

people of England during these trials; and of the care of sick and wounded, with the undesigned trial of brainpower and speed between man and woman. The changes of position that took place after the beginning of winter, as Mr. Kinglake explains before recurring to his protracted chronicle, were several. The Russians withdrew from Tchorgoum, and generally from the plain of Balacava; but into the winter they so far became aggressive as to encroach upon ground previously held by the Allies and to strengthen their acquisition by earthworks. They seized and for weeks held the Mamelon, a mound in advance of their Malakoff Bastion, and they threw up redoubts—far in advance of their Karabel defences—on the north-west angle of Mount Inkermann. As regards the French and English, the important change in their position is thus stated: At the time indicated in the text, General Canrobert relieved the overtaken troops from a material part of their duties, by taking up the ground they had occupied both on Mount Inkermann and on the Victoria Bridge.

The winter troubles and the winter sickness and suffering began to lessen with the gradual return of spring. After a while, in gentle—almost humble—guise, which, as Mr. Kinglake gracefully says "put the foes of change off their guard," there acceded to the State a new power—the power of womanhood.

Almost at one time—it was when they learnt how our soldiers had fought on the banks of the Alma—the hearts of many women in England, in Scotland, in Ireland, were stirred with a heavenly thought impelling them to offer and say that, if only the State were consenting, they would go out to tend our poor soldiers laid low on their hospital pallets by sickness or wounds; and the honour of welcoming into our public service this new and gracious aid belonged to Mr. Sidney Herbert.

Most happily this gifted minister had formed an ardent belief in the advantages our military hospitals would gain by accepting womanly aid; and proceeding to act on this faith, he not only despatched to the east some chosen bands of ladies, and of salaried female attendants accustomed to hospital duties, but also requested that they might have quarters and relations assigned to them; and, moreover, whilst responsible for the principal medical officers at Scutari to point out to those new auxiliaries how best they could make themselves useful, Mr. Sidney Herbert enjoined him to freely visit the patients and determine the councils of the lady-in-chief. That direction was one of great moment, and well calculated to govern the fate of a nearly ventured experiment. Thus it was that under the sanction of a Government according to the counsels of one of its most alert and sagacious members, there went out angel women from England, resolved to confront that whole world of horror and misery that can be gathered into a military hospital from camp or battlefield; and their plea, when they asked to be trusted with this painful, this heart-rending mission, was simply the natural sympathy of their sex for ministering to those who lie prostrate from sickness or wounds. Using that tender word which likened the helplessness of the down-stricken soldier to the helplessness of infancy, they only said they would "nurse" him; and accordingly, it regarded with literal strictness, their duty would simply be that of attendants in hospital wards—attendants obeying with strictness the orders of medical officers. It was seen that the humble soldiers were likely to be the men most in want of care, and the ladies were instructed to abstain from attending upon any of the officers.

A wholesome revolution was speedily effected by the brain of woman in our vast barrack hospital at Scutari. Miss Stanley, with the ladies who followed her, became a gracious example of the ministering power that feminine gentleness can wield. "Mary Stanley, now no more," says Mr. Kinglake in a foot note, "was a daughter of the late Edward, Bishop of Norwich, and a sister of the Dean of Westminster. Her life has been sketched very briefly and simply—the brevity and simplicity of a powerful writer—by her brother Arthur Stanley, the Dean." Half in precept and half in prophecy, her mother used to say to her, "Remember Mary, your lot in life is to sow for others to reap." The injunction was not forgotten. "I am contented," said the noble-hearted lady, in her life, "that it should be so."

When the number of lives were saved—saved even in that pest-stricken hospital at Kullali—by a long, gentle watchfulness, when science almost despaired, no statistics of course can show; and still less can they gauge or record the alleviation of misery effected by such care as this; but apparent to all was the softened demeanour of a soldier when he saw approaching his pallet some tender, gracious lady, intent to assuage his suffering, to give him the blessing of hope, to bring him the food he liked, and withal—when she came with the medicine—to rub him like a sick child. Coarse expressions and oaths derived from barracks and camps died out of the wards as though exorcised by the sacred spell of her presence, and gave way to murmurs of gratitude. When conversing in the softened mood with the lady appointed to nurse him, the soldier used often to speak as though the worship he owed her and the worship he owed to heaven were blending into one sentiment; and sometimes indeed he disclosed a wild faith in the ministering angel that strained beyond the grave. "Oh!" said one to the lady he saw bending over his pallet "you are taking me on the way to heaven; don't forsake me now!" When a man was under delirium, his magic force always transported him to the home of his childhood, and make him indeed a child—crying "Mother! mother!" Amongst the men generally, notwithstanding their moments of blind piety, there still glowed a savage desire for the fall of Sebastopol. More than once—waited up from Constantinople—the sound of great guns was believed to announce a victory, and sometimes there came into the wards fresh tidings of combat brought down from our army in front of the long-besieged stronghold. When this happened, almost all of the sufferers who had not yet lost their consciousness, used to show that, however disabled, they were still soldiers, true soldiers. At such times, on many a pallet the dying man used to raise himself by unwonted effort, and seem to yearn after the strife, as though he would answer the appeal of the bugles and drums.

