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HOME OFFICE
CIVIL DEFENCE

Manual of Basic Training

VOLUME II

BASIC
FIRE FIGHTING

PAMPHLET No. 2

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SIXPENCE NET

GENERAL PREFACE

The series of Civil Defence handbooks and pamphlets is produced under the authority of the Home Secretary by the Civil Defence Department of the Home Office with the assistance of and in co-operation with the Secretary of State for Scotland and other Ministers concerned.

Measures for safeguarding the civil population against the effects of war which these publications describe, have become an essential part of the defensive organisation of this country. The need for them is not related to any belief that war is imminent. It is just as necessary that preparations for Civil Defence should be made in time of peace as it is that preparations should be made for the Armed Forces.

The publications cover, as far as is possible, measures which can be taken to mitigate the effects of Civil Defence, if it is to be efficient, must be up-to-date and must take account of all the various weapons which might become available. The scale of bombing experienced in Great Britain during the 1939-45 war might be considerably exceeded in any future war, and types of weapons and tactics which were not experienced in this country might conceivably be used against it in the future. It does not follow that any one of the weapons, e.g. the atomic bomb, will necessarily be used, and it is most important that a proper balance is held between what is likely and what is possible.

The use of poison gas in war was forbidden by the Geneva Gas Protocol of 1925, to which this country and all the other countries of the Western Union were parties. At the outbreak of a war, His Majesty's Government would try to secure an undertaking from the enemy not to use poison gas. Nevertheless the risk of poison gas being used remains a possibility and cannot be disregarded any more than can certain further developments in other scientific fields.

The publications are designed to describe not only precautionary schemes which experience in the last war proved to be extremely effective in preventing avoidable injury and loss of life, or widespread dislocation of national industries, but also the training, both technical and tactical, which will be required of the personnel of the Civil Defence Services if they are to be ready effectively to play their part if war should ever break out. The publications aim at giving the best available information on methods of defence against all the various weapons. Information is not complete in respect of some of these weapons and the best methods of countering them, but as results of experimental work and other investigations mature, they will be revised and added to from time to time so that the Civil Defence Services may be kept up-to-date and their training may be on the most modern and experienced lines.

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BASIC FIRE-FIGHTING

INTRODUCTION

Perhaps the greatest lesson brought out by the war was that incendiary bombs caused far more loss of life and property than did High Explosive Bombs. As a result of experience, the proportion of incendiary bombs to H.E. bombs in the loads carried by our bombers, was stepped up more and more as the war went on. The present state of German and Japanese cities shows the result.

In this country we escaped comparatively lightly, though much damage was caused none the less. But we were not called upon to experience the results of Atomic Bombing. We were never exposed to the full force of a Saturation Attack.

The magnitude of such a disaster often blinds the uninformed to the continued need for the elementary fire-fighting appliances and technique described in this pamphlet.

Even though no fire-fighting of any kind is possible in the area affected by such a catastrophe, there still remain the outer areas, where the weight of attack "shades off." Here the timely use of even minor appliances in the hands of a well-trained and resolute population is capable of turning the tide, saving untold destruction of life and property.

This pamphlet deals with elementary fire precautions and fire-fighting up to the arrival of the professional fire services. It is designed to put before the ordinary individual the problems which are likely to confront him, and the many steps he can take to help himself and others.

A number of unused paragraphs have been left at the end of each chapter to permit of any additions that may be considered necessary from time to time. This, it is hoped, will avoid the necessity of re-numbering paragraphs.

CHAPTER I

GENERAL

1. HOW FIRE STARTS

Neither liquids nor solids burn, only the vapour given off by them when they are heated and then only when it has been mixed with oxygen and the temperature of this mixture has been raised to a point at which it will *burst into flame*.

Three stages are essential to create a fire.

- (i) The heating of the material to the point at which it gives off inflammable vapour.

(ii) The mixing of this vapour with oxygen in the surrounding atmosphere.

(iii) The ignition of the inflammable vapour mixture.

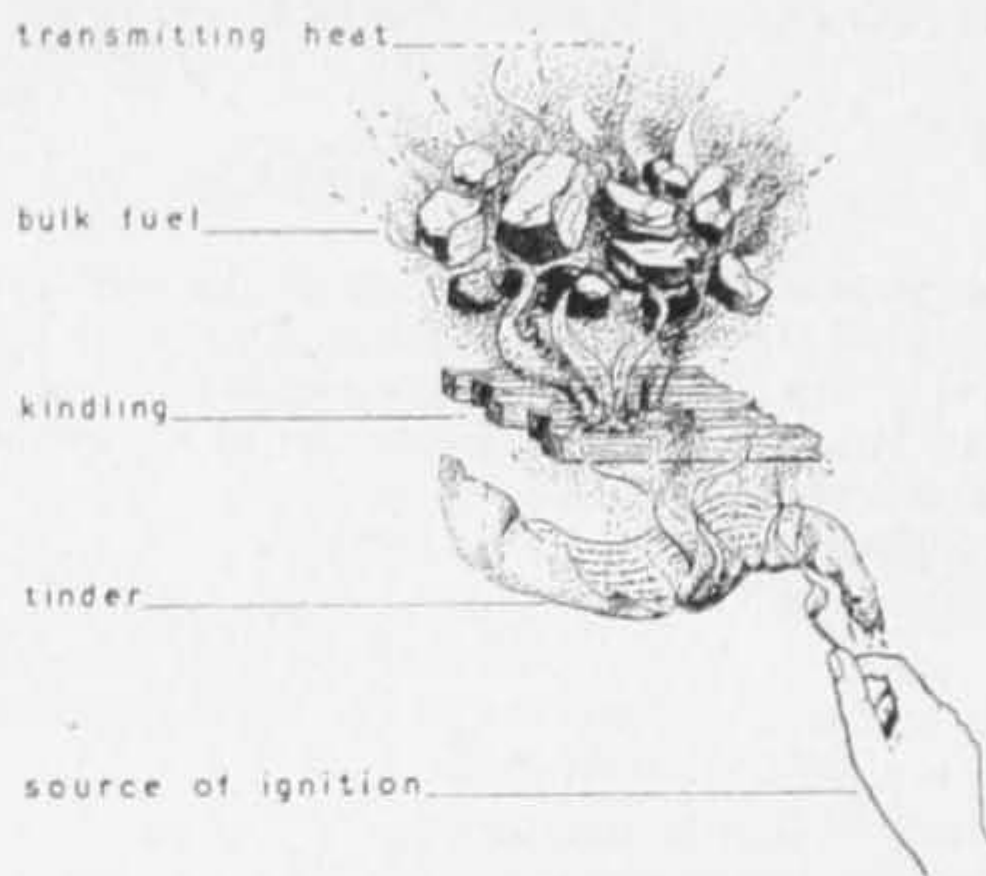


Fig. 1.

2. BUILD-UP OF FIRE

Having got fire, you get more heat.

This additional heat will drive off an increased amount of vapour from the fuel : it will also increase the amount of hot gases arising from the fire and draw in from the surrounding air the extra oxygen needed : further, it will raise the temperature of this mixture until still more fire results.

Having got still more fire it will produce still more heat and so the build-up progresses more and more rapidly.

From the above it will be seen that to continue burning a fire needs:—
FUEL, OXYGEN, HEAT.

3. EXTINCTION OF FIRE

As there are three essentials for the propagation of fire, it follows that if *any one of them* is sufficiently reduced, the fire must go out.

In practice, it is seldom possible to reduce the amount of fuel (by removal of furniture, etc.) or the amount of oxygen (by closing doors and windows) sufficiently to extinguish the fire ; its intensity can however be greatly reduced by the above means. For extinction, the heat is reduced by cooling down with water.

4. COMBUSTIBILITY

The spread of a fire depends on the combustibility of the contents of the place in which the fire has started, and on how those contents are distributed.

By " Combustibility " we mean the facility with which any material will burn. Some are very liable indeed and usually burn fiercely from the beginning. Such materials are " Inflammable." Wood, coal, lino,

carpets and rugs, are combustible. Celluloid, petrol, some oils, thin material such as muslin, are inflammable. These are just a few examples.

In the home the combustibility of the various articles is roughly as follows, starting with the most combustible :—

(i) Hanging draperies—such as curtains, tablecloths, coats or dresses, bedclothes, lampshades and other thin materials of that kind.

(ii) Wicker furniture, baskets, and the like.

(iii) Wooden furniture, tables, chairs, wooden bedsteads, cupboards, pictures.

(iv) Wooden fittings, doors, window-frames, fitted cupboards and panelling.

(v) Laid carpets, rugs, lino.

(vi) Rafters, joists, etc.

You have probably noticed that the most combustible things are usually the most portable.

5. FIRE SPREAD IN A BUILDING

In the roof, fire will tend to spread :—

(i) Sideways along the roof space.

(ii) Downwards, owing to the burning material dropping to the floor underneath and setting fire to fresh materials.

On any floor the fire will tend to spread :—

(iii) Upwards at first ; particularly up staircases and lift shafts, both of which act like flues.

(iv) Sideways, along joists ; often under floor boards and out of sight. Also through open doors and windows.

