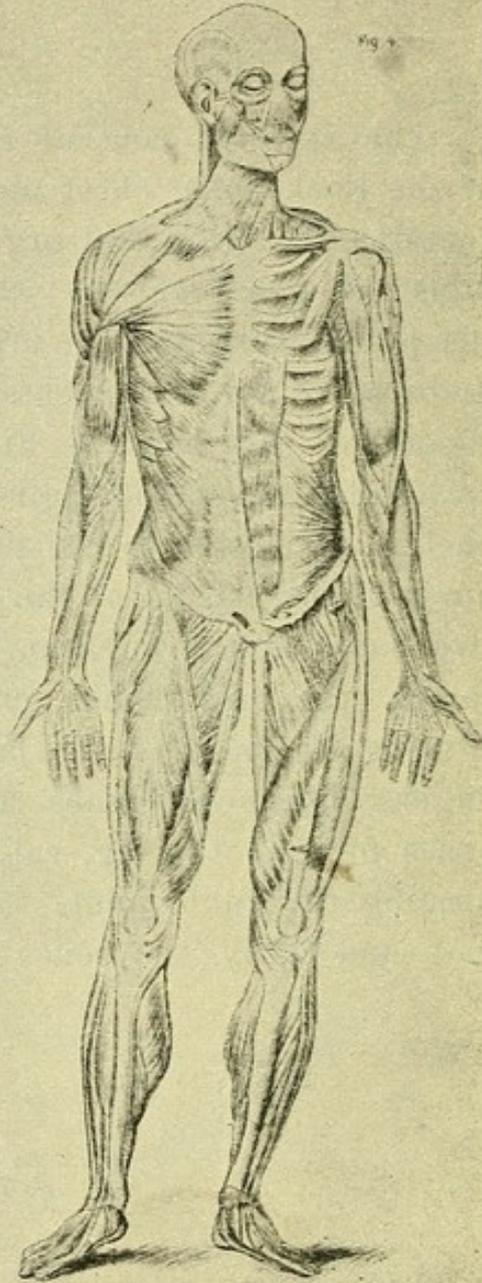
Tafel II.

Fig. 3.



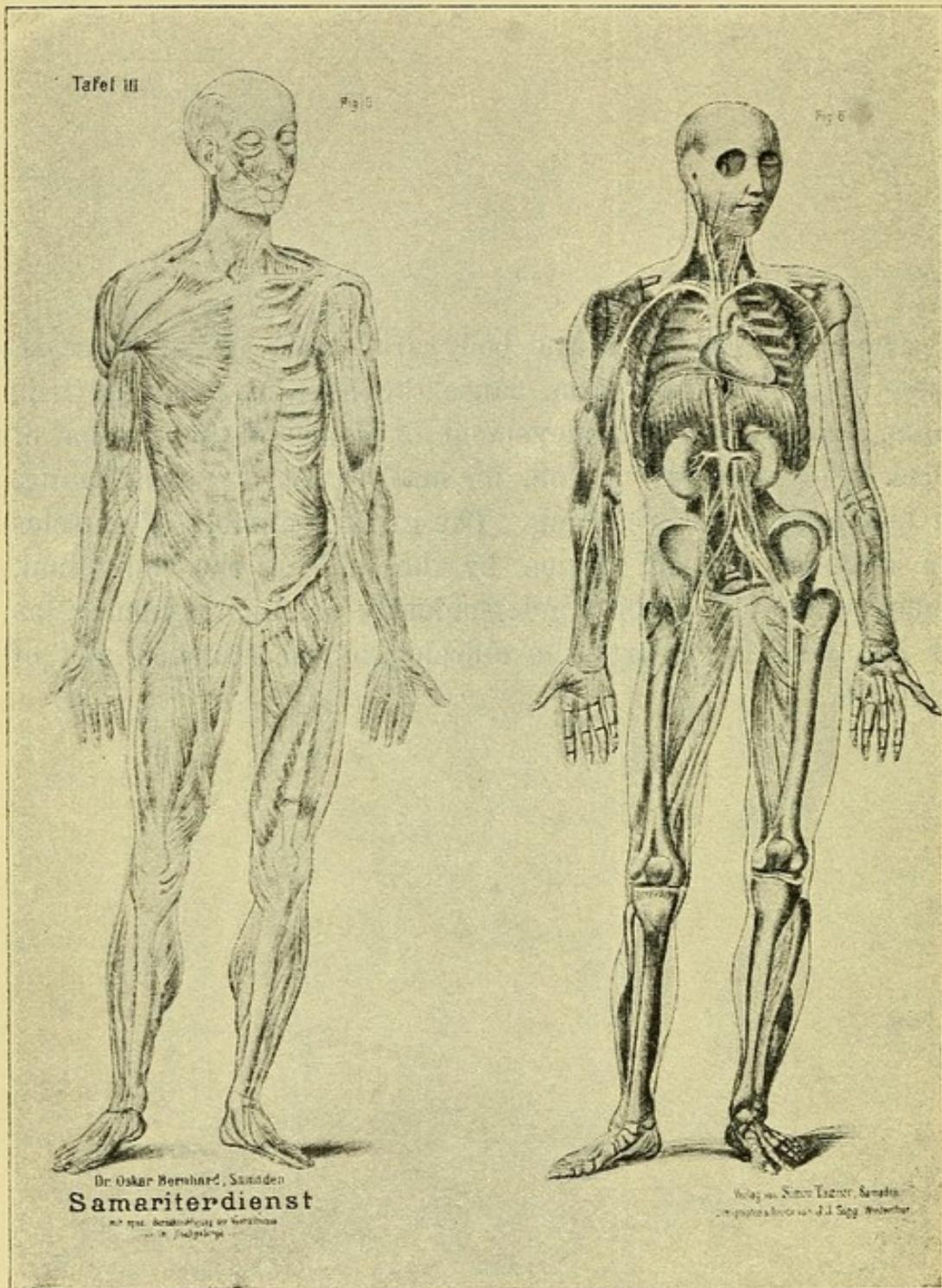
Dr. Oskar Bernhard, Sanitätsrat
Samariterdienst
 für den Verein der Samaritaner in Berlin
 1884

Fig. 4.

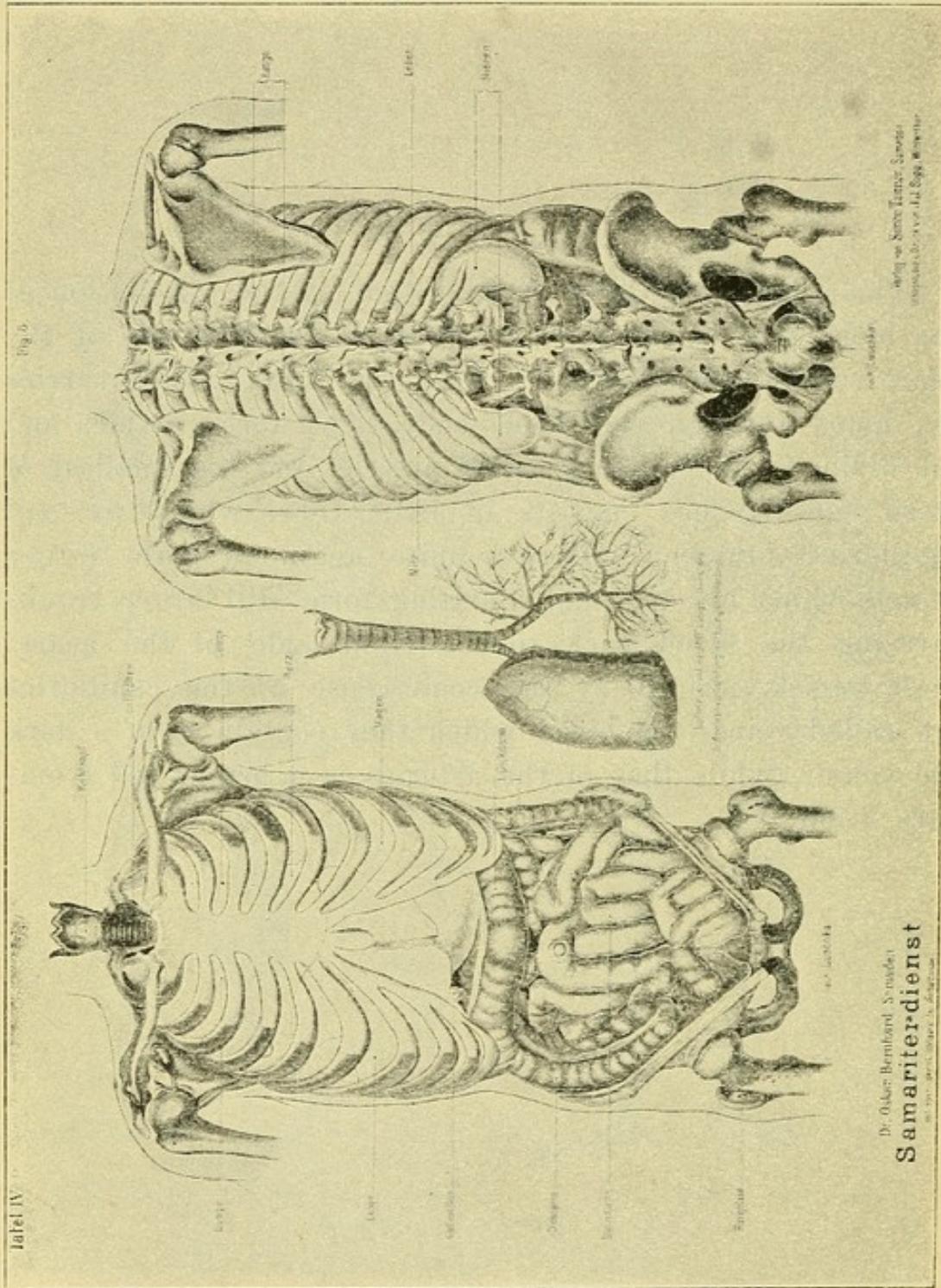


Verlag von Neumann, Neudamm
 1884

The fleshy parts of the body are made up of muscles. These, by their contraction, cause the bones to move at their joints, and also effect movement of some of the organs of sense. They serve for motion, for mastication, for swallowing, for talking and for breathing. The greater number of muscles can only be put in motion by the will of the individual, others again move quite independently of such influence, as for instance, the heart, the muscles of the stomach and of digestion.



This diagram exhibits the system of the circulation of the blood in the human body. Out of the left side of the heart comes a large blood vessel, the aorta, which carries the blood through the whole body. The aorta divides and sub-divides into branches called arteries and the smallest of these sub-divisions consists of little tubes which we call capillaries; these capillaries unite again to form larger vessels which by continually uniting form still larger trunks carrying the blood back to the right side of the heart; these vessels formed by the coalescence of the capillaries are called veins; the blood which they contain is of a dark red colour, while that of the arteries is a bright red (compare Table VI).



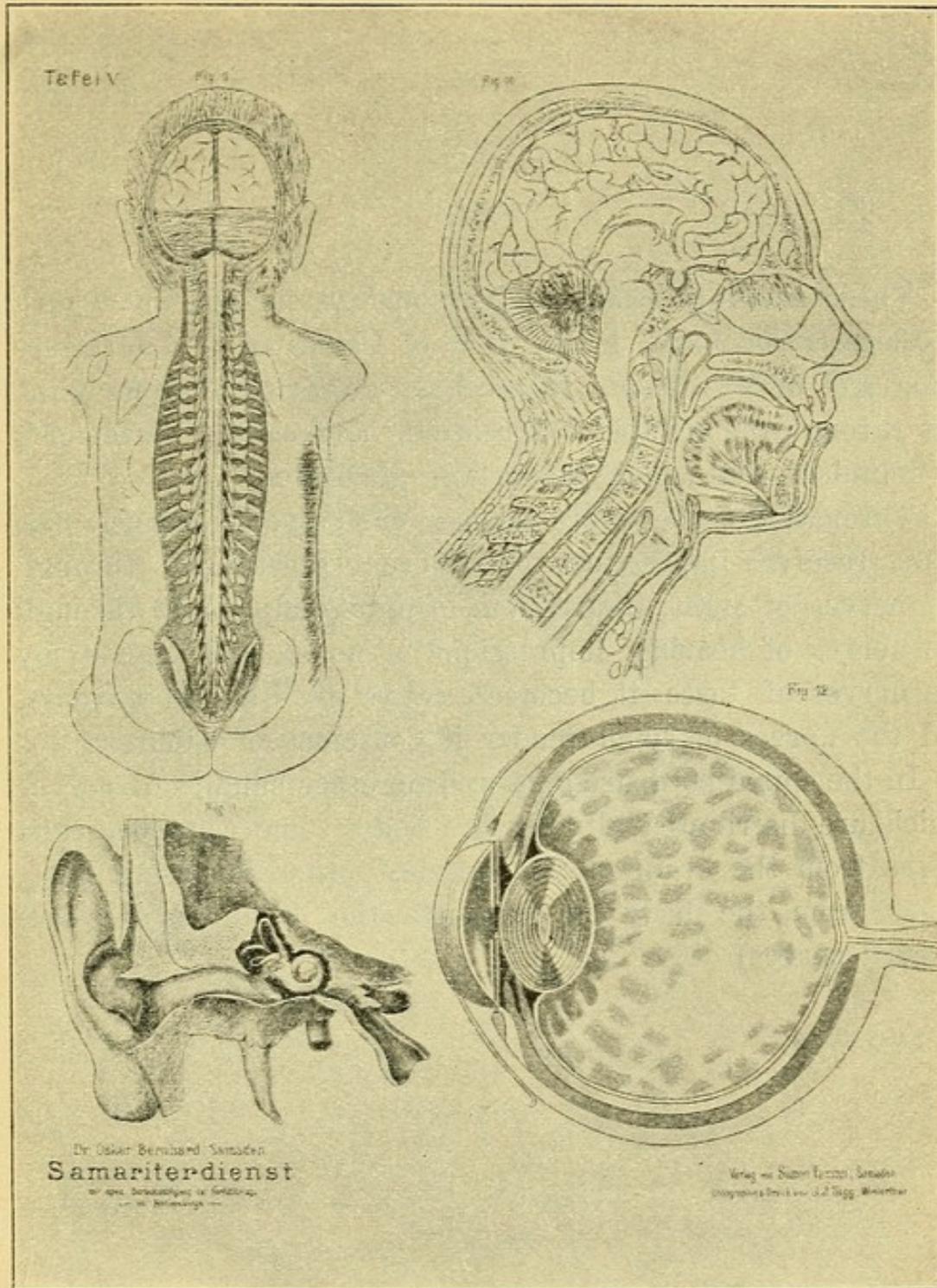
The Viscera are seated in the cavities of the Chest and Belly, the diaphragm dividing the cavity of the Chest from that of the Belly.

In the chest are placed the Lungs and Heart. In man we find one lung on either side. The lungs are two spongy sacs containing a great number of blood vessels and are attached to the windpipe. The windpipe is a rigid tube made up of rings of cartilage or gristle. Its upper and broader part is known as the larynx. This organ has two folds in its interior, the vocal cords. The air passing up from the lungs sets these in vibration; by this means the voice is produced. The windpipe, passing downwards, divides into two branches, one passing into each lung. In the lung itself these branches further divide into smaller and smaller branches. The finest of these branches end in small bladders which one may liken to the "pores" of a sponge; these are called the air cells or vesicles of the lung. The lungs lie quite close to the chest walls and follow these in all their movements. When the frame work of the chest rises, they expand and become filled with air, when it sinks they are compressed and the air is driven out of them (Inspiration and Expiration). Owing to this interchange of air within the lungs, the blood constantly streaming into them takes in Oxygen and gives out Carbonic Acid.

The heart is a cone shaped hollow muscle approximately the size of a clenched fist. The apex points downwards and to the left. By its movements, it drives the blood through the body and draws it back again. To prevent any backward movement of the blood within its cavities, each of these is provided with valves. The heart may be regarded at the same time a force and suction pump. The heart contracts 60—80 times a minute. This contraction is seen at the apex of the heart and can be felt in the arteries. The rapidity of the heart's beats is usually estimated by feeling the artery at the wrist, which we usually call the "pulse". This artery lies on the thumb side of the fore arm immediately above the wrist.

In the cavity of the belly lie the organs which serve for digestion and nutrition. After the food has been chewed in the mouth and mixed with the saliva, it passes through a long muscular tube the Gullet into the stomach, and thence makes its way into the intestines. The stomach and the intestines secrete the juices necessary for the digestion of the food. These juices are thoroughly mixed with the food which has been swallowed, and form a liquid known as chyme, whose nutritious parts are absorbed by the lymphatic vessels and are carried back to the blood as a milky white juice. The parts of the food which cannot be employed for nutrition pass into the large intestine and thence pass out of the body. The stomach, a hollow bag shaped muscular organ, lies on the left side of the cavity of the belly. The stomach joins the intestinal tract which is divided into the small and large intestines. On the right side of the cavity of the belly is situated the liver, placed under the arches of the ribs. This secretes the bile which is poured into the intestine and aids in digestion particularly in that of fats.

Another gland which produces digestive juices is the Pancrease or Sweetbread, which lies behind the stomach. On the right and left of the spine at the back of the cavity of the belly lie two elongated bean-shaped organs, the kidneys. These act as scavengers in that they excrete the urine that is the noxious materials circulating in the blood which have been absorbed from the body at large. The urine is carried out of the kidneys by two long tubes, the ureters, which lead into the bladder. The bladder lies at the bottom of the belly behind the front part of the pelvis.



Dr. Oskar Bernhard Samaden
Samariterdienst
 für alle Krankheiten der Kehlkopf-
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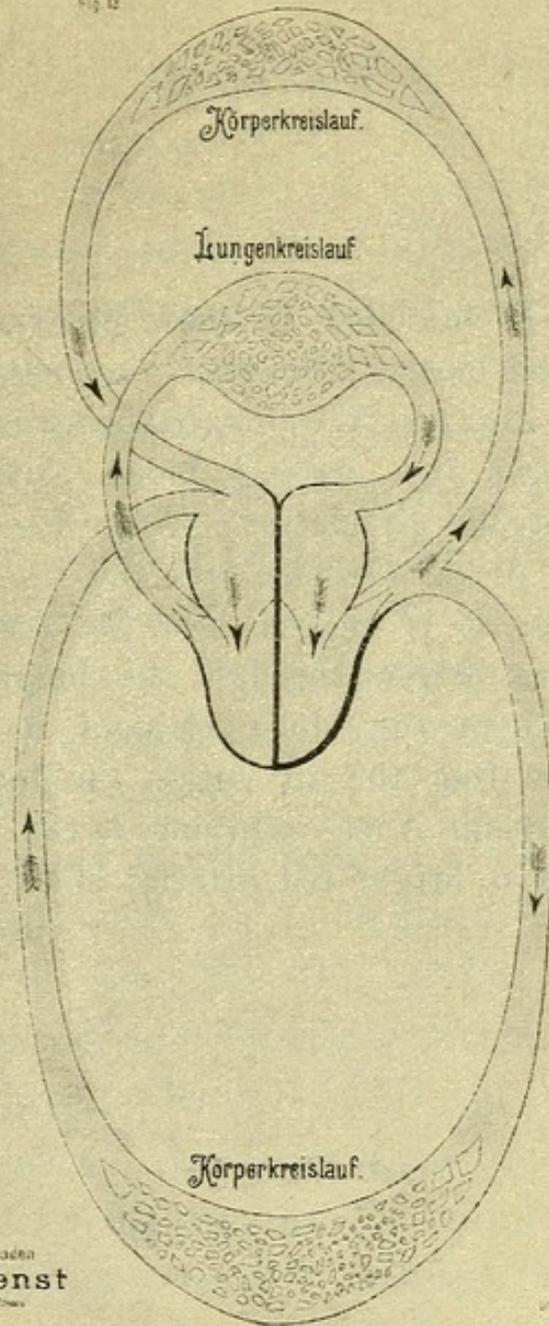
These drawings show the Nervous System and the organs of Sense. The brain is the seat of Consciousness, of Sensation and of Movement. It receives impressions from without through the nerves of sensation, and causes movements by impulses sent along the nerves of Motion.

Through the sense organs and their special nerves, the brain receives impressions of different sensations; through the nerves of sight, impressions of light and colour; through the nerves of hearing, impressions of noises and sounds; by the nerves of taste it becomes aware of different flavours, and the nerves of smell render it conscious of odours.

In the spinal cord are gathered together bundles of nerves which are distributed all over the body, some conveying impulses from the brain to the muscles, others bringing sensations from the body at large to the brain (motor and sensory nerves).

Tafel VI

Fig. 12



D: Oskar-Bernhard, Samaden
Samariterdienst
 mit einer Beschreibung der Verhältnisse
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This sketch is intended to shew diagrammatically the circulation of the blood. The heart is opened showing its division into two halves. The left half with its thicker walls drives the bright red arterial blood through the body (General or Systemic circulation). After its course through the body, when it has become dark red in colour or, as it is called, venous, it is sucked into the right half of the heart and thence driven through the lungs. (Pulmonary Circulation.) There the blood changes its character by receiving oxygen from the air within the lungs and giving up in return Carbonic Acid, returning to the left side of the heart once more as bright red arterial blood.

WOUNDS.

We are accustomed to distinguish two classes of wounds: wounds in which the skin remains whole, which are caused by blunt instruments (crushes or contusions) and wounds in which the skin is cut, torn or broken (open wounds, or simply, wounds). If at the same time that the skin is divided any poisonous matter is introduced into the wound, such as the poison of a snake, of some insects or of a mad dog, the wound is spoken of as a poisoned wound.

Given similar conditions, a contusion is much less dangerous than an open wound. For a broken skin opens the door for the agents which give rise to inflammation and by these the whole body may become infected. Further, in the case of contusions, dangerous haemorrhages occur much less frequently than in the case of open wounds. Large blood vessels are rarely injured, and when the smaller ones are damaged the bleeding is less dangerous, since although the blood is poured out into the tissues, it has no outward escape, and thus the tightened skin exercises a certain amount of pressure on the bleeding vessels.

Contusions.

The chief feature of contusions has already been mentioned, namely, the collection of blood under the skin, the so-called bruise.

According to the severity of the contusion we find either a slightly red painful swelling of the skin, or in more severe cases (that is, where the effusion of blood has been larger), more extensive swellings with livid discolouration are observed. If such a severe contusion occurs at a joint we call the resulting injury a sprain.

Contusions which affect only the outer soft parts are usually entirely free from danger. All that the bystander need do until the doctor comes, is to apply ice or to wrap the part in cloths soaked in cold water, fixing the limb in a be raised position on pillows or some other soft material. Should the pain after awhile decrease or the swelling lessen (thus shewing that there is no further haemorrhage under the skin), if no doctor is at hand the injured man may be carried to one.

In contusions of the upper limb the arm should be put into a sling, and if the damage is not extensive the injured man may go on his way with help (See figures 121 on Plate 37). Contusions of the head, the back bone, the chest, or the stomach,

may be much more serious, especially if the underlying organs, (the brain, spinal cord, lung, liver, kidney, spleen or intestine) be bruised or torn. In the latter case the injured man may faint and this collapse may rapidly pass into death.

Even in slighter cases the patient is often found lying in a fainting condition, pale and unconscious. The pulse is sometimes almost or entirely imperceptible, the breathing, very shallow and irregular, so that after an imperceptible breath, or a long pause, a deep sighing breath is drawn. When these symptoms occur after a blow on the head the result is not infrequently fatal.

In injuries of this gravity, the patient should not be moved except in the most urgent necessity, then carried with the utmost gentleness with the head and shoulders low. If in any way possible a doctor should be brought with all speed to the seat of the accident. Meanwhile the patient should be laid on blankets or coats with the head low and the feet raised, the clothes should be loosened, water constantly sprinkled on the chest and face, and if the breathing stops entirely Artificial Respiration should be performed (see later). If the patient can swallow he should be given wine or brandy, and if they can be had 20—30 drops of Hoffman's Anodyne*) on sugar or in water. But

*) Hoffman's Anodyne (modern form) Ether (sp. gr. 0,735) — one ounce. Rectified Spirit — two ounces.

if he cannot swallow, nothing can be more dangerous than to pour fluid down the throat, as it may pass into the lungs and cause death by suffocation.

Open Wounds.

An open wound may threaten or indeed destroy life in two ways, either, as we have before said, by the introduction into the wound of bodies which may set up putrefaction in the wound itself and thence infect the blood, or by causing excessive loss of blood.

One of the saddest experiences of a surgeon's life is to see the corpse of a well formed man murdered, as it were, in the flower of his youth and the prime of his strength, by the careless use of a foul bandage or a dirty finger, or because no one present had the knowledge necessary to avert the tragedy while his life's blood ebbed away, and with each pulsation the shadows of death drew closer round him.

Thus but a short time since, that excellent Oberland guide, Peter Egger, bled to death owing to cutting the artery of his forearm in endeavouring to make a glass bottle into a lantern, while his companions stood by powerless, when pressure on the bleeding point or a stone properly applied would have saved his life.

How are such dangers to be met?

First, wherever possible, a wound must not be touched by the fingers but only with clean band-

ages. Only in the case of a wounded artery the finger may be put into the wound to compress the bleeding point, *the finger must, however, be carefully cleaned first.*

Before handling a wound clean the hands with water and sand, or snow and ice, and carefully cleanse the nails with a knife. Carefully cut away all clothes from the wounded part. Do not touch the wound again with the clothes until it has been cleansed and bound up.

If circumstances permit, use only boiled water for cleansing the hands and the wound. Clothes or Cotton wool which are intended for dressing the wound should also be boiled in the water. Boiling destroys the germs of putrefaction. In many places, as in the Club Huts of the Ober Engadine, antiseptic solutions, (such as Carbolic and sublimate lotions), and medicated bandages are provided. In such case the hands and wound should be washed with the lotion and the wounds should be bound up with the bandages.

Cases may occur in the mountains where neither water, nor snow, nor ice are at hand, in such cases the hands and the edges of the wound may be washed with brandy. If such substances as sand, earth, small stones or scraps of clothing have been driven into the wound, they should be removed by careful bathing and only after this has been done should the wound be bound up. Should anyone meet with a man whose wounds

have stopped bleeding and become covered with clotted blood, these clots should on no account be disturbed as their removal may lead to a renewal of the bleeding.

Loss of blood.

The second danger of an open wound is caused by loss of blood.

If the bleeding is small in quantity nothing need be done as it will soon stop of itself, especially under a bandage. If, however, the bleeding is severe its arrest must be the first consideration.

If only the **smallest blood vessels or so-called capillaries** have been injured, the blood oozes slowly from the whole wound like water out of a full sponge and the amount of bleeding is roughly proportionate to the size of the wound. If, on the contrary, **an artery** has been opened the blood **spurts** out forming an arch which **rises and falls with each beat of the heart**. The cut artery can often be seen in the wound as a white ring, surrounding the stream of blood. In bleeding from one of the **larger veins** the blood often pours out in an arch but in a **continuous and not an intermittent stream**; or it describes no curve and merely runs in a considerable stream out of the wound.

Venous blood is of a darker red colour than arterial blood. Fig. 15, Plate VII. Fig. 21, 23,

Plate IX, shew bleeding arteries, Fig. 22 a bleeding vein.

Large losses of blood are always dangerous.

Arrest of Bleeding.

This is perhaps the most important and thankful task which First Aid can render.

The three chief steps in stopping bleeding are, **Elevation of the limb, Cold and Pressure.** Where the bleeding is severe, but does not occur in spurts, that is to say when it comes from **capillaries** or **veins**, the limb must be raised, and the wound washed with water: if any ice be at hand a clean piece should be applied to the wound and a wet clean cloth bound on until the bleeding stops; the limb should still, however, be maintained in an elevated position until it is certain that the bleeding does not recur.

When severe bleeding is proceeding from a vein, all pressure above the wound, such as garters, etc., should at once be removed, since the venous blood flows back to the heart and therefore up the limb. By such measures bleeding of this character can usually be stopped.

The employment of spider's webs, tinder, and similar popular remedies should always be avoided. The styptic cotton wool (which is impregnated with chloride of Iron) carried with them by many travellers and which is also to be found in the

medicine chests of many Club Huts, may be applied to small wounds, but should not be applied to deep ones.

When an **artery** is injured, as evidenced by a stream of bright red blood spurting from the wound, sometimes for a distance of several feet, then we must act quickly and decisively to prevent the man bleeding to death. How are we to act under these circumstances? Certainly not by running to an old woman and asking her to come and use her incantations, or by running away to look for spider's webs. As Sonderegger sarcastically remarks, "men act in a more sensible manner in the case of less valuable fluids, such as wine or brandy. When the bung or the tap is forced out of a barrel people do not seek for an old woman or look for spider's webs but at once plug the hole out of which the precious fluid is pouring."

Similarly an artery should be plugged by the readiest means, i. e. **Pressure**.

Pressure should at once be applied upon the spouting artery either with a clean finger or clean handkerchief, or cotton wool, until a doctor can be found to tie the vessel. If, however, there is a long time to wait, and the hand gets tired, some other means must be devised to keep up a **continuous** pressure on the artery. Where the wound is small and the artery near the surface, as in the arteries of the temple, of the lower jaw and of the wrists, a pad should be made with wool or

rolled up rags, and this should be tied firmly on to the bleeding vessel; or a large knot may be tied in the middle of a handkerchief and firmly secured over the bleeding point; or a flat stone may be wrapped up in a clean handkerchief and fastened over the wound.

If, however, a large and deeply seated artery is injured, direct pressure on the artery is difficult to apply, and if the hand gets tired, other measures must at once be resorted to. Several ways are available.

In some situations we may endeavour to close the injured artery by bending the limb at the joint above the cut as far as it can be bent and tying it in that position.

In wounds of the hand and forearm we can control the bleeding by placing a stout piece of wood between the upper arm and the chest wall and then tying the arm tightly to the side with a handkerchief passed round the chest. By this means the artery of the upper arm is compressed between the upper arm bone and the wood.

This brings us to the Indirect method of applying Pressure; that is, its application to the chief artery above the wound. In the upper arm, this artery is situated in the middle of the inner side of the arm. In the thigh, just below the middle of the groin. In the neck just outside the windpipe and larynx.

The exact situation of these arteries can only be fully taught by demonstrations in ambulance classes.

Bleeding at the throat can be stopped by compressing the artery against the backbone and maintaining the pressure. In bleeding from the shoulder the artery must be sought for just above the middle of the collar bone and pressure then made upon it directly downwards, compressing it against the first rib.

In the arm and the leg the bleeding may be stopped by tying a fair, sized flat stone over the trunk of the artery.

If this does not succeed the limb must be tightly tied round with an elastic band or India-rubber tube. In the event of neither of these being at hand, a handkerchief may be used which can be tightened by passing a stick through the ends and twisting it. Esmarch's braces, which are worn by many travellers, are very useful for this purpose. They consist of a broad elastic band and in applying them care should be taken that the band is applied to the limb as flat as possible and not rolled up or twisted. It should be remembered, however, that tying up a limb is not without its own dangers, and should only be resorted to when the bleeding directly threatens life. The danger consists in the fact that after the limb has been tied up for from $2\frac{1}{2}$ to, at the outside, $3\frac{1}{2}$ hours, there is great probability of mortification

setting in the part below. The possibility of such a deadly danger, therefore, renders such a prolonged ligature justifiable only when all other means have failed and the wounded man would otherwise certainly die.

If the bleeding is entirely or even partially stopped by any of these methods the wound should be carefully cleansed and then bound up.

There remains for us now only to consider how to treat a patient who has suffered severe loss of blood. If he lies in a fainting condition he must be treated as directed in the chapter devoted to that subject. If he is very weak, but still able to drink, he should be given plenty of water. If any table salt is at hand he should be given as much as will go on the end of a knife in a glass of water. The head should be placed low and the feet raised. The blood which is thus aided to flow back is very beneficial to the almost bloodless brain.

The doctor may on his arrival inject a solution of salt underneath the skin or into a vein. It is a well-known fact that the chief cause of death from loss of blood is the small amount of blood within the vessels. Even in the case of those who have almost bled to death, there is yet enough blood in the body at large to sustain life if it can be brought again into the circulation. This result may to a large extent be brought about by injections of salt solution.

