

Scientific American.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT NO. 87 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year, postage included... \$3 20
One copy, six months, postage included... 1 60

Club Rates.

Ten copies, one year, each \$2 70, postage included... \$27 00
Over ten copies, same rate each, postage included... 2 70

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written, and also state at which time they wish their subscriptions to commence, otherwise the paper will be sent from the receipt of the order.

VOLUME XXXIII, No. 18. [NEW SERIES.] Thirtieth Year.

NEW YORK, SATURDAY, OCTOBER 30, 1875.

Contents.

(Illustrated articles are marked with an asterisk.)

Accumulator, an* 250
African explorations, new 251
Altiscope, the* 250
American Institute fair, the 254
Anchor tripper, an* 253
Angle joints* 258
Angular gearings* 258
Answers to correspondents 258
Aquometer, the 253
Astronomical telescope, a home-made* 250
Artificial arm, the* 250
Ball falling in a car, a (18)* 253
Ball from gun, deviation of (8)* 253
Balls, round and conical (20)* 253
Battery for plating (34)* 254
Battery reaction, the Grenet (36)* 254
Boiler, horse power of a (30)* 254
Boiler phenomena (2)* 253
Boilers, dangerous (1) 253
Boilers, springs, etc., in (13)* 253
Bones, buffalo 257
Bronzes, Japanese 251
Business and personal 253
Centennial notes 256
Chloroform, antidote for 254
Cincinnati exposition, the 253
Colleges and the hard times 272
Cone plate for boring* 277
Cordials, American 273
Crystallizing fruits (31)* 254
Darwin and his doctrine (22)* 253
Decomposition, preventing (14)* 253
Electrical exhibition in Paris 277
Electrical fish bait, an* 279
Electric signals, military 281
Element of discovery of a new 281
Engine and horse power (22)* 253
Engine cylinders, fallow in (9)* 253
Engine on the center, an (6)* 253
Engines, etc., for boats (19)* 253
Expansion, the force of 281
Fence posts, setting (24)* 253
Filter, pressure in a brick (38)* 253
Forest, a buried 254
Friction clutch pulley* 274
Gas, new process for 273
Germination of seeds, the 273
Glass opaque, to render 281
Gunpowder and steel (22)* 253
Heat on steel, effects of 253
Horticulture, oriental* 274
Hospital construction, recent* 274
Hyperbolic logarithms (15)* 253
Incubator, a new 273
Inventions, useful and curious* 253
Ivory, preserving color of (37)* 253
Jars, stone, to clean (14)* 253
Joints, tight, to unscrew (41)* 254
Keely motor deception, the 273
Kettle, improved tea* 274
Knapsacks* 250
Leaks in floors, etc. (23)* 253
Leverage on screws (16)* 253
Locomotive, semi-centennial, the 272
Locomotives, modern British* 271
Locomotive, traction of (7) 283, (35) 284
Magnetism, effect of stress on 280
Microscope, a home-made* 250
Microscopical society, a 278
Mills, improved grinding 276
Mills, oil car, new 281
Patent laws, State (11)* 284
Patents, American and foreign 282
Patents, foreign, cost of 273
Patents, list of Canadian 285
Patents, official list of 284
Patents, reduced cost of 282
Plows, re-pointing (10)* 281
Polishing steel buttons, etc. (29)* 284
Polishing wrought iron (5)* 283
Pond, L. W. 273
Practical mechanism—No. 34* 277
Preserving meat 281
Railroad, the first U. S. (27)* 281
Railway carriage, new* 276
Refrigerator and counter 273
Saws and ripping knife* 274
Skillfully executed job, a 271
Slotting machine tools* 277
Snake within a snake, a 277
Steamers, fast (43)* 284
Steam, expansion of (32)* 284
Steel an artificial production (17)* 283
Telescopes, marine (25)* 276
Testing gold (12)* 283
Tinning iron wire (14)* 283
Tinning small castings 279
Torpedo system useless, is our 272
Trade marks, rise and progress of 273
Tube Company, the National 271
Varnish for paper (33)* 274
Vessels, vertical motion of 276
Water for turbines (28)* 283
Water in tubes, pressure of (22)* 283
Water, shortening ropes with (42)* 284
Wells, testing for animal matter 281
Wells, artesian (38)* 283

IS OUR TORPEDO SYSTEM USELESS?