(v) Downwards, when it has burnt a hole in the floor and burning fragments drop through into the room underneath.

6. FIRE SPREAD FROM BUILDING TO BUILDING

If the house on fire is one of a terraced row, there is great danger that the fire will spread along the roof-space to the next house.

The fire may spread to other buildings by direct flame, radiated heat, or burning fragments and sparks. The most likely places it will catch are :—

Wooden Sheds.

Thatched Roofs.

Skylights facing the fire.

Wooden window-frames.

Contents of rooms (through open windows).

CHAPTER II

HOW FIRES ARE CAUSED

12. INCENDIARY AGENTS

So far as property is concerned, war records show that fire from incendiary bombs caused anything from 10 to 100 times as much damage as high explosive, the proportion varying according to the target and the method of attack.

The most effective incendiary was the small magnesium bomb dropped in very large numbers with the idea of "saturating" the target area and so overwhelming the Fire Service. There is little doubt that bombs of this kind will be the main incendiary weapon for a long time to come. Thus, the fire-fighting problem should be much the same in any future war as it was in the last.

The medium and large incendiary bombs have the advantage that they may individually start a fire which will need to be tackled from the beginning by the Fire Service, with its full-sized appliances; but this advantage is outweighed by the fact that bombers can only carry a comparatively small number of these bombs. Such bombs are only likely to be used against special targets, and not for a "full-scale" fire-raising attack on a built-up area.

13. INCENDIARY BOMB FILLINGS

It can be accepted, then, that unless some new and more efficient filling is discovered, thermite in a bomb with a magnesium wall (as in the German 1 kilo type), is likely to hold its own. For the larger bombs the fillings will probably be a mixture, with petrol or oil as the main ingredient.

Phosphorus, as such, makes an inefficient incendiary, but may be added to incendiary mixtures so as to ignite the filling if the fuse fails and the bomb breaks up on impact, or if the filling is in any way exposed to the air.

Incendiary bombs are not the only cause of fires in an air attack. The blast, and sometimes the earth-shock, caused by High Explosive bombs, often start serious fires by scattering burning coals, etc., from domestic fires on to carpets, woodwork, and other combustible materials.

14. ATOMIC BOMBS

A great additional risk is caused by the fire-raising effects of the Atomic bomb.

"Heat Flash" is a very short-lived wave of intense heat radiated over a considerable distance in all directions at the moment of burst. It will start fires over a very wide area. The combustible content of many buildings is liable to catch fire simultaneously on all floors.

At Hiroshima, buildings, strong enough to stand up against the blast, were completely gutted because they contained inflammable and combustible materials.

Atomic bombs are also likely to start fires on a wide scale in the same way as H.E. bombs.

We must realize that this country, bad though the damage was, got off very lightly compared to Germany and Japan. There is not a single person who has seen the fire damage in either of those countries, who has not been appalled at the sight of what fire can do once it has been allowed to get out of hand.

It is up to us to keep on our toes if we are to prevent the same kind of thing happening here in any future war. The best insurance of all is for the able bodied adult population to be thoroughly trained in elementary fire fighting.

CHAPTER III

FIRE PREVENTION

20. PRACTICAL PRECAUTIONS

Wartime experience of Incendiary and H.E. bomb attack showed the value of taking *beforehand* all practical precautions to reduce the risk of fires starting and spreading.

Everyone knows the immense tasks which faced the Fire Services, and will certainly face them again, probably on an increased scale. We all know, too, how much householders and the officially organized services were able to do, with a little training and knowledge, and how this eased the situation.

Cases will be remembered where incendiary bombs fell on every house in a street and how, by the efforts of the inhabitants, every house was saved. That is the object of elementary fire-fighting, and the simple and practical hints given in this pamphlet.

In other words, in wartime—and in peacetime too—learn first of all how to reduce the risks to a minimum, and secondly, how to overcome them if incendiary attack is experienced.

(i) Clearance of combustible materials

“ IT MAY COME IN HANDY SOME TIME ” !

How often we have all heard these words ; and how often have they been responsible for the loss by fire of a building which might otherwise have been saved.

Go and look at the contents of your own boxroom or attic. You will find an accumulation of odds and ends most of which are combustible, or inflammable (which is worse). Then imagine an incendiary bomb falling into it.

Even in peacetime such an accumulation of inflammable material in these places is dangerous, but in wartime it is certain to lead to trouble, not only involving your own house but probably your neighbours' as well. Be absolutely ruthless and do not let sentiment play any part. Clear out everything that will burn. If it is necessary to keep certain articles, then store them in some outbuilding away from the main building, if you can.

(ii) Access to your Roof-space

Very often an attic has a ceiling. Perhaps your own has one. Between that ceiling and the roof itself there will be a space.

Sometimes there is no trap-door, or other means of access to the roof space. Then you should have one made.

Lastly, having arranged a means of access, don't forget that you have to use it ; so have a long enough ladder or steps handy.

(iii) Fire-retarding materials

In fire-fighting, particularly in wartime, seconds count. You have now cleared out unnecessary junk from the attic, and by doing that you have won at least half the battle, if not more.

There is still the possibility that if an incendiary bomb lodges in some corner, underneath a piece of constructional woodwork, such as a rafter, the heat radiated upwards will start a fire before you can get there and tackle the situation.

You can reduce the risk by coating such timbers with a fire-retarding solution. There are a number on the market ; some are paints, and some are washes. Sodium silicate (waterglass) is an example.

Do bear in mind that *none* of these materials make the woodwork *fireproof*. In other words they will catch fire eventually. What happens is that the outbreak is delayed for a while—usually for long enough to give you a chance to deal with the situation and put the bomb out before it does any mischief.

Fires are often spread as a result of heat radiated from a nearby burning building. This danger may be lessened by ensuring that the windows are kept closed and by treating the curtains with a fire-retarding mixture.

(iv) Simple Fire-fighting Appliances

It is essential to have some means of tackling fires in the building. In the war, thousands of householders dealt with incendiary bombs and fires in their own buildings without calling the Fire Service or even the Fire Guards. By doing this, they enabled the Fire Service and Fire Guards to concentrate on places where their efforts were essential.

If this was necessary in the last war, how much more necessary will it be in future, when the weight of attack may be far heavier. You must look on what you might call "Self-Help" as part of the normal duty of every citizen. The Germans did and they were successful until their active defences collapsed, so that the full, almost unopposed, weight of the allied attack overwhelmed them.

The most helpful thing you can do is to get a stirrup-pump. Remember too, that no pump is of any use without water ; so you will need an ample supply. Get as many buckets or other containers as you can (buckets are best) and keep them full of water.

Perhaps the biggest fire lesson of the war is that **YOU CANNOT HAVE TOO MUCH WATER.**

Try to build up a reserve of water from which to refill your buckets. The war-time hint of keeping your bath full of water proved most useful.

Never forget war experience, which showed that hundreds of buildings were lost, though there were plenty of pumps and people to work them, simply **BECAUSE THERE WAS NOT ENOUGH WATER.**

(v) The Value of Training

You have now done everything to make your building as safe as any building can be in wartime. You have cleared out all combustible material from your attic. You have your stirrup pump, or pumps, your water-buckets and you have ensured a reserve of water.

But there is one essential thing ; and that is to get trained—and thoroughly trained—in the use of your appliances. It is not much use keeping a pistol against robbers unless you know how to use it.

Fire is the worst robber of all. So learn how to use your equipment so that you get the very best out of it.

(vi) Industry

The same problems which affect the householder and the same principles which help to solve them, apply to industry. The scale is larger, and the details more complex ; but the same advice holds good :—

(a) Never allow combustible and inflammable materials to accumulate. Get rid of all surplus material as quickly as you can, if it is humanly possible to do so.

(b) Make use of fire-retardant paints or washes wherever possible.

(c) Lay in an ample stock of fire-fighting appliances and see that all your employees are well-trained to play their part in using them. If oil or petrol is stored on the premises foam extinguishers should be installed.

(d) Make every effort to ensure an ample reserve of water. Double the amount you think you might need.

(e) Be certain that fire-fighters can get to every part of your premises. Unnecessary destruction was caused in the war in warehouses, etc., when fire-fighters found that goods were stacked so closely together in bulk that they could not get near enough to bombs or fires.

By arranging gangways in both directions between such piles of goods, you not only provide "fire-breaks," but enable your fire-fighters to get to the heart of the trouble.

(f) Be certain that all employees likely to be engaged on fire-fighting have a thorough knowledge of the layout of the premises.

(g) This pamphlet cannot hope to cope with the more complex problems of wartime fires in industry. Advice can be obtained from your local Fire Service.

(vii) Fire Prevention in Peacetime

Thousands of avoidable fires occur in peace-time, and most of them can be prevented by reasonable steps being taken beforehand and above all by being careful. Smouldering cigarette ends, faulty electrical apparatus, unguarded open fires, etc., can all cause fires.



CHAPTER IV

ESCAPE AND RESCUE FROM BURNING BUILDINGS

26. PERSONAL PROTECTION

If you are trapped by fire there are one or two elementary principles to be borne in mind.

