

INSTITUTION OF CIVIL ENGINEERS.

The Council of the Institution of Civil Engineers have recently awarded the following premiums for papers which have been read during the past Session:—

1. A Telford Medal, to Daniel Kinnear Clark, Assoc. Inst. C.E., for his paper "On the Improvement of Railway Locomotive Stock."
2. A Telford Medal, to Robert Hunt, F.R.S., for his paper "On the Application of Electro-Magnetism as a Motive Power."
3. A Telford Medal, to George Rennie, M. Inst. C.E., F.R.S., for his paper "On the Employment of Rubble-Béton or Concrete, in Works of Engineering and Architecture."
4. A Telford Medal, to William Bridges Adams, for his paper "On the Varieties of Permanent Way practically used on Railways."
5. A Council Premium of Books, suitably bound and inscribed, to Frederick Richard Window, Assoc. Inst. C.E., for his paper "On Submarine Electric Telegraphs."
6. A Council Premium of Books, suitably bound and inscribed, to George Barclay Bruce, M. Inst. C.E., for his "Description of the Method of Building Bridges upon Brick Cylinders in India."
7. A Council Premium of Books, suitably bound and inscribed, to Augustus Stephen Lukin and Charles Edward Conder, for their paper "On the Disturbances of Suspension Bridges, and the Mode of Counteracting them."
8. A Council Premium of Books, suitably bound and inscribed, to William Bell, for his paper "On the Laws of the Strength of Wrought and Cast Iron."
9. A Council Premium of Books, suitably bound and inscribed, to Francis Roubilliac Conder, Assoc. Inst. C.E., for his paper "On the Laying of the Permanent Way of the Bordeaux and Bayonne Railway."
10. A Council Premium of Books, suitably bound and inscribed, to Thomas Dunn, Assoc. Inst. C.E., for his paper "On Chain Cable and Timber Testing Machines."

BIG BEN "CRACKED."

To the surprise and disappointment of every one who takes an interest in the mysterious art of bell founding, it turns out that the mammoth bell for the new Houses of Parliament—rejoicing in the euphonious title of "Big Ben"—has a crack in his rim, which will put an end for ever to the sound of his magnificent voice. Big Ben's friends say he has been unfairly used. It will be remembered that on the 21st of November last year, this world-famous bell was landed at Maudslay's wharf in London, whence it was conveyed across Westminster Bridge to the foot of the clock tower of the new Houses of Parliament, where it has remained ever since, and in this inconvenient and objectionable position the bell has been tolled and the hours struck upon it by means of a huge and clumsy hammer—much too large for the purpose. As a consequence—some people will say a natural consequence—of this rude treatment, Big Ben, a few days ago, was found to give out a hoarse, harsh, and "uncertain sound."

The dismal truth rushed into the minds of his attendants, and on narrowly inspecting the exterior, a crack was found, through which the light of a candle could be plainly seen! We shall, therefore, hear no more for the present of "Big Ben," for in all probability this beautiful specimen of the bell founders' art will be broken up and cast over again, but before this is done it is desirable that some inquiry should be made as to the cause of this untoward accident. We may not divulge the cost that this bell has been to the nation, but we may mention, *en passant*, that an ordinary price for bells is six guineas per cwt., that "Great Peter," the big bell at York, cost the citizens there £9 6s. per cwt., and that "Big Ben," at this latter rate, would mount up to the respectable figure, as the Yankees have it, of £3,000—three thousand pounds in hard cash.

As attention will once more be directed to the subject of bells, the following table of the weights of some of the most famous bells in the world, will probably be interesting to some of our readers:—

	Tons.	Cwt.	qrs.	lb.
Great Bell at Moscow	198	2	1	0
" " Pekin	53	11	1	20
" " Nankin	22	6	1	20
" " Rouen	17	17	0	16
" " Notre Dame (Paris)	17	0	0	0
" " Olmutz	17	18	0	0
" " Vienna	17	14	0	0
" " Big Ben " of Westminster	15	18	1	22
" " Great Peter " of York	10	15	0	0
" " Great Tom " at Oxford	7	11	3	4
" " Great Tom " of Lincoln	5	8	0	0
Great Bell at St. Paul's	5	2	1	22
Dunstan at Canterbury	3	10	0	0

We also append a table of the composition of Bell metal for various purposes, comparing it with that of which the Westminster Bell was composed:—

1 6-10th's oz. of Tin, to 1 lb. of Copper =	Small bells found in Nineveh by Mr. Layard.
3	= Soft musical bells.
3½	= Chinese Gongs and Cymbals
4	= House Bells and Indian Gongs
4½	= Large Bells.
5	= Largest Bells.
5½	= "Big Ben" of Westminster.

