

ship. The following advantages may be expected to arise from the use of the iron self-supporting mast:

1st. Its strength would be greater than that of its timber competitor, whilst it would, at the same time, be more evenly distributed.

2d. Less resistance would be opposed to the wind, in the ratio of about 2 to 3.

3d. In consequence of the absence of the stays and shrouds, the foot of each sail might be attached to the yard at several places in addition to the clews, and thus a greater effective area of canvass would be obtained, and the tendency to "balloon" would be prevented.

4th. The yards might be braced up to as small an angle with the keel line as the seamen could possibly desire, and hence the sails would be turned to the best advantage when sailing on a wind.

Fig. 1 represents a horizontal section of my proposed duplex concentric tubular mast, taken near its base, the tubes being each of half-inch iron, riveted together by the stays, A.

[Masts of tubular wrought iron have already been used to some extent, but only, so far as we are aware, for large steamers. One or two large iron ships, of Clyde build, have been so fitted, but we are not in possession of their actual details of construction, or their behaviour at sea. Telescopic bowsprits, to work on the principle proposed by Mr. Joule for striking the topmast, have also been patented by Mr. Borrie, but they have not yet come into regular use, although we know that the weight of such constructions in tubular wrought iron is only two-thirds that of the same details in pine. It is, in fact, scarcely possible to overrate the advantages derivable from such a system of construction, for, whilst greater strength is obtainable, with less dead weight, than when timber is used, the telescopic plan furnishes great facilities in the transport of vessels in harbor, as well as in easing their laboring at sea, and enabling them to carry a press of sail much longer. In bowsprits, the jib boom running inside keeps the strain directly on the centre, and obviates the severe twisting strain usually experienced at present in a sea way. Masts and spars also partake more or less of these advantages. Besides, the great losses from the natural decay of timber, and the heavy expense of replacing sprung bowsprits, lower and topsail yards, must be enormously diminished with the employment of tubular iron; and the great improvement in appearance, in comparison with the confessedly clumsy bowsprit, jib boom, and topmasts, is a point by no means to be disregarded.—*Ed. P. M. JOURNAL.*]

Process for giving Various Objects a Pearly Lustre. By O. REINSCH.*

To produce the iridescence of mother-of-pearl on stone, glass, metal, resin, paper, silk, leather, &c., Reinsch adopts the following process:—2 parts of solution of copal, 2 parts of that of sandarach, and 4 parts of solution of Damara resin (equal parts of resin and absolute alcohol), are mixed with half their volume of oil of bergamot or rosemary. This mixture is to be evaporated to the thickness of castor oil. If this varnish

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be then drawn by means of a feather or brush, over the surface of some water, it will form a beautifully iridescent pellicle. This film is now to be applied to the objects which are to be rendered iridescent. The vessel in which the water is contained, on which the pellicle has been produced, must therefore be as large as, or larger than, these objects. The water should have about 5 per cent. of pure solution of lime added to it; its temperature should be kept at about 72°. The objects are dried in the air.—*Kunst und Gewerbebl. für Baiern*, 1852, p. 165.

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Remarks upon Maynard's System of Priming for Fire Arms. By WM. N. JEFFERS, U. S. N.

If we examine the history of inventions, we find that at all periods the class of offensive weapons has exercised the ingenuity of men of all professions, and of this class, portable, or technically *small arms*, furnishes the greatest number. Their use and mode of fabrication being generally well understood, inventive genius has been able to produce the most varied combinations, in general intended to increase the rapidity of firing, and new efforts are being constantly made to adapt these inventions to the requirements of the military service. Hitherto, the principal difficulty has escaped the penetration of inventors; and, while repeating and revolving, breech-loading, and other arms, designed to supersede the musket, have multiplied, until nothing remains new or patentable but the improvement of the mechanical execution of some part of the machinery, the musket itself has suffered from a general neglect.

The progress of invention is generally with rapid strides, when the necessity for its exercise is made apparent, until a point is reached bordering upon absolute perfection; but if we trace back to the fifteenth century the successive improvements which have been made upon the musket, we are astonished that so little has been in reality accomplished.

The invention of cannon having preceded that of portable guns, it was not until the latter part of the 15th century, that a weapon was produced resembling the musket in having a wooden stock, and intended to be supported at the shoulder with the left hand, while fired by a match held in the right. The improvement of this weapon, by the addition of a bent lever, one end of which formed the trigger, the other end carrying a lighted match, which by a movement of the lever could be brought in contact with the priming, occupied another half century, and at this point the Chinese still rest. The next step was the invention of the wheel lock; in which, by the friction of a revolving wheel upon a composition, a shower of sparks was produced, which inflamed the priming; but it was not until 1540 that fire arms entirely superseded the bow and the sling. Sixty years later, the invention of the flint lock gave to the musket its character, and at the end of the seventeenth century, the match lock was finally abandoned.