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Tents

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TENTS.

Invented by himself.

By MR. GEORGE TURNER.

In instituting the improvements which I flatter myself I have effected in tent construction, my greatest desire has been that they may lead to a considerable change in the system of encampment, and be the means of removing much of the hardships hitherto incidental to a campaign, and of improving generally the sanitary condition of the soldier in the field. Of all the causes tending to weaken the effective force of an army, disease is the most formidable, and nothing extends and strengthens its ravages more than wet nightly lodging, bad ventilation, or insufficient shelter from the inclemency of the weather.

And in respect to the wounded or the sick, it is a notable fact that there is no assistance the skill of the surgeon can receive in promoting a cure, equal to enabling his patients to breathe a pure air and affording them the comforts necessary to their condition.

Canvas constructions of the ordinary kind mostly fail when their services are required, viz. in wet, stormy, and inclement weather, and the tents and marquees used by the British Army in the Crimea may fairly be classed amongst the worst of the kind.

No event of the present day has stirred the public feeling to so great an extent as the ever to be regretted sufferings and decimation of those gallant soldiers composing the British Contingent in the late Crimean campaign—sufferings which called forth feelings of sympathy from every breast, and were characterised by Lord John Russell, in the House of Commons, as being truly heartrending and afflicting.

To those who watched the progress of that war, and read the interesting letters of the correspondents of "The Times," and other journals, and the letters from officers and others, published at the time, it must be evident that most of those disasters were traceable to the wretched shelter afforded to the troops by the old regulation "Tents," and to the inadequacy of the means provided for alleviating the sufferings of those disabled by wounds or sickness.

The following are selections from many of the statements which have appeared in the public prints on the subject.

Mr. Russell, in his correspondence, remarked that on the 14th November,

"A fearful hurricane passed over the camp; all the tents were blown down, and the men exposed to cold, rain, and hunger for the day.

"Last night it blew cold and fierce, rain and sleet fell in torrents, and many tents were blown down in camp; I need not say that those who were suddenly exposed to the violence of the elements were in a very sorry plight indeed.

"A bed with a lively little sewer intersecting it, is not the most agreeable thing in winter time.

"The beggar who wanders about the streets of London in the rain leads the life of a prince compared with the British soldiers who are fighting out here for their country.

"They have no shelter, no rest, and no defence against the weather; the tents let the rain through like sieves, and are perfectly useless as protections against the weather.

"Think what a tent must be, pitched as it were at the bottom of a marsh, into which some twelve or fourteen miserable creatures, drenched to the skin, have to creep for shelter, after twelve hours vigil in a trench like a canal, and reflect what state these poor fellows must be in at the end of a night and a day spent in such shelter, huddled together without any change of clothing, and lying packed up as close as they can stow themselves in saturated blankets.

"Men have been frozen in their tents.

"The camp was visited by a hurricane to-day. The whole head-quarters camp was beaten flat to the earth, and the unhappy occupants were rushing through the mud in all directions, in chase of their effects and clothes.

"Our fine patent stoves are wretched affairs. They are made of thin sheet iron, which cannot stand our fuel; besides, with charcoal they are mere poison manufactories, and they cannot be left alight in the tent at night.

"The cold is developing itself, and I regret to say our efforts to guard against it have been attended with mischief. Captain Swinton, of the Royal Artillery, was found dead in his tent, suffocated by the fumes of charcoal from a stove, which he had placed within it for the purpose of warmth.

"Lieut. Ramsbottom, of the 97th Regiment, was found dead from suffocation by charcoal. He had come from duty in the trenches, and had closed his tent and laid down for a few hours.

"Although the tents stood, they flapped about so much, and admitted such quantities of snow, rain, and filth from outside, that it was quite out of the question to sleep in them. Our general's marquees were as incapable of resisting the hurricane as the bell tents of the common soldiers.

"We hear that the hospital tents are all down, and that the sick have had to share the fate of the healthiest and most robust.

"There are 20 cases of frost-bite out of 125 patients brought by the Melbourne. The greatest number of these patients affirm that the frost-bite came on while they were lying sick of some other disease in the temporary hospital huts and marquees."

A correspondent of "The News of the World," after sundry remarks upon the weather, observed—

"It has also rained hard, completely swamping some of the tents, and the hospital of the Grenadier Guards was inundated to such an extent that the men were obliged to be moved out of it. The deaths are increasing frightfully. The daily average is now seventy. Literally speaking, the men perish from cold and want of shelter."

An officer of the 2nd Royals, writing to the "Times," stated—

"January and February, with part of March, are very bad, and the cold will be most intense. What we shall do in our tents I know not; we cannot make huts, as there is no wood. In the cold and damp tents it will be miserable. The tents all leak, and the men are lying 15 together in a place where no English gentleman would put his pigs."

An army surgeon, writing also to the "Times," soon after Inkerman, observed—

"Our tents were blown down lately, and deaths from exposure, rain, snow, and sleet took place. We could light no fires, and for 48 hours were in a terrible plight."

And the Hon. Captain Maxwell, of the 50th Regiment, in a letter to his brother, Lord Farnham, made the remark—

"I shall never forget the suffering I endured for five or six days, in a miserable, cold, wet tent, with nothing but the ground to rest upon, and two blankets to cover me."

The foregoing are but a few of the many complaints made upon the subject, and it was in consequence of reading some of the earliest of those accounts that appeared in the press, that I first committed myself to the task of remedying such glaring defects.

Many years of the early part of my life have been spent at sea. A great portion of time passed among the natives of the Islands of the South Pacific at New Caledonia, Erromanga, Tanna, the Society and other groups, gave me many opportunities of observing the practices of savage life, and fitted me in a great measure for the task I entered upon.