A wet cloth, or handkerchief placed over the mouth and nose will give some measure of protection against smoke, by preventing the larger particles from being inhaled (but will give no protection against suffocation from lack of oxygen, excess of carbon dioxide, or poisoning from excess of carbon monoxide).

Quite a small fire can produce a large amount of smoke in which conditions become impossible unless great care is taken. A person lost in a room should make for a wall and then continue round it in the same direction until the door or exit is reached. If it is suspected that another person is lost it is often possible to indicate the whereabouts of the exit by standing close to it and shouting or blowing a whistle.

27. ESCAPE

When moving about in smoke in strange surroundings, it may only be possible to work by touch. This necessarily calls for caution.

The air will be clearest and coolest near the floor and the person entering the room will usually find it advisable to go down on his hands and knees, and crawl (*See Fig. 2.*) When moving forward the free hand should be raised in front lightly clenched, with the back uppermost, to feel for obstructions. If the back of the hand touches a live electric wire the shock will throw the hand clear and will not cause it to clasp the wire, as would occur were the hand open. It will often be possible to detect from this position the glow of a fire which cannot be seen when standing up.

Stairs are a source of danger when escaping from a building which is on fire and should always be treated with caution. Wooden stairs seldom collapse without warning, but may become so weakened by charring that portions of them will give way beneath a person's weight. When using any stairs, always keep close to the wall since the treads will usually bear weight at this point, even though their centres may be weakened. Go down backwards and feel with your foot for each step before putting your full weight on it. If the step is missing one knee will still be resting on the step above and you can catch hold of some part of the stairs with your hands. In searching for the head of a staircase, take care when grasping the handrail, since this may have been weakened and collapse if any weight is applied to it. Metal handrails may be hot enough to burn the hands.

It is often possible to escape by dropping from a window on to the roof of an outbuilding, such as a wash-house or projecting kitchen, and so reaching the ground.

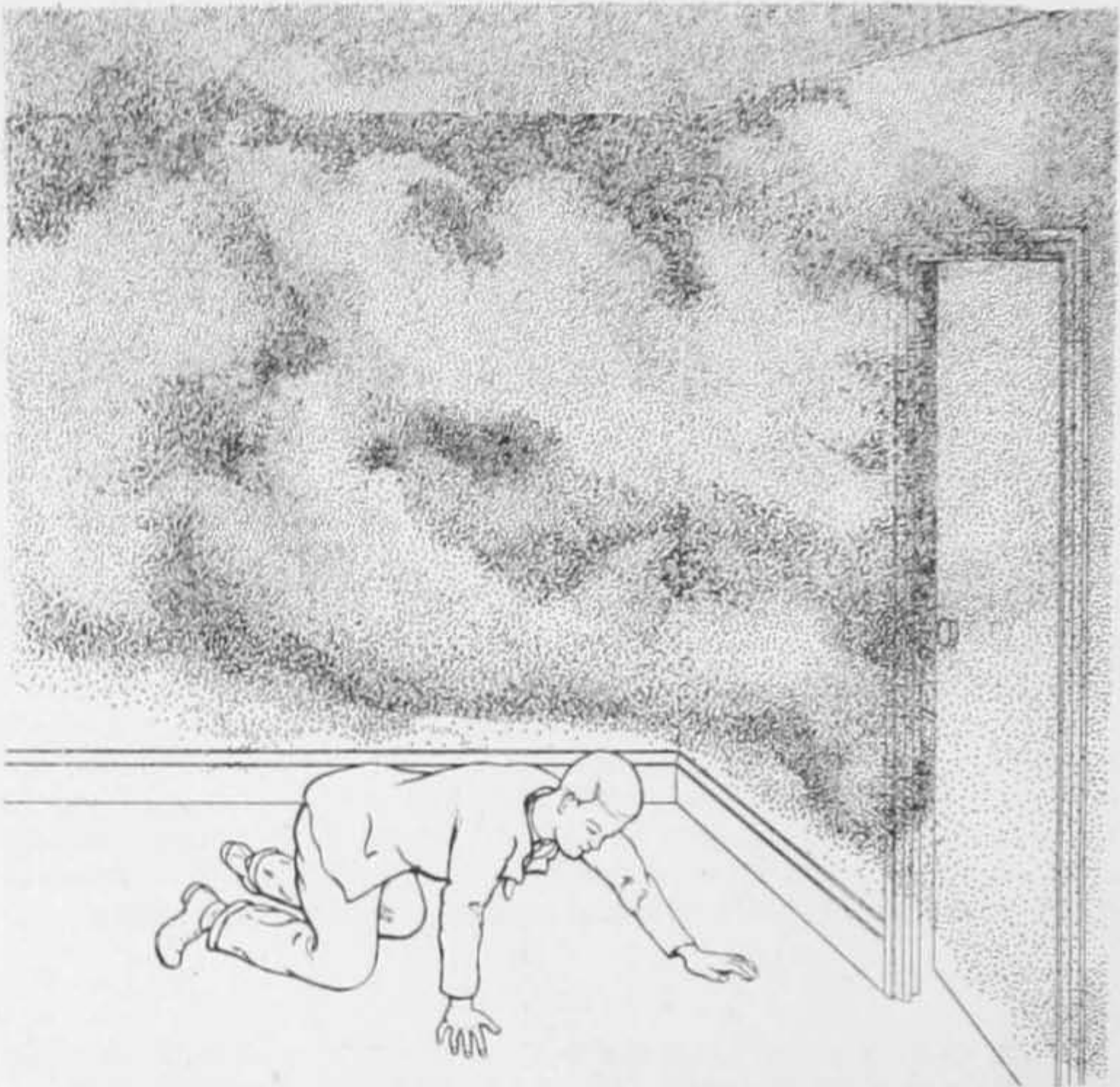


Fig. 2.

When dropping, it is essential to reduce the length of the fall as much as possible. To do this, sit on the window sill, with your legs outside, turn over, grip the sill and lower yourself to the full extent of your arms, then let go and drop. In this way you reduce the distance by about seven feet and are less likely to hurt yourself. (See Fig. 3.)

Finally, do not panic. If you are caught on a floor higher than the first one up, you may be able to knot sheets and blankets together, tie one end to some heavy piece of furniture, drop the other out of the window, and climb down, if not all the way to the ground, at any rate until you are able to drop with reasonable safety.

If you live on the third, or higher, floor of a building it is advisable to buy a rope which should be kept in readiness and which will reach to the ground, and be capable of bearing your weight. In peace time it is reasonable to assume that a fire escape will soon arrive, but in time of war it may be delayed and you may have to rely on your own efforts.

If all else fails, shut the door, call for help from the window, and wait to be rescued. A closed door will hold back heat and flame for quite a long time.

28. RESCUE

(i) General

The primary duty of fire-fighters is to save life. Due to fear and excitement, persons trapped often forget the normal means of escape