Nose Bleeding.

For bleeding at the nose the clothes about the neck should be loosened, cold or if possible, iced water, should be got and dashed over the head and nose. The head should be held upright and craned forward. When the sufferer is lying down, the head should be turned sideways to prevent the blood flowing back into the throat. If the bleeding does not stop, the nostrils should be pressed firmly together and if this fails a pad should be made of cotton wool, linen, or styptic wool and packed into the nostrils. The styptic wool is very useful in these cases.

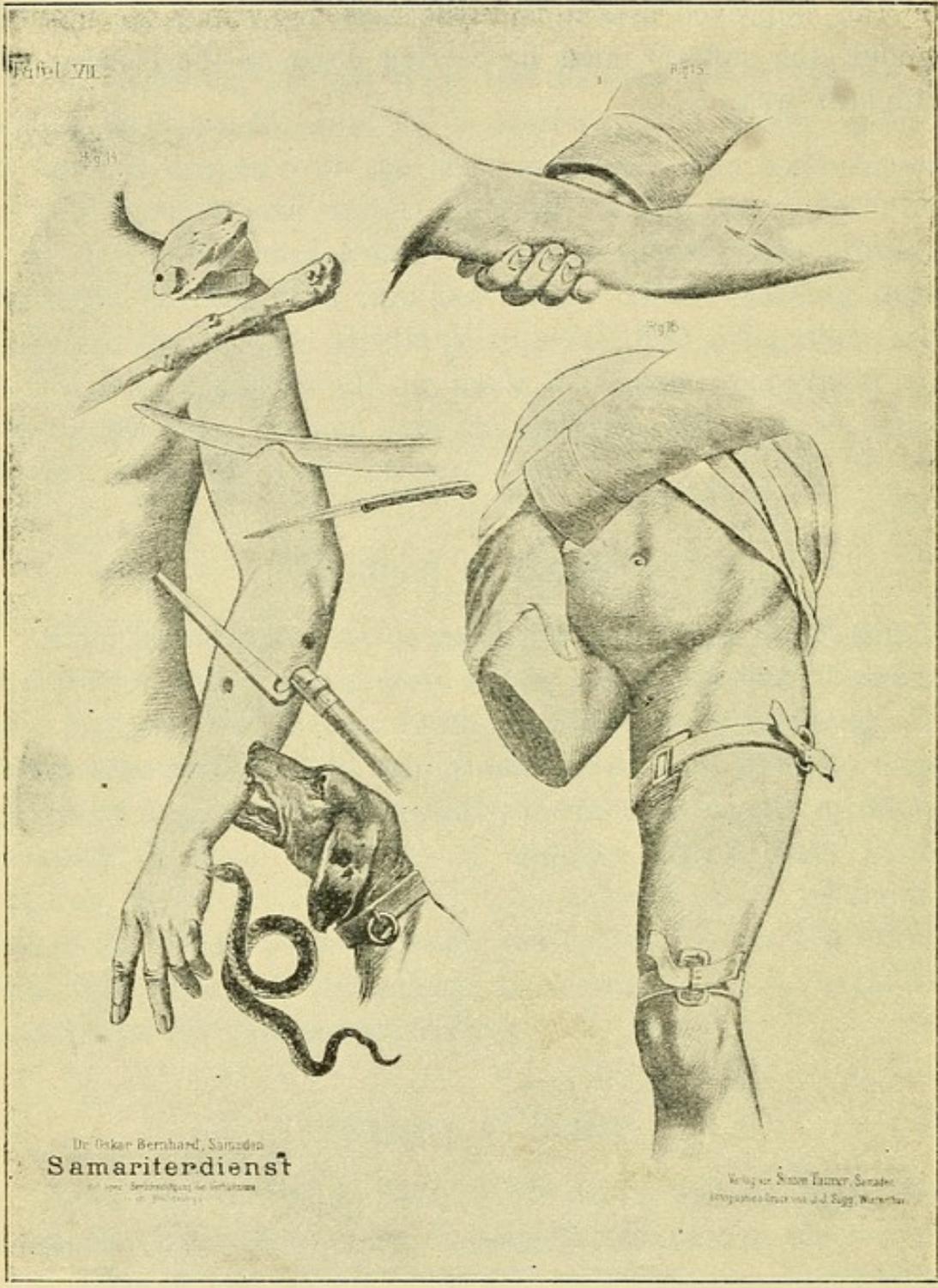
Spitting of Blood.

Even sound men may occasionally spit blood on mountain excursions, this being merely one of the symptoms of mountain sickness, or due to excessive exertion in climbing; in either case the blood is bright and mixed with phlegm. This naturally occurs more frequently in delicate people or those inclined to blood spitting. A climber seized with blood spitting, however slight, must on no account go on, he should lie down where possible, suck ice, place ice on his chest, and then return to the valley. More severe cases should be carried to the nearest habitation.

Vomiting of Blood.

Vomiting of blood may occur from falling upon the stomach, from blows from falling stones or ice blocks, or may arise spontaneously in people suffering from disease of the stomach (gastric ulcer). The sufferer first feels faint, and then vomits dark coloured blood often in a considerable quantity. The patient should be laid flat with the head on one side, given ice to suck or cold water to drink, and ice

or cloths dipped in cold water, should be applied to the stomach. When the bleeding has stopped, which is indicated by the improved aspect and the face regaining its natural colour, the sufferer must be carried down in the easiest and quickest way.



Dr. Oskar Bernhard, Samaria
Samariterdienst

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Fig. 14 shews **CONTUSIONS**, caused by blows from stones or logs of wood. **Cuts or Slanting wounds**, as **sabre cuts** (flap wounds) or **knives** (incised wounds). **Punctured Wound** (as from a bayonet). **Shot Wounds** and **Bites**.

Fig. 15. Shews how to stop bleeding in the arteries of the fore arm by compression of the artery in the upper arm.

Fig. 16. Compression of the main (or femoral artery in the thigh) in different places; in the groin, in the middle of the thigh, and near the knee either by the hand or by means of the elastic band.

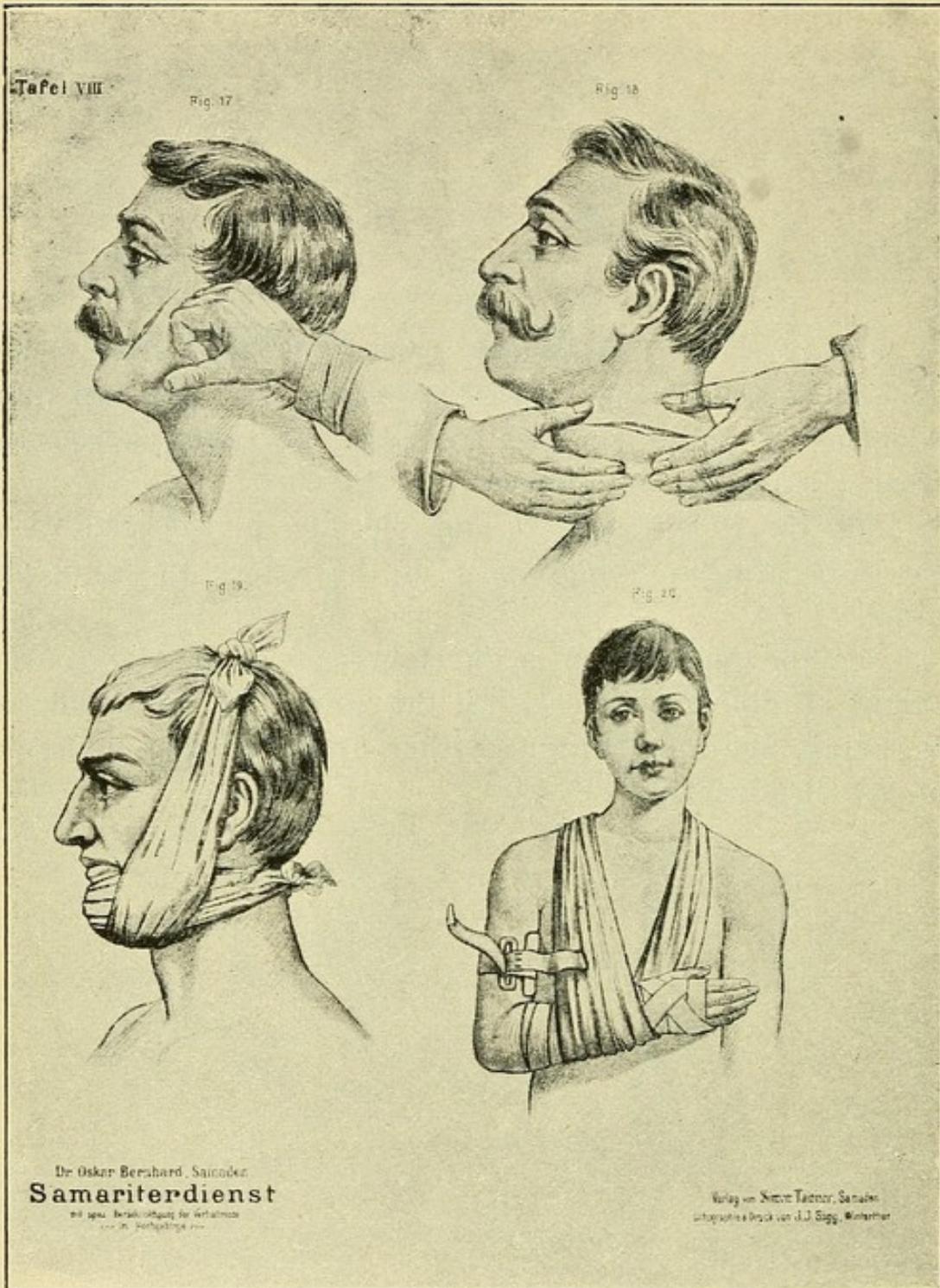


Fig. 17. Shews how to arrest bleeding from a cut in the cheek by compressing the artery against the lower jaw bone.

Fig. 18. The drawing together of the wound in a case of bleeding from the vessels of the neck and compression of the artery against the back bone.

Fig. 19. A pad of wool or linen or a clean flat stone has been applied to the bleeding artery on the lower jaw and secured by a cloth passing round the chin and the neck, and this again is kept in place by another one going under the jaw and over the top of the head.

Fig. 20. Illustrates the temporary arrest of bleeding in the forearm by an elastic band round the upper arm and a bandage round the wound.

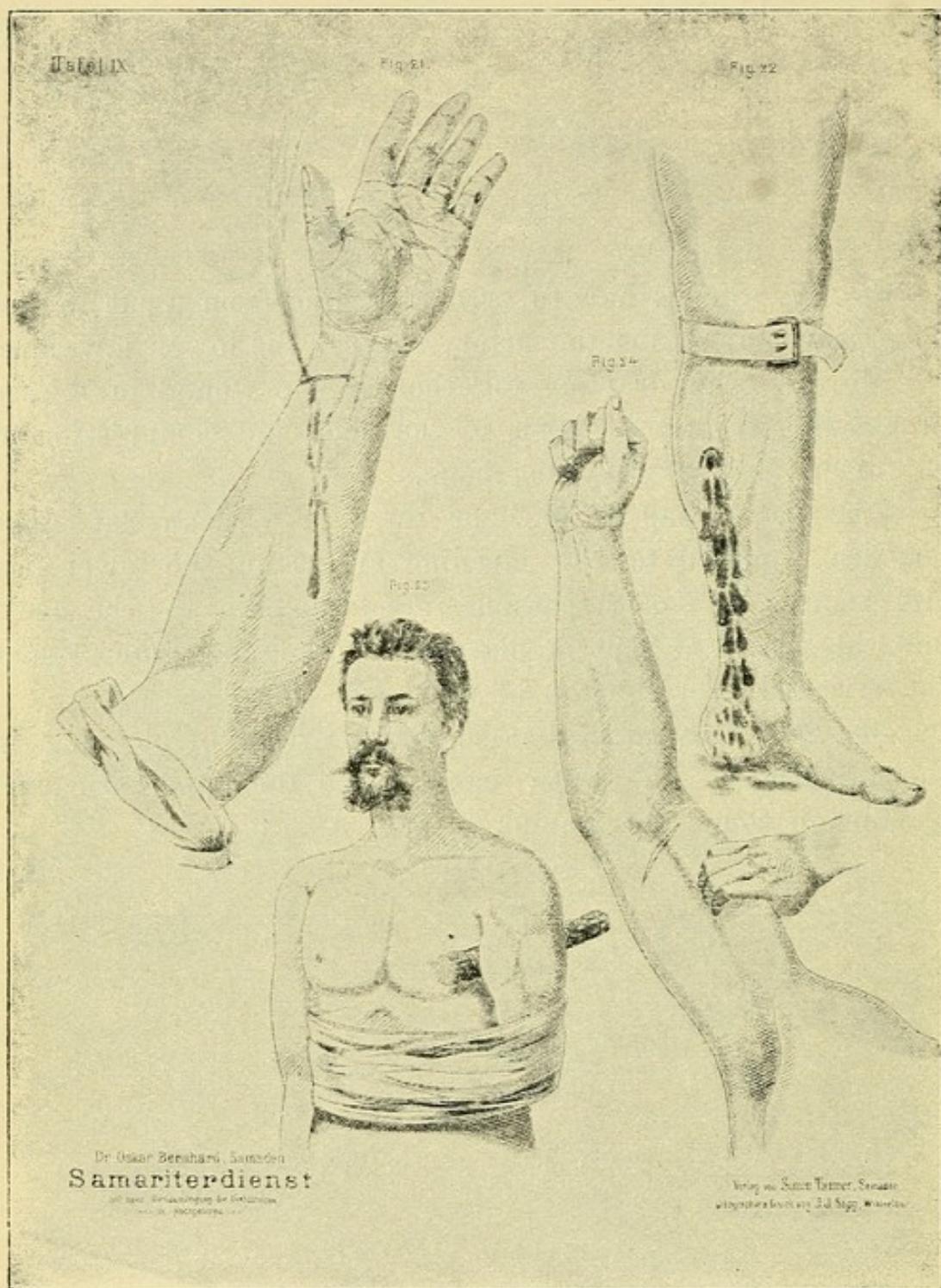


Fig. 21. Shows the spurting of the blood from an injured artery, while in **Fig. 22** the blood is shown flowing thick and evenly from an open vein (in this case a ruptured varicose vein).

Fig. 23 and 24 Illustrate what we have said on page 22.

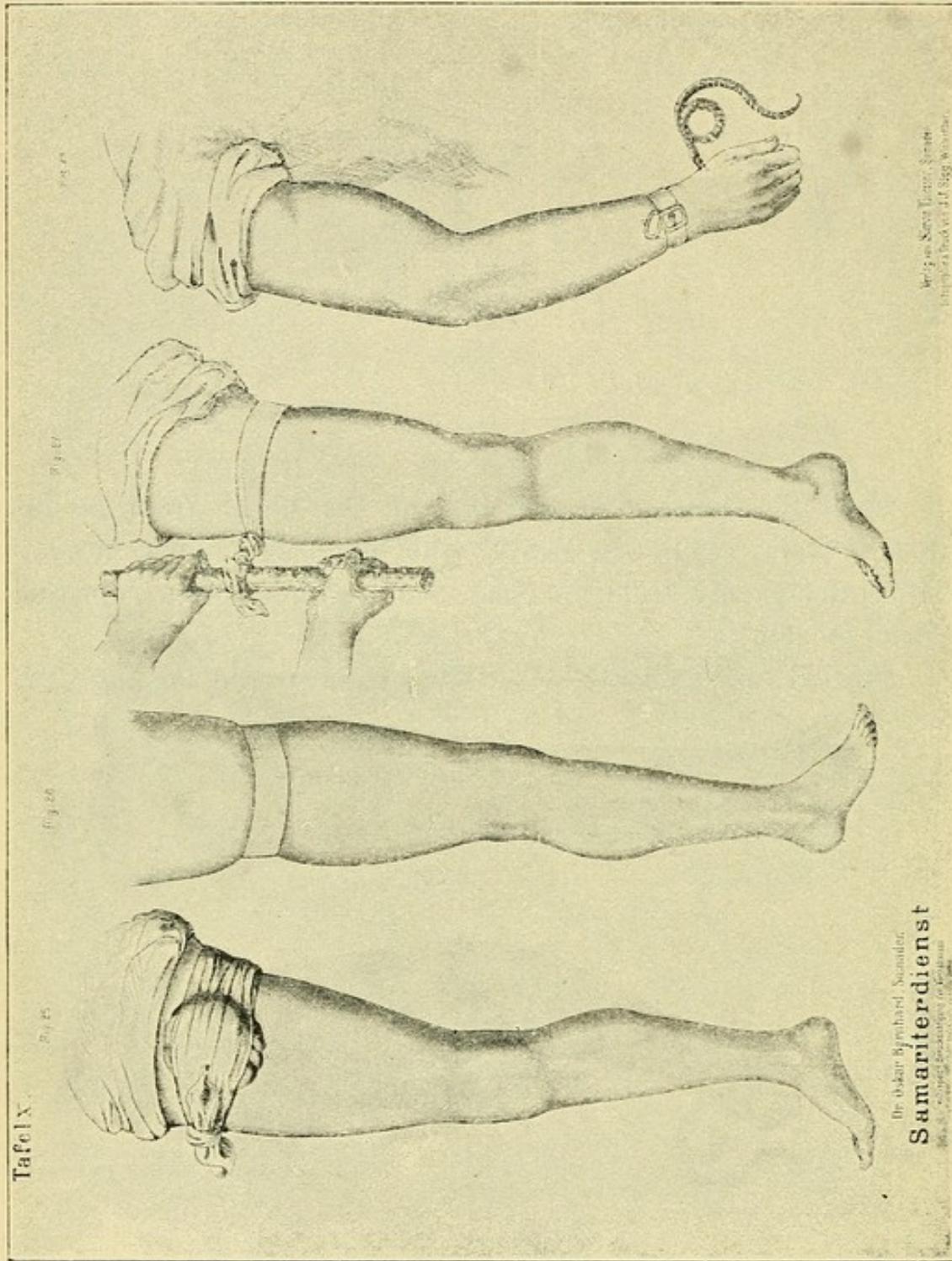


Fig. 25. Shows the arrest of bleeding in the leg by tying a flat stone over the main artery of the thigh.

Fig. 26. Shows the arrest of bleeding by an elastic band.

Fig. 27. By a handkerchief twisted with a stick.

Fig. 28. The employment of the elastic bandage above a poisoned bite.

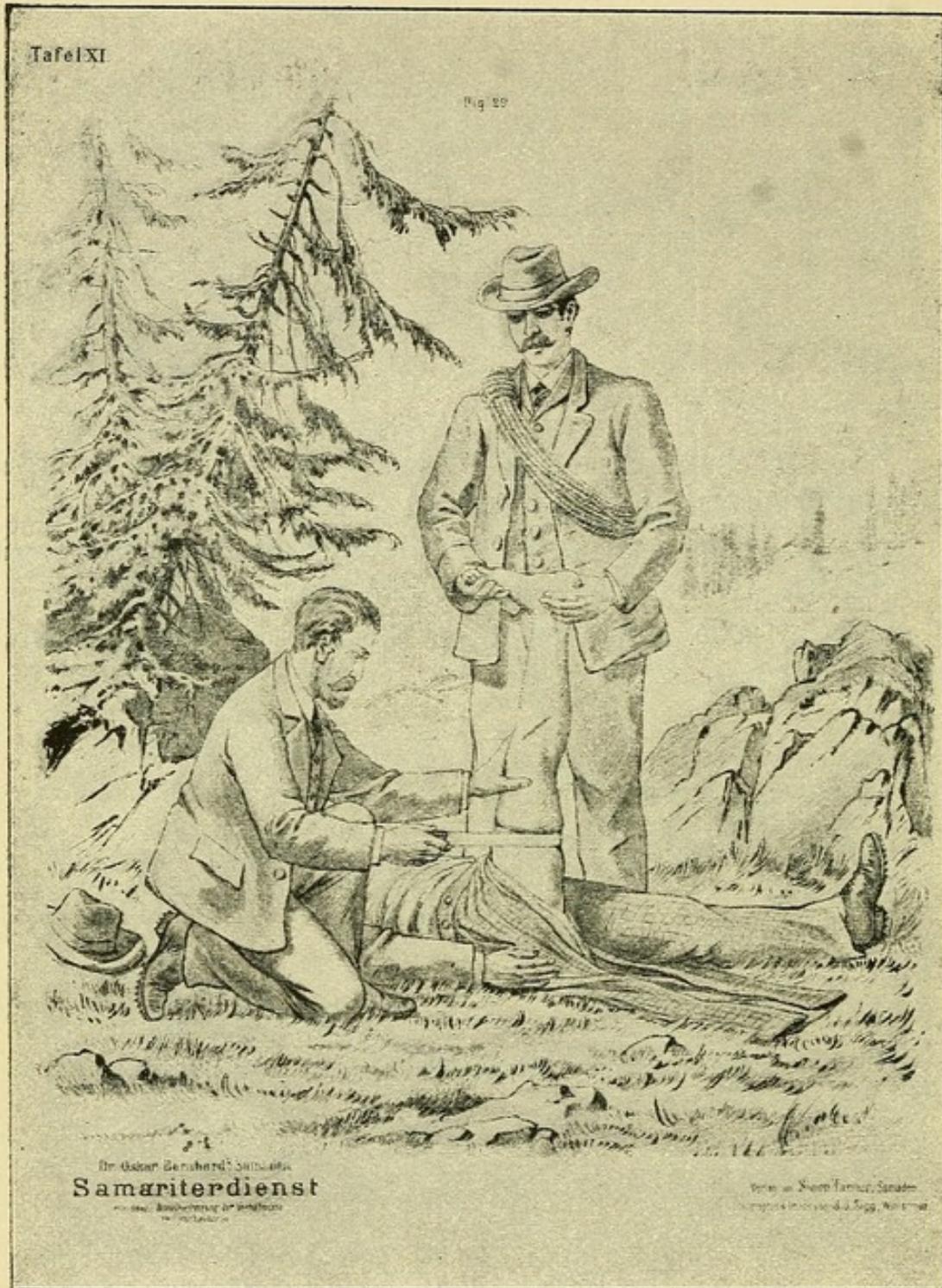


Fig. 29. An elastic bandage made from the Esmarch braces. In order to free the wound and enable the bandage to be properly applied the trouser leg has been cut up in its full length.

Dressing of Wounds.

Sticking plaster is sufficient to draw together and cover small wounds or lacerations. For large wounds, however, a bandage is necessary. Many guides and travellers carry a bandage case; this is most useful and cannot be too strongly recommended. These should be used in each case in the manner advised. Clean wool or linen should be placed upon the wound and a bandage over that. In the following plates a number of different forms of **bandage** are figured.

Bandages formed from cloths, (the so-called triangular bandage is greatly to be recommended, many travellers carry it with them, otherwise handkerchiefs, napkins, or towels may be used), **Head bandages** and **Roller bandages**.

The handkerchief bandage is very easy to apply and remove, it is very comfortable and most useful in any emergency. The necessary material can always be obtained. It is useful both for keeping on dressings and for making slings. The triangular handkerchief is either folded like a **neck cloth** and tied round the injured part, or is **smoothed out and used as a cloth**. Almost all bandaging can be done with the folded bandage.

Slings should be made either with a long cloth folded like a neckcloth (small arm sling) or from a large opened out cloth (large arm sling). If no cloth of sufficient length is forthcoming two short

ones should be used. One should be laid loosely round the neck and the second which supports the arm joined to this. In case of necessity a coat tail may be turned up and used to support the arm, Plate XVI, figs. 50—53).

The head bandage is formed by taking a rectangular cloth by the two narrow sides and cutting each of these part of the way up; a four-tailed bandage is thus produced which, as the name implies, is only used for the head, it is easy to apply and holds perfectly (Plate XVIII, Figs. 57—59).

Roller bandages are made of linen, gauze, flannel, etc. and should be used broad or narrow, according to the breadth of the part to which they are to be applied. They should be tightly rolled. In applying these bandages the roller should be taken between the thumb and middle finger of the right hand. A small piece should be unrolled and fixed on that part of the body where the bandage is to begin by the forefinger or thumb of the left hand. In order to fix the bandage firmly when beginning, two turns should be accurately superimposed (round turns); the subsequent turns should slope spirally upwards, each turn overlapping the preceding one for half its width (spiral turns); the bandage is finished off with one or two round turns and the end fastened with a safety pin or a few stitches. Where the part to be bandaged is of unequal thickness, as

in the leg or forearm, the turns do not lie evenly, and the lower turn often slips away from the one above it. In order to prevent these gaps and obtain uniform and firm pressure, the so-called resersed turns must be employed (Plate XVII, Figs. 54—57). A good bandage should serve the following purposes: it draws the lips of the wound together by its pressure, it helps to check bleeding, it keeps out the air and other hurtful influences, and by its support of the injured limb eases pain.

The drawings will give a better idea than words can of the proper method of applying bandages. This however can only be learnt from demonstration and by constant practice.

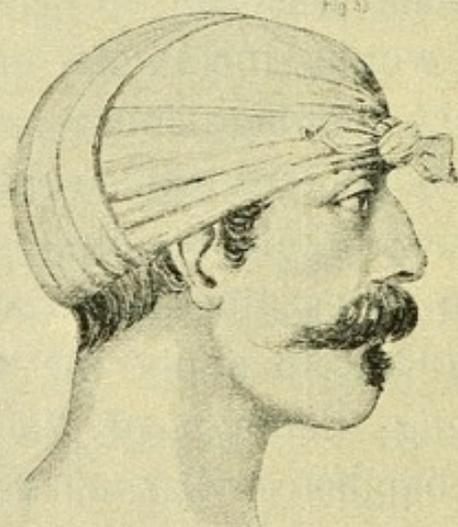
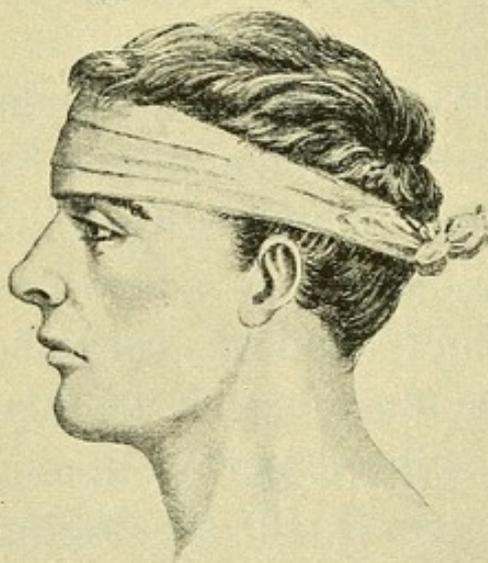
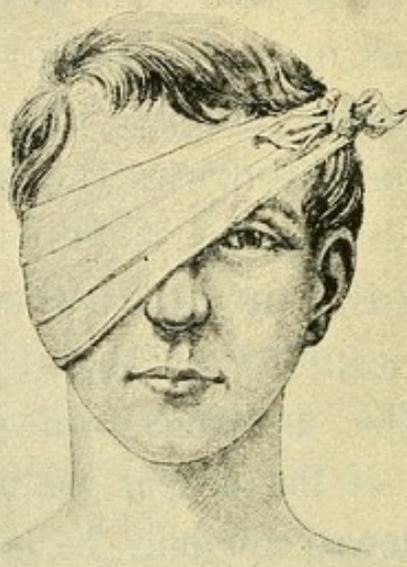
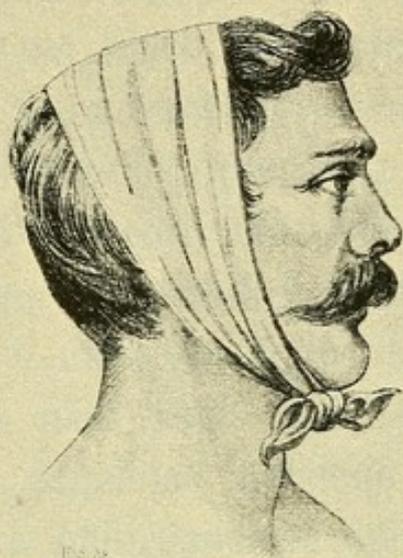
I would formulate one rule for all bandages. Every bandage must be tied with a "Reef Knot" and never with the so-called "Granny's Knot" which is very likely to slip.

In using the handkerchief bandage, care should be taken to apply the bandage so as to take in a long diameter of the injured part; slipping of the bandage will thus be prevented, see Plate XII, Figs. 30—33.

In the case of deep and severe wounds in the upper limbs the limb should be put in a sling; the man's strength will form the best criterion as to whether he can walk.

In the case of deep and severe wounds of the lower limbs, transport is necessary.

Tafel XII.

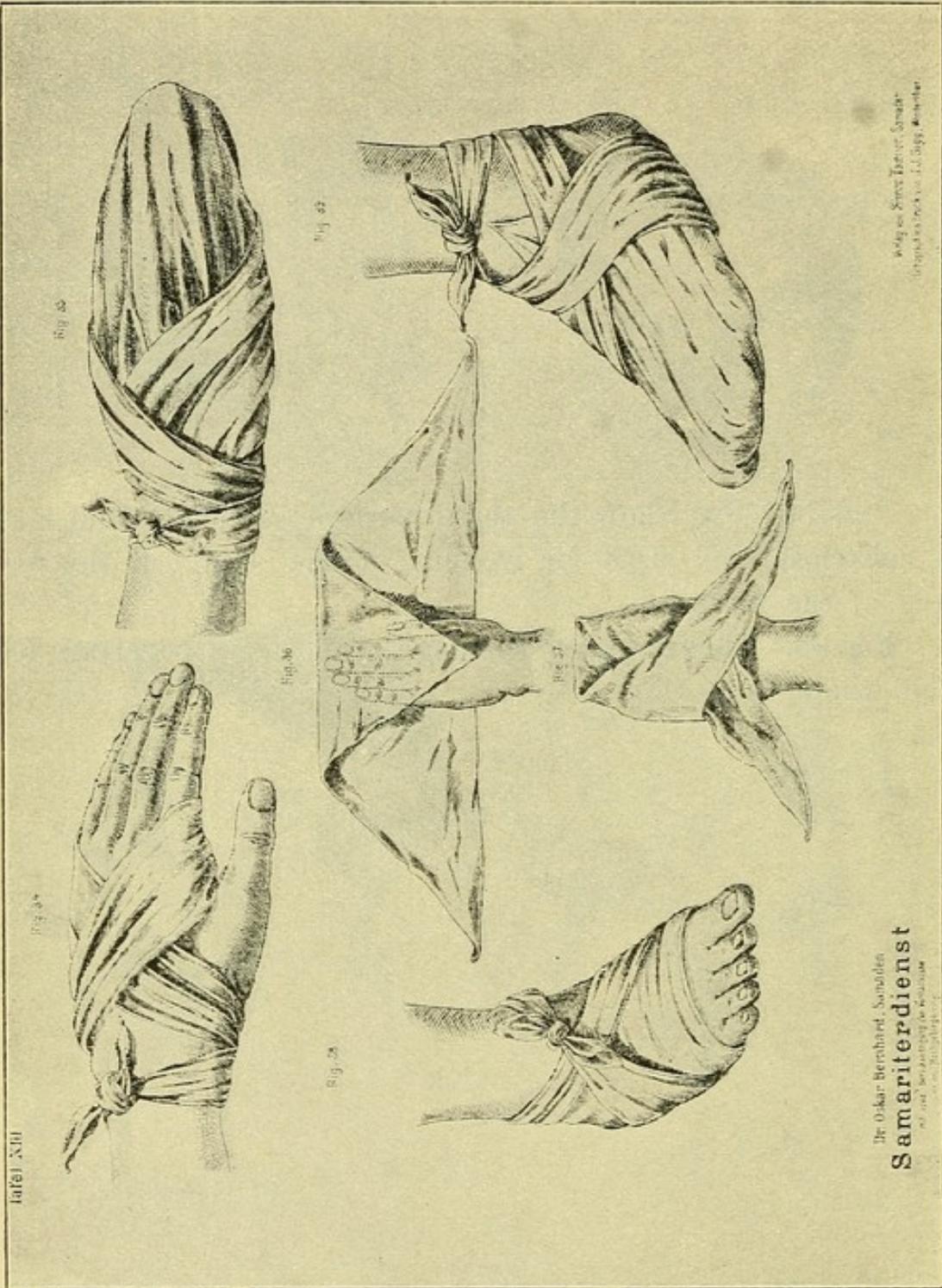


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Samariterdienst
 eine neue Beschreibung der 12 Stämme
 von den Samaritanern

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Figs. 30—32. Show the three-cornered bandage folded as a neckcloth and used for wounds of the skull, of the eye and of the forehead.