A name that followed quickly in this bright and tender page in the chronicles of pain and death was that of Florence Nightingale. This gracious lady had become well-versed in the business of hospital management; and she knew well that for the careful nursing of a prostrate soldiery, laid out before her in ranks so appalling, it was as to bear being reckoned in miles, an administrative mechanism, both impelled and controlled by authority, was a condition of absolute need. Her dominion over the minds of men was such that while she governed those in authority she likewise commanded the willing obedience of soldiers and orderlies who, during the winter months, never failed in her ready attention.

In thoughtful considerate delicacy. These are her words, quoted by Mr. Kinglake, in one of the most absorbing chapters of his present volume.

"Never came from any of them one word nor one look which a gentleman would not have used; and while paying this humble tribute to humble courtesy, the tears come into my eyes as I think now, amidst scenes of loathsome disease and death, there rose above it all the innate dignity, gentleness, and chivalry of the men—for never, surely, was chivalry so strikingly exemplified—shining in the midst of what must be considered the lowest sinks of human misery, and preventing instinctively the use of one expression which could distress a gentlewoman."

"The Invasion of the Crimea: Its Origin, and an Account of its Progress down to the Death of Lord Raglan." By A. W. Kinglake. Vol. VI. William Blackwood & Sons.

LECTURE ON THE PRINCIPLES WHICH SHOULD GUIDE THE CONSTRUCTION OF HEAVY ORDNANCE, AND ON THE MATERIALS FOR THE SAME.

I now come to Sir William Palliser's system of construction, which, without a doubt, has been of much advantage to the country in affording the means of utilizing a great number of old cast-iron guns and converting them into very efficient rifled weapons. It is stated by Captain E. Palliser that not a single burst has taken place either in England or in the United States, out of nearly two thousand service guns, from the 61-pounders to the 40-ton gun.

I am indebted to Captain E. Palliser for a copy of his report on Sir William Palliser's system as applied in the United States.

In this report it is said that "the law laid down by Sir W. Palliser is this: 'Every gun should have a casing, and this should never be in a state of tension, but of a repose, in fact of perfect rest, till called on to do its work each time it is fired.'"

He goes on to describe the construction as an inner tube of cold wrought iron pushed into an outer casing by hand and secured by a ring screwed in at the muzzle; he says, "when the gun is fired the tubes expand till they rest against the interior surface of the casing, and then a sort of give-and-take work is set up between the barrels and the great mass of the casing," and he adds, "this construction gives enormous strength, a strength which has never yet been carefully considered and estimated."

The explosion must throw a strain upon the wrought-iron tube far beyond its elastic limit, but the tube being a soft and yielding nature stretches and takes a permanent set. At the same time the strain passes in part to the cast iron, and if it brings on a strain beyond its elastic limit, this also requires a permanent set, and the condition described by Captain Palliser is only possible in case the two permanent sets should be exactly balanced. But even in this case this permanent set would go on increasing each time the gun was fired, and the gradual result would be to increase the strain upon the cast iron and decrease that on the wrought iron until at length the normal condition of the gun would be that of a soft iron tube compressed by a cast iron jacket.

If, now, this can be so arranged that the strain upon the cast iron never exceeds its elastic limit, the gun will have arrived at a permanent condition, and no amount of firing will alter it; but I do not believe this can be attained with cast iron in large guns and with heavy pressures.

The process of alteration of condition in these guns up to the sizes of which proof has been made, as recorded in Captain E. Palliser's report, and under the moderate powder pressure therein mentioned, viz., 4 to 13½ tons per square inch, will no doubt be very slow, but in large guns and with heavier pressure powder it would undoubtedly be more rapid.

That Sir William Palliser's system is one of very great value cannot be denied, and probably for guns of moderate size it would beat all others in cheapness, and equal them in durability, and to those to whom actual experience outweighs a priori reasoning, the fact that an old 32-pr cast iron gun converted into a 61 pr by Sir William Palliser, fired 2,150 rounds with heavy charges, and is still a good serviceable gun, must be a convincing proof of the eminent services which Sir William Palliser has rendered to his country by his untiring perseverance in the face of many and great difficulties.

But when I come to consider the question of heavy guns, such as 9-inch and upwards, I must be guided by a careful study of the induced strains.

I will direct your attention to the 9-inch gun No. 3 mentioned in the American Ordnance Report for 1876, converted from a Rodman according to Sir William Palliser's system.

I find that with a charge of 20 lbs. of powder and 100 lbs. shot, the powder pressure was 5.3 per square inch.

The shrinkage between the inner tube and wrought iron jacket was .006 inches in the diameter, equal to about 1 in 100.

The slack between the wrought iron jacket and the cast iron was 0.055 inch or about 1 in 122 parts.

Under these circumstances the resulting strains would be as follows:—

			Tons per square inch
Iron tube..	Inner surface	19.67	" "
	Outer surface	14.45	" "
Iron jacket..	Inner surface	18.17	" "
	Outer surface	14.73	" "
Cast iron....	Inner surface	0.1823	" "
	Outer surface	0.2353	" "

Now the elastic limit of this iron is given at 11-15 tons. Consequently the inner tube and jacket are strained from 3½ to 8½ tons above the limit, and a permanent set would result.

The permanent set of the same iron under a strain of 14½ tons is also given as .01 per inch of its length.

If then there were no outer shell of cast iron, the external radius of the iron jacket would become 6.7425 x (1 + .01) = 6.810175, but the inner radius of the cast iron was only 6.748250, therefore the new condition of the cast iron in permanent set would be equivalent to a shrinkage of .061925 between the wrought iron and the cast iron, or about 1 in 16 parts.