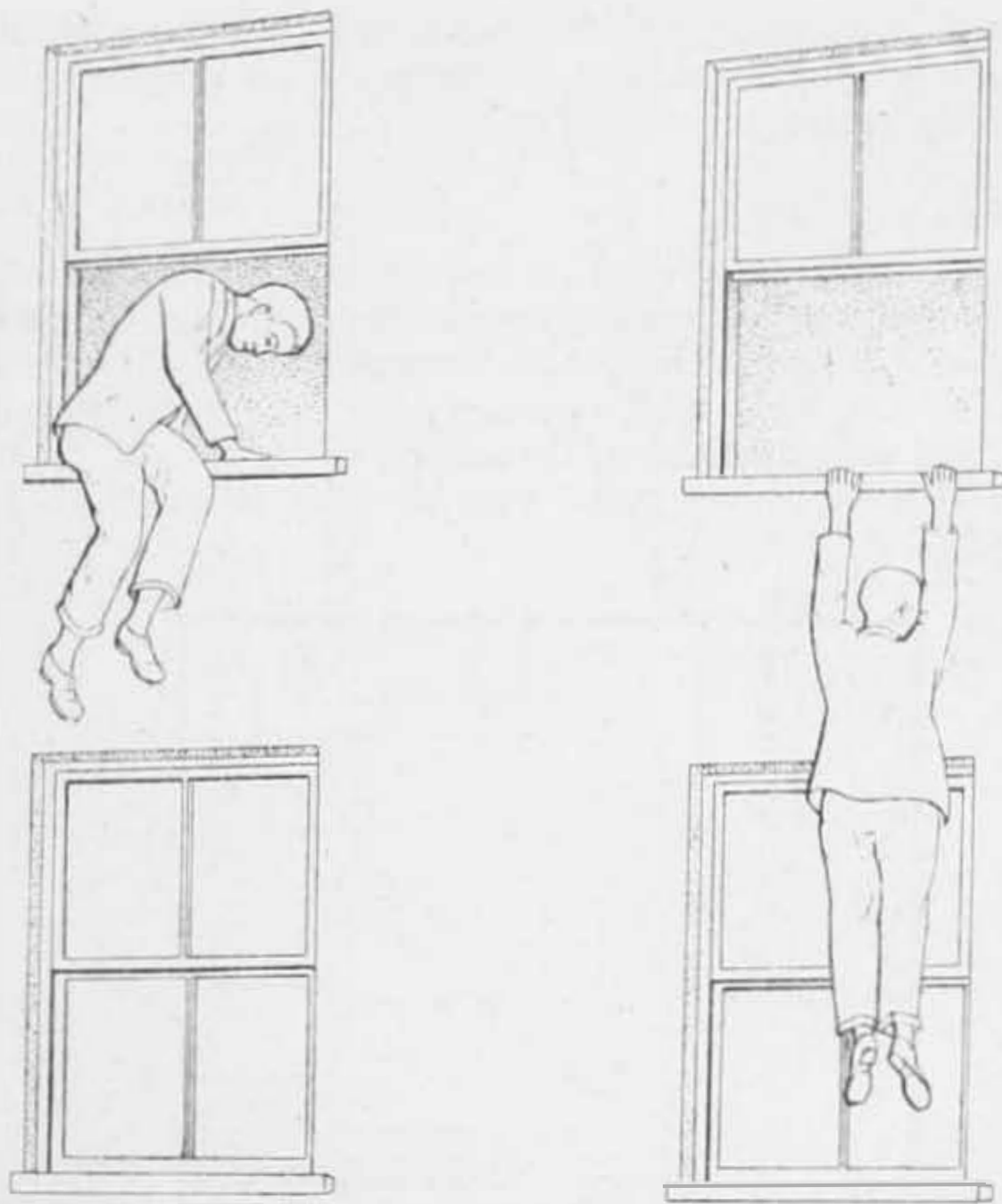


Fig. 3.

and have a tendency to throw themselves from a window or roof into the street, despite the fact that there may be no immediate danger and that help may be at hand. Where persons are crying out for help they should be reassured and told not to jump. Find out as quickly as possible whether any one is trapped ; this information can often be obtained from neighbours. If it is suspected that anyone is still in the building a thorough and methodical search must be carried out at once.

No hard and fast rule can be laid down as regards rescue, as it depends entirely upon the type of building and equipment available. The general rule is that the search should begin at the top of the building so that the searchers are nearest to fresh air and safety at the end of their search.

(ii) Entry

When trying to enter a building the main door should first be tried. It may not be locked. If entry has to be forced, it should be done by the method which will cause least damage, remembering it is easier to break glass rather than wood. The possibility of entry by the back door should not be overlooked.

(iii) Searching a Building

When possible, it is advisable to work in pairs on entering a smoke-filled room or building. This gives confidence and makes it possible for one to assist the other. People trapped by fire or smoke, particularly children, often take refuge under beds or in cupboards where they hide

to escape the smoke and flames. Searching though swift, should be thorough, every room should be investigated and no possible hiding place, however unlikely, overlooked.

(iv) Searching a Room

Searching a smoke-filled room is not an easy task and is unlikely to be successful unless carried out on a definite plan. Once inside the room a complete circuit should be made, keeping close to the wall, feeling under and on the beds, and opening and feeling inside cupboards, wardrobes and other articles of furniture. Finally, the room should be crossed diagonally to make sure no one is lying in its centre. (See Fig. 4.)

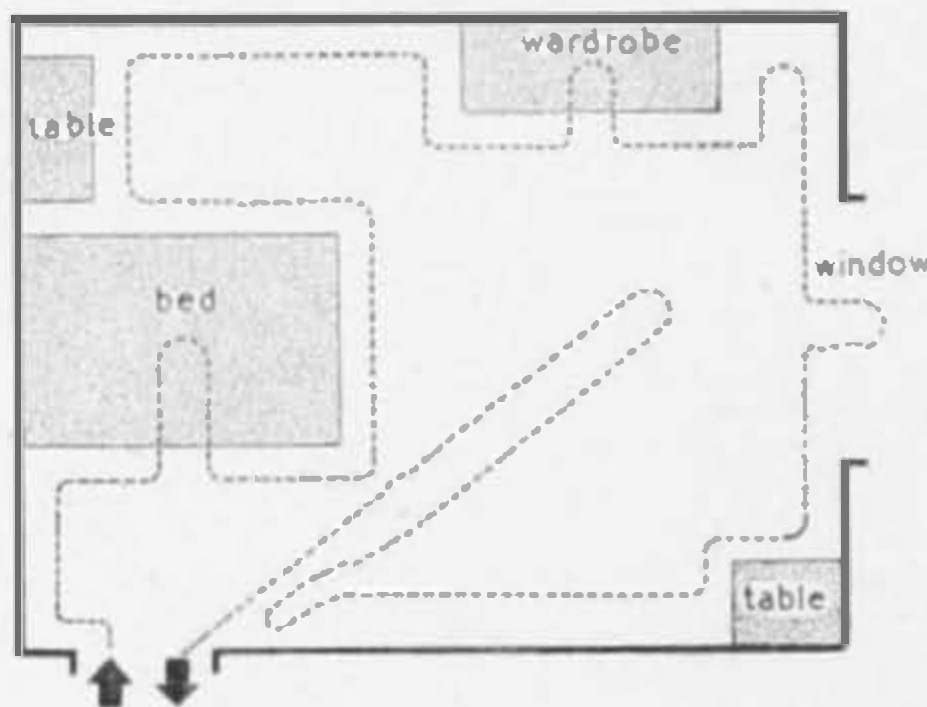


Fig. 4.

Always remember that floors immediately above the fire, may have been weakened sufficiently to become dangerous and care should be exercised when it is necessary to search the centre of the room. Whether or not the windows should be opened to obtain fresh air during the search depends on circumstances. Only when it is known that the fire is in a distant part of the building and is being tackled, or if the atmosphere is cool, is it safe to open the windows.

When opening a door behind which fire may be found, the possibility of a back draught of flame caused by the intake of air should not be overlooked. The most obvious warning of danger is the presence of heat. The metal shank connecting the two door knobs is a good conductor of heat and if this or the door knob prove to be very hot then the door must be opened with care. A room should not be entered, except for rescue purposes, without a stirrup pump for the immediate application of water to the fire. (See Fig. 5.)

If the door opens towards you then the foot should be placed against the bottom of the door, and the handle turned gently. (See Fig. 6.)

There may be a considerable pressure in the room due to the expansion of the heated gases. It is desirable to crouch in such a way that any heated gases or flames which are released pass over the head.

(v) Moving an Insensible Person

It is not an easy matter to lift an insensible person, and carrying involves the maximum danger in smoke, both from suffocation and



Fig. 5.

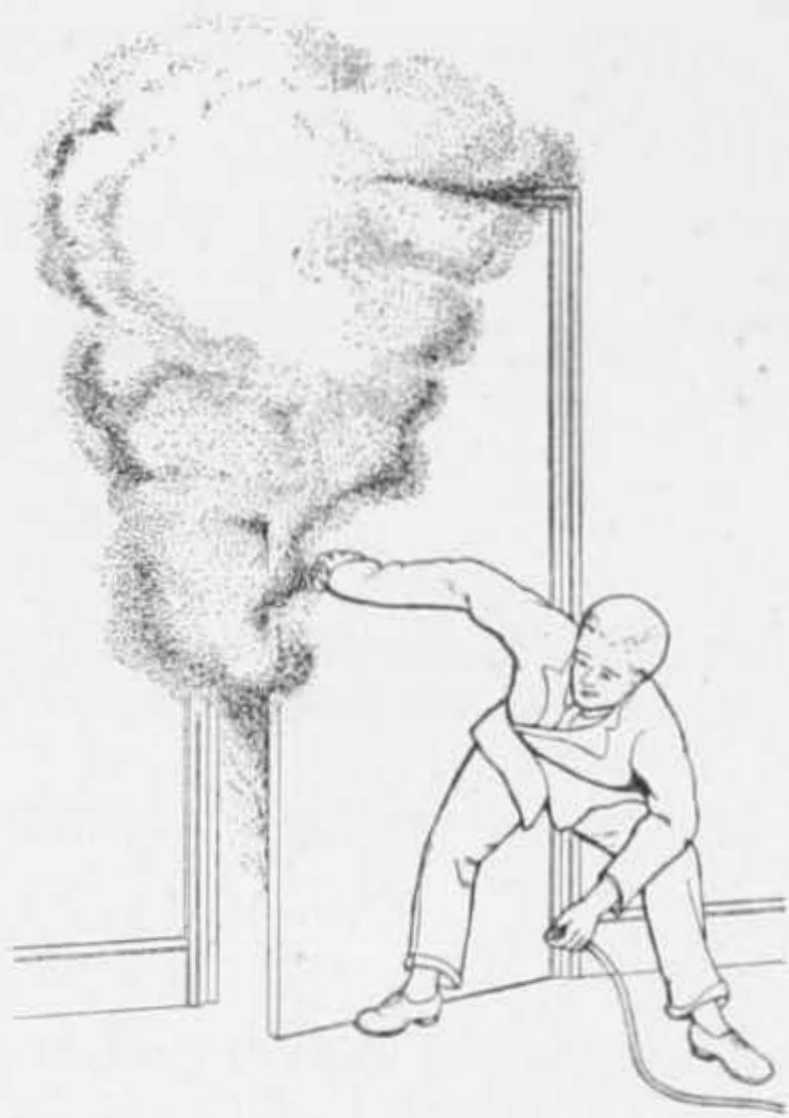


Fig. 6.

falling. To move an insensible person, turn him on his back on the floor, tie his wrists together, kneel across him and place your head through the loop formed by his arms : then you can crawl on hands and knees, dragging him with you although he may be far heavier than yourself. To move an insensible person downstairs, lay him on his back, head downwards on the stairs, place your hands under his arm-pits, so that his head rests on the crook of your arm and ease him gently downstairs.