A careful observation of the subject soon convinced me that the tents and marquees were wanting in the following particulars, viz.: *Stability*, a proper system of *Ventilation*, impermeability to *Wet*, means of sleeping the men off the ground out of the mud and mire, and a practical plan of fitting stoves for fires, to guard against *Frost Bite*, and yet not to affect the inmates by the *Smoke* and other *poisonous exhalations*.

Some deep thought was requisite, in order to combine so many advantages, without making a tent too cumbersome an article to be portable. A few hours' consideration however gave me the key to the whole; and how far my efforts have been successful, and in what way I have effected the improvements requisite, may be seen by the following brief particulars, and the appended reports of the *officers* who have had the *direction* of the *trials* of my *tents* at *Aldershot* and *Chatham*, as well as by the *statements* of the *Press* in their *favour*.

These improvements, I believe, comprise all that can be desired in habitations of this nature, and are classed as follows:—

1st. *Stability*, which is obtained by an improvement in the construction and arrangement of the framing and ground fastenings. The stays or framing which support the covers of the tents are of galvanised wire cord, and are adjusted to a metal collar through which the pole or support is inserted, and from which they lead to the ground. Each stay or cord is secured to an improved peg or fastening which is simple, strong, and light. I have different descriptions of pegs adapted for either soft or stony ground (figs. 1, 2); but those in use at the trials my tents have latterly undergone were made

FIG. 1.—Screw Peg Fastening for Tents & Marquees.

of rod iron, and consisted of one turn of a screw at the bottom of a shank. These screw-pegs can be easily repaired or replaced by an ordinary smith in case of damage or loss, if spare ones are not in reserve. They screw into the ground without disturbing the surface, but should the surface soil be too light to afford proper holding power, they can be screwed down until firm holding is obtained.

As they enter the soil without noise, their use for guard or outpost tents would be advantageous, as a tent could be pitched to shelter an outlying picket at night, close to an enemy's videttes, without attracting attention, an impossibility with the wooden peg, which requires driving with a mallet.

They vary from 9 to 12 inches in length, and weigh from 12 to 16 ounces, the smallest one when screwed has borne a strain of 830lbs. before drawing out of the ground, and a tent can thus be so firmly

FIG. 2.—Driving Peg Fastening for Tents and Marquees.

secured that no wind will affect it, neither would any accumulation of snow upon the roof be likely to break it in. The wire cord used for stays is about $\frac{3}{16}$ ths of an inch in diameter, and, being extremely pliable, can be spliced or knotted the same as hempen cord. Although it weighs but half an ounce per foot, it requires a strain of 600lbs. to break it, and will last for several years in constant wear.

When stowed, the stays fold up with the roof without fear of derangement or injury, and but very slightly increasing its bulk as a package.

The arrangements for suspending hammocks or cots by means of struts or rods, according to my plans, add considerably to the strength and stability of the tent, as, when the hammocks or cots are down and in use, the weights all tend to a common centre, and remove the strain from the pegs or fastenings.

FIG. 3.—Top of Tent on enlarged scale, showing Ventilator.
(b) Ventilator closed.

FIG. 4.—Top of Tent on enlarged scale, showing Ventilator.
(a) Ventilator open.

2nd. Improvement in Ventilation.—This is effected by a very simple arrangement. An aperture is left in the top of the roof, immediately around the pole or tube. A hood or cover is fitted above it, and can be raised or lowered at pleasure by a simple pulley (see figs. 3, 4); the aperture is thus protected from the pressure of the external air, and the temperature of a tent or marquee placed under most perfect control, the simplicity preventing any fear of derangement to the apparatus. The hoods are of a description adapted to the shape of the roof; they are easily adjusted, and, when out of use, fold up and stow away with the covering. No system of ventilation can be perfect that does not protect the aperture from the pressure of the external air, and the aperture must be capable of

being increased or diminished at pleasure, so as to regulate the temperature according to the climate.

The perfect ventilation obtained in these tents will be apparent from the register of the thermometer, as taken at Fort Vincennes, Paris, in June 1857, during a trial of my tents against the best used in the French Army. A thermometer was placed on the pole of each tent, and the following is one day's register of the same, commencing at midnight on the 9th, and ending at midnight on the 10th, viz.:—

Time.		My Tents. Degrees Fahr.	French Tents. Degrees Fahr.
Midnight 9th	. .	70	64½
3 A.M.	. .	68	63
6 "	. .	68	66
9 "	. .	70	79½
Noon	. .	70	79
3 P.M.	. .	64½	71½
6 "	. .	62½	64½
9 "	. .	61	62½
Midnight 10th	. .	66	61½

This statement proves that my tent was warmer at night and cooler in the day-time when the sun was out than the French tent, and could have been made cooler by day had such been required, as the ventilator was nearly closed. The French tent, on the contrary, had no means of regulating the temperature.

In hot countries, ventilation may be further assisted by raising the curtain or wall of a tent, either partially or wholly, thereby giving free admission to the air, and effectually dispersing all damp and noxious vapours. The doorway is also a great advantage in ventilating my tent. This is effected by raising the lower portion of one of the gores or sections of the roof, which not only admits the air freely, but acts as an awning to the entrance, and screens it effectually both from sun and rain. Again, by tricing the hammocks close up to the top of the tent, they touch each other, and form an air-chamber between them and the roof, which entirely excludes the heat of the sun, and renders the interior quite cool; the curtains can also be kept up at night, if necessary, without fear of draughts or other inconvenience.

3rd. *Waterproof material for the roofing of tents and marquees.*—This is composed of mineralized india-rubber double-texture fabrics. The mineralizing process destroys the tacky or sticky properties of the india rubber, and renders it perfectly impermeable to moisture, &c. Being proofed at about 300 degrees, it is unaffected by either heat or cold; any damage to this material by shot or otherwise can easily be repaired in a few minutes.

