

*b*, and *f*, present their ends to the wind, whilst *a*, is just coming into action.

*i*, Fig. 5, is a section of one of the transverse pieces upon the shaft, and *k*, of one of the arms to which the sails are attached: this latter is hinged by one of its angles to *i*, which admits of its turning so as to bring the sails, represented by the dotted lines, alternately, into a horizontal, and vertical position.

*l*, is a rod and ball of metal intended to balance the sails, so that when out of action, they may rest in the position represented by the dotted lines. This balance may be seen on the arms in fig. 4, and its use is evident, on inspecting fig. 5, the hinge being on one side of the piece carrying the sails.

*Remarks upon the properties essential in good gunpowder, and upon the methods of testing its strength.* By JOSHUA SHAW, Esq.

TO THE EDITOR OF THE FRANKLIN JOURNAL.

SIR—Being a constant reader of your Journal, and always interested in new discoveries and improvements, my attention was arrested by an article in your last number, on the strength of American gunpowder. The subject is one of which I may claim some knowledge, from a practice of more than thirty years, in the sports of the field; and from having myself performed numerous experiments in relation to it, and paid much attention to the experiments and opinions of others.

Although I differ, in some points, with captain Baird, and with the writer of the "Manual," we all agree, that powder to be good, should be quick, strong, free from impurity, and not liable to attract moisture from the atmosphere. In the article alluded to, it is said, that "several methods for proving, or trying, the strength of powder, have been adopted, but with the exception, perhaps, of Mr. Dupont's eprovette, none of them can be relied on for much accuracy." Now, in my opinion, this eprovette is equally defective with those usually employed, and which I consider as worse than useless. Their great fault is, that a similar result may be obtained by them from powder which is strong, and from such as is comparatively weak, but which excels the former in quickness.

The real strength of powder depends upon the quantity of gas resulting from its explosion: the coarser kinds frequently yield more than the finer; every experienced sportsman knows, that with coarse powder, he can kill wild-fowl at a greater distance than he can with the best cannister, although the measure of both be the same, yet, in this case, the weight of the fine will exceed that of the coarse. The blow upon the shoulder, it is true, will be most powerful from the fine, that from the coarse being scarcely felt; the cause of this is, the coarse burns with comparative slowness, and giving out a large volume of gas, the elastic force increases, until the shot leaves the muzzle of the gun; whilst that which is fine, being generally quicker, has every grain ignited at nearly the same moment, and exerts a sud-

den force, which is felt like the blow of a hammer; but this force does not continue, but relaxing before the shot is discharged, these latter are retarded by friction, and pass on with decreased velocity. A little reflection will make it apparent, that the quickest, and not always the strongest, powder will tell best, either in the eprovette described, or those referred to in the article in question. It is true, that the quickest powder may also be the strongest, but the test given is fallacious, and is calculated to lead into error; besides which, were the means good, but few persons could avail themselves of them, as they have no instrument at their command. I will therefore describe the mode which I have followed, and which can be practised by every man who has a gun; but I will first add a few words upon the properties of powder.

In field sports, the percussion gun has effected a considerable revolution; having caused such powder to be preferred, as was formerly rejected. Strength, not quickness, is now the important point, because the fulminating powder used for priming these guns, distributes the fire with the quickness of lightning, throughout the whole charge, and at once ignites every grain, thus rendering what, in the old gun, was slow powder, many times more rapid in its combustion, than the quickest powder formerly was. A quick powder is rendered so much more so, when ignited in this way, as to resemble, in its action, some of the fulminating powders, and consequently to endanger the bursting of the gun. The English manufacturers are evidently aware of this effect, as is evident in a number of fine guns lately imported by Mr. Constable, of this city: they are thickened near the breech, whilst they are kept as light as usual, by lessening their thickness in other parts where the metal might safely be spared.

The effect of a too rapid explosion may be illustrated by the action of the fulminating powders, of which there are several kinds. A small charge of these will burst the strongest fowling piece, but will not throw a ball ten paces. Although strength is always an important point, I think that it must now be manifest, that it is dangerous to confound this property, and quickness, with each other.

Impure or dirty powder is the detestation of every sportsman, as it is a fault without remedy. If his powder be weak, he may add to his charge, and obviate this evil. I have freely used the Brandywine powder, and also Pegou's, and have consulted with many of my friends, who have also used both; all have agreed that the Brandywine is both strongest and quickest; but all have also agreed that it is much less cleanly, soiling the gun more than Pegou's, and giving to water, in which the barrel is washed, an ink-like appearance, whilst a grayish tint only is produced by the latter, without much injuring the transparency of the fluid.

Had captain Baird tested the powder intended for ordonance, he would have probably found that the English manufactured article is not yet equalled by that made in this country. This, at all events, was the case with a quantity found on board the *Lady Johnson*, captured during the last war, on her voyage to Canada. The fact rests on the testimony of every one who had an opportunity

of trying it. This is a point of great importance, and well worthy the attention of the government, and of the manufacturers of the article.

I will now describe the mode which I have adopted in testing the *strength* of gunpowder. The machinery which I employ, may not be very scientific, but it is, nevertheless, certain, and uniform, in its results. I place a piece of board, vertically, with a hole in it, of from six to eight inches in diameter, over which I nail a quire of paper, by the two upper corners; the sheets are compact, as taken from the ream: writing paper is to be preferred. This is my target, at which I fire from a distance of thirty or thirty-five yards. My shot is weighed, and the powder measured, with some care; and before firing at the target, I turn up six or eight leaves of paper, placing over them a loose board, to protect them from the shot. I then fire, say No. 6 shot, and if the powder be strong, many of the pellets will pass entirely through the paper: if more than half pass through, I turn down some of the sheets, and thus proceed until it is perforated by about one-half of the number discharged. Other kinds of powder may now be compared with that first used; one, may not cause a single pellet to pass through, whilst from another, the whole charge will pass; by increasing or decreasing the number of sheets, you may find a difference of twenty per cent, and that, in favour, sometimes, of powder which appeared the weakest by the common eprovette. The correspondence between this mode and the practical use of powder, is apparent; and experience has proved it to be the best.

The trial, by firing powder on white paper, is altogether fallacious; some kinds not soiling it, which yet are absolutely filthy, when used in the gun; and some burning quickly in the loose heap, which are slow when rammed down.

I trust I have proved, that quickness is a property in powder, much less durable than formerly; and that elastic force, and purity, are the main requisites.

Should you sir, however, wish for further evidence upon this point, it will afford me pleasure to furnish you with my mode of testing the quickness of powder, which measures the time required to burn different kinds of powder with such accuracy, that in numerous trials the difference in the results will be a mere fraction.

In offering these views, I have not been prompted by any invidious motive; my aim has been to ascertain the truth; in two out of three of the main points, I have confirmed the statements of captain Baird, although in some minor particulars we have not agreed. I am not an adept at writing, but having had much practice, in the use of gunpowder, I have attempted to describe what I have actually observed; and if I have succeeded in making known any thing which may have escaped the notice of others, my observations will possess some value.

Very respectfully yours,

JOSHUA SHAW.

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17