An editorial has recently appeared in the New York Sun, advocating the abolition of the engineer corps of the army on the ground that that arm of the service is no longer useful. Referring more particularly to the Government torpedo station at Willett's Point, on the Narrows of Long Island Sound, where a school of instruction in the manufacture and use of torpedoes for the army engineers has been for some time past established, the Sun considers that the same is of no value to the country, mainly on account of the defects known to exist in fixed submarine torpedoes, which class of weapon the Sun seems to believe is the only one made the object of military study.

It is well known, to all who have watched the remarkable progress which, during the last few years, has been made in torpedo science, that of all types the planted torpedo is probably the weakest. Unless a vessel comes within a destructive range, which experiment has proved to be quite contracted, no injury would result; and there are besides the other disadvantages of the concussion of one submarine mine blowing up the others, and of possible deterioration of the explosive material through long immersion. These facts are set forth by Admiral Porter, and are true enough; but on other hand it should be remembered that in themselves they constitute problems capable of solution, and because they exist now is the strongest possible reason why the engineers should continue the experiments already begun with that object. Again, the Sun and the Admiral place much stress on the failure of submarine torpedoes during the war. It should be remembered, however, that such torpedoes (with the exception of a few attempts made by the Russians during the Crimean war) were the first ever employed, and were of the crudest imaginable construction. Nitro-glycerin never entered into their composition, and seldom gun cotton; and very frequently they were merely tin cans or kegs of powder rigged with a percussion fuse to blow up on impact with the vessel, or some equally imperfect arrangement, to

be fired by a friction tube attached to a cord from the land, and which, if left under water for months, might easily become harmless. They are certainly not to be compared for an instant with such submarine torpedoes as were used in the recent Oberon experiments in England, to explode which electrically worked devices were employed, which not only enabled the operator to blow up the sunken mine, but also exactly indicated when a vessel had arrived within the destructive area of the torpedo.

We think, therefore, that, even if the engineers devoted themselves to nothing but submarine mines, which is not the case, the continued existence of the corps would be an advantage to the country. The fact is, however, that the engineers study not only the system of fixed but that of movable torpedoes; and that the latter constitute the vastly more effective branch, the Sun fails to consider. To every one inventor who is giving his attention to the fixed torpedo, a dozen are devoting their energies to the movable types, and the movable torpedoes are those which will play the prominent part in future conflicts. We have already noted the remarkable success which has attended the experiments upon the Lay and Ericsson boats, which can be directed into the midst of an enemy's fleet when the latter is miles away from shore, and be made to blow up the strongest vessels without those on board having the slightest indication of their presence. There are the spar torpedo launches, now built in England, of steel, and capable of steaming at the rate of 18 knots per hour. Half a dozen of these swift craft, each provided with a heavy torpedo, could on a foggy night run in among a fleet of vessels, and each sink or shatter its victim before the crews could get to their guns. The heaviest cannon would be of little use against rapidly moving objects which could noiselessly steam inside of point blank range before fairly discovered by the lookouts.

Our readers are sufficiently posted in the progress made in torpedo science not to require any review of what has been accomplished at Newport, the work at which station is well supplemented by that at Willett's Point. Both schools have acquired a high reputation abroad, and the abolition of either would be, we think, a loss which the country can ill afford to incur.

THE COLLEGES AND THE HARD TIMES.