As well as sewing, the seams are secured by means of light rivets, which add greatly to their strength. Besides its waterproof qualities, the material is opaque, and one great annoyance in an Indian climate, the dazzling light occasioned by the sun's rays penetrating the ordinary duck coverings, would be removed.

The curtains or walls are of light cotton canvas or duck, and depend directly from the roof to the ground (fig. 5), the height varying from

FIG. 5.—Tent, fitted with Hammocks and Fireplace. (a) Hammock as in use; (b) Hammock as stowed, when out of use; (c) Method of stowing Musket; (d) Cover of Roof; (e) Curtain to do.; (f) Door open to the full extent; (g) Tent Lines; (h) Ventilator; (i) Fireplace; (k) Tube forming Flue to do., and support to Tent.

three feet in tents to six feet in marquees, and are fitted either permanently, or laced to the roof. The height of the wall allows a man to stand upright at a greater distance from the pole in my tents than in the present ordnance tents, whilst in my marquee a man can stand upright close to the wall.

Common canvas or any other material can be used for roofing if preferred, but it has the disadvantage of not being waterproof, and of becoming much heavier for transport when wet, which causes an increase in weight of about 75 per cent.

The way in which the roofing is adjusted and secured to the framework prevents the unpleasant flapping motion so common in the old tents and marquees in boisterous weather, and draughts are also so effectually excluded that a candle will burn under them as steadily as in a room. The material of the roofing may be preserved from rot or mildew in case of being packed in a damp state.

4th. *Sleeping accommodation for troops and others off the ground without the use of bedsteads.*—This most desirable and important advantage is attained by suspending hammocks or cots by means of light wooden struts or rods, one end being attached to a loop or eye fitted to the wire rope stays, and

the other hooking on to a flange fitted at a convenient distance from the bottom of the pole or chimney tube, whichever is used (see fig. 5).

My tents lately tested at Chatham and Aldershot were fitted with eighteen hammocks, and the framing of the tents have been proved capable of supporting continually that number of men, averaging from 24 to 26 cwt.

The hammocks are disposed radially around the pole, and when in use, are from 12 to 18 inches from the ground. During the day they are drawn close up to the roof, leaving the area of the tent quite free.

Should the hammocks on one side only be in use at one time, the stability of the tent is but little affected, as a test lately made proved that not more than an inch of deflection was perceptible in the pole. The weight, however, should be equally distributed around the pole.

A tent can be fitted with nine cots in lieu of eighteen hammocks, each cot requiring two struts or rods, whereas the hammocks requires but one.

The cots are adapted more for the use of the sick, and for officers and civilians.

The hammocks are easily detached from the tents, and form ambulance litters of the simplest and lightest construction, and by their use two men can easily carry another off the field (fig. 6). A belt is fitted over the

FIG. 6.—Hammocks in use as Ambulance Litters; two Men carrying one.

shoulder, having an eye into which the hook of the strut is inserted, and they are thus enabled to carry the weight with ease (fig. 7). In a hot sun, the wounded men may be sheltered from its rays by a light covering being placed over the pole, and air would be admitted freely at the ends.

A very important feature in this method is, that the bearers are not only able to carry their rifles with them when so employed, but can use them, if surprised, without placing their burden on the ground, the arms being left entirely free.

FIG. 7.—Belt for carrying Ambulance Litters.

In case of emergency, a lower tier of men can sleep upon the ground, according to the method at present adopted, thus enabling a tent to accommodate nearly a double number of men.

5th. *Warming a tent or marquee*, without subjecting its occupants to the deleterious and often fatal influences experienced by the ordinary method of placing a stove containing charcoal or wooden embers in the tent.

I effect this by making the flue of the fireplace the support of the roof, in lieu of a wooden pole, by which means the smoke and poisonous gases are effectually carried off, but a wooden pole can be used, if desired, to save weight, as they can be shifted from one to the other in a few minutes at pleasure (figs. 8, 9).

FIG. 8.—Fireplace as fitted to Tents, made to take in pieces. Fireplace; (b) Hood over do., Door open; (c) Stand for fireplace and Saucepans, and Stay for Legs; (d) Saucepans.

FIG. 9.—Another method of fitting Stoves to Tents, &c.; Tube supported on Tripod; Stove connected with Elbow Joint.

The fireplace is of a light and simple construction, and will burn any kind of fuel, even grass or roots. It throws its heat equally to all parts of the tent or marquee, and is adapted for cooking as well as heating purposes.

In a trial recently made with a fire of wood only, the temperature of a tent was increased 25 degrees in 30 minutes from the time of lighting.

When packed for use the stove and chimney tube occupy less space than a wooden pole, each tube being arranged so that one part stows into the other, making a compact parcel of about a third its entire length; the stove, as well as the hood for conducting the smoke into the chimney, fold together into a very compact and small parcel.

The fire can be used at night without endangering the tent or hammocks, thereby keeping the interior perfectly warm and dry in the coldest and dampest weather.

Any description of stove can be fitted to the chimney tubes, and more than one stove to a marquee if necessary.

6th. *Durability.*—My method of fitting wire-rope stays to support the roofing of tents and marquees affords a framework for the covers to rest upon. The coverings spread evenly and smoothly thereon, and all stress from the pressure of the wind is completely removed, the strain being borne by the stays. This adds greatly to the durability of the material, as the principal cause of tent covers tearing so frequently results from the canvas forming the only support to the poles, in which case it has to bear the whole strain and pressure of the wind. The wire stays or framing can be fitted to other covers when the first are worn out, as the wire cord is calculated to last for many years.

Though more expensive in the first cost, my tents and marquees will be found more economical in the end than those in present use, on account of their great durability.

7th. *Stowing fire-arms.*—Each tent is fitted with appliances for the stowage of the fire-arms and accoutrements of the men, by which means they are kept dry and ready to hand, in case of sudden alarm (see fig. 5).