CHAPTER V

FIRE-FIGHTING EQUIPMENT—ITS USE AND CARE

34. GENERAL

(i) The Householder

War experience proved that in well-trained and resolute hands, the simplest appliances and equipment were capable of dealing with the incendiary bomb menace.

If you are a householder, or the occupant of any but large business premises, you should have :—

- Buckets of water .
- Buckets of sand or earth .
- Stirrup hand pumps (say one to every three or four people).

(ii) Business and Industry

Large business and industrial concerns normally have a variety of appliances and their own trained firemen. These arrangements are usually adequate in peacetime ; but in time of war more is needed.

The ideal should be that every employcc is trained in the use of the smaller appliances and that enough appliances are available to bring the maximum possible strength to the attack of the fire menace.

This means that besides Self-propelled Pumps and the lighter power-driven units of the " Trailer " and " Wheel-barrow " types, a plentiful stock of stirrup pumps, buckets and an ample reserve supply of water should be available.

35. APPLIANCES FOR HOUSEHOLDERS AND SMALL BUSINESS PREMISES

(i) Water Buckets

Get as many of these as you possibly can. You cannot have too many. The ordinary bucket holds a little short of two gallons, and you will find that this is the most convenient size.

You must have at least two always in use at the pump and enough extra to ensure a continuous supply from the nearest source of reserve water.

Even in the absence of a pump, a non-stop chain of buckets, in capable hands, can quench a fire in its early stages, though this will not be enough if the fire has gained a hold.

Keep every bucket full of *clean* water. Impress on everyone that they are not there as receptacles for match-sticks, cigarette ends and rubbish of that sort.

Do not keep all the buckets massed in one place. It might be that when the time comes the fire would prevent you from getting at any of them. Space them out in such a way that no matter where the fire may be, you can always lay your hands on a sufficient number.

Inspect your buckets at regular intervals, not only to make sure that they are clear of rubbish, but also because they will need "topping-up" every now and then.

(ii) Sand Buckets

Keep a few buckets full of dry sand or earth. Builders' sand is better than sea-sand, and earth, if used, must be free of grass roots and other combustible material of that kind.

If anything goes wrong with your pump or your water supply, then a couple of buckets full of sand or earth will partially smother a magnesium bomb and, by cooling it down, will delay its tendency to burn through the floor.

In addition sand or earth is very useful for smothering burning oil, as you will learn in the next chapter.

(iii) Stirrup Hand Pumps

The stirrup-pump is by far the best piece of elementary fire-fighting equipment. It is easy to use, easy to keep in good order and, what is more, makes more effective use of limited water supplies than anything else.

It can be used by two people, or in an emergency, even by one. The normal stirrup pump team should be four, but if the man-power situation will not permit, then three should be used.

No. 1. Tackles the bomb and the fires with the hose.

No. 2. Works the pump.

No. 3. Brings up further water supplies.

No. 4. (If available) assists No. 3 to bring up water. In the event of a long carry being necessary, No. 4 will bring up supplies to a pre-arranged point leaving No. 3 to take them forward from there.

Nos. 2, 3 and 4 change over at intervals, but every member of the team must be trained to do any of the three jobs in case of need.

The drill for a team of four is given in Appendix "A," and for a team of three in Appendix "B."

The pump (*See Fig. 7.*) is very simply made, and there are only three moving parts :—

(a) The plunger tube, to the bottom of which is fitted the piston.

(b) The metal ball which forms the non-return valve in the piston.

(c) The metal ball which forms the foot valve in the base of the barrel.

In the bottom of the pump is a strainer, which can be unscrewed and taken out if necessary.

To use : put the barrel of the pump into a bucket of water so that the metal stirrup rests on the ground outside the bucket.

No. 2 holds the pump firmly in position by putting his foot on the stirrup.

Training and practice will show you the best pumping rate to maintain a steady stream of water, and you will find that short quick strokes give the best results.

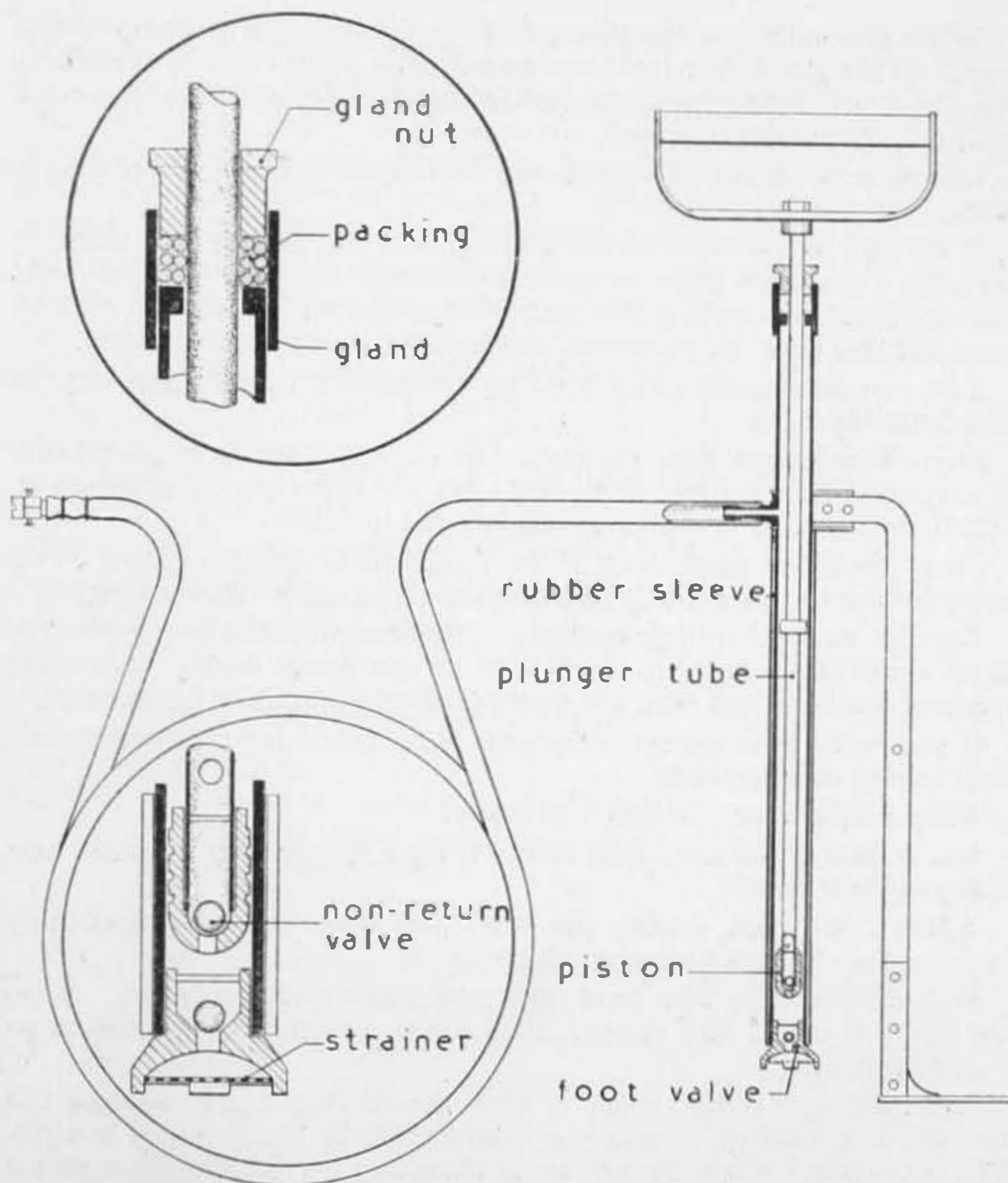


Fig. 7.

Provided you test the pump at least once a fortnight—better still, once a week—it will go on giving you good service more or less indefinitely, but if anything should go wrong, it is probably due to one of the following :—

- (i) Rusted ball valves.
- (ii) Ball valves stuck on the seating through lack of use.
- (iii) Choked strainer cover.
- (iv) Choked hose nozzle.

The most common defect of the earlier models is rusted ball valves, due to the use of steel balls which are liable to rust fairly quickly if the pump is not regularly used.

To put this right, remove the strainer at one end and the pump handle at the other, and pull the plunger out of the lower end of the pump barrel. Then you can remove the rust with a pocket knife. Later models were fitted with phosphor-bronze balls which do not rust.