Fig. 33. The unfolded bandage used as a covering for the whole head.

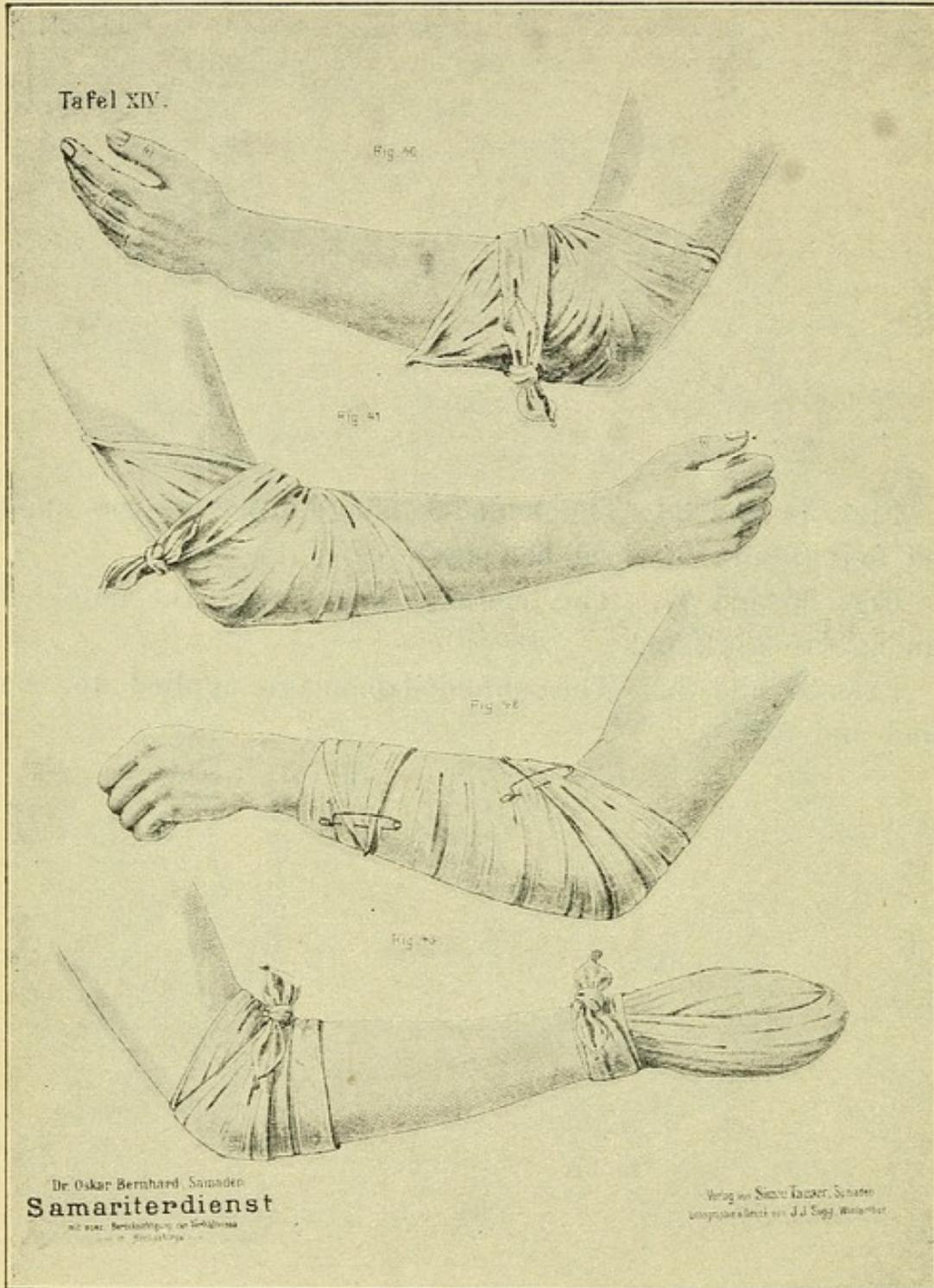


Figs. 34 and 38. The folded bandage used for the hand and foot (figure of eight bandage).

Figs. 36 and 37. The method of applying the unfolded bandage to the hand.

Figs. 35 and 39. The unfolded bandage applied to the hand and foot.

Tafel XIV.



The different bandages which may be formed with the folded und unfolded bandage, triangular bandage.

Tafel XV



Fig. 11

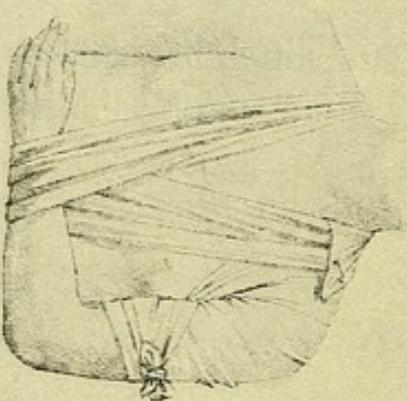


Fig. 12

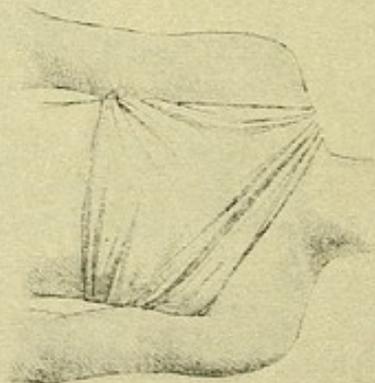


Fig. 13



Fig. 14

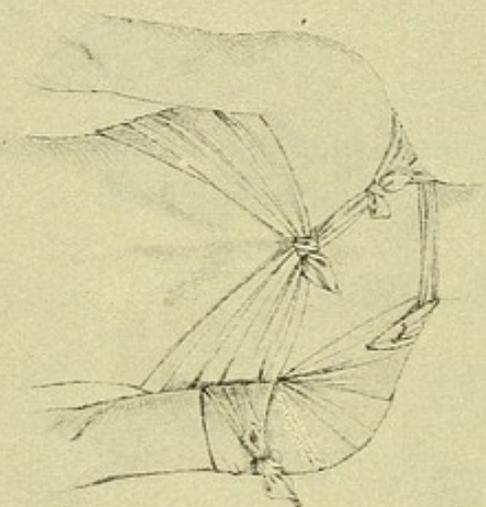


Fig. 15

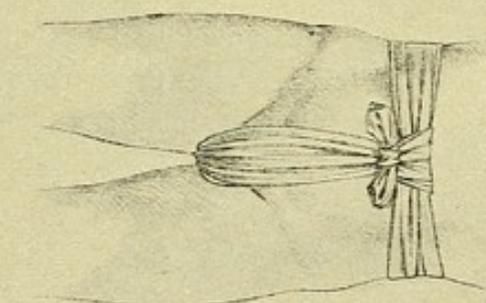


Fig. 16

De Oude en Nieuwe Samariterdienst

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Fig.44. Sling made with a large four-cornered unfolded cloth.

Fig.45. Shoulder cloth fastened to a sling.

Fig.46. Bandage for the chest.

Fig.47. Hip bandage.

Fig.48. Back view of a chest and shoulder cloth.

Fig.49. The so-called T bandage. This is used for injuries of the genital organs, of the anus, coccyx and sacrum. A three-cornered bandage is folded and fastened round the hips, and gives attachment to another bandage passing through the legs which covers the injured part.

Tafel XVI.



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und H. F. Schöberl

Witz u. Simon Tausch, Wien
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Fig. 50. A sling made with the folded bandage (small arm sling).

Fig. 51. A sling made with the unfolded bandage (large arm sling).

Fig. 52. A sling made with two bandages, one folded round the neck, the other open for the arm.

Fig. 53. A sling improvised by turning up the coat tail.

Tafel XVII.

Fig. 54.

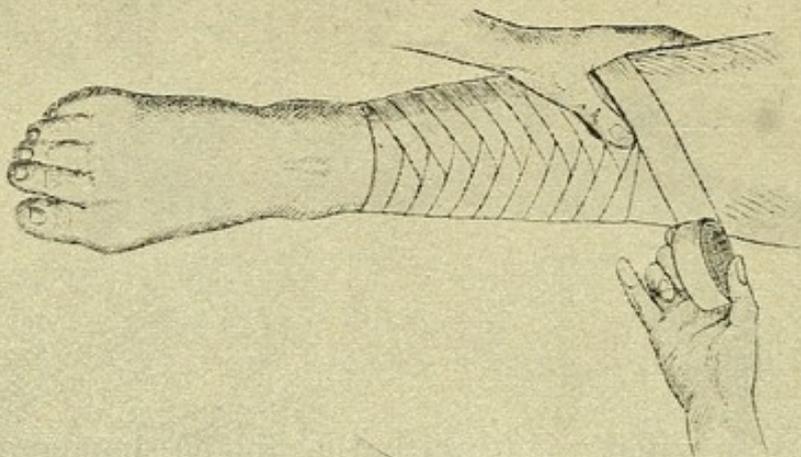


Fig. 55.

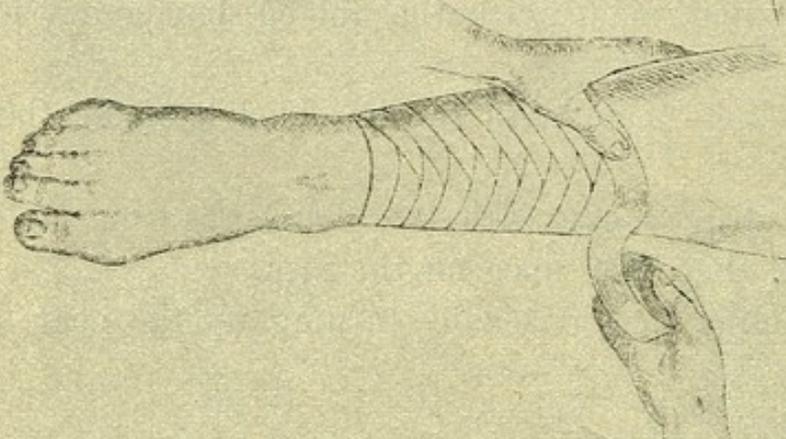
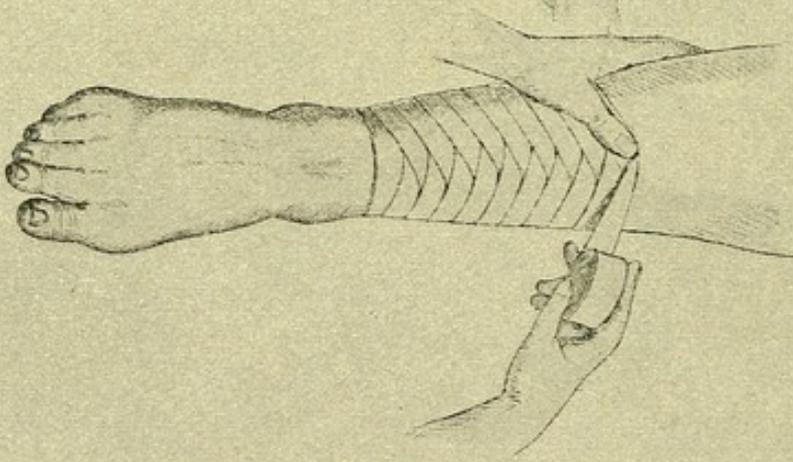


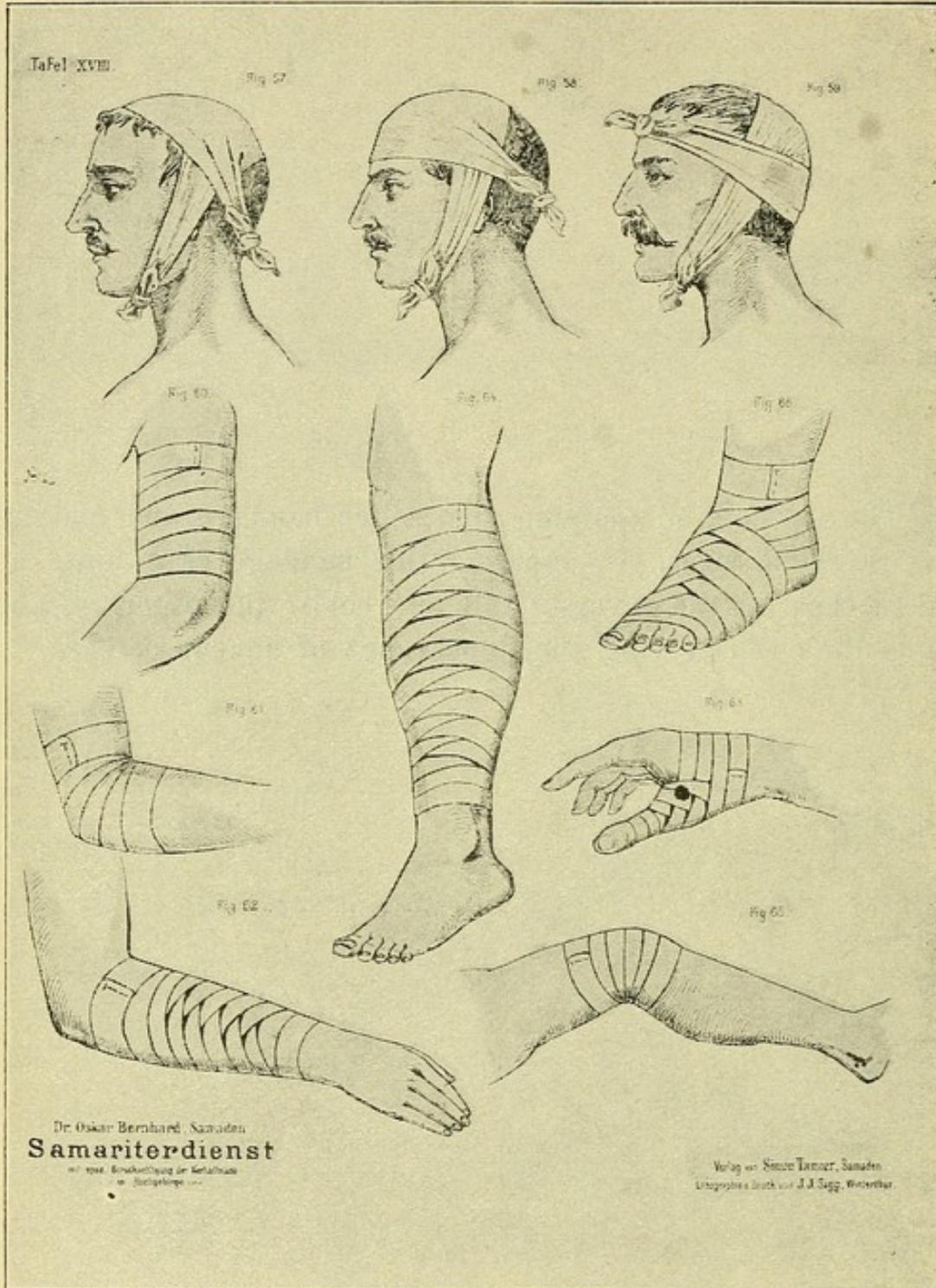
Fig. 56.



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Samariterdienst
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The method of applying the roller bandage and making the reversed turns. In applying this bandage care must be taken that all the reverses fall one below the other, in the same limb thus giving the appearance of an ear of corn.



Figs. 57—59. The method of covering the scalp, the forehead, and the back of the head with the head bandage.

Figs. 60—65. Roller bandages applied to the upper and lower limbs. At the knee and elbow the turns should give the appearance of jointed armour.

Poisoned Wounds.

In European Countries the only poisoned wounds with which we have to deal are the bites of **rabid animals**, of **snakes** and the **stings of insects**. The proper treatment is to encourage bleeding by pressure round the wound, which should be washed out with water, by preference warm water. If the lips of the bystander are free from cracks or scratches, he may also suck the wound. To prevent the poison entering into the circulation, a bandage should be tightly tied round the limb above the injury (See X, Fig. 28). Further, an attempt may be made to eradicate the poison by burning the wound with a needle or knife made red hot.

When a person has been bitten by an animal which is supposed to be **mad**, every effort should be made to place the animal under the observation of a veterinary.

Snake bites are more frequent in the mountains than in the plain. Not only is the adder common in the mountains, but another and more venomous species is found, the *Vipera Aspis*. The bite of either is dangerous, accompanied by severe symptoms and heals slowly.

The wound is very painful, a large circle of the surrounding skin often becomes discoloured from the escape of blood from the vessels under the skin; the victim commonly turns faint, the

limbs become cold and stiff, the face changes colour, the tongue swells, cramps of the lower jaw and gullet set in, accompanied by vomiting and unquenchable thirst. Unless these abate death is likely to follow.

Besides the treatment we have mentioned above, the following remedies are useful against poisonous snake bites: the application of sal volatile or strong ammonia to the wound, and the free use of brandy or strong wine up to the limit of making the victim drunk. Strong ammonia is also a good remedy against **insect bites**, such as scorpions or gnats. Ammonia should never be applied to the eyes or lips as it would burn the mucous membrane and might damage the eye. Cold applications only should be used in these situations.

The stings of flies, bees, and wasps may produce bad effects. As a rule cold water bandages are sufficient to allay pain and inflammation. In the case of wasp and bee stings, the sting, which can usually be seen sticking in the skin, should be taken out.

Medical aid should be obtained if, after an insect sting, the surrounding skin becomes red and swollen, or if near a fly bite the skin becomes livid and vesicles make their appearance. This is a sign that the fly has fed on carrion and thus poisoned the wound.

We may add to the preceding observations the treatment of burns and frost-bite.

BURNS.

Burns may be caused by actual flames, or, as is more commonly the case, by hot objects (such as stoves) hot fluids, molten metals, phosphorous (from matches), sealing wax, etc., and again through the action of corrosive chemicals, such as Vitriol. Hydrochloric Acid, Caustic, Alkalies, etc.

Burns are divided into three classes, according to their severity.

In the first class there is redness and swelling of the skin.

In the second class the surface of the skin is also blistered.

In the third class are included deeper burns, in which the whole member may be burnt. The severity of a burn is dependent not so much on its depth, as on its extent. A burn involving two-thirds of the body even though it be but of the first degree is almost always mortal. **Bad burns require medical aid.**

The first matter to be attended to is the relief of pain. This can be done by excluding the air with a dressing. If blisters have formed, or if the upper skin is injured, the greatest possible care must be taken in removing the clothes, so as to prevent breaking the blisters or pulling away any of the raised skin. If the blisters are very tense and thus increase the pain, they may be

pricked with a needle which has been cleansed by passing it through a flame, care being taken simply to let out the water and on no account to touch the skin at the bottom of the blister. After this, the skin should be covered with a soft close fitting dressing. Cotton wool and soft linen are to be recommended and where possible, they should be first dipped in a mixture of lime water and boiled linseed oil.

If the latter is not to be obtained, salad oil, suet, or fresh butter may be employed. Burns caused by **lightning** are to be treated in the same manner. If the patient is unconscious the treatment directed for restoring the apparently dead must be employed (see later).

Sun or Glacier Burn.

Another kind of burn is here treated of which is important to climbers. Superficial burns may be produced by the rays of the sun on the face and neck when the skin is tender or when the exposure has been prolonged. This may be daily observed amongst mountain travellers. Long walks over glaciers and snow fields with uncovered face and neck always result in a greater or less degree of burning of those parts. Strong high winds aggravate this by drying the skin. Fresh fallen snow at great heights is especially bad, owing to the greater reflection of the sun's rays from its surface.

But the skin may be burnt even on foggy, sunless days, though not to the same extent as in fine weather. For Professor Bonney has proved that much of the light which reaches us does not come direct from the sun but is reflected from the atmospheric vapours.

Sunburn shews itself in the following ways; the skin becomes red, swollen, hot and very painful, afterwards it dries, cracks, and eventually peels off. Even where veils etc., are worn, it is better to rub the skin, before starting, with vaseline, lanolin, or some other fatty material. When, however, the face is already burnt, cold compresses should be put on until medical remedies can be obtained.

Another affection, due to similar causes, to which climbers are liable, is **Snow Blindness**. Prolonged exposure to the dazzling light reflected from snow and ice fields, in some cases produces inflammation of the eyelids and eyeball. The eyes are bloodshot, full of tears, and are very sensitive to light. This affection occurs at great heights more frequently than at lower altitudes. Occasionally the inner and more delicate structures of the eye are involved, this may give rise to a long and serious malady.

Snow glasses are used to prevent snow blindness. These should be put on **before** the eye has become sensitive. The best sort of snow glasses are smoked spectacles surrounded with wire at the sides; these prevent the light striking the eye laterally.

If snow blindness has already set in and the patient cannot proceed on account of the pain, cold compresses should be applied. A piece of ice should be wrapped in a handkerchief and this improvised ice-bag applied to the inflamed eye. These ice compresses should be continued later in a dark room for one or more days.

LOCAL FROST BITE.

Exposure to extreme cold may produce changes resembling that of a burn in one or other of the members of the body. The extremities of the

body are the parts most subject to frost-bite, fingers and hands, toes and feet, then the tip of the nose and lastly the ears. Tight clothing favours frost-bite by impeding the circulation of the blood. A far greater degree of cold can be encountered without frost-bite ensuing, in still and dry weather than in windy or damp.

As in the case of Burns we can distinguish three degrees of frost-bite, the stage of redness and swelling, of blistering, and of mortification. The first stage is preceded by the familiar "dying" of the affected member, which is familiar to all mountaineers: whether fingers, the end of the nose, or the ears, are affected, the skin will in each instance become white and wrinkled and feeling will begin to disappear. The affected organs may be restored by persistent rubbing with snow. The freezing then disappears without leaving any bad results.

When the process has gone on into a frost-bite of the first degree, the painful, swollen, blue-red coloured skin can be restored to its normal condition by continued rubbing with snow or with cold wet cloths.

When the process has gone on to the formation of blisters these should be treated in the same way as burn blisters. **But this is a much more serious condition and medical aid should be obtained. This is still more essential in a frost-bite of the third degree.**

The method of procedure when the whole body is frozen stiff and apparently dead will be dealt with in a subsequent chapter. It must be borne in mind that it is very easy to break limbs in this conditions; hence the greatest caution is necessary in moving the body.

INJURIES OF BONES AND JOINTS.

These are the most common of all surgical injuries particulary in the mountains. They may be divided into Sprains, Dislocation, and Broken bones or Fractures.

Sprains.

As we have remarked in a previous portion of this work Sprains are Contusions occurring in Joints. The ends of the bones are bruised, the ligaments or bands strengthening the joint are torn as also are some of the blood vessels; in consequence blood is poured out within the joint and into the surrounding parts.

The most common seats of sprains are the wrist and ankle (twisted ankle). A sprained joint swells up, becomes discoloured through the effused blood, is painful, and can either not be moved at all or only with great pain and difficulty.

The difference between a sprain and a broken bone is, that in the case of the former the natural movements can be made passively, i. e., by a bystander, further, although the limb is swollen, its shape is not altered, as may be seen by comparing it with the corresponding joint on the sound side.

The treatment is as follows. Raise the limb, apply cold (ice is best of all if it can be got), soak a cloth or bandage in cold water and apply it fairly tightly to the injured joint. In sprains of the hand, elbow or shoulder, put on an appropriate sling and the patient may walk home, but not so if the injury be to the foot, knee or hip. In these cases the injured man must be carried home, for were he to walk every step would tend still further to increase the injuries to the ligaments and the effusion of blood into the joint. By imprudent walking upon a sprained leg many a man has had to lie up longer than for a broken bone.

Dislocations.

If through a fall or blow the cap and bands of a joint are torn through and the ends of the bone or bones slip out of the socket, the injury is called a dislocation. This injury may be recognised by the striking alteration in the shape of the joint and by the fact that its movements are either rendered impossible or performed with extreme difficulty. The only cure for a dislocation

is putting back, or, as it is called, reducing the head of the bone. This, however, should only be performed by a doctor, since unskilled attempts at reduction would probably result in either breaking the end of the bone or seriously tearing or bruising the surrounding nerves and arteries. The bystander should therefore make no attempt at reduction, contenting himself with supporting the injured limb with a sling (if the shoulder or arm be injured) and applying ice or cold compresses to ease the pain, and get the patient as quickly as possible to the doctor. Dislocations of the foot and leg necessitate a well divided carrying chair and careful transport.

Broken Bones or Fractures.

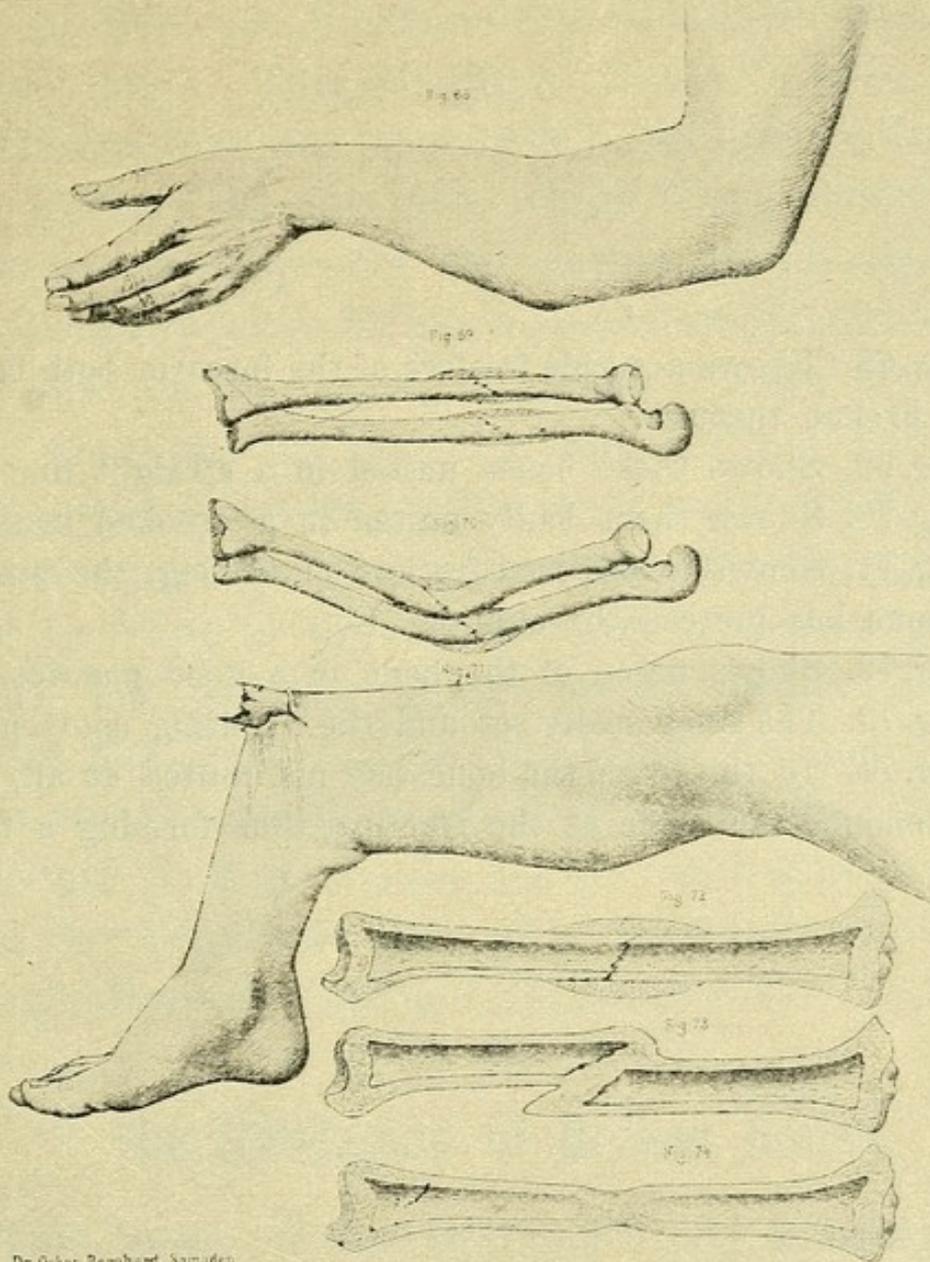
A Bone may be broken in many ways, by blows, falling stones, wood, or ice blocks, by shot, by being run over, and by falls from a height. If the bone be broken, but the skin uninjured, and the bone not visible we call the fracture a **simple** one: if, however, the skin be broken by the injury, or if one of the sharp broken ends of bone have pierced through the skin, the bone appearing bare in the wound, the injury is known as a **compound fracture** (e. g., if a man falls from a cliff on to his right leg and the bone break, the upper fragment may be driven through the skin and trousers and as it were spiked into the earth).

Compound fractures are far more dangerous injuries than simple ones. Here we have the same difference as between a contusion and an open wound of equal severity. Dirt and other causes of inflammation can easily enter the wound and may cause blood poisoning or at least long continued formation of pus. In the case of a compound fracture again, it is far more difficult to get the bones into good position than in a simple one, the ends are driven farther apart and it is no easy matter to get them back to their original position.

A fracture may be recognised by noting that the bone is shortened and unnaturally bent, further, that the bone can be moved laterally at some point between the joints where it is usually immoveable. This movement is often attended by a jarring which can be felt and sometimes heard. The patient complains of great pain at the broken part and is absolutely unable to move the limb.

If properly treated (i. e., the bones brought into their natural position and kept there by bandages) broken bones unite in their natural position in a greater or less number of weeks, the time depending on the size of the broken bone. This union is brought about by the formation of masses of bone between the broken ends. These bone masses at first form a thick ring at the broken place, this subsequently disappears. Bones which have been badly set produce in their union a

Tafel XX.



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Fig. 68. Shows a **simple fracture** of the forearm both bones being broken through.

Fig. 69. Shows these bones united in a straight line.

Fig. 70. Shows them badly united in a crooked manner.

Fig. 71. Shows a **compound fracture** of the leg, the broken shin bone has pierced the skin.

Fig. 72. Shows union of the bone in a good position.

Fig. 73. The same badly set and the resulting shortening.

Fig. 74. In this case the bone has not united at all, but has remained moveable at the fracture thus forming a false joint.

crooked limb which is consequently shorter than its fellow.

Sometimes the broken bones do not unite at all; in this case the bone remains moveable at the broken place. This condition is called a false joint.

The fracture may frequently be recognized through the clothes. In any case where a possibility of a fracture is suspected the clothes and boots must be carefully cut off; on no account should either the one or the other be pulled. After the limb has been put on a splint, and, in the case of a compound fracture, after the wound has been cleansed and dressed, the clothes may be replaced and tied on, to prevent the patient suffering from cold. The layman should on no account attempt to set the fracture, i. e., to bring the bones back into their natural position. This is the doctor's province, and it should always be borne in mind that unskilful handling of a limb may convert a simple fracture into a compound one.

The Bandaging of Broken Bones.

The duties of the bystander are **to bandage up the broken limb so as to enable the patient to be moved with safety.** In applying a bandage he should aim at fulfilling the following conditions: Rest to the broken bones, so that they shall not move to and fro, that so far as may be pain shall be prevented, and above all that the limb shall be

arranged in such a way as to prevent the broken ends of the bones cutting through the soft parts, and thus converting a simple into the far more dangerous compound fracture. Should the fracture prove to be a compound one the open wound must be treated according to the directions already given, before the limb is put in splints. Should a large bruise complicate the fracture, a cold compress should be applied before bandaging up the limb.

Materials for splints and bandages can always be obtained by a little ingenuity and setting about the matter systematically and thoughtfully. Naturally such materials are harder to obtain in the mountains than in the plain, and in some parts more so than in others. For the sake of demonstration we will suppose that the accident has taken place.