Comparison of weight and stowage between the present pattern of Ordnance tents and marquees and those of my own construction.—The Government tent weighs 65½ lbs. when dry, and has a cubical capacity of interior, when pitched, equal to 512 cubic feet, or at the rate of 5½ lbs. and 42½ cubic feet per man. This tent is about 13 feet diameter, and 10 feet 3 inches high.

My own tent of 16 feet diameter and 10 feet high, with a stout duck roof, weighs about 100 lbs., and contains an internal capacity of about 900 cubic feet, being for 18 men, the number the tent is adapted for, about the same weight and capacity per man as the Ordnance pattern. The bulk, when packed, being also identical.

If fitted with the waterproof material for roofing, an increased weight of about ¼ lb. per man would be the result.

The hammocks and fittings weigh 7 lbs. per man, and the whole number for one tent occupies 6 cubic feet when packed.

If fitted with stoves, the extra weight will be 3 lbs. per man.

The hospital marquee used by the army at the present time is 29 feet long and 14½ feet wide. Its weight, when dry, varies from 428 to 507 lbs., and contains about 3,300 cubic feet of air.

A marquee of my construction, of the same size and internal capacity, fitted with a waterproof roof and lined throughout, would weigh but 340 lbs. fitted complete with all my improvements except stoves, each of which would add about 80 lbs. to the weight.

The bulk of the Government marquee packed is 26 cubic feet, against mine of 16 feet, the difference being on an average about 120 lbs. in weight, without stoves, and 10 cubic feet in bulk, and the larger the construction the greater will be the saving of weight in my marquees.

The following extract from the Report of Sir John McNeill and Colonel Tulloch will prove that marquees are highly essential for field hospitals:—

"The circular tent used in the British Army, which is calculated to contain 15 men, is altogether unsuited for an hospital in any climate. It affords very insufficient protection against cold, or rain, or heat. When there is much wind in wet weather, the rain beats through the canvas; and when it blows upon the door, which is continually opened for ingress and egress, the rain is driven to all parts of the tent. The pole being in two pieces for convenience of carriage, is weak at the joint, and in stormy weather is apt to give way. The side wall is too low to admit of the use of any kind of cot, if there be more than two or three men in the tent; the space is too confined to admit of proper attendance on the patients, even by the medical officer; and it is impossible, with safety, to use a stove or other means of warming it. In short, whatever may be the supposed advantages that have led to its adoption as a barrack tent, it would be difficult to contrive anything much more unfit for the accommodation of the sick."

As a general field hospital, I beg to offer a novel and peculiar adaptation of my system, by means of which six to eight marquees may be made to branch off from a common centre, in the form of a star, thus embracing a number of wards, in connexion with, yet distinct from, each other, while the part at the centre forms a place for the meeting of the medical men, the duties of the apothecary, and for surgical operations, out of view of the patients. At the same time, the whole of the wings of the wards will be under the eye of the attendants. A construction of this nature, with six wings, each 60 feet long by 16 feet wide, would afford accommodation for beds, and possess ample means for warmth and ventilation, and effect a great saving in weight over the same number of marquees containing equal accommodation, if fitted separately.

My hospital bedsteads fold up into a compass 2 feet 3 inches by 3 feet and 2 inches deep, and are fitted with a shelf at the headpiece, which will be found an important adjunct, as the patient can have his medicines or food close at hand, and thus help himself in the absence of an orderly or nurse. They are very strong and yet of light weight.

For the want of tables for surgical operations in the Crimea, many a poor fellow suffered severely during amputation. The tables which I have designed for my hospital marquees, although specifically designed for surgical purposes, are equally adapted for other uses. They are light, without sacrifice of strength, and, being fitted to connect in their several parts, are immediately available for use.

The oven designed by me for camp use (forming also a case for storing saucepans, &c.), answers equally as a boiler or stewpan, and must be used outside the tent, and separately from the stove. It is composed of two cylinders, one within the other, leaving an air chamber or space between them: in use it has proved to be most efficient, and will roast coffee, bake bread or any kind of food, in the shortest possible time, without fear of burning, as the inner cylinder is heated by the hot air in the chamber, and has a ventilator affixed at the top to regulate the heat. The manner of using it is a modification of the method of cooking practised by the natives of the South Sea Islands: a shallow hole being dug in the ground, and the bottom paved with stones or bricks, roughly laid, a fire is to be made upon them of any brushwood or rubbish that can be obtained,

and when it has subsided to an ember, the oven is to be placed over it, and its sides banked up with earth to keep in the heat, a small hole being left on either side for vent. In ten to fifteen minutes the oven will be fit for use. A piece of beef, 16 lbs. weight, has been baked by this means in two hours, and potatoes in twenty to twenty-five minutes. This does away with the constant boiling so loudly complained of, and enables the soldier to vary his meals by an occasional baked joint, hash, or stew. At Chatham, a leg of mutton of 12 lbs. weight was cooked for the serjeant's mess of 3rd Depôt Battalion in one hour and ten minutes.

The theory of encampments involves no question second in importance to that of sheltering the troops. Sent forth to fight our battles, they have surely a right to expect that, on the score of humanity alone, the greatest ingenuity will be exerted to devise means of preserving them in health and strength; but, independently of the promptings of humanity, the necessity of economizing the resources and preserving untarnished the military reputation of the nation must be held by every patriotic and enlightened mind as constituting the strongest motive for preserving those who are willing to devote their lives to their country's defence.

Man's nature and constitution will not permit him long to endure exposure with impunity; and it is a mistaken notion to imagine that soldiers can fight battles and bivouac any length of time without proper shelter from the weather. All soldiers suffer sufficiently during a campaign from other and irremediable causes, but to oblige them to seek repose frequently in wet clothing and lying on wet ground in inclement weather is certainly fatal to health and life; and the military history of Europe affords numerous examples of the folly of the practice.