When you withdraw the plunger, do not interfere with the packing-gland. If the gland does leak, you can usually put it right by tightening the gland nut. If this fails, pick out the packing altogether, and re-pack with a length of oiled string.

Do not over-tighten the gland-nut, or you will find the pump hard to work.

If the ball valves stick to the seating, you can usually free them by pushing a pin, or a piece of wire, up through the filter. If this fails, unscrew the strainer altogether and lever up the ball with a thin piece of stick. If this does no good you will have to dismantle the pump.

You can clear a choked nozzle by unscrewing it and removing the dirt from the hole.

Some nozzles are dual purpose, and deliver a spray or jet at will. Others only deliver a jet. With this type, the spray can be achieved by placing the thumb or finger partially over the hole.

Spray should be used on an oil fire to cut off the oxygen supply. You must not use the jet, its only effect would be to scatter the burning oil.

Regular use of the pump makes you familiar with the best method of handling it and shows up any faults in the pump itself. Use it for washing windows and cars, for watering gardens and for laying dust.

If you want your pump to last do NOT use it for spraying strong disinfectant or insecticide.

Keep it where you can get at it easily.

Look after it and keep it in order, from a fire fighting point of view it is your best friend.

Again and again during the war, this little pump triumphantly justified the claims which were made for it.

Provided that the fires have not spread to any great extent beyond the room in which they started, they can be attacked with every prospect of success.

Even when a whole room is blazing and flames are shooting out through the window, it does not follow that the fire is out of control. The effect of 15—20 gallons of water from two stirrup pumps on such a fire has to be seen to be believed. There were cases where it was extinguished within ten minutes.

You will find other instances of the pump's capabilities in Chapter VIII.

(iv) Domestic Water Supplies

Cases did occur where householders, to save the expense of buying pumps and buckets, fixed lengths of hose to taps.

This is unsound, and is *not* recommended. Domestic water supplies usually come from a gravity tank in the attic or roof-space. It is true that you might get quite a good head of water on the lower floors of a tall building; but on the upper floors, and particularly in the attic or roof space (two places where incendiary bombs are the most likely to land) you will get little or no head of water.

Besides this, the town water supply may fail, in which case, having emptied your gravity tank, you will be without water.

(v) Chemical Extinguishers

At first sight a chemical extinguisher may seem to be the ideal fight portable apparatus for use in wartime. When you go into the matter

(v) Chemical Extinguishers

Certain chemical extinguishers, such as those which contain carbon tetrachloride or methyl bromide, cause noxious gases to be generated when the contents come into contact with the molten magnesium of an incendiary bomb or other hot metal. This sort should therefore, on no account be used for controlling incendiary bombs.

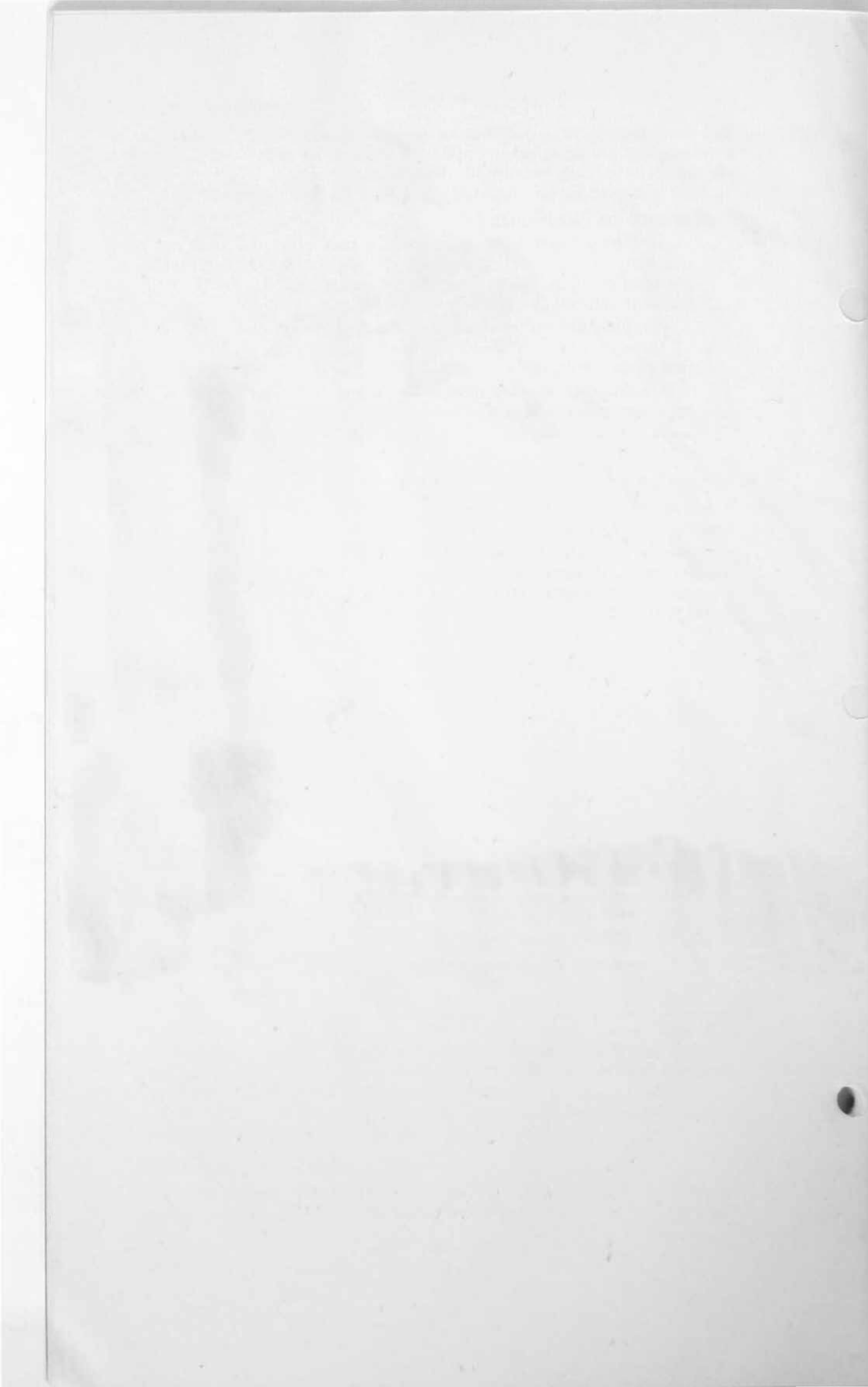
The normal domestic type of soda acid (acid alkali) or compressed carbon dioxide (water) extinguishers do not, however, cause dangerous gases to be produced and can be used on incendiary bombs and resulting fires in the same way as the stirrup hand-pump.

The advantages of these extinguishers are :—

- (i) For first attack on a fire it is often the most readily accessible fire-fighting appliance.
- (ii) Only one person is needed to work it.
- (iii) When kept in good working order, it is reliable.
- (iv) It is self-contained, having a capacity sufficient to deal with minor outbreaks.
- (v) It is almost instantaneous in action.
- (vi) It has only one moving part.
- (vii) The length of the stream may be expected to reach 30 to 40 ft., but there is every advantage in using the stream at a shorter distance, where possible.

The disadvantages are :—

- (i) Once the action is initiated the extinguisher must be completely discharged before being refilled.
- (ii) As the liquid discharged is a conductor of electricity, it should not be directed on to live electrical apparatus.
- (iii) As with any appliance using water, it requires protection against freezing ; at low temperatures the chemical reaction may develop slowly.
- (iv) The liquid ejected from the soda acid type extinguisher contains a chemical (sodium sulphate). Clothing and fabrics may in some cases be affected by the liquid.
- (v) Certain types of fire, *e.g.*, those below floorboards, etc., cannot be tackled successfully with an extinguisher which will not operate in the inverted position unless fitted with at least three feet of hose.



CHAPTER VI

HOW TO ATTACK A FIRE

41. RECONNAISSANCE

From what has been said previously it is obvious that in tackling a fire the following must be borne in mind :—

Generally the fire will be extinguished by cooling with water, therefore the closer one can get to the heart of it the more effective will be the jet, and the maximum the effect of its impact. At the same time, so far as it is possible the supply of oxygen must be kept to a minimum ; and so, as many doors, windows and other openings must be closed as is consistent with a safe line of retreat. Any combustible material in the vicinity of the fire should be removed as opportunity offers. Moreover there may be more than one fire-source.

A thorough, though rapid reconnaissance is a vital preliminary to attack : *time so spent is never wasted.*

In making this reconnaissance, it must be remembered that part of the approach, and the attack on the fire, will have to be made in the prone position, as near the floor there will normally be more cool air, better visibility and less heat and smoke than at a higher level.

Unless the fire is quickly brought under control it will spread, therefore it is vital to attack the heart of the fire rather than the more spectacular-looking flames ; none the less all combustible material near the fire is itself a potential fire and unless cooled from time to time, may burst into flame.

In the event of there being more than one stirrup pump available the additional ones may be used either to reinforce the first, or to attack the fire from more than one direction and at the same time prevent the fire spreading.

When the fire is out, all debris must be cooled with water and a final reconnaissance made to ensure there are no hot spots which might flare up after the fire-fighters have left.