No one will deny that money is "tight" at the present time. Nine men out of every ten we meet exclaim: "Oh, I can't get any money." At this time it would be well to remember the principle embraced in the famous reply of that sturdy old New Englander, who said that, among the rocks where they could raise nothing else, they built schoolhouses to raise men. When you cannot find work for the hands, set your brains at work. If you cannot labor, study. If the counting houses, the woolen mills, the machine shops, even the railways, will not open their doors to your sons, there are plenty of educational mills where they will be thrice welcome. Every trade seems overstocked with men just now; but he who lays a sound foundation at any technical or scientific school during his enforced vacation will be the better prepared to profit by the revival of trade and manufacture when it does come, as come it must and will in due time. The machinist who has mastered the higher mathematics, or acquired skill and facility in the use of his pencil, is prepared to take a high rank as inventor, superintendent, or proprietor, when time and practice shall have rendered him equally skillful in the use of tools and the working of metals.

We met a gentleman recently who had taken up the study of a foreign tongue in order the better to study his profession. To-day, he tells us, the knowledge of that language, taken up only as a means, has become a source of profit almost equal to that which had been his main object of study. Many are the cases we have met where some subject, pursued at odd times as recreation, has become a source of honor, if not of glory. Dr. Priestly, the discoverer of oxygen gas, was a theologian, and chemistry was his pastime; but chemists honor his memory and celebrate his achievements, while his name has long since passed from the notice of the theologians, or is mentioned only with disrespect and disgust.

It is a gratifying fact to notice that the attendance at all our principal institutions of learning is larger this year than ever before; new colleges are being opened, old ones are generally full; salaries and appropriations are raised, new chairs are endowed, and general educational prospects are bright and encouraging.

THE LOCOMOTIVE SEMI-CENTENNIAL.

On the 27th of September, 1825, the first railroad for conveying passengers was opened in England between the towns of Darlington and Stockton. The occasion brought together a throng of witnesses, some doubtful, more scornful, and all perhaps better prepared to scoff at the failure, which it was confidently predicted awaited the bold inventor in his daring attempt to make vehicles travel at the unprecedented rate of fifteen miles an hour, than to congratulate him upon the triumph which upset their theories and left them questioning the reliability of their senses. It is suggestive to contrast this unbelieving assemblage with the gigantic gathering which has enthusiastically celebrated the day which marks the lapse of the half century since that victory over prejudice and ignorance was gained. Sooty Darlington, opportunely washed by recent heavy rains, donned her gayest garb. Flags and banners flaunted from every building, triumphal arches spanned the streets, processions paraded, the railway magnates and notabilities congregated at a great banquet, and a peer of the realm unveiled a statue of Joseph

Pease, the philanthropist and capitalist, in whose open purse George Stephenson found the staunch material support which enabled him to prosecute his labors to their successful end. On the following day, the festivities were continued in adjacent towns, and so, for forty-eight hours, the jubilee existed.

In Darlington, the locomotive which drew the first passenger train was exhibited actually at work. It was propped up so as to be just clear of the rails; and being held in a stationary position, its wheels revolved at their utmost speed, which would have carried the engine along at its old maximum rate of eight miles per hour. The weight of the machine is but six tons, twenty-five tons less than that of the magnificent engines which English workshops now produce. The contrast between the two (of which next week, when we publish the engravings of both, our readers will have an opportunity to judge) is as proportionately great as that between the knot of unbelievers of 1825 and the cheering crowds of the recent festival.