Mr. Russell, when writing on the subject, has observed that "the cheapest, wisest, and most humane plan, unquestionably, is to spend money on the soldier; to supply him abundantly, keep him warm, and feed him well, of course without pampering him, or accustoming him to luxuries.

"The British soldier is too valuable an article, and too difficult to replace, to be allowed to perish for want of due provision for his health and comfort. What would we not give to get back those battalions of well-trained veterans who perished in the mud and misery of last winter! Such soldiers are not to be replaced for years; and recruits, however strong of heart and arm, cannot fill the void left by men who have been long under the colours."

"The Times" in its columns, under date of the 19th June, 1856, when writing upon the war in the Crimea, made the statement, that "20,000 men died of disease, cold, hunger, and nakedness, and such ordinary causes, whilst less than a fifth of that number were killed by the enemy," and further remarks, that "the duties of self-preservation are of primary importance in war, not falling below the art of killing the enemy. Indeed it appears, if we improve so far as to be able simply to keep ourselves in the presence of the foe, while he does not improve in that respect, we must conquer him by mere vitality—by a proper use of meat, drink, clothing, and housing; for while he is perishing by thousands, we shall simply survive him."

It is impossible to calculate the loss a country sustains through sickness in the ranks of its army. Many a battle may be lost, or a victory

but half achieved, may be the consequence; but, independent of this, and putting considerations of humanity also aside, the result is costly to a country like England, where no conscription enforces the enrolment of men, but all are obtained through the medium of the recruiting serjeant and the bait of a bounty.

Directly a soldier dies, or becomes incapacitated for service through sickness, his money value ceases, and his place must be filled up by another. The money is lost to the country, and the effective strength of the army weakened, until the gap is filled up.

A correspondent of "The Times" has remarked upon the false economy of retaining so frail a covering for our troops as the old regulation tent.

"Canvas *versus* Life.—We cover numberless vans and Railway waggons at home with durable tarpaulin; we cover our soldiers abroad with tents made of porous canvas, such as Pickford would scorn to use.

"If our valuable goods can be thus protected, why cannot our invaluable soldiers be equally well screened?

"Nothing is more destructive to the health than wet nightly lodging; and the false economy which abstains from furnishing the waterproof material, contrasts badly with that remarkable instance of true economy, in a matter where canvas and men's lives were concerned, recorded of Lord Nelson (by Alison, chap. xxxix. p. 356), who, on bearing down on the enemy at Trafalgar, made signal when the ships entered into action to cut away their canvas, in order that no hands might be lost in furling sails. The loss to the fleet in a few minutes was £200,000, but to this admirable piece of foresight much of the early success was owing."

The legislature of this country are fast becoming aware of the necessity of providing for the health of the soldier.

Lord Ebrington, in May 1855, drew the attention of the House of Commons to the subject of barrack accommodation, and pointed out the defects of the system in a series of resolutions.

He was warmly supported in his remarks by several Members: Lord Palmerston, Sir Harry Smith, and the Right Honorable Mr. Sydney Herbert, the present Minister of War. Amongst the number, Lord Palmerston observed that, "money spent in improving barrack accommodation was a most economical expenditure, because it not only was a direct saving of money through the health of the men, but it also promoted the efficiency of the service."

The present Minister of War added, "that the question was truly one of expense, but they could not do worse than kill good and well trained men on that account."

Surely the same arguments are equally applicable to tents, because men are more under canvas in time of war, a period when the health and life of the soldier are of the most value; and, since it has become the practice to place our troops under canvas in the country, during the finer portions of the summer months, in order to inure them to the practices of a camp life, it must be also desirable that their health should be preserved whilst learning these necessary duties.

The state of affairs in India justifies the belief that a large European force must necessarily be required for some years to come. These troops must be housed and efficiently protected from the climate, which is such

as occasionally to demand their removal to healthier localities in the mountain districts, where encampments in the open air will be infinitely preferable to the prescribed limits and close confinement of towns. China, too, whose climate is peculiarly inimical to European constitutions, is just now dividing our attention, and many troops will be required for service in that country. The French Government have issued a code of regulations for the guidance of their troops in China; among other things they strongly recommend their avoiding (by any means in their power) sleeping on the ground at night, though it is difficult to imagine how this is to be accomplished with the means at their disposal. I trust however that the tents of our own soldiers may be so improved that the details of disaster and death which so distressed us in the Crimea may not be revived in that remote region.

That all the Government tents are as defective as those in use in the Crimea, and consequently as unfitted for the use of our troops, both in India and at home, will be evident by the following statements from the press:

"The camp at Dover no longer exists. Its occupants, who had hitherto been so quiet, were suddenly in disorder and confusion, from finding their drenched tents blown down by the unexpected gale, which continued to rage for some hours. The soldiers, after fruitless endeavours to keep their tents, were under the necessity of abandoning them, and, finding themselves without shelter, unanimously agreed to leave the camp and enter the town."—ILLUSTRATED TIMES, *October 25th, 1856.*

"During the gale of Thursday week, the whole of the tents of the encampment belonging to the Pembroke garrison at Freshwater East were blown down."—LLOYD'S WEEKLY LONDON PAPER, *October 17th, 1853.*

An officer, writing from the seat of revolt in the East, says—

"I arrived here (Loodianah) last night, after a tiresome march. Those who know India can tell how hot a tent is in May. My tent was blown down on the top of me, and my friend who accompanied me. We were very nearly 'squashed' by it, and had to sit out all night on the ruins, in dust, rain, and wind."—*Vide TIMES, September 1st, 1857.*

An officer of the 61st Regiment, who had charge of the party that took the palace at Delhi, and afterwards had the custody of the old King, dating from Ajmere Gate, Delhi, September 28th, 1857, writes as follows:

"The wing to which I belong left Ferozepore on the 25th July, and arrived here on the 14th August. You may fancy how hot it was in tents: the wonder was we did not all die from it."—*Vide TIMES, 27th November, 1857.*

Admitting the important position the consideration of weight and bulk in baggage must always occupy in connexion with the subject of active movements in the field, I would humbly submit that the first care should be the maintenance of an army in as full force and efficiency as possible.