The first reconnaissance may show that the fires are too large for the capacity of the appliances available, if so, additional help should be summoned and the available appliances used to hold the fires pending the arrival of reinforcement. Particularly may this be so in the case of an atomic bomb where fires may be started simultaneously in all parts of a building. In this extreme case the fire fighters should concentrate on saving life.

No matter how large the area of fire, there will always be a perimeter where the attack has been less concentrated and here fires can, and **MUST**, be fought to prevent a bad situation from becoming worse.

Except for the extreme case mentioned above, the object at all times should be to extinguish the fires no matter what complications there may be. Such things as phosphorus, oil, incendiary bombs with explosive charges and so on are additional dangers, the presence of which must never be allowed to interfere with the fire fighting, though they may call for alterations of technique.

42. FIRES CAUSED BY INCENDIARY BOMBS

(i) Magnesium

When tackling a fire caused by a magnesium I.B., no departure is needed from the principles of fire-fighting already outlined. The I.B. will normally be the heart of the fire and should be attacked as such. (See Fig. 8.)

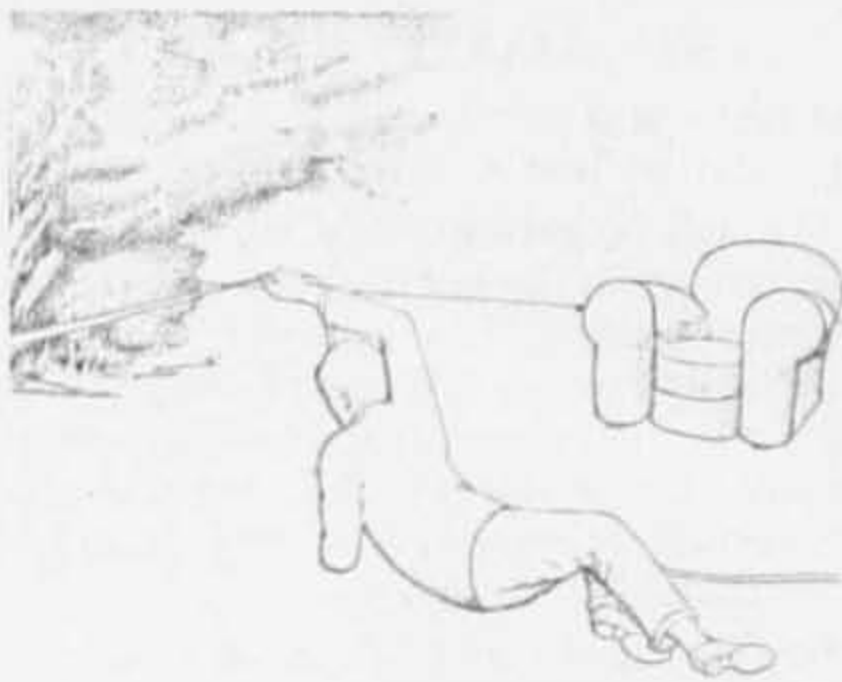


Fig. 8.

A jet of water directed at the I.B. will cause considerable spluttering of the magnesium away from the fire-fighter and may start other fires in the vicinity.

Should the bomb have been burning for some time before the situation is tackled, it may have reached the stage when spluttering has stopped and the bomb reduced to a molten puddle of magnesium. In this case the fires started by the bomb will probably have a good hold and must be attacked with water at once. The only danger from the molten bomb will be in burning through the floor boards.

Incendiary bombs may be fitted with explosive attachments, therefore when fighting a fire caused by incendiary bombs, full advantage should be taken of any available cover against splinters. (See Fig. 9.)

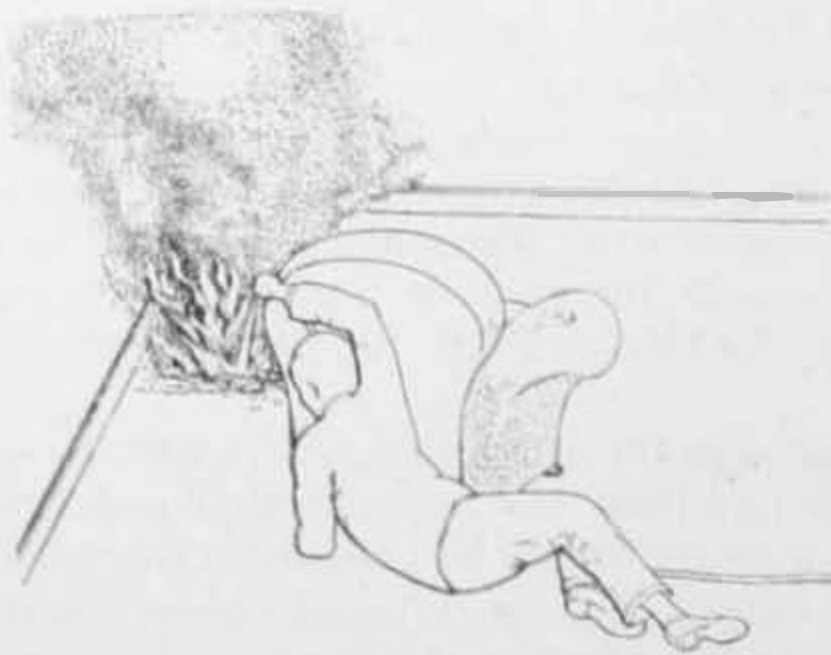


Fig. 9.

If none is available, the risk must be accepted and the fire tackled regardless of possible injury.

(ii) Phosphorus

These fires can be readily controlled by water, preferably in the form of spray, but it must be remembered that phosphorus will re-ignite if allowed to become dry. Cases were known in the war of phosphorus re-igniting after a lapse of ten days. It is necessary to keep wet all inflammable surfaces which are contaminated by phosphorus until such time as it can be removed by scraping or some other means. Remember that phosphorus on the skin or clothes will re-ignite unless kept damp and can cause serious burns.

(iii) Oil

Oil fires should not be attacked with water in bulk, such as a jet. The burning oil may float on the surface of the water and so cause the fire to spread. They should be smothered with earth or sand to exclude oxygen, or may be blanketed with a fine spray of water. The latter method has the additional advantage of cooling.



CHAPTER VII

FIRE-FIGHTING HINTS

The principal points in fire-fighting are briefly summarised below in the form of "DO's" and "DON'TS."

DO

- (i) Break a panel near the lock if it is necessary to force a door.
- (ii) Turn off gas at the main on entering. This will prevent an explosion.
- (iii) Leave electricity "on" but if it is already "off" find out the reason before putting it on again.
- (iv) Start at the top and work downwards when searching a house.
- (v) Exclude oxygen by keeping doors and windows closed when possible.
- (vi) Crawl, don't walk, when in thick smoke.
- (vii) Keep near walls, where floor and stairs are strongest.
- (viii) Attack fires at closest possible range.
- (ix) Attack the heart of a fire.
- (x) Attack oil fires with sand, earth or foam.
- (xi) Before leaving be sure that all fires are out.
- (xii) When leaving turn off electricity at main.
- (xiii) Remember that phosphorus will re-ignite when dry.
- (xiv) Keep all fire-fighting appliances in order.
- (xv) Keep ample supplies of water, **YOU CANNOT HAVE TOO MUCH.**

DON'T

- (i) Go alone in a smoke-filled building except to save life.
- (ii) Enter a burning building or room, except to save life, without fire-fighting appliances.
- (iii) Play water on electric wiring.

GENERAL

- (i) When in smoke, and looking for a window from which to escape, remember that fire may be reflected from a mirror and make it resemble a window.
- (ii) Make a note of the position of the nearest :—
 - (a) Fire Station.
 - (b) Emergency water supplies, e.g., ponds, rivers, etc.

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CHAPTER VIII

ELEMENTARY FIRE-FIGHTING EXPERIENCES IN WAR-TIME

During the war, reports on many incidents were received at the Home Office and Scottish Home Department. Some were on the work of Wardens and Police, some related to the Fire Service and some covered the work of the Fire Guard. This chapter contains a selection of war-time experiences in elementary fire-fighting.

All are taken from official reports and each proves that training and constant practice are required to make an efficient fire-fighter. Read them carefully, some apply to fire-fighters who trained and some to those who did not.

A trained man is a valuable help, an untrained one is a liability, not only does he fail to assist others but he has to receive assistance.

Which are YOU going to be?

48. HOLDING A FIRE IN CHECK

A fire broke out in a small factory but was held in check by Wardens and Fire Guards until the arrival of the N.F.S. who, with their major appliances, soon extinguished the blaze. Had this fire gained a hold it would have spread, owing to the direction of the strong wind at the time, and gutted the main shopping centre.

49. DISCIPLINE AND TRAINING

(i) Reports from certain residential areas make it clear that many Fire Guards took shelter with their families and made little attempt to deal with the bombs, many houses being burnt out. This cause of failure lies in the lack of leadership and discipline.

Reports on business premises in the same town state that the parties were at their posts ready to go into action at once. The teams were composed of men working in the same employment who knew one another and were accustomed to working together. They had been properly trained and their equipment was ready to hand. They did excellent work.