- a)* Near some inhabited place, as for instance, a mountain inn, a shepherd's hut, or a club hut.
- b)* In the woods.
- c)* On a cliff, or grass slope, or on glaciers.

In these different cases we can make temporary splints and bandages as follows.

In case (*a*) out of cardboard, cigar boxes, rulers (from an inn) fire hooks, wooden spoons, roofing, chair legs, palings, planks.

In the case of (*b*) with pieces of branches or boughs or with properly cut pieces of bark; these

can be padded with "Oldmans-beard"; or the arms can be cut off a coat and stuffed with twigs.

In the case of (c), we must in the main select our materials from such articles as we happen to have with us, as, for instance, a map, the guide's book, a folded lantern, or a telescope may be used for broken arms: sticks or alpenstocks, a rifle (in the case of hunters), tightly rolled blankets, or an ice axe may be used for broken legs, the head of the axe forming an admirable support for the foot. A very useful splint may be made by coiling a rope in a particular way. This form of splint can be made either single or double.

Soft material must always be placed beneath the splints and they must be well padded. Wool, cloths, hay, straw, and moss, or any other soft material which is at hand may be used for this purpose. Special care should be taken in padding those places where the bones lie directly under the skin, i. e., at the wrist, ankle, elbow, and toes, because pressure at such situations is very apt to produce inflammation of the overlying skin.

For fastening the splints nothing is better than handkerchiefs folded like neckcloths, failing these we may use cloth, braces, straps, strings, etc.

It must be borne in mind that knots should never be tied over the skin, but always over the splint.

The following plates show the method of applying temporary splints to the different broken limbs.

For Fractures of the skull, back bone, bones of the face, ribs, collar bone, shoulder blade, and pelvis, splints are not used: a broken finger is usually fastened to one or two of the neighbouring fingers.

Fractures of the skull and of the backbone are only too common in the mountains and are usually the result of falls.

If the fracture of the skull be not a compound one, it should only be touched by the doctor. In such an accident the patient is usually unconscious, sometimes one side of the body is paralyzed, and not infrequently there is bleeding from the ears. All fractures of the skull are in the highest degree dangerous. Should the fracture be a compound one, the wound must be treated in the same manner as those in other parts. If there is no wound, but a fracture of the skull is suspected, owing for example to the patient's unconsciousness, cold compresses should be continuously applied to the head. And wherever possible these cases should only be moved with the assistance of a doctor. The same rules apply to fractures of the spine. The broken bone in these cases usually completely paralyzes the limbs below the fracture by injuring the spinal cord.

Fractures of the bones of the face should be treated with cold water compresses tied on with a handkerchief.

Fractures of the lower jaw should be treated with the bandage shewn in Plate VIII, Fig. 19.

Broken ribs may be suspected when an uneven painful spot is felt on the injured rib; this pain is much aggravated by taking a deep breath or coughing.

This injury should be treated by a large bandage placed round the whole chest (Plate XV, Fig. 46) by this means the movement of the ribs is lessened and pain diminished.

When the pelvis has been broken the pain may be greatly diminished and transport rendered easier by a broad firm bandage applied round the hips.

In fractures of the shoulder blade and collar bone, the application of a sling is sufficient immediate treatment Plate XV, Fig. 44.

In fractures of the upper limbs, if adequate splints are applied and the arm is put into a sling and the general condition of the patient is good, he need not be afraid of walking home.

Fractures of the lower limbs, however, and weakness from shock or loss of blood necessitate the patient's being carefully carried.

Tafel XXI.

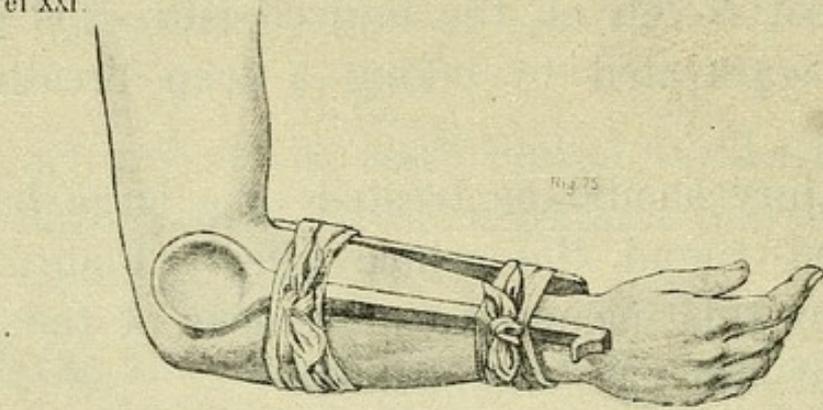


Fig. 75

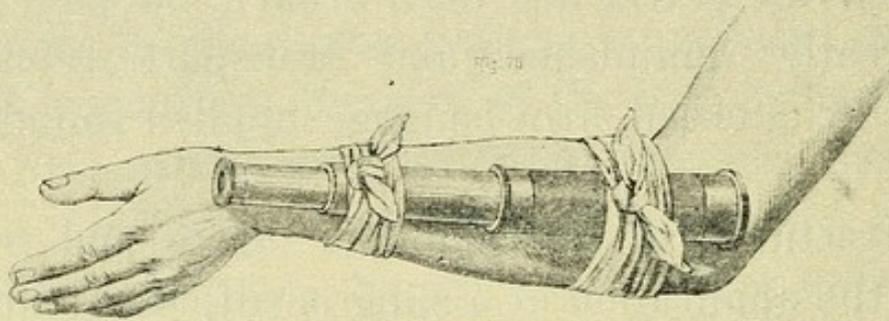


Fig. 76

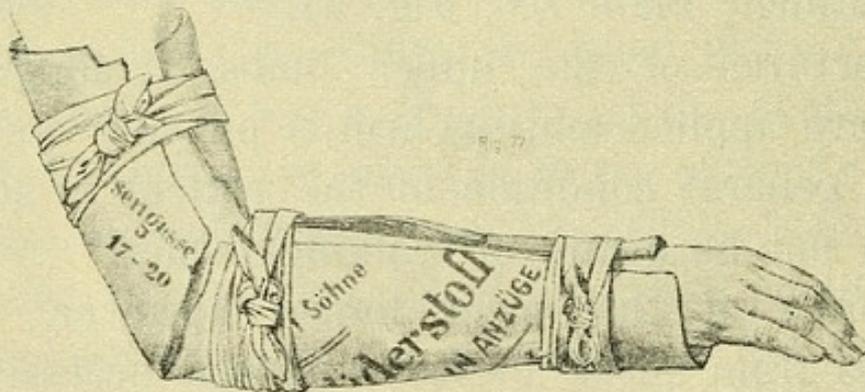


Fig. 77

Dr. Oskar Bernhard, Sanitäten
Samariterdienst
 17-20
 Sohn
 derstoff
 ANZÜGE

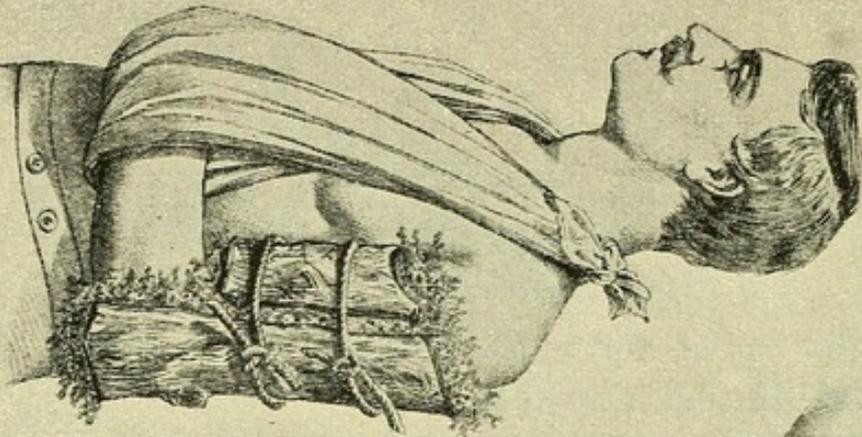
Verlag von Neumann, Neudamm
 1894

Fig.75. Splint for a fracture of forearm made from a piece of board and a wooden spoon.

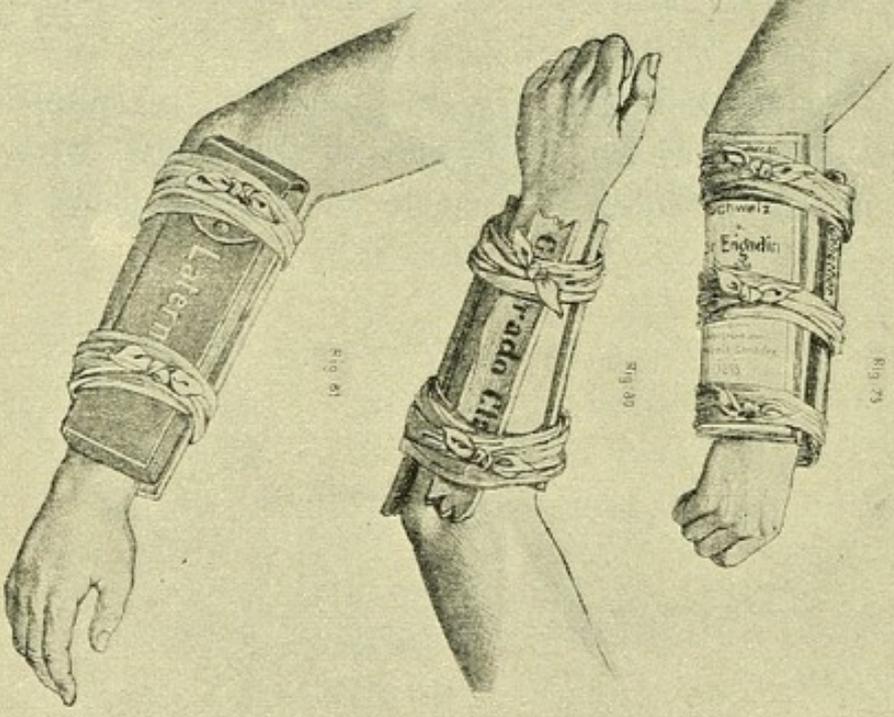
Fig.76. The same with a telescope on one side and a map or guide's book on the other.

Fig.77. Shows the way to improvise a splint for a fracture of the forearm, or injury to the elbow, with cardboard soaked in water and cut to the desired shape.

Tafel XXII



Dr. Oskar Bernhard Sauerer
 Samariterdienst
 per. 1881. Photograph. in Berlin
 Dr. Sauerer



Werk von Sauerer Sauerer
 Leipzig & Dresden 1881. No. 1000



Fig. 78. A splint for a fracture of the upper arm made from two pieces of bark which fit together. the padding made with moss; this may be secured with string (this is a very useful splint for transport).

Figs. 79—81. Splint for fractures of the forearm made with a map and a guide's book, with the sides of a wooden cigar box, with the folded lantern on one side and its case on the other.

Tafel XXIII

Fig. 62



Fig. 63

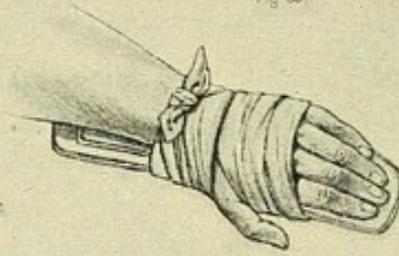


Fig. 64

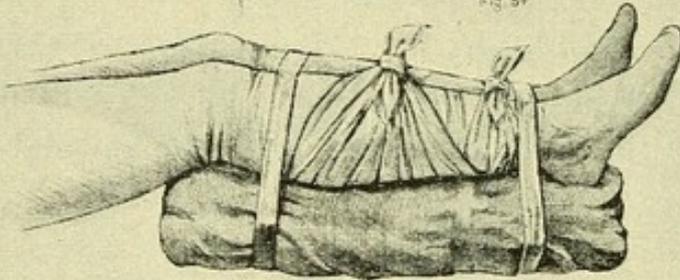
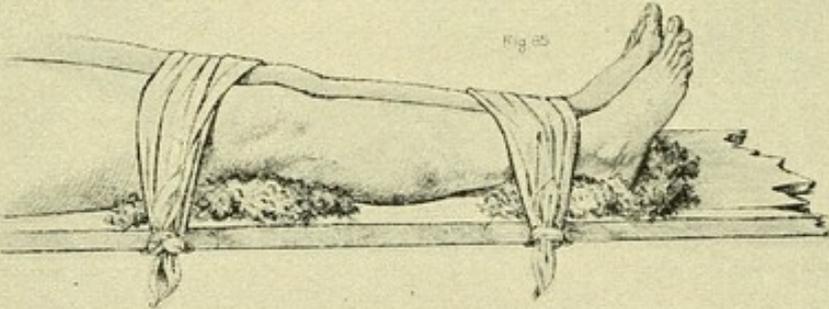


Fig. 65



Dr. Oskar Bernhard Samaden
Samariterdienst
 mit spez. Berücksichtigung der Verwundeten
 von Dr. Hochstätter

Gez. von Simon Tanner, Saraden
 Lithograph. Anst. von J. J. Sagg, Winterthur

Fig. 82. Splint for a fracture of the upper arm made with a few pieces of wood and padding of hay or moss.

Fig. 83. Splint for a fracture of the hand, or of several fingers, made out of a piece of pasteboard.

Fig. 84. Splint for a fracture, or wound of one or both legs.

Fig. 85. The same for fractures of the thigh or leg, also for deep wounds.

Tafel XXX.

Fig. 66



Fig. 67

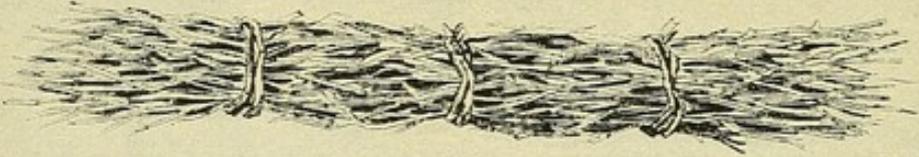


Fig. 68

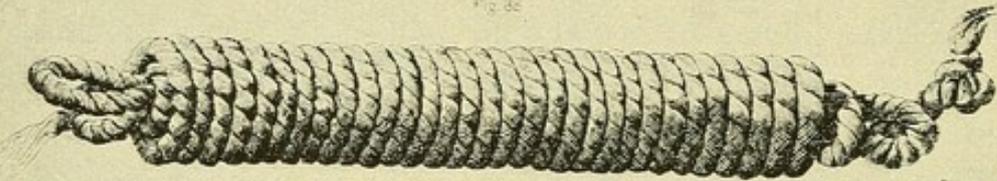


Fig. 69

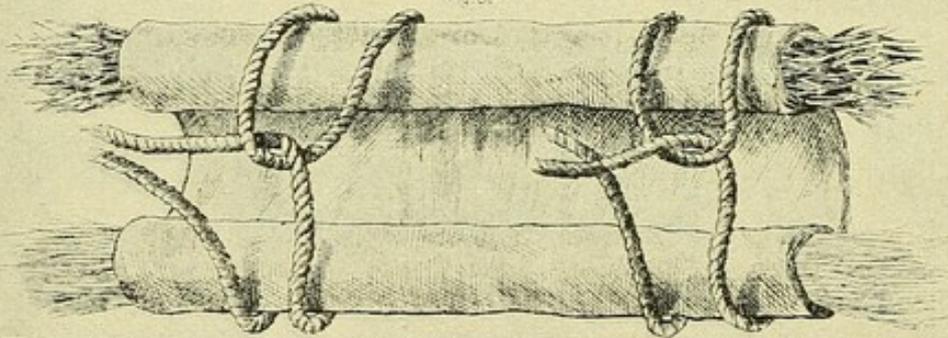
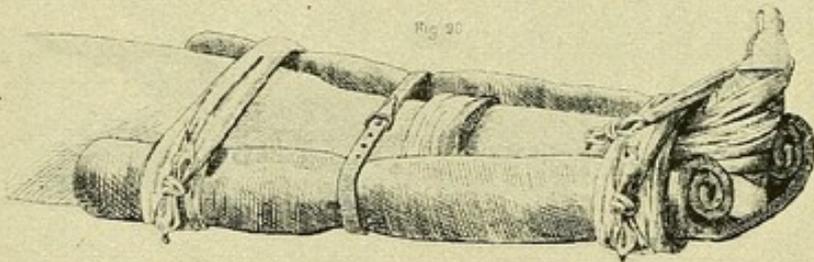


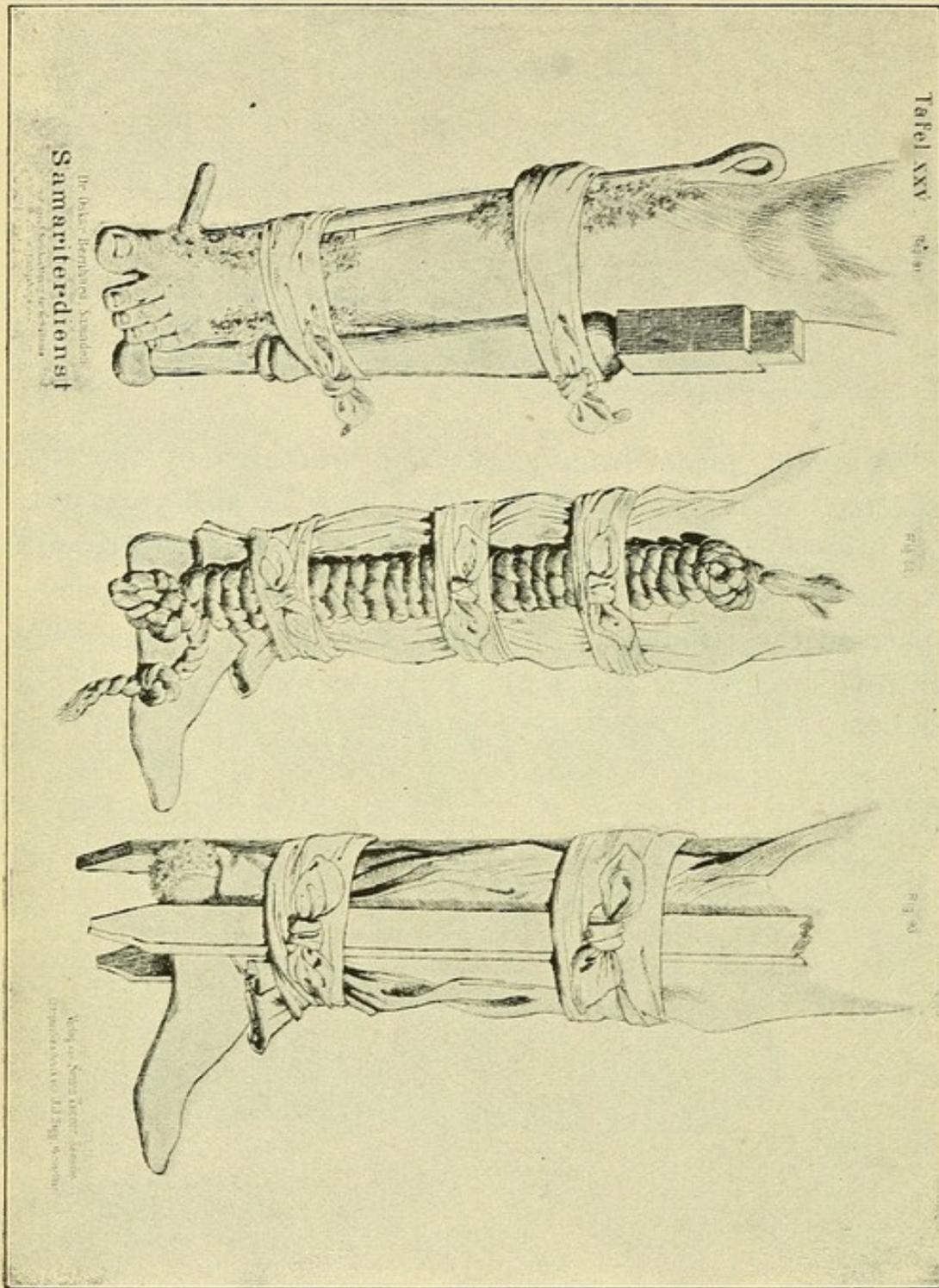
Fig. 70



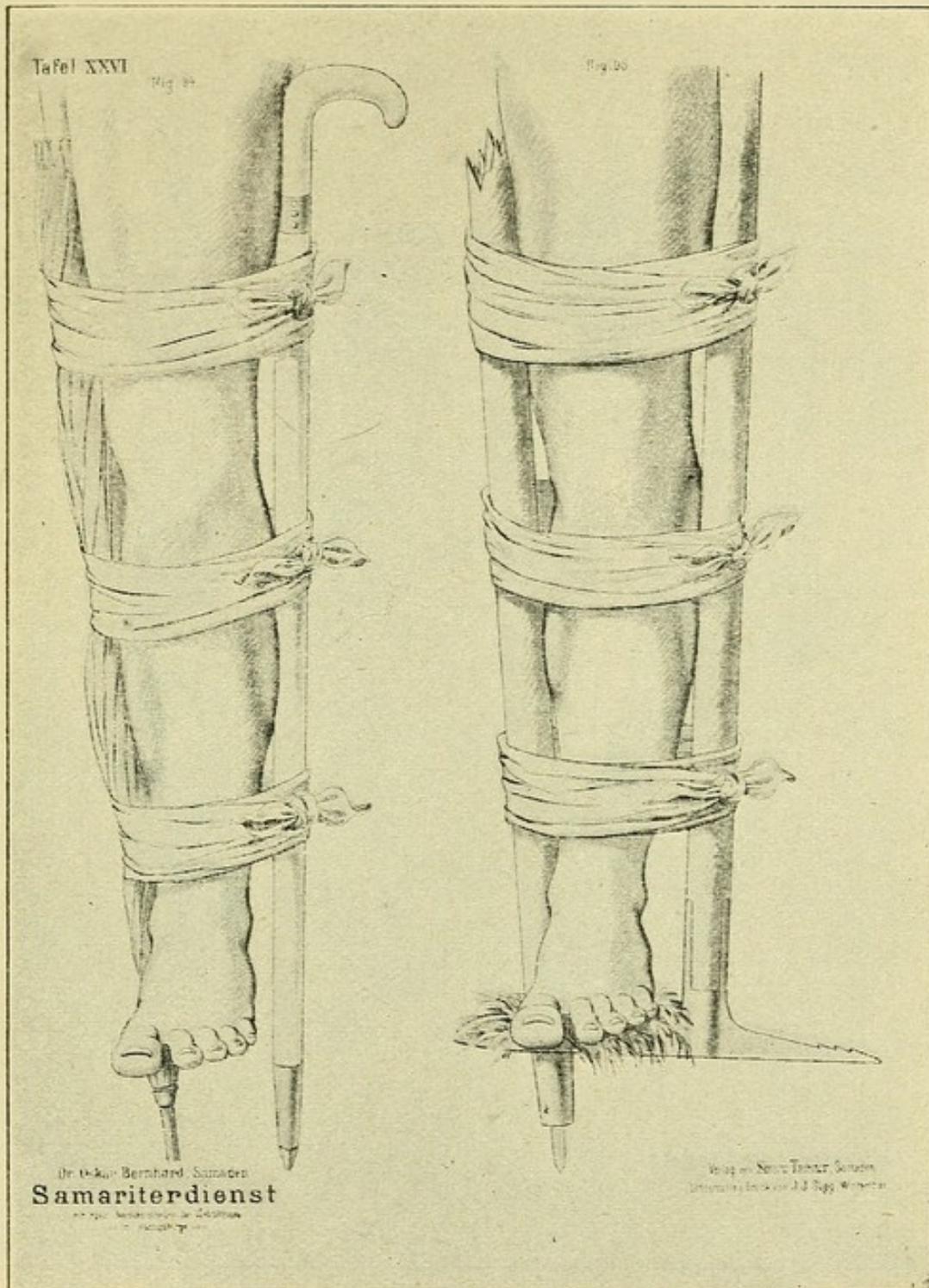
Dr. Oskar Bernhard, Samarien
Samariterdienst
 mit einer Beschreibung der Bekleidung

Verlag von Neube Tarnow, Samarien
 Lithographisch gedruckt von J. J. Stegg, Wilmersdorf.

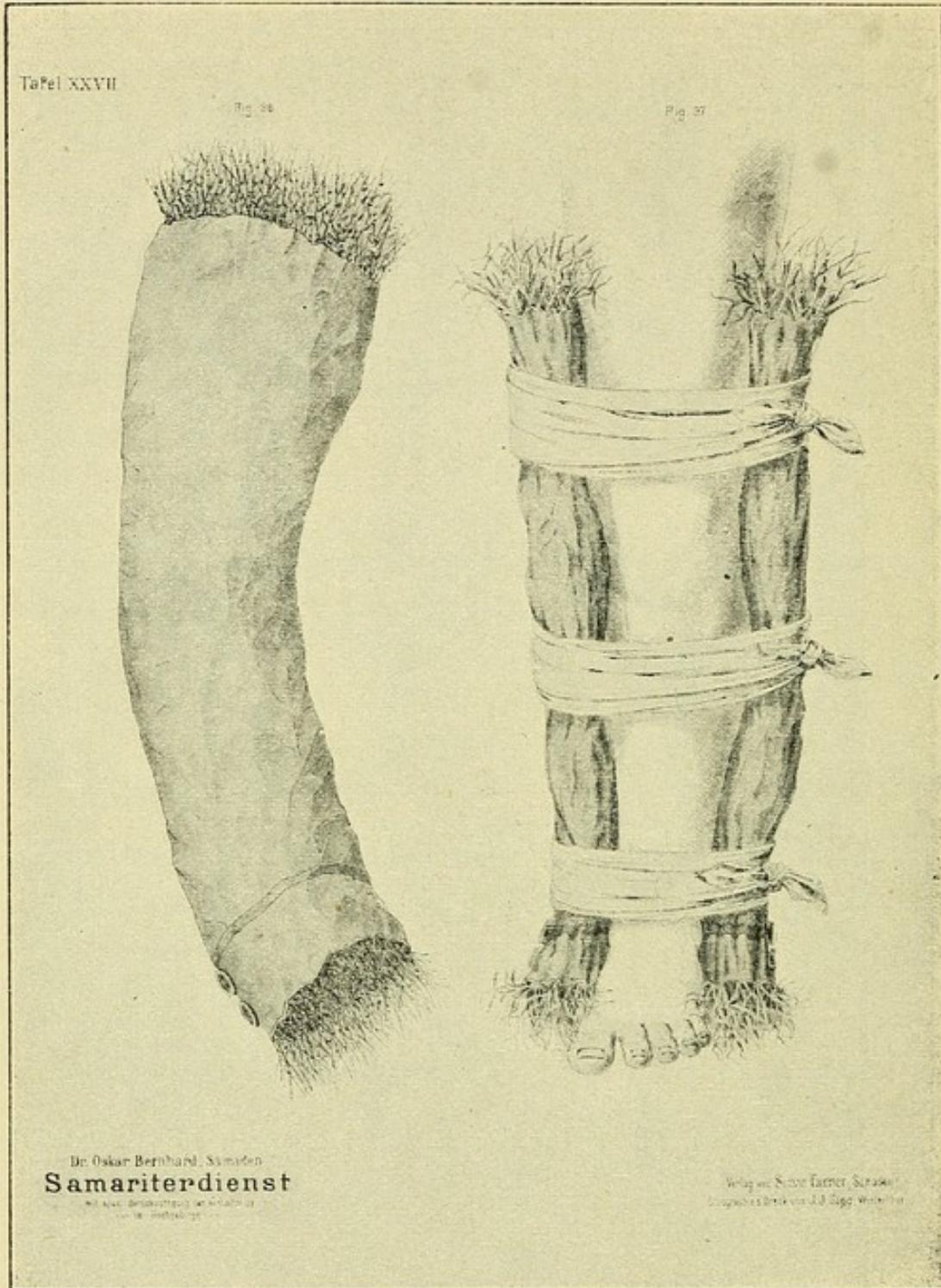
A splint made from a rug for fractures of the thigh and leg, or the bones of the foot. This is also very useful for transport in cases of dislocation of the knee or ankle. A rug is either rolled up from each side leaving just enough space in the middle for the limb (Fig. 90) or straw, twigs, or rope are rolled up in the folds to strengthen it, Figs. 86--89.



Emergency splints for fractures of the leg, either near the knee, in which case a third splint must be applied behind, reaching above the knee, Fig. 93, or in the middle of the leg, or near the ankle (fracture of ankle bone).



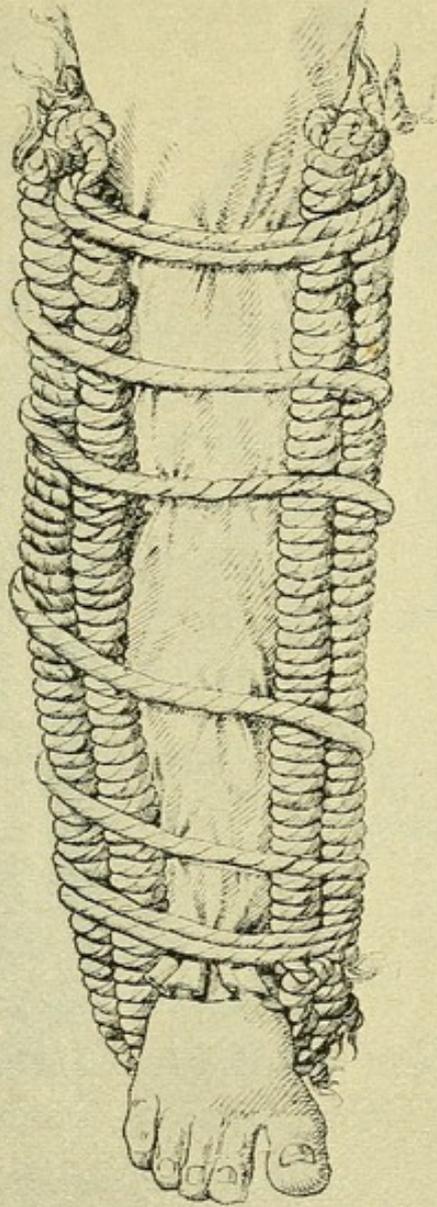
Further splints for fractures of the leg, the head of an ice axe padded with straw, moss, or cloth, forms a very good support for the foot.



Splint for the leg made by cutting off the arms of a coat and filling them with hay, straw, or moss. This splint will be found very useful, as it fits tightly and does not gall.

