

in iron grooves. It will be seen that one of these square bilge carriages will give four or five times as much support as ordinary blocking, and they are not liable to be displaced by rough water ever, when struck by seas in exposed positions.

For some special cases when loaded vessels have to be raised, the sliding bilge blocks are enlarged and provided with air-bags or water-bags made of indiarubber and canvas, enclosed in a strong cord belting, so that the whole sides of the vessel are supported on cushions as if they were in the water. In this way, vessels with loose grain or similar cargo can be safely docked even when fully loaded. The vessel when docked rests fairly on the pontoons (by which it is supported and not by the side of the dock), the outrigger giving the stability required.

The dock carrying the vessel, which is raised till her keel is a foot or two above the top of the piers, is then towed to the staging, and the pontoons floated in between the piers; by admitting water the vessel is lowered on to the staging and the dock is then drawn out ready to receive another vessel.

The depth of water required between these stages is, of course, only that which is sufficient to float the pontoons, say from ten to fifteen feet, according to the size of the dock, but, at the spot where the vessel is lowered to receive the vessel, a greater depth, equal to the draught of the vessel added to the depth of the pontoons, is necessary.

It is evident that the operation of transferring the vessel from the dock to the staging can only be performed when the water is at a certain level, varying a few feet, more or less, which difference can be adjusted by the blocking.

The severest test that could have been made of the efficiency of Messrs. Clark and Stansfield's invention was afforded at the dock constructed by the patentees at Nicolaieff, the Russian Naval Arsenal on the Black Sea, which we illustrate on page 359. Military exigencies made it a matter of the greatest importance that the "Russia," a vessel of 334 feet in length, should be prepared for sea without delay; it was therefore determined by the authorities to use the dock for the purpose of cleaning her, and this, although but a length of 174 feet on the side, was completed, and but six of the pontoons attached, the difficulty being still further increased from the fact that of these, three were spaced only five apart and the remainder twenty-five feet. Figs. 6 and 7 show respectively the vessel as she was docked and as she ought to have been docked.

In spite of all this, however, Capt. Goniaeff of the Russian Imperial Navy, the Government representative at the construction of the dock, reported that the vessel, although her estimated weight corresponded nearly exactly to the lifting power of the six pontoons used on that occasion, was lifted and her bottom scrubbed and painted down to the upper part of her keel.

Capt. Brovzin, the superintendent of the Nicolaieff Dock, who was formerly in charge of the establishment at Cronstadt, reports very favourably on its security and ease of manipulation, and specially notes the ease with which its submersion can be adjusted.

The advantages claimed by the patentees for this system of depositing docks and staging are, among others, that with one dock any number of vessels can be docked and deposited high and dry on platforms in convenient position for cleaning or repairs, each equivalent length of staging being equivalent to the building of another dock; that as the vessels docked are usually deposited on a stage, the dock is always free for use, and can be transported from place to place, for the purpose of raising or depositing vessels at different points; and lastly, that, if constructed in the first instance too small for the requirements of trade, the dock can at any time be enlarged at the same rate per ton as the original cost.

A PAINTING MACHINE.—An English firm shows at the Paris Exposition a novelty in the form of "Roberts' Self-acting Painting Machine," which will paint or varnish, without steam power, the window-blind laths of houses, the figures given being 60,000 running feet per hour. The flywheel spindle of this machine carries a pair of bucket grooved wheels, which in their rotation dip into a well or reservoir of the paint or varnish to be used, and then discharge the pigment on the lath inserted between small rollers. Equality of distribution is provided for by means of stationary brushes. Hoop iron intended for packing purposes, or bedsheads, can be treated in the same manner.

men. We have, fortunately, been indebted to a large number of our subscribers for support who are not connected with mechanical trades, and who take the Magazine for the varied, useful, scientific, architectural, and other matter contained in its columns.

In order, therefore, that the subjects on which the Magazine treats should be better known, we have given it a broader title which will embrace Science, Art, Inventions and Mechanics, and by this change we hope to introduce it more prominently to the notice of many, who, under its present name, have not been aware that it was a *scientific* as well as a *mechanics'* magazine.

CHURCH OF ST. MICHAEL AND ALL ANGELS, BALTIMORE, MD.

MESSRS. WATT AND SPERRY, ARCHITECTS.

The transepts and tower of this church are now being built, on the north-east corner of St. Paul and Denmead streets, Baltimore. The exterior walls will be of Falls blue stone with finish of a reddish brown stone from Longmeadow. The interior will be finished with open timber roof, the walls will be decorated with painting. The arches and band courses will be of colored brick and terra-cotta, with corbels, &c., of Amherst stone.

—*American Architect and Building News.*

WAGES IN ENGLAND.

The Secretary of the Iron and Steel Association has received from a special correspondent in England the following particulars with regard to the wages paid there in April last:

WAGES PAID EMPLOYEES ON THE MIDLAND RAILWAY.—Engine-men, per day: first six months, 5s. 6d. — \$1.34; second six months, 6s. 6d. — \$1.58; four years, 7s. — \$1.70; full pay, 7s. 6d. — \$1.83; permanent shunter, 6s. — \$1.46. Firemen, per day: first twelve months, 3s. 6d. — 85c.; afterward, 4s. — 97c; passed as drivers, 4s. 6d. — \$1.10. Guards or brakemen, per week: passenger, main line, 21s. to 29s. — \$5.11 to \$7.06; passenger branch line, 21s. to 25½s. — \$5.11 to \$6.09; freight, main line, 24s. to 30s. — \$5.84 to \$7.30; freight, branch line, 24s. to 29s. — \$5.84 to \$7.06.

WAGES PAID EMPLOYEES IN THE NORTH OF ENGLAND IRON MILLS.—Puddling gray iron and mixtures, per ton, 8s. 3d. — \$2.01; prize money per week of full heats, 2s. 6d. — 61c.; prize money per shift to underhands for full heats, 6d. — 12c. Heating rails, large mills, per ton, 1s. 4½d. — 33c.; heating rails, small mills, per ton, 1s. 8½d. — 42c.; reheating rails, large mills, per ton, 8½d. — 16c. Rolling rails, large mills, per ton, 1s. 9d. — 42c.; rolling rails, small mills, per ton, 2s. 2½d. — 54c. Laborers, mills and forges, per shift, 2s. 9½d. — 67c.; laborers, blast furnaces, per shift, 3s. — 73c.

OVER 2,000 farmers in Maine have taken hold of the best-sugar enterprise, and are raising this root for the factory in that State.

TESTING THE STRENGTH OF CEMENT.—At the Paris Exposition there is on exhibition a machine for testing cement. To the upper end of a suitable cast-iron framing is hinged a bent lever, one end of which carries a heavy counter-balance weight. The other (and shorter end) has suspended from it the frame in which the block to be tested is placed. The lower end of this frame is acted upon through a link by a toothed quadrant, which can be partly rotated by a handle driving the worm which engages it. By means of a segment at the back of the machine, and a pointer driven by a small stud on the bent lever, the maximum attained elevation of the counterbalance weight is shown, and therefore by suitable marks the strain sustained by the block is at once known. It will readily be seen that the pulling motion is extremely even and gradual, so that the block cannot get broken by jerks. The two bolts which untie the two halves of the frame in which the specimens are tested are left very slack, by which arrangement the full test load can be applied, and at the same time the counterbalance weight can only drop a short distance when fracture takes place. The machine is simple and efficient, and a large number of manufacturers and users of cement have them daily employed at their works.