This owes its pungency to the juxtaposition made between the mind of the arch-villain Richard and the sentiments and spirit of Holy Writ. So Macbeth refers to another clause in the same verse ("pray for them which despitefully use you") when he is urging an assassin to murder Banquo in retaliation for the wrongs done to him:—

"Are you so gospell'd
To pray for this good man and for his issue,
Whose heavy hand hath bowed you to the grave?"

Cardinal Beaufort is very appropriately addressed as

"Thou wolf in sheep's array,"

considering that the words in the Gospel are applied to false prophets and to those who, for wicked purposes, assume the office of Christian teachers.

Again, we find Hamlet saying:—

"There's a special providence in the fall of a sparrow."

The allusion is obvious; and very beautifully is the same passage introduced in "As You Like It." Adam, like a faithful old servant, in dissuading his master, Orlando, from plunging into an evil course to get a living, says:—

"But do not so: I have five hundred crowns,
The thrifty hire I saved under your father,
Which I did store to be my foster-nurse
When service should in my old limbs lie lame,
And unregarded age in corners thrown;
Take that: and He that doth the ravens feed,
Yea, providently caters for the sparrow,
Be comfort to my age."

In contrast with this, here is a sentiment of Shylock's, steeped in gall:—

"There be the Christian husbands: I have a daughter—
Would any of the stock of Barabbas
Had been her husband, rather than a Christian!"

Numerous other passages, equally or even more striking, might easily be quoted. But after all, the most interesting illustrations of Shakespeare's use of the Bible are those which cannot be referred to one or two texts, but are steeped in Scriptural sentiment and religious truth. There is, for instance, that grand prophecy of Archbishop Cranmer's at the end of "Henry VIII." concerning the Princess Elizabeth:—

"This royal infant (Heaven move still about her!)," &c.

Then, again, there is that well-known appeal of Portia to Shylock:—

"The quality of mercy is not strained," &c.

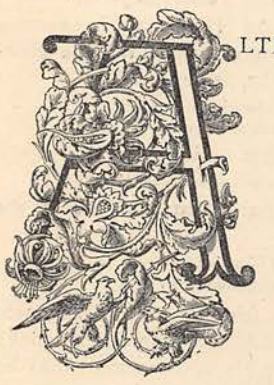
A similar sentiment occurs in Isabella's appeal to Angelo on behalf of her brother, who, Angelo says, has become a forfeit to the law:—

"Alas! alas!
Why, all the souls that were, were forfeit once!
And He that might the vantage best have took
Found out the remedy. How would you be
If He, which is the top of judgment, should
But judge you as you are? Oh, think on that,
And mercy then will breathe within your lips,
Like man new-made."

These are sentiments that could have come only from a soul in love with goodness. They are genuinely religious, and the state of mind they imply could hardly be assumed for the occasion. On the whole, we may say that for inspiring a true detestation of vice, and a genuine love of goodness, no human writings can surpass Shakespeare's. No wonder, then, that Shakespeare, whilst intelligible to the understanding of a child, and fascinating to the youthful imagination, should still be the friend of the full-grown man and the sharer of his most serious feelings; and when many authors, once admired, have ceased to charm, no wonder that this author still retains his hold upon us.

B. A.

MILITARY BALLOONING.

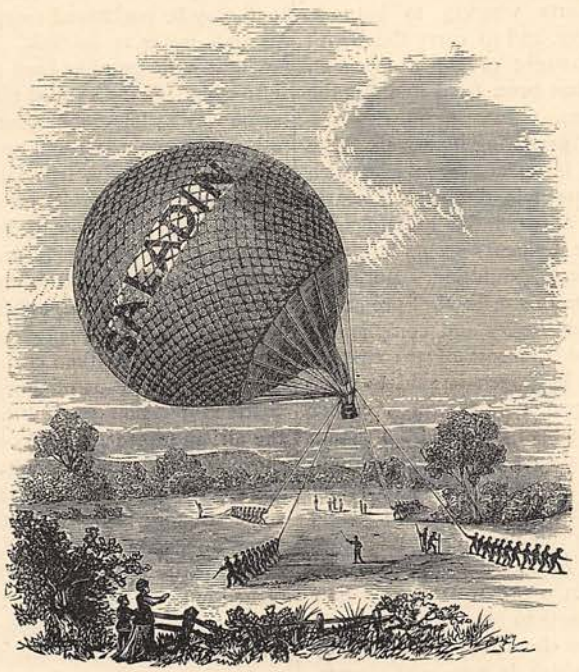


ALTHOUGH there is no novelty about the employment of balloons in warfare, it is only within the last few months that the aëronaut has become a part of the British army, and aërial machines have been fashioned under the direction of the War Department. At the Royal Arsenal, at Woolwich, a balloon factory has of late been established, and balloons are now built in the same huge manufactory of war *matériel* with ponderous cannon and death-dealing shot and shell. At this moment our military authorities possess a whole series of aërial machines of various sizes, suitable for different services, and placed in charge of a staff of red-coated sappers. A captain of Royal Engineers is in command, and the whole balloon equipment—men and machines—is at the present time in the hands of Captain Templar, an aëronaut of experience, to whom the War Office appears to have confided the fitting out and training of the new Balloon Corps.