Tafel XXVIII

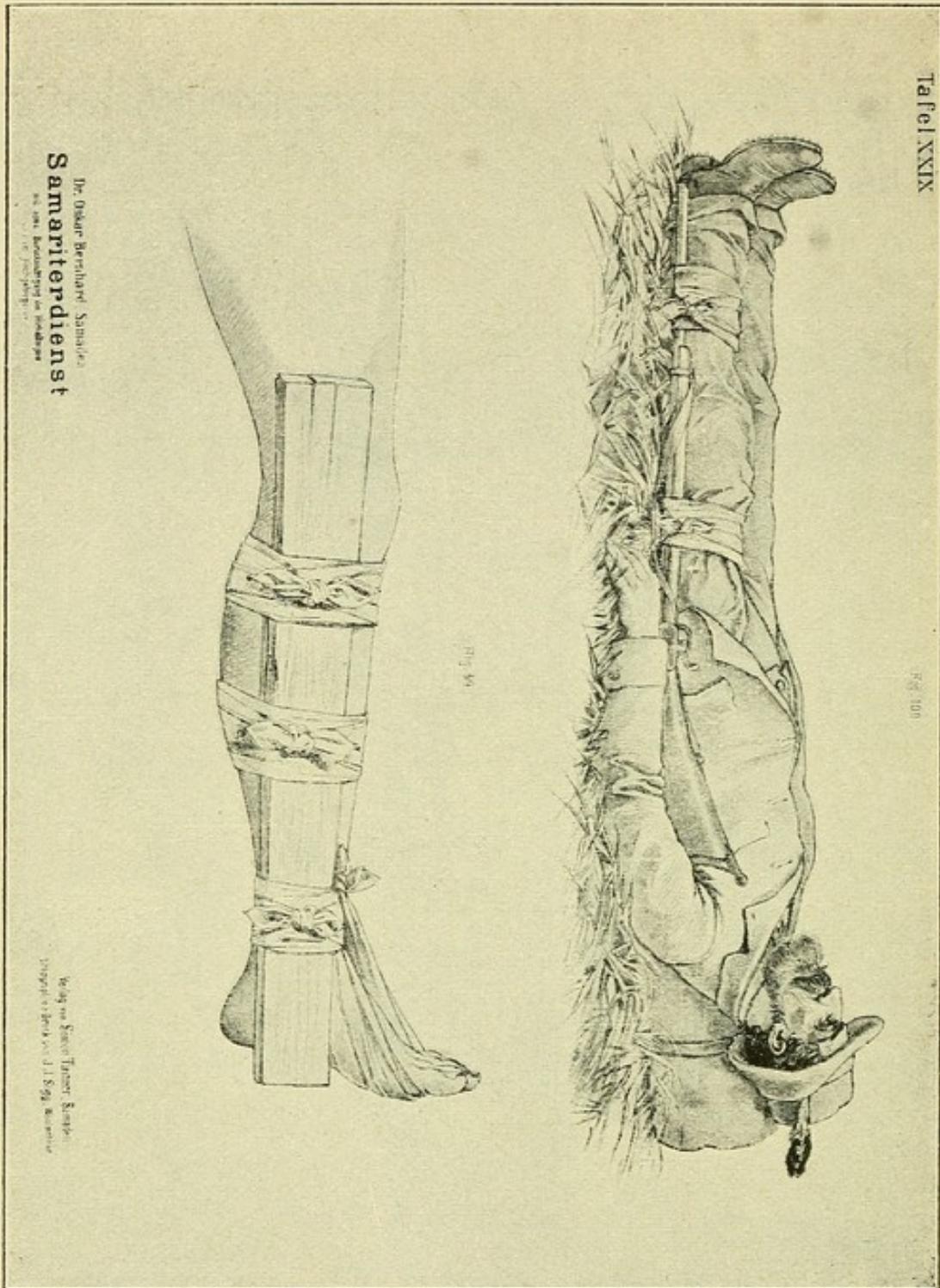
Fig. 55



Dr. Oskar Bernhard, Samaden
Samariterdienst
 mit einer Beschreibung der Verhältnisse
 in der Schweiz

Verlag von Schmid, Tanner, Samaden
 Lithographische Anstalt von J. J. Sigg, Aarau

Splint for fracture of the leg or lower third of the thigh made of the Alpine rope. This is a good firm splint.



Splint for fracture of the thigh made with a rifle on the out side; on the inner side and behind the two halves of an Alpenstock may be employed.

Fig. 90. Splint for fracture of the leg made with two boards. The foot whether injured or not should be held in its place with a comforter which acts as a stirrup.

APPARENT DEATH.

A condition closely resembling death may be caused by **Suffocation, Drowning, Exposure to cold, Heat-Apoplexy**, by **great shock**, such as Lightning Stroke, and falls from a great height, etc. This condition may rapidly pass into death itself unless prompt and efficient remedial measures are used. Consciousness, breathing and pulse are absent, the body is cold and its colour corpse-like. This condition we call Apparent Death.

Suffocation results from: (a) The stoppage of the entry of air into the lungs, by hanging or strangulation, by blockage of the larynx with foreign bodies (e. g., large pieces of food or bones); by smothering beneath falling earth, rubble, or avalanches. (b) Through breathing noxious fumes; this latter case, however, would rarely come under the observation of Alpine Climbers.

In Drowning, during submersion, water instead of air is drawn into the lungs. Drowning is nothing more than suffocation by water. If the water is cold the appearances of freezing are superadded. (e. g., drowning in the water at the bottom of a crevasse).

Freezing. General Freezing usually begins with uncontrollable sleepiness; apparent death follows this sleep and unless promptly treated passes into real death. Weary and drunken individuals are especially liable to death by freezing. When a traveller is caught by bad weather or a snow storm on a pass, snow slope, or glacier, and is obliged to spend the night in this inhospitable region, he should keep himself awake by constantly moving and have recourse to his brandy flask as sparingly as possible, since the spirit increases the sleepiness and from this sleep he might never wake.

Heat Stroke or Heat-Apoplexy.

Heat stroke is a malady which is dreaded with reason. It occurs during long marches in hot oppressive air, especially through shadeless, arid country.

Its cause lies in excessive sweating, and when the secretion of sweat can no longer be carried on the blood becomes thick and circulates with difficulty. The flow may even be entirely interrupted, especially in the brain: death is then instantaneous.

Premonitory symptoms of heat apoplexy are thirst, a dry hot burning skin, extreme redness of the face, weariness, and headache. When spoken to, the patient gives slow answers in a

thick voice. Anyone presenting such symptoms should be got as quickly as possible to a cool shady place near water, tight clothing should be loosened, the whole body sprinkled with cold water, cold compresses applied, abundant water to drink and several doses of 20—30 drops of Hoffman's Anodyne administered in water. If the patient falls senseless to the earth, he must be treated in the same way, except that nothing must be poured down the throat. If he does not recover, if the breathing remains irregular or ceases, artificial respiration must at once be resorted to.

Sunstroke.

If a traveller walks in a burning sun and is, as is not uncommonly the case, so foolish as to carry his hat in his hand instead of on his head, the brain may become affected by the sun beating upon the head and neck, this begins with headache and dizziness, and may pass into loss of consciousness.

These patients also should be placed in the shade, their clothes loosened, especially about the neck, and water applied externally and given to drink. They should be led or carried as quickly as possible down into the valley to the nearest habitation, Club hut, shepherd's hut, or hospice. They should be put to bed, ice applied to the head and medical aid summoned.

Treatment of Apparent Death.

As soon as a man has ceased to breathe, air must be driven into his lungs artificially. The cause of the accident should be removed at once.

First. in the case of hanging or strangulation, the rope or handkerchief should be carefully cut through so as not to injure the patient, the body being held by one arm to prevent its falling.

Second. If the **air passages are stopped up by foreign bodies**, these must be carefully removed from the mouth and nose. If the obstruction lies deeper in the throat, as in the case of lumps of food, a determined attempt should be made to remove it with the fore finger or the two fore fingers (care should be exercised to avoid being bitten). Should there be any difficulty in opening the mouth, the nose may be held with the left hand. The doctor should be sent for and told exactly what is the matter.

Third. In the case of **poisoning by noxious vapours**, the patient should be brought as quickly as possible into the fresh air, the rescuer exercising due care to prevent getting poisoned himself.

Fourth. As soon as the **drowned** man has been got out of the water, his mouth and throat should be cleansed from sand and froth, the upper part of the body stripped, and the trousers unfastened: the body should then be placed across the knees with the head and chest sloping slightly downwards (but should not, however, be held upside down) and attempts made to drive the water out of the lungs by pressure applied to back and ribs (Plate XXX, Fig. 101). If this does not suffice to restore him we must at once begin Artificial

Respiration. During the attempts at resuscitation, which should be continued if necessary for hours and in **any case until the arrival of the doctor, who should immediately be summoned in every case of apparent death**, the body should be rubbed dry with woollen cloths or articles of clothing. As drowned people are often absolutely stiff with cold, especially from immersion in cold water, it is essential that they should be warmed.

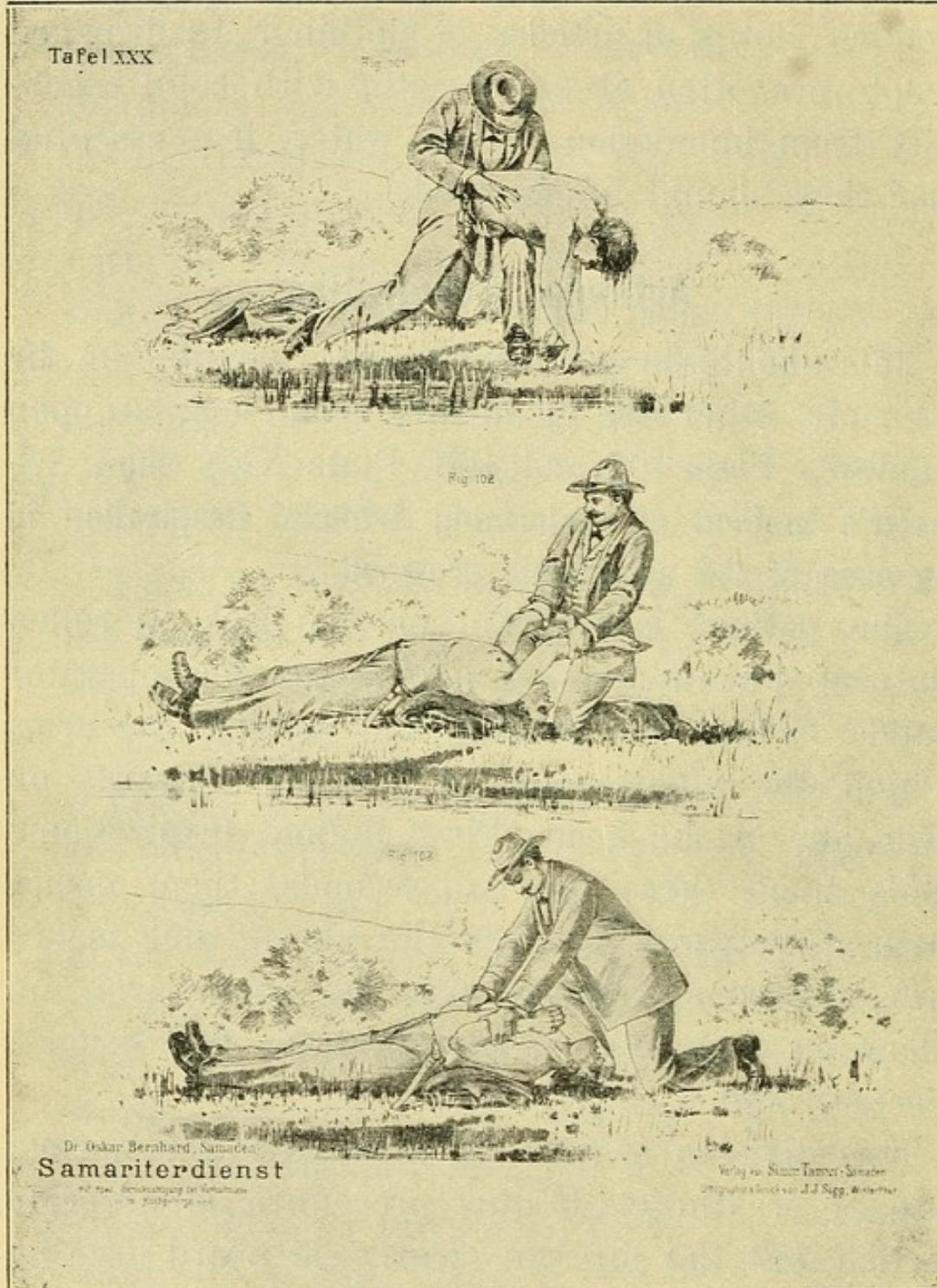
Artificial Respiration.

This should be performed where possible in the open air, otherwise in an airy room near an open window. Figs. 102 and 103, Plate XXX **show Sylvester's method of performing Artificial Respiration in the case of the apparently drowned.**

The patient is laid flat on his back, a rolled up coat put under his shoulders, the operator stands behind the patient and seizing the arms behind the elbow joint pulls them upwards on each side of the head (First Motion, Inspiration); holds them there for two seconds, then pushes them downwards towards the chest, and makes firm and even pressure with the upper arm and elbow on each side of the chest for two seconds (Second Motion, Expiration).

This division of time corresponds to the normal rate of breathing. If this procedure is properly carried out the air can clearly be heard passing in and out of the larynx.

When there is a sudden change in the patient's appearance, the natural colour returning to his face, the first breath will soon be drawn and his return to life assured.



Another method of performing **Artificial Respiration**, which has often in my hands yielded very good results is that of **Laborde** which is figured in the following plate.

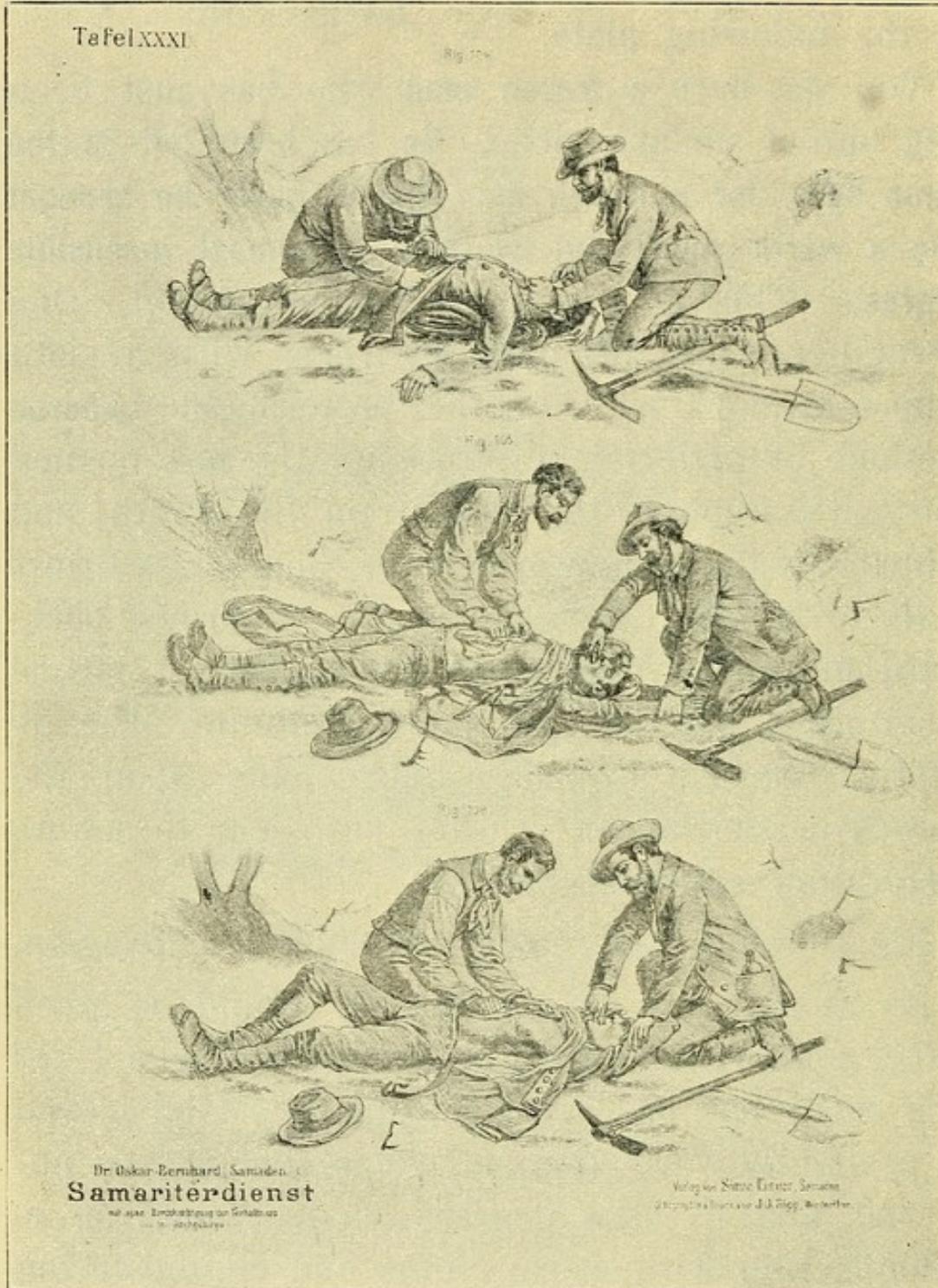
You see here a **frozen man** who has just been dug out of an avalanche. **He has been left in the same spot, for a frozen man should never be brought into a warm room, but warmed by almost insensible degrees.** This is a correct popular notion. One bystander rubs the patient's chest with a cloth dipped in snow, while another performs the **Laborde** method of artificial respiration. He has opened the jaws, removed the snow from the mouth, and pulled out the tongue which he then seizes firmly with a handkerchief and makes vigorous backward and forward movements at the rate of normal respiration. That is, 20 times a minute. The irritation caused by these movements upon the nerves of the larynx is often sufficient to set up respiratory efforts.

Fig. 106 shows the frozen man coming to life again.

As soon as he can swallow he should be given some cold wine, coffee, or brandy. And not till this stage has been reached should he be moved to a slightly warmed room, where he may be put to bed, and by slow degrees we may pass on to rubbing him with warm cloths and administering warm food and drinks.

The Count de la Beaume climbing the Piz Zupo (Bernina-Massive) in 1882 fell into a crevice, that was covered by

snow, with his two guides. All three were buried by the falling snow. The two guides, however, were lucky enough to get out. After excavating the Count they found the same



suffocated. If the guides had really known the treatment of apparent death it is most probable that they would have been able to call their tourist back to life.

The Laborde method of Artificial Respiration may also be advantageously employed in cases of **suffocation, lightning stroke,** and in cases of **collapse or shock** (compare Contusions, p. 16), and in cases of **heat-apoplexy.**

ATTACKS AFFECTING THE NERVOUS SYSTEM.

In the mountains more even than elsewhere affections of the nervous system are met with in which prompt and efficient aid is of the highest value. The commonest of these are **fainting fits.** These are due to disturbances of the circulation of the blood in the brain, either by **an undue pressure,** or **by want of it; the latter is the more common cause.** Through impairment of the heart's action and of that of the great vessels within the body the bulk of the blood collects there, leaving the brain and the surface of the body partially bloodless. This impairs the action of the brain. The sufferer's colour changes to a deadly pallor, his head swims round, a cold sweat breaks out upon him, everything appears dark before his eyes, and he falls unconscious to the ground. This may occur to the strongest as well as to the weakly ones. The most common causes of fainting are unusual bodily exertion, acute mental impressions, such as fear and joy, sudden severe pain, falls, blows, and loss of blood.

The duration of a fainting fit is usually short. Most people quickly recover without help, and without ill after effects. The patient should be laid flat, with the head low. Sometimes a companion is seen to turn pale and beads of sweat break out on his forehead, then one may know that he is going to faint: if he is at once laid down flat the occurrence may be prevented. All clothing which tends to hinder breathing and circulation, such as collars, neckties, belts and stays should at once be unfastened, the face should be sprinkled with cold water, smelling salts should be held to the nose and the forehead and temples rubbed with Eau de Cologne or vinegar. If the patient can swallow he should take brandy, wine, or other stimulants or 20—30 drops of Hoffman's Anodyne. If the fainting fit lasts some time, a doctor should be sent for.

It is obvious that when the fainting fit is due to loss of blood the first thing to do is to stop the bleeding.

If the fainting fit is due to excessive pressure of blood in the brain, as for example after long hot walks or in the victims of heart disease, the eyes are staring and the face is not pale but dusky red. In this case the head should be propped up, cold water bandages or ice applied to it and, where possible, counter irritants employed (hot water to the feet, mustard leaves to the calves and chest and rubbing of the body with cloths) until the doctor's arrival.

Should the fainting fit be due to **exhaustion** the first thing to do is to give the patient the necessary rest.

Apoplexy.

In an apoplectic stroke the victim falls senseless to the ground, and one side of the body will generally be found to be paralysed. He moves the leg and arm of one side only, and if the arm of the other side be lifted up it falls back like a log of wood.

The victim of an apoplectic seizure should be laid down in a comfortable position, with the shoulders slightly raised; wet cloths or, better still, a cloth with bits of ice wrapped up in it applied to the head, and medical aid summoned.

The victim should on no account be moved except when a doctor is present.

Epilepsy.

Although persons subject to epileptic fits should on no account climb mountains, yet injunctions are often disobeyed and they take part in excursions. If seized with one of these fits the victim presents a most distressing appearance. Sometimes after a warning, such as feeling sick, or sensible of an unpleasant smell, often, however, without any premonition, he falls to the ground unconscious, uttering a loud cry, his whole body becoming convulsed. The face is distorted, the fists are clenched, and the arms, legs, and body, quiver convulsively. As there are no means of cutting short these attacks, the only thing to do is to remove anything against which the unfortunate victim might hurt himself in his convulsions. He should be taken away from cliffs, blocks of ice, roots, or stones, against which he might hit himself, and laid on soft grass, or if the fit occurs on a glacier or snow field, on rugs or a coat, and watched until the fit ceases. Nothing should be done to the patient, (such as holding him tightly or rousing him). Such attempts only increase the severity, and lengthen the duration of the fit.

When the fit is over the patient feels exhausted, but after a short rest can proceed on his way.

Drunkenness.

As is well known, heavy drinking can lead to complete loss of consciousness, and cause considerable anxiety. The man's breath smells of whatever stimulant he has been taking and at once discloses the cause of his condition.

The patient should be brought to a shady place, tight clothing loosened, the throat tickled with the finger or a feather, until he vomits, his head sprinkled with cold water and cold water bandages applied to it; his shoulders should then be raised and he should be left to sleep off the effects of his intoxication.

MOUNTAIN SICKNESS.

The name of mountain sickness is applied to the various symptoms caused by climbing mountains of 10,000 feet and upwards, and which are caused by the action of the rarefied air and the fatigue attendant on the ascent.

Different persons are affected by mountain sickness in very different degrees.

People accustomed to be much on the mountains, such as shepherds, chamois hunters, guides, and the majority of climbers, very rarely suffer from it and are more capable of resisting it than people unused to mountain climbing.

Its earliest symptom is an unconquerable feeling of fatigue and loss of courage, **so that a man who**

has up to then walked well and pluckily, loses his sureness of foot, gets giddy, is frightened at perfectly easy places, refuses to go further, lies down and often expresses thoughts of dying. Palpitation of the heart, tightness of the chest, dislike to food, a sense of suffocation, ringing in the ears, and headache are also prominent symptoms. Nausea, bleeding from the mouth, nose and ears, sometimes even from the lungs, are occasionally noticed. Aeronauts also experience these feelings when they are rising to great heights; but except the ascent is made very rapidly, the symptoms only come on at very great heights, since in their case one of the chief factors, fatigue, is absent.

In the mildest form of the affection, which is shown by loss of courage, the victim can generally be rallied from his state of demoralization. He should then be given some food and a drink of wine, after which he will generally be able to go on. The matter, however, does not always end so simply. With the best will in the world, the patient may not be able to master his weakness. In such case it is useless to urge him forward, his condition will only be aggravated. The only thing to do is to let him rest for a time, and then descend. Mountains sickness should never be treated by the administration of drugs, such as Antipyrin, Phenacetin, Cocaine, etc.; they are quite useless, and indeed harmful, under the circumstances.

TRANSPORT AND TRANSPORT MATERIALS.

Next to the arrest of bleeding and resuscitation, the transport of injured people is the most important department of ambulance work. I must again repeat that it is not the duty of the trained bystander to act as doctor, but merely to avert immediate danger until the doctor's arrival, or to transport the injured man with the least possible discomfort to a place where he can obtain medical aid. In the mountains, even more than elsewhere, transport is of the highest importance. In the plains a doctor can always be easily obtained; but it is otherwise in the mountains, where hours or even days may elapse before his arrival, and indeed it may occur that owing to age or weakness the doctor cannot reach the place of accident.

Under these circumstances, it becomes imperative to bring the patient into the valley or at least to an accessible spot.

By the use of proper means of conveyance, not only will the patient be saved much unnecessary pain, but he will also have the gratifying consciousness that he is getting down to nursing and skilful attention. Yet transport opens the way for many blunders. As we have before seen there are many cases in which the patient should only be moved in the direst extremity, and indeed

there are some where he should not be moved at all. When a man is so badly injured that even a layman can see that death is surely impending, the attempt to move him would be mere cruelty, especially if he is still conscious. It would be heartless to further embitter his last moments by the added pain of moving him: it is better to lay him down in the nearest sheltered spot, to protect him from the cold as far as may be and let him die in peace.

Before moving a patient one should always carefully consider what is the best kind of transport for the individual case.

If a **solitary climber** meets with an accident, he should summon all his strength to reach the nearest habitation, even if it be on all fours. There, he may have at least the hope of either finding men or being found by them. Should this be impossible, he must endeavour to drag himself to a conspicuous place, where he can make signals of distress with his Alpenstock, and his handkerchief. Many a man has thus escaped death from cold or hunger by putting forth all his strength in a sensible manner. I can testify to this from my own experience.

On an early September morning several years ago while Chamois hunting on the north side of the Corvatsch, in crossing a frozen slope I slipped. There was no chance of stopping one's self, and I slid towards a precipice.

In this short time a crowd of thoughts rushed through my brain; but the sensations up to the moment when the

concussion against the rocks rendered me senseless, were by no means so pleasureable, as one would suppose from reading Professor Heim's pamphlet on "Death by Falling".

The mid-day sun roused me from my unconscious state caused by loss of blood and shock. I lay with the back of my head on the edge of a stream which sprinkled my hair. In my fall I had sustained considerable contusions, deep cuts at the back of the head, and a compound fracture of the bones of the left hand. The wounds on my head had ceased bleeding, but that in my hand soon burst forth again. I dipped my handkerchief in the clear, cool mountain stream, and tied it round my hand securing it as tightly as I could with my teeth and my right hand. Then I quenched my burning thirst in a more simple manner than Diogenes, by drinking straight out of the brook; after this I felt somewhat revived. As I could not walk, I dragged myself on all fours as best I could to a shepherd's hut about an hour distant, which however I did not reach till the evening, and sank exhausted on the bed.

Shortly afterwards another Chamois hunter came into the hut. he covered me with his coat, made a fire and revived me with some hot chocolate and next morning carried me down into the Fexthal. Had I lain where I fell, the cold autumn night would have been very dangerous to life itself at that height.

If there are **two travellers** and one of them meets with an accident, or is taken ill, he can be helped along by his friend. If he is unable to walk his friend takes him on his back. A strong man can in this manner carry another down hill for hours along the most difficult paths. For short distances a man can carry another in his arms, the injured man being able to hold by his arms round the other's neck. If the carrier takes a blanket, cuts

two holes, one near each end and puts his head through these, he will find by carrying the injured man in this improvised sling that it will enormously reduce the fatigue of his burden.

Where transport is likely to be longer, a carrying chair or emergency sling should be constructed, or a handcart obtained. The simplest carrying chair is formed by taking an ice axe, stout stick, or trunk of a small tree, wrapping a coat or blanket firmly round it, and slinging it from the shoulders by two straps of rope or leather.

The injured man sits on the seat, with his face pointing forwards, and one leg on either side of the carrier. The patient holds on to the carrier by the shoulders. The carrier can if necessary fasten him to himself by passing a strap round the back of the patient and securing it round his own body. A very good carrying chair can be made with a piece of wood cut into the shape of a heart (Fischer's shoulder chair). Good carrying chairs can also be made out of ordinary chairs fastened to the back by shoulder straps. To prevent the back of the carrier getting rubbed a pad made from a folded blanket or straw may be placed between his back and the chair. A similar chair may be formed with one of the frames which peasants use to make packs of their provisions. There again, where possible, the patient should be seated face forwards. The reason is that when the face is turned backwards the centre of gravity

is brought so far back that much additional power is spent in counteracting this force. In passing narrow paths which skirt cliffs, however, the patient must be placed facing backwards, for otherwise his legs protruding on either side of the carrier would render the passage impossible.

In woods a form of carrying chair can be rapidly improvised (Plate XLI, Fig. 141). The baskets which are used for carrying loads on the back may also be employed, the back being cut out and the bottom filled with hay. If the lower limbs have to be supported the chair should be lengthened with a plank or with branches to which the legs are firmly secured.

With a mountain sledge a single man can easily draw an injured one with very little discomfort. Figs. 159—161 on Plate XLVIII show the construction of such a conveyance and its method of use.

Similarly, an injured man can be conveyed on a handcart, by one man alone. When the patient has to be conveyed in a recumbent position, the long hand carts used in some places for hay are very useful, they can be made more comfortable by adding some extra cross slats. Plate XLVIII, Fig. 162.

For conveyance in a sitting posture, a wheelbarrow is admirably adapted. A wheelbarrow can be used on almost all paths, even where there is only room for one man as well as on the narrowest bridge or even over an unrailed plank bridge.

Where the party consists of **more than two**, transport is rendered much easier, and if necessary one can always hurry down to the valley and seek further help. Two men can always carry a third in short stages, either by putting him on their crossed hands (carriage by Swiss methods) or by holding him under the arms and knees and walking in Indian file, or by carrying him sitting with his legs hanging down with or without supporting his back (back support).

The employment of the so-called carrying seat (made of straw, rope, or a buckled belt) or a seat made by two pieces of wood passed through a piece of linen, will be found to render this form of transport much easier.

Where the distance to be traversed is considerable, an improvised carrying apron will be a great help.

A wrap (such as a plaid or a hay cloth) should be taken, a hole cut through one end, and a stick secured across the other. One carrier puts his head through the hole; the apron is extended and the injured man placed on it so as to bring the stick under his knees; the other carrier places himself between the patient's knees, bends down and catches hold of the two ends of the stick.

At a given signal the two carriers raise themselves at the same moment.

Should the lower limbs be injured and the distance to be traversed considerable, in the absence

of a stretcher, **three men** are necessary; two of these should carry the man on a carrying seat while the third walks in front and carries the legs supporting them beneath the knees and ankles (Plate XLIV, Fig. 132).

When there are several people present and the distance to be traversed is long an **emergency stretcher** should be constructed. This can be made in various ways, according to the nature of the locality in which the accident has happened.

If the accident has happened near dwelling places, a stretcher can be improvised from doors, ladders, or benches, straw sacks, hay cloths, (hanging litter); out of troughs, or by cutting off the corners of empty sacks and running two poles along the sides.

In woods we may use twigs and branches, or may run two poles through the sleeves of a coat turned inside out, and then buttoned.

On glaciers or rocks, we may use ice axes, rifles, or one or two alpenstocks, these being lashed together with braces, rope, belts, rugs, one or two waistcoats, a waistcoat and a comforter, a coat, one or two knapsacks, according to the position in which the patient has to be carried.

The bottom of the litter should if possible be covered with soft material; a pillow should be made for the head, with a rolled up coat or rug, or knapsack filled with hay, twigs, etc. The stretcher may be carried with the hands, or slung

from the shoulders by straps. Plate XXXVI, Figs. 119—120, and further Fig. 118 on Plate XXXV show the best method of getting an injured man on to a stretcher or carrying chair. A badly injured man or a very nervous person should always be tied on to the stretcher.

The bearers of stretchers or carrying chairs should always remember to break step (i. e., never to start with the same foot) and to take small quick steps. The bearers should if possible be of about the same height. Otherwise, the carrying straps must be adjusted so as to render the stretcher horizontal.

The stretcher should never be carried on the shoulders as in that case the injured man may fall out or die suddenly unobserved.

When the stretcher has to be carried down steep slopes, along steep paths or up and down stairs, the following plan should be adopted. Two men should be placed at the head of the stretcher who carry it on their shoulders; at the other end one man should be placed who carries it with his hands, in this way keeping the stretcher as horizontal as may be. In going down hill two bearers should go in front and one behind; in going up hill two bearers behind and one in front (Plate XLVII, Fig. 157). Where possible the patient should be placed on the stretcher with his face towards the rear bearer, so that the latter can

watch him carefully. On uneven ground he should be carried uphill head first, down hill feet first.

A broken leg, however, forms an exception to this rule as one must always avoid the weight of the rest of the body pressing upon the injured part, for this would cause excruciating pain.

In placing the patient on a litter, or in taking him off, the greatest care should be taken to avoid undue shaking or swaying, as an extra movement is not only excessively painful, but may be absolutely harmful. Wherever possible one should avoid crossing fences, walls, or ditches; when there is no very great hurry, it is far better to make a detour. Wherever **wheeled vehicles** and **animals for draught or riding** can be procured, these should be used. Where one of the wood or hay sledges used by the peasants on the Alps is at hand it forms a useful and very comfortable means of transport: these can be drawn either by men or beasts. A post parcel sledge is a very convenient form of transport and even in summer these can be found at hospices on the tops of passes, and at road mender's huts.

