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DEFECTS OF AMERICAN FLAX---CHOOSING SEED.

Linen is, perhaps, the most ancient and beautiful of all vegetable fabrics. One hundred years ago only, it was almost exclusively used in all civilized countries for shirting, sheeting and other domestic purposes, and cotton fabrics were then but little known. The rapid progress of the cotton manufacture and its extensive development during the present century are due to an almost unlimited supply, at a low cost, of this staple from the Southern States. Cotton is usually more expensive to cultivate than flax, but it can be prepared for carding and spinning at much less expense. Owing to its present very high price, however, and the prospect of a limited supply of it for the immediate future, much attention is now concentrated upon flax, to take its place in textile manufactures. We believe that flax may now be cultivated and prepared for carding at remunerative prices. Our opinions on this subject have been previously published, and need not now be elaborated. Our object at present is to urge the subject again upon the attention of our farmers, before sowing their seed and to point out some defects which have hitherto characterized American flax. In the records of the transactions of the Rhode Island Society for the Encouragement of Domestic Industry, for 1862 (just published) we find the following paragraph in the report of the committee on flax culture :—

"A noticeable fact relative to all samples of Western flax exhibited to the committee is the weakness of the staple ; that it wastes largely by manipulation, and when prepared, appears only suited for coarse fabrics. On the contrary, Canada flax is very strong, wastes much less in handling, and, when properly prepared, seems fitted for the finest purposes. The inferiority in Western flax appears to arise from the different mode of cultivation and after-care. They believe that any failure to work Western flax will be traceable to a want of knowledge on the part of the producer of the best modes of sowing, reaping and curing it, rather than to any other cause ; and that experiments to ascertain the best mode of cultivation and cure of it, with a view to its textile use, to be thorough, should begin with the planting of the seed."

This extract deserves the attention of all our farmers who design to cultivate flax. Our American Western flax is described as being defective in three very important features—it is weak, wastes largely in tow and is fit only for coarse fabrics. Nothing worse could really be said against it. And these defects are not due to climate or soil, but to a want of knowledge or carelessness in its modes of cultivation and after-care. We cannot agree with the last clause of the above extract, that further experiments are required in either the cultivation or cure of American flax. In Canada West, which has a climate similar to that of Michigan, we are told that flax of a superior quality is raised. Let our farmers, then, adopt the practice which has obtained in Canada, and without further experiments they will raise flax equally as good. In Canada West there are a large number of Scotch-Irish farmers who were acquainted with the cultivation of flax in Ulster, Ireland, and who have carried their knowledge and practice with them to America. One great defect in American flax is due to the inferior seed that has been used. No farmer expects to raise good wheat, oats or corn from bad seed, and flax in this respect should form no exception to the general rule. But hitherto our farmers have cultivated flax chiefly for its seed, to extract its oil, hence they have paid little attention to it for the purpose of obtaining its fiber. They must now abandon this idea, if they wish to secure good fiber. Russian—not American—seed is the best for this purpose, and the Dutch is next in quality. In the event of not being able to secure these European seeds, flax seed from Canada should be chosen, or very carefully-selected American seed.

THE BEST METAL FOR GREAT GUNS---OUR NEGLECTED WROUGHT-IRON CANNON OF LARGE CALIBER.

In the early ages of gunnery cannon were fabricated of a caliber compared with which the largest modern guns are pigmies. They were mostly made of bronze, although some of them were composed of wrought-iron forged in bars and banded with hoops of the same metal. A number of ancient bronze guns varying in caliber from 16 to 30 inches are still mounted on the forts at the Dardanelles, but the largest cannon of this kind was one cast at Moscow, Russia, in 1586. It is 18 feet long, the bore is 36 inches in diameter ; its chamber is sufficiently large to hold 500 pounds of powder, and the stone ball which was intended to be fired from it weighed 2,500 pounds ; a solid iron shot to fit it would weigh 6,000 pounds. The total weight of this cannon is 97,500 pounds, but like the great bell of Moscow, it has been simply a gigantic curiosity. As the powder used in olden times possessed much less expansive force than that which is now manufactured, and as stone balls were much lighter than those of iron, which are now used, of course these old guns were not subjected to such strains as modern artillery. From the old big guns of the Turks, Russians and others, there was a gradual descent, for two hundred years, to cannon of a smaller caliber. Half a century ago 32-pounders were the great guns on the largest war-ships, and in 1820, the heaviest cannon mounted on our American sea-coast defenses were 24-pounders. About thirty years ago gunnery took an upward tendency and we are still advancing in the construction of large cannon. Instead of 24-pounders for our coast batteries and 32-pounders for the navy, we have now guns ranging from calibers of 3 up to 15 inches—the largest being capable of throwing a shell of 420 pounds, and one of 20 inches caliber, capable of throwing a thousand-pound shot, has been proposed.