There is little of mystery in a balloon factory. To make a balloon it is simply necessary to cut out and join certain pieces of fabric. A valve at the apex of the structure is provided to allow the gas to escape when necessary, and a netting distributed over the exterior of the sphere serves to attach the ropes that support the car. The fabric in the case of the war balloons is not silk, but calico; and this is thoroughly coated with varnish to prevent the escape of the gas confined in the balloon. It is difficult enough to make a fabric so impervious that it will not permit the exudation of coal-gas, but the war-balloons are required

to keep in a much more subtle body—hydrogen. This latter, the lightest gas with which we are acquainted, will penetrate the finest pores, and hence careful and repeated varnishing is necessary in the manufacture of the Woolwich balloons. Again, while buoyancy is imperative in an aërial machine, it is of the utmost importance that a balloon that is to be carried about in the field, that may be roughly handled by soldiers, and has to go through the vicissitudes of a campaign, should be as solidly constructed as possible, and capable of withstanding wear-and-tear in some degree. The car must be somewhat stronger and the ropes rather stouter than in an ordinary balloon, for in war time captive ascents are for the most part attempted, and these strain a balloon far more than any free voyage.

There is little need to point out the uses of a balloon in campaigning. It is, as everybody knows, the object of the enemy to mask his attack as much as he can, and take his opponent as far as possible unawares. If the country is wooded and undulating he may dispose of his forces, without trouble, out of sight; and it is only when he begins to develop his attack that one by one the divisions, or brigades, make their appearance. Whether he has 10,000 men, or ten times as many, in the immediate neighbourhood, you cannot tell, for rising ground or dense forest prevents you from seeing whether he is massing or withdrawing his forces.



PREPARING TO START.

Spies are well enough in their way, but spies are just as likely to be in the enemy's pay as your own, or what is worse, they may themselves have been deceived and misled. In any case, you cannot always rely on their information, while the observations of an aëronaut may be trusted and depended upon. A scout in the air is worth a hundred on foot. If the neighbourhood is not mountainous, an ascent of 500 or 1,000 feet will lay bare the country twenty miles round. With a good glass the balloonist may see double as far on a clear day, and the disposal of forces in the neighbourhood is set out as clearly as on a map. To the right he sees a brigade of horse, to the left several batteries of artillery; he observes at a glance where the infantry is massed, where the reserve is, and where the site chosen for the encampment. In ten minutes the aërial scout has made a rough map of the country below him, and has filled in the whereabouts of every one of the enemy's positions. Nay, more: now-a-days, with camera and highly sensitive photographic plates, the scout may secure a dozen views of the landscape at his feet in almost as many seconds. He brings these photographic plates down with him, develops and prints them, and may even have them enlarged, thus securing a bird's-eye view of a hostile country through which it may ere long be necessary to march.

If time presses, the aëronaut need not descend to convey his news to those below, Wound round the rope that tethers the balloon are a couple of electric wires, and by the aid of these the balloonist can maintain a conversation with his companions on earth. By means of a telephone, speaking can go on as rapidly as by word of mouth, and recently, at Woolwich, this means of communication was put into practice with marvellous success. The officer of Royal Engineers in the balloon answered questions as to temperature, acquainted those below with the objects he saw, and gave news as to the force and direction of the wind, as quickly as the information was demanded of him. He was raised and lowered by the machinery below by his own directions, transmitted through the telephone, and if he had been in the presence of an enemy his words might have been privately conveyed to the general's ear, in case the latter desired secrecy. Of course, when the enemy is close at hand, only a captive ascent can possibly be undertaken, and then the range of vision is naturally limited. But in a free voyage the extent of country to be seen is very wide.

Our military balloons, it has been said, are made of different sizes, according to the nature of the service on which they are to be engaged. The smallest balloon, filled with hydrogen, capable of raising one man from the ground, with ropes, ballast, &c., measures 8,000 feet, while the largest made at Woolwich will contain 60,000 cubic feet, and would be capable of carrying at least half a dozen passengers. This latter is intended more for purposes of experiment and instruction, for there would, under ordinary circumstances, be no occasion for more than two aëronauts to ascend in time of war. The difference in the lifting capacity of hydrogen and coal-gas is very marked.