A very good wheeled ambulance can be improvised from a two wheeled cart (see Plate XXXIX).

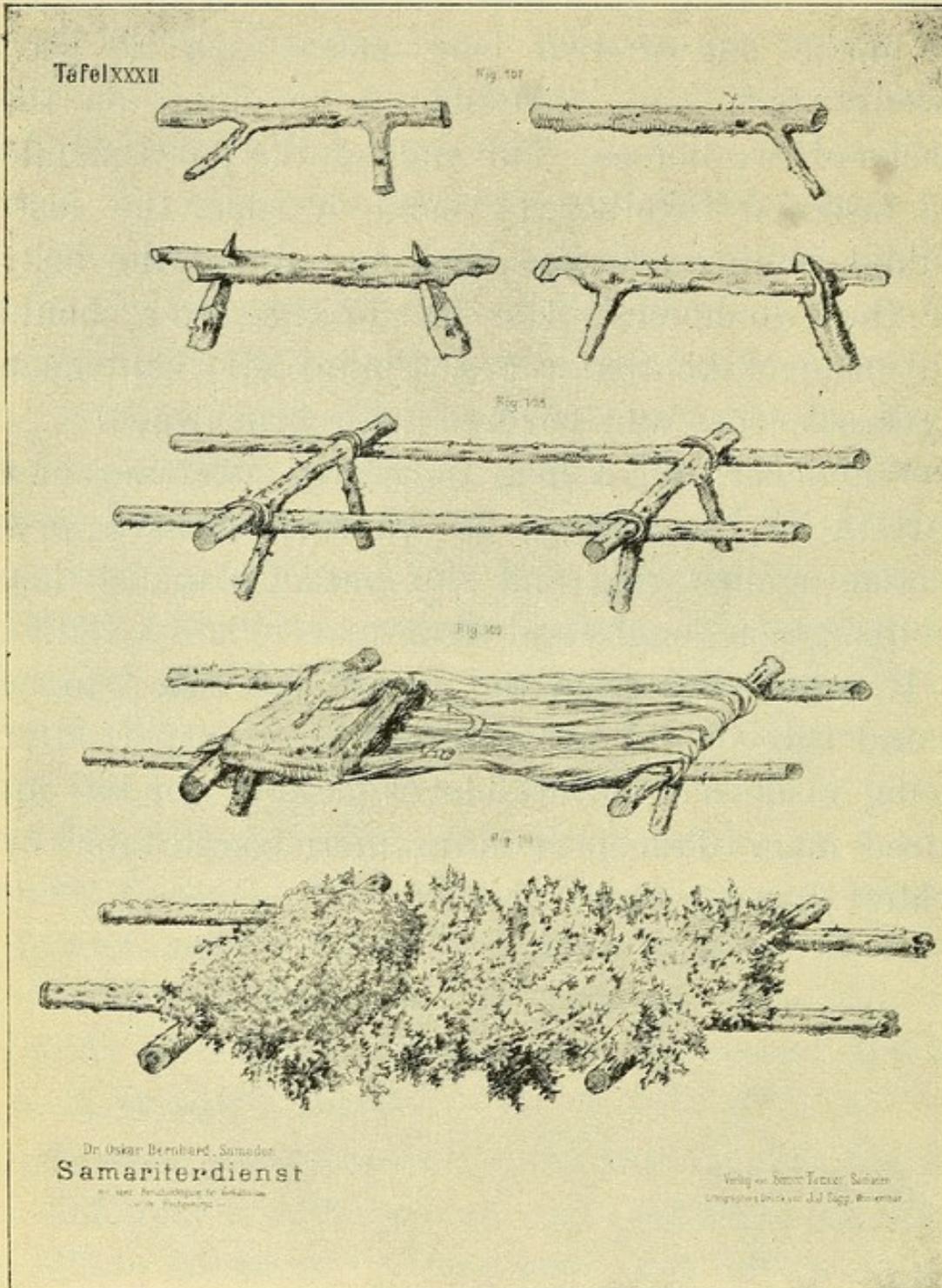
Plate LI shows a very good way of forming a wheeled ambulance for one or two men out of a mountain cart (Leiterwagen).

When draught animals, horses, donkeys, mules or oxen can be procured but no vehicle is forth-

coming, a large mountain sledge should be made and the animal harnessed to this, or a litter may be made out of two long poles each at least twenty feet long, this should be slung on the backs of two horses. The ends of the poles should be fastened together by belts or rope, the fastenings joining over the back and round the belly of the two horses. The bed of the litter should be made of knotted ropes (Plate LXII) kept open by crosspieces and covered with brushwood.

When carrying a man in a large stretcher or a cart, a **tilt** can always be improvised as a protection against rain and sun out of blankets, hay cloths, green boughs and straw mats (Plate XXXIX).

If a lake lies upon the way and a **boat** is to be found this should be preferred for transport after being made as comfortable as possible for the injured man. Transport is far more comfortable by water than by land.



Emergency stretchers, with and without feet made out of the small trunks or branches of trees (From Esmarch and Christian Smith). Blankets, or wattle made with twigs, may be used for the bed.

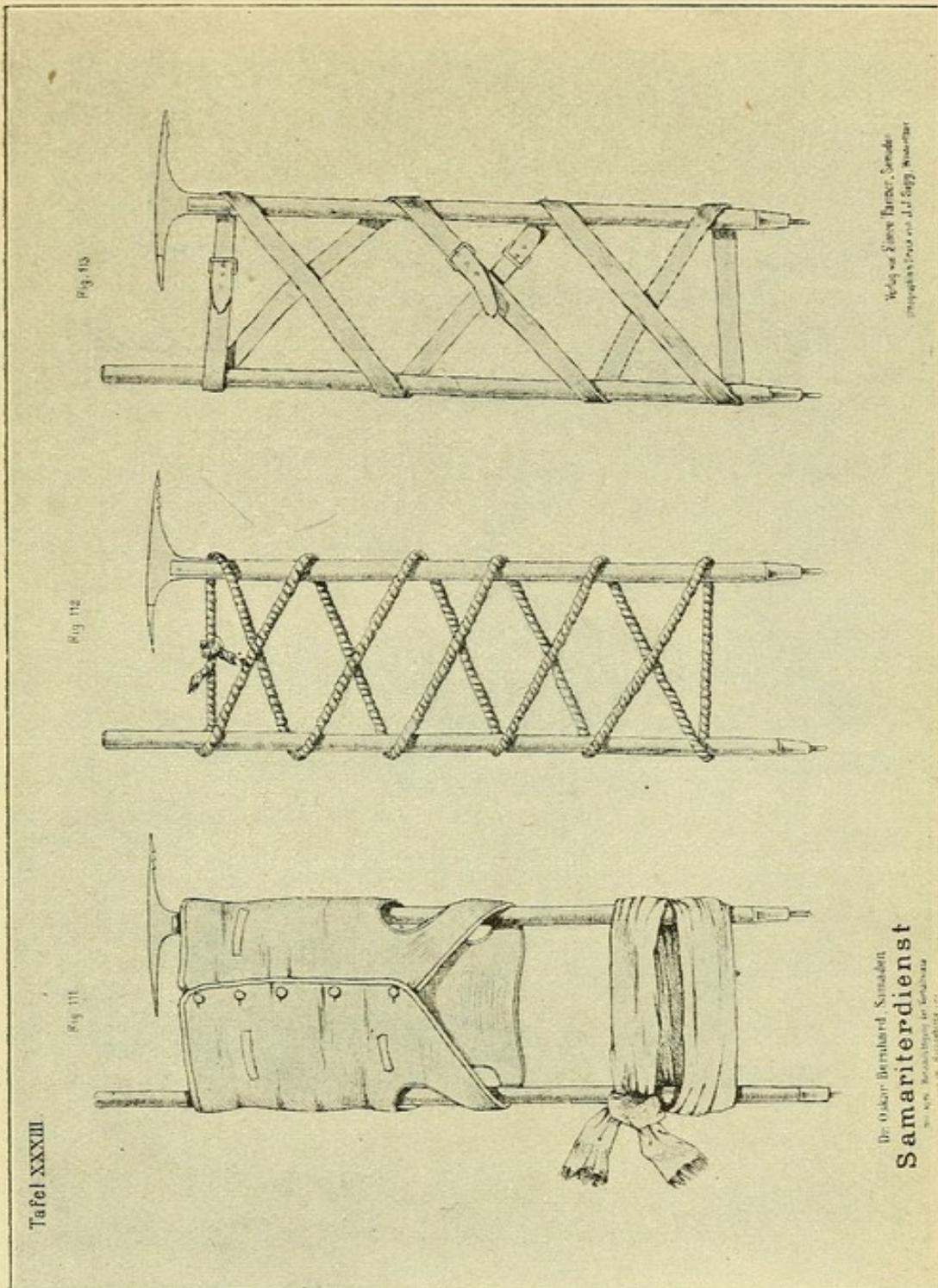


Fig. 111. A stretcher made from a waistcoat and a comforter.

Fig. 112, 113. Stretchers made with the rope or with belts. All these stretchers can be strengthened by placing a forked crosspiece at either end.

Tafel XXXIV.

Fig. 114

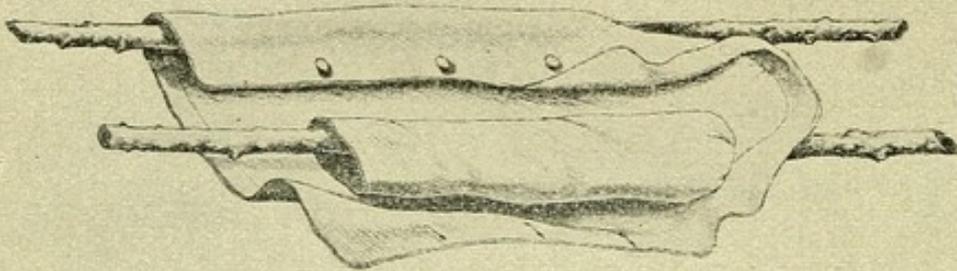


Fig. 115

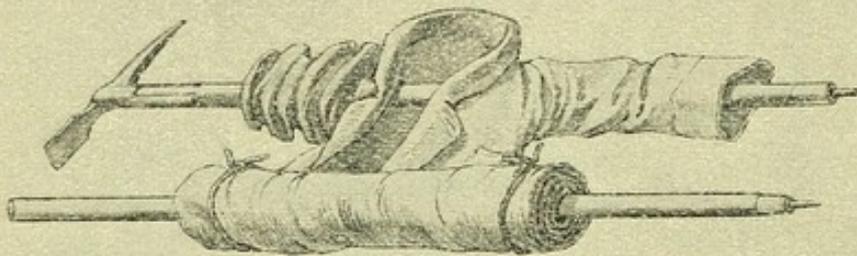
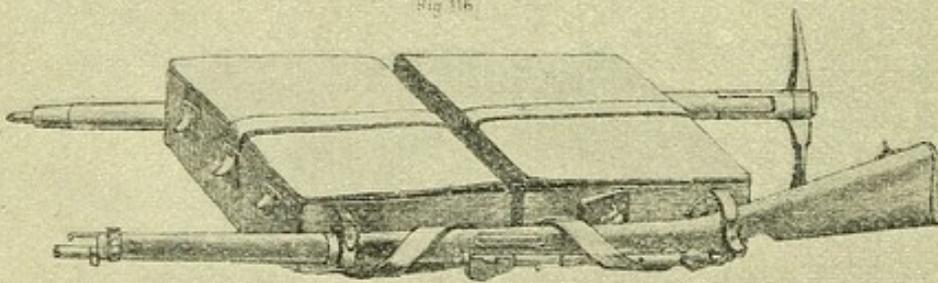


Fig. 116



Dr. Oskar Bernhard Sanden
Samariterdienst
 von ihm. Berücksichtigung der Samaritanen
 in der Bibel.

Verlag von Simon Tschirner, Samaria
 1894. 12. 8. 1/2. 1/2. 1/2. 1/2.

Fig. 114. A full length stretcher made from a coat. Both arms of a coat are turned inside out and poles run through them, the coat is then buttoned.

Fig. 115. A sitting stretcher made with a coat. In this case an ice axe has been passed through the two arms of the coat, while to form the other side the skirts of the coat have been rolled round an alpenstock and secured.

Fig. 116. A three-quarter length stretcher made from two knapsacks, an ice axe and a rifle.

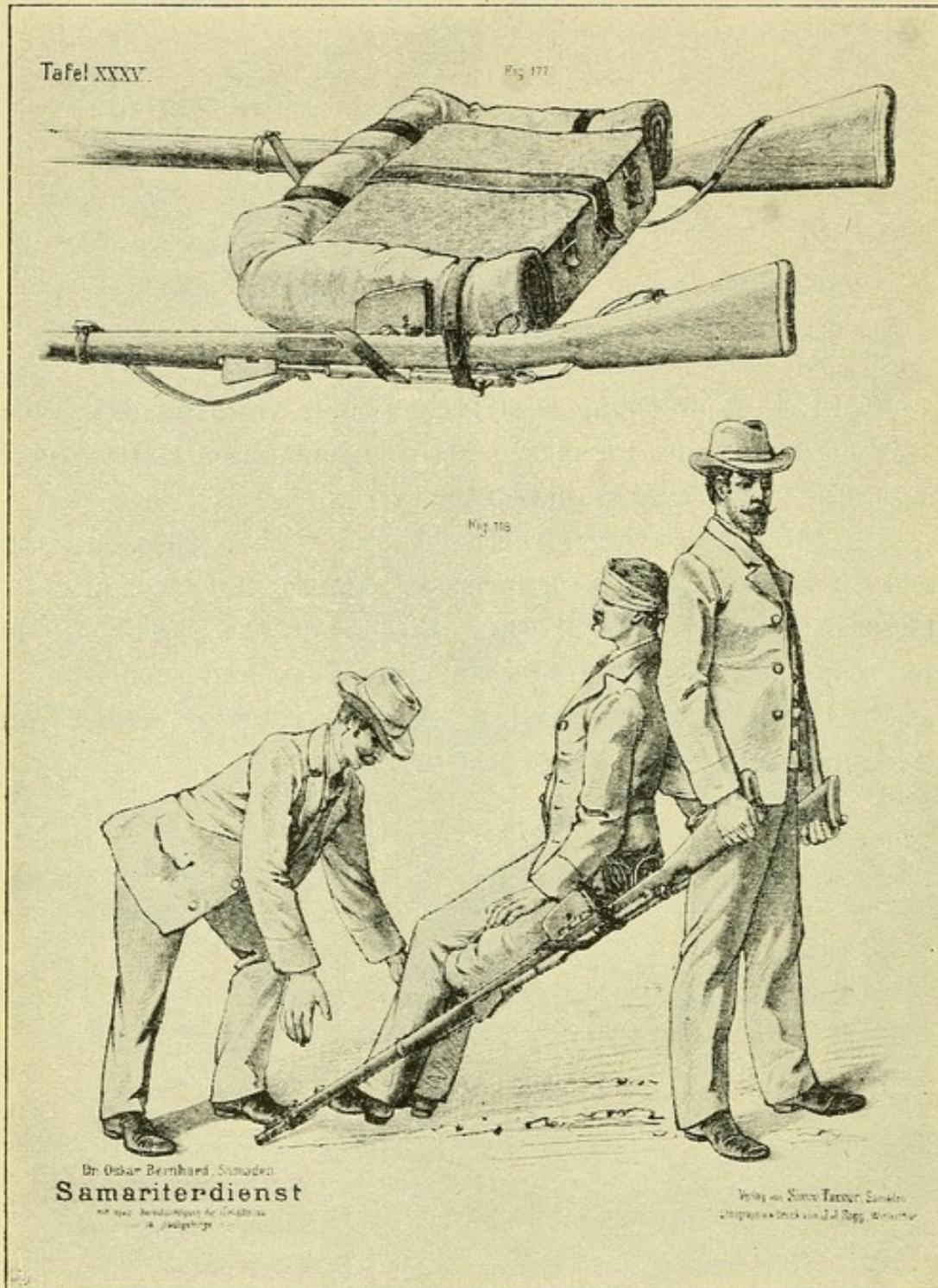
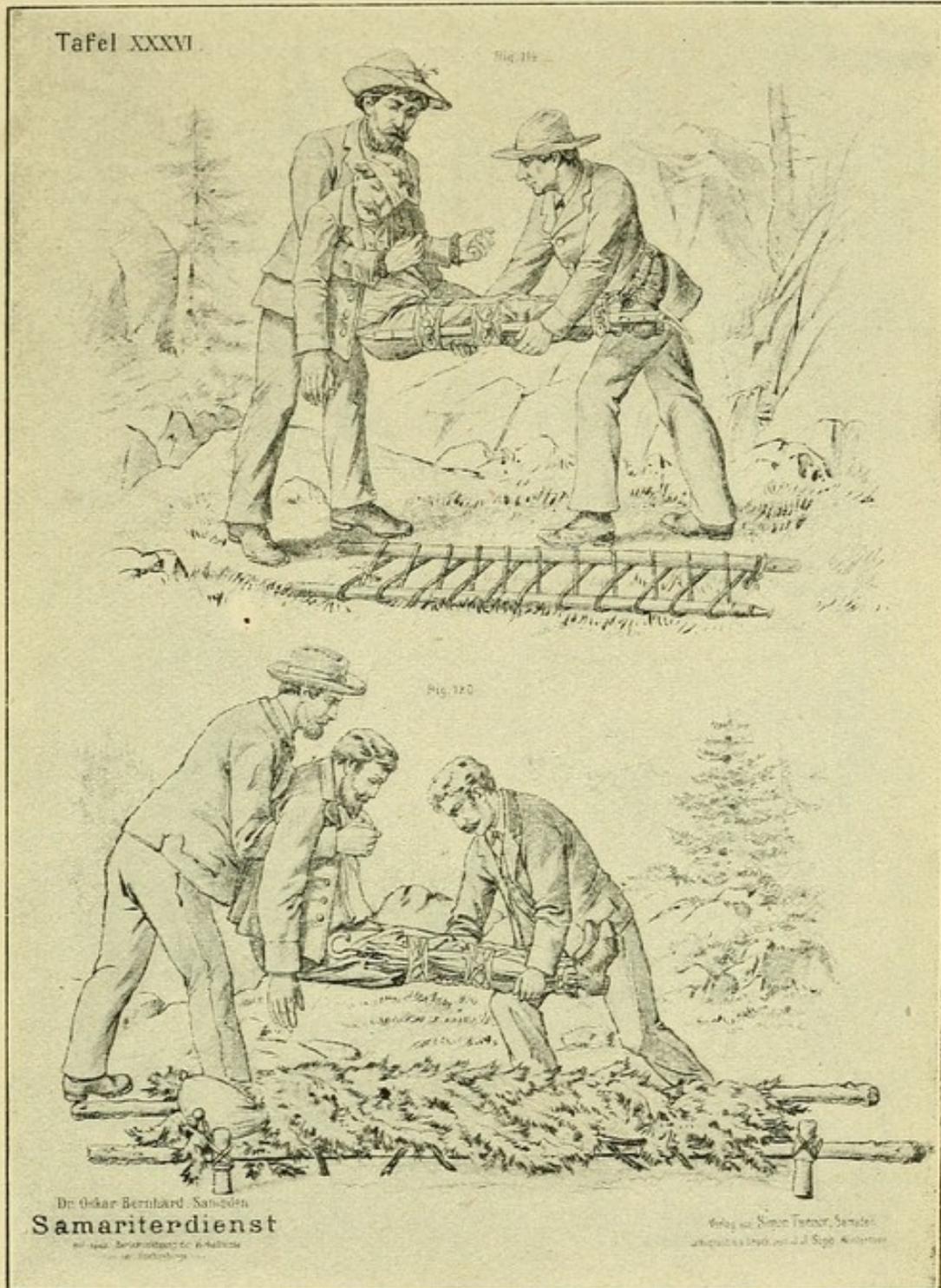


Fig. 117. A carrying chair made of a knapsack and two rifles (knapsack chair).

Fig. 118. Shows the method of placing and carrying the patient with such a chair.



The method of placing patients on stretchers. As soon as the patient has been comfortably settled, the carriers place themselves between the poles at the head and foot, stoop down, seize the handles and raise themselves simultaneously at a given signal.

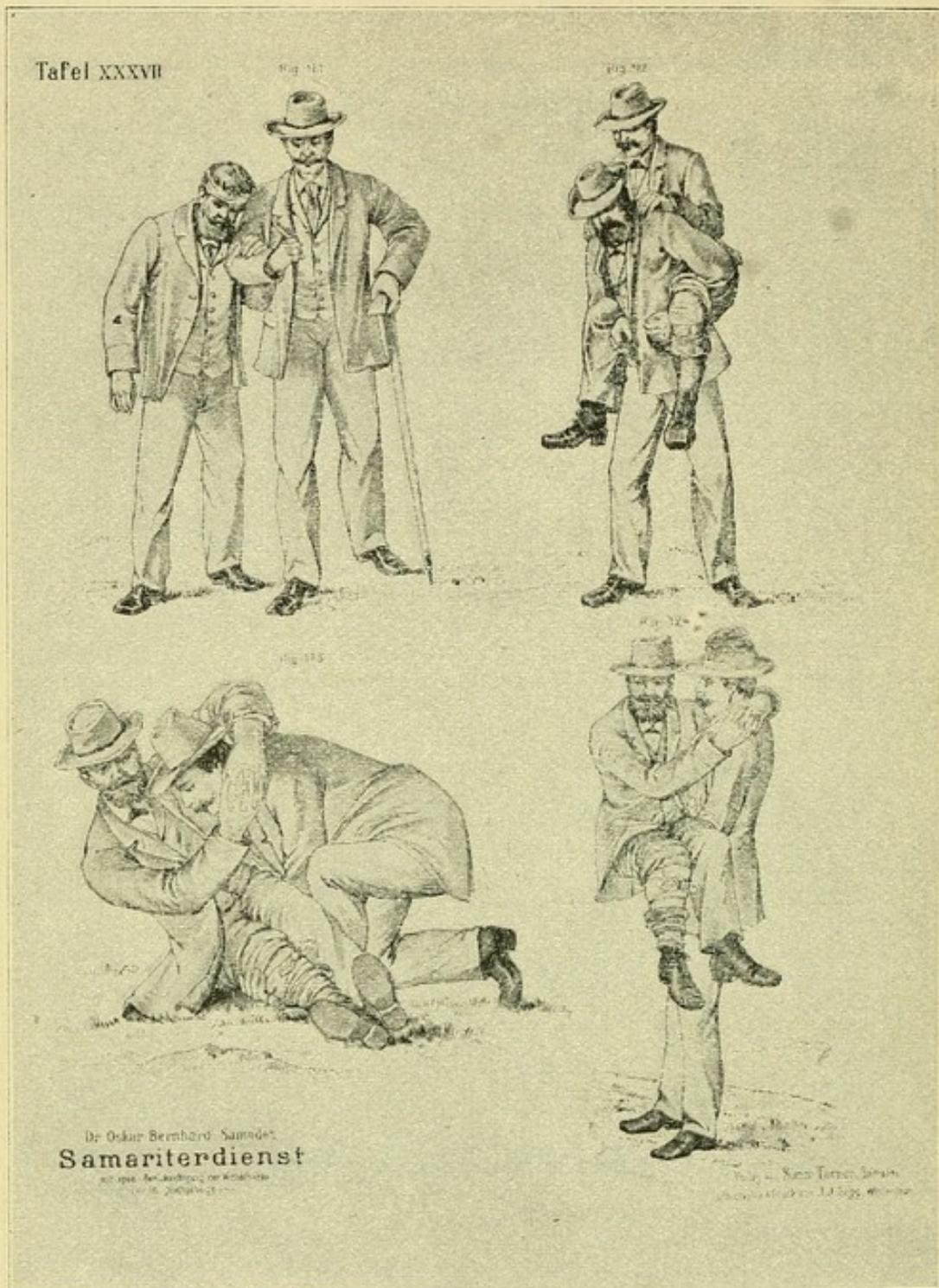


Fig. 121. Helping a man with the arm.

Fig. 122. Carrying on the back.

Fig. 123 and 124. Method of carrying in the arms; the injured limb should always lie on the outside so as not to rub up against the bearer.

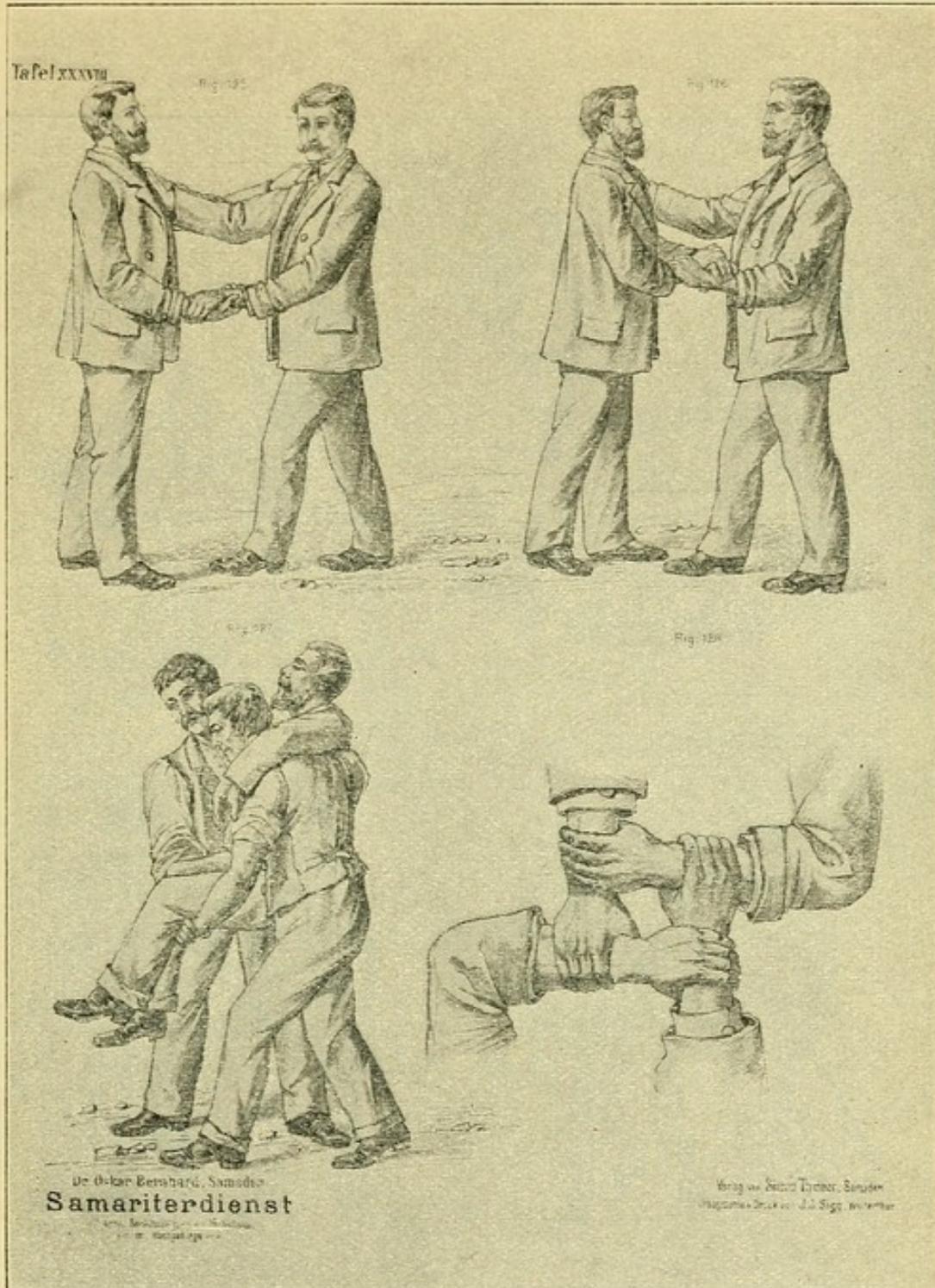


Fig. 125 and 127. Two men carrying a man in a sitting position. Two strong men hold each other's hands and seat the injured man on them. The free arms are crossed behind his back (back support).

Fig. 126. Shows a modification of the preceding, the bearers hold their arms closer to form a carrying chair.

Fig. 118. Shows the method of forming a carrying chair, with the four hands of the two carriers (Swiss method).

Tafel XXXIX

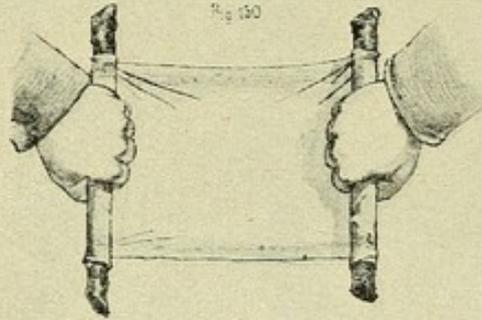


Fig 130

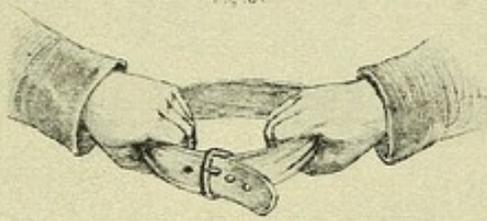


Fig 131



Fig 132

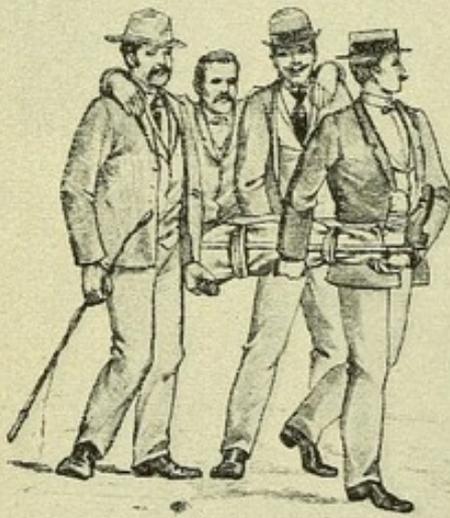


Fig 133

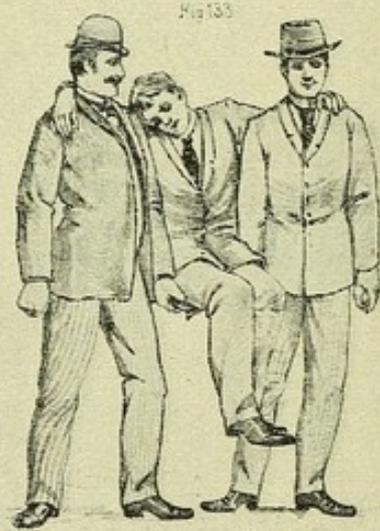


Fig 134

Dr. Oskar Bernhart, Samaden
Samariterdienst
 mit einer Beschreibung der Samaritaner
 von Dr. Bernhart

Verlag von Simon Tarnow, Samaden
 Lithographirt von J. J. Sigg, Winterthur

Fig. 129. Carrying an injured man under the arms and knees by two bearers in Indian file. The wounded man should not be held across the chest since that would impede his breathing.

Fig. 130. Carrying chair made of a cloth and two sticks.

Fig. 131. Carrying ring made from a buckled belt.

Fig. 132. 133. A carrying ring used by two and by three men.