It is needless to pursue this subject further, but we may observe in conclusion that it is a remarkable fact, as proving the rapidly increasing metallurgical importance of the county of Durham, that "Big Ben" was a pure "Durhamer," the bell itself having been cast by the Messrs. Warner at Norton, near Stockton-on-Tees, while the tongue or clapper—which was said by the *Times* to be a "unique specimen of wrought iron"—was produced at the Houghton-le-Spring Iron Works, in the same county, by Mr. Geo. Hopper, the eminent manufacturer of hammered iron work.

GREAT EASTERN STEAMSHIP.

In reply to numerous applications made to the Directors of the Eastern Steam Navigation Company, relative to the launching of the Great Eastern, Mr. Yates, the secretary of the Company, has published the following letter from Mr. Brunel, dated 23rd October, which "conveys all the information possible at the present moment to impart on a subject for which past experience affords no guide":—

"13, Duke-street, Westminster, Oct. 23.

"Gentlemen,—The difficulty of replying to the numerous inquiries made respecting the period at which the ship will be launched, seems to render it desirable that some means should be taken of giving the information generally that it may be uncertain up to the end of next week whether the ship will be launched on the 3rd proximo or the 2nd of December, and also of correcting the erroneous impressions which exist as to the nature of the operation, which can only lead to the disappointment of those who anticipate a display on an unusually large scale of that which is a beautiful spectacle with ships of ordinary dimensions.

"As regards the period of the launch, I have for some time past calculated upon being ready by the first tides of next month; and, by the unwearied exertions of those on whose assistance I have depended, with the advantage of unusually fine weather, the

principal works required are so far advanced that there seems every prospect of success; but a change in the weather is threatening, the time remaining is short, and comparatively small causes may create such delay as to render it more prudent, if not unavoidable, to postpone the operation until the following available tide—namely, that of Dec. 2, as no mere desire to launch on the day supposed to have been fixed will induce me to hurry an operation of such importance, or to omit the precaution of a careful and deliberate examination of all the parts of the arrangements, after all the principal works of preparation shall have been completed. Should such postponement prove necessary, or be adopted from prudence, everything having been now prepared, the launch will be on the 2nd of December. As regards the nature of the operation, it has frequently been stated, but it seems necessary to repeat it, that the ship will not be "launched" in the ordinary sense of the term, but merely lowered or drawn down to low water mark, to be thence floated off by a slow and laborious operation, requiring two and possibly three tides, and very probably effected partly in the night, and at no one time offering any particularly interesting spectacle, or even the excitement of risk, as I am happy to feel that, even assuming accidents to occur, or miscalculations to have been made rendering the operation unsuccessful, the ship may stop half way down, or not move at all, more power or other remedies may have to be applied, but no injury to the ship can result from any failure in the course of proceeding in this mode of launching.

"I am, Gentlemen, your obedient servant,

"I. K. BRUNEL.

"To the Directors of the Eastern Steam Navigation Company."

ARTHUR'S BRICK-MAKING MACHINE.

(From the Glasgow Herald.)

OUR readers may remember that we briefly called attention to this machine at the time the Highland Society held their exhibition of stock and implements on the Green. The machine was then only in process of construction. Since that time it has been completed, and may be seen at work in the establishment of Messrs. Steven, Little Hamilton-street.

It is no easy matter to convey any correct idea of a piece of machinery by mere words. There are always some portions of the design which must be studied in model or diagram. Fortunately, however, this very admirable tool is not only most perfectly adapted for its work, but also so simple, that a verbal description may be read with advantage by those who have no opportunity of seeing it at work.

It may not be out of place to mention here that this machine is not, like many which have done good service in the mechanical and engineering arts, the result of many experiments, or of accident. Mr. Arthur was requested to invent and construct a machine to make bricks without clay or water—and he did so. This is no small matter. He had been employed in Spain in the manufacture of bricks, where the material either could not be had suitable for the ordinary methods of brick-making, or only at such enormous prices as made bricks almost as dear as one of the precious metals; so that his invention not only makes bricks out of materials not hitherto used, but without water, in a country where that element is sold by the wine glassful.