The best coal-gas that can be prepared for balloons will lift about fifty pounds per 1,000 cubic feet, while hydrogen, provided it is nearly pure, will raise seventy pounds per 1,000 cubic feet. So that if a balloon of 8,000 feet capacity will lift a man and his equipment when filled with hydrogen, we should want a machine holding not less than 11,000 feet when there is coal-gas only at our disposal. But there is another reason why our soldiers prefer hydrogen to coal-gas, namely, because the latter is not so readily prepared in the field, away from coal depôts and gas-holders. It was all very well during the siege of Paris to employ coal-gas in the big balloons that went up almost daily from the beleaguered capital, because both material and conveniences were at hand, but it would be a different matter, say, in Zululand or Ashantee. Coal, and retorts wherein to burn it, would be hardly forthcoming, and to carry these with an army could not be thought of for a moment. Hence it is that hydrogen has been fixed upon as the medium for military balloons.

There are several ways of preparing hydrogen. One method, a very easy one, is to act upon zinc with sulphuric acid. The hydrogen in this case is nearly pure, and the plan was adopted for inflating the monster balloon that made frequent ascents last year during the Paris International Exhibition. But there are two weighty objections to this method of preparing hydrogen; in the first place, heavy and complicated apparatus is necessary, and the cost of preparation is very great. The Paris hydrogen is said to have cost no less than a franc per cubic metre. Another simple method is to separate the hydrogen from steam, and this is the plan our military authorities have chosen.

We all know that water consists of oxygen and hydrogen; and steam, which is simply water in a state of vapour, has obviously the same constituents. If we can rob steam, then, of its oxygen, the hydrogen remains behind, and we can in a few words show how the military balloonist attempts to get over the obstinacy which combines the two elements. He does it by having recourse to a body which is greedy of oxygen. This is iron. Everybody is aware how readily iron rusts, and the process of rusting is nothing more than the absorption by the iron of oxygen, producing oxide of iron. Iron will rust under almost any conditions, but never so readily as when subject to warm vapour. So the military balloonist lays his plans accordingly. He takes with him into the field a small portable boiler, and the wherewithal to build a rough furnace. The furnace is lit, and into it is put a large pipe, or tube, filled with iron turnings and iron fragments. When thoroughly heated, a jet of steam is passed through this tube. The steam attacks the iron forthwith, and oxygen is absorbed in rusting the metal; the consequence naturally is that hydrogen is set free and passes out at the other end of the tube. Here it is dried—for the hydrogen is still mixed with a lot of steam—and is then available for filling the balloon. The more tubes there are, the greater obviously is the supply of hydrogen, but a well-constructed furnace should furnish 1,000 cubic feet of hydrogen an hour—sufficient therefore to fill a small balloon in eight hours. The gas is not so pure as that prepared by other methods, but it serves the purpose for which it is intended, and is, as we have seen, readily produced with very simple appliances.

But our military balloonists propose to do more than this. After making their hydrogen gas, they hope to be able to carry it about with them in pontoons, which would serve the double purpose of bridging and ballooning, according to circumstances. There is no need to carry pontoons, or metal cylinders, of 8,000 feet capacity in order to store therein 8,000 feet of hydrogen. All gases are capable of compression, and it is very easy to carry ten cubic feet of hydrogen within the space of one. Oxygen and hydrogen gases are at this moment commercial articles in London, and may be purchased compressed in this way, much as soda-water is bottled. Therefore, in the field, as soon as hydrogen has been produced, it is to be forced into cylinders and carried with a fighting column in the same way as telegraphic, surveying, photographic, and other equipment is borne by the Royal Engineer train.

As we said at the beginning of this article, military ballooning is no novelty; it is only under the improved condition of things just pointed out that the aëronaut can claim to be a pioneer. The French formed a company of *ingénieurs aérostatiers* in 1793, and made use of them to some effect in the following year at the Battle of Fleurus. The balloon was inflated in the nearest town, then carried along the roads by the engineers, by means of guy-ropes. On the eve of the battle in question some French officers mounted into the air, and were able successfully to take note of the movements of the Austrians. Subsequent attempts to employ balloons by the Russians in 1812 did not prove so successful; in this case the aëronauts proposed to carry up with them incendiary projectiles, and to let these drop upon the French army; but the scheme turned out a failure. Since then little has been done in the matter of military ballooning until the last Franco-German war, when aëronauts left Paris almost daily to convey news beyond the German lines. From the 23rd September to the 28th January, no less than sixty-six huge balloons departed from the French capital, navigated for the most part by sailors of the Marine, who had been hastily trained as aëronauts. The post-bags were carried by these aërial machines as regularly almost as by the ordinary mail. Invested as Paris was by the enemy, only five were taken, while three others were lost at sea. One balloon travelled to Christiania, in Norway, in thirteen hours, right across the North Sea; its passengers made the quickest voyage ever accomplished, having travelled on an average something like seventy miles an hour. Altogether 161 persons quitted Paris by this route, while upwards of 3,000,000 letters were despatched by *la poste aérienne*. These Paris balloons, which generally started at night, so as to be out of sight of the investing enemy by daybreak, measured on an average 2,000 cubic metres, and were therefore much larger than our war-balloons are.

H. BADEN PRITCHARD.