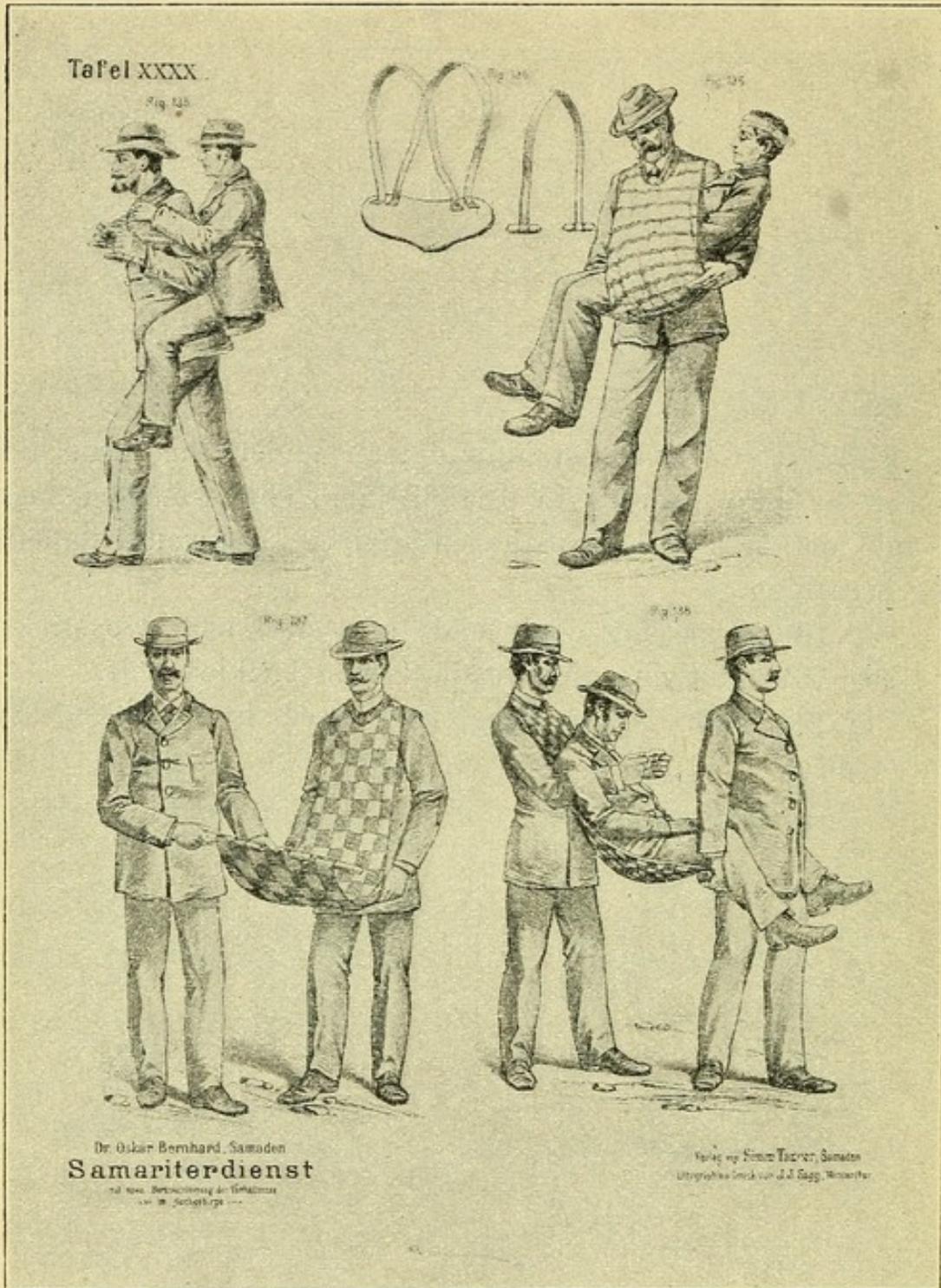


Fig. 134. A shoulder carrying chair made with straps (after Fischer).

Fig. 135. Method of carrying with the preceding.

Fig. 136—138. Carrying apron made from a shawl or blanket, for transport by one or two men.

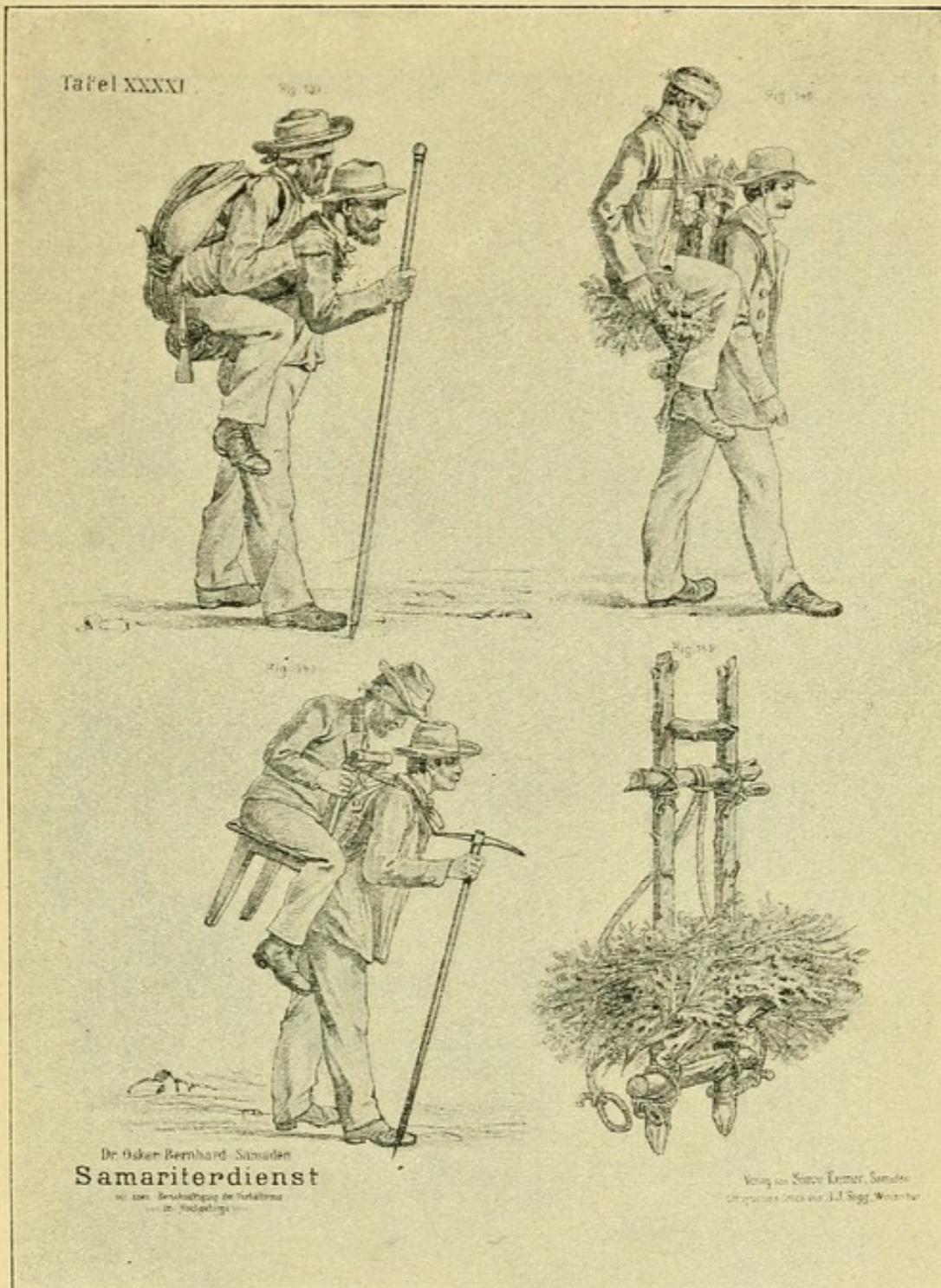


Fig. 139. The simplest form of carrying chair made of a rug wrapped round an ice axe (a stout branch or stick may be used instead).

Fig. 140—142. An improvised chair for carrying; the seat is made of twigs.

Fig. 141. A Chair as used for carrying.

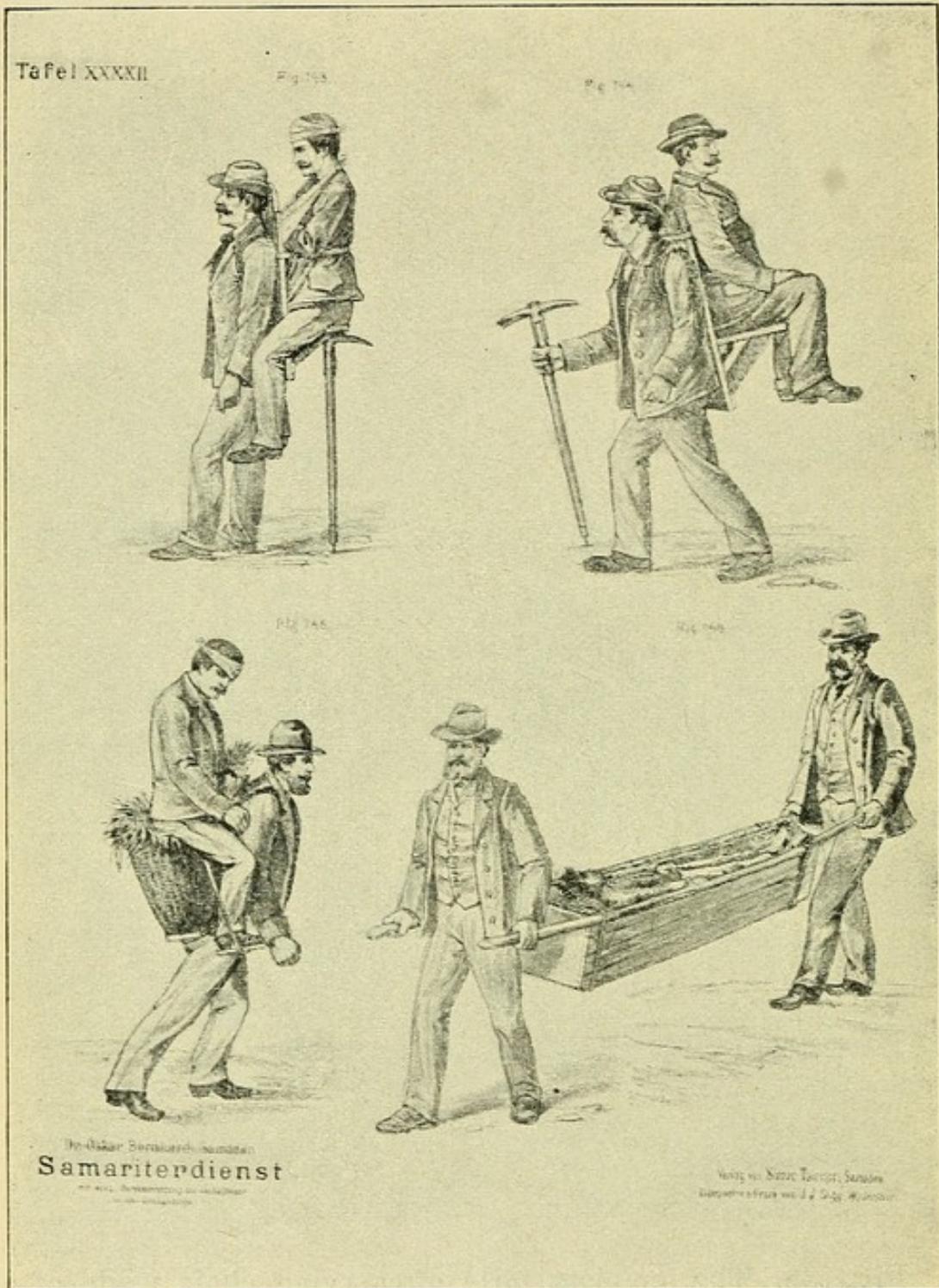


Fig. 143—144. Method of carrying on a pack, the legs pointing either forwards or backwards.

Fig. 145. Carrying in a basket with the back cut out and with a foot piece added on either side.

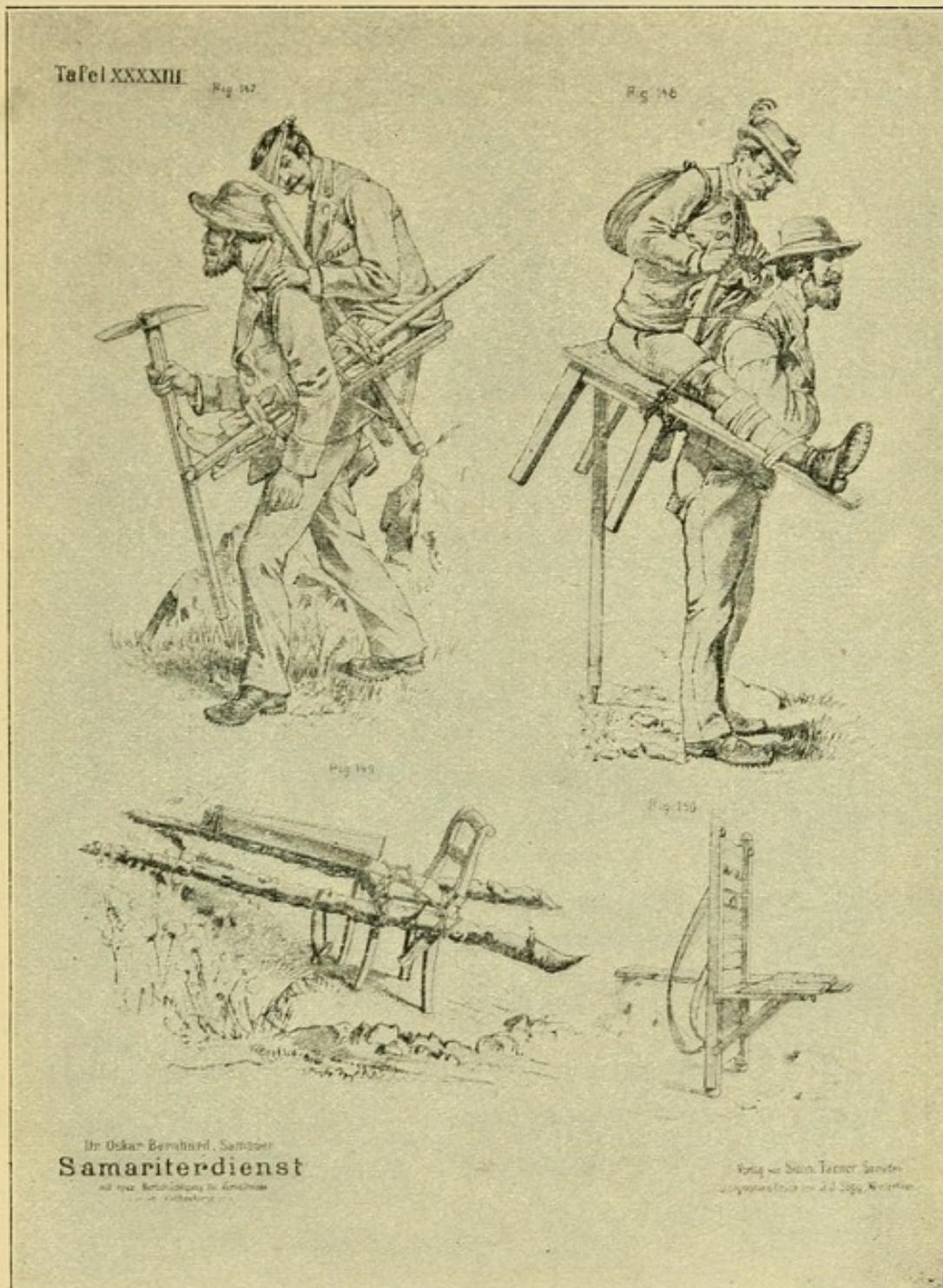
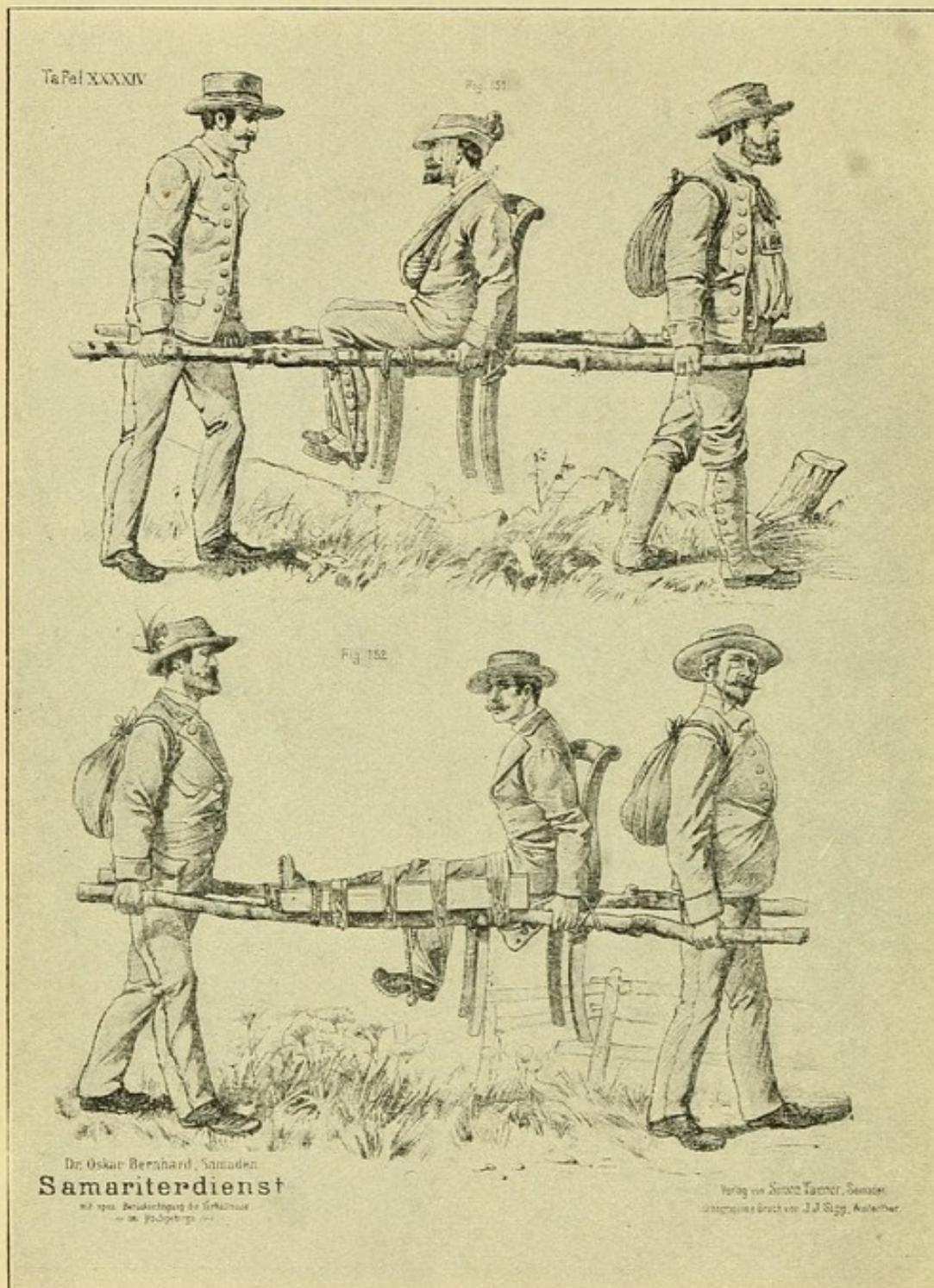


Fig. 147, 148. Transport with a pack and stool, a leg rest has been made by nailing on a board.

Fig. 149. A carrying chair arranged for a broken leg.

Fig. 150. A pack arranged in the same way.



Transport on carrying chairs.

Fig. 151. With a foot board.

Fig. 152. A foot-board for the sound and a pillow-like splint for the injured leg.

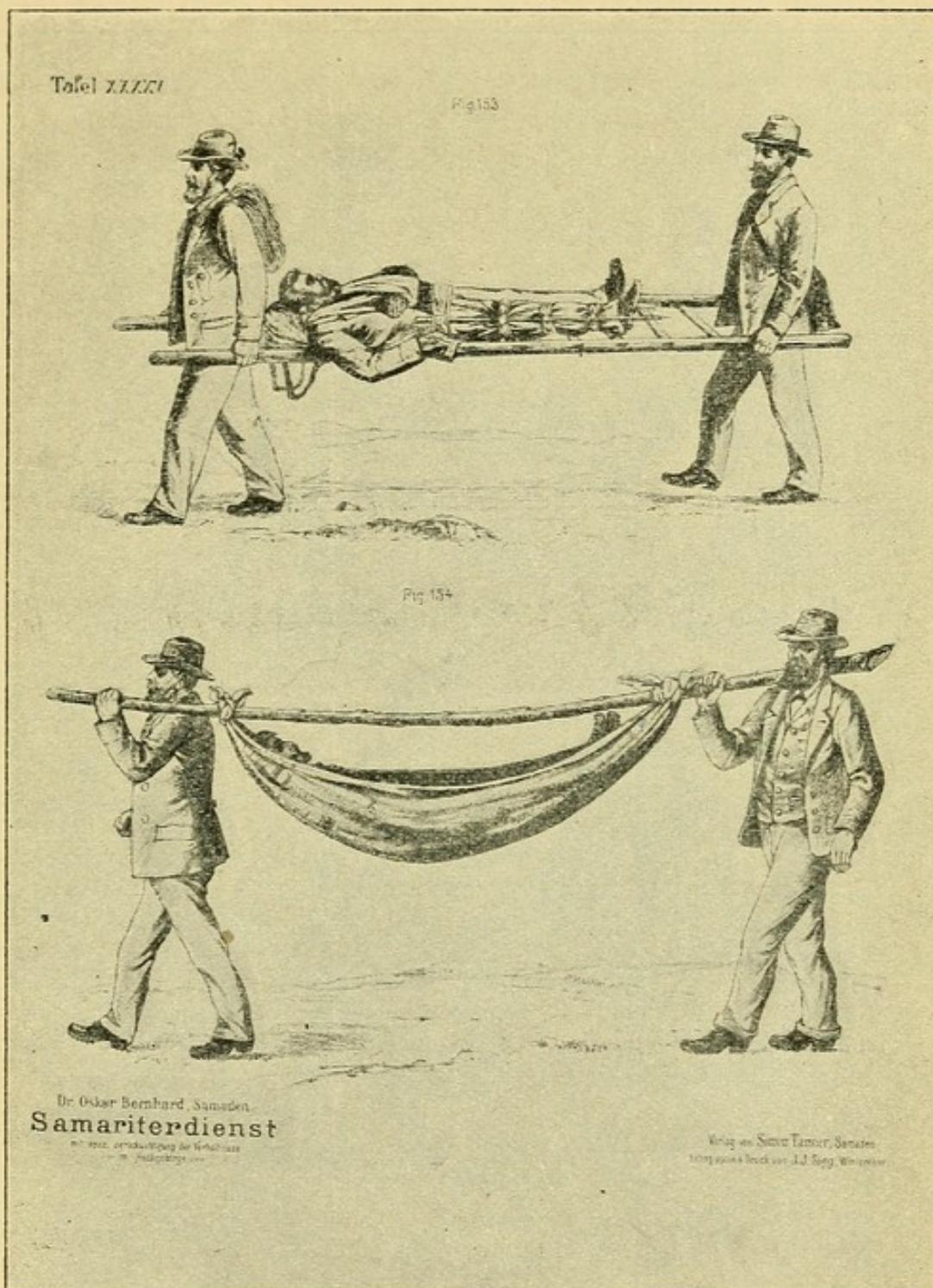


Fig. 153. Shows the employment of a ladder, or the side of a Leiterwagen as a stretcher.

Fig. 154. A hanging stretcher made with a hay cloth and one long pole.

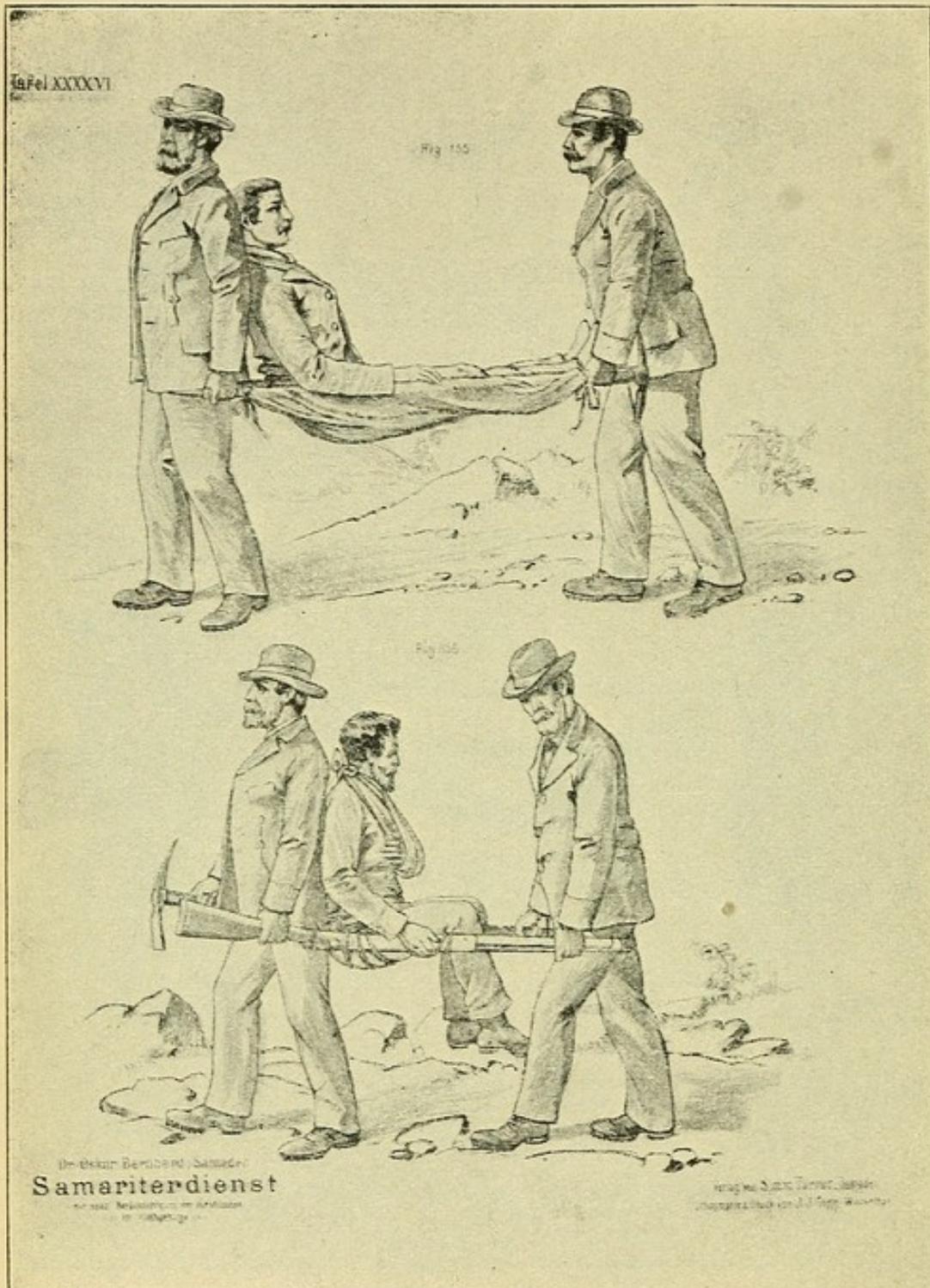
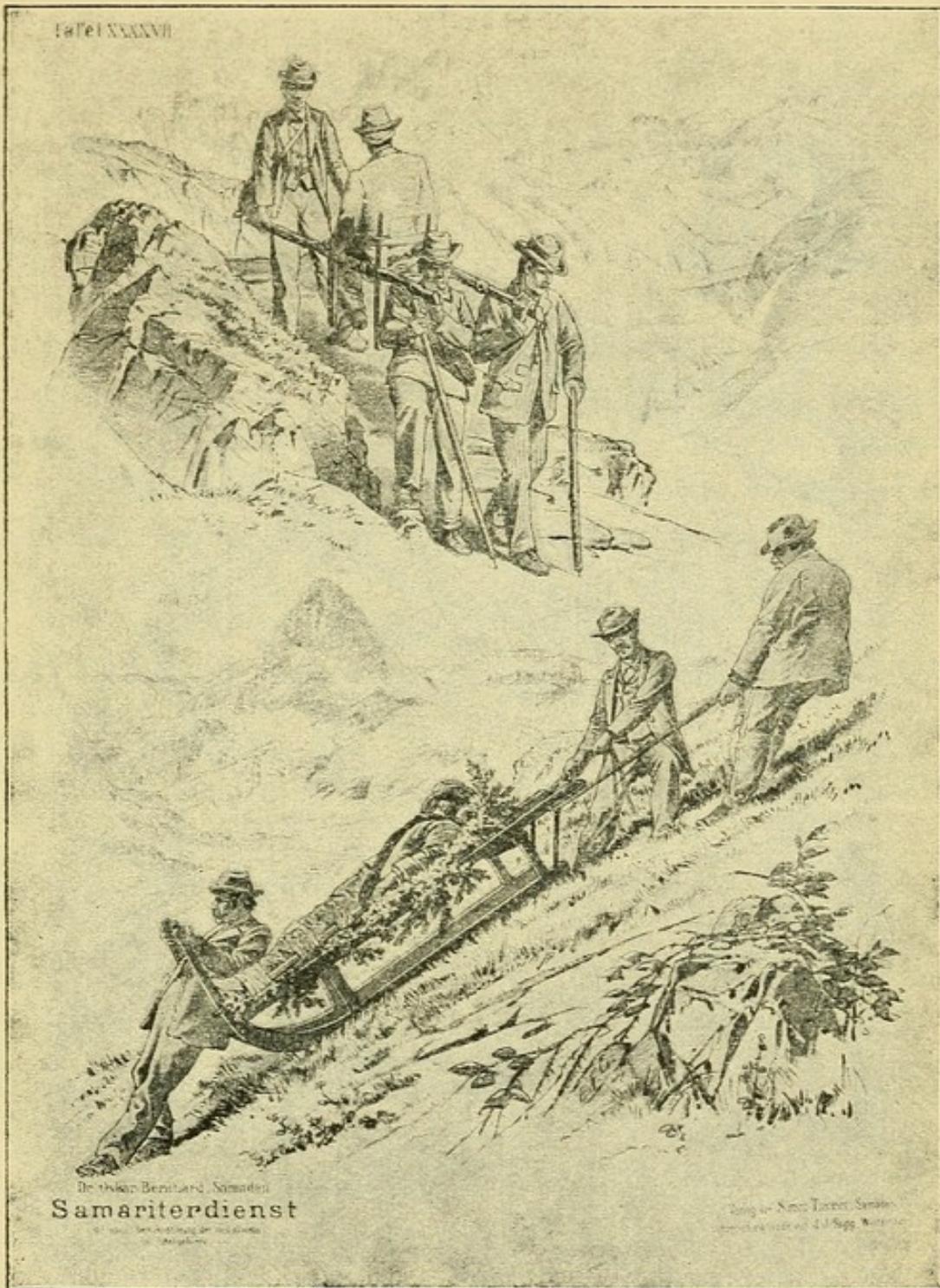


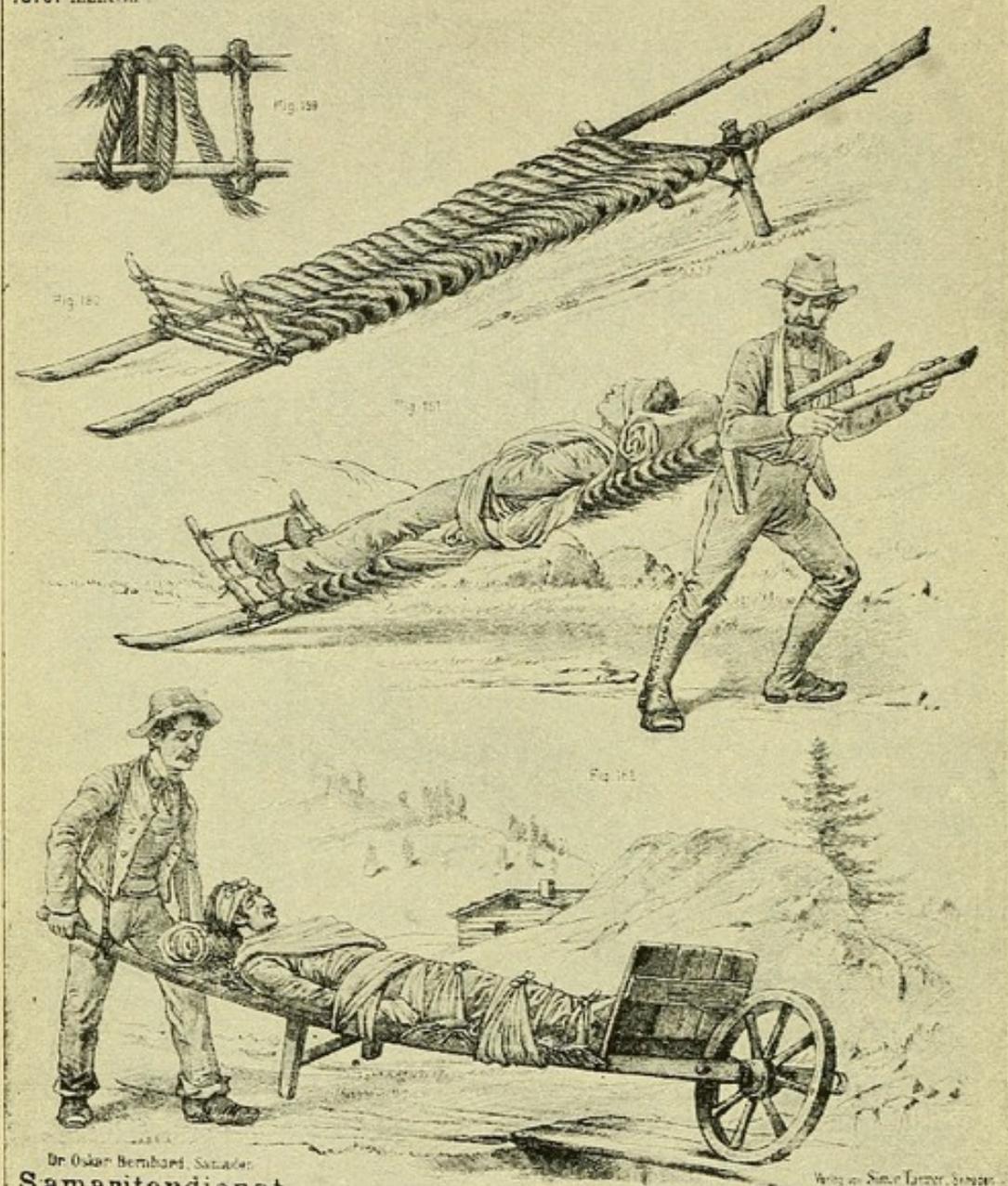
Fig. 155. An improvised stretcher made with an ice axe, alpenstock and rug (rug stretcher).

