And now to return to the field of action. I have said that the Cuirassiers had got in amongst us, and as I had got pretty far from the wood before they made their appearance, how I was to get back again was the job. I made for the wood, and when I saw a batch of them coming where I was, I threw myself on my face as if I had been shot, running the risk of being trampled by the horses' hoofs rather than be cut down with the sword; and by such means I got to the edge of the wood, but the place I came to was a thick, high thorn hedge. There was no time to be lost, as the dragoons were cutting at our men as they were getting through the hedge, and I saw it was either do or die in the proper sense of the word. Regardless of the thorns running into my hand, I put one hand on the top of my firelock and the other on the top of the thorns, and gave myself a poise; and over I went, heels over head. My military hat kept the thorns from running into my head, but it stuck there, and I have never seen it since. I soon got another, as there were plenty lying about whose owners did not need them any more. When we got into the wood we made the Cuirassiers pay for their whistle. We pelted them through the hedge, and, although they were strongly reinforced, they never were able to take the wood again; so we kept up a hot fire on them till it was dark, when it ceased. There were a lot of us had got into an angle of the wood, wishing to find our way to where our regiment was formed, when all at once there was a fire opened on us, and we lined ourselves along the hedge and opened on the enemy, and kept it up briskly for about half an hour. We then agreed that we should charge. We gave a loud huzzah, darted through the hedge, and rushed upon the infantry: but they took to their heels. At this time a field officer came riding up, and told us we had done nobly, and just to keep the ground we had got and he would have us relieved. When he was gone to get some men to relieve us, and while we were standing, there were two poor French soldiers lying wounded behind. They asked for a little water. We had none, and one of our men and myself took out their blankets and wrapped them about them, placing their knapsacks under their heads; but still they cried for water, and I said to the man that helped me to sort them that I would go down the wood and try and get a little water for these poor fellows. This was about ten o'clock at night, and it was dark; but away I went, and when I got into the wood I asked some straggling men if they knew where I could get some water, and one of our company cried me by name to come to him. He was wounded; I bade him cry on until I would come to him, it being dark; and when I came to where he was there were from 30 to 40 wounded men lying along the hedge. I told them to cheer up a little; that the spring waggons were ordered up, and that they would get away very soon. I took it for granted that would be the case, as it really was, for they did come and took them away that night. They were taken prisoners next day, waggons and all, and were retaken the day following. I got the water, such as it was, and gave the poor Frenchmen as much as they wanted of it. By this time the general officer had brought up a part of the 33d Regiment and relieved us, when we went and found out our regiment as we best could; and this ended the first day of the two, or the 16th. On the 17th we marched for the Plains of Waterloo, the French following us up, but keeping a proper distance, and as we began to file off on the field where the battle was fought, there came such peals of thunder, one after another, that one would have thought the very earth would rend; and the lightning flashing along the ground in wide sheets, and rain falling beyond description, made the scene an awful prelude to what was to follow the next day. I never saw such a night. As for rain, it could scarcely be called such; it came down as though it were emptied out of buckets. It is unnecessary to say that next morning we were all wet to the skin and shivering; but when the cannon commenced it soon drove the shivering out of us, and then began the bloody work.

As I gave you a short account of what came under my notice on that day on the last 18th of June, I forbear to say more about it now; yet I may be allowed to say here that all I have written concerning that dreadful day is as fresh in my memory now as if it had happened yesterday; and as it is most likely I will never trouble you any more, your insertion of the above will much oblige, yours, &c., M.

An Old Peninsular and Waterloo Man,
Late of the Grenadier Guards.

GUNPOWDER.