But now to the machine. In the first place, as indicated, bricks can be made by it of any sort of earth, as thus—at the one end there is a cylinder slightly inclined from the horizontal at its outer end. This cylinder is kept constantly revolving by means of a locomotive engine of four horse power, which drives the entire machine. The outer end of the cylinder is of solid metal, and within it revolves, in an opposite direction, and at a different degree of speed, a series of chopping blades, which cut and triturate the earth which is cast into the cylinder, just as it is dug from where the machine may happen to be required. This triturated earth passes slowly down the incline until it comes to a portion of the cylinder which is constructed like a sieve, with reticulations of about a half an inch each, through which it falls upon an endless band of leather, and by which it is carried to an endless chain of small buckets like those on a dredging machine. These buckets carry the pulverised earth up to a hopper in that portion of the machine which forms the bricks, and the manner in which they are formed remains now to be told.

Beneath the hopper a strong wheel revolves vertically, and on its periphery, with their mouths placed outwards, are arranged a series of dies or moulds, into which the earth falls from the hopper, only in such quantity as will make one brick. During the revolutions of this die-loaded wheel it passes under a piston which is moved up and down by a cam, and as each die passes the earth receives the full force, equal to many tons, of the piston, and is pressed into a solid and handsomely-formed brick ready for the kiln. When each die has reached the lowest point of the wheel's revolution, another piston comes into action which forces the compressed block of earth from the mould, whence it falls upon another endless belt of leather, and is then ready to be carried to the kiln.

Having thus attempted to describe how this machine makes bricks, it may not be amiss to say a word about the quantity and quality of its work. The rate at which the machine works, with its handsome and very economical little four horse engine, enables it to throw out with ease 25 bricks per minute, or about 15,000 per day, and requires no more than three or at most four men to work it; whereas the same number of bricks made by hand, and in the usual way, would require not fewer than forty men. Besides, hand-made bricks require to lie drying for several days before they can be put to burn, whereas these machine-made bricks can be kilned as soon as made. And as to quality, we can vouch from actual observation, that before being burned they are almost as strong as many burned bricks—e.g., we saw a strong man lift one of the unburned bricks fresh out of the machine, who, lifting it over his head, threw it four times down upon the hard floor of Messrs. Steven's machine work before it broke.

It is scarcely worth while, after what we have said, to recommend Mr. Arthur's machine to the brick manufacturers of Scotland, because we think that two or three of them would do all the brick making required on this side of the Tweed, but we think that in England, where so many miles of brick are constantly being required, it would be found to be an admirable and economical assistant to builders and contractors.

L'ANGLETERRE CONTINENTALE.

UNDER this alarming title the *Siecle* gives us some information with respect to a project for connecting England and France by a submarine tunnel. The following is abridged from the article of our contemporary:—

We assure our readers that we are not speaking now of any wild project which it is always easy to conceive when once in the domain of social or political fantasy. The possibility of uniting England and France by means of a submarine tunnel

has been practically and scientifically considered by a skilful engineer, M. A. Thomé de Gamond.

This gentleman has submitted his project in the first place to the Emperor, who was greatly struck with it. Afterwards the Minister of Public Works, in accord with the Minister of Marine, named a special commission, composed of the most eminent scientific notabilities. This commission has decided that M. Thomé de Gamond was no mere dreamer. The English Government have also named on their side a commission, and it is probable that in the coming spring French and English engineers will apply themselves to the work of vigorously examining the practicability of the project.

Since the beginning of this century the attention of many engineers and politicians have been drawn to the possibility of uniting the two countries by a tunnel. But the less advanced state of engineering science, as well as political questions, have prevented the subject hitherto from attracting serious notice. Such plans as have been elaborated previous to those of M. Thomé de Gamond have all been characterised by the same want of precise knowledge as to the nature of the submerged ground. M. de Gamond has applied himself particularly to the study of this subject, and after long and severe researches he has made a geological collection containing seventy-four specimens of the submarine strata and deposits.

The scientific commission appointed by the Government will test the value of his facts and inferences, and M. Thomé de Gamond, as modest as he is skilful, wishes for no other or better test.

In the actual state of his researches the following is a sketch of the project of M. Thomé de Gamond:—The tunnel will commence on the French coast at Marquise, a small town of the Pas-de-Calais, from which it will branch on one side to the Boulogne Railway, and on the other to the Calais line. The first of these branches will be 13,700 metres in length, and the second about twenty kilometres. The tunnel will extend from Marquise 8,800 metres towards Cape Grinez, at which point it will enter the Straits and strike the English coast at Eastware, between Dover and Folkestone. A branch of 5,500 metres will connect the tunnel with Dover and all the net-work of the English railways.