The general inference to be drawn is that everything depends on discipline, leadership and training. Very little reliance can be placed on the unco-ordinated efforts of individuals acting without competent leaders or positive orders.

(ii) A small number of incendiary bombs fell on and round a church where there were three Fire Guards on duty. One I.B. penetrated the roof and lodged in the rafters. A Fire Guard got on to the roof (no easy task) and with an axe hacked away at the rafters to dislodge the I.B. which with the burning rafters fell into the nave, as intended, where they were soon dealt with. These Fire Guards had been thoroughly trained.

(iii) Two young nurses, two maids and a middle aged cook comprised a Fire Guard "squad" on duty at a hospital. A number

of I.B.'s fell on the roof of the building and in the grounds. Those in the grounds were left to burn out whilst the others were promptly and efficiently tackled with a stirrup pump and the fires extinguished. It was a case showing that good work can be done by trained women Fire Guards.

50. LACK OF WATER

(i) A hospital was lost owing to reliance being placed on the electrically-operated pumps. The electricity supply failed early in the raid. Well trained stirrup pump teams, and an adequate static water supply might have saved the building.

(ii) The Fire Guards in a factory used the bulk of their static water supply on a neighbouring fire, trying to stop it spreading to their own premises. When their own building caught fire, there was not sufficient water to deal with it as the mains had gone. Thus the negligence of the first factory in not making provision for adequate static water supplies resulted in the destruction of both factories.

51. SPREAD OF FIRE

(i) Incendiary bombs fell on the fire-resisting flat roof of a modern steel framed building and were at once dealt with by the Fire Guards. The chief danger to the building lay in the spread of fire from other buildings around, all of which were on fire.

One window faced an alley, 9 ft. wide, across which there was a four storey building of old and combustible construction, which was gutted. A 4½" brick wall had been built inside the wooden window frame. This frame was entirely burnt away but the interior of the room was unmarked by fire. Had the window not been bricked up there is little doubt that it would have constituted a serious hazard to the building.

(ii) A 50 Kg. phosphorus bomb burst in a terrace house. Four stirrup pump teams went into action and although the back rooms of the house were gutted, the fire was cut off and, not only was spread prevented to the neighbouring premises, but the front rooms were saved.

(iii) Four incendiary bombs penetrated an upper room of a three storey building where a large stock of camouflage netting was stored. This netting, owing to the proofing process, was highly inflammable and almost immediately a fierce fire was raging. Two Fire Guards tackled the fire with a stirrup pump whilst a third man carried water. At a later stage a number of naval ratings arrived and offered assistance.

By relays of water in buckets and by the use of stirrup pumps the fire was fought for nearly an hour, and spread of fire prevented. When the N.F.S. arrived, lengths of hose were run out and the fire was soon under control. This fire was confined entirely to two rooms on the upper floor.

52. PHOSPHORUS

The need for the quick removal of phosphorus splashes from walls, timber and the like, is most important, as it is not only liable to cause further outbreaks of fire but also physical injury to people, particularly

children, coming into contact with it unwittingly. In one raid, this clearance was not done for three days and as a result two people received burns.

53. MAKING SURE THE FIRE IS OUT

A small incendiary bomb went through the roof of an unoccupied house and lodged between the rafters and the top ceiling. To gain entry the door had to be forced and the rapidly spreading fire was tackled with stirrup pumps and buckets of water. The fire was apparently extinguished but broke out again some time after the raid. This time the whole of the property was gutted. It is important to make sure that a fire really is out before it is left.

54. THE VALUE OF LEADERSHIP AND TEAM WORK

A modern departmental store of fire-resisting construction, with a fire-resisting roof without roof lights, was entirely surrounded by fire. On two sides the danger was great, as the burning buildings were not more than 10 feet away.

The chief Fire Guard said he had always realised that the windows constituted the chief danger to the building, and had formed the habit of laying out 60 ft. lengths of $\frac{1}{2}$ " hose fed from a large roof tank, together with stirrup pumps and buckets. On alerts, one man was present on each floor and could summon help by means of whistle signals.

When the attack began, the men pulled down the blackout curtains on the exposed windows and removed combustible material from their neighbourhood. They succeeded in preventing more than slight damage by running from window to window and hosing the steel window frames. In two or three places the fire had entered and taken hold of wooden fittings, but energetic action prevented spread.

After the raid the building stood intact, surrounded by an area of complete devastation.

55. STATIC WATER SUPPLIES

Most residents in a heavily raided town had water containers full and readily available, but, even with all this reserve, it became necessary in some areas to draw on the mains. Despite the fact that they were mostly undamaged, the demands of the N.F.S. had so lowered the pressure that in some areas it was impossible to obtain more than a trickle from the taps. It is impossible to store too much water.

56. THE VALUE OF TRAINING

Between two and three thousand incendiary bombs were dropped on a residential area about one-third of a mile long and one hundred yards wide. In some streets there was not a house that was not penetrated by a bomb. A large proportion of the houses had three to five bombs in them, and a church had as many as twenty. There were 127 fires but the Fire Guard was well trained and well led. The N.F.S. received seventeen calls but in only two cases did they have to unroll their hose, and even in these cases an extra stirrup pump might have been sufficient. Not a single house was burnt down though there was heavy damage and many rooms were gutted.

57. WATER AGAIN

A Fire Guard Post for a business premises block was inspected during the early evening and the buckets of water which should have been available on the first floor were discovered in an inner room. The occupier, who kept a hairdressing saloon, explained that his customers might be upset if fire buckets were kept in the saloon or in the passage and that it was his practice to fill the buckets at night. Two more empty buckets were found on the stairs between the first and second floors. Two new bins full of paper and rubbish (which might have been filled with water) were found on the top floor.

There is no prize for knowing what happened when the building was hit by incendiaries that night.

APPENDIX A

STIRRUP PUMP DRILL FOR A TEAM OF FOUR

Drill

The duty party consists of 4 persons who should be numbered 1 to 4, No. 1 is in charge of the Team.

When Moving to Attack a Fire

No. 1 carries out a reconnaissance.

No. 2 carries the pump.

No. 3 carries two filled buckets

No. 4 carries two filled buckets.

On the Order from No. 1

"Get to work" No. 1 goes forward with the nozzle.

Nos. 3 and 4 place the buckets where ordered by No. 1 and No. 3 assists No. 1 in running out the hose. He then returns to No. 2 and assisted by No. 4 maintains the water supply. He also keeps in touch with No. 1.

Nos. 2, 3 and 4 exchange duties when required.

No. 2 places the pump in the bucket and pumps a few strokes to fill the hose.

"Water on" No. 2 pumps.

"Water off" No. 2 stops pumping.

"Knock off and make up" Hose is cleared by pumping and gear is made up, the hose being coiled and secured.

CLASSIFIED DETAIL OF DUTIES

No. 1	No. 2	No. 3	No. 4
In charge of team. Makes reconnaissance. Selects position for pump. Goes forward with nozzle to deal with incendiary bomb and resulting fire. Gives order "Water on" and "Water off" as required.	Operates pump. Is relieved by Nos. 3 and 4 when desired.	Lifts hose forward to No. 1. Keeps in touch with No. 1. With No. 4 maintains the water supply and when required relieves No. 2	Assists No. 3 to maintain the water supply. In the case of a long carry brings water supplies to a pre-arranged point from which No. 3 takes them forward to the pump. Relieves No. 2 when required.

APPENDIX B

STIRRUP PUMP DRILL FOR A TEAM OF THREE

Drill

The duty party consists of 3 persons, who should be numbered 1 to 3. No. 1 is in charge of the team.

When Moving to Attack a Fire

No. 1 carries out reconnaissance.

No. 2 carries the pump.

No. 3 carries two filled buckets.

On the Order from No. 1

"Get to work" No. 1 goes forward with nozzle.

No. 3 places the buckets where ordered by No. 1 and assists him in running out the hose. He then returns to No. 2 and maintains the water supply, and relieves No. 2 at the pump when required. He also keeps in touch with No. 1.

No. 2 places the pump in the bucket and pumps a few strokes to fill hose.

"Water on" No. 2 pumps.

"Water off" No. 2 stops pumping.

"Knock off and make up" Hose is cleared by pumping and gear is made up, the hose being coiled and secured.

NOTES

(i) No. 2 maintains water supply when No. 3 is pumping.

(ii) Where man-power allows, a fourth person can be used to maintain the water supply.

If only two persons are available, No. 1 carries the pump, and No. 2 carries 2 filled water containers. Where only one person is available, he should take the pump and one bucket of water, and would have to operate the nozzle from the pumping position.

CLASSIFIED DETAIL OF DUTIES

No. 1	No. 2	No. 3
Is in charge of team. Makes reconnaissance. Selects position for pump. Goes forward with nozzle to deal with incendiary bomb and resulting fire. Gives orders "Water on" or "Water off" as required.	Operates pump. No. 3 relieves him when desired.	Lifts hose forward to No. 1; maintains water supply and relieves No. 2 as necessary; keeps in touch with No. 1.

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