Stephenson, it may be remembered, was born at Wylam-on-Tyne, and it was there in 1813 that a locomotive called the "Puffing Billy" was built, under William Headley's patent, for Christopher Blackett, Esq., the then proprietor of the collieries. The machine was used to drag coal long before Stephenson constructed his railway engines. Probably it was from this crude old apparatus (which, after working at Wylam continuously from the year above mentioned up to 1862, was removed to its present resting place in the Patent Office Museum in London) that Stephenson gained some of the ideas which he subsequently developed. Puffing Billy has, however, another and greater claim upon popular notice, one especially interesting in these later days, when railroad litigation has become so vast and extended that a new code of laws has sprung up for its government, and that is that it was the subject of the first legal controversy engendered by the railway. The question of nuisance, on which the difficulty was based, became afterwards the ground for many of the most absurd objections to Stephenson's proposed use of the locomotive for passenger transportation. "The smoke and dirt will annoy everybody on the line," "the noise of the machine will scare cows so badly that their lacteal functions will be arrested," "if cows get on the track, how will the engine get out of the way?" are specimens of this cavilling, familiar to every one who has perused Stephenson's eventful biography. The smoke nuisance seems to be the trouble in this earliest dispute, and the opinion of the counsel learned in the law, who was appealed to in the matter, we give below. It is a curious contribution to the history of the railroad, and we are indebted for it to a London correspondent, who copied it from the original manuscript now hanging framed beside the old engine.

9th July, 1814.

CASE RESPECTING THE USE OF A STEAM ENGINE FOR CONVEYING COAL, FEE FOR MR. WILLIAMSON'S OPINION, 1 GUINEA.

BAINBRIDGE:

CASE.

Mr. Blackett is Proprietor of a coal mine at Wylam in Northumberland and for the purpose of sending his coal to Lemington he took Wayleaves on various Estates between there and Wylam, especially over the estates of A, for a term of years not yet expired whereby a demise of a sufficient and convenient Wayleave Liberty and Passage to and for Mr. Blackett his Executors Administrators and assigns and his and their Agents Servants and Workmen from time to time and at all times during the continuance of said demise to take leave and carry away with horses carts waggons or any other carriages whatever all and every or any of the coals to be won, wrought and gotten forth and out of the said colliery and coal mines in through over and along the lands and closes of A, according to the line of way therein described under the yearly certain and contingent rents therein mentioned.

When the Wayleave was granted Mr. Blackett led his coal by the ordinary coal waggons drawn by horses; but his agent has recently discovered an Invention to them by a Steam Engine instead of horses and for that purpose he obtained his Majesty's Letters Patent as a reward for his ingenuity and the Steam Engine is now actually at work. In the operation a little noise and Smoke is certainly made, which A. considers a nuisance and has requested Mr. Blackett to suspend the use of it. Mr. Blackett is extremely anxious of being on good terms with his Landlord and is inclined to yield to his wishes so far he consistently can, but in the first place he is desirous of having the Question of right and wrong established between them.

The Patent in Question is granted for the express purpose of enabling the Patentee to carry the waggon by means of a Steam Engine instead of Horses, and it is rather improbable that Government would license a thing the use whereof could be deemed a nuisance; and in a Mining Country like this Every Encouragement should be given to the Ingenuity of Mankind in all things that tend to decrease the Expence of Labor.

In consequence of the Waggon way being made, the county road has in many places been lain close to and contiguous with the Waggon way and it is alleged that the Steam and Smoke will frighten the Horses passing and repassing and render traveling unsafe. However in many places the road has been removed to the Waggon way, and not the Waggon way to the road.

You will be so good as peruse the case and give your opinion on the following Queries:

Whether under all the circumstances stated in the case Mr. Blackett has a right by virtue of the above recited Leave to carry his coal Waggon by means of a Steam Engine which is placed upon a Frame resembling that of a Coal Waggon over the lands of A.

Whether the use and exercise of the Steam Engine upon the Waggon way and for the purpose above suggested can under all the circumstances of the case be deemed a nuisance.

It does not appear to me that there is any objection arising from the Leave itself, to Mr. Blackett conveying his coal waggons by means of this Steam Engine. But I think that the use of such an Engine may be deemed a nuisance to A. if the smoke and noise occasioned thereby render his habitation unhealthy or uncomfortable. But this must entirely depend upon the quantity of smoke and noise so occasioned, and the distance of the house of A. from the Waggon Way.

Rt. HOPPER WILLIAMSON.

If the noise of the engine disturbs the cattle grazing on the lands adjacent to the Waggon Way so as to injure them with regard to their feeding, I think it may be considered a nuisance. Rt. H. W.