The best material of which guns of large caliber should be made is a question of much importance. At present there are four kinds used in the American army and navy. One class is made of bronze ; they are chiefly used for boat howitzers and light field-pieces. Another class consists of rifled guns, each formed with a cast-iron tube banded at the breech and the reinforce with wrought iron. Some of these are large ; they are used on vessels for long ranges and on land for siege and battery trains. A third class consists of rifled steel guns ; the fourth class are made entirely of cast iron. Most of our navy and fort guns belong to the latter class ; they are smooth-bores and range from 3 to 15 inches in caliber. As our largest guns are made of cast iron, the natural inference to be drawn from such a use of this metal is, that it is held to be the strongest and best metal for the purpose. This is a debatable question. No better evidence against it could be adduced than the admitted fact of its being unsafe for the manufacture of large rifled guns, which are subjected to greater strains than the smooth-bores. When used in rifled guns, these have to be banded with wrought-iron hoops. Why then should this metal be used at all for large guns? What would be thought of the proposition to use cast iron for musket barrels? It appears to be more unreasonable to employ this metal for large than small fire-arms, because guns formed of a stronger metal could be made lighter, and they would thus be more easily handled. The question naturally arises, why not use the best wrought iron—such as that employed for musket barrels—in the manufacture of heavy guns? This metal is much stronger than cast iron ; but it has been urged against its use that large sound forgings, such as are required for cannon, cannot be made; also, that it is more liable to take a permanent set than cast iron ; and lastly, that the use of hard cast-iron shot would soon wear them out. The latter difficulty can be overcome by coating the shot with a softer metal, as is now done with elongated rifled shot; the other two objections are not founded on perfectly reliable data ; although the greatest difficulty undoubtedly lies in securing good forgings.

We are glad to notice that the authorities of our Navy Ordnance Department have advertised for proposals for the construction of wrought-iron guns of as large a caliber as 100-pounders. We infer from this action that those who have charge of the Ordnance Department believe that superior heavy guns may be made of wrought iron, as our 15-inch cast-iron guns have, as yet, achieved no glory, and they cannot be used with large charges of powder. But we are not left in ignorance as to its fitness for such purposes ; we are only astonished that the Navy Department does not make use of the large wrought-iron gun which it has had in its possession for over twelve years. There is now in the Brooklyn navy yard a 12-inch wrought-iron gun which was made at the Mersey Steel Works, Liverpool, for the United States, under the direction of Commodore Stockton. It is as beautiful a piece of ordnance as can be seen anywhere, and it appears to be a very perfect piece of workmanship. It weighs 21 tuns, and is capable of throwing a solid shot of 280 pounds. Prior to the casting of our new 15-inch guns it was the largest cannon in the United States. It has driven a shot through several inches of iron plates bolted together, and why it has not been used and is not now mounted on one of the coast forts is inexplicable to us. We think it may be fired with a greater charge of powder and that it will send its shot with a far higher velocity than any of our cast-iron guns. The same parties who made this gun for our navy fabricated (in 1856) one of the same pattern and of similar material, of 13-inch caliber, for the British navy, and it has proved to be the most destructive battering piece of ordnance in the world. It has been fired repeatedly with 75-pound charges of powder and, at a distance of 800 yards it has sent its spherical shot through the "Warrior target" at Shoeburyness as easily almost as if the iron plates had been stoneware. No less than 8,000 pounds of powder have been used in firing with it, and it appears to be as sound in the bore as when its first shot was discharged, as stated on page 360, Vol. VII. (new series) of the SCIENTIFIC AMERICAN. It seems that the British Admiralty were once as oblivious to the merits of that great gun as our authorities have been to the one in *their* possession. The former gun lay rusting for three years on the seashore at Portsmouth, but it is now mounted and its merits appreciated ; the latter and older gun we saw last week lying like rubbish in the navy yard, and Col. Mordecai states that "it has never been tried." This statement does no credit to those who have the charge of it. We hope this gun will soon be rescued from its ignoble position, mounted and brought into use. There is not a gun on the harbor defenses of New York that can equal it for smashing and penetrating iron-plated frigates at short ranges.

ARMOR FOR SHIPS OF WAR.

Ever since iron-clad ships were invented there has been a conflict of opinions upon the subject of their armor. The proper thickness, the mode of fastening it, whether single plates or a number of thin ones are the best, with wood backing or without—these are only a few of the questions bearing upon the subject which have received attention. That some one plan has not been universally adopted is owing to obvious natural causes. Each person or Government thinks himself or itself best qualified to judge where his or its immediate interest is at stake.

In this country we have more generally adopted the series of thin plates in preference to heavy single ones ; although there are some exceptions to this statement. Abroad, the reverse is true. Thus far we have had more practical experience with iron-clad ships than any other people. The last to adopt these engines of war, we have been the first to put them into actual service, and our success has been wholly with the combinations of thin plating. The gunboats on the Western rivers—*Conestoga* and *Lexington*—were plated with solid iron $2\frac{1}{2}$ inches in thickness, yet they were completely riddled in