Fig. 156. With an ice axe, rifle, and a rope (rope stretcher).



Transport (in steep places) with a carrying chair by three men; the same with a sledge on a grass slope. The two men behind act as a drag holding a rope which is tied round the back of the sledge.

Tafel XXXVIII



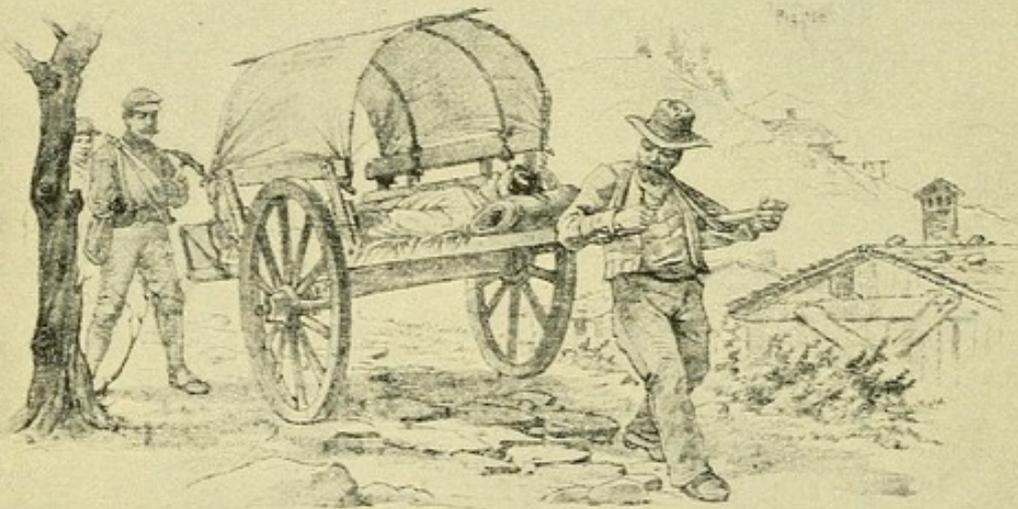
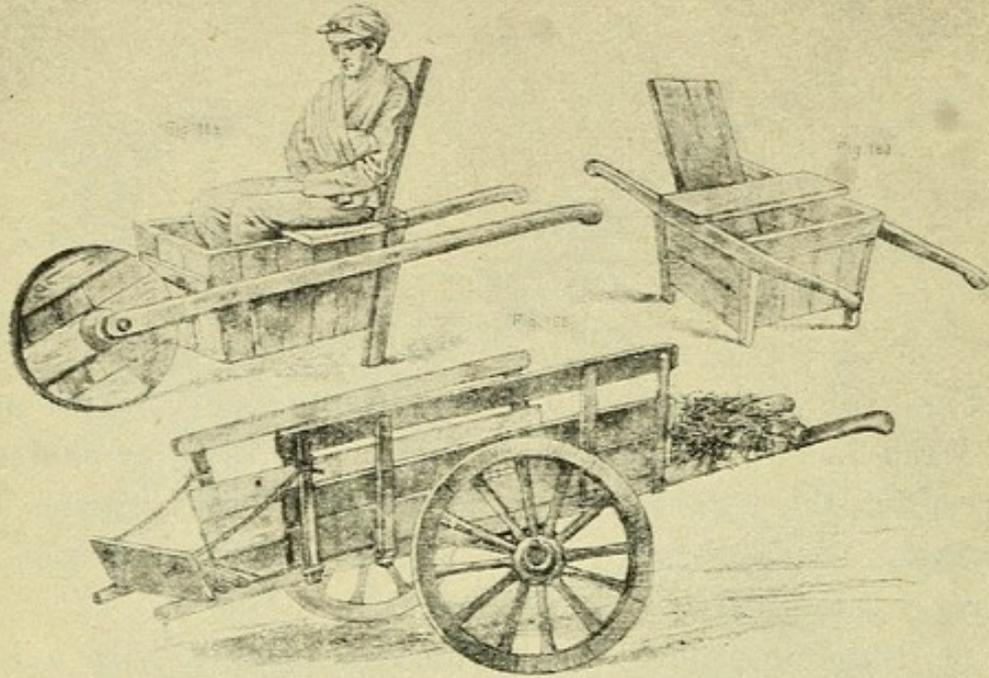
Dr. Oskar Bernhard, Sanitätsarzt
Samariterdienst
für alle Berge und Gebirge
in Ostbayern

Verlag von Schmid, Leipzig, 1890.
Verlag von Schmid, Leipzig, 1890.

Figs. 159, 160. Method of improvising (out of two poles and straw bands) a mountain sledge to be drawn by one man. A rest for the legs has been made of a few branches tied together; two feet have been added in front to ease the bearer while resting.

Fig. 162. Transport in a recumbent posture with a hand cart (hay cart).

Tafel XXXIX



Dr. Oskar Benjard, Samaria
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von Dr. Oskar Benjard

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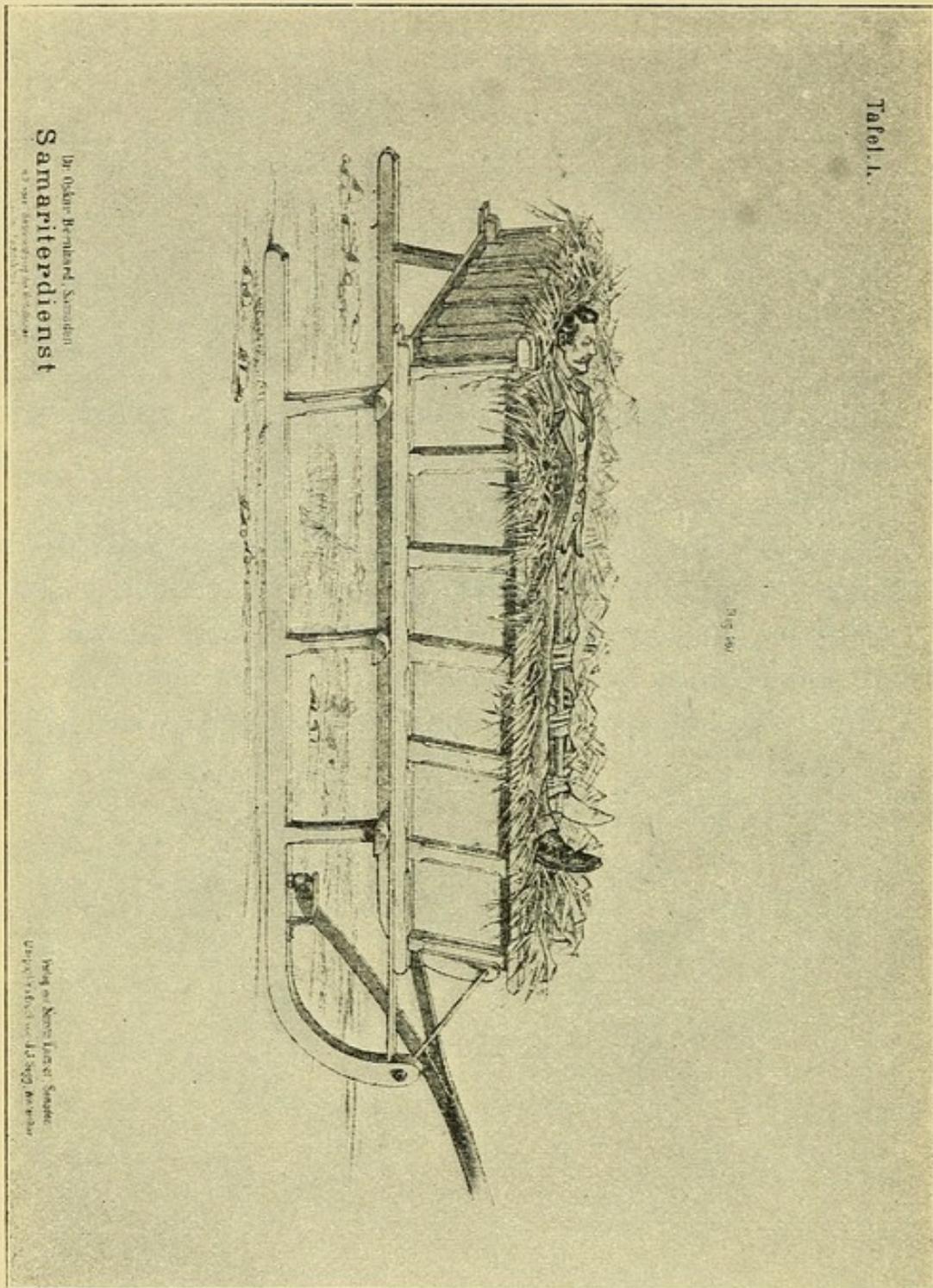
Fig.163. Method of transport sitting in a trough with a back rest.

Fig.164. A wheel barrow arranged in the same way.

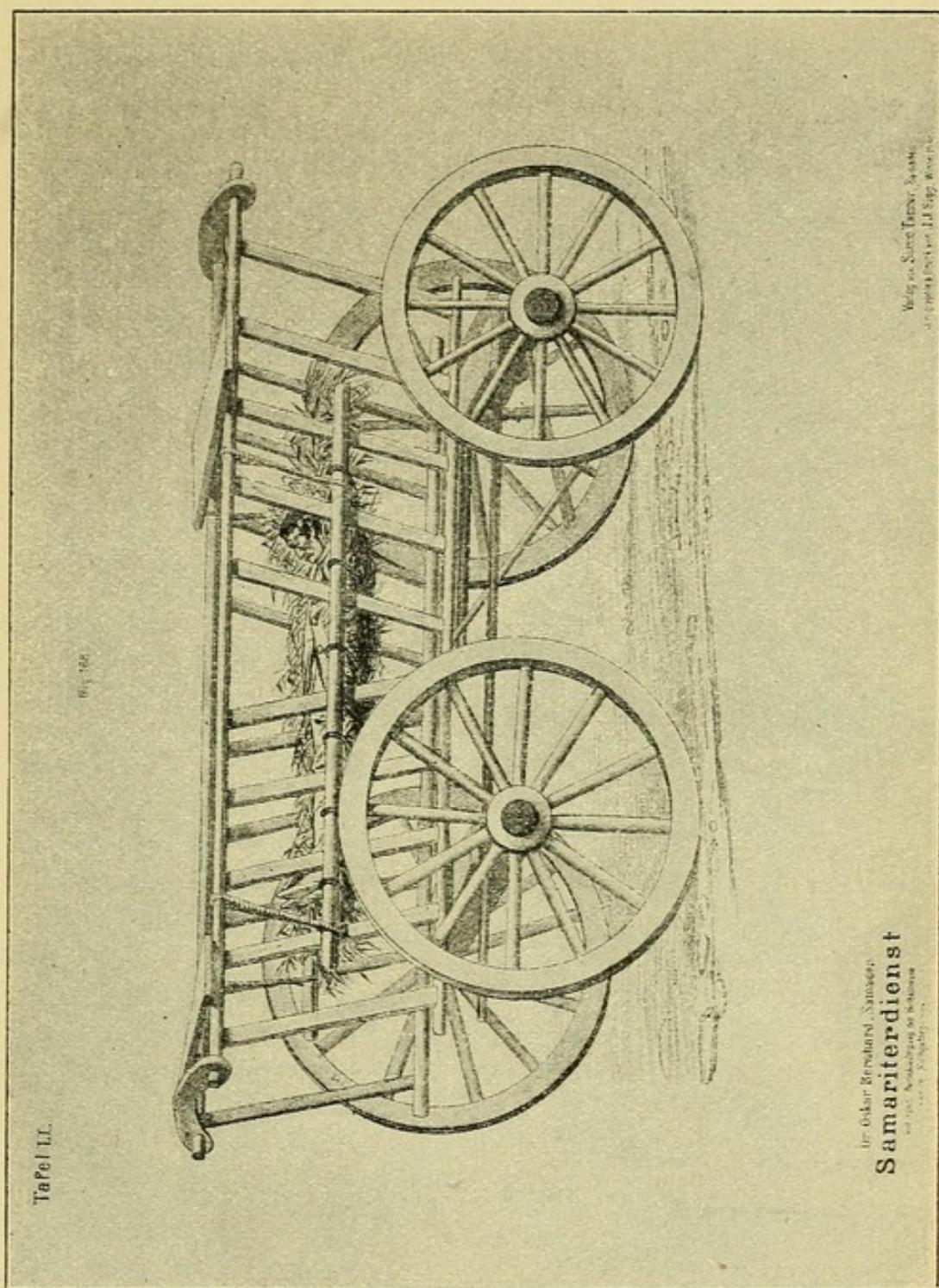
Fig.165. The method of lengthening a two-wheeled cart to make it suitable for transport in a recumbent posture.

This is done by fastening transverse pieces of wood in front and behind; a foot piece has also been added.

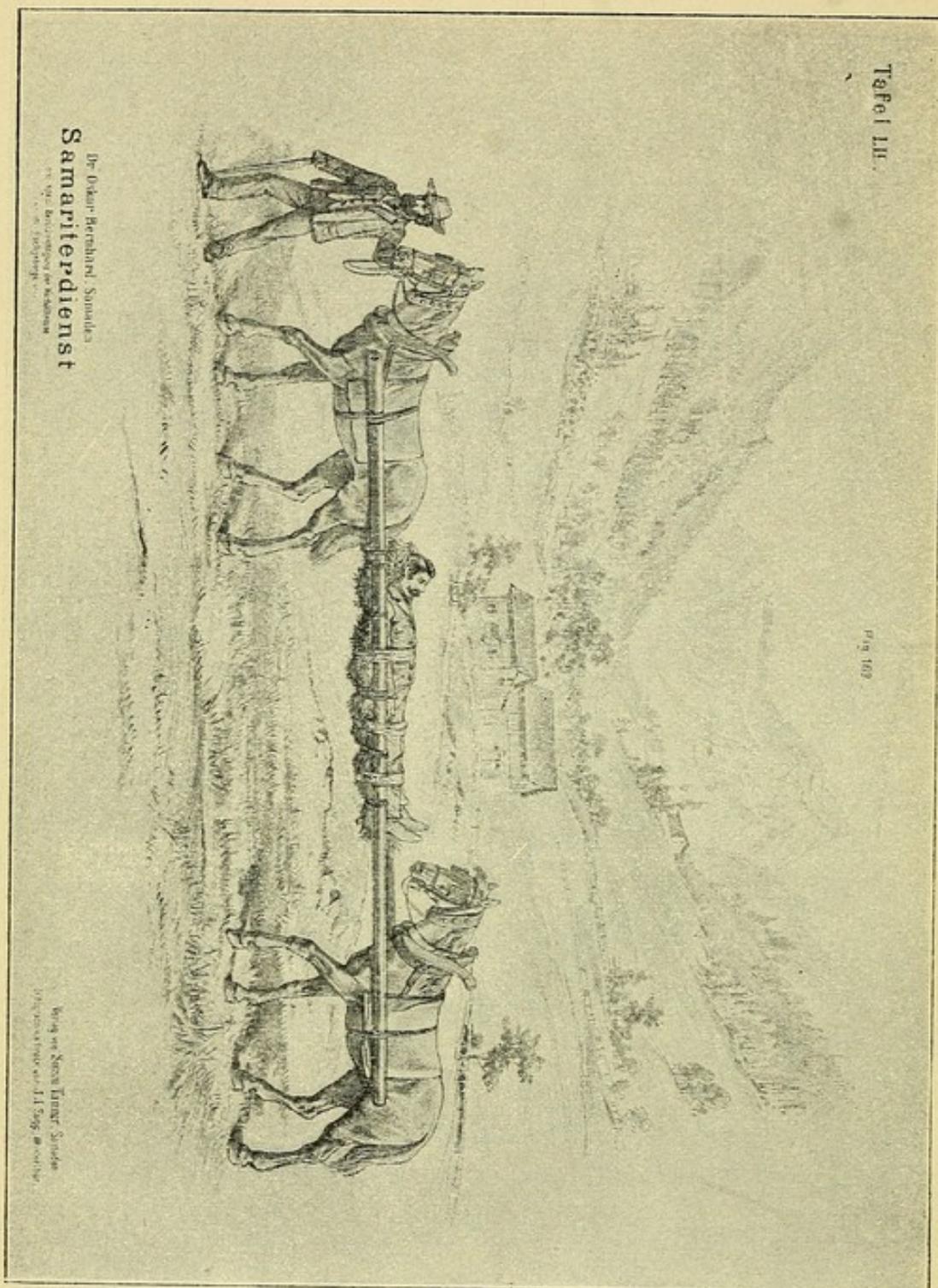
Fig.166. Transport on a cart with an improvised tilt.



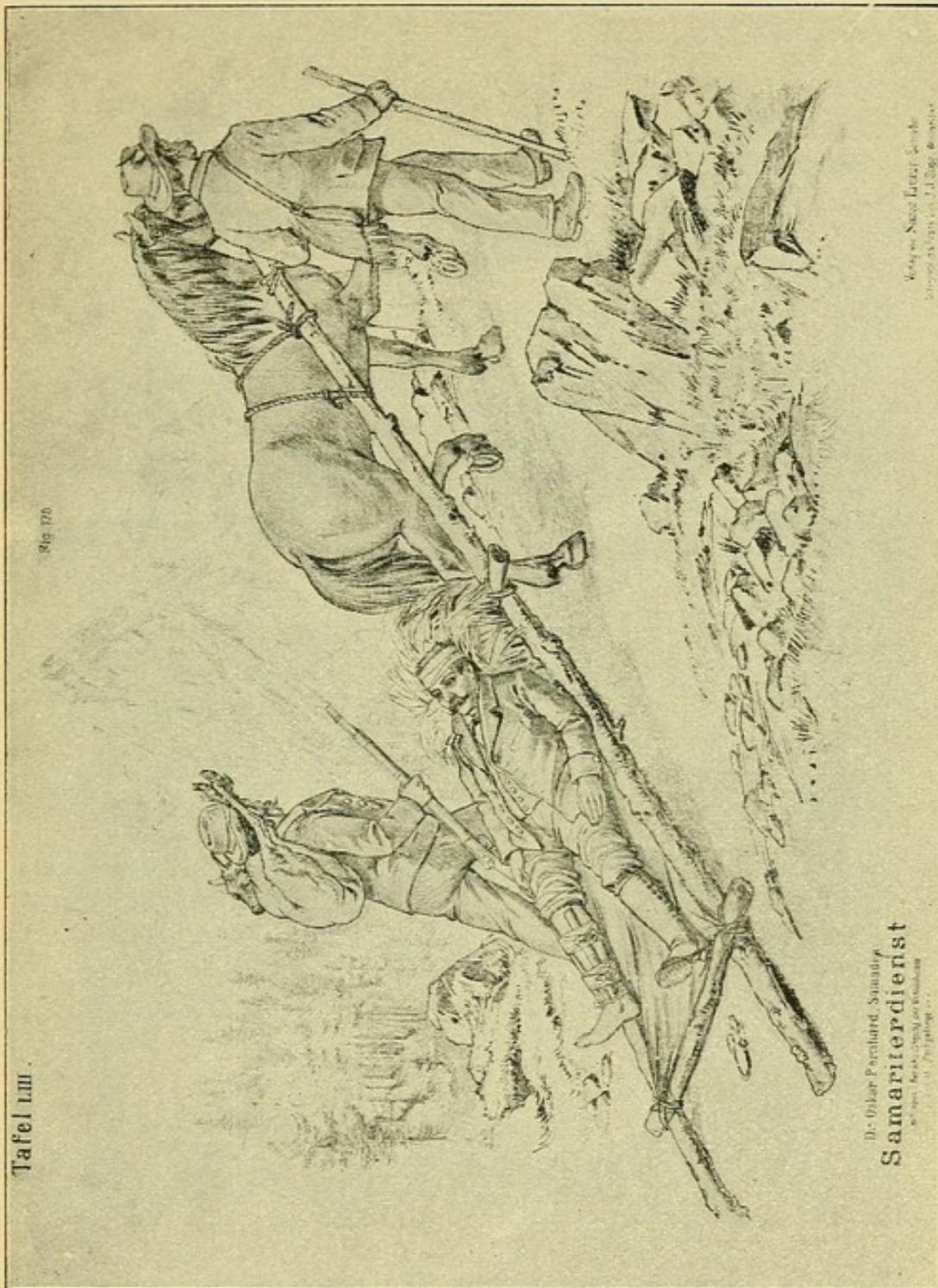
A post parcel sledge covered with hay or straw for the transport of one or more injured men; a method of transport much to be recommended.



Half way up the sides of a cart (Leiterwagen) run two poles each longer than a man. These swing by ropes from the top of the cart, they have been joined by knotted ropes and covered with hay, thus forming a litter for one or two men according to the width of the cart.



A pole litter twenty feet long, the bed formed by rope covered with hay. The ends of the poles are securely fastened round the horse's barrel with rope or leather. In order to prevent these fastenings slipping grooves are cut for them in the poles.



Large litter for a draught animal, made by two long poles joined by crosspieces on which a rug has been fastened.

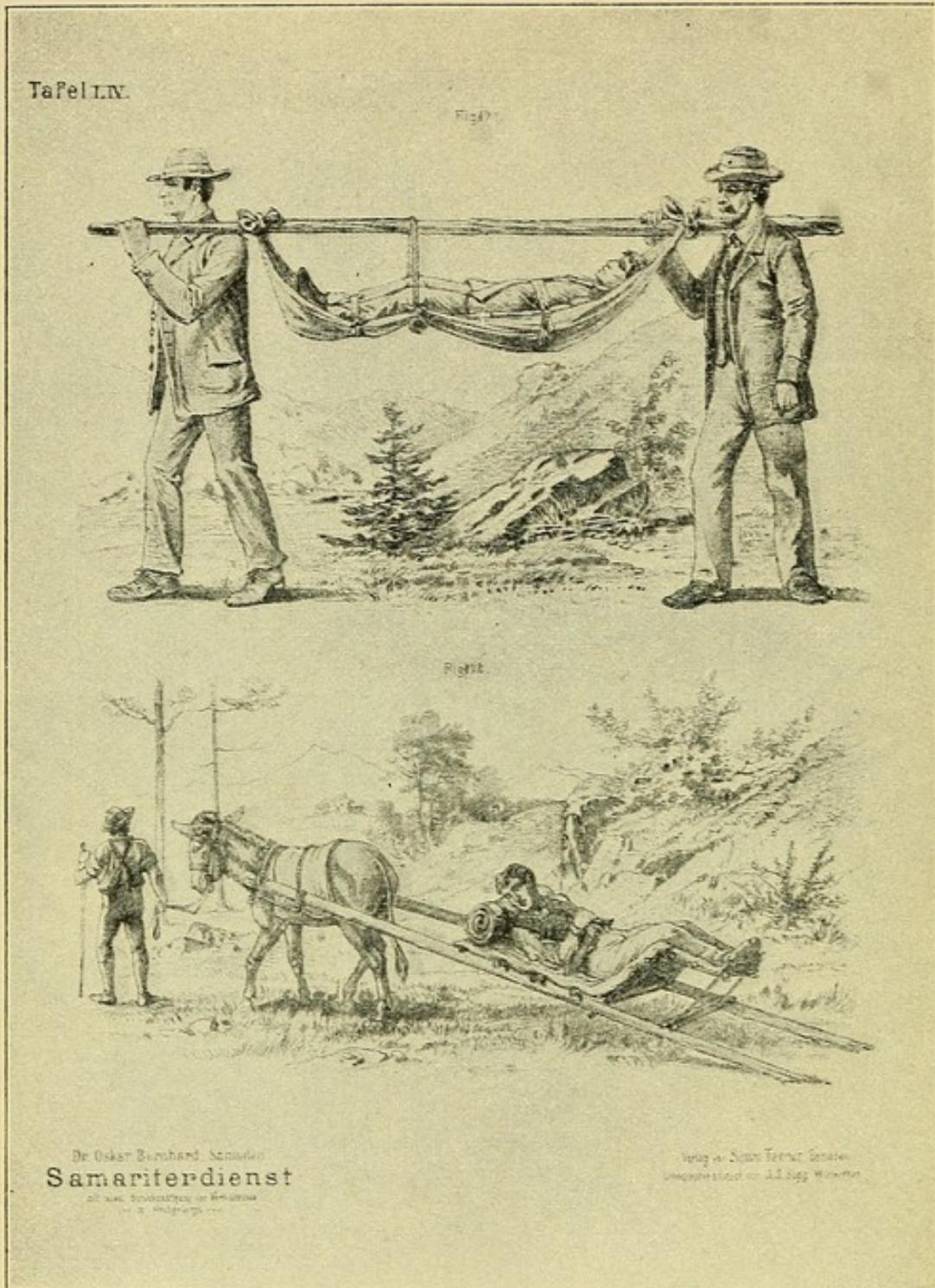
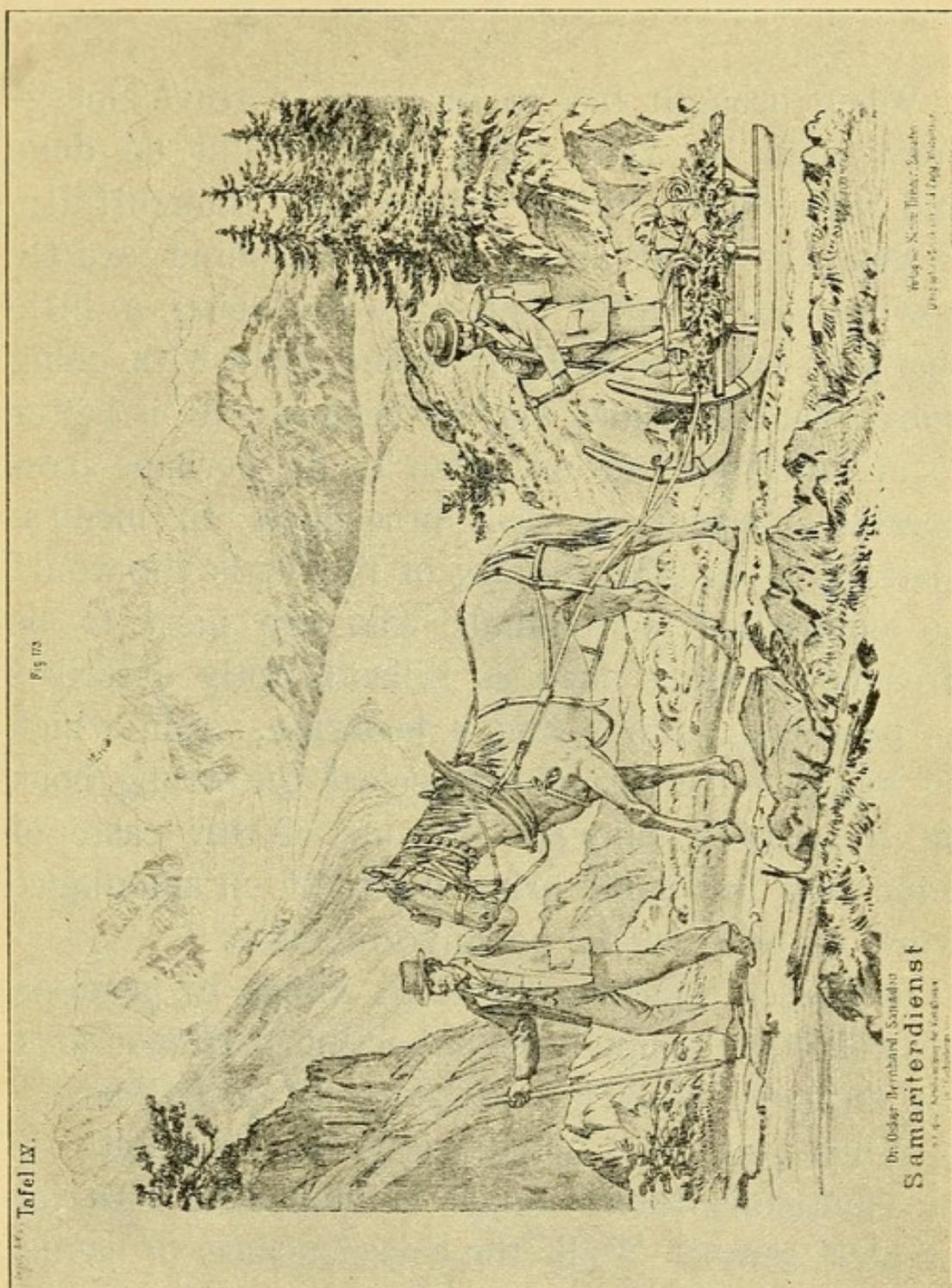


Fig 171. Hanging stretcher. To prevent the upper part sinking too low a crosspiece is placed under the knees and swung from the pole.

Fig. 172 Mountain sledge to which a leg rest has been added (after Dr. J. Port).



Transport of seriously injured man on a wood sleigh with a horse. A soft bed has been made with small branches.

Concluding Remarks.

When brought face to face with a grave emergency make up your mind what should be done and then do it quietly, calmly and thoughtfully. If you are uncertain in your own mind exactly how to act, content yourself with doing a little that you know to be right, rather than with doing more, some of which may be harmful. It is better to err through caution, than to do perhaps irreparable mischief by rash procedure. In medical matters, as in other affairs of life, it is the would be omniscient individuals who are most to be dreaded: persons such as Billroth aptly describes as possessing minds like a bookcase, from which on any given occasion they select the wrong book on the wrong subject. Persons of this caste of mind will inevitably bring discredit on ambulance work as they would on anything else.

In medical matters above all things be prudent, bearing ever in mind the aphorism of Hippocrates, the Father of Medicine—“*Above all do no harm.*”

When you have acted wisely and promptly in an emergency then you are recompensed with the greatest reward of all, the consciousness of having done good. Gratifying as is the consciousness of having eased pain, or averted disease and suffering, yet the highest pleasure a man can have is the knowledge of having saved a fellow creature's life.