Of late years, and chiefly determined by the advent and necessities of rifled artillery, much consideration has been given to what has been called the *vis viva of gunpowder*, or, as the French express themselves, the *force brisante*. It is always desirable to avoid the introduction of new names except they set forth some new idea, and we do not think there is need for the use of the term *vis viva*. The violence of explosion has more to do with the time in which the gaseous products of ignition are liberated than with the actual bulk of them. By the *vis viva* or *force brisante* is to be understood the function of combustive velocity apart from the volumes of gas of combustion liberated. Since the introduction of rifled artillery, and in especial built up rifled artillery of large calibre, the combustive velocity of gunpowder has been much considered. It was soon found in the practice of these guns that, using gunpowders already known, the shock of first explosion was almost greater than metal could bear. Thereupon it became desirable to lessen the combustive velocity of the powder used without diminishing the actual bulk of evolved gases. In the British service this desideratum was sought to be accomplished by the device of increasing the size of the grains. In America, and under the auspices of Rodman, the same end was sought to be achieved, perhaps has been achieved, by the device of a perforated powder block. Looking at the requisitions of gunnery and the capabilities of gunpowder, it would strictly follow that there should be a different modification of powder for each individual gun. To achieve this desideratum in practice would of course be impossible, still the theoretical indication should never be lost sight of.

Preceding considerations lead us to correct certain ordinary impressions relative to the expressive strength as applied to gunpowder. When a statement is made that some one kind of gunpowder is stronger than another kind what is the idea begotten? Is it meant that the strongest gunpowder has more immediate shattering effects, or that it is better adapted to projectile usage? If a little of the fulminate of silver or chloride of nitrogen be laid upon a penny piece and ignited, there follows explosion with deafening noise, and the penny piece, if not perforated, will at least be stongly bent. Substitute gunpowder and no such result will follow. Whether then is gunpowder on the one hand or fulminate silver and chloride of nitrogen on the other, the strongest? Judged by the immediate effect, the preponderance of strength is in favor of the two chemical explosives, but in regard to projectile powder their energy is inconsiderable or more properly speaking insignificant. The consideration of time as an element of projectile force is essential to a due comprehension of the subject. The problem being to urge a projectile out of a gun barrel, the precise theoretical conditions to be secured would be as follows: a gunpowder the immediate first force of ignition of which would be enough to overcome the resistance of combined friction and gravity of the projectile; then a progressively increasing velocity of gaseous evolution up to the point whereat the projectile leaves the muzzle of the gun. These conditions evidently do not admit of being achieved. Their fulfilment would imply the existence in one catridge of successive layers of gunpowder, each successive layer when ignited evolving more gas than the preceding and in a smaller division of time. Even, however, did they admit of being achieved, the advantage in gunnery practice would not be considerable. After a certain velocity of propulsion in a projectile has been attained the increment of any further *vis a tergo* involves an increment of atmospheric resistance so enormous that while the increment of range in the projectile thereby achieved is trifling, the aberration of flight is considerable. The propulsive force of inflamed gunpowder admits of comparison with the progressive velocity of a falling body; only where as the precise law of increment in the latter case is known, in the former it can only be theoretically approximated. This, however, is certain, that the projectile force of gunpowder is established from very small beginnings, as the following experiment will make evident. If a smooth bore flint musket be taken, loaded with a full powder charge, and filled with an accurately fitting cylindrical plunger of metal; if the musket be then fired, the cylinder of metal will not be projected at all, there will be no report, and all the energy of combustion will be expended through the touch-hole. The consideration of time of combustion as an element of projectile force accounts for the fact, now well known, that the proper length of a barrel has a certain ralation to the quantity of associated gunpowder. Whatever may be the velocity of gunpowder ignition and persistence of its gaseous development, a theoretical point must necessarily be attained at which the velocity of the projectile has overun the velocity of gaseous evolution. Theoretical indications obviously require that the projectile shall have left the gun some time previously, at the point, to be precise, at which the projectile's velocity and that of the projecting gases are exactly equal. Whenever the conditions are such that the projectile remains in the barrel after the attainment of the limit, then will the former suffer a retardation proportionate to the force of the partial vacuum established in its rear. If a barrel was sufficiently long a projectile might be brought to rest within it through the operation of the cause just indicated. We have often wondered that the experiment has not been tried. It would be easy of trial with a barrel of musket calibre, there then would be no practical difficulty in joining temporarily any number of musket barrels end to end, so as to make some continuous barrel for experimental uses.