The bottom of the sea at one point of the Straits at an equal distance from each coast has an elevation, which at low water is covered only by twelve metres of water. This rock, which the charts describe under the name of Varne, will be raised, and will form the marine station of the tunnel. A harbour will be there constructed. Docks, lighthouses, &c., will make of the Varne station a meeting point for all the shipping of the globe.

It will be necessary, for the sake of rapidity of execution, to commence the tunnel at both sides of the channel at the same time. M. Thomé de Gamond proposes therefore, and it is perhaps the most chimerical part of his magnificent project, to apply to the excavation of this submarine tunnel the procedure employed with so much success in the excavation of land tunnels, and particularly in that of Nerthe, on the line from Lyons to the Mediterranean. The method alluded to is that of sinking wells. To do this it is proposed to throw up, at certain distances on the line prescribed for the direction of the tunnel, thirteen temporary islands of a good width of base. Each of these islands raised above the sea will be provided with a small reflector light and necessary workshops. It will be thus possible to sink thirteen wells, and to attack the work of boring the tunnel by twenty-eight openings at once, which will admit of this monumental labour being completed in six years.

We do not here enter into the technical details of the plans made with so much exactness by M. Thomé de Gamond. We will not attempt to describe the means proposed for the construction of these islands and of the great station of Varne. We limit ourselves to saying that, according to the researches of this skilful engineer, nature seems to have foreseen that the two great Western nations would undertake this vast enterprise, for they have places in profusion on their coasts for the materials necessary for its accomplishment.

What will it cost? An important question. According to the calculations closely and adequately established by M. Thomé de Gamond, the total expense will be 174 million francs (£6,960,000), about the ninth part of the cost to France alone of the Crimean war.

If the alliance between England and France is not a mere pretence, it is in such a monumental work that it should be rendered imperishable. *In hoc signo vinces.*

The plans of M. Thomé de Gamond may be modified by further study and research, but the idea will triumph. The moment is arrived for the Governments, if they wish not to turn for ever in a fatal circle of revolutions, to prepare, by such undertakings, for that peace and union among nations that will open to the world a new era, the dawn of which is at hand.—*Morning Post.*

THE INDUSTRIAL POPULATION OF ENGLAND.

STATISTICS of Pauperism were recently published, classed, in respect of the localities, on the plan adopted for the census of 1851, and augmented, in respect of subject-matter, by the publication of the returns of each union separately; with the addition of some industrial statistics. These statistics are very voluminous. The following is given as the various employments of the people, under classes:—

1. Persons engaged in the general or local government of the country	65,330
2. Persons engaged in the defence of the country	78,498
3. Persons in the learned professions (with their immediate subordinates), either filling public offices, or in private practice ..	87,422
4. Persons engaged in literature, the fine arts, and the sciences ..	94,790
5. Persons engaged in the domestic offices, or duties of wives, mothers, mistresses of families, children, relatives	2,777,017
6. Persons engaged in entertaining, clothing, and performing personal offices for man	1,620,881
7. Persons who buy or sell, keep, let, or lend, money, houses, or goods of various kinds	162,265
8. Persons engaged in the conveyance of men, animals, goods, and messages	252,196
9. Persons possessing or working the land, and engaged in growing grain, fruits, grasses, animals, and other products	1,576,081
10. Persons engaged about animals	63,506
11. Persons engaged in art and mechanic productions, in which matters of various kinds are employed in combination	554,878
12. Persons working and dealing in animal matters	419,282
13. Persons working and dealing in matters derived from the vegetable kingdom	739,314
14. Persons working and dealing in minerals	623,171
15. Labourers and others—Branch of labour undefined	290,227
16. Persons of rank or property not returned under any office or occupation	147,879
17. Persons supported by the community, and of no specified occupation	103,458
18. Other persons of no stated occupations or conditions	110,407

Total of persons, aged 20 and upwards, in England and Wales 9,816,597

ST. JAMES'S-PARK IMPROVEMENT.—On Sunday last the iron suspension bridge across the basin in the enclosure of St. James's park was opened to the public. It is situated in a line between Queen-square and the court-yard leading to Marlborough-house.