Every soldier placed *hors de combat*, either by wounds or sickness, not only weakens the effective force, but operates as an impediment upon the movements of an army, to a far greater extent than a small increase in the weight of baggage. He must be attended to, cared for, and moved (if on the march), with all the care possible under the circumstances. Baggage can mostly be destroyed by a retreating army, to prevent its

falling into the hands of the enemy; but the sick cannot be so disposed of, and no greater disgrace or reverse can befall an army than that of deserting their sick to the foe.

Of late years, it has become the practice in most European armies to increase the weight of field ordnance. This entails extra transport for ammunition, and more horses for the movement of the guns. The object in view is to gain an advantage over the opposing forces. How much greater the advantage, if the troops can be kept in health and available for all contingencies?

The trifling addition to the baggage by using the patent tent in its most perfect state would be as nothing compared with the addition to the ordnance; while the patent tent, embracing several important advantages, can be used under its lightest form at a weight not exceeding the one at present in use; and in respect to marquees for hospitals or cavalry stables, the advantage of weight is entirely on the side of the improved system of construction.

Viewing my tents in connexion with the billeting system, Mr. Charles Cowan made a motion in the House of Commons, animadverting upon the demoralizing system of billeting troops in Scotland, and proposing to supersede it by the erection of supplementary suburban barracks throughout the country. Were the armies supplied with the tents of my construction, the billeting system might be far more effectually, and less expensively, superseded than by the plan proposed. The tents could be kept in store under the care of the quarter-master, while the men were in barracks, and when on the line of march they could easily convey their tents by light baggage cars, and pitch them for use in any given locality. The duties of the men, thus constantly alternating between camp and barrack life, they would become thoroughly familiarized with their tents, and pitch and strike them with the greatest ease and expedition.

This system would also be found invaluable in the event of an epidemic breaking out among troops in barracks, as they could easily be removed to any open and healthy locality in the neighbourhood out of the reach of the contagion. It may be argued, that the common tent would also answer that purpose; but it must be borne in mind, that placing men on the ground under an ill-ventilated and crowded tent would be likely, at such a time, to aggravate rather than mitigate the evil.

In the month of February, 1855, I first commenced the construction of my improved tent; from that time to the present I have been unremitting in my endeavours to get them adopted by Her Majesty's Government. In May, 1855, I placed my models before a Committee sitting on tents at Woolwich, and in August of the same year erected a full-sized tent at the Wellington Barracks in St. James's Park.

About this time a great number of invalids had returned from the Crimea, and many of them were located at these barracks. The whole of these men affirmed that my tent would have been instrumental in preventing the losses the army had sustained, and many of them added that if they were sufficiently recovered they would gladly volunteer to return again if they could make certain of having such comforts as my tents provided.

A few weeks ago, being at Chatham, Captain Durnford, of the Royal

Engineers, brought to me a sergeant of that corps in order that I might hear his opinion upon my system of fitting hammocks to tents.

The sergeant observed that the plan would have been invaluable in the Crimea, and would have saved thousands of lives; Captain Durnford added that the sergeant was in the Crimea from the landing at the Old Fort until the final evacuation, and had seen numbers carried to the hospitals merely from sleeping on the ground.

As will be seen by the previous statements, my tents were before Her Majesty's Government long before huts were thought of as a shelter for our troops in the Crimea. That those huts utterly failed in their object is a matter of history; and that they were immovable when once put together may be gathered from the fact that the army were obliged to leave them behind on leaving the place, and it now appears that the inhabitants of Sebastopol are rebuilding their town with them. The whole of the cost of these huts was lost to the nation, whereas had my tents been used they could have been struck and packed in a few minutes, and ready for use at another time.

I have heard of numerous inventions in relation to military appliances, which seem to have for their chief object the destruction of life in the shortest possible time; but in my remarks this evening, I have endeavoured to show what may be done to preserve the life of a soldier, especially when engaged in active service in an enemy's country.

A MEMBER inquired whether any sewing was required at the seams in addition to the rivets, or was it a mere solution that held the seams together. He also inquired the amount of contraction or expansion per square foot, upon the exposure of the material to the rain, or the sun's heat.

MR. TURNER: There would be no more expansion than in ordinary linen fabric or duck, as the India rubber was contained between the two fabrics.

In answer to a question from the same Member as to the amount of wet that would be absorbed—

MR. TURNER said, that it would be very trifling indeed, on account of the rain not penetrating the entire surface. The utmost increase in weight would be about ten or fifteen per cent., whereas the common duck, under the same circumstances, would be increased in weight about seventy per cent. on the whole.

Captain BURGESS inquired what means there were of preventing the canvas from catching fire from the stove.

MR. TURNER replied, that it in no way came in contact with the stove or funnel. Upon this subject he could not do better than refer to the Report of Quarter Master Menzies, of the Chatham garrison. He said:—

"With a view to testing whether any damage might possibly arise from the ignition of the tent, a large fire was heaped upon the stove, and, as an experiment, a rope was tied round the funnel; this severe trial lasted for some hours, and, upon inspection, it was not found that any injurious effects had resulted, and upon the removal of the rope it was not charred or burnt, although the heat carried off by the pipe during the time had been intense."

Capt. BURGESS: Is it not the case that stove chimneys of the ordinary construction frequently get very nearly red hot?

Mr. TURNER: Yes, but there is no contact here. It is simply the hot air passing up the funnel. The fireplace does not touch the iron hood, and the smoke passing through the funnel merely gets it to steam heat.

