It preserves in the lockers when exposed to the air, without sensible alteration during several consecutive years, and can submit to the many operations of loading and unloading, of being placed in lockers and coal bunkers, without being damaged; but it is indispensable that these operations should be done by hand as much as possible, and that the blocks descend to the bottom of bunkers on slides, if it is impossible to convey them there by hand, of which we should always make use in stowing them; for if we treated the mixture same as common coal, without any management in throwing them in the bunkers, we are naturally deprived of the advantages that their cohesion, and especially their form, present for stowage.

The French Marine has dispensed with the cylindrical form of mixture for the parallelopiped in blocks used by it. This form answers better than all other forms the important purpose of stowage, for in the same space we can hold from 20 to 25 per cent. more of combustibles by using blocks of mixture instead of coals.

The dimensions of the blocks, and consequently their weight, are not arbitrary. One can examine in the French Marine some of the block factories, with the ordinary methods of this industry; they are only confined to the surface, leaving the interior in powder, while their weight is about 10 kilos. (22·04 lbs.), and the thickness about 0·12 m. (3·72 in.) The use has been adhered to of 9 kilos. (19·84 lbs.) weight maximum—such as the blocks of Ruzin, of the Grand Combe of Portes, Séréchas, &c., having a mean of 0·30 m. (11·8 in.) in length, 0·20 m. (7·8 in.) breadth, and 0·10 m. (3·94 ins.) thick—to those of blocks of 5 to 6 kilos. (11 to 13·2 lbs.) weight, a mean model constituent; and lastly, to that of a small model from 2·500 kilos. to 3 kilos. (5·5 lbs. to 6·6 lbs.) weight.

The great French collieries which apply themselves to the manufacture of compositions can more easily employ a large capital, and, wishing to economize time, have generally adopted the larger model, 9 kilos. (19·84 lbs.) of Mazoline or Revollier. This last, working with the hydraulic press, has a very regular form.

The small factories, for the opposite reasons, have adopted the small model of 3 kilos. (6·6 lbs.).

Whilst the blocks arrive intact in the heat chamber, it is usual, if they have been manipulated with care, to break them with a chopper, if they give from 10 to 12 per cent. of loss occasioned by the use of the hammer serving to break the coals.

It is evident that the small brick of 3 kilos. (6·6 lbs.) requires less blows with the chopper than that of 9 kilos (19·84 lbs.) in order to be reduced to pieces of 0·500 kilos. (1·102 lb.), estimated as the most suitable for heating, and consequently will entail less *débris* and loss. As for the blocks of 9 kilos., if they are well compressed and have 0·5 cohesion, the breakages will be more numerous without doubt, but they remain good, and only produce few fragments or useless *débris*. But, when we consider the frequent mishaps to which the blocks are exposed in the wagons, in putting them in bunkers, in loading and unloading, stowage, &c., when we see the difficulty for the sailors in handling more than one block at a time, whether it be 9 or 3 kilos. (19·8 lbs. or 6·6 lbs.), some considerable time must be reckoned on in these different manipulations, while we use blocks of 3 kilos. (6·6 lbs.) instead of blocks of 9 kilos. (19·84 lbs.). In other words, for an equal weight, as the surfaces and vulnerable angles for blows are less for the blocks of 9 kilos. (19·8 lbs.) than for those of 3 kilos. (6·6 lbs.) in the French Navy, we have a slight balance in favour of the blocks of 9 kilos. (19·8 lbs.).

For the above reasons, touching the respective positions of the manufacturers of blocks, the manufacture of blocks of 6 kilos. (13·23 lbs.) weight is little spread in France, and their use in the French Navy consequently is very limited now. It appears by its weight to realize the mean of the qualities of blocks of 3 and 9 kilos. (6·6 and 19·8 lbs.) united; but the great question of time in embarking the combustible on board the ships is considered too important not to affirm that the blocks of composition 9 kilos. (19·8 lbs.) will be always preferred to other blocks of smaller weight.

The Director of Stores,

V. Sabattier.

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## APPENDIX D.

Sir,— Moat House, Woodgreen, 8th November, 1875.

According to your request, I have carefully examined the analysis of the various coals of New Zealand and New South Wales. Of the latter, I have bought a large quantity to send to China for our ships of war, during the high prices of coals in 1873 and 1874, and am well acquainted with its value. I have endeavoured to answer all your questions as concisely as possible. Your questions are as follow:—

1st. Will New Zealand coals make a good patent fuel, especially the brown coals?

2nd. What is the relative value of New Zealand coals compared with New South Wales (Newcastle)?

3rd. Cost of manufacture, including all machinery and materials?

4th. Relative value of patent fuel and coal?

5th. Quantity of patent fuel made in England or on the Continent?

6th. Future prospects of patent fuel?

Question 1. The brown coals from—

1. Green Island, Otago,
2. Saddle Hill, „
3. Green Island, „
8. Saddle Hill, „

or any other brown coals with 40 per cent. carbon, and not more than 2½ per cent. of sulphur. These coals will make a very good fuel, both for steam and household purposes, as by the process of manu-