the others, and it is believed five piles are amply sufficient to resist any mass of ice that can come between the wharf and the pier.

It is not considered necessary to revise the estimates heretofore made, as the modifications proposed extend only to details involving no additional expense. I have the honor to be

Your most obt. servt.,
(Signed) W. H. EMORY,
1st Lieut. Top. Eng.

Topographical Bureau, May 20, 1844.

Explanations of Plate I.—Fig. 1, elevation of the pier; fig. 2, plan of braces and collars; fig. 3, top view of centre collars for braces; fig. 4, side view of centre collars for braces; fig. 5, top view of outside collars for braces; fig. 6, side view of outside collars for braces; fig. 7, mooring shackle *enlarged*; fig. 8, collar for mooring shackle; fig. 9, pile head; fig. 10, nut for pile head.

a, mooring shackle; *b*, collar for mooring shackle; *c*, covering plate; *d*, braces; *e*, outside view; *f*, inside view; *g*, Mitchell's screw.

The following detailed description of Mitchell's mooring screw, and its application to the construction of the Wyre light-house, was prepared for publication before our receipt of the foregoing article, and may be considered as an appropriate appendix to it: COM. PUB.

Description of Mr. Mitchell's Patent Screw Mooring, as being now laid down in the Port of London. By J. ELMES, Esq., Surveyor.

This sort of mooring is constructed, as its name implies, on the principle of the screw, but differing essentially in form from that well known instrument; for while the spiral thread makes little more than one turn round its shaft, it is, at the same time, extended to a very broad flanch, the hold which it takes of the ground being proportional with its breadth of disk.

Where it is necessary to provide against a very heavy strain, Mr. Mitchell has moorings of 3 feet 6 inches diameter, and the principle is capable of still further extension.

A mooring of the above diameter presents a resisting surface equal to about ten square feet; whereas the palm of the largest anchor in the British navy does not exceed half that size; and some estimate of its holding powers may be formed, when it is shown that this broad surface can be screwed to a depth many times greater than that to which the palm of an anchor can ever descend.

The method of laying down the mooring is briefly thus:—A strong mooring chain being so attached to it as to allow the screw to turn freely without carrying the chain round with it, a powerful iron shaft is then fixed firmly in the upper part of the mooring, which is formed square for that purpose, setting in the same manner as a key to a harp, or piano forte, in winding up; it is then lowered by the mooring chain, joint after joint being added to the shaft till the mooring has reached the ground; light levers of 12 feet in length are then applied to the shaft in the manner of a capstan, when the operation of screwing the mooring into the ground commences.

Two boats, or barges, having been moored firmly, head and stern, close alongside each other, and the upright shaft rising between them about midships, the men place themselves at the bars, and move round from one boat to the other, the two giving them a safe and convenient platform; by a simple contrivance the levers are occasionally shipped upwards, as the screw and shaft sink into the ground.

When the number of men employed can no longer force the screw round, the levers are removed, and the shaft drawn out of the ground, leaving the mooring firmly imbedded with the chain attached to it; a buoy being shackled to the other end of the chain the work is completed, the time required for the whole operation seldom exceeding a few hours.

Fig. 11, Plate I, shows the screw mooring, as prepared for use. *a*, is a spiral, or screw, flanch of about one turn and a half, having a hollow cylindrical centre, as shown in fig. 12, and of cast-iron in one piece; *b*, is a wrought-iron spindle, which passes through the cylindrical socket of the screw flanch, somewhat tapering in form, as shown in fig. 13, and when driven up tight, is fixed thereto by a forelock, which passes through both; it is formed with a square head, *c*, to receive the key for screwing it into the ground; *d*, is a collar of wrought-iron, the front of which is shown in fig. 14, fitted so as to turn freely on the upper part of the shaft of the spindle below the collar. Fig. 12, shows the upper surface of the spiral flanch; fig. 13, the spindle; and fig. 14, the collar and shackle. The shackle is fixed to the spindle by means of the loose collar, in order to prevent the dragging round, and the consequent fouling of the chain, whilst the spindle is being turned in, or out, of the ground.

Civ. Eng. & Arch. Journ.

Description and Structure of the Wyre (Seaward) Lighthouse, leading to Port Fleetwood. By Com. H. M. DENHAM, R.N., F.R.S.

It was my study, when planning this navigation, to identify the remotest spit of bank turning into it, without subjecting the mariner to the treacherous, and, at best, but partially lighting agent, a *Light Vessel*; Messrs. Alexander Mitchell & Son, of Belfast, readily took up the proposition, and the Board of Directors of the railway and harbor project, as readily adopted the application of Mitchell's ingenious mooring screw to the insertion and basing of piles, or pillars, in sub-marine foundation. I had given much trouble to Messrs. Mitchell, when unavailingly submitting their plans and specifications to the Liverpool Dock Company, (Oct. 4, 1838,) of so perfect a mode of establishing lights *out upon the very* banks of a navigation, whereby the power and object of a light-house is enhanced by proximity with the anxious observer from sea. In fact, a light-house can be thus erected upon any *under-water* spit, as indifferent to a 30 feet rise of tide and channel surge, whilst sending forth its light of the same character and stability, as if on the main land; thereby throwing it more intensely and effectively *on the region required*, especially where