Capt. BURGESS: Is the cap over the chimney made of wood or iron?

Mr. TURNER: Galvanized sheet iron, about three inches deep. The wire ropes are all attached to the flange at the top of the pole or chimney.

A MEMBER: Are the wires attached to the tube before raising?

Mr. TURNER: Yes; the method of raising is very simple. A circle is staked out by means of a line, and pegs are screwed in at stated intervals. The centre being marked by means of a wooden plug, the funnel or pole is passed through the flange, fixed into the centre in its proper place, and the lines depend from it, and are hooked on to the pegs. In striking tents, the lines will unhook at once, and the hooks are slightly curved to prevent any flapping motion detaching them from the pegs.

The CHAIRMAN: Will you favour us with a few remarks as to the comparative cost of your tents?

Mr. TURNER: The Government marquee, the dimensions of which were 29 by 14 feet, and 5 feet 8 inches high at the walls, cost about £34. and contained at the outside about fourteen men, whilst my own of the same size and dimensions, for the same number of men, would cost, if fitted with duck, £33, and, if fitted with waterproof material, about £42. The Government tent of the common size for twelve men costs about £3 10s. Mine, for eighteen men, fitted with duck wall and roof, would cost 15 guineas, or with waterproof material £20. The latter tent, however, would last three times as long as the former, besides the extra advantages of stability and comfort. The above cost includes my new screw pegs, but not the stove, which costs from £4 to £5, according to the construction, and with cooking utensils another pound or 25s. Each hammock with a pole would cost about 12s. 6d.

APPENDIX.

Extracts from Official Reports of Commanding and other Officers at Chatham Garrison, relative to Turner's Patent Tent, Marquee, &c., from the Office of the Quartermaster-General, Sir Richard Airey, K.C.B., Horse Guards, London, obtained January, 1860.

From MAJOR-GENERAL H. EYRE, Commandant, Chatham Garrison.

Chatham, November 23th, 1859.

SIR,—The tent and marquee of Mr. Turner, referred to in your letter of Sept. 30, having been made trial of by the several battalions (Royal Engineers, 1st Depôt Battalion, 2nd Depôt Battalion, 3rd Depôt Battalion), I have now the honour to submit to you the result (of the trial), as shown in the accompanying reports. You will see that these reports all speak very favourably of them; and I think there is no doubt that a great deal may be said in their praise.

For a camp likely to be of any duration, in fact, on such a service as our army encountered in the Crimea, this tent and marquee would be very valuable, but the important

question to have decided is, whether they can be made available with advantage on daily active service? I am inclined to think they would bear the test, and would be found to answer better than any yet invented.

I have the honour to be, Sir,

Your obedient humble servant,

H. EYRE, Major-General.

To Sir RICHARD AIREY, K.C.B.,
Quartermaster-General Horse Guards.

Extracts from Reports to which Major-General H. Eyre alludes in his letter.

From QUARTERMASTER WILLIAM MACKAY, Second *Dépôt* Battalion, Chatham,

Chatham Garrison, 22nd Sept. 1859.

(MEMORANDUM).

Mr. Turner's field tent, pitched by six men in nine minutes, including the fixing of the fire-place and ventilator. Struck and put into the valise, by the same number of men, in four minutes.

Advantages over the Government Field Tent.

1st. Ventilation can be regulated according to the temperature.

2nd. There being no strain on the canvas (it being merely a covering laid over a frame of galvanized wire ropes), which cannot shrink by moisture, a considerable saving will be afforded in wear and tear of canvas, lines, and tent-poles.

3rd. The pegs being screwed into the ground, no reasonable amount of pressure to which they can be exposed can draw them.

4th. It can be used either with or without a fire-place; and, as all the gear which comes in contact with the flue is iron and brass, no danger need be apprehended from ignition.

5th. The greatest of all advantages is, that the men can sleep off the ground; at first it was tried with twelve hammocks, occupied by twelve men, where they slept very comfortable; it was then completed to eighteen, the number which it is designed to accommodate; and around a wooden pole

6th. As the ground-screws cannot be drawn; and, should they be so, the weight of the men gravitating towards the centre, prevents it being blown down by the storm, which the present Government tent is very subject to.

On the 29th September, 1859, the tent was struck by six men in four minutes, and pitched in nine minutes.

(Signed)

WILLIAM MACKAY.

To Major of Brigade,
&c. &c. &c.

Brigade Office.

*Proceedings of a Board ordered to assemble by order of Colonel R. N. Phillips, commanding the 2nd *Dépôt* Battalion, to report upon a Marquee and Bell Tent, the Inventions of Mr. George Turner.*

Chatham, Oct. 1st, 1859.

MAJOR F. G. T. DESHON, 2nd <i>Dépôt</i> Battalion.	President.
CAPTAIN WILLIAM M. LEES, 23rd Regiment.	
LIEUTENANT T. D. WOOD, 29th ditto	
QUARTERMASTER WILLIAM MACKAY, 2nd <i>Dépôt</i> Battalion.	Members.

The Board having examined the tents, viz., a marquee and bell-tent, which have been pitched for trial in the Spur Battery, report as follows:—"The bell-tent has been pitched and struck three times by six men; each time it was pitched in nine minutes; the fixing of the fire-place and ventilator being included in the operation. It was struck and packed in the valise in four minutes. The same number of men pitched and

struck the common bell-tent in the same time; but it must be observed, that Mr. Turner's tent would have been pitched in a much shorter time, had it not been for the fixing of the fire-place and ventilator—contrivances which the men had not seen before, and which in themselves require more time in being put together than the mere raising of the pole of the common bell-tent.

The advantage of Mr. Turner's tent over the common bell-tent consists in the contrivances for the stinging of hammocks, by which the men are enabled to sleep off the ground, and in its being well ventilated by the opening in the top round the pole.

The capability of the tent being warmed by a stove, is another advantage; but, even without the fire-place, this tent is stated by the men to be more warm and comfortable than the old tent, for the fact of their not sleeping on the ground, the coldness, hardness, and dampness of which they complain. The Board have, therefore, to report most favourably on Mr. Turner's bell-tent, the construction of which contains many advantages; and they consider that it presents nothing impracticable for service in the field.

With regard to the marquee, the Board consider it possesses many advantages over the one at present in use, as to weight, and space, and means of warming it

(Signed)

F. G. T. DESHON, Major, 2nd Depot Battalion.	} <i>President.</i>
W. LEES, Lieutenant, 23rd Regiment.	
T. D. WOOD, Lieutenant, 29th ditto.	
WM. MACKAY, Quartermaster, 2nd Depot Battalion.	

Members.

To Col. R. N. Phillips,
Commanding 2nd Depot Battalion,
Chatham.

From COLONEL R. N. PHILLIPS, Commanding 2nd Depot Battalion, Chatham Garrison.

Chatham, 3rd October, 1859.

SIR,—I have the honour to forward the proceedings of a Board of Officers assembled to report upon Mr. Turner's marquee and tent, occupied by the 23rd Regiment; and, having examined these tents, I coincide with the opinions expressed by the Board

I have the honour to be, sir,

Your obedient servant,
R. N. PHILLIPS.

The Major of Brigade,
&c. &c. &c.
Brigade Office.

Extracts from the Proceedings of a Committee assembled at Brompton Barracks, Chatham, by order of Lieut.-Colonel Ross, Commanding, to report upon Mr. Turner's Tent and Marquee.

CAPTAIN DURNFORD, R.E.	} <i>President.</i>
LIEUTENANT CLAYTON, R.E.	
LIEUTENANT WYNNE, R.E.	

Members.

Turner's Bell Tent.

On examining this tent, for a description of which *vide* Mr. Turner's pamphlet, pages 6 to 16, the Committee observe:—

1st. That a very great advantage is gained by raising the men off the ground by means of hammocks for sleeping purposes, which may also be used for the transport of wounded men, being borne by two or four men, according to the distance to be traversed. . . .

2nd. The tent lines attached to a collar fitting on the tent pole, entirely under the covering of the canvas, seems a good point in this tent, quite obviating the serious defect of the line tearing through the canvas as in the common tent, to the canvas of which the hempen lines are attached. Turner's lines being of galvanized iron wire, do not expand and contract when dry or wet, thereby doing away with the inconvenience of slacking off

tent lines in wet weather. It is also considered that wire rope, from its strength and durability, is well adapted for tent lines and guys. Mr. Turner serves with list those portions of the lines in contact with the covering of the tent, which appears a good precaution, preventing the contact of the wire and canvas. Attached to the tent lines are small lashings used by day for the purpose of tricing up the hammocks, and by night for securing the rifles, so that each man has his weapon at hand in case of alarm. The belts can be attached to the end of the hammock poles, nearest the wall of the tent.

Some experiments were made by the Committee to ascertain the respective holding powers of the common wooden pickets, as used in the service, and Turner's iron pegs, with the following results:—

1st. In loamy soil, the common small wooden picket drew with a weight of about 230 to 290 lbs., Turner's small screw peg with a weight of about 830 lbs. A large wooden picket for guys broke in driving, and a second of sound oak broke with a weight of about 530 lbs. Turner's medium screw was unaffected by a weight of about 920 lbs., which was the most the apparatus used would safely bear, and, consequently, the large screw was not tried.

2nd. In made ground, consisting of lumps of chalk, rough stones, and pieces of brick, the small wooden picket drew with 300 lbs. The large wooden picket of ash broke with about 800 lbs. Turner's barbed rock picket drew with about 600 lbs., and his small screw peg, which was screwed down with some difficulty, with about 800 lbs. In each case, Turner's pegs were driven in perpendicularly to the ground, and the wooden pickets slanting, as in using them for the lines of a tent. The strain was applied in each case as if by a tent line or guy.

From these experiments, it would appear that Turner's pegs answer admirably.

The Committee would express their cordial approval of Mr. Turner's system of providing hammocks for sleeping purposes. . . . And also of his staying the tent pole with lines, and throwing a covering over all, thus ensuring perfect stability so long as the tent pegs hold; and Mr. Turner's appears to answer the purpose very effectually. They also approve of the good system of ventilation, so defective in the service tent; also of the reduced height of the tent (9 feet), and increased depth of wall (2ft. 6in.) . . .

Turner's Hospital Marquee.

Mr. Turner's Hospital Marquee, of the same size as the service one, is erected upon the same principle as the Bell Tent, having the poles or tubes stayed by wire lines, and a covering of mineralized waterproof fabric thrown over all.—Mr. Turner's Pamphlet, pages 16 to 22. . . . The Committee would, however, remark that Mr. Turner's marquee appears to fulfil several requisite conditions for hospital purposes, being dry, warm, well ventilated, and of perfect stability. . . . In conclusion, the Committee must observe that the advantages . . . of Mr. Turner's tents must be considered in a *hygienic point of view*, and it becomes a question for deep consideration whether the *undoubted advantages* to be derived from a tent which secures the army, in a great degree, from the bad effects of exposure to wet and cold, heat and impure air, will not, in most cases, more than counterbalance the . . . increased weight to be transported, by preserving the men in a state of health and efficiency.

(Signed)

A. DURNFORD, Captain Royal Engineers, <i>President</i> .	
V. G. CLAYTON, Lieutenant	ditto
E. T. WYNNE, ditto	ditto

} *Members.*

Brompton Barracks, Chatham, 15th November, 1859.

I concur in this report.

(Signed)

H. SANDHAM,

Colonel Commanding, Royal Engineers, Chatham Garrison.

The Quartermaster-General